BCD TO BINARY CONVERTER

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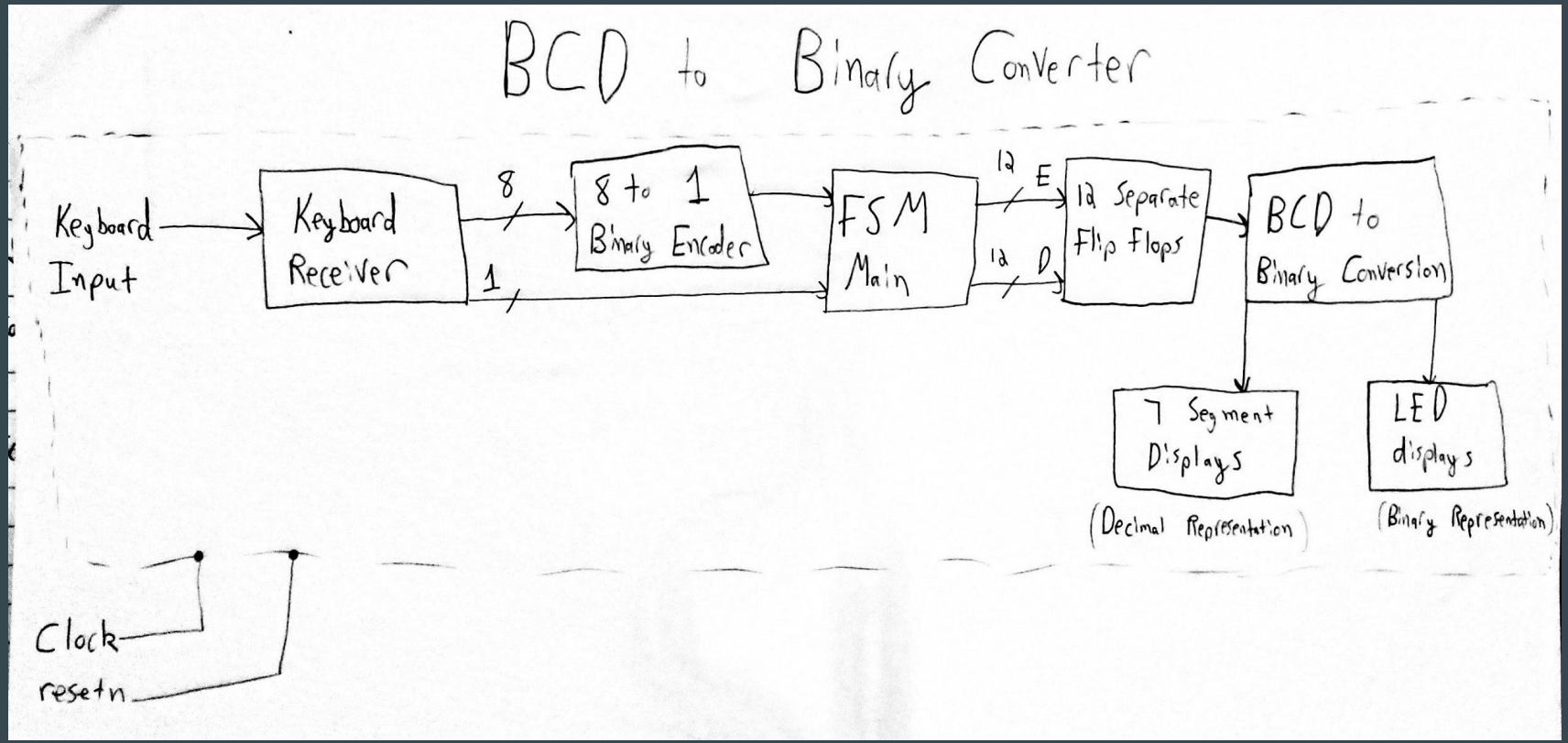
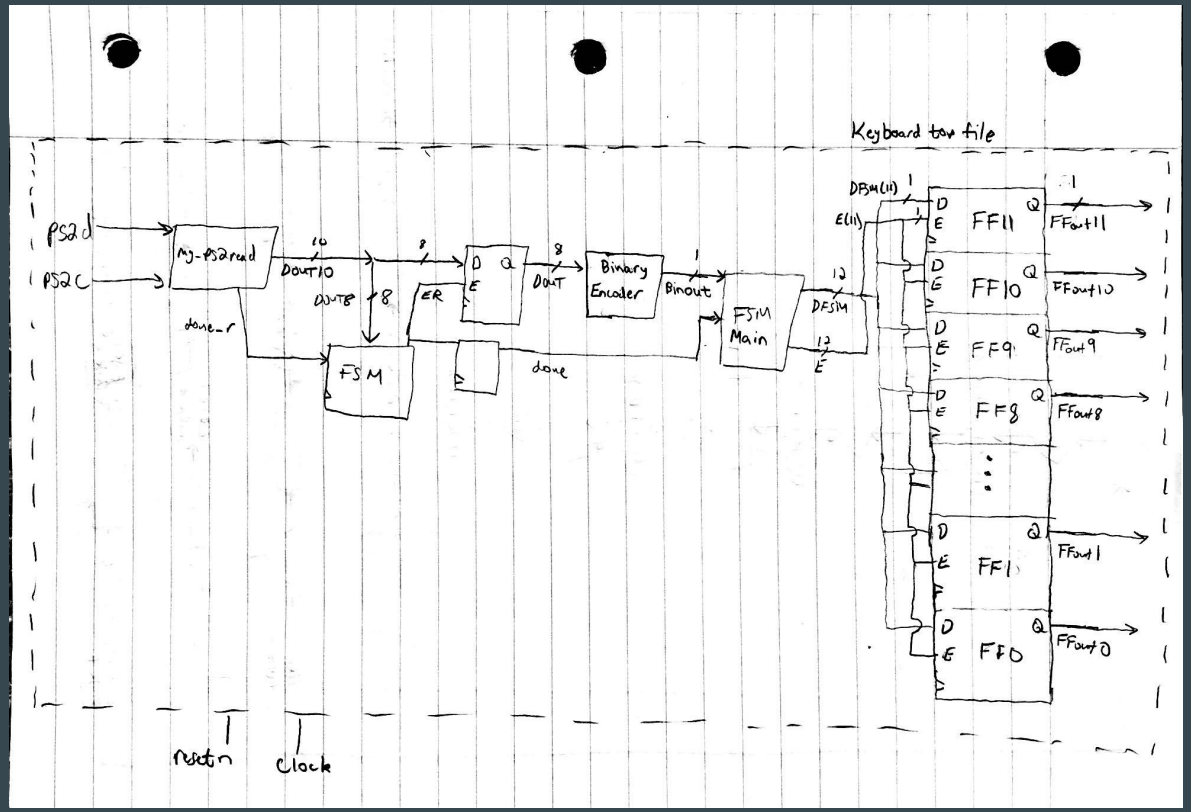
Overview

- PS/2 Keyboard connected to FPGA board via USB
- 12 bit typed BCD keyboard input
- Decimal representation shown on three 7-segment displays
- VHDL code converts the input from BCD to Unsigned Binary
- Binary representation shown on LEDs

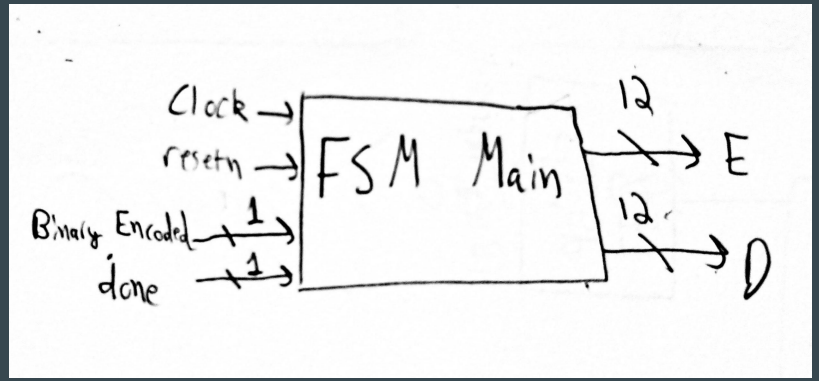
Main Block Diagram

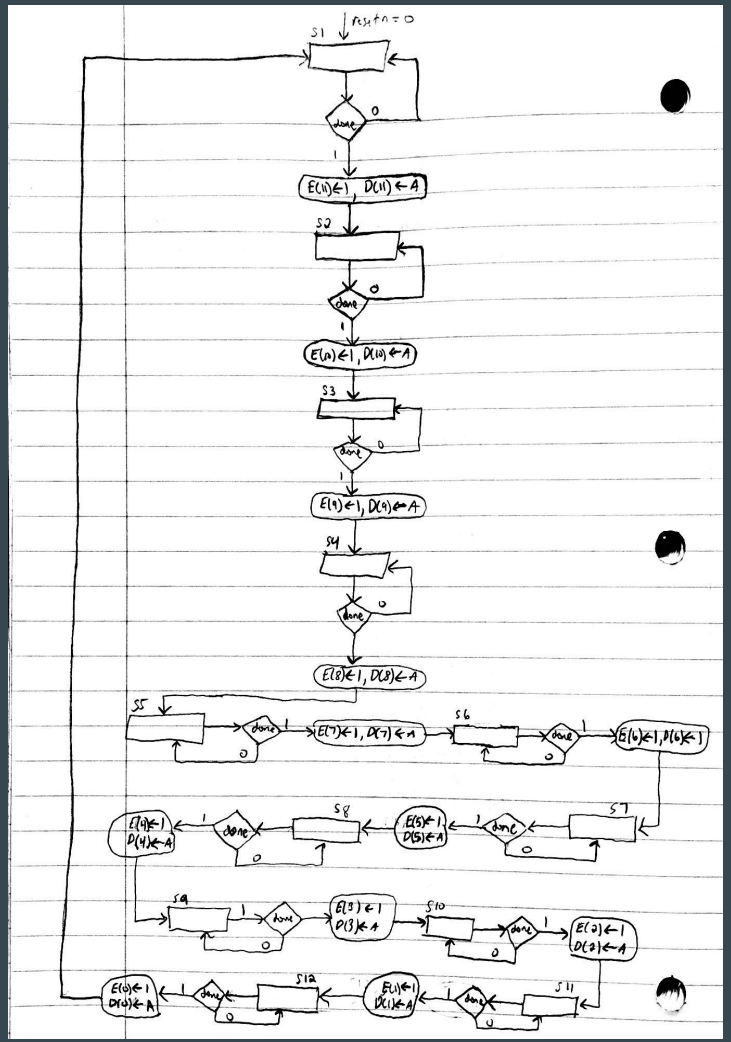


PS2 Keyboard

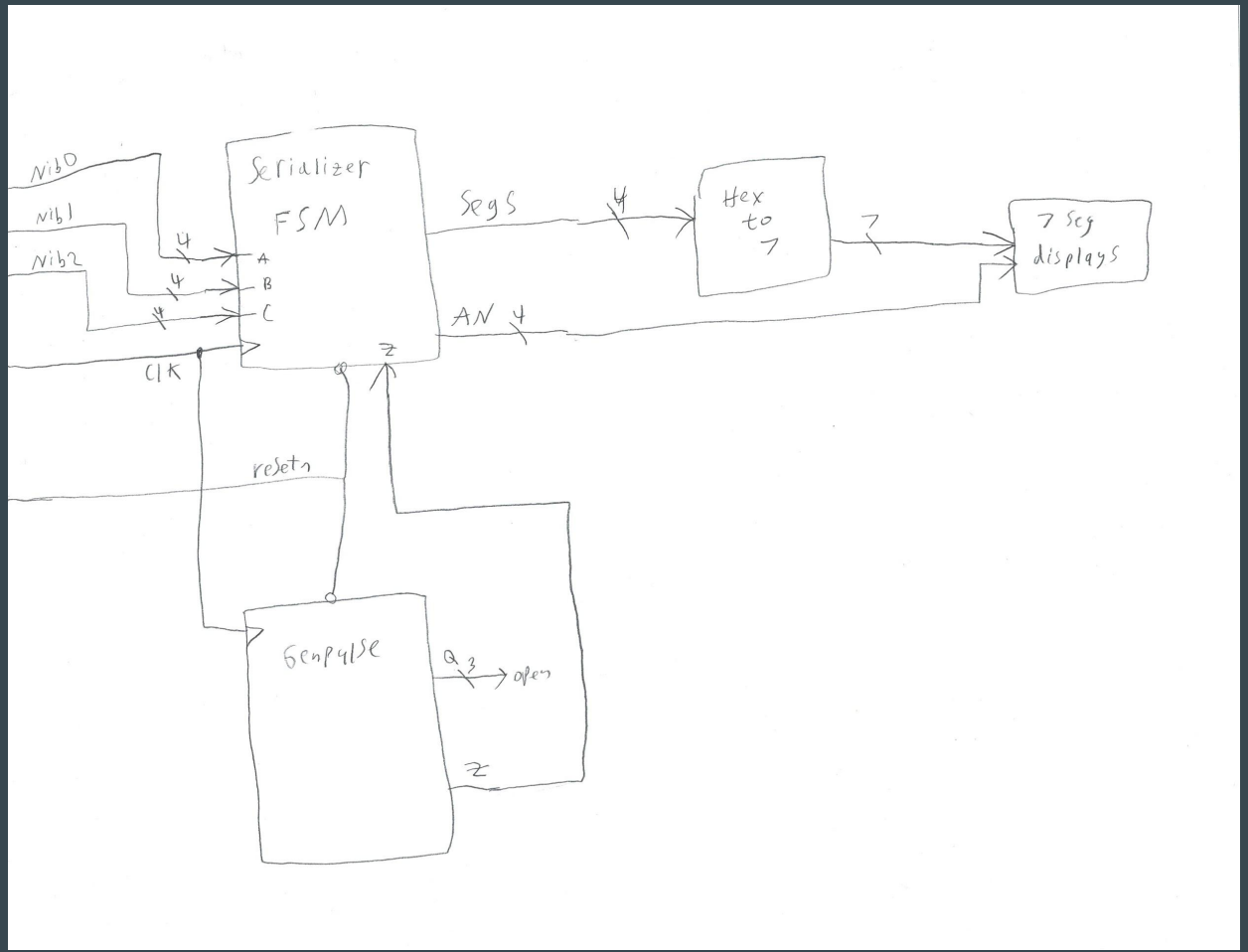


FSM Main

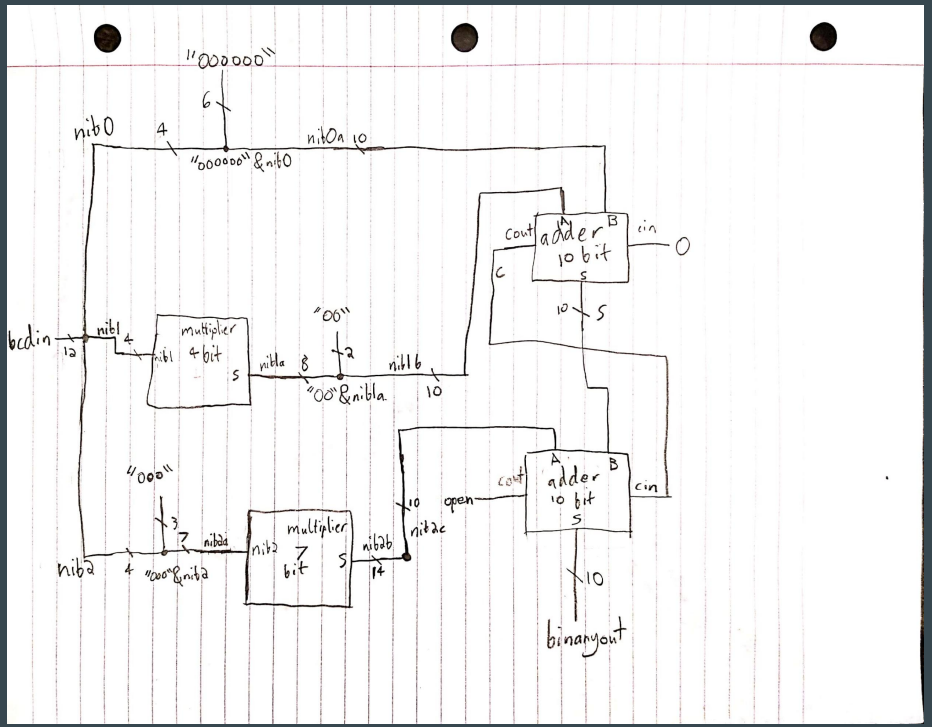

Clock
resetn
Binary Encoded
1
done
1
FSM Main
12
E
12
D


reset n = 0
S1
done
0
1
E(11)←1, D(11)←A
S2
done
0
1
E(10)←1, D(10)←A
S3
done
0
1
E(9)←1, D(9)←A
S4
done
0
E(8)←1, D(8)←A
S5
done
1
0
E(7)←1, D(7)←A
S6
done
1
0
E(6)←1, D(6)←1
S7
done
1
0
E(5)←1
D(5)←A
S8
done
1
0
E(4)←1
D(4)←A
S9
done
1
0
E(3)←1
D(3)←A
S10
done
1
0
E(2)←1
D(2)←A
S11
done
1
0
E(1)←1
D(1)←A
S12
done
1
0
E(0)←1
D(0)←A

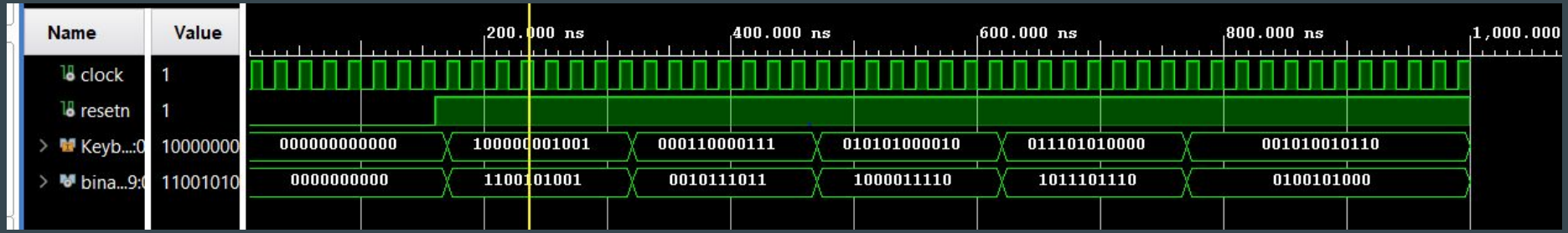
7 Segment Displays



BCD Converter



Timing Diagram



Testing Setup

Trial #	BCD Keyboard Input	Decimal Output	Binary Output
1	1000-0000-1001	809	1100101001
2	0001-1000-0111	187	0010111011
3	0101-0100-0010	542	1000011110
4	0111-0101-0000	750	1011101110
5	0010-1001-0110	296	0100101000

Backup Video Demonstration

(https://drive.google.com/file/d/1vA4av1TpVnwTqaM3dTbfXN0yEs8A_fMb/view?usp=sharing)

Conclusion

- Project successfully completed fully within our initial expectations
- Keyboard
- FSM
- VHDL libraries
- Utilization of generic map function
- Learned how to work as a group and delegate work
- Changes can be made to make full output displayed at once