Paul Kim

Lab 03

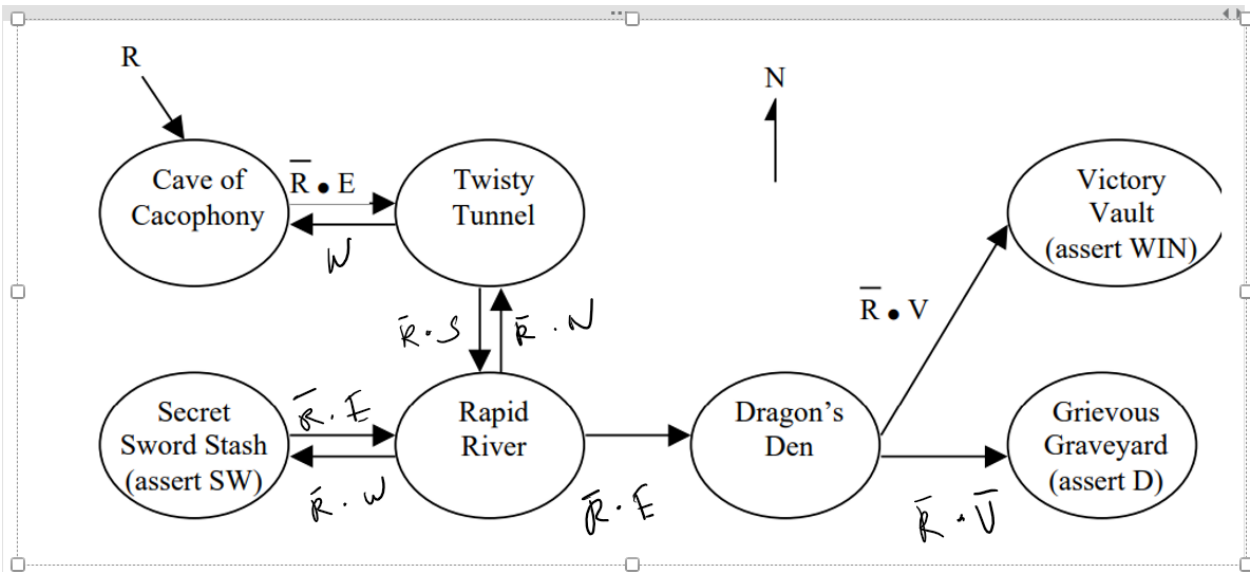
Friday section

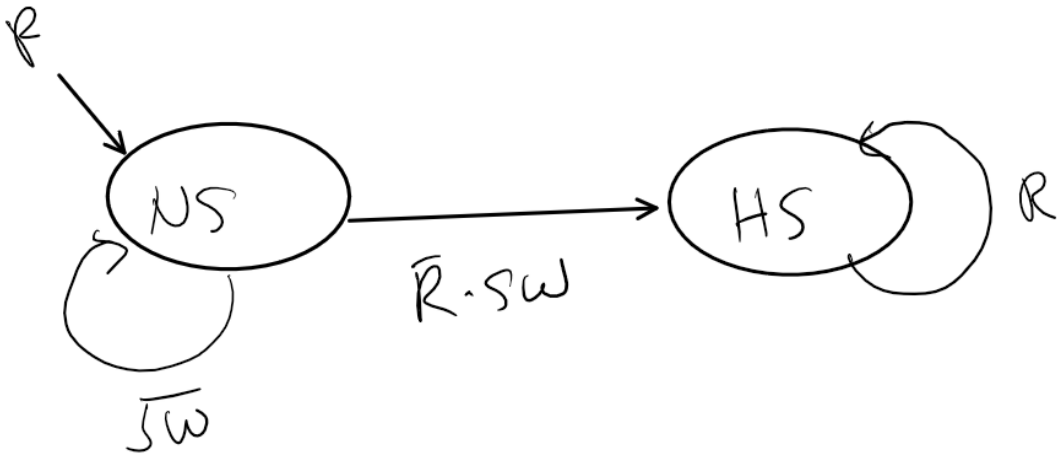
I have spent about total 2 hours reading the “DSD lab03.pdf” lab instruction. I’ve tried to understand and grasp the idea fully.

Then I’ve first tried to write my own table, write my equations, and draw the schematic drawings. Then I’ve compared my answers to hint pdf. It really helped me a lot. Otherwise I might have much more hours to debug my design. Also whenever I was stuck on some problems on software or the lab itself during Thursday 2-4pm, I went to Mr. Feng’s office hours 2-4pm Thursday while I was working downstairs on the computer lab. All these procedure took me about 5 hours.

Waveform simulation took me about 2 hours because my Quartus ‘prime lite’ on my pc was giving me node error. I’ve tried to figure out in my pc for awhile by remaking the project etc etc. But eventually I’ve gave up and decided to use the computer lab computer and rebuilt the project and I eventually got the result.

So This lab took me 2+5+2=9 hours total


R
N
Cave of Cacophony
R • E
W
Twisty Tunnel
Victory Vault (assert WIN)
R • V
S
N
Secret Sword Stash (assert SW)
E
W
Rapid River
E
Dragon's Den
Grievous Graveyard (assert D)
V


R
NS
HS
R
R·SW
SW

Room FSM

state transition table

	inputs						output
state	N	S	W	E	R	V	state
X	x	x	x	x	1	x	CC
CC	x	x	x	1	0	x	TT
TT	x	x	1	x	0	x	CC
TT	x	1	x	x	0	x	RR
RR	x	x	1	x	0	x	SS
RR	x	x	x	1	0	x	DD
RR	1	x	x	x	0	x	TT
SS	x	x	x	1	0	x	RR
DD	x	x	x	x	0	1	VV
DD	x	x	x	x	0	0	GG

output table

current state	sw	d	win
CC	0	0	0
TT	0	0	0
RR	0	0	0
SS	1	0	0
DD	0	0	0
VV	0	0	1
GG	0	1	0

Sword FSM

state transition table

input			output
current state	sw	R	next state
x	x	1	NS
NS	0	0	NS
x	1	0	HS
HS	x	0	HS

output table

input	output
current state	V
NS	0
HS	1

State encodings

	Room		
		CC	0000001
		TT	0000010
		RR	0000100
		SS	0001000
		DD	0010000
		GG	0100000
		VV	1000000
	Sword		
		NS	0
		HS	1

Room FSM

binary state transition table

	inputs						output
state	N	S	W	E	R	V	state
X	x	x	x	x	1	x	0000001
0000001	x	x	x	1	0	x	0000010
0000010	x	x	1	x	0	x	0000001
0000010	x	1	x	x	0	x	0000100
0000100	x	x	1	x	0	x	0001000
0000100	x	x	x	1	0	x	0010000
0000100	1	x	x	x	0	x	0000010
0001000	x	x	x	1	0	x	0000100
0010000	x	x	x	x	0	1	1000000
0010000	x	x	x	x	0	0	0100000

output table

current state	sw	d	win
0000001	0	0	0
0000010	0	0	0
0000100	0	0	0
0001000	1	0	0
0010000	0	0	0
0100000	0	0	1
1000000	0	1	0

Sword FSM

binary state transition table

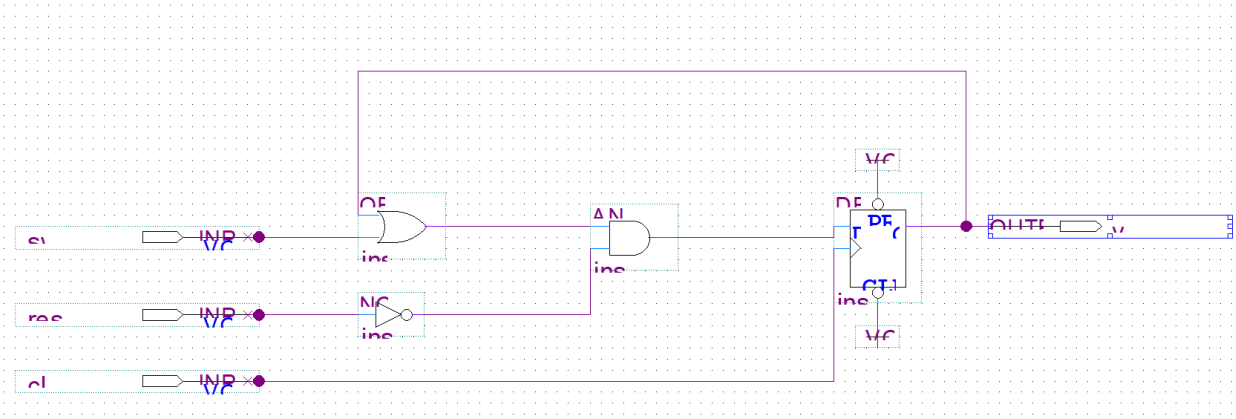
input			output
current state	sw	R	next state
x	x	1	0
0	0	0	0
x	1	0	1
1	x	0	1

output table

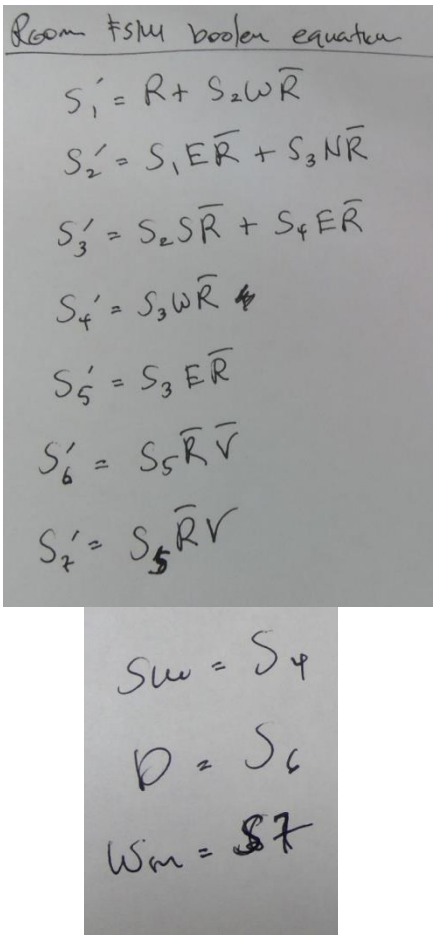
input	output
current state	V
0	0
1	1

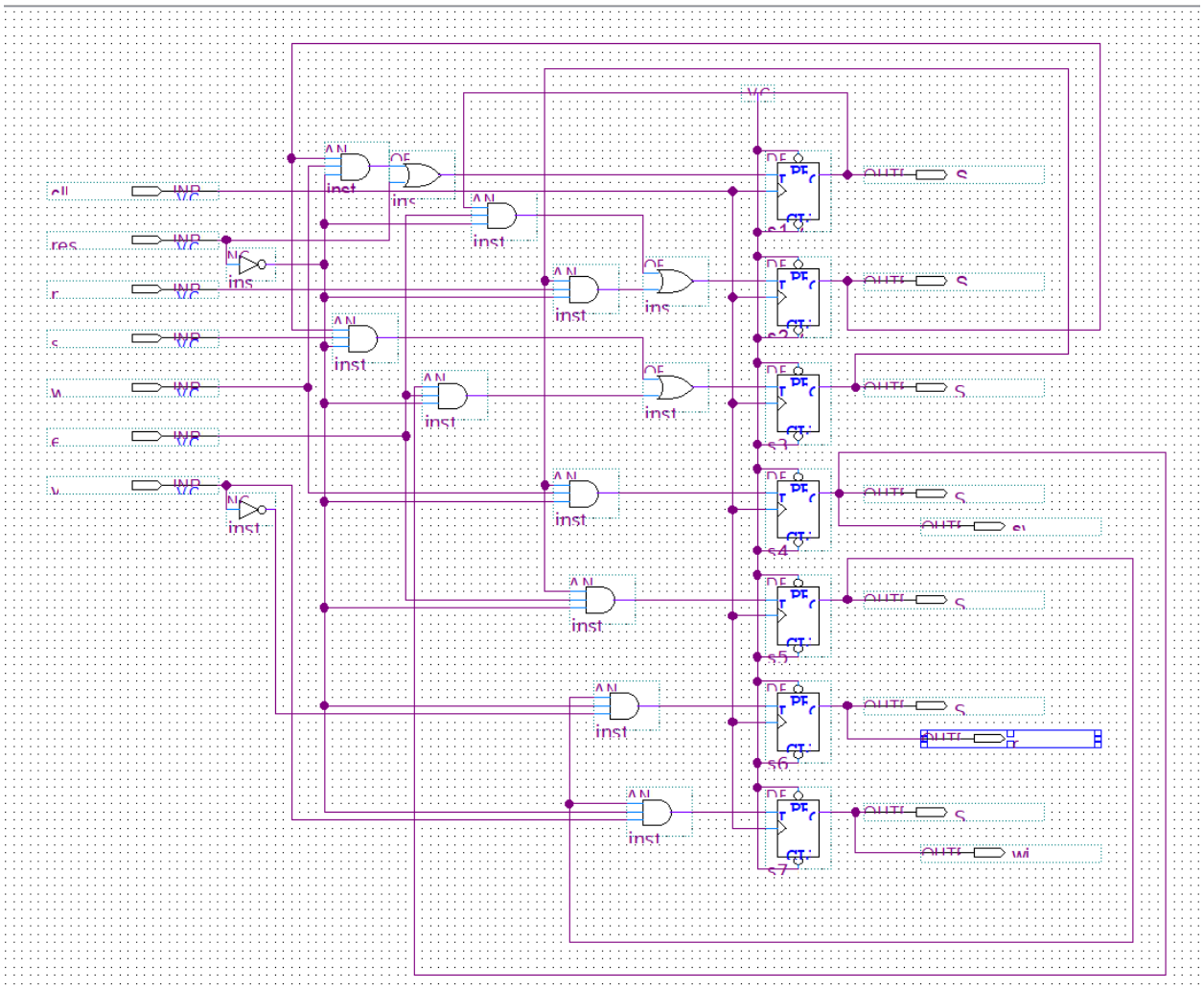
Sword.bdf

$V' = (sw * \bar{R})$+(V*$\bar{R}$)

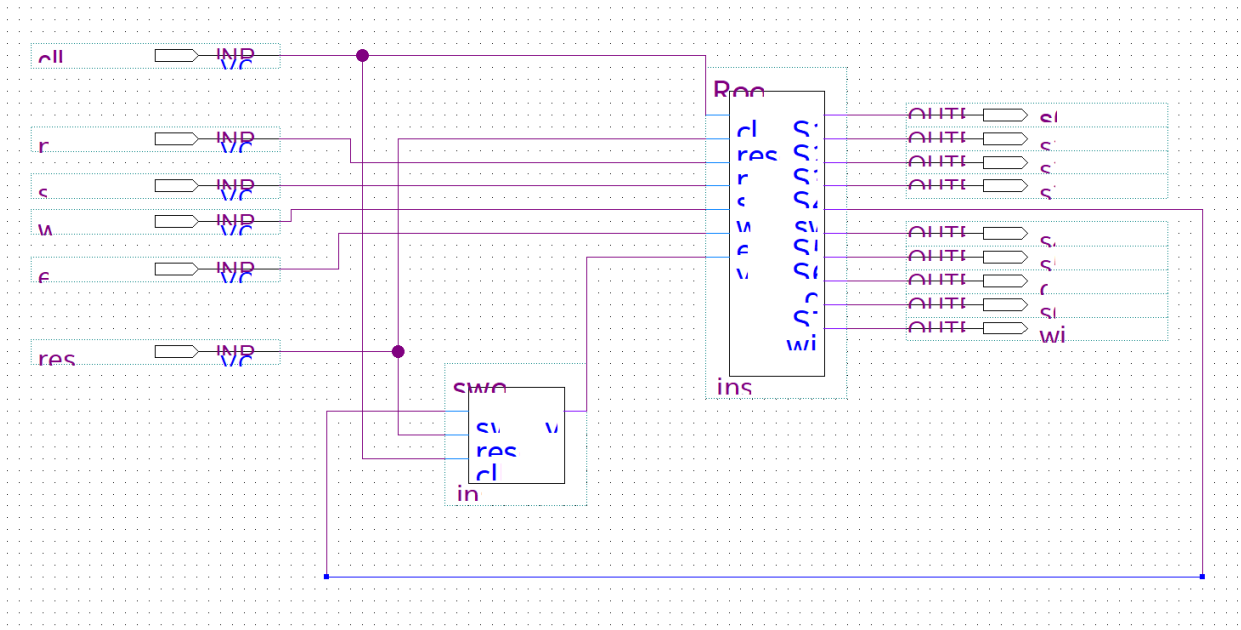


Room.bdf

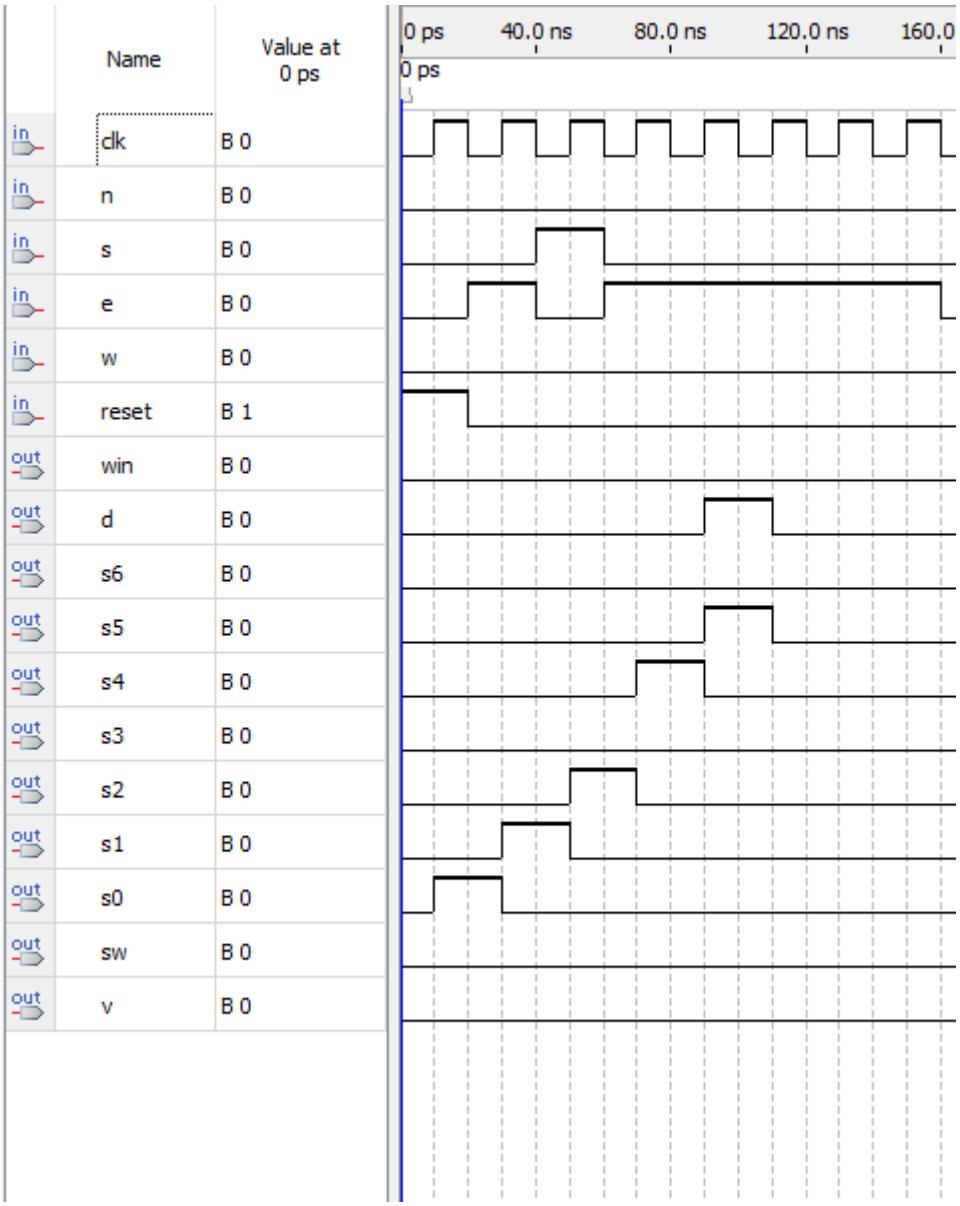

Room FSM boolen equation
$S_1' = R + S_2 W \bar{R}$
$S_2' = S_1 E \bar{R} + S_3 N \bar{R}$
$S_3' = S_2 S \bar{R} + S_4 E \bar{R}$
$S_4' = S_3 W \bar{R}$
$S_5' = S_3 E \bar{R}$
$S_6' = S_5 \bar{R} \bar{V}$
$S_7' = S_5 \bar{R} V$
$S_W = S_4$
$D = S_6$
$W_m = S_7$


INP
inst
OUTP
S

Lab03_PK.bdf



Losing game


Name
Value at
0 ps
0 ps
40.0 ns
80.0 ns
120.0 ns
160.0
0 ps
in clk B 0
in n B 0
in s B 0
in e B 0
in w B 0
in reset B 1
out win B 0
out d B 0
out s6 B 0
out s5 B 0
out s4 B 0
out s3 B 0
out s2 B 0
out s1 B 0
out s0 B 0
out sw B 0
out v B 0

winning game