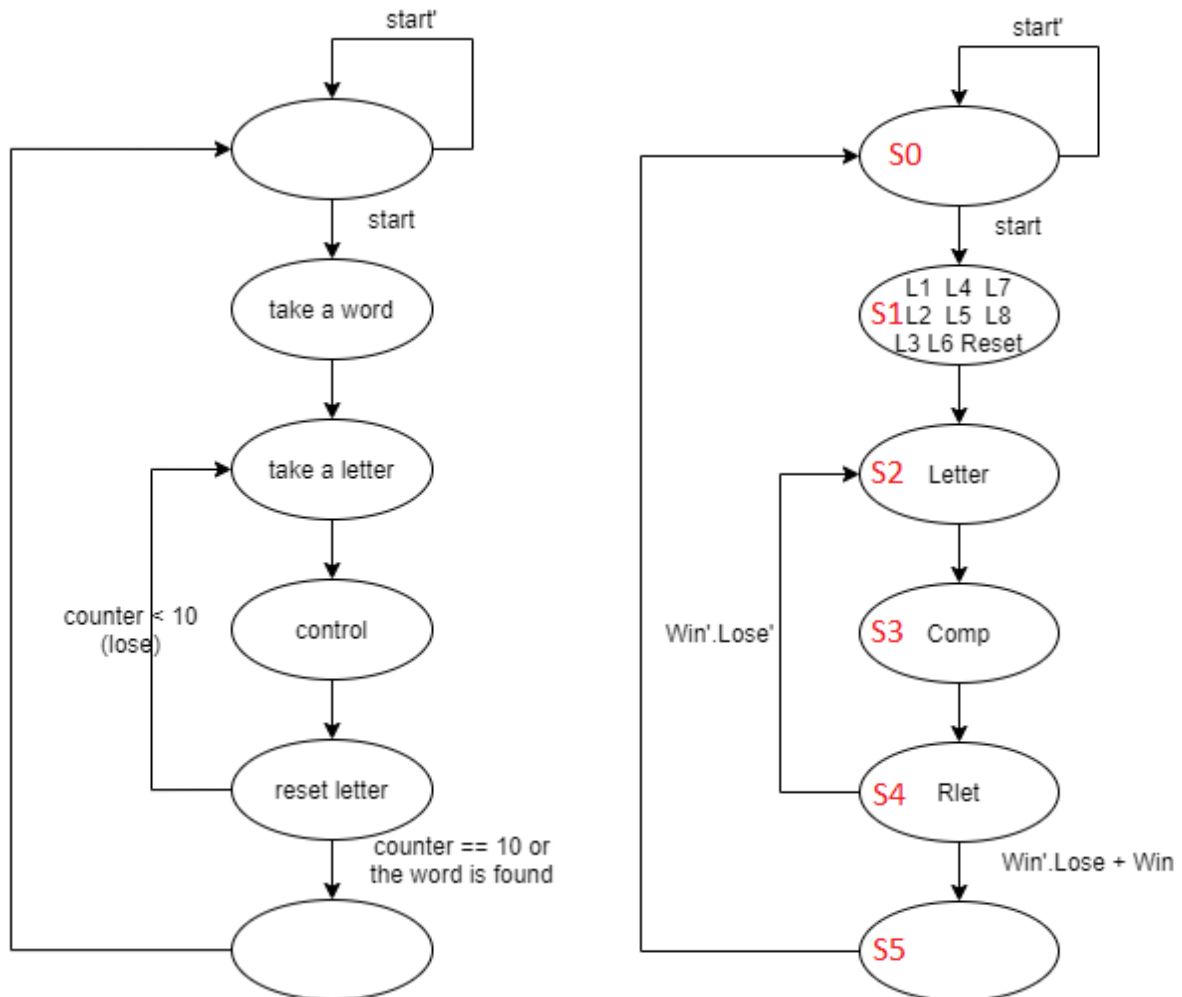# CSE 232 SPRING 2020
FINAL PROJECT
HANGMAN GAME MACHINE
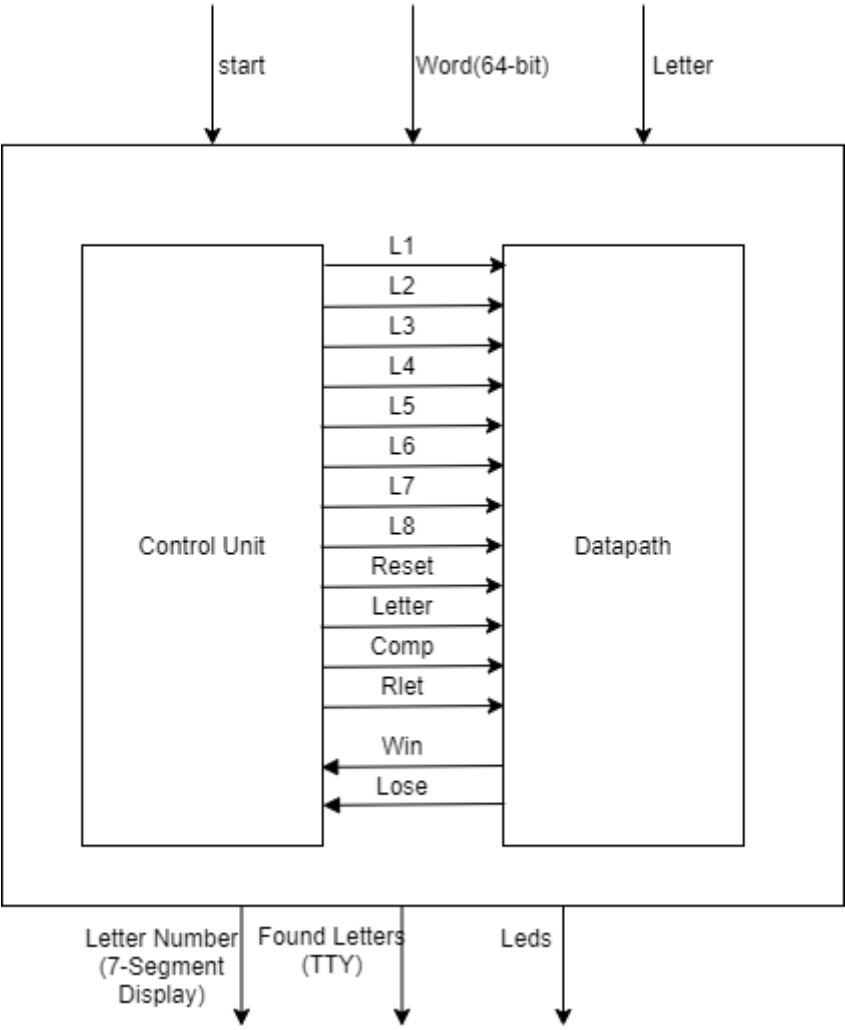
REPORT

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HANGMAN GAME MACHINE

State Diagram:

In this diagram, the signals inside the states are 1 and the remaining signals are 0.

FSM:

Truth Table:

Present State			Inputs			Next State		
S2	S1	S0	Start	Win	Lose	N2	N1	N0
0	0	0	0	-	-	0	0	0
0	0	0	1	-	-	0	0	1
0	0	1	-	-	-	0	1	0
0	1	0	-	-	-	0	1	1
0	1	1	-	-	-	1	0	0
1	0	0	-	0	0	0	1	0
1	0	0	-	0	1	1	0	1
1	0	0	-	1	-	1	0	1
1	0	1	-	-	-	0	0	0

Present State			Outputs												
S2	S1	S0	L1	L2	L3	L4	L5	L6	L7	L8	Reset	Letter	Comp	Rlet
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
0	0	1	1	1	1	1	1	1	1	1	1	0	0	0
0	1	0	0	0	0	0	0	0	0	0	0	1	0	0
0	1	1	0	0	0	0	0	0	0	0	0	0	1	0
1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
1	0	1	0	0	0	0	0	0	0	0	0	0	0	0

Boolean Expressions:

L1 = L2 = L3 = L4 = L5 = L6 = L7 = L8 = Reset = S2'.S1'.S0

Letter = S2'.S1.S0'

Comp = S2'.S1.S0

Rlet = S2.S1'.S0'

N2 = S2'.S1.S0 + S2.S1'.S0'.Win'.Lose + S2.S1'.S0'.Win
 = S2'.S1.S0 + S2.S1'.S0'.(Win'.Lose + Win)

N1 = S2'.S1'.S0 + S2'.S1.S0' + S2.S1'.S0'.Win'.Lose'
 = S2'.(S1 XOR SO) + S2.S1'.S0'.Win'.Lose'

N0 = S2'.S1'.S0'.Start + S2'.S1.S0' + S2.S1'.S0'.Win'.Lose + S2.S1'.S0'.Win
 = S2'.S0'.(S1'.Start + S1) + S2.S1'.S0'.(Win'.Lose + Win)

Letter Counter:

State Table:

FSM:
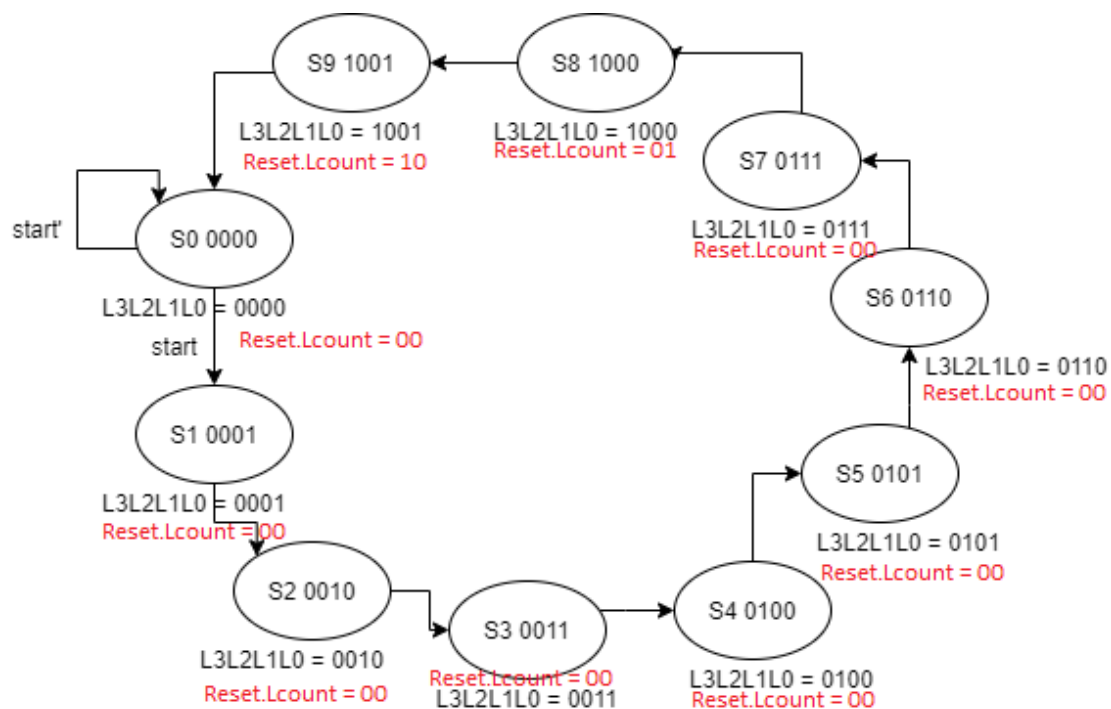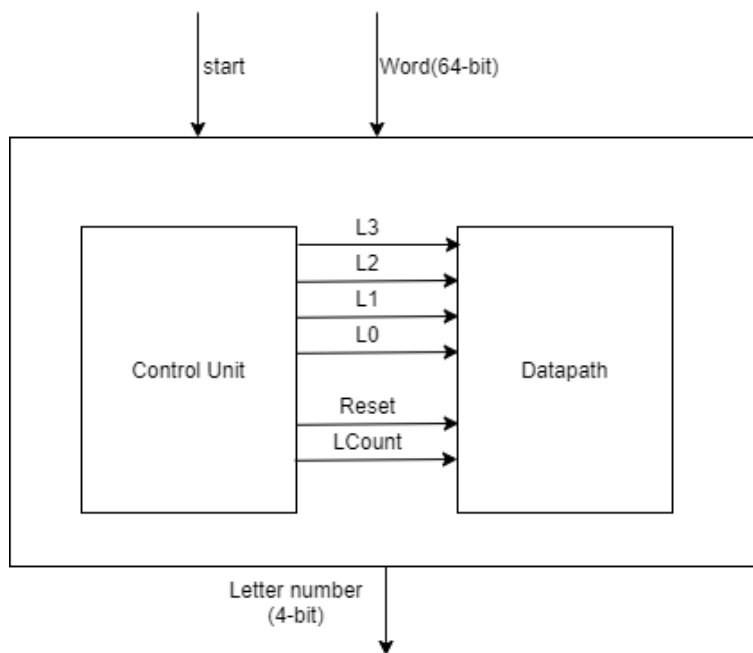
Truth Table:

Present State				Inputs	Next State			
S3	S2	S1	S0	start	N3	N2	N1	N0
0	0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	0	1
0	0	0	1	-	0	0	1	0
0	0	1	0	-	0	0	1	1
0	0	1	1	-	0	1	0	0
0	1	0	0	-	0	1	0	1
0	1	0	1	-	0	1	1	0
0	1	1	0	-	0	1	1	1
0	1	1	1	-	1	0	0	0
1	0	0	0	-	1	0	0	1
1	0	0	1	-	0	0	0	0

Present State				Outputs					
S3	S2	S1	S0	L3	L2	L1	L0	Reset	LCount
0	0	0	0	0	0	0	0	0	0
0	0	0	1	0	0	0	1	0	0
0	0	1	0	0	0	1	0	0	0
0	0	1	1	0	0	1	1	0	0
0	1	0	0	0	1	0	0	0	0
0	1	0	1	0	1	0	1	0	0
0	1	1	0	0	1	1	0	0	0
0	1	1	1	0	1	1	1	0	0
1	0	0	0	1	0	0	0	0	1
1	0	0	1	1	0	0	1	1	0

Boolean Expressions:

N3 =S3'.S2.S1.S0 + S3.S2'.S1'.S0'

N2 = S3'.S2'.S1.S0 + S3'.S2.S1'.S0' + S3'.S2.S1'.S0 + S3'.S2.S1.S0'
   = S3'.S1.(S2 XOR S0) + S3'.S2.S1'

N1 = S3'.S2'.S1'.S0 + S3'.S2'.S1.S0' + S3'.S2.S1'.S0 + S3'.S2.S1.S0'
   = S3'.S1'.S0 + S3'.S1.S0'
   = S3'.(S1 XOR S0)

N0 = S3'.S2'.S1'.S0'.start + S3'.S2'.S1.S0' + S3'.S2.S1'.S0' + S3'.S2.S1.S0' + S3.S2'.S1'.S0'
   = S3'.S2'. S0'.(S1'.start + S1) + S3'.S2.S0' + S3.S2'.S1'.S0'

L3 = S3

L2 = S2

L1 = S1

L0 = S0

Reset = S3.S2'.S1'.S0

Lcount = S3.S2'.S1'.S0'

Decoder for 7 Segment Display:

	Inputs				Outputs						
	n3	n2	n1	n0	a	b	c	d	e	f	g
0	0	0	0	0	1	1	1	1	1	1	0
1	0	0	0	1	0	1	1	0	0	0	0
2	0	0	1	0	1	1	0	1	1	0	1
3	0	0	1	1	1	1	1	1	0	0	1
4	0	1	0	0	0	1	1	0	0	1	1
5	0	1	0	1	1	0	1	1	0	1	1
6	0	1	1	0	1	0	1	1	1	1	1
7	0	1	1	1	1	1	1	0	0	0	0
8	1	0	0	0	1	1	1	1	1	1	1
9	1	0	0	1	1	1	1	1	0	1	1

Boolean Expressions:

a' = n3'.n2'.n1'.n0 + n3'.n2.n1'.n0'
   = n3'.n1'.(n2'.n0 + n2.n0')
   = n3'.n1'.(n2 XOR n0)

b' = n3'.n2.n1'.n0 + n3'.n2.n1.n0'

  = n3'.n2(n1'.n0 + n1.n0')

  = n3'.n2.(n1 XOR n0)

c' = n3'.n2'.n1.n0'

d' = n3'.n2'.n1'.n0 + n3'.n2.n1'.n0' + n3'.n2.n1.n0

  = n3'.n1'.(n2'.n0 + n2.n0') + n3'.n2.n1.n0

  = n3'.n1'(n2 XOR n0) + n3'.n2.n1.n0

e = n3'.n2'.n1'.n0' + n3'.n2'.n1.n0' + n3'.n2.n1.n0' + n3.n2'.n1'.n0'

  = n3'.n0'.(n2'.n1' + n2.n1) + n2'.n0'.(n3'.n1 + n3.n1')

  = n3'.n0'.(n2 XNOR n1) + n2'.n0'.(n3 XOR n1)

f' = n3'.n2'.n1'.n0 + n3'.n2'.n1.n0' + n3'.n2'.n1.n0 + n3'.n2.n1.n0

  = n3'.n2'.(n1'.n0 + n1.n0') + n3'.n1.n0.(n2' + n2)

  = n3'.n2'.(n1 XOR n0) + n3'.n1.n0

g' = n3'.n2'.n1'.n0' + n3'.n2'.n1'.n0 + n3'.n2.n1.n0

  = n3'.n2'.n1'.(n0' + n0) + n3'.n2.n1.n0

  = n3'.n2'.n1' + n3'.n2.n1.n0