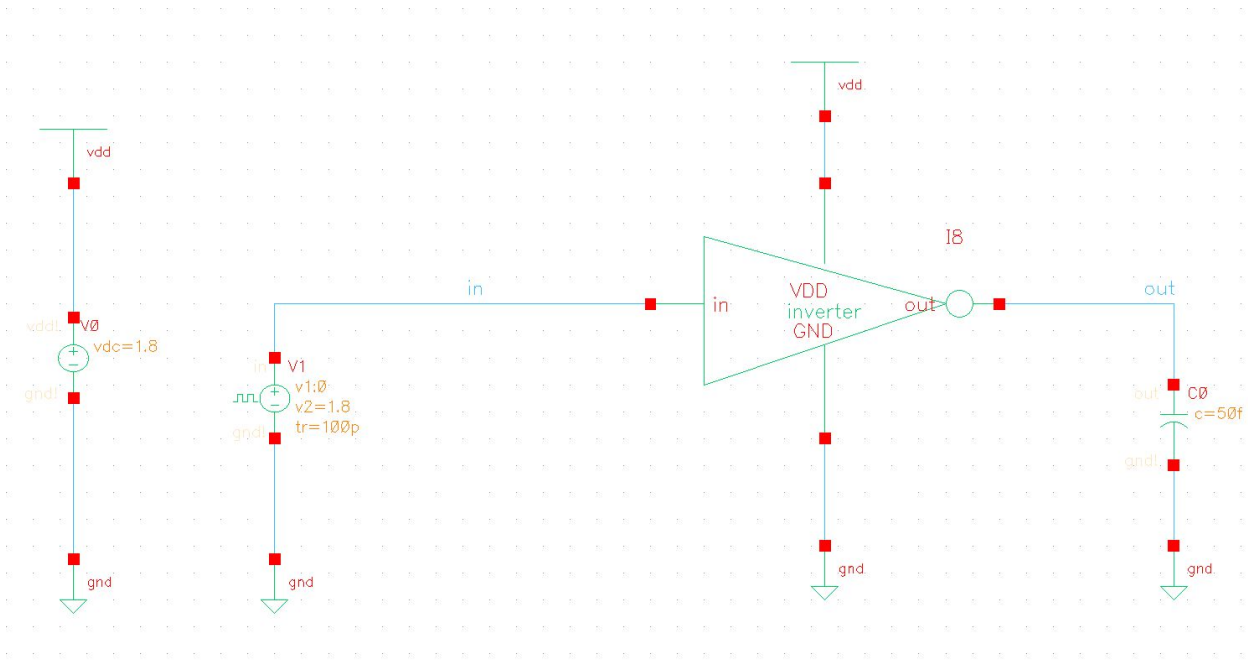
ECEN 454-508
Lab 4

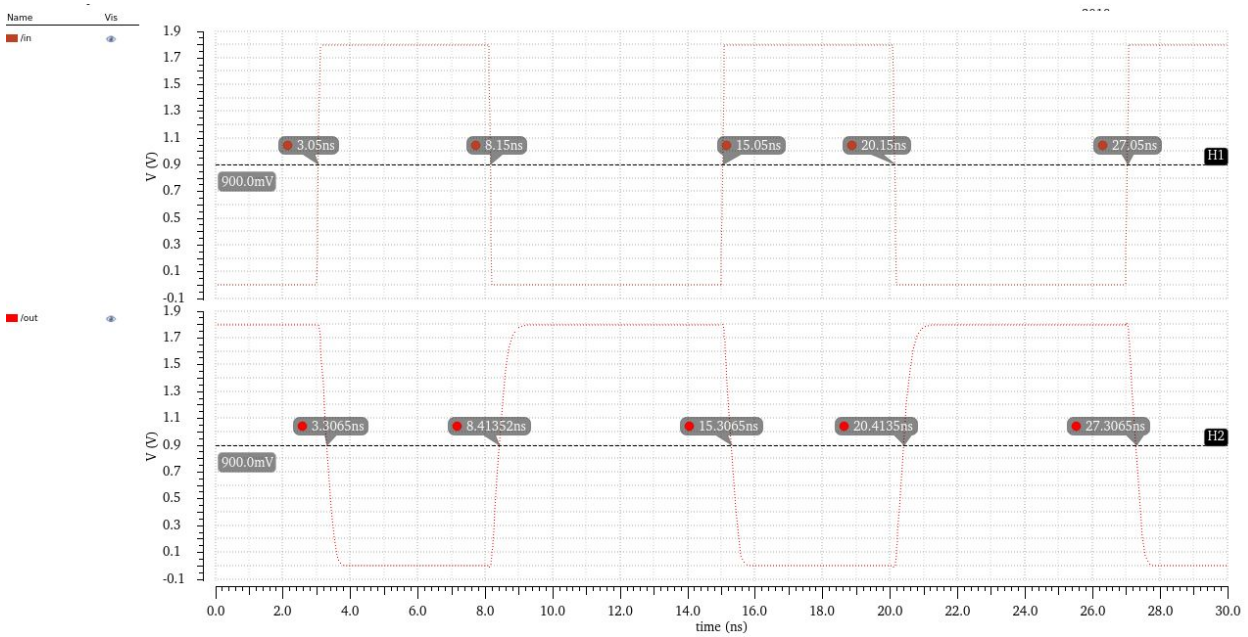
Nicholas Tann

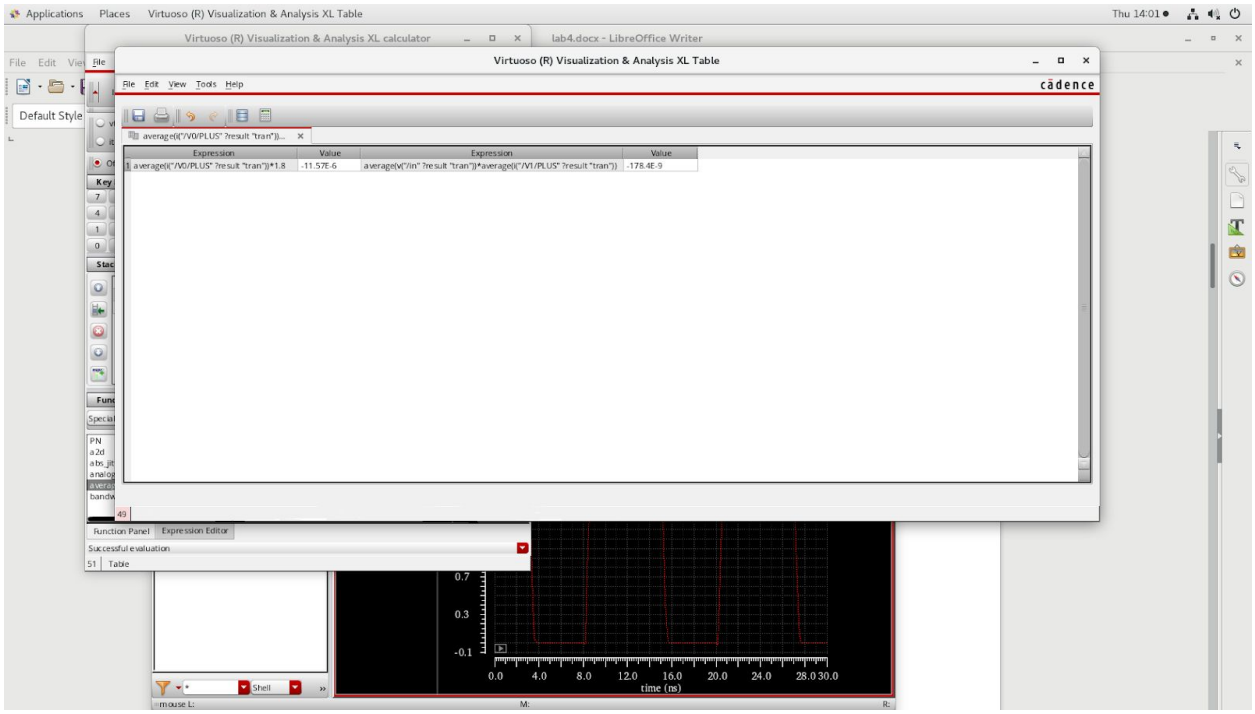
2/16/2020

Inverter:

Rising Delay	Falling Delay	Difference	% of rising	% of falling
481	498	17	3.53	3.41

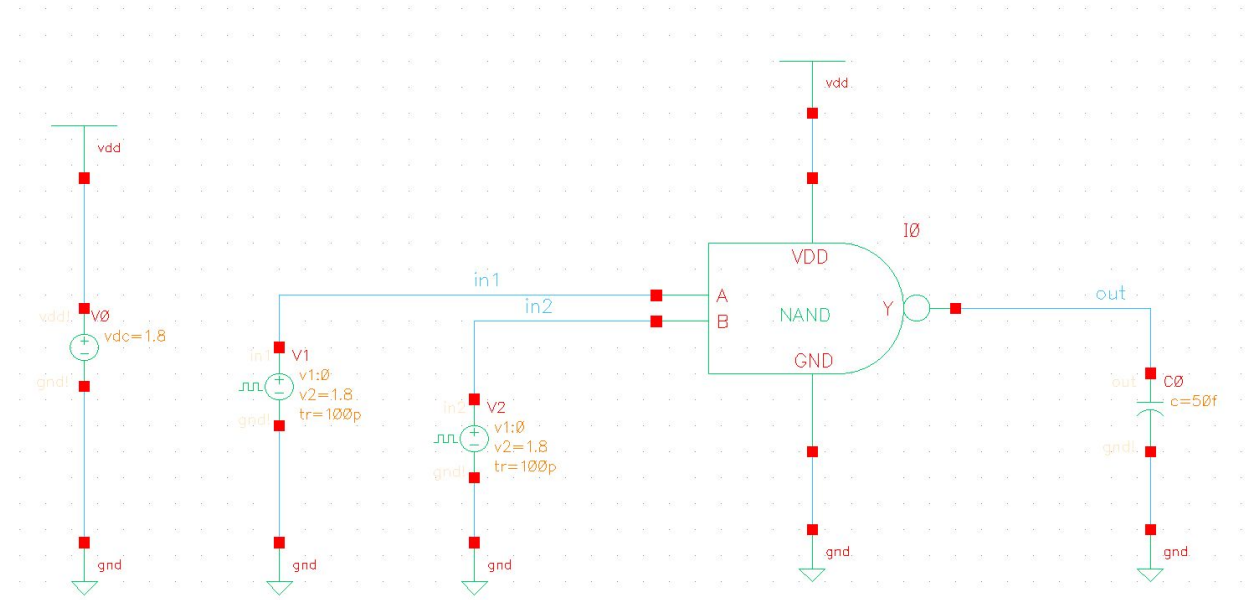


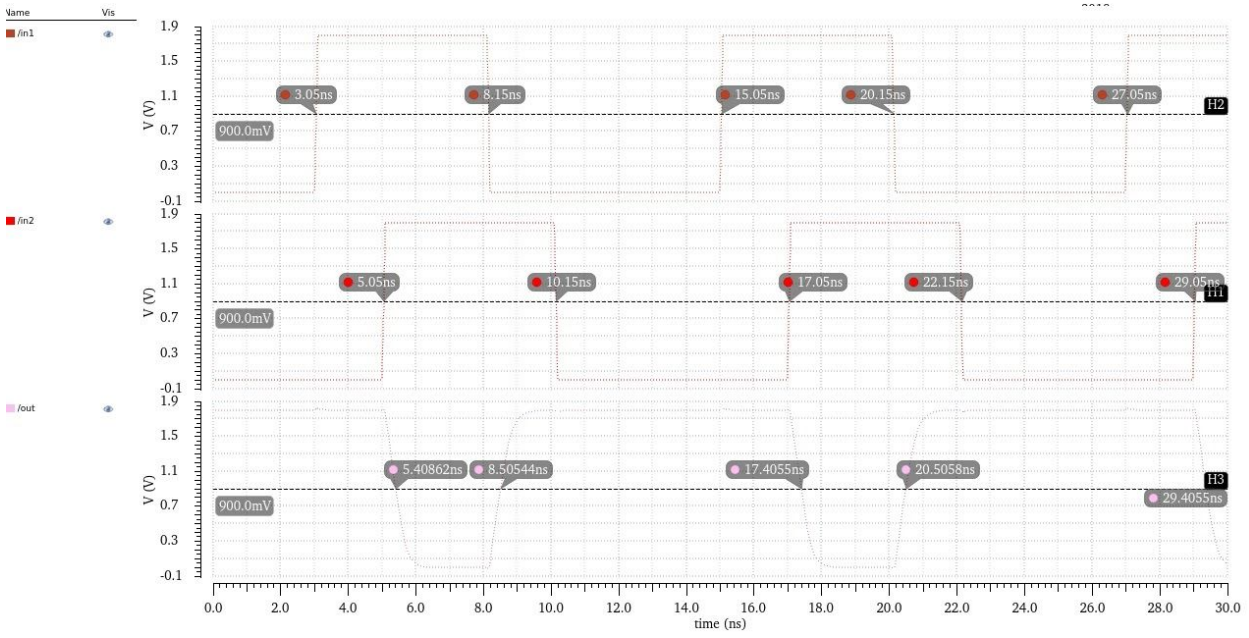


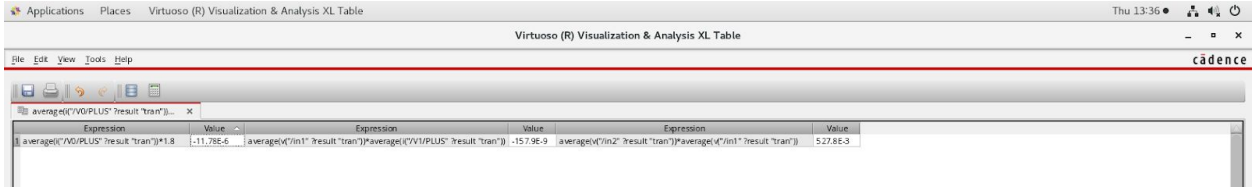


NAND:

Rising Delay	Falling Delay	Difference	% of rising	% of falling
487	505	18	3.70	3.56

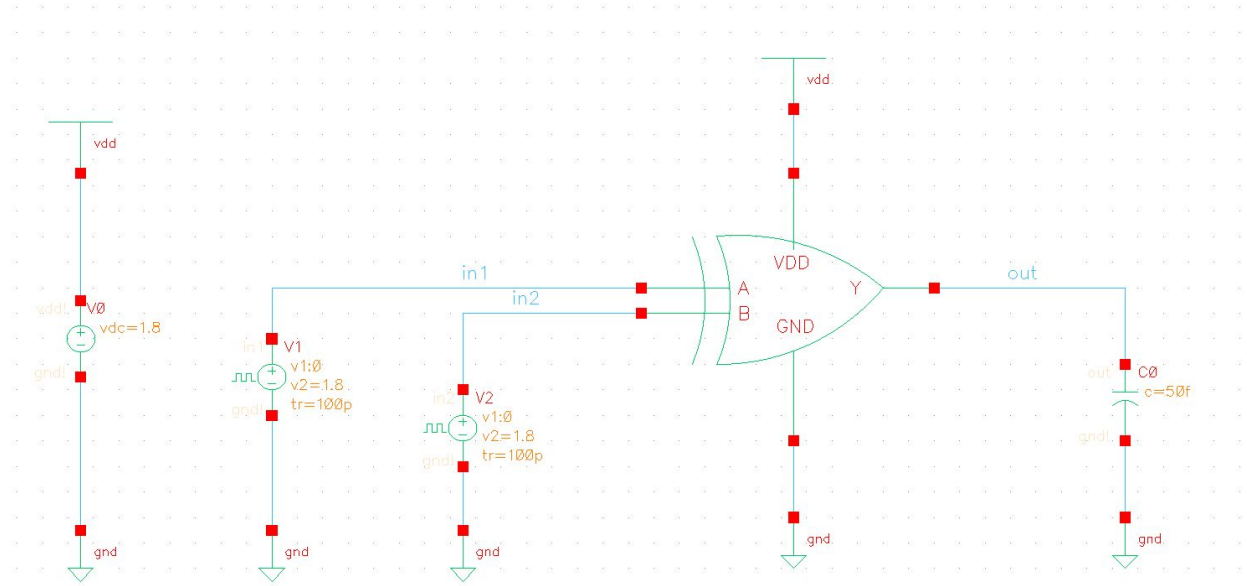

vdd
VØ
vdc=1.8
gnd
in1
V1
v1:Ø
v2=1.8
tr=1ØØp
in2
V2
v1:Ø
v2=1.8
tr=1ØØp
IØ
VDD
A
B
NAND
Y
GND
out
CØ
c=5Øf

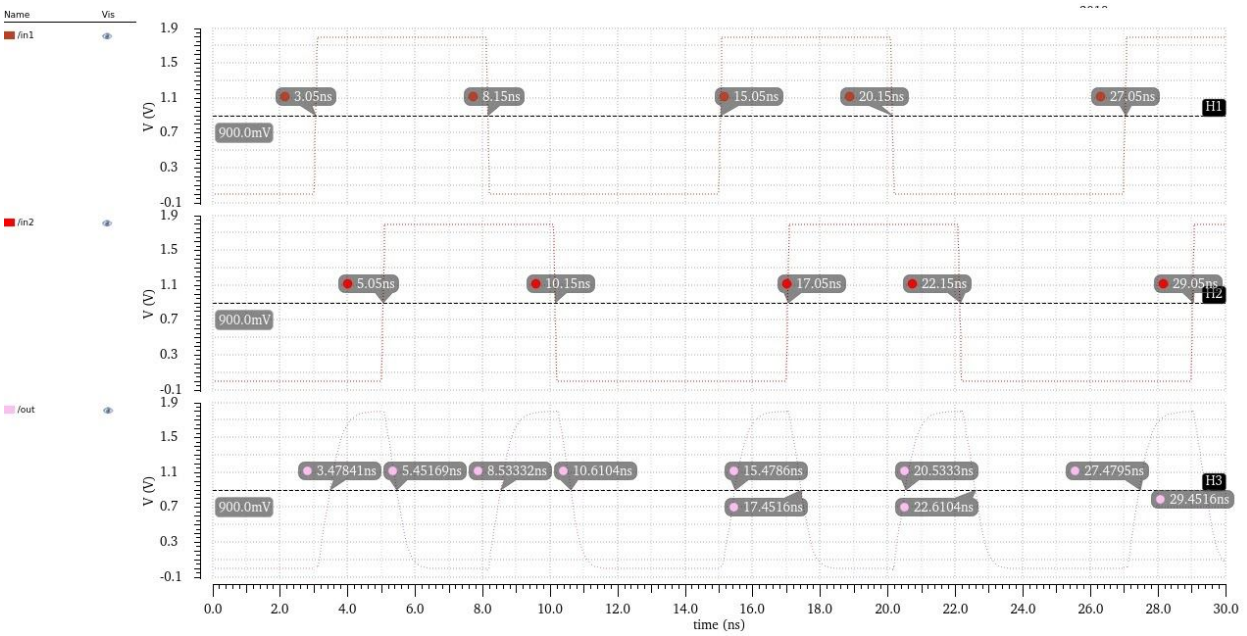

/in1
/in2
/out
V (V)
time (ns)
3.05ns
8.15ns
15.05ns
20.15ns
27.05ns
H2
900.0mV
5.05ns
10.15ns
17.05ns
22.15ns
29.05ns
H1
5.40862ns
8.50544ns
17.4055ns
20.5058ns
29.4055ns
H3

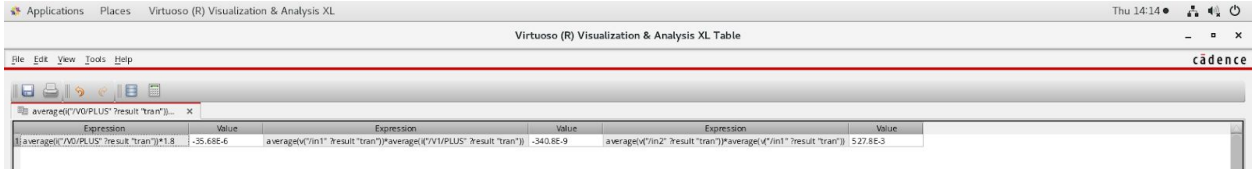

Applications
Places
Virtuoso (R) Visualization & Analysis XL Table
Thu 13:36
Virtuoso (R) Visualization & Analysis XL Table
File
Edit
View
Tools
Help
cadence
Expression
Value
Expression
Value
Expression
Value

XOR:

Rising Delay	Falling Delay	Difference	% of rising	% of falling
658	649	9	1.37	1.39

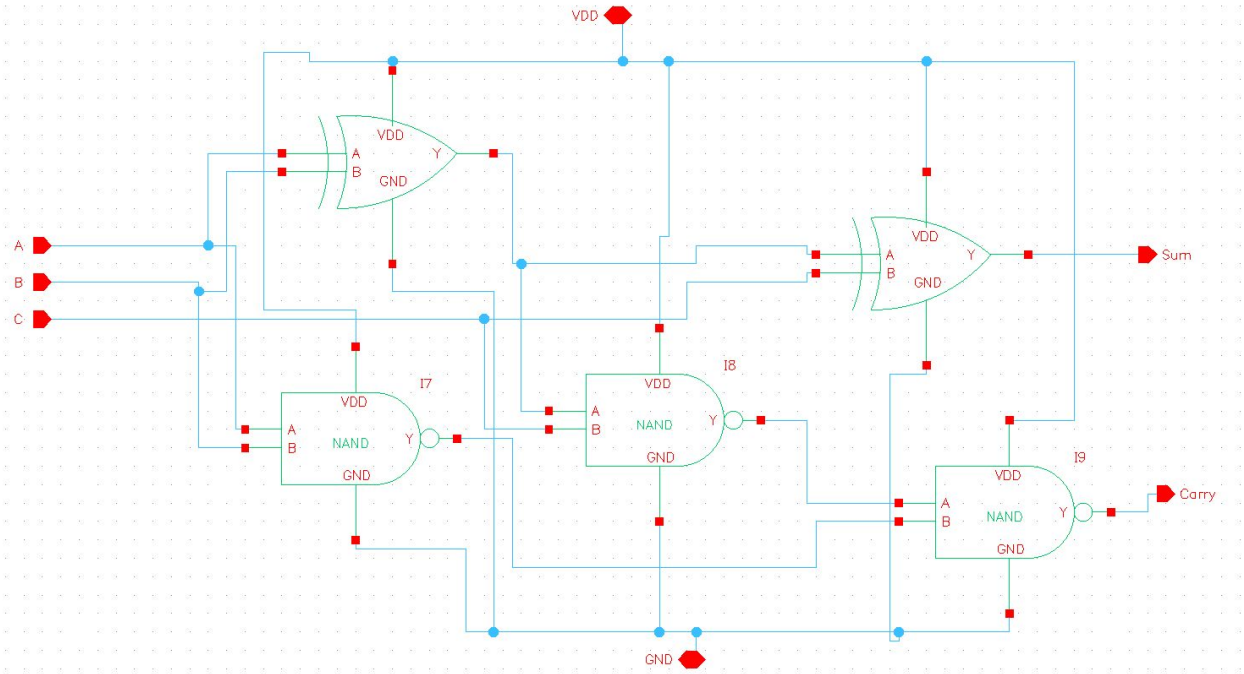

vdd
VØ
vdc=1.8
gnd
V1
v1:Ø
v2=1.8
tr=1ØØp
V2
v1:Ø
v2=1.8
tr=1ØØp
in1
in2
A
B
VDD
GND
Y
out
CØ
c=5Øf

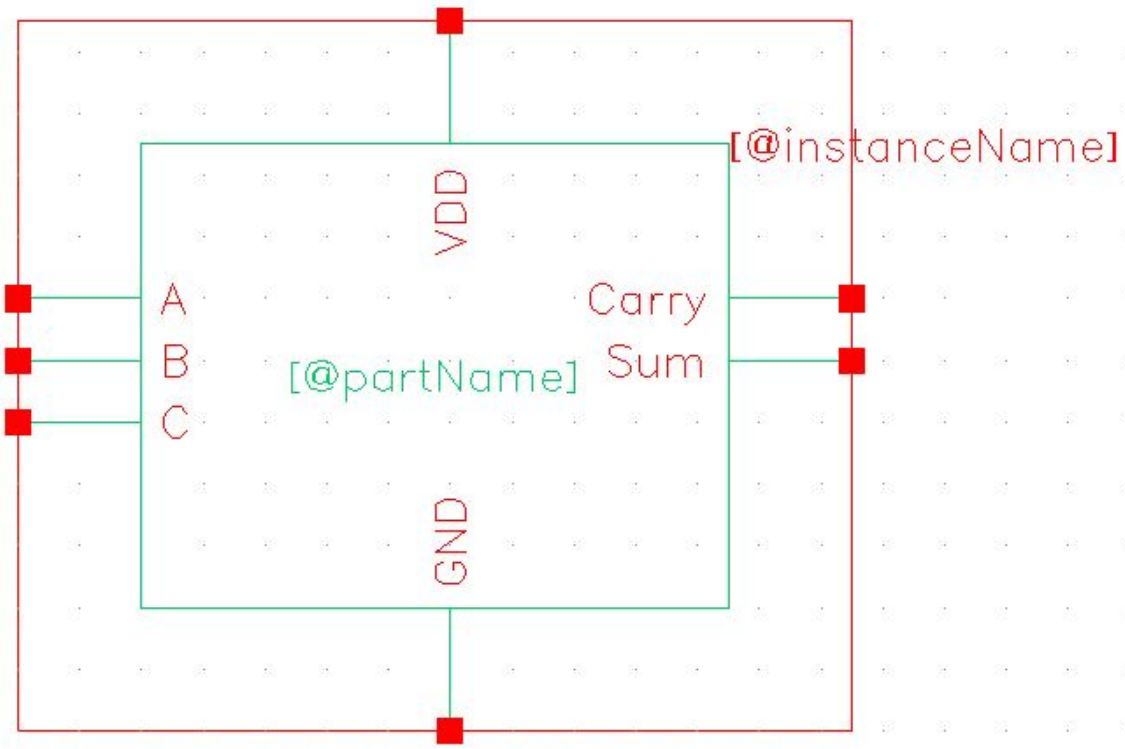

/in1
/in2
/out
V (V)
time (ns)
900.0mV
3.05ns
8.15ns
15.05ns
20.15ns
27.05ns
H1
5.05ns
10.15ns
17.05ns
22.15ns
29.05ns
H2
3.47841ns
5.45169ns
8.53332ns
10.6104ns
15.4786ns
17.4516ns
20.5333ns
22.6104ns
27.4795ns
29.4516ns
H3

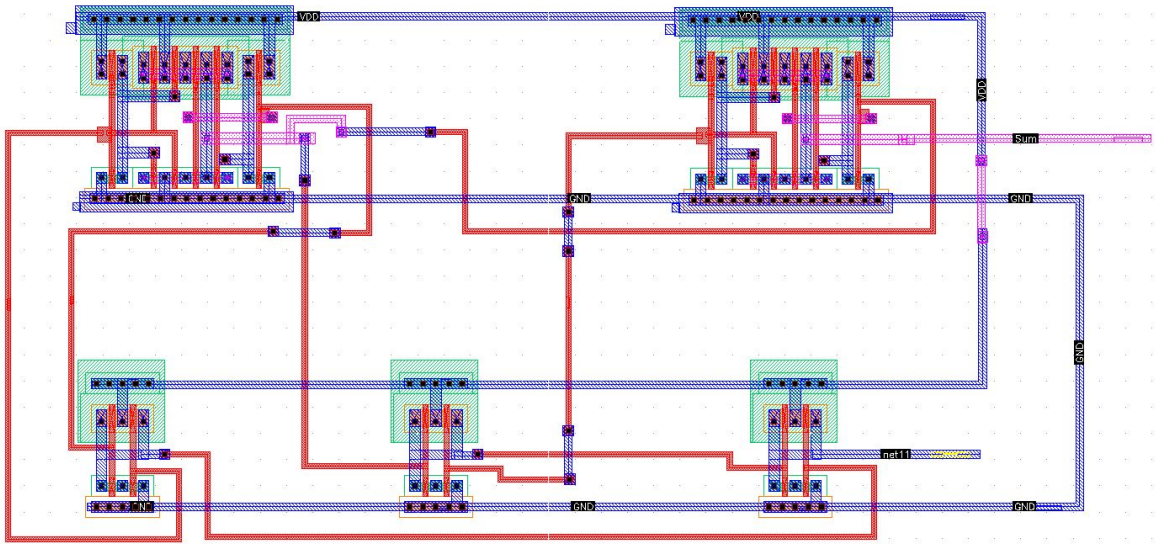

Applications
Places
Virtuoso (R) Visualization & Analysis XL
Thu 14:14
Virtuoso (R) Visualization & Analysis XL Table
File
Edit
View
Tools
Help
cadence

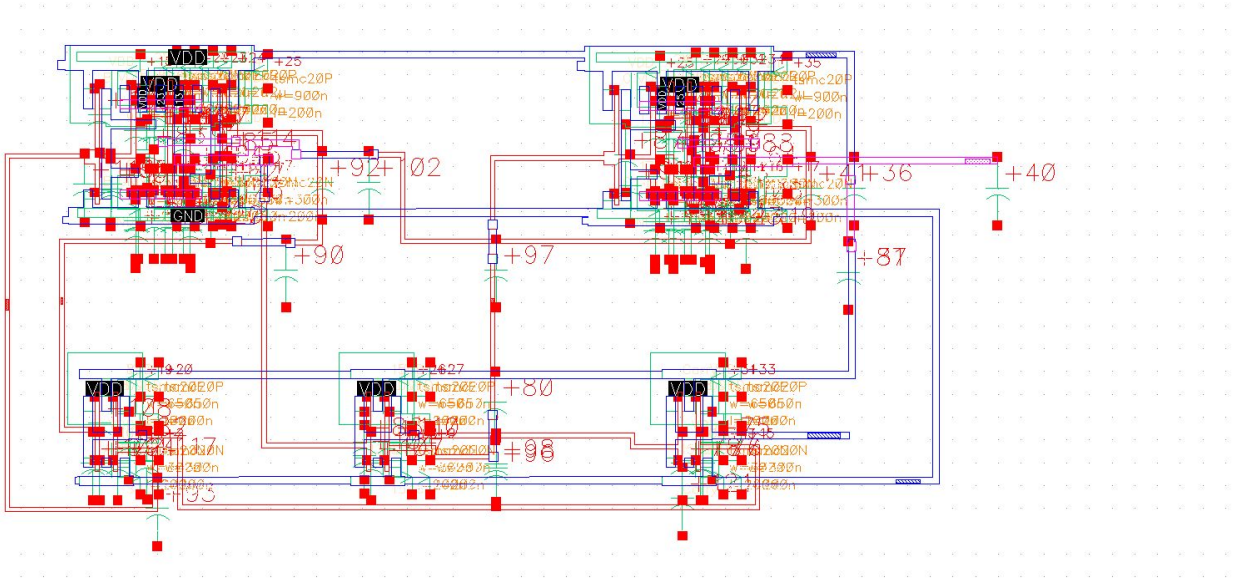
1 Bit Adder:

Rising Delay	Falling Delay	Difference	% of rising	% of falling
362	384	22	6.07	5.72




[@instanceName]
VDD
A
B
C
[@partName]
Carry
Sum
GND


VDD
GND
Sum
net11



As the pulse width was decreased on Cin the SUM output peak increased more and more rapidly until it maxed out at 1.8 Volts at 1.6ns

	Inverter	NAND	XOR	Adder
Ia	-320.5nA	-181.7nA	-554.6nA	17.83nA
Va	789mV	789mV	789mV	867.8mV
Pa	-181.9nW	143.4nW	437.6nW	15.47nW
Ib		-198.1nA	-431.7nA	13.14nA
Vb		783mV	783mV	727.7mV
Pb		155.1nW	338nW	9.56nW
Ic				-6.24nA
Vc				734.4mV
Pc				-4.58nW