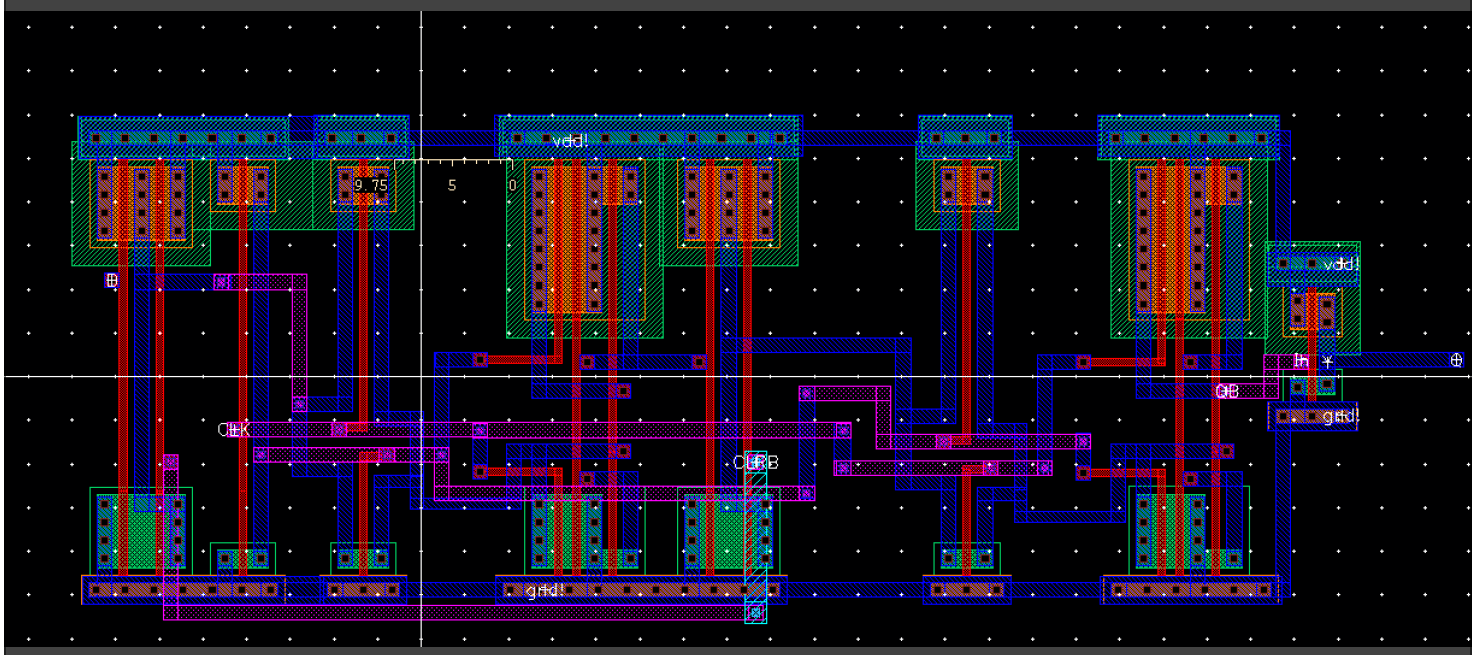
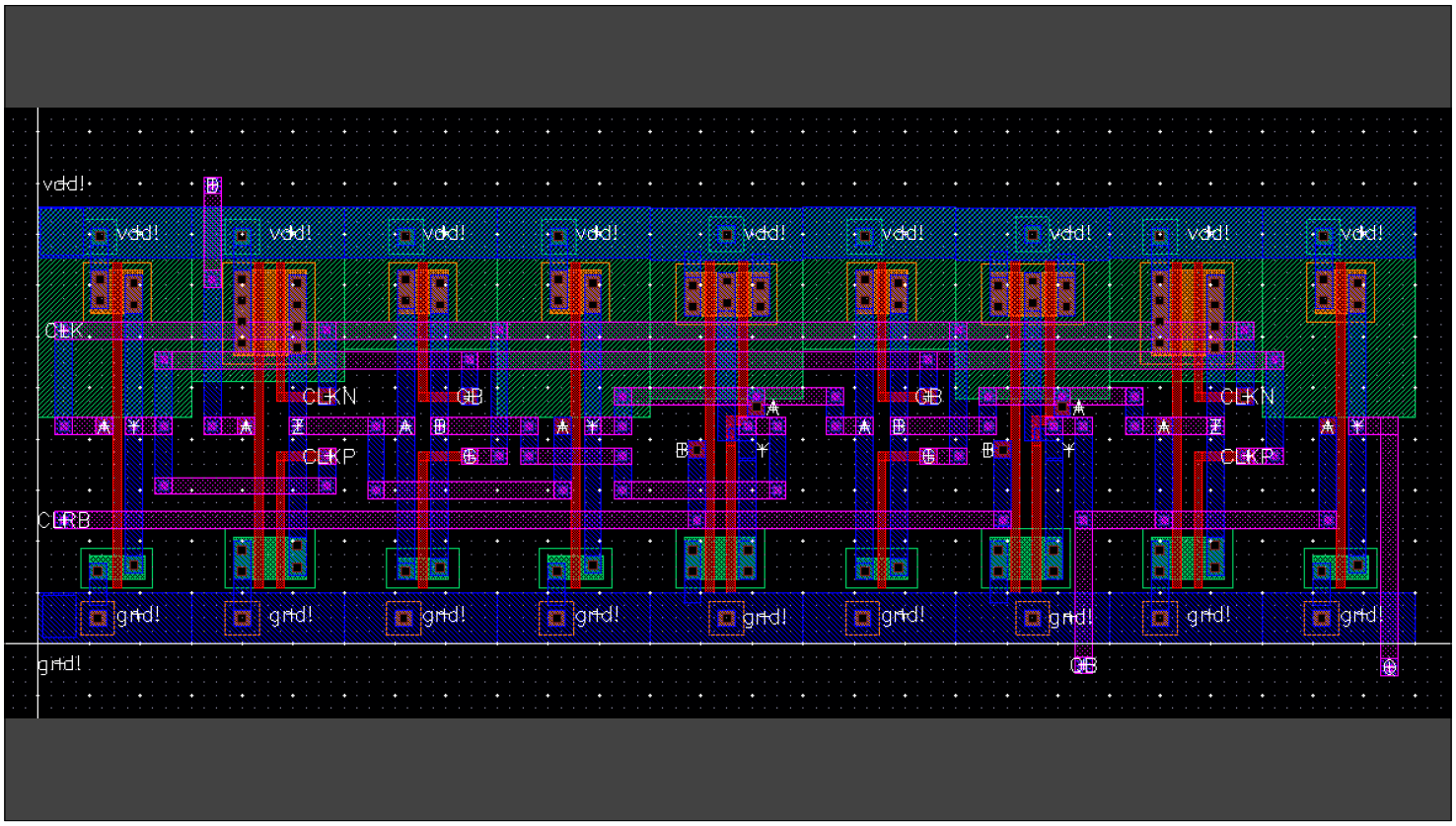
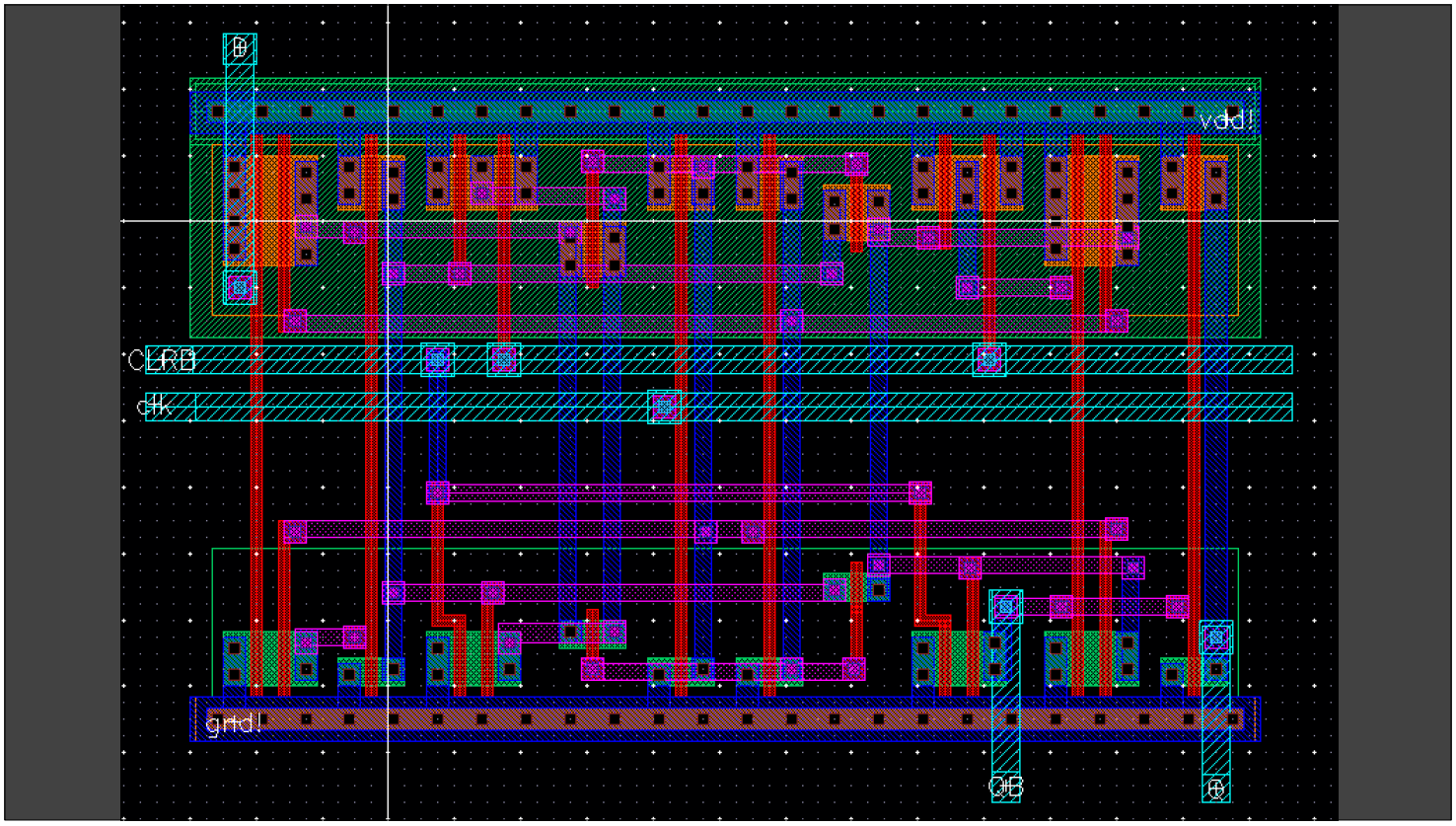
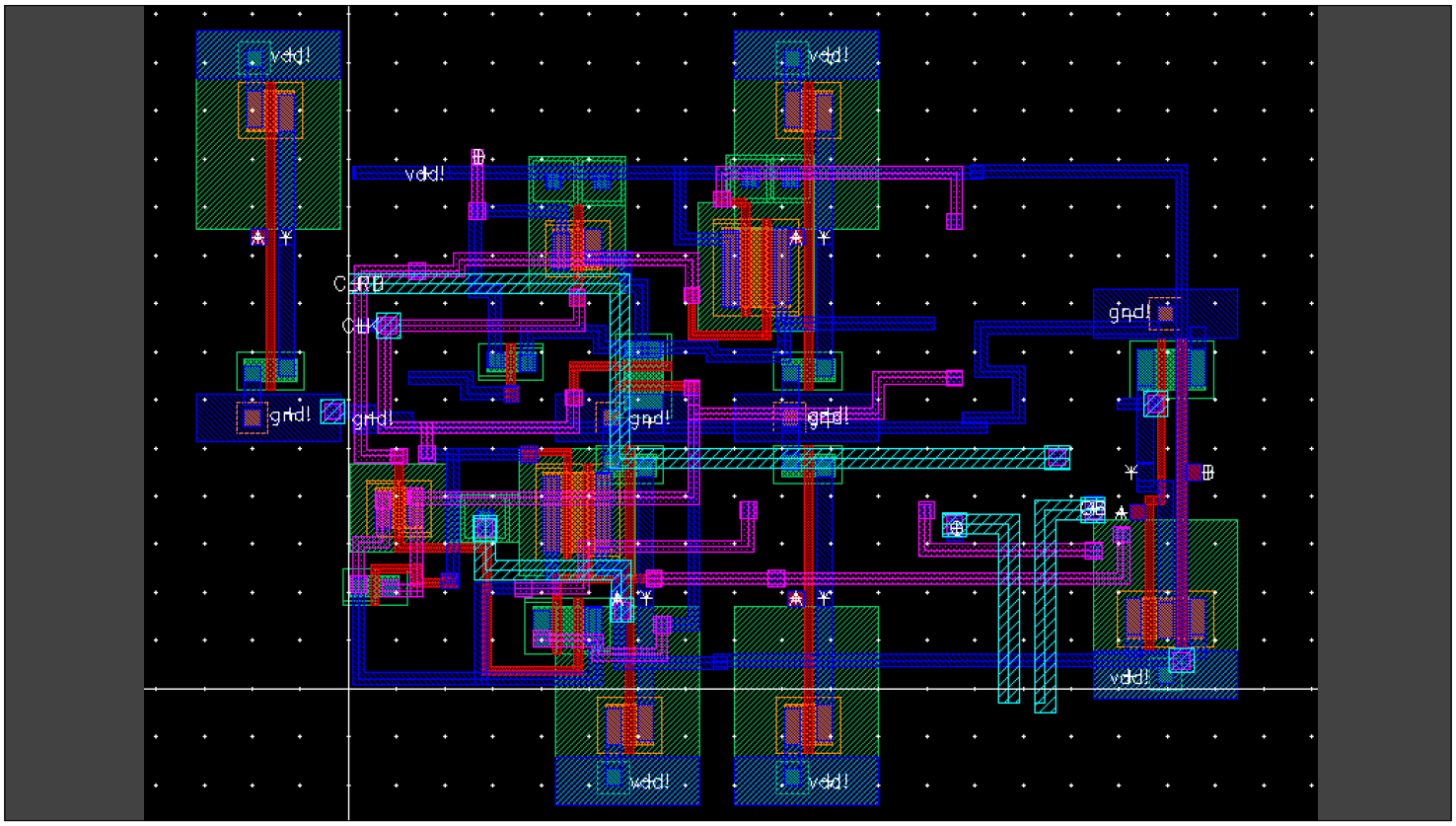
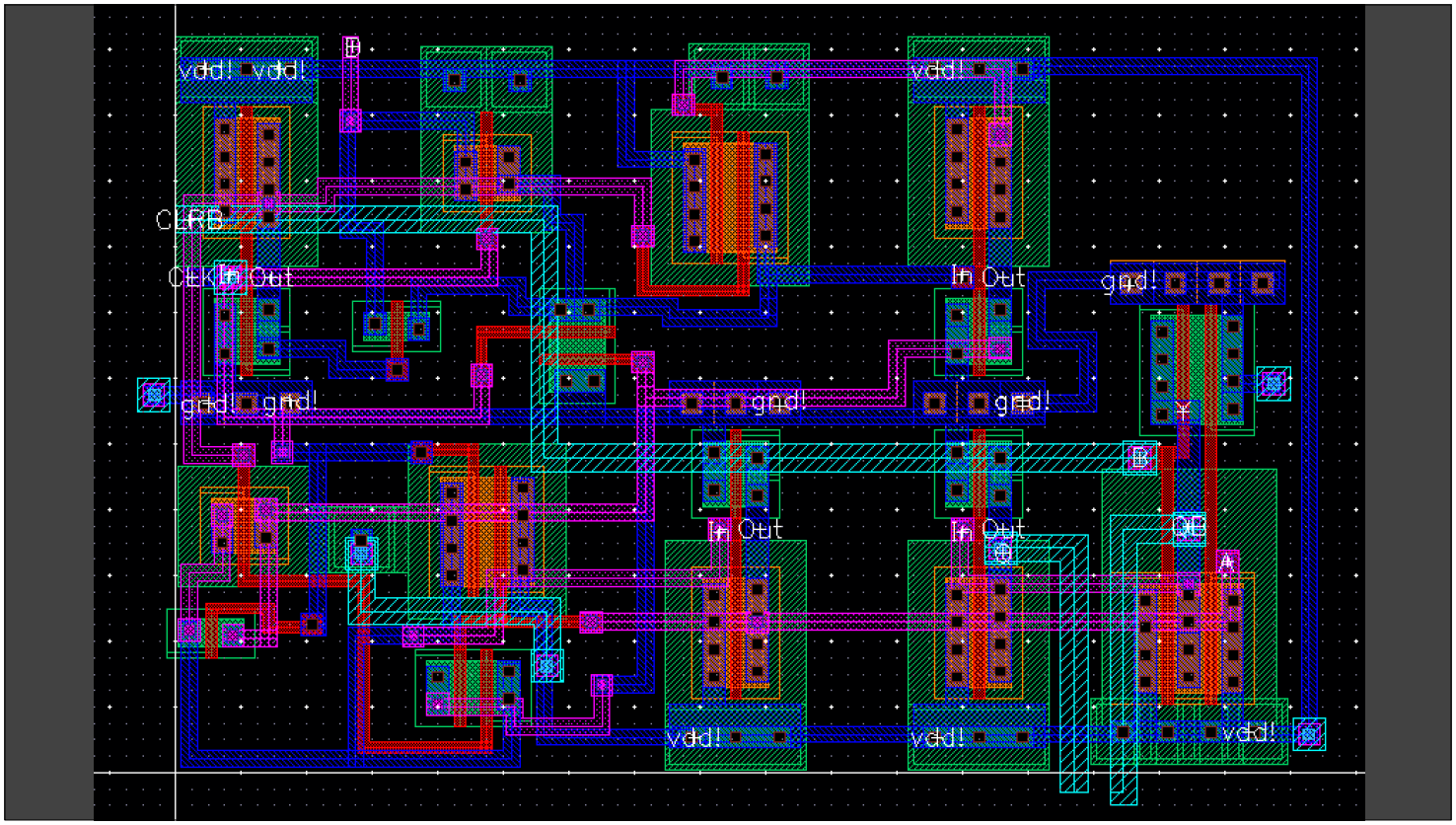
CAD3 DFF

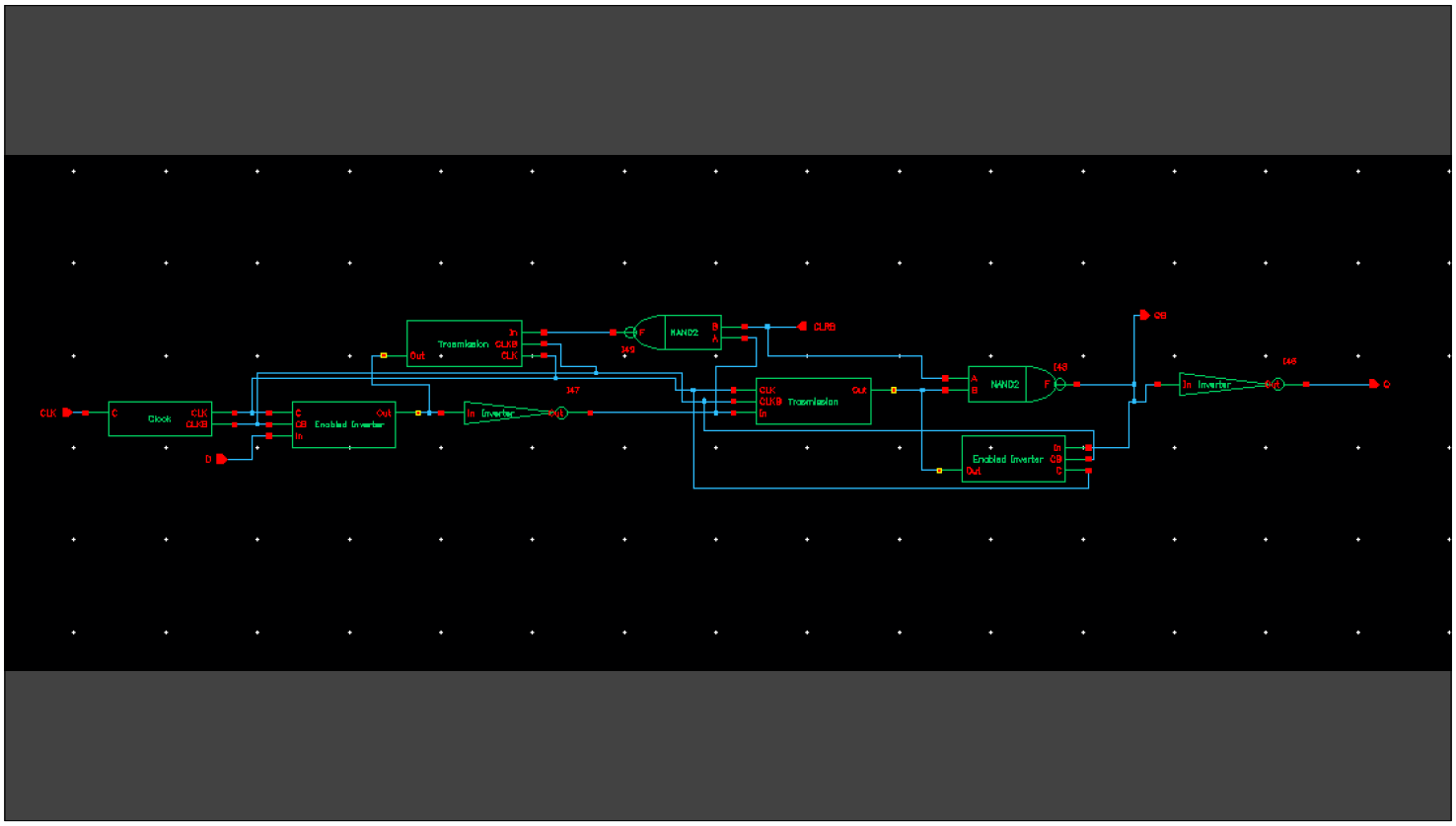


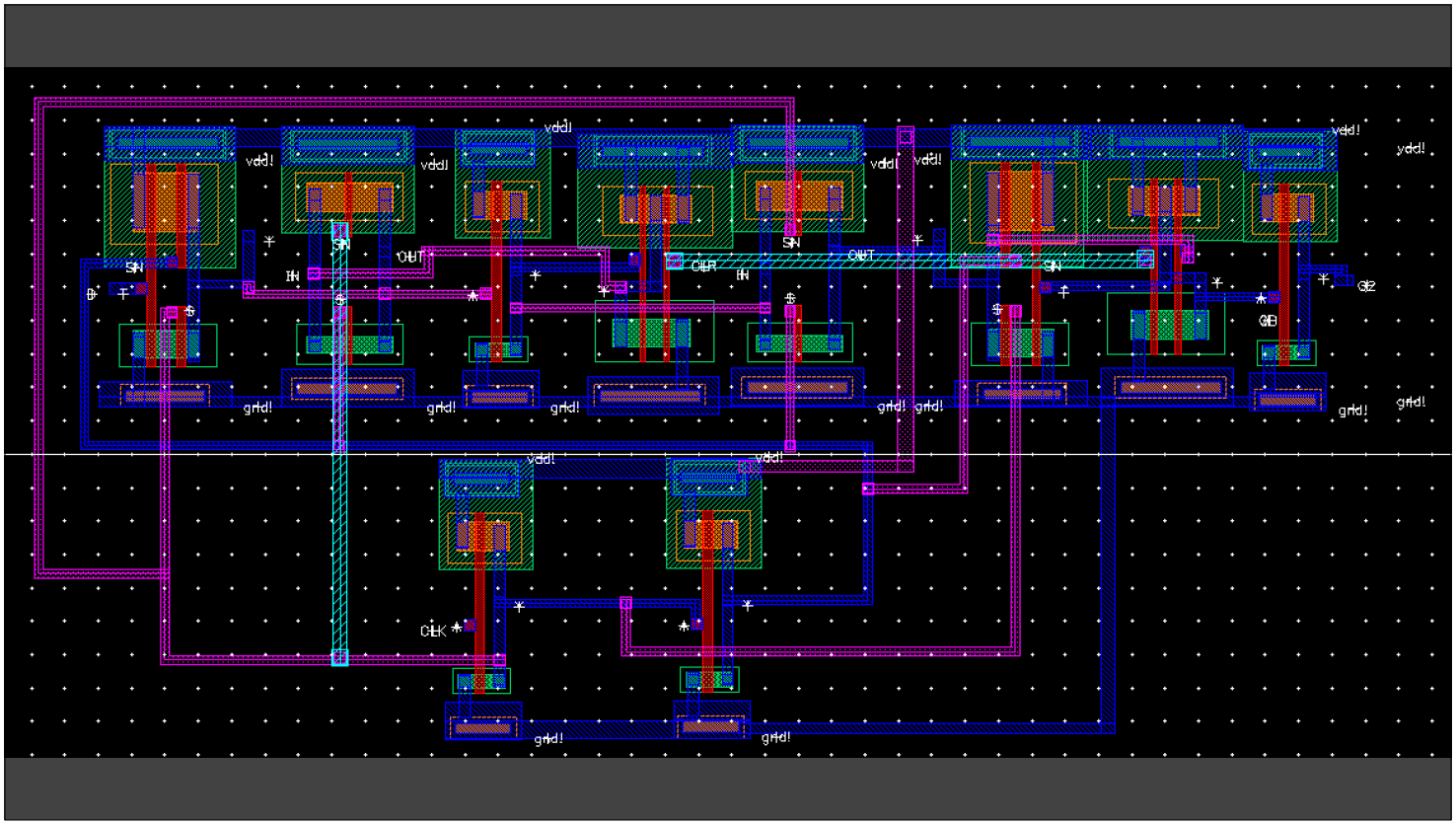

vdd!
CLK
CLKN
GB
CLKP
CLRB
grnd!

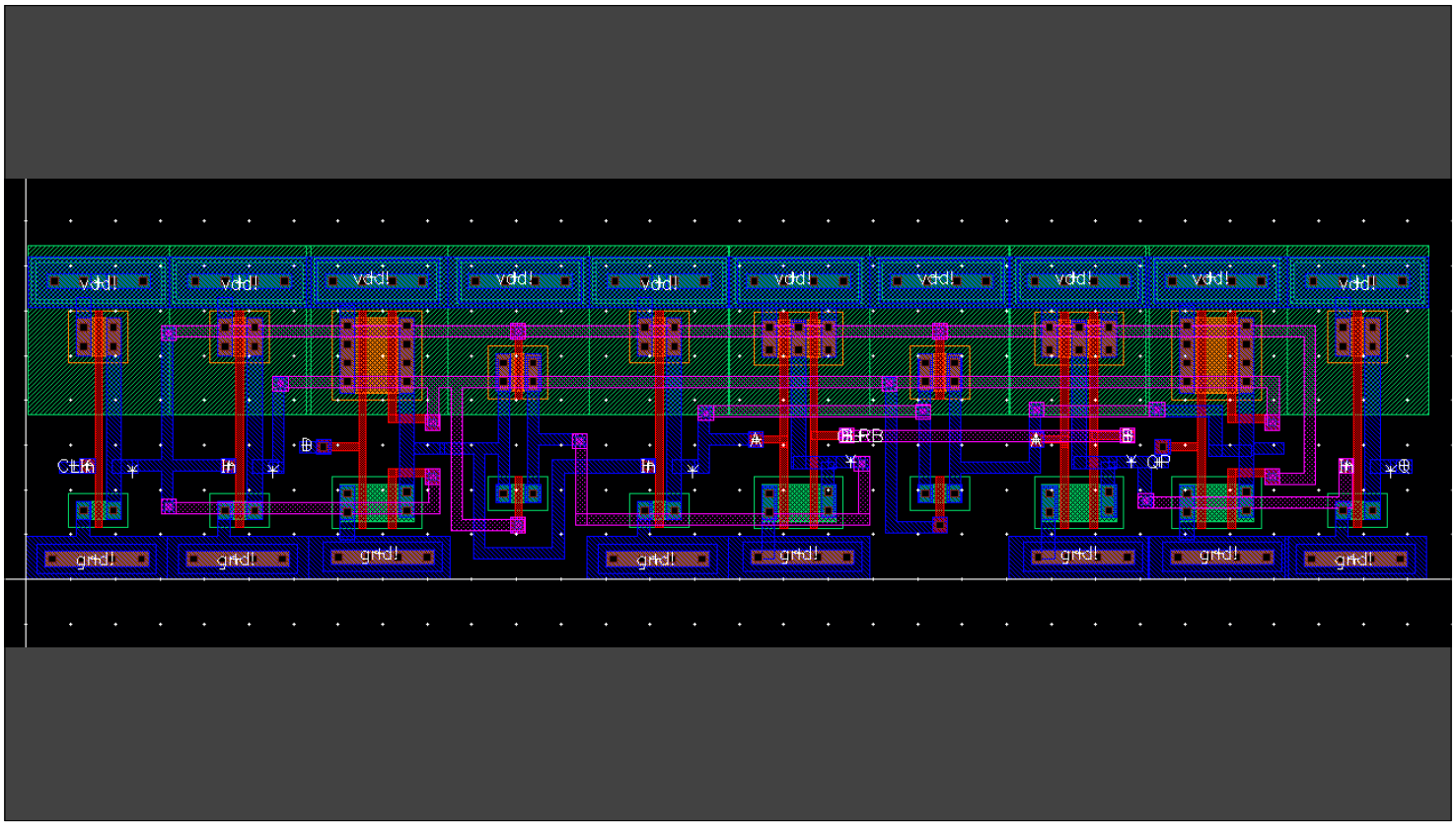

vdd!
CLRB
clk
grnd!
GB

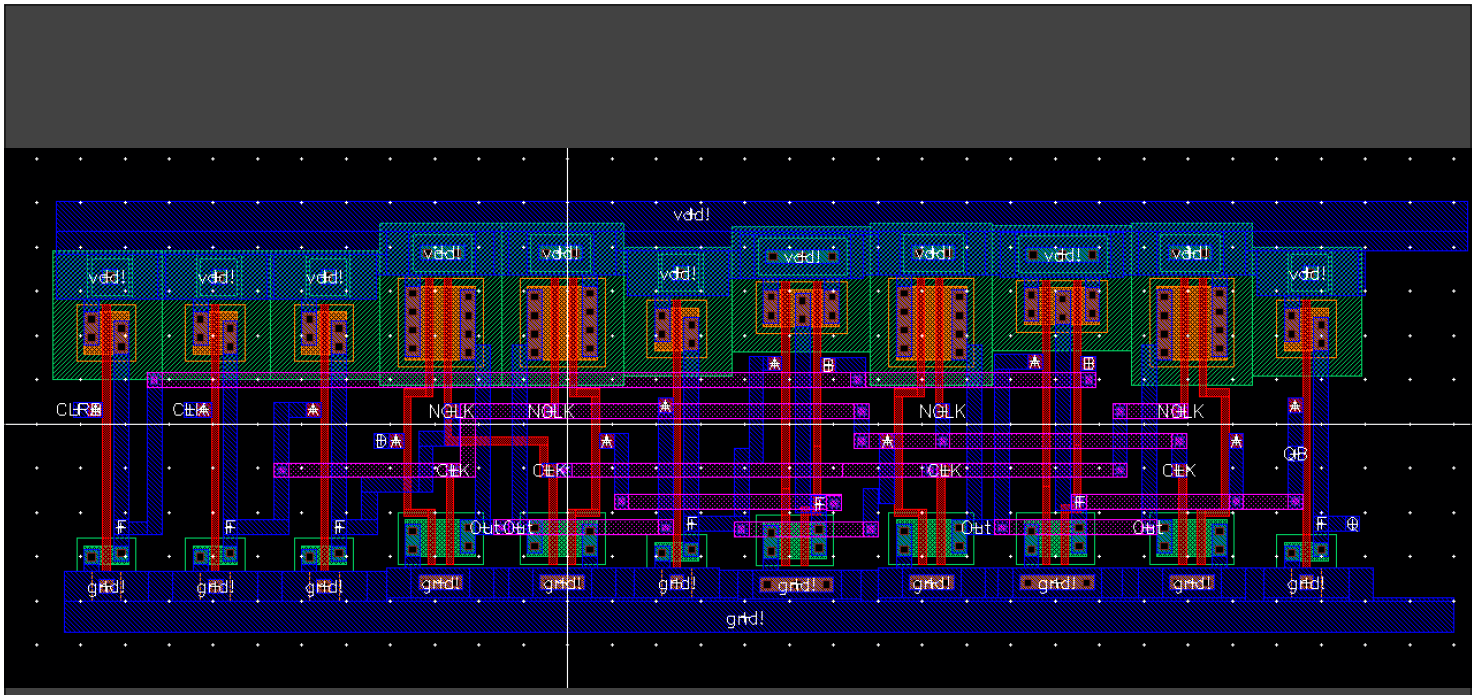

vdd!
vdd!
vdd!
CLKB
Out
gnd!
gnd!
gnd!
gnd!
gnd!
vdd!
vdd!
vdd!

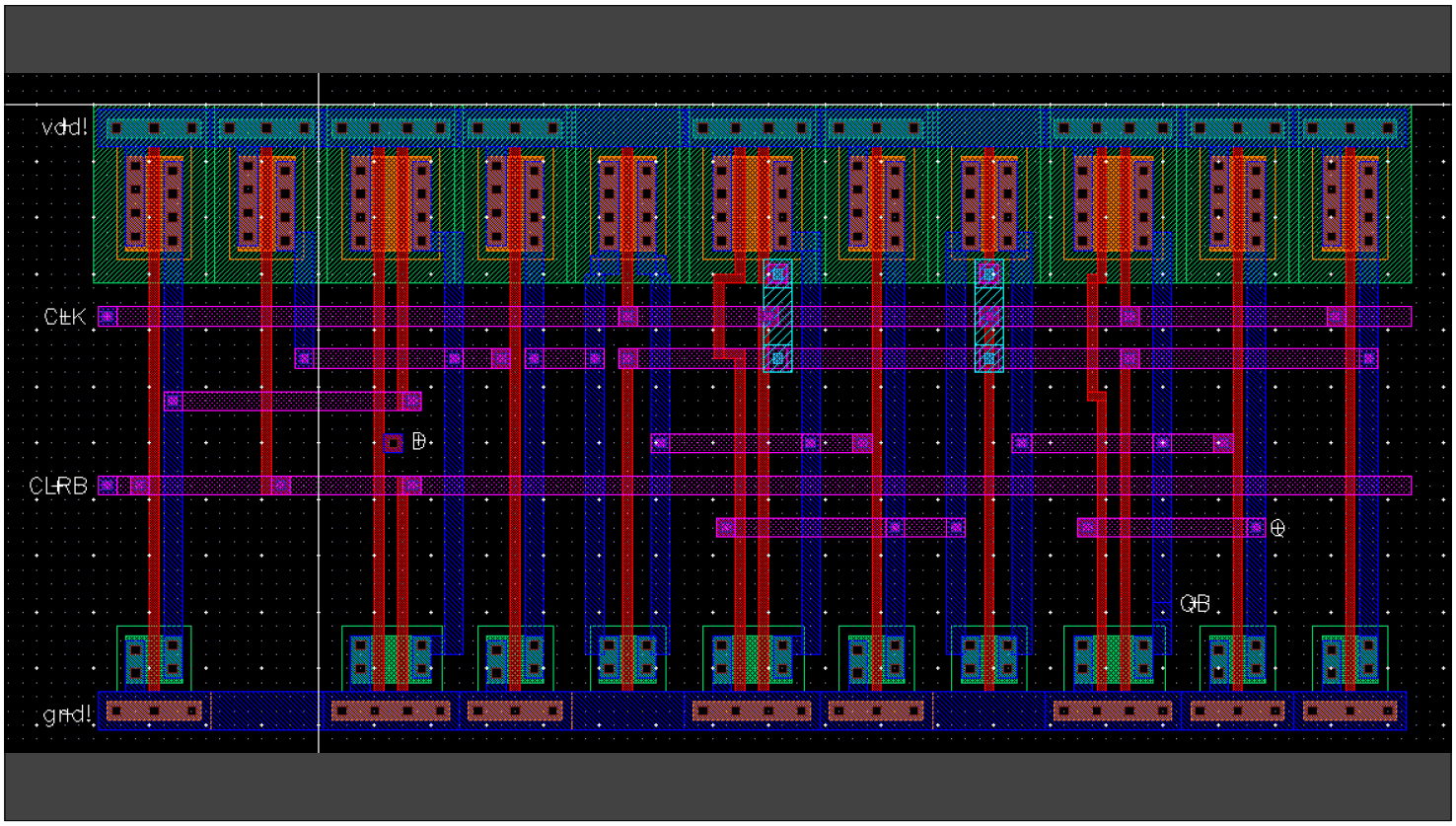

vdd!
vdd!
vdd!
CLKB
CLK
In
Out
In
Out
gnd!
gnd!
gnd!
gnd!
gnd!
In
Out
In
Out
vdd!
vdd!
vdd!

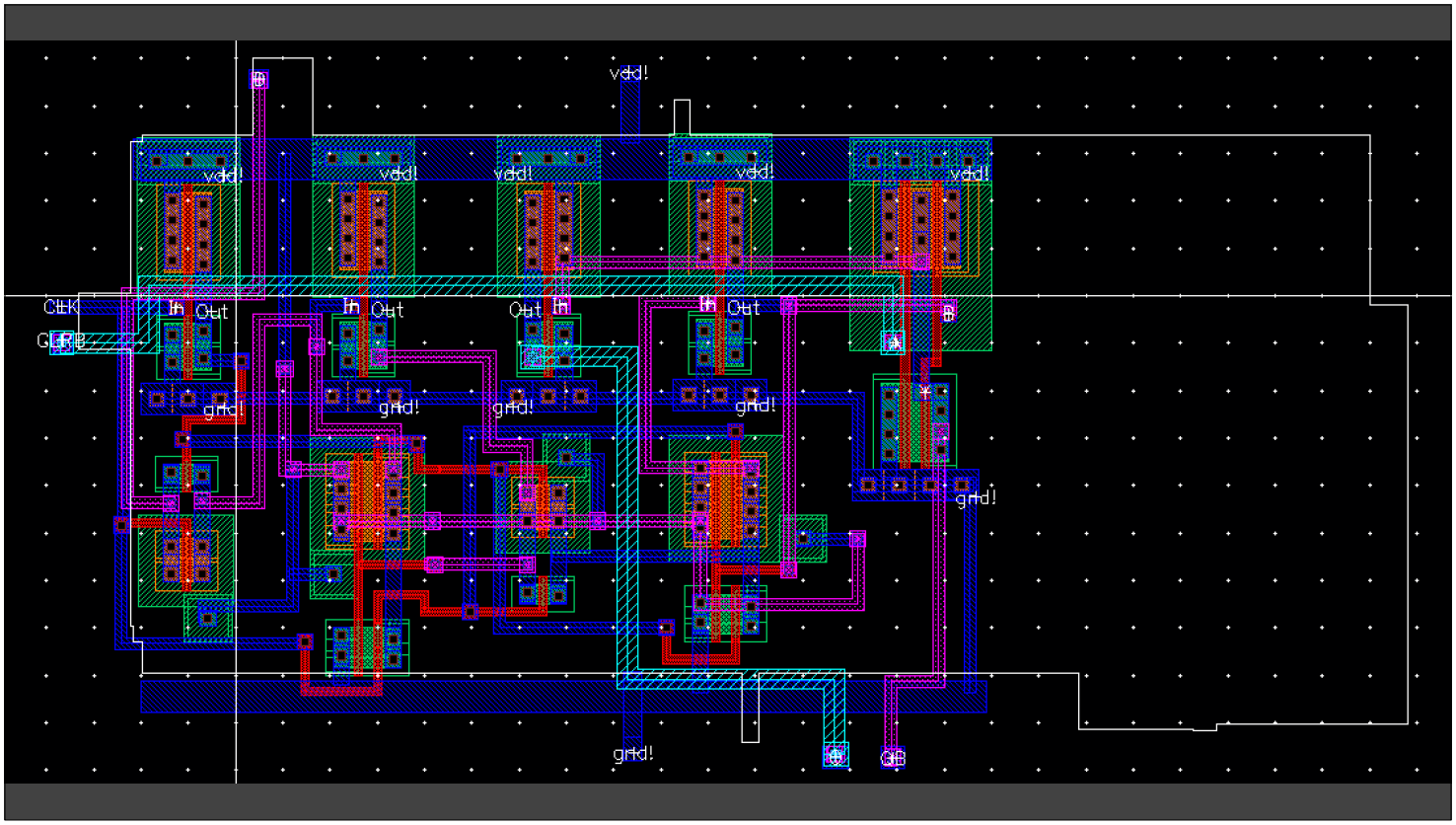

CLK
C
Clock
CLK
CLKB
D
C
CB
Enabled Inverter
In
Out
Transmission
In
CLKB
CLK
Out
In Inverter
147
149
NAND2
B
A
F
CLKB
CB
CLK
CLKB
Transmission
In
OUT
NAND2
A
B
F
148
Enabled Inverter
In
CB
Out
C
In Inverter
148
Q

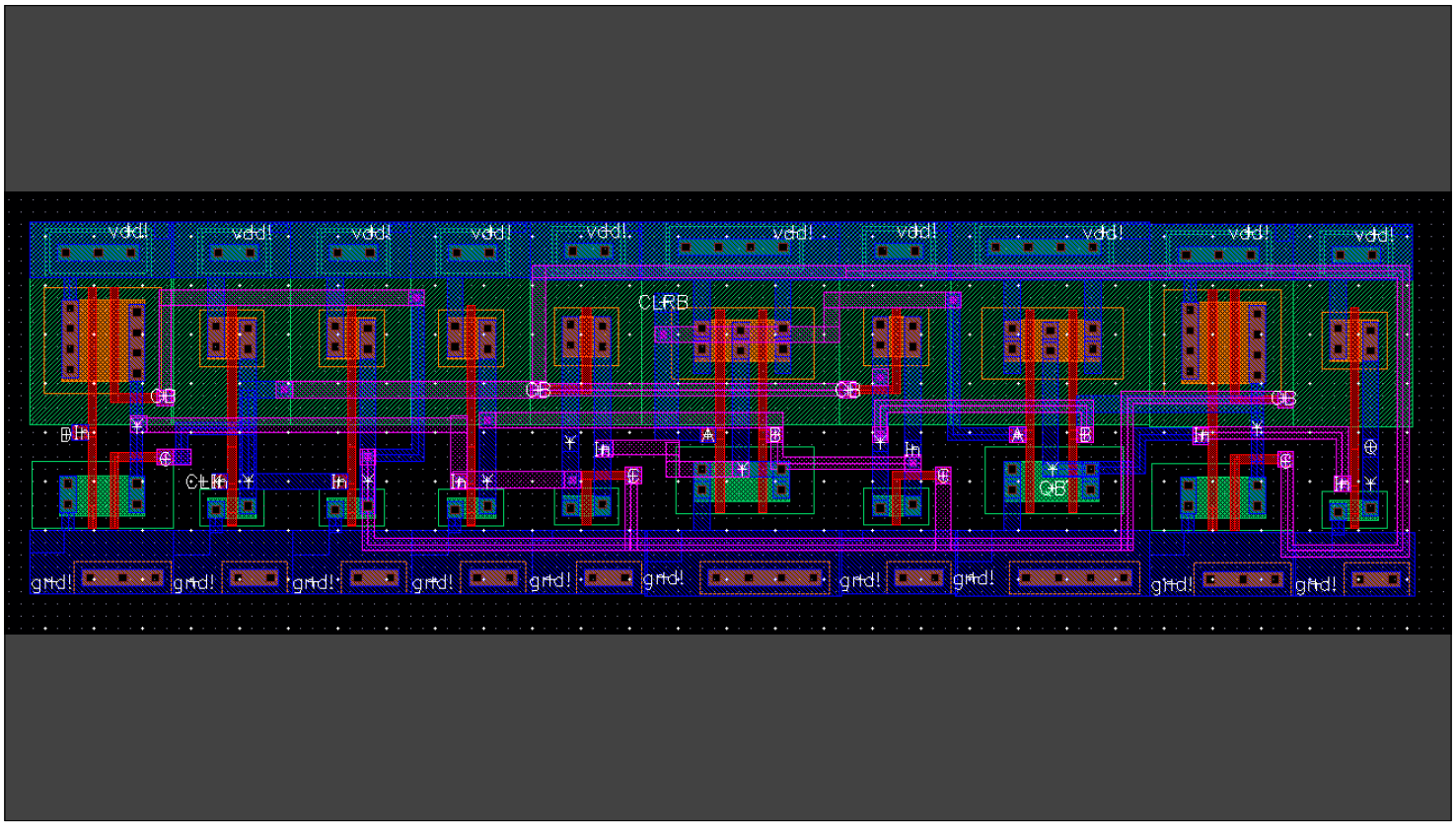

vdd!
gnd!
SN
IN
OUT
CLK
QB
Q2
CLK

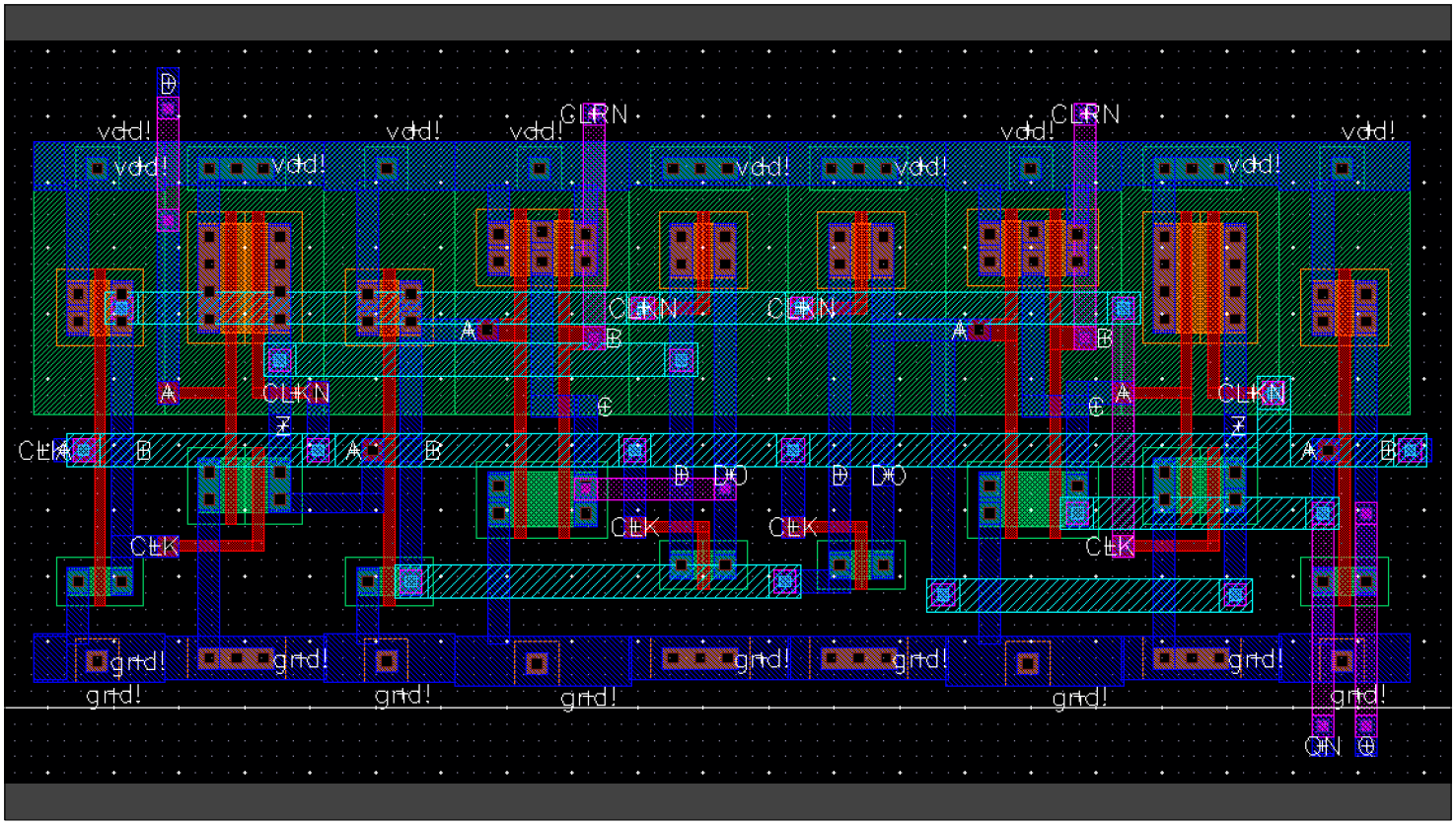

vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
CLK
In
In
In
In
B
A
B
A
B
A
B
QP
In
QB
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!

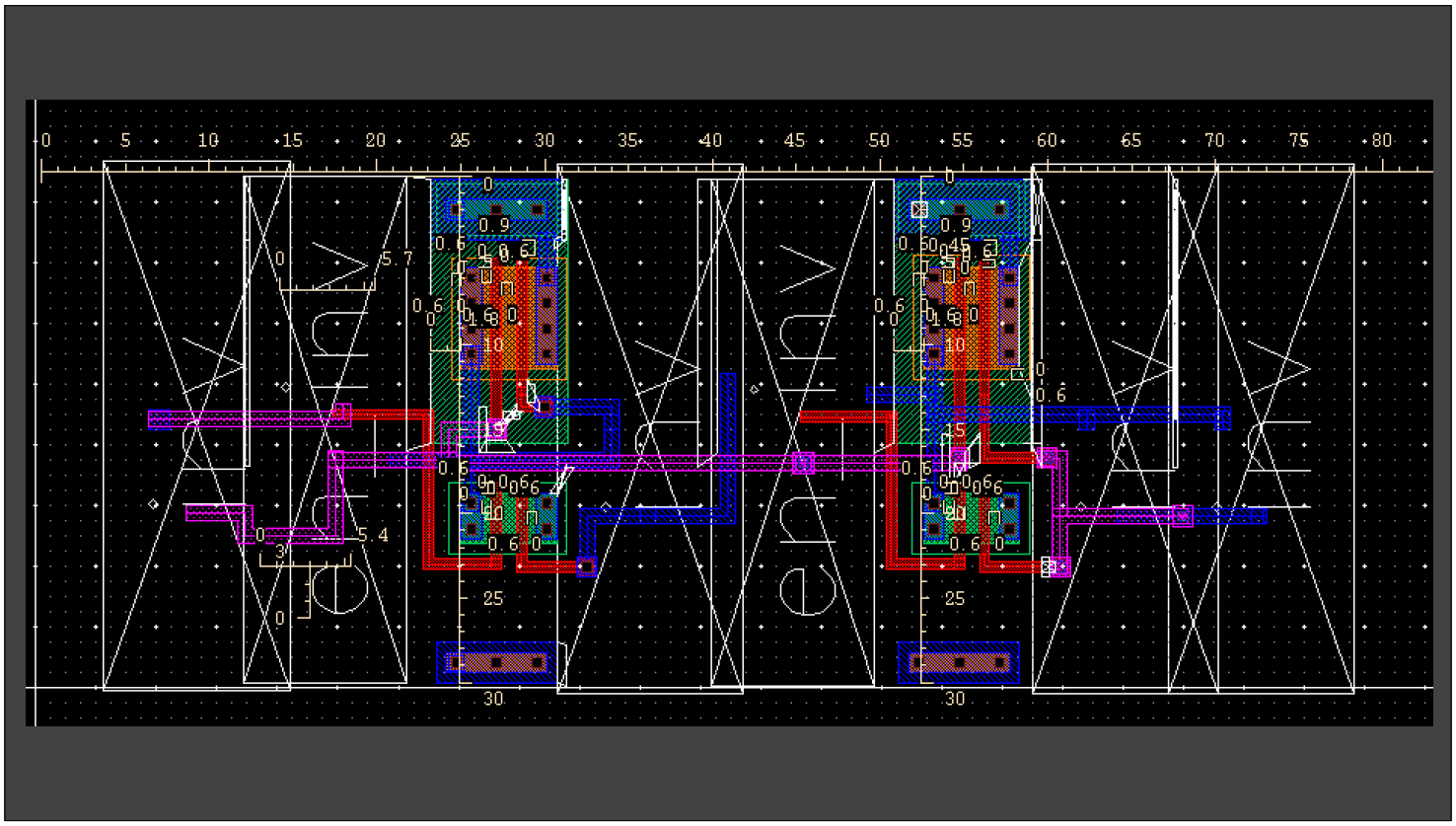

vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
CLR
CLK
A
NCLK
NCLK
A
NCLK
NCLK
A
B
A
A
B
A
A
A
CLK
CLK
CLK
CLK
QB
B
B
F
F
F
Out
Out
F
Out
Out
F
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!

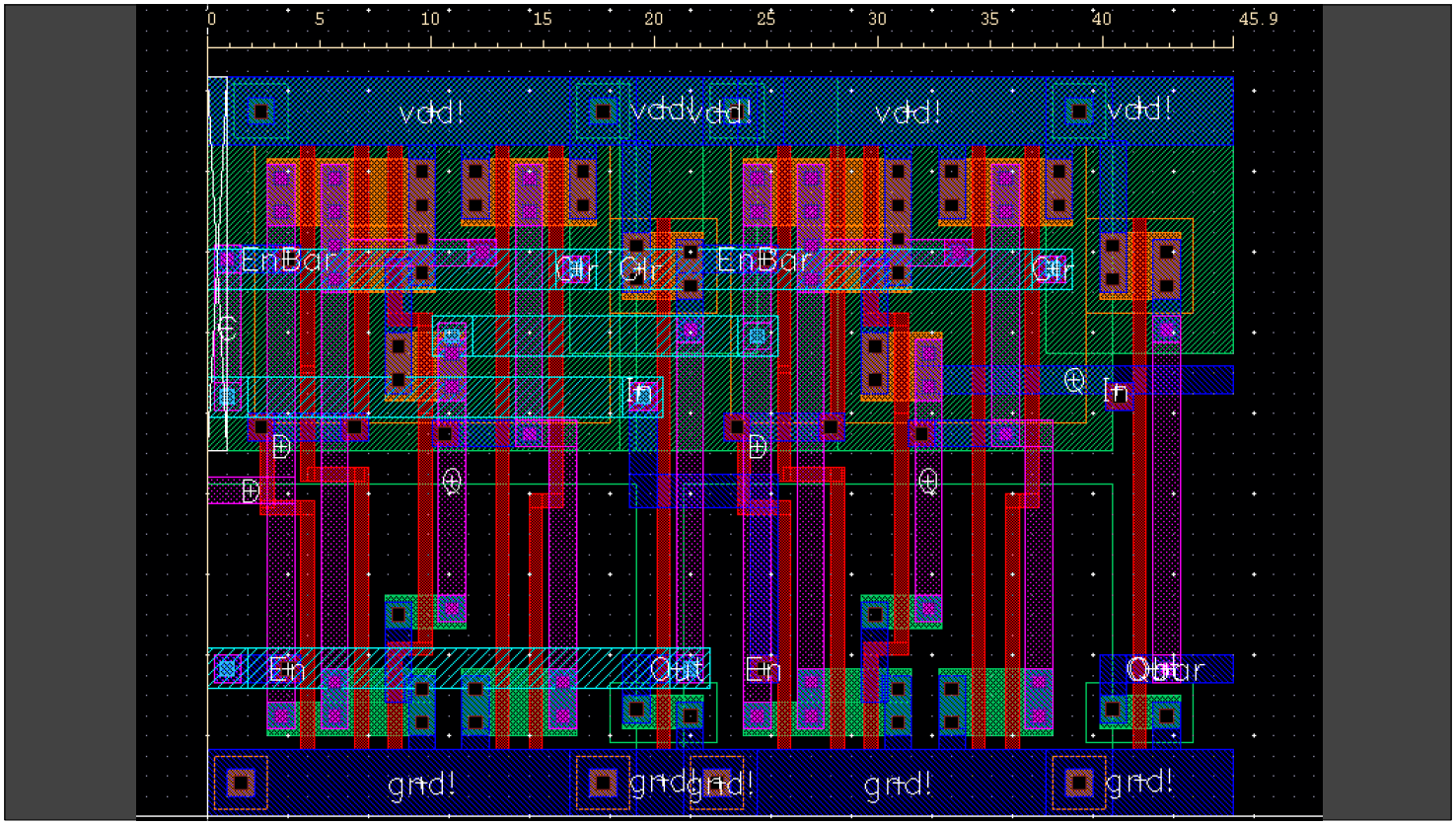

vdd!
CLK
D
CLRB
Q
QB
gnd!

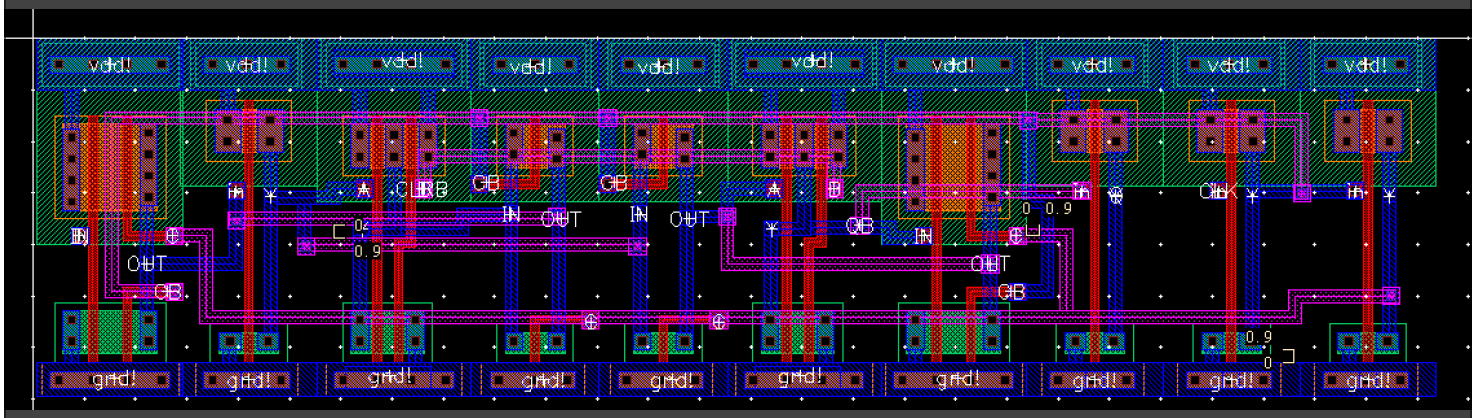

D
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
CLK
CLRB
In
Out
In
Out
Out
In
In
Out
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
QB

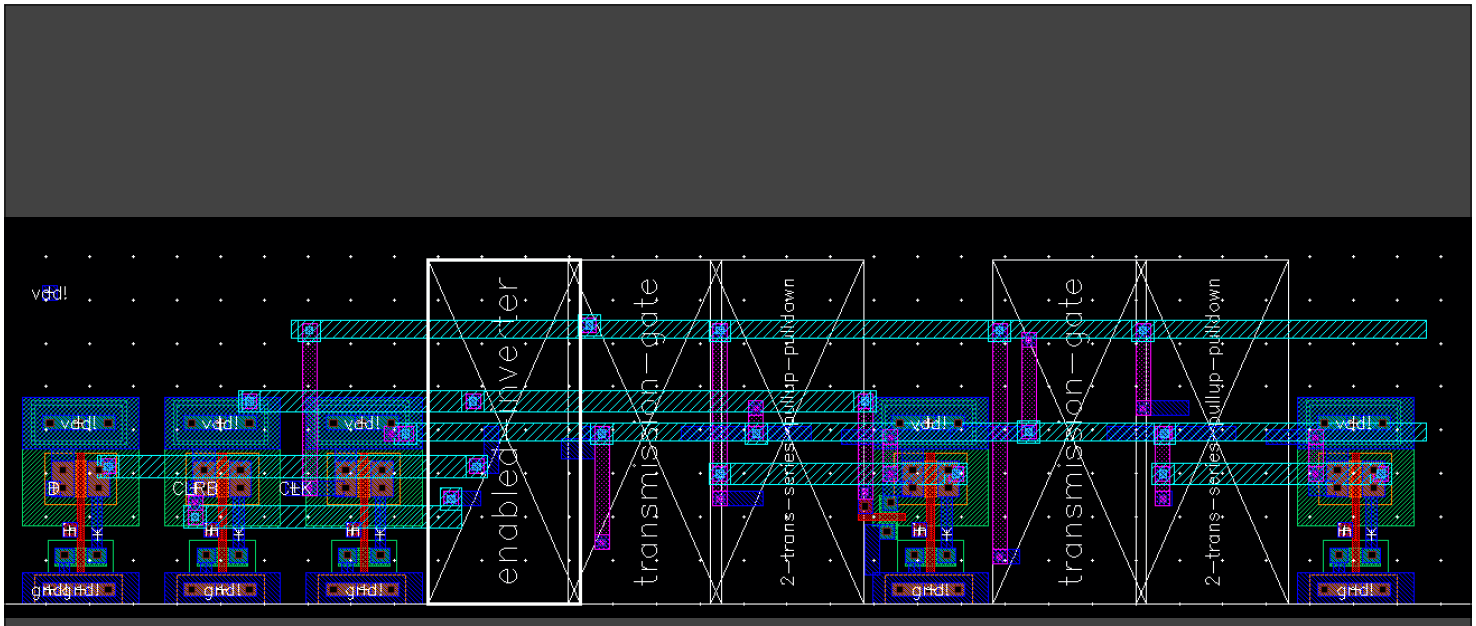

vdd!
CLKB
QB
gnd!

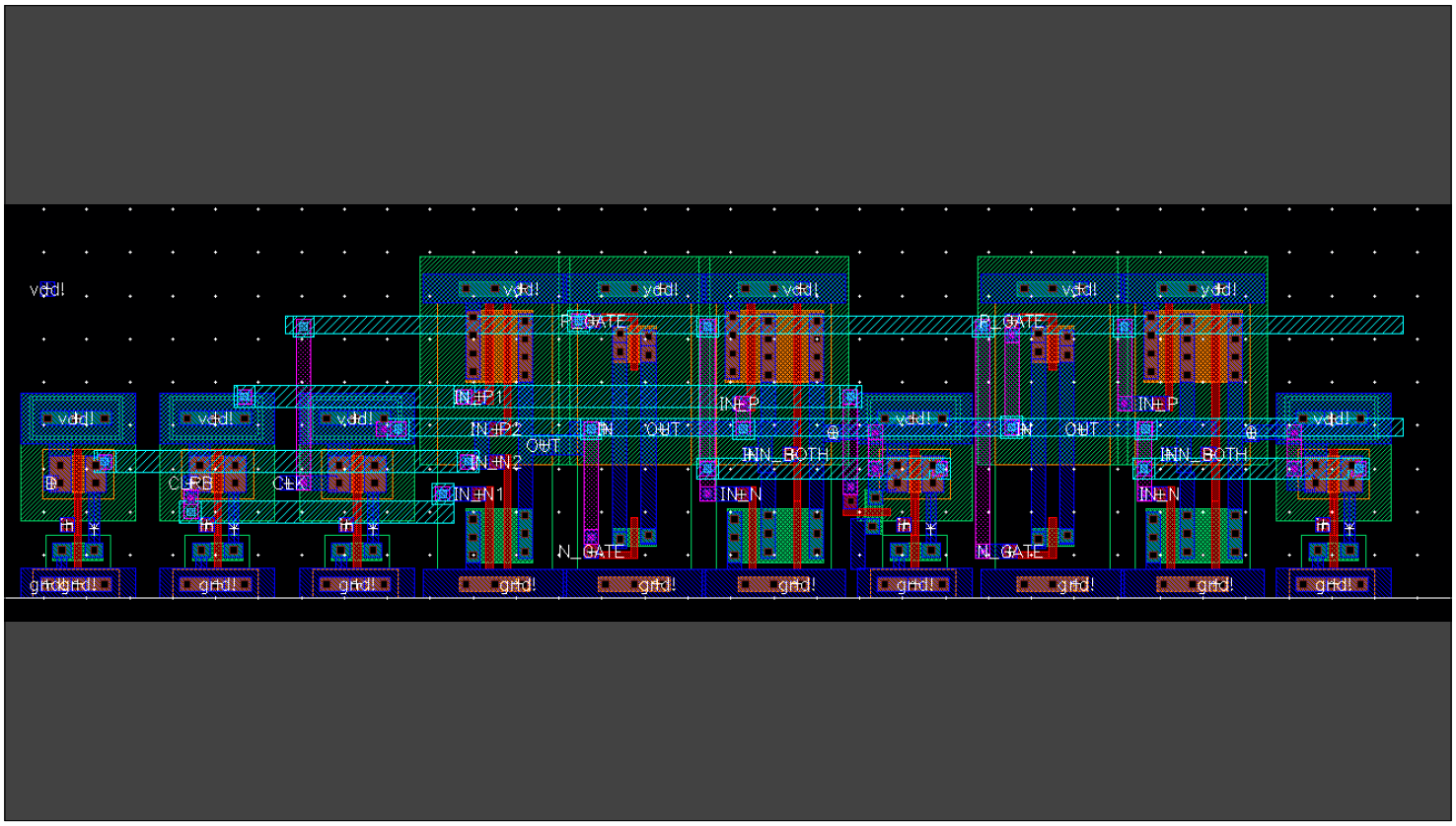

vdd!
CLRN
CLKN
CLK
D
DO
gnd!
QN

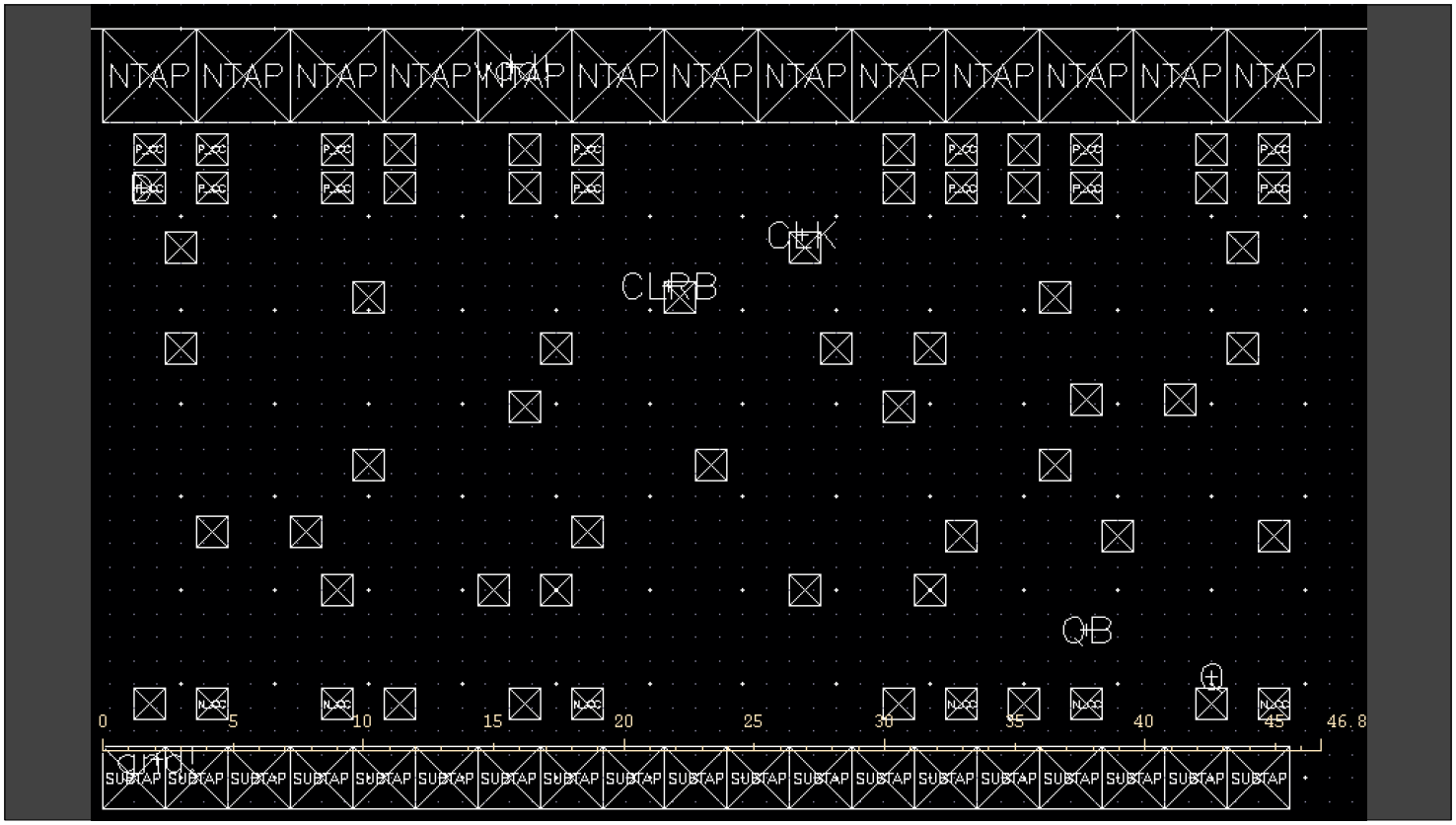


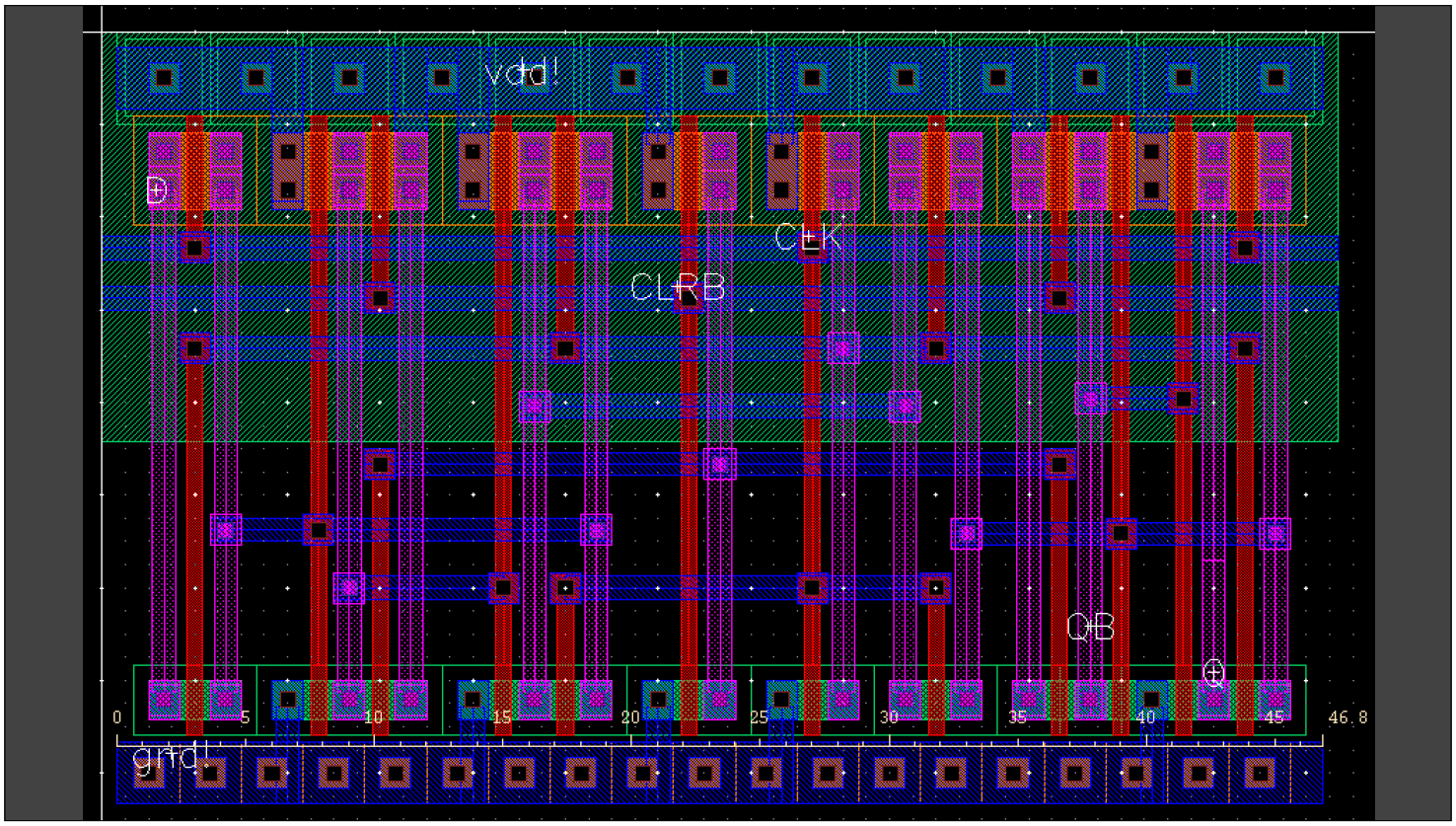

vdd!
vdd!
vdd!
vdd!
vdd!
EnBar
Outr
Outr
EnBar
Outr
In
In
En
Outr
En
Outr
gnd!
gnd!
gnd!
gnd!
gnd!

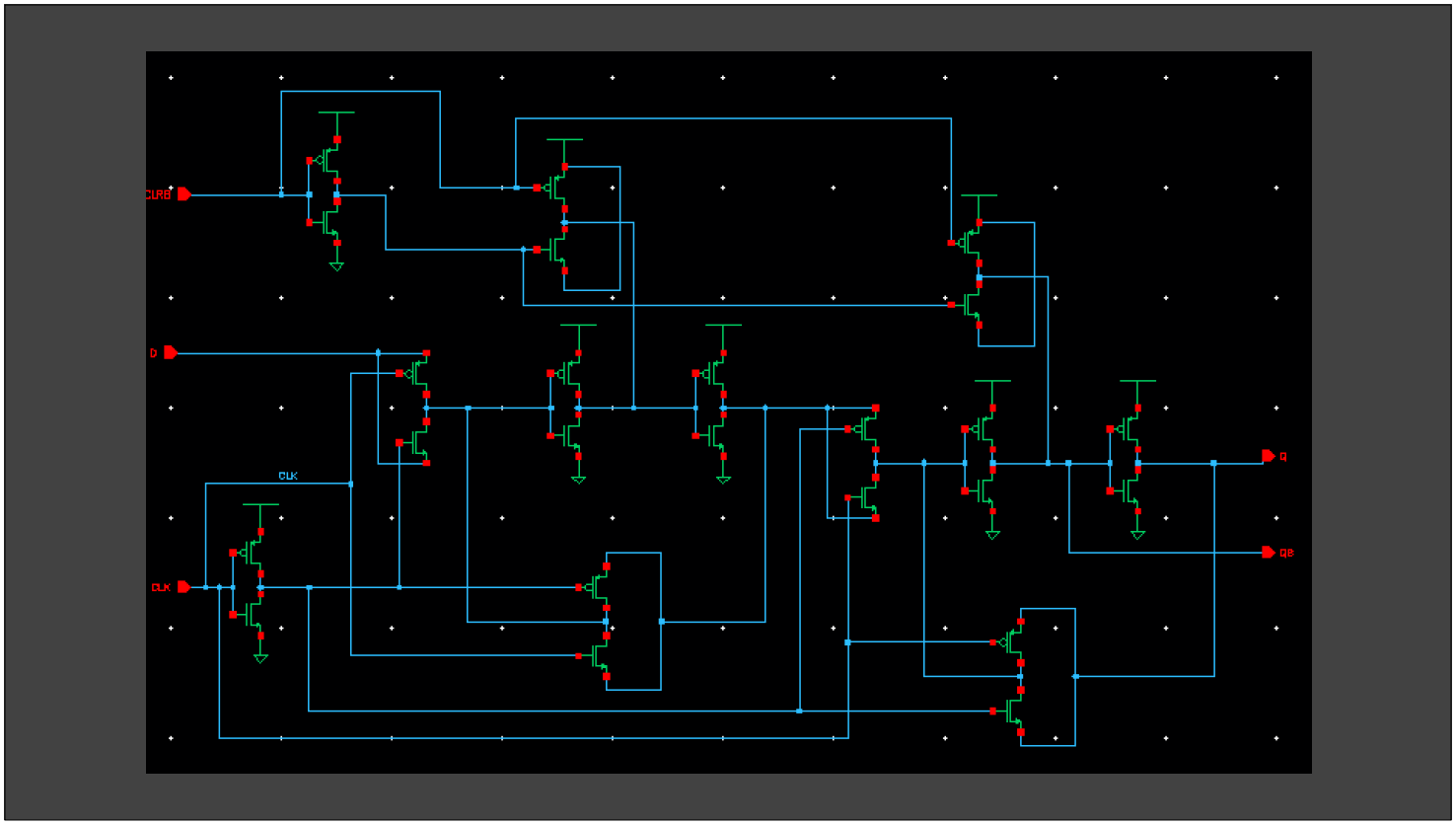

vdd!
gnd!
IN
OUT
CLKB
CLK
0.9
0

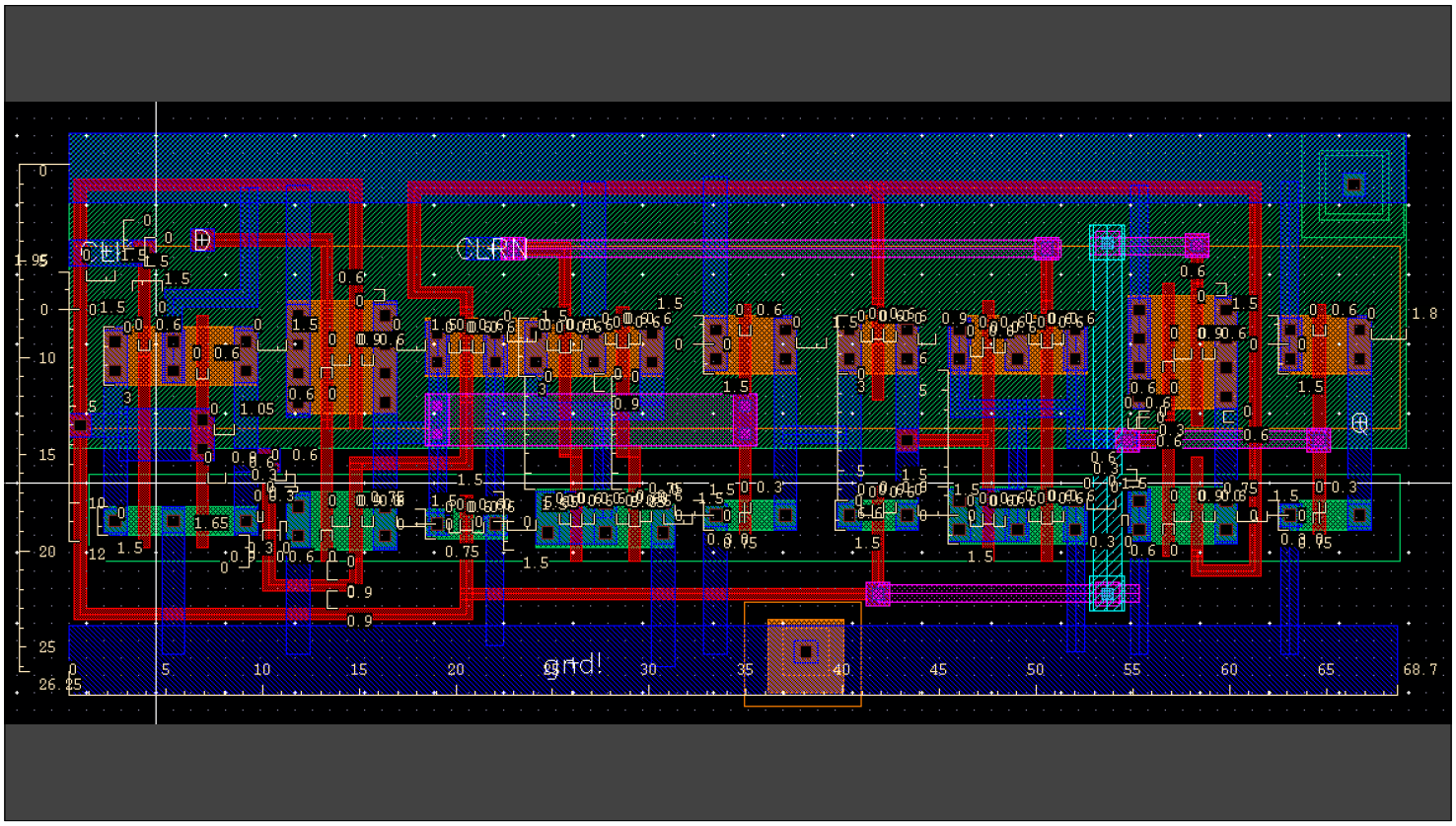

vdd!
gnd!
CLKB
CLK
enabled inverter
transmission-gate
2-trans-series pullup-pulldown
transmission-gate
2-trans-series pullup-pulldown

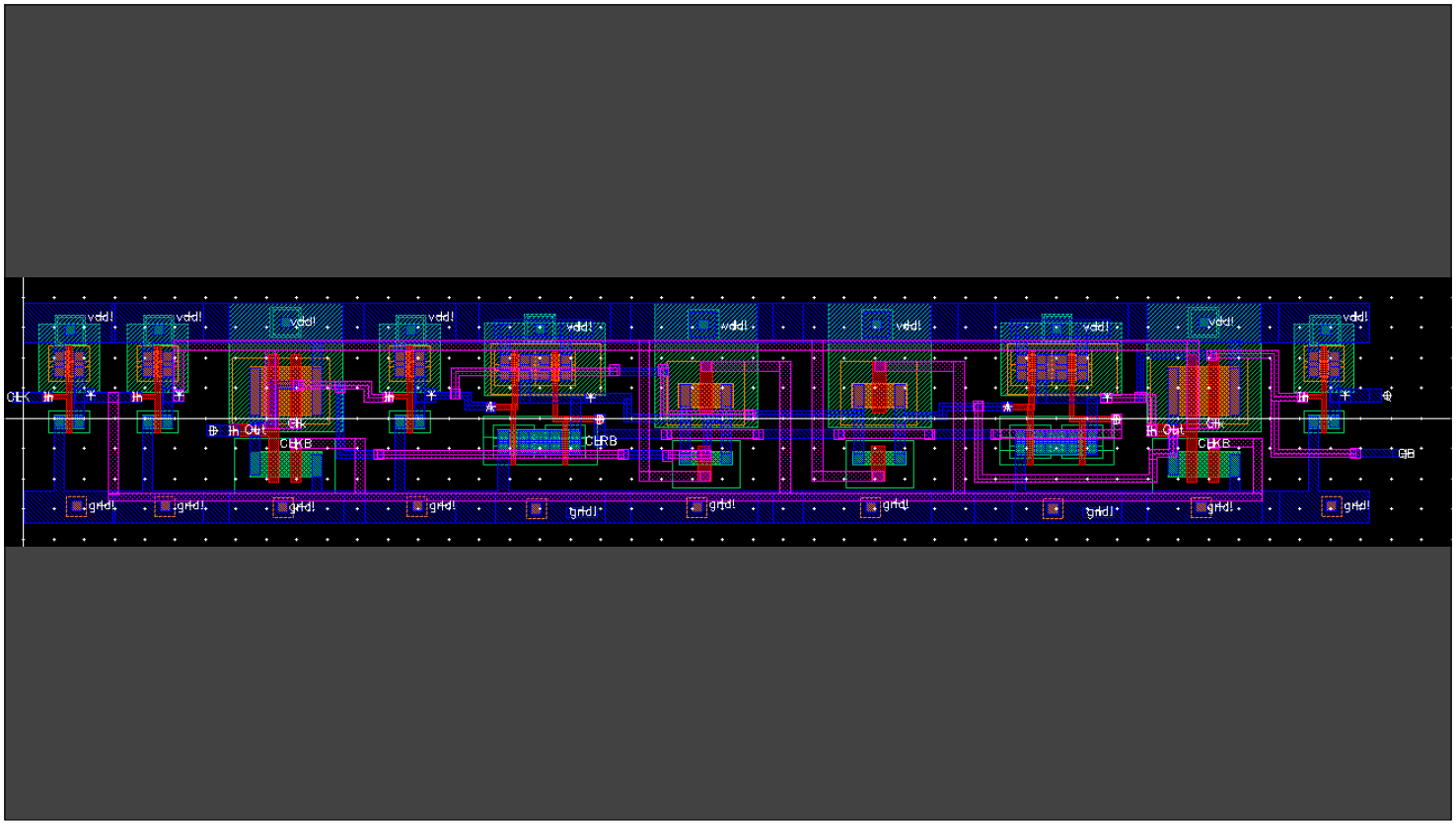

vdd!
P_GATE
INP1
INP2
INN2
INN1
OUT
IN
CLKB
CLK
INP
INN_BOTH
INN
N_GATE
gnd!

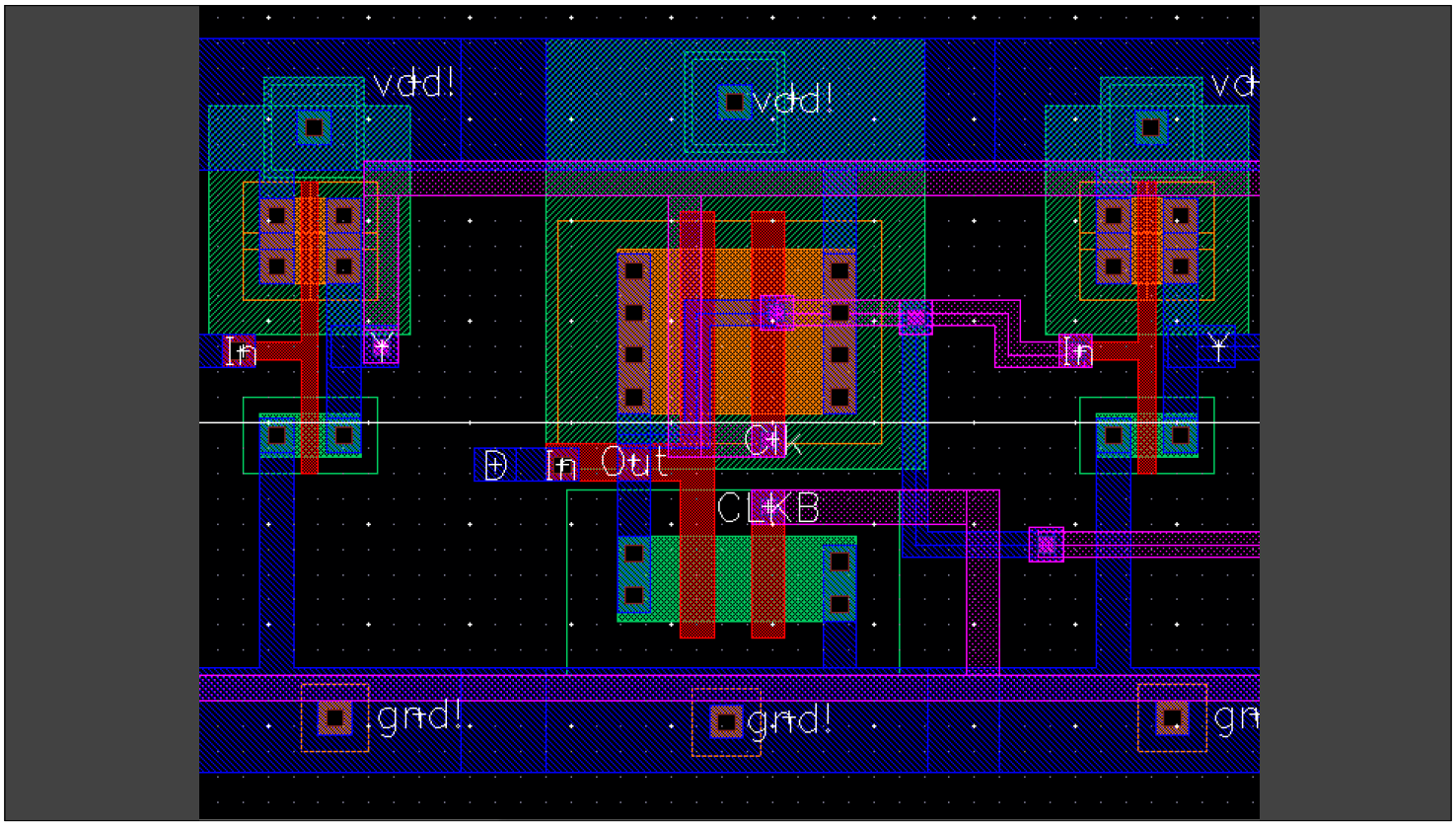

NTAP
vdd!
CLK
CLKB
QB
0
5
10
15
20
25
30
35
40
45
46.8
gnd!
SUBTAP

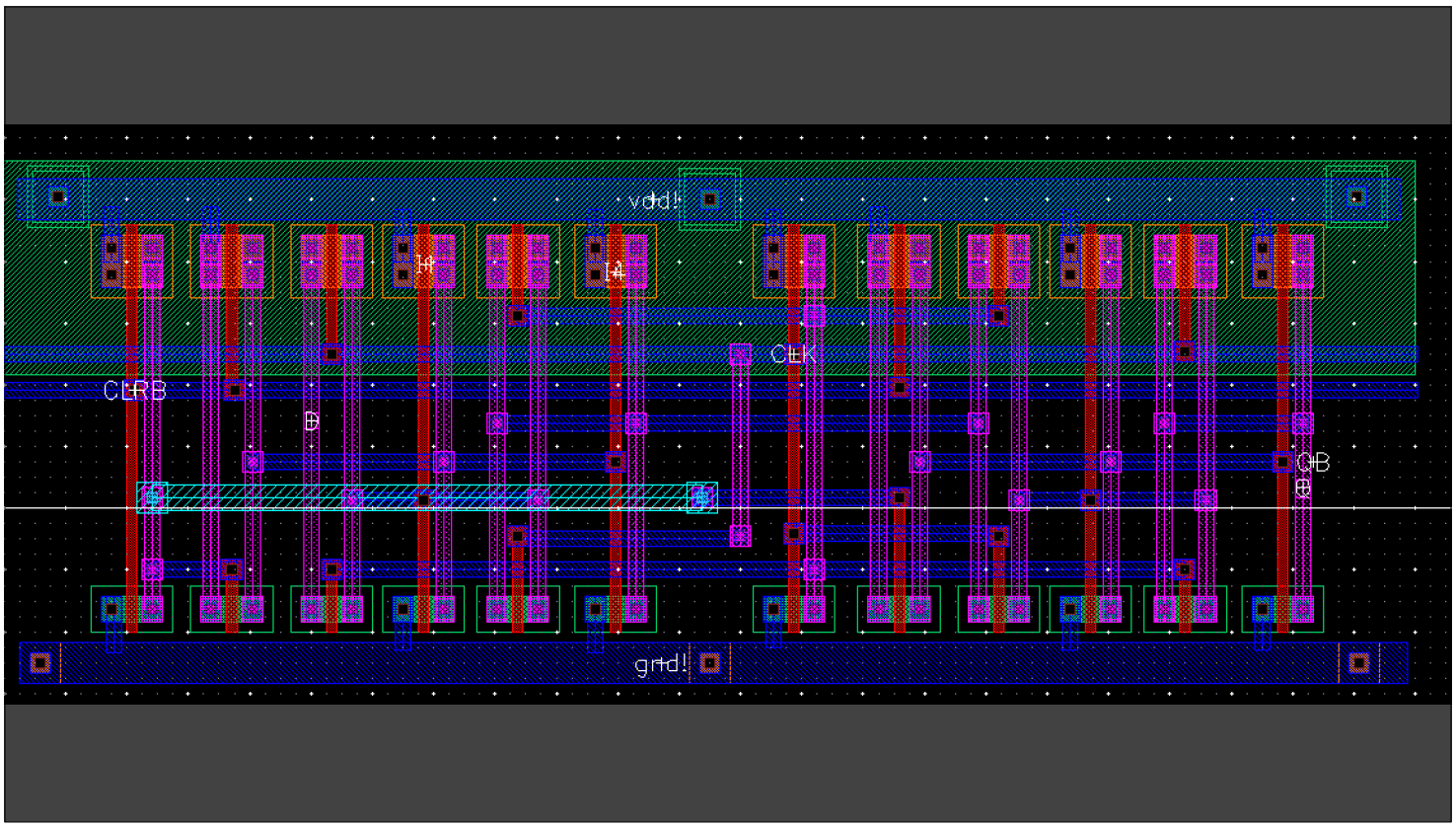

vdd!
D
Clk
CLRB
QB
Q
0
5
10
15
20
25
30
35
40
45
46.8
gnd!

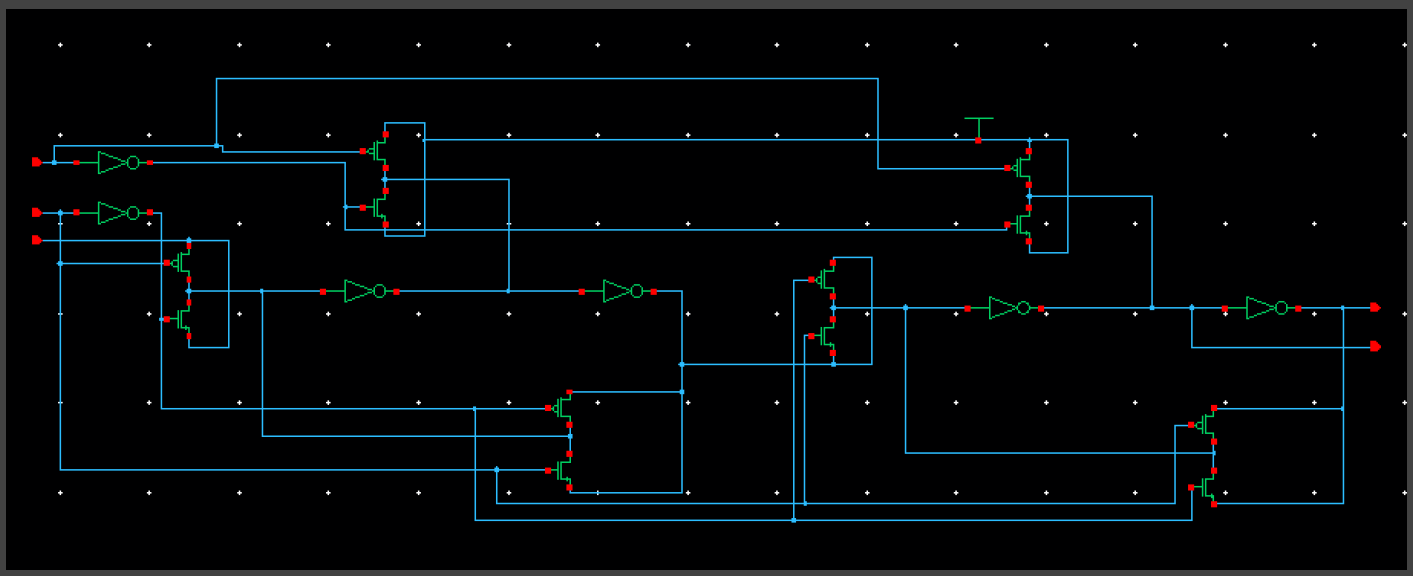

CLRB
D
CLK
clk
Q
QB

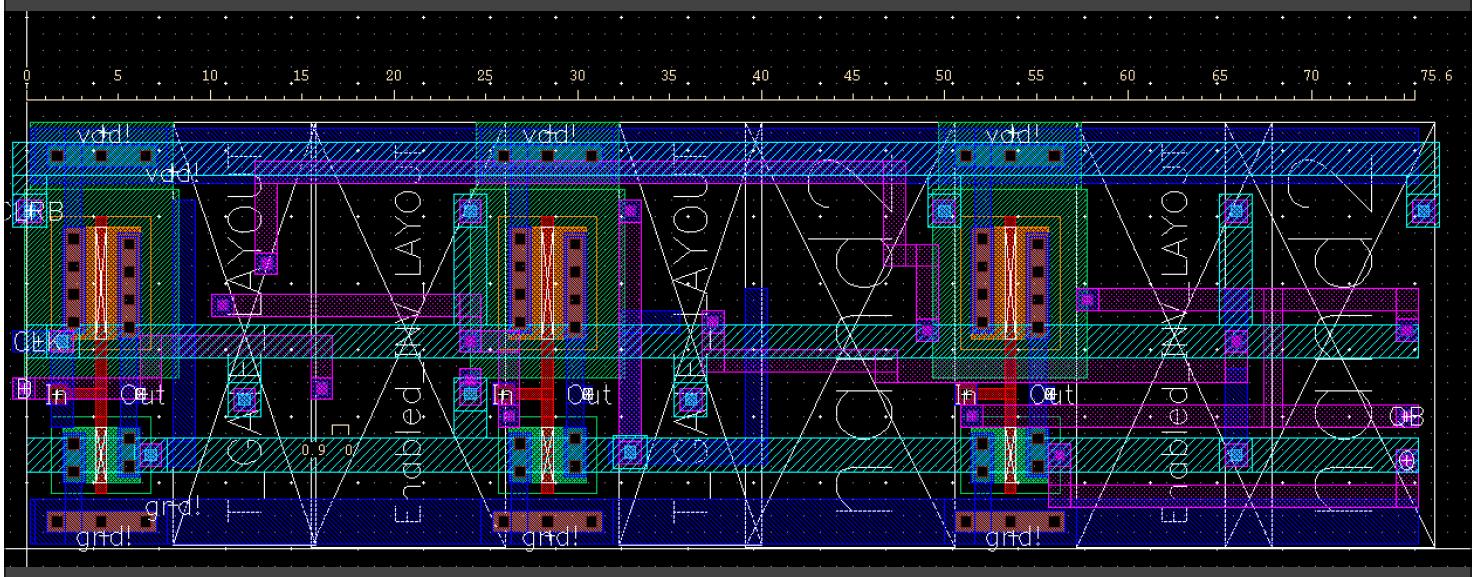

CLRN
gnd!

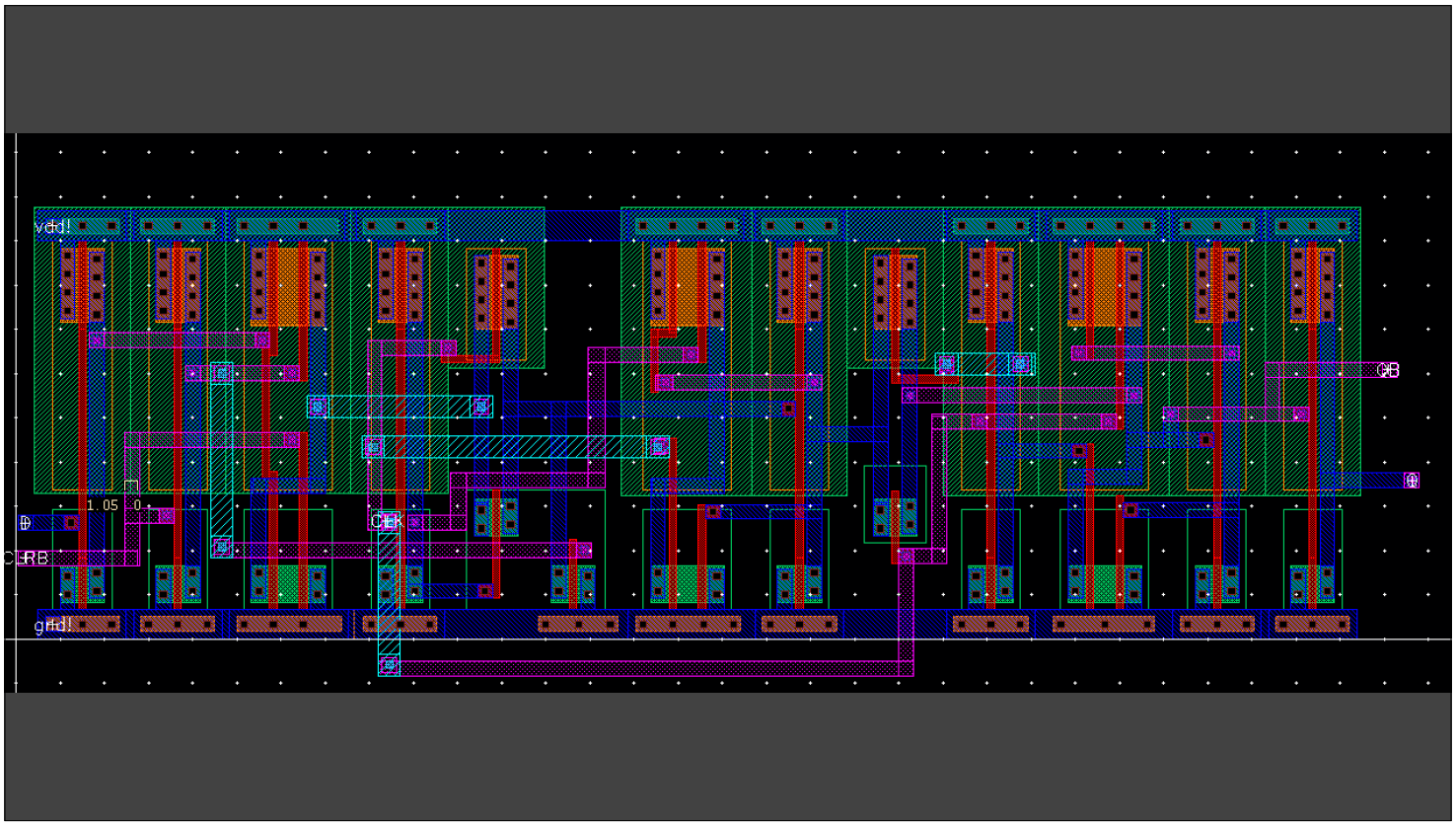

vdd!
gnd!
CLK
In
Out
CLKB

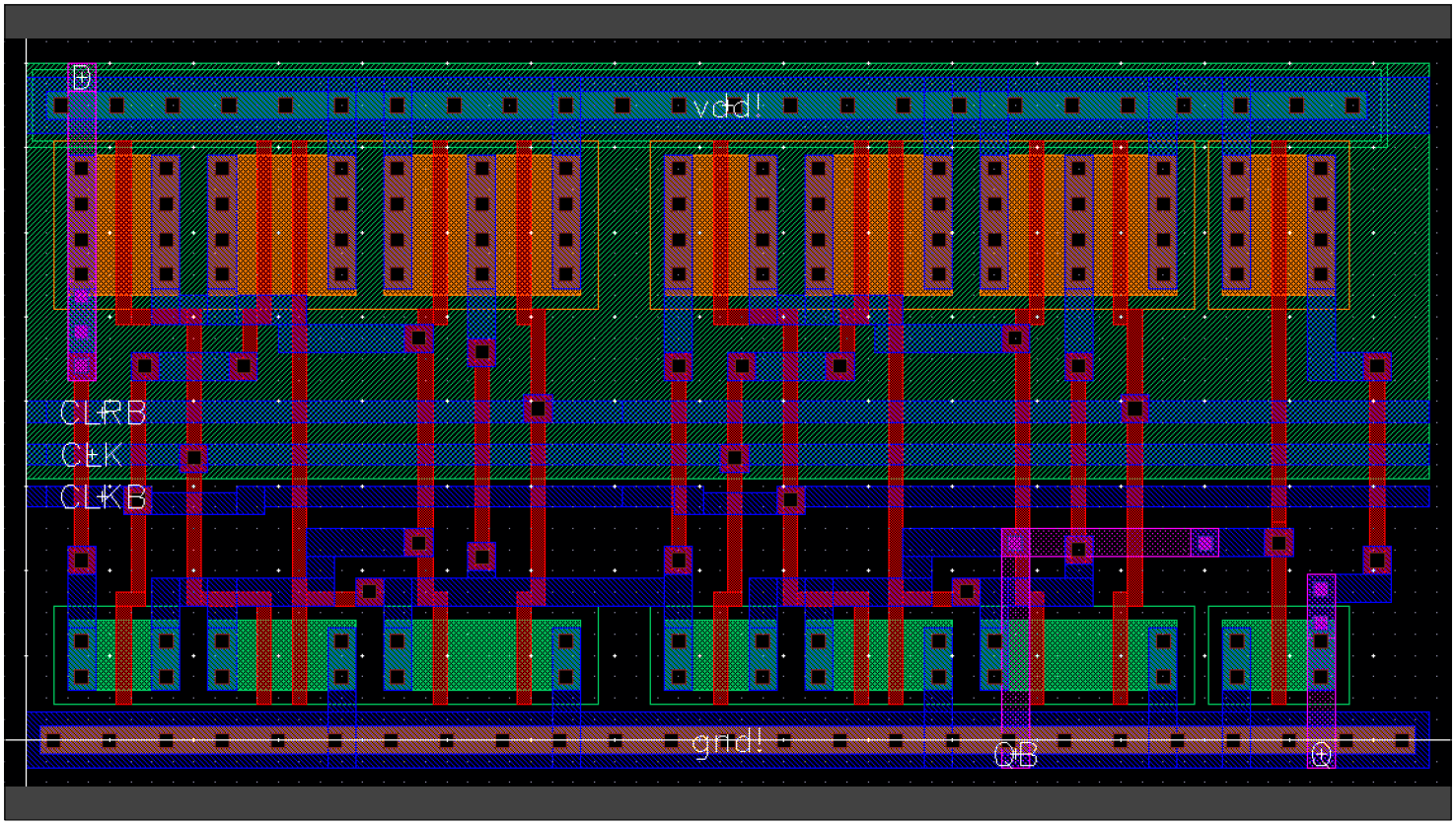

vdd!
vdd!
In
Y
In
Y
Ck
D
In
Out
CLKB
grnd!
grnd!

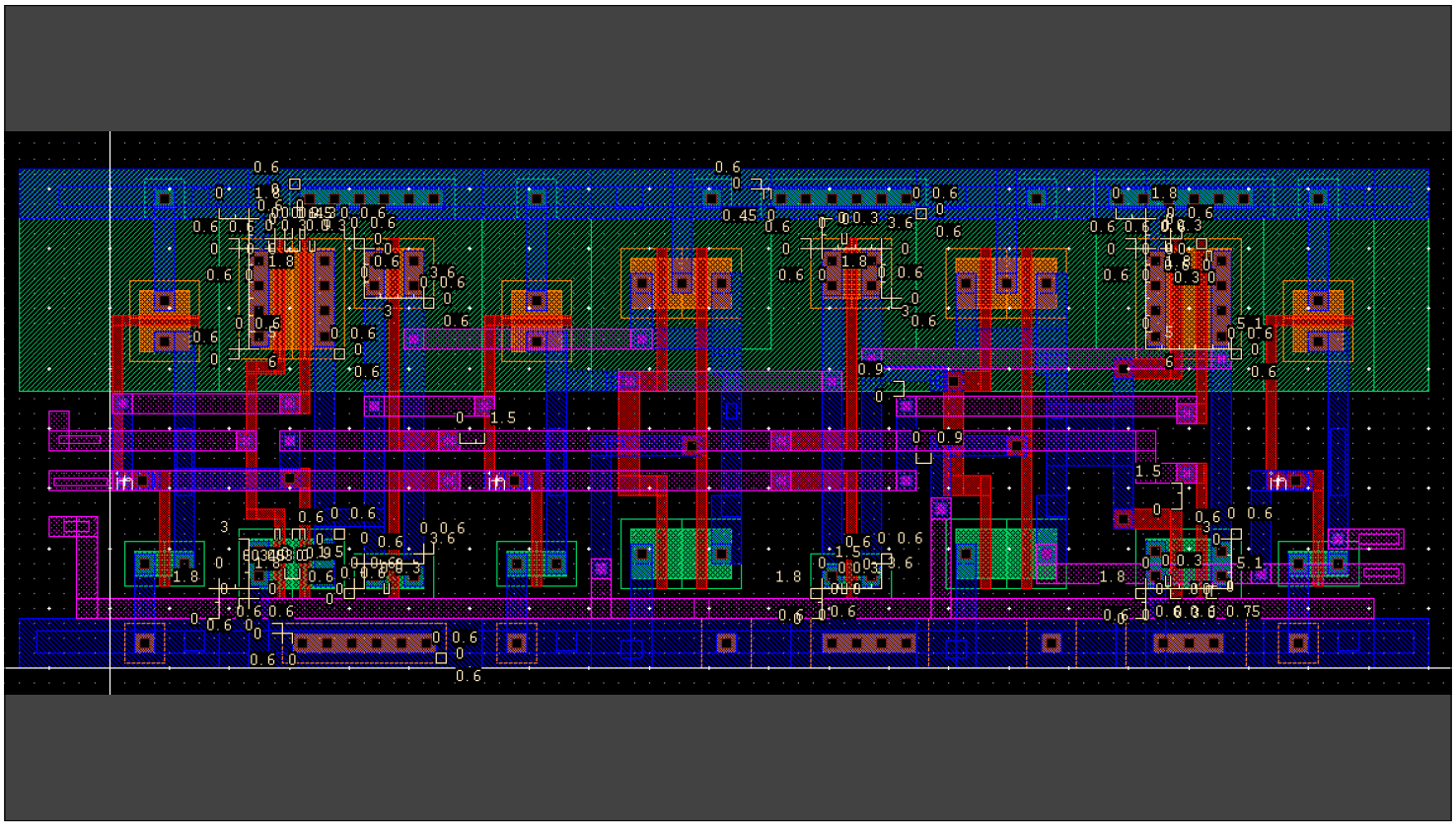

vdd!
In
In
CLK
CLKB
D
CLKB
D
grnd!

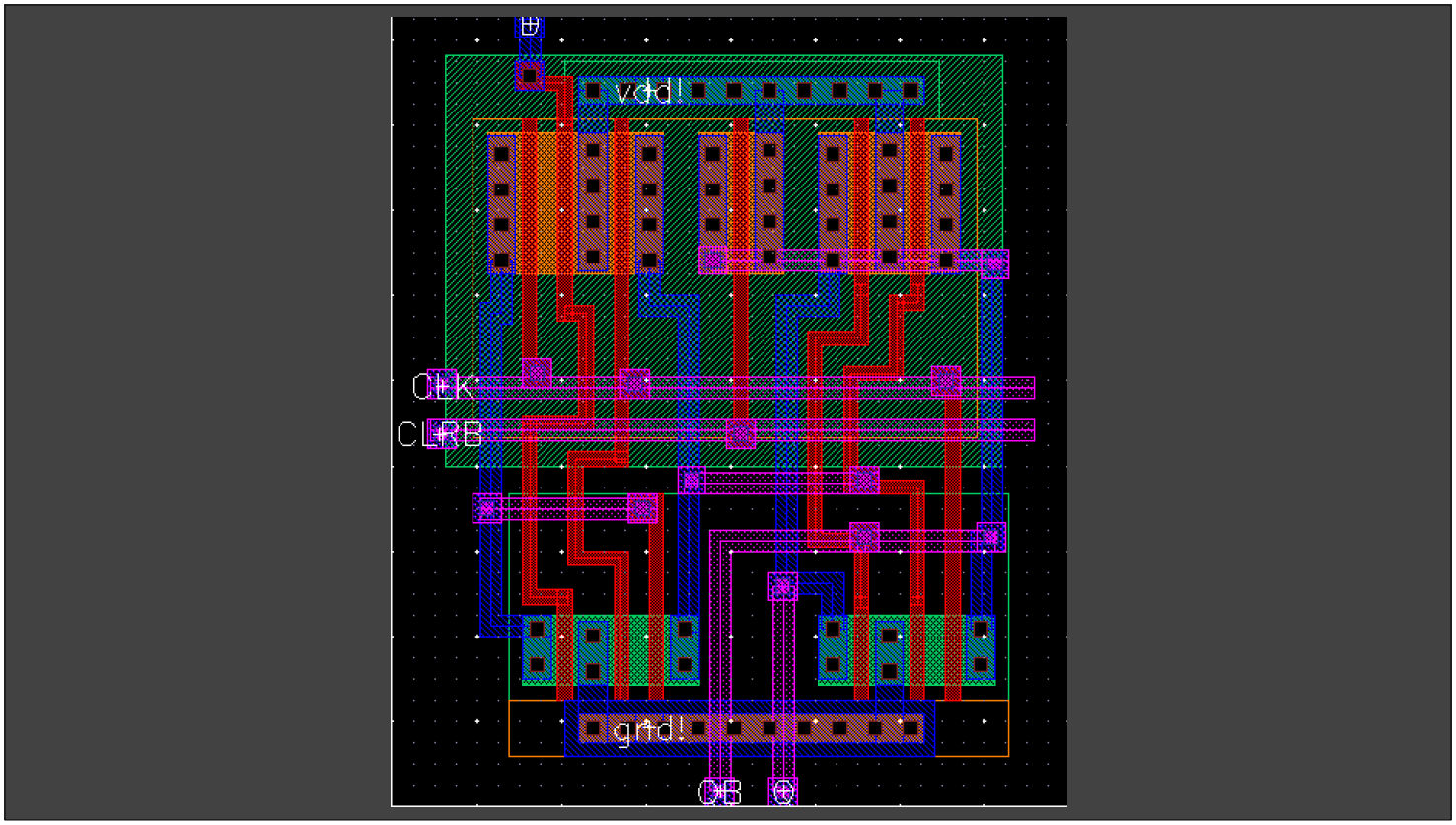


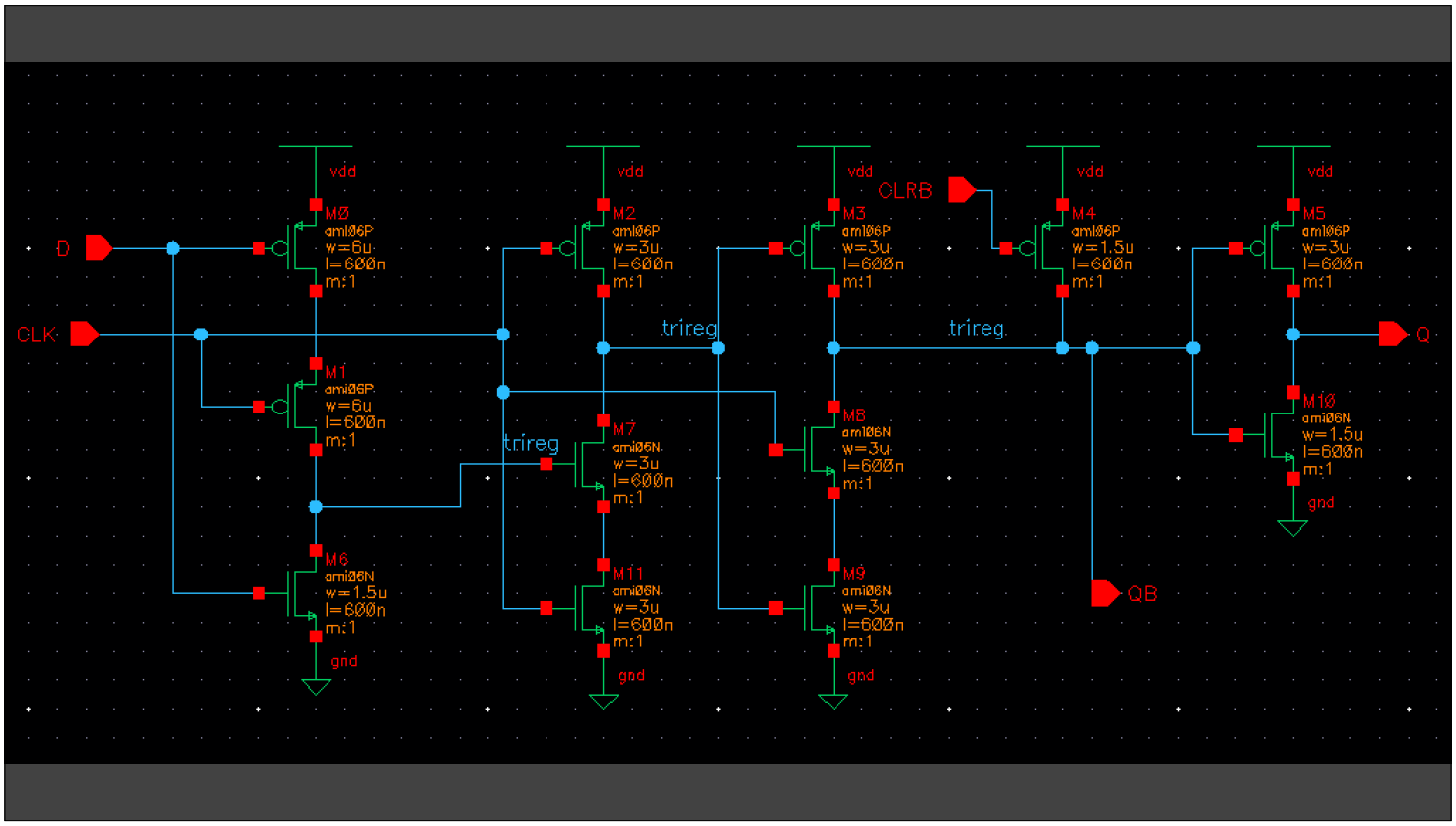

0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75.6
vdd!
vdd!
vdd!
vdd!
CE
CEB
In
Out
In
Out
In
Out
CE
grd!
grd!
grd!
grd!
Enabled_AV_LAYOUT
Enabled_AV_LAYOUT
Enabled_AV_LAYOUT


vdd!
QB
D
CLRB
CLK
gnd!


D
vdd!
CLRB
CLK
CLKB
gnd!
QB
Q

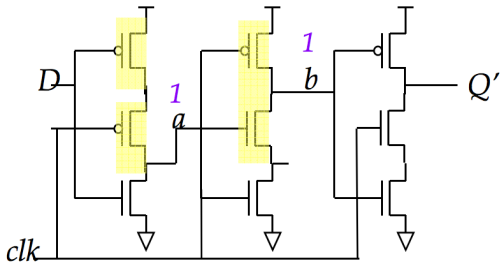

in
in
in


vdd!
Clk
CLKB
gnd!

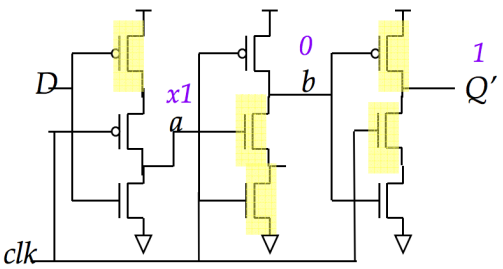


Operation

D=0, clk=0

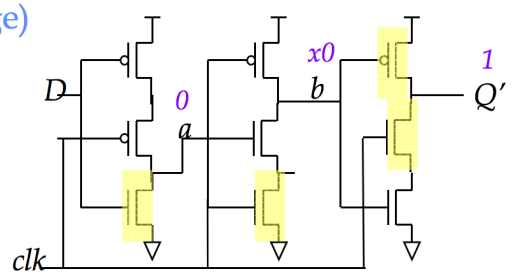


ck →1



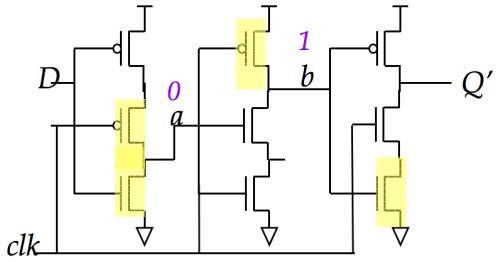
Note: a/b floats high or low (x0, x1)

D→1, clk=1 (Q′ should not change)

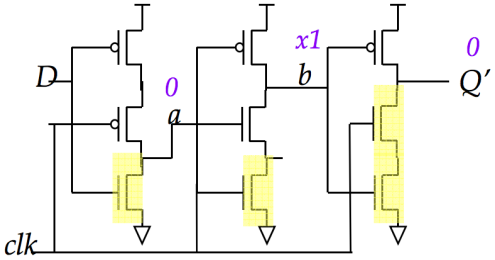


Operation

D=1, clk=0

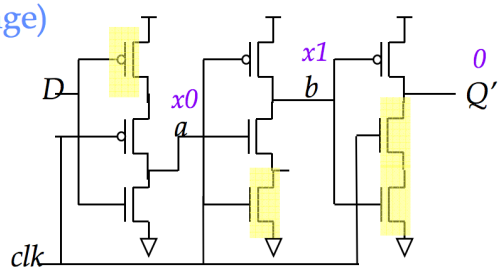


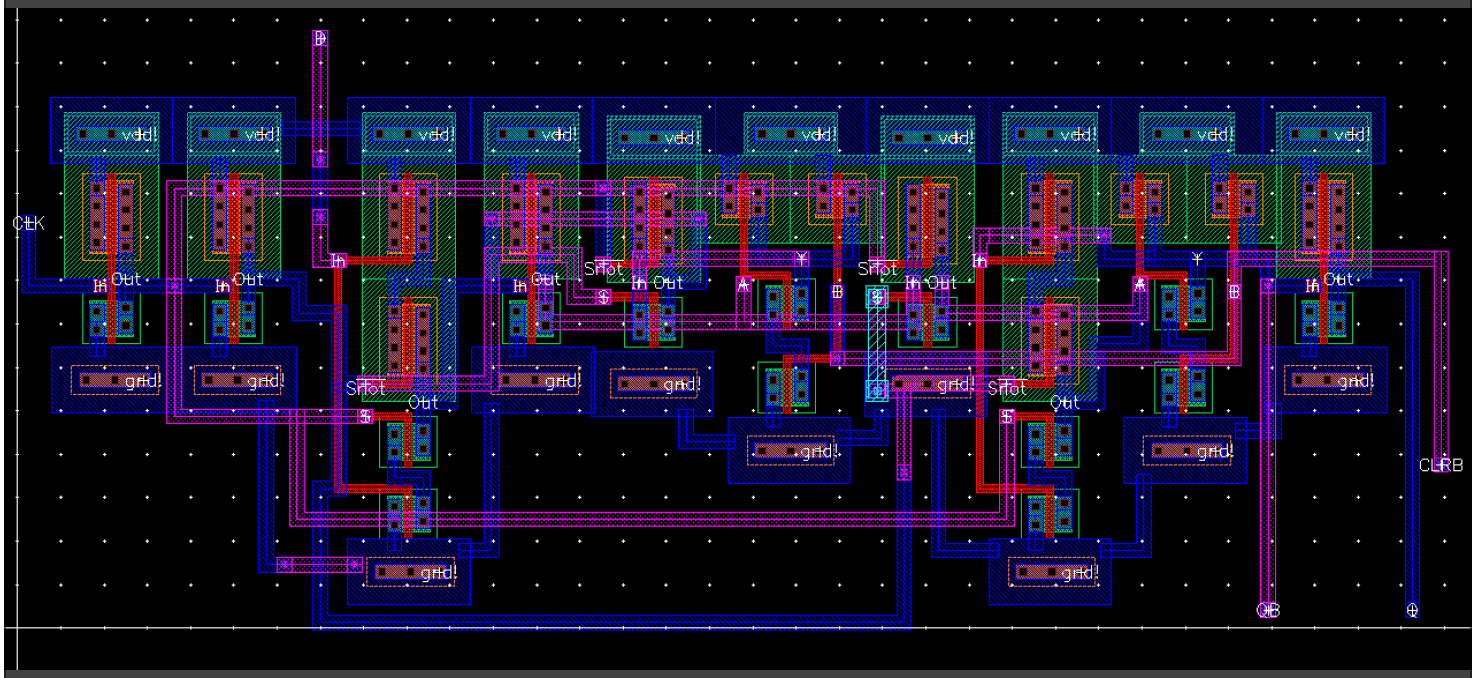
ck →1

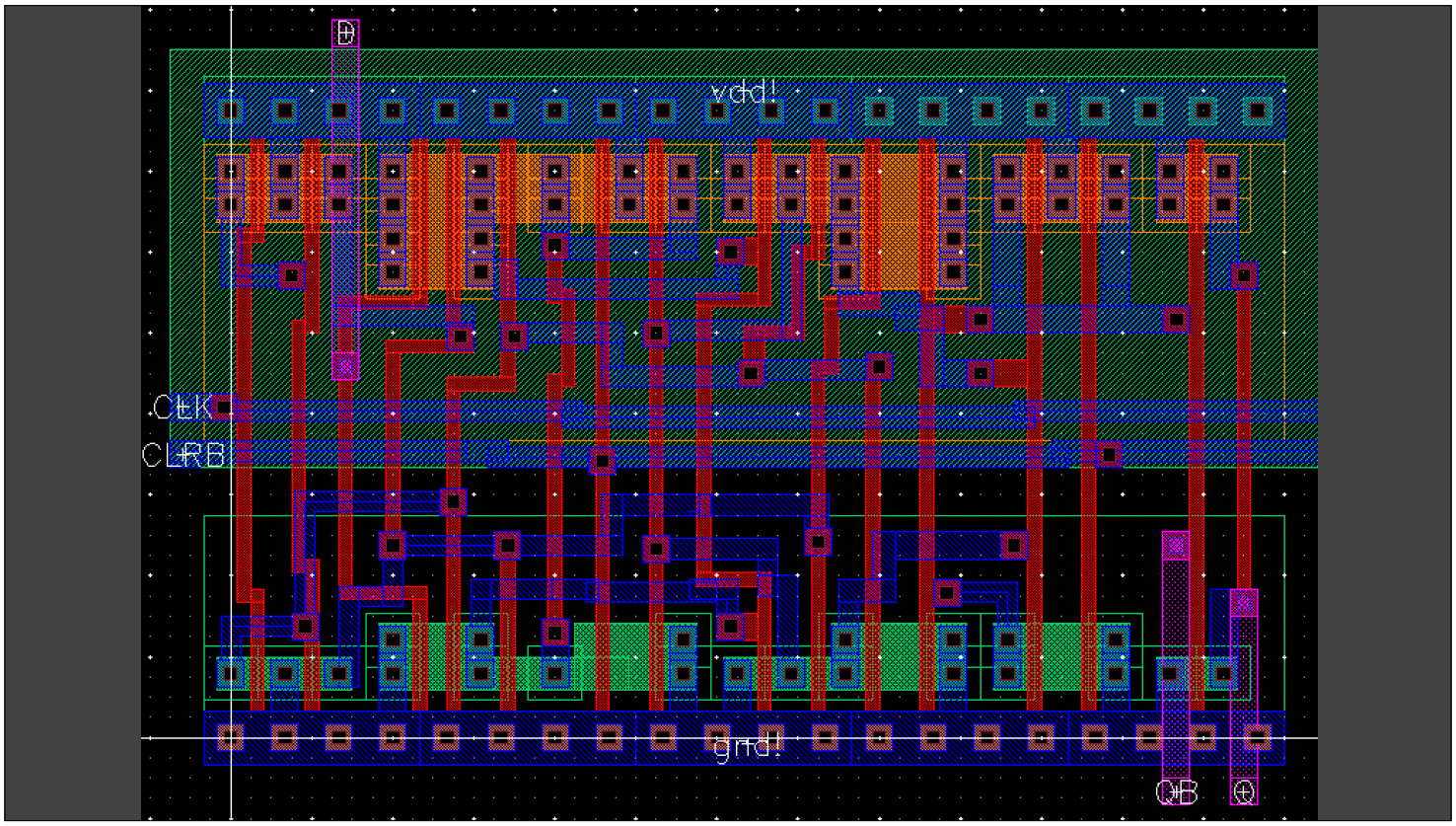


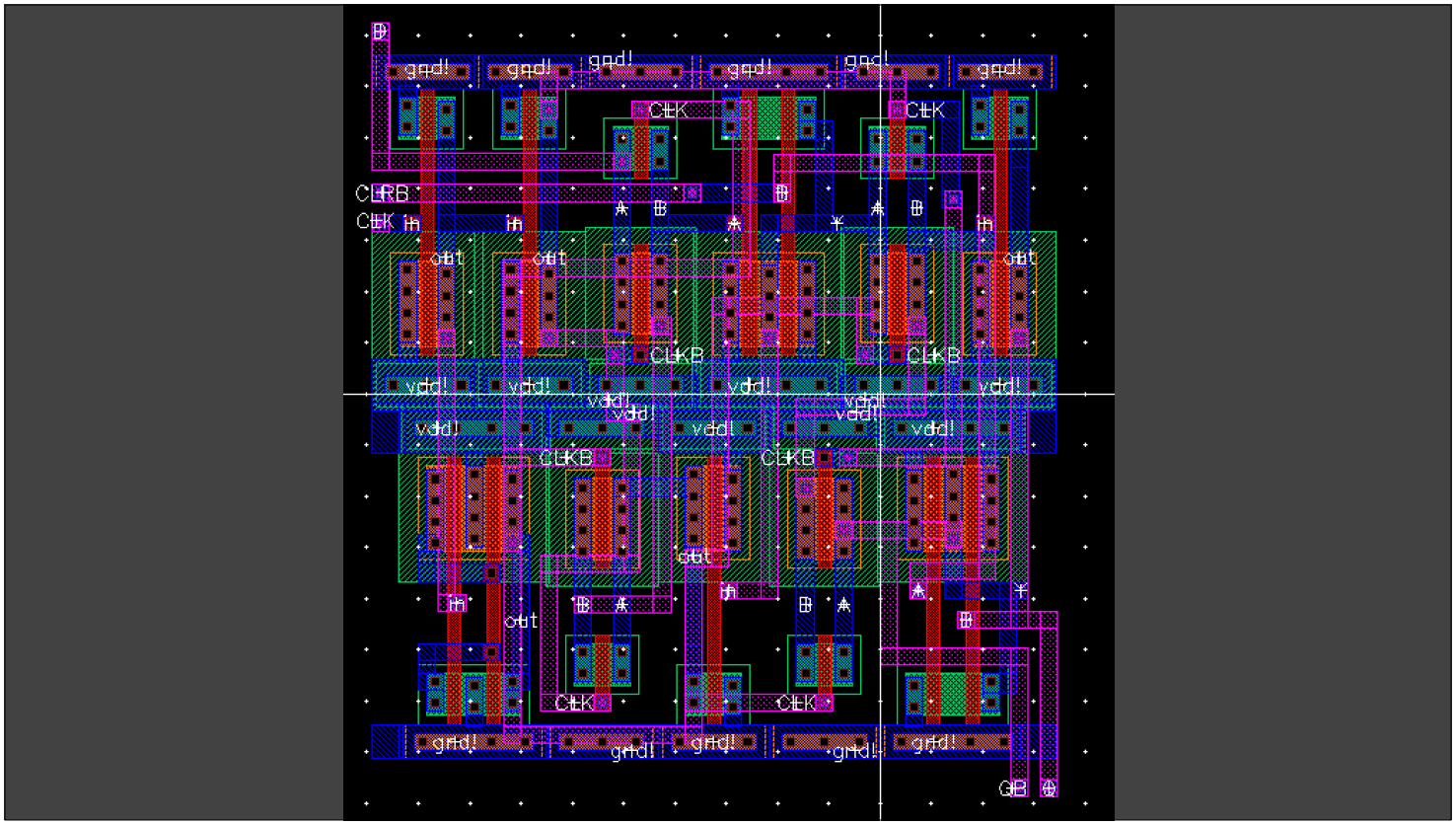
Note: a/b floats high or low (x0, x1)

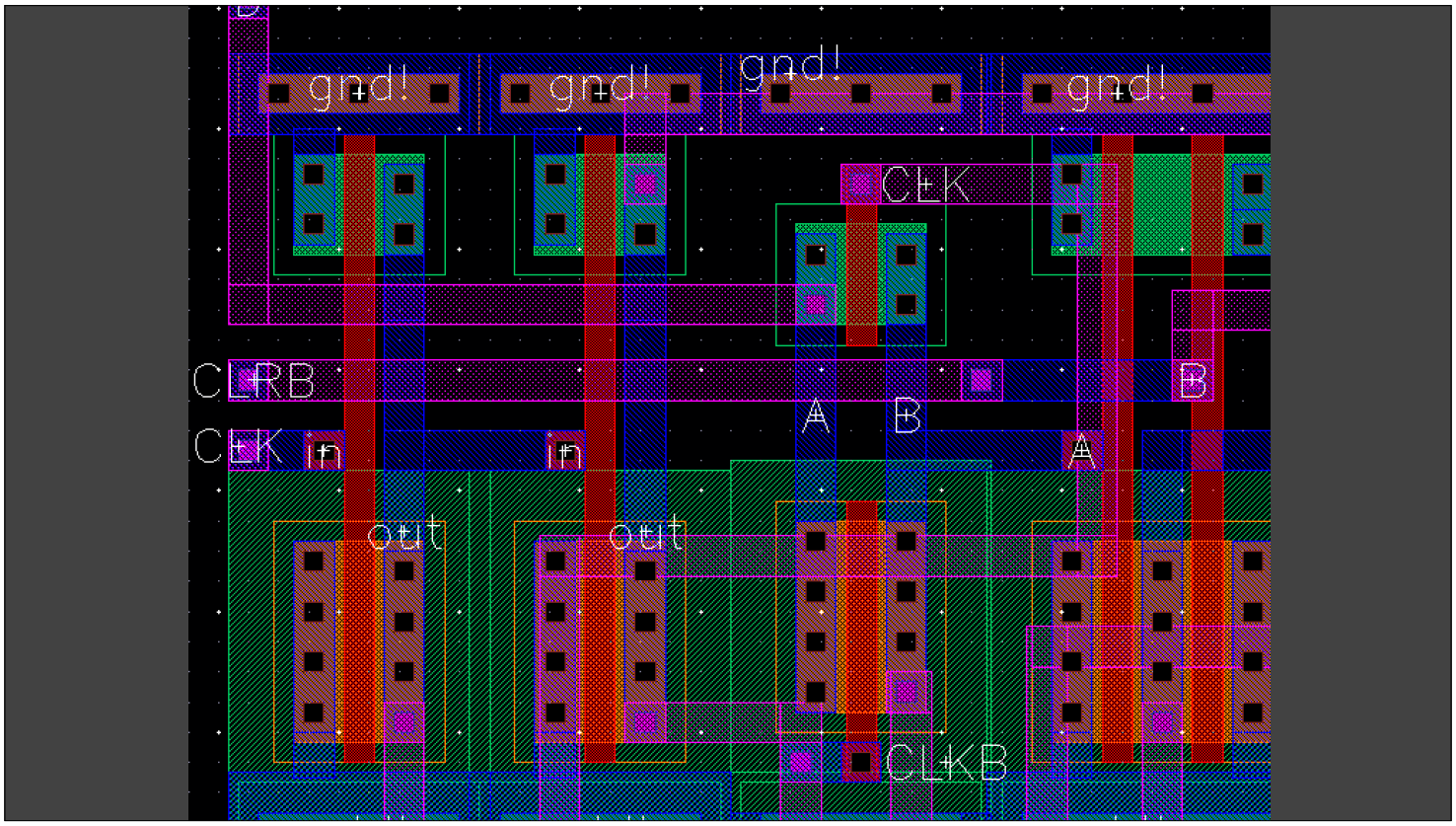
D→0, clk=1 (Q′ should not change)

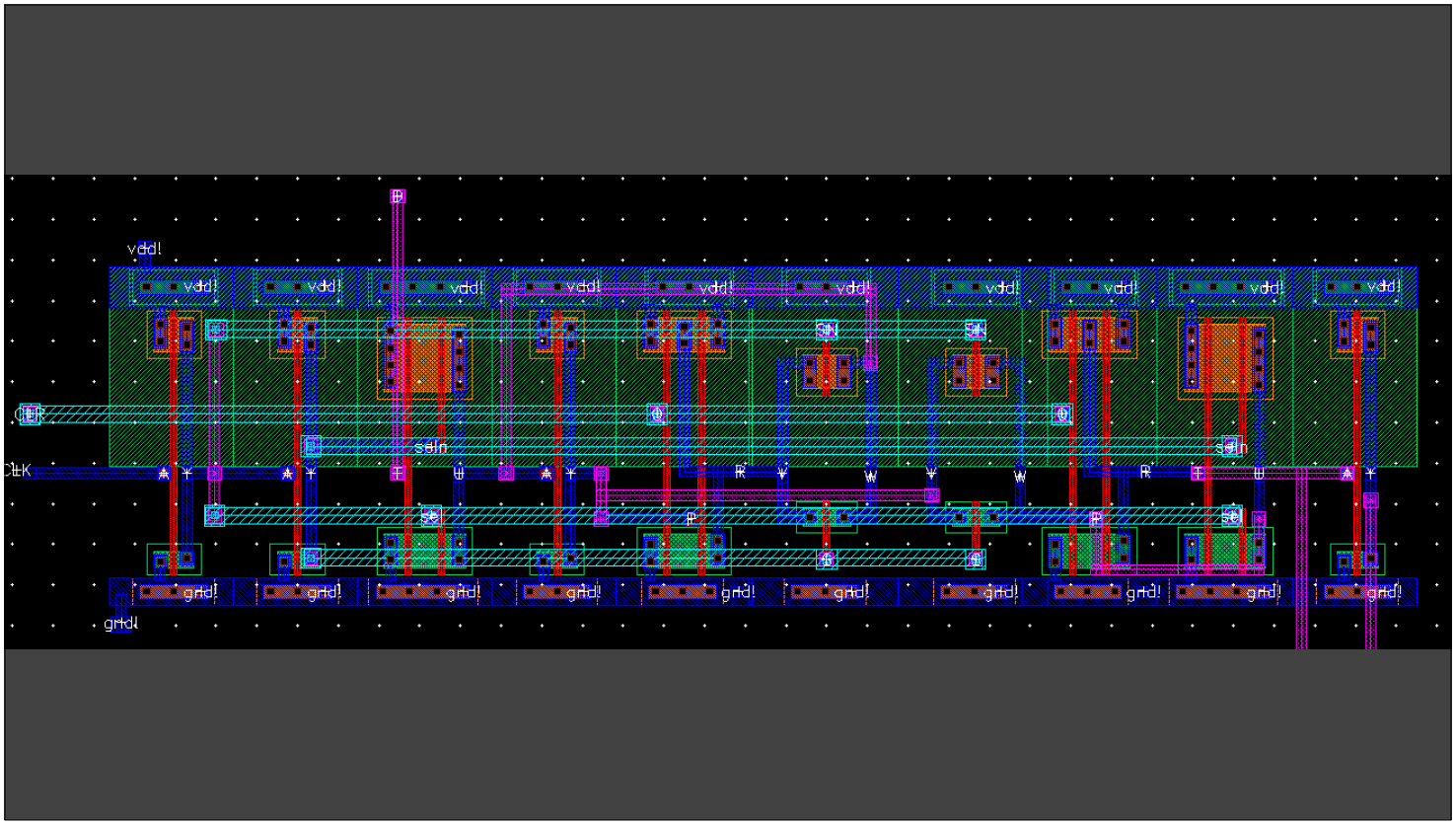


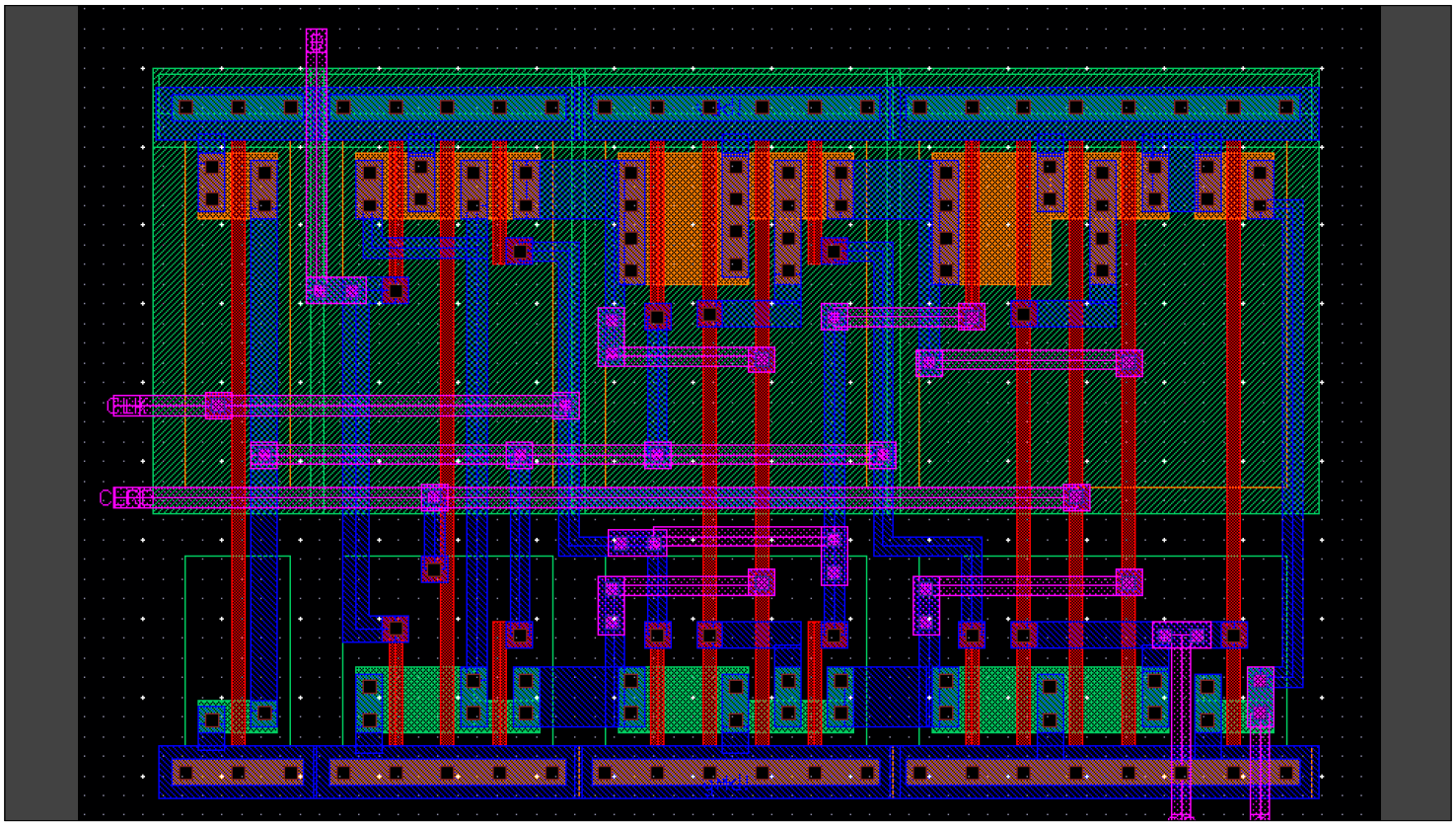


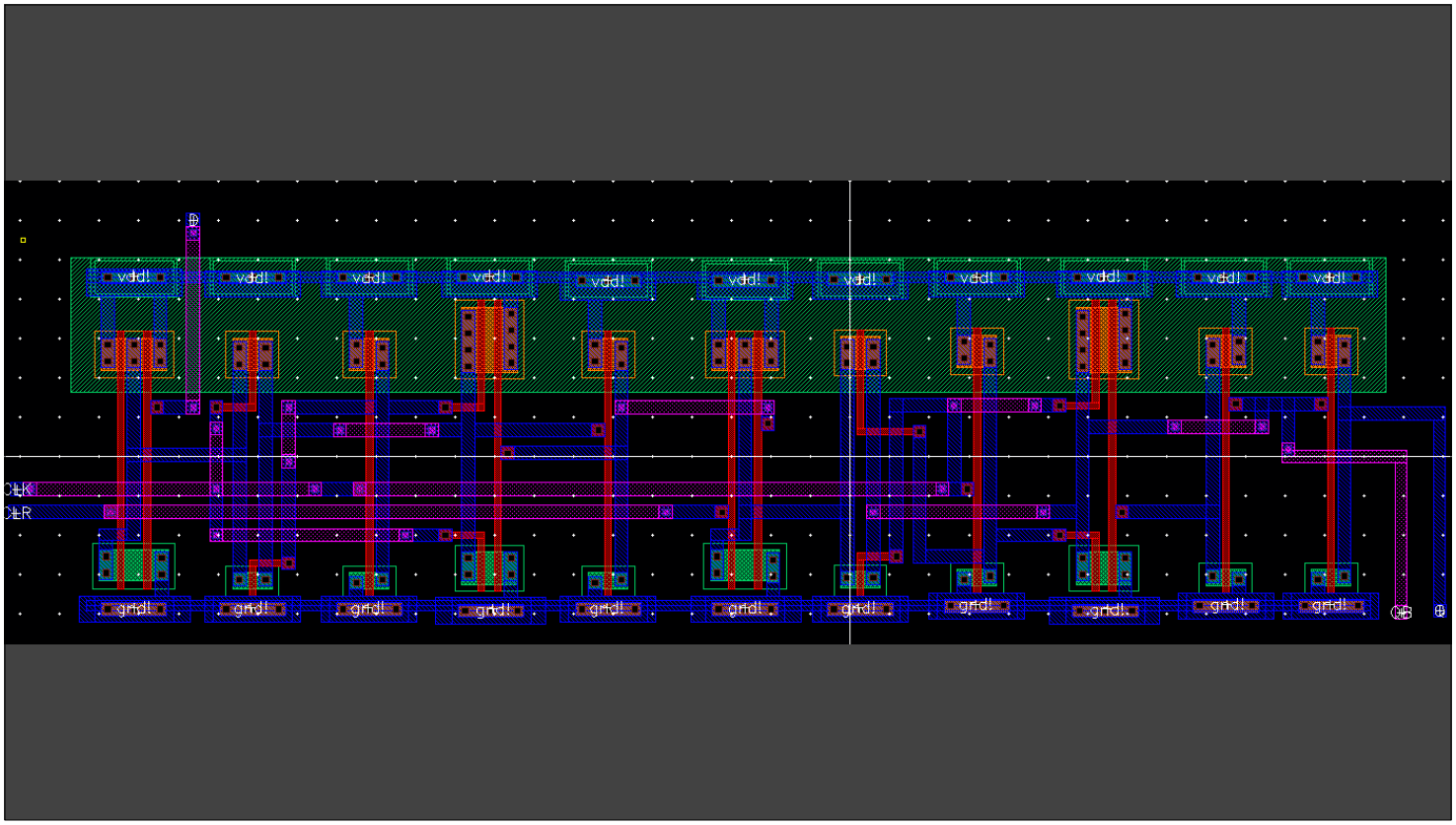

vdd!
CLK
CLKB
gnd!


gnd!
CLK
CLKB
in
out
vdd!


gnd!
gnd!
gnd!
gnd!
CLK
CLRB
B
A
B
CLK
in
in
A
out
out
CLKB


vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
vdd!
CLRB
CLK
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!
gnd!

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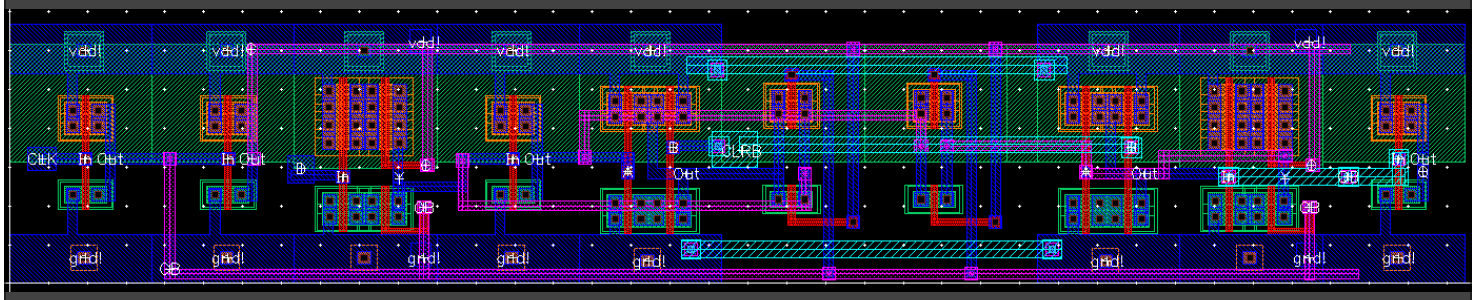

Lots of variety!
No perfect answer…