# Logic Synthesis & Verification, Fall 2024

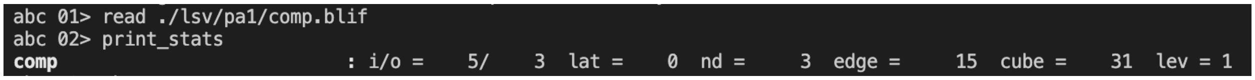
National Taiwan University

## Report of Programming Assignment 1

電子所碩一 R13943074 楊珩

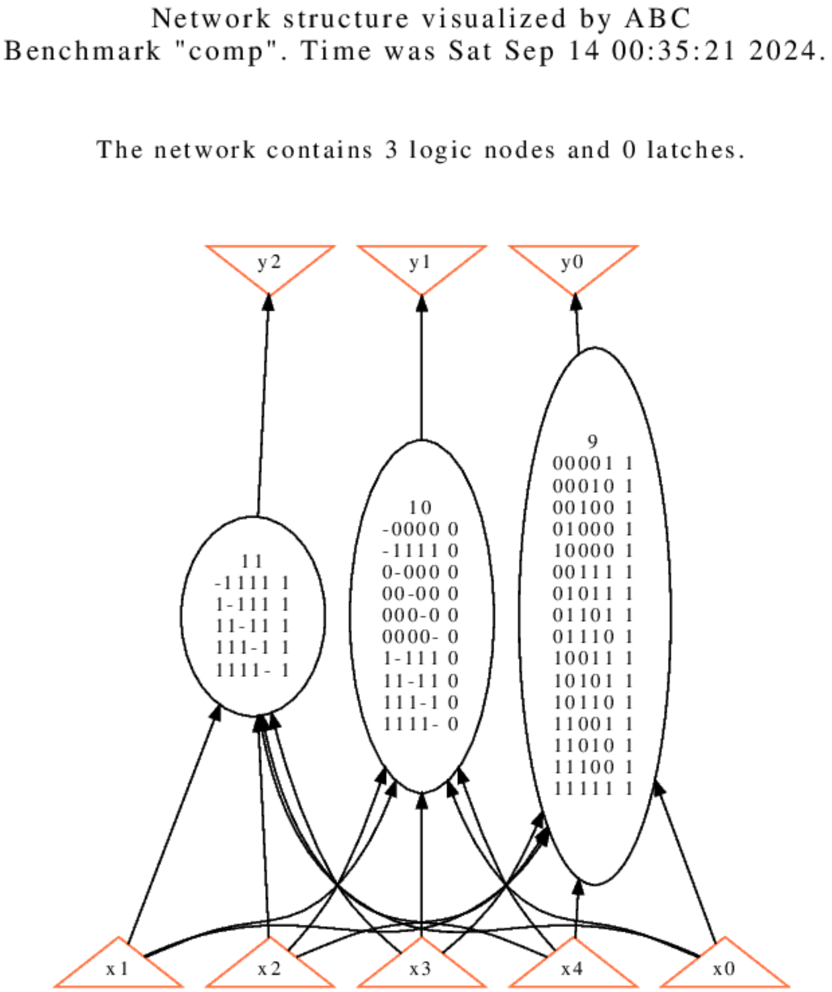
## 2 [Using ABC]

1. read the BLIF file into ABC (command “read”)
2. check statistics (command “print stats”)

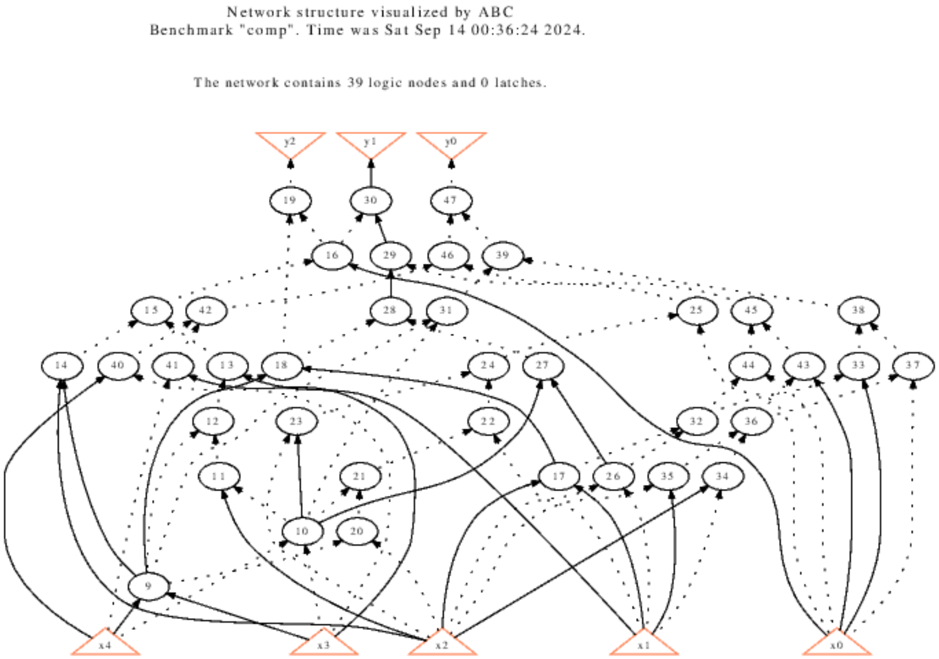


```
abc 01> read ./lsv/pa1/comp.blif
abc 02> print_stats
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  cube =     31  lev = 1
```

3. visualize the network structure (command “show”)



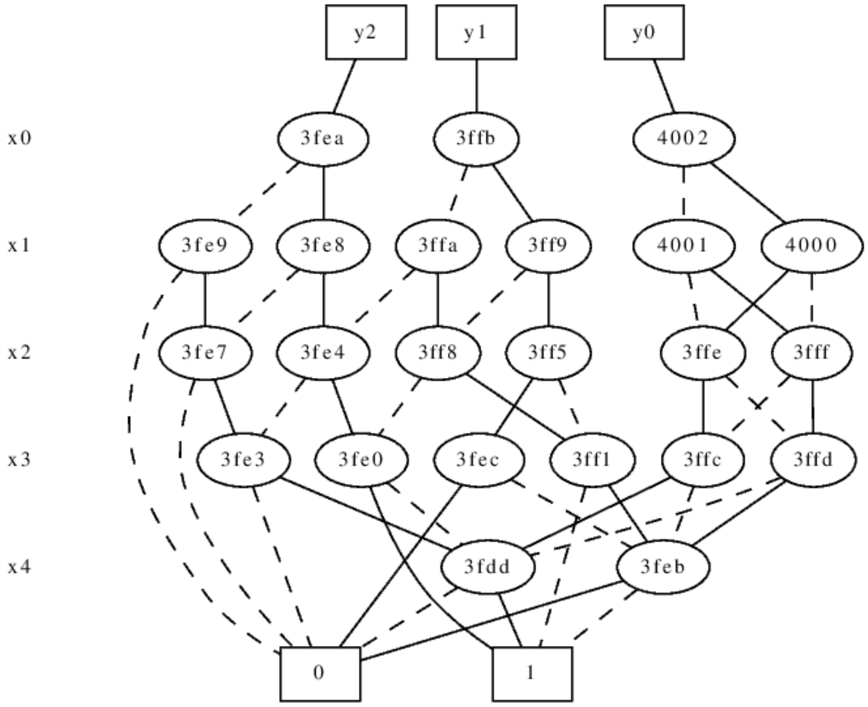
4. convert to AIG (command “strash”)
5. visualize the AIG (command “show”)



Network structure visualized by ABC
Benchmark "comp". Time was Sat Sep 14 00:36:24 2024.

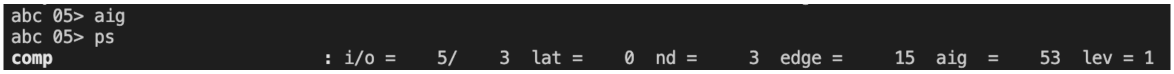
The network contains 39 logic nodes and 0 latches.

6. convert to BDD (command “collapse”)
7. visualize the BDD (command “show bdd -g”; note that “show bdd” only shows the first PO; option “-g” can be applied to show all POs)

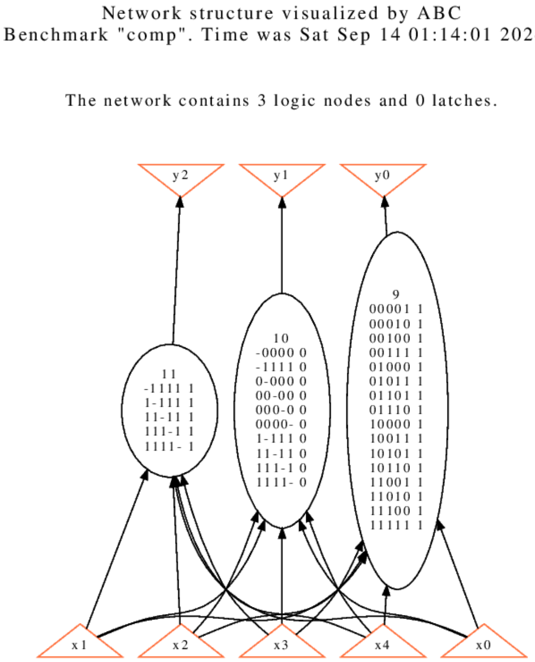


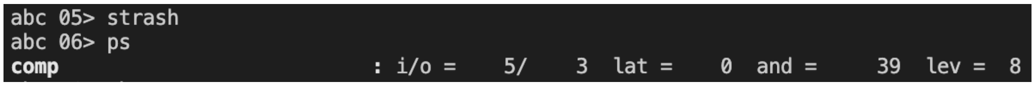
## 3 [ABC Boolean Function Representations] (a)

1. logic network in AIG (by command “aig”) vs. structurally hashed AIG (by command “strash” )

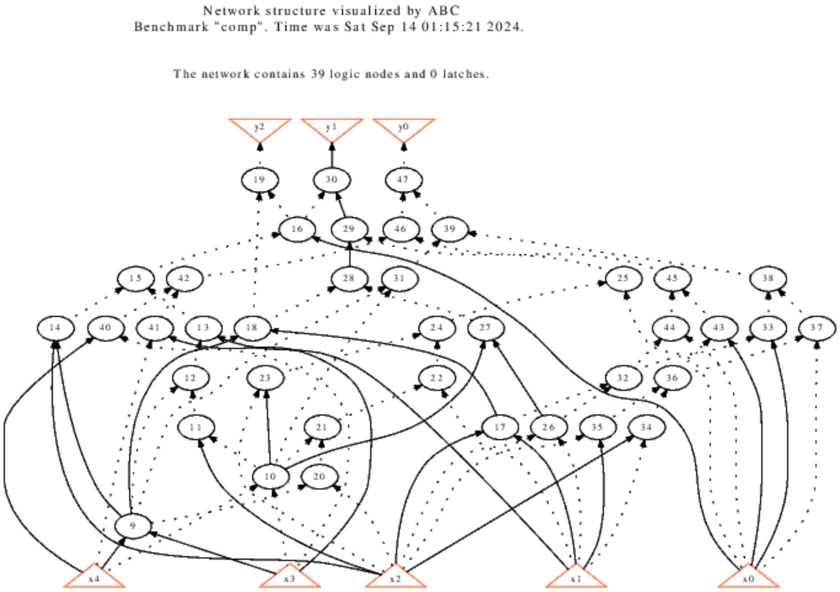


```
abc 05> aig
abc 05> ps
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  aig  =     53  lev = 1
```





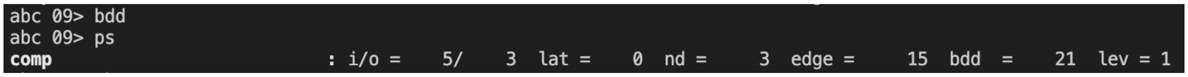
```
abc 05> strash
abc 06> ps
comp                       : i/o =    5/    3  lat =    0  and =     39  lev =  8
```



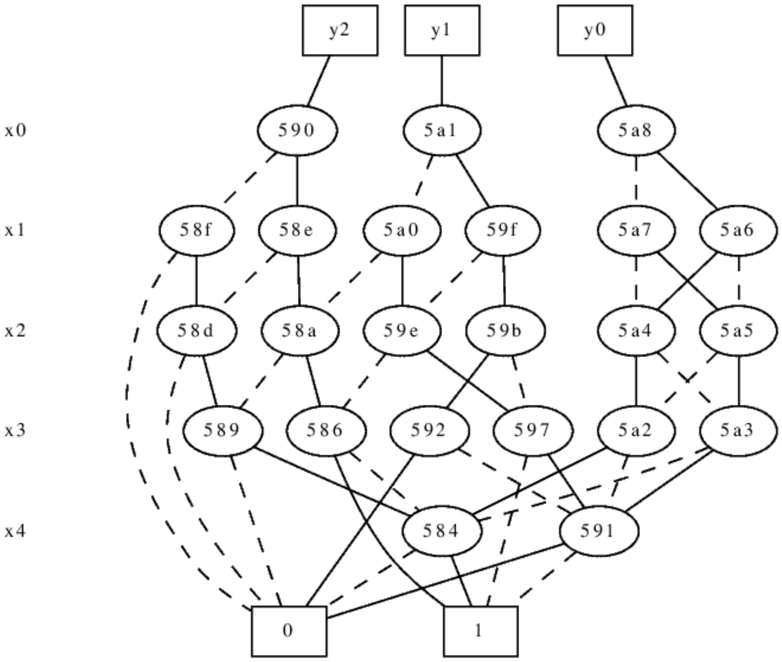
Network structure visualized by ABC
Benchmark "comp". Time was Sat Sep 14 01:15:21 2024.
The network contains 39 logic nodes and 0 latches.
y2
y1
y0
x4
x3
x2
x1
x0

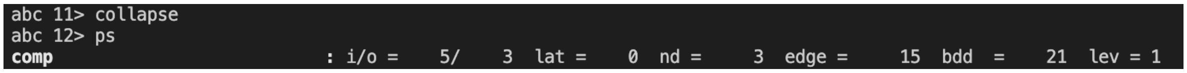
Thoughts: Structurally hashed AIGs are more compact and efficient, which reduces the complexity of the network without changing its logical function.

2. logic network in BDD (by command “bdd”) vs. collapsed BDD (by command “collapse”)

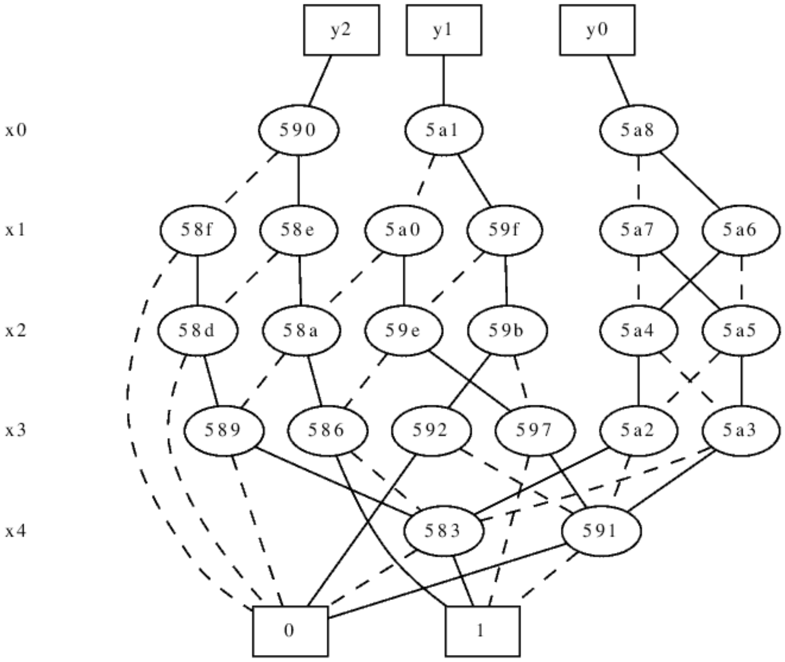


```
abc 09> bdd
abc 09> ps
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  bdd  =    21  lev = 1
```





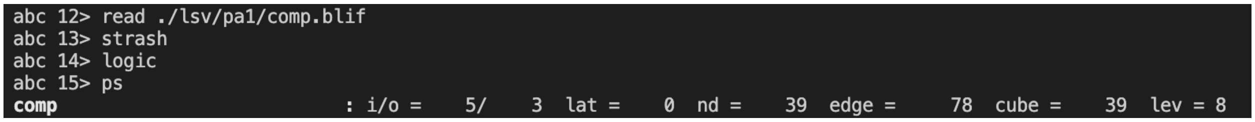
```
abc 11> collapse
abc 12> ps
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  bdd  =    21  lev = 1
```



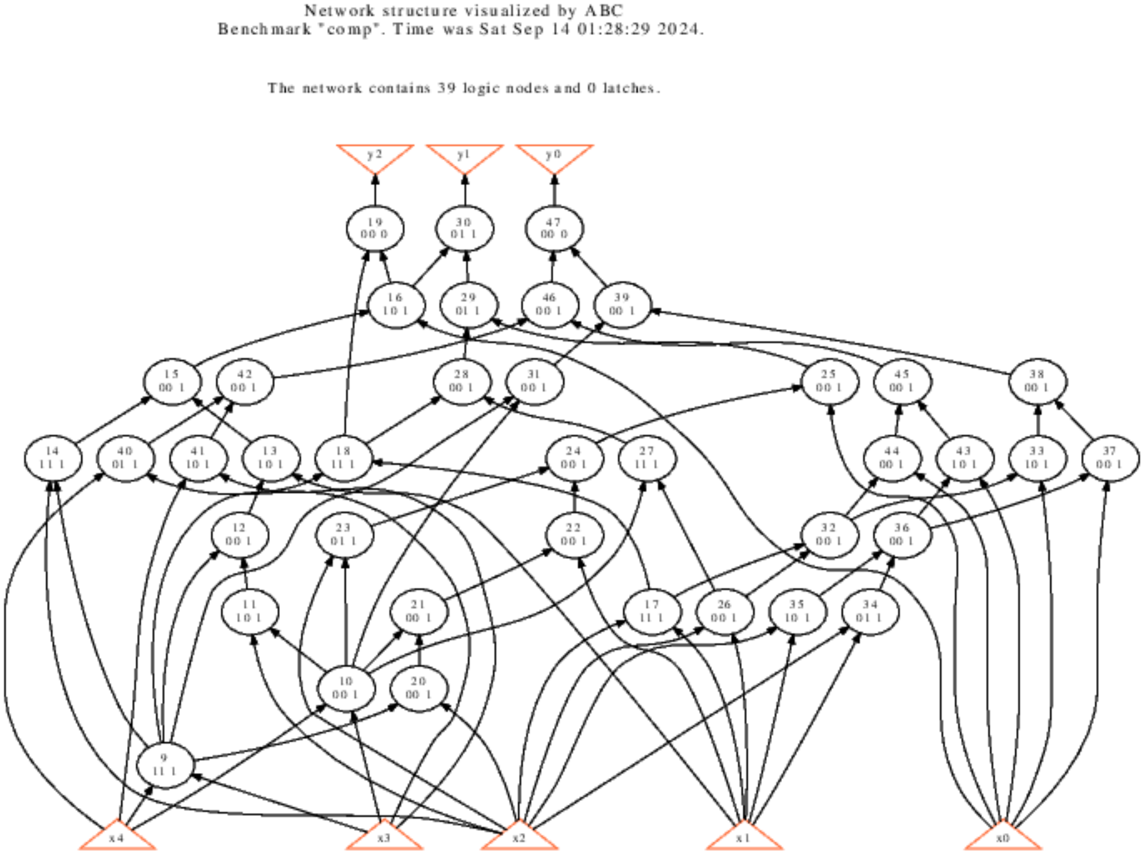
Thoughts: The collapsed BDD simplifies the representation of the Boolean function, making the network more efficient. However, for the comp.blif they look the same.

## 3 [ABC Boolean Function Representations] (b)

Read file -> strash -> logic



```
abc 12> read ./lsv/pa1/comp.blif
abc 13> strash
abc 14> logic
abc 15> ps
comp                          : i/o =    5/    3  lat =    0  nd =    39  edge =     78  cube =    39  lev = 8
```



Network structure visualized by ABC
Benchmark "comp". Time was Sat Sep 14 01:28:29 2024.

The network contains 39 logic nodes and 0 latches.