LSV
PA1-Exercises2、3

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2.

(b)

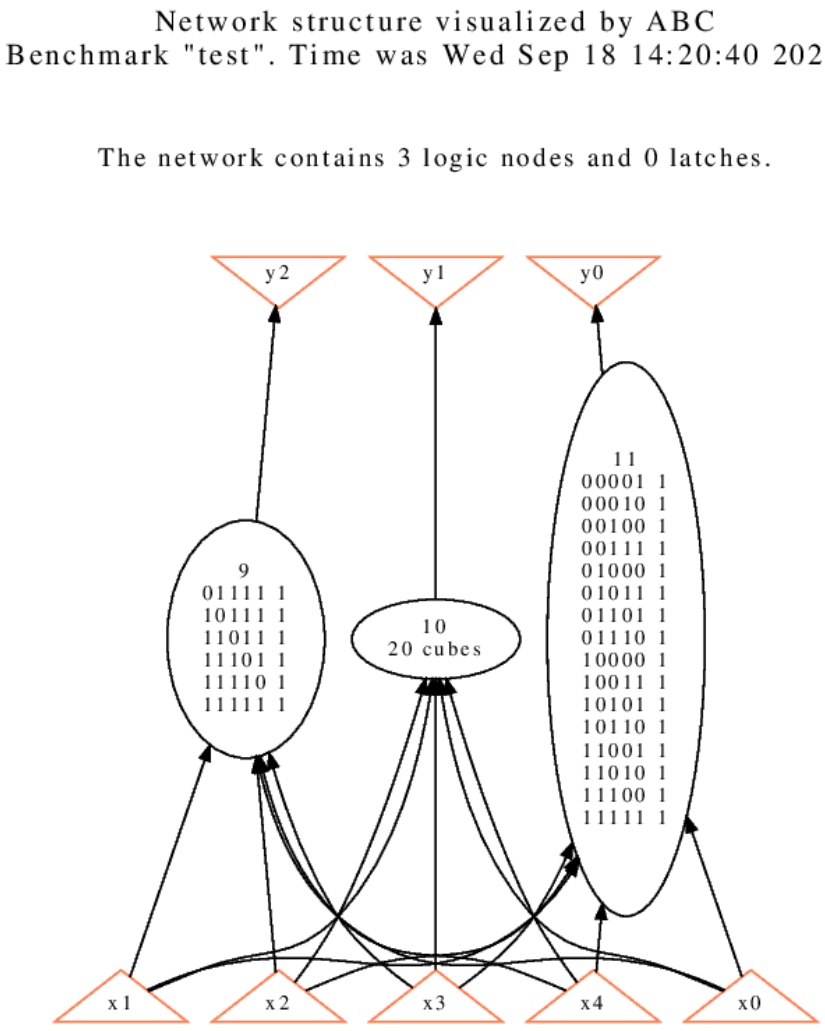
1. read the BLIF file into ABC,

```
abc 01> read comp.blif
abc 02> print_stats
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  cube =    42  lev = 1
```

2. check statistics

```
abc 01> read comp.blif
abc 02> print_stats
comp                          : i/o =    5/    3  lat =    0  nd =     3  edge =     15  cube =    42  lev = 1
```

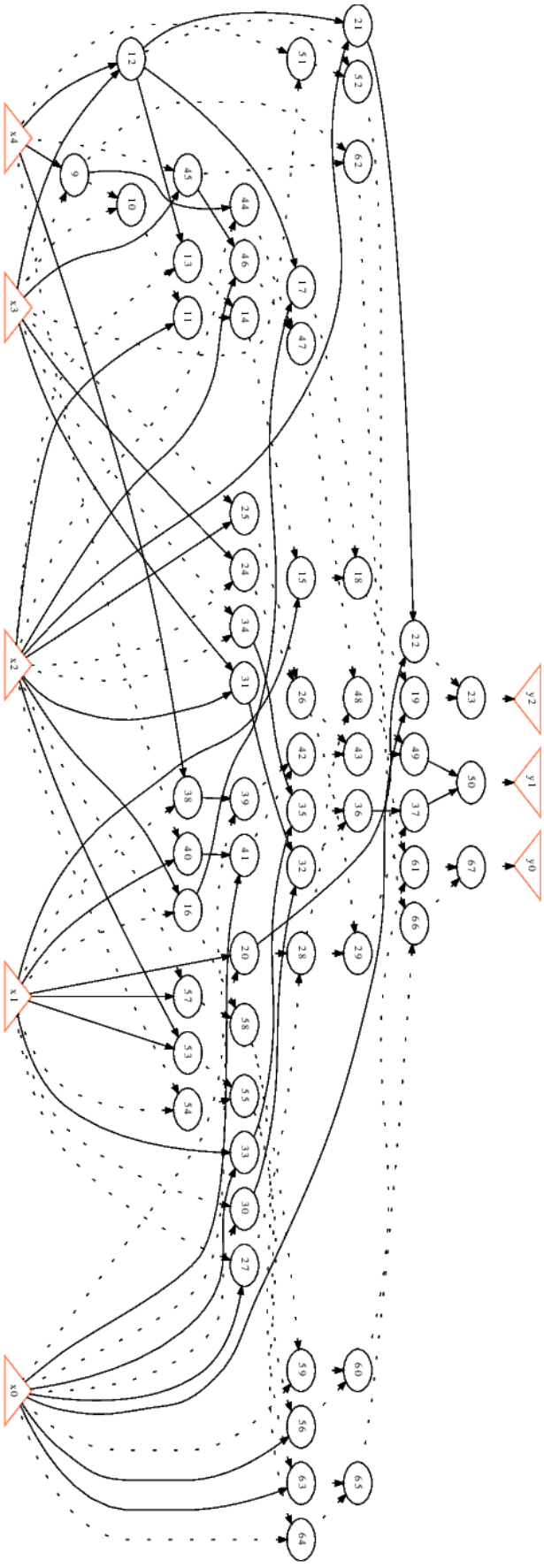
3. visualize the network structure



4. convert to AIG

```
abc 02> strash
abc 03> show
abc 03> Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-140-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Missing charsets in String to FontSet conversion
Warning: Cannot convert string "-efont-biwidth-medium-r-normal--16-*-*-*-*-*-iso10646-1,-gnu-unifont-medium-r-normal--16
-*-*-*-*-*-iso10646-1,-adobe-helvetica-medium-r-normal--14-*-*-*-*-*-*-*,-jis-fixed-medium-r-*--16-*-*-*-*-*-jisx0208.19
83-0,-*-*-medium-r-*--16-*-*-*-*-*-*-*,*" to type FontSet
Warning: Missing charsets in String to FontSet conversion
Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-120-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-100-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Cannot convert string "-*-Helvetica-Bold-R-Normal--*-120-*-*-P-*-ISO8859-1" to type FontStruct
```

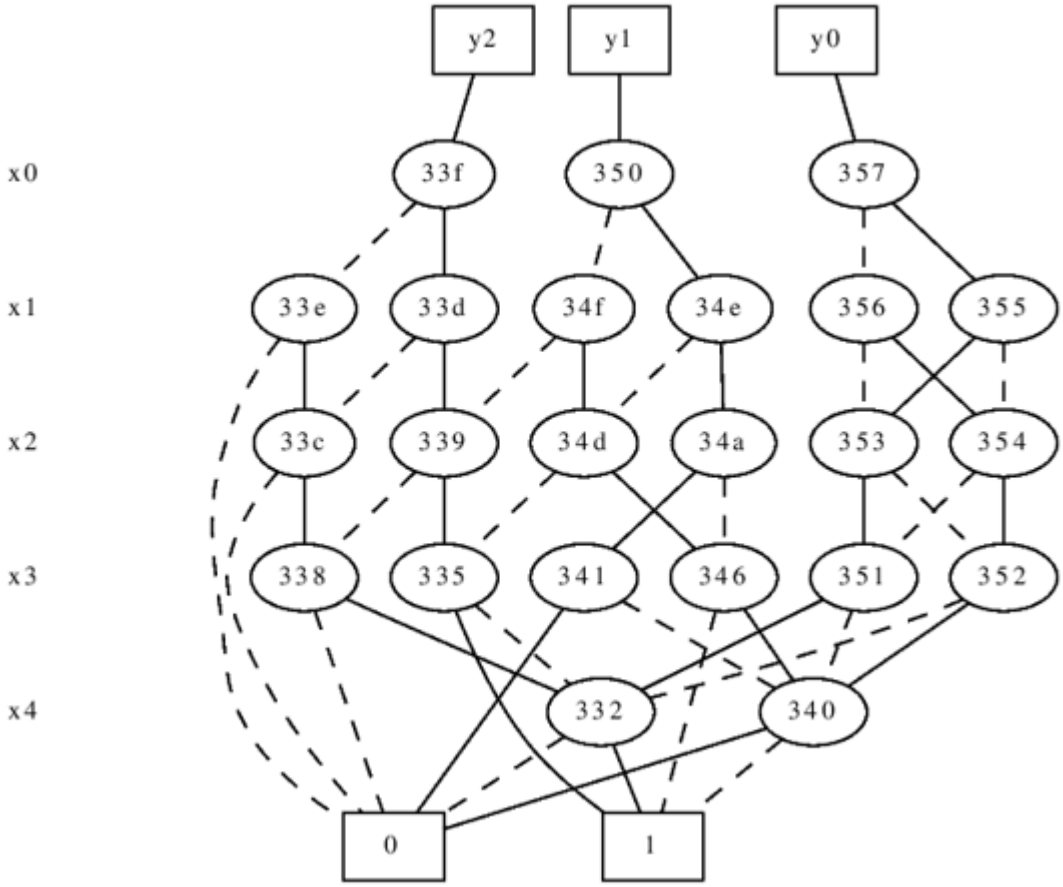
5. visualize the AIG



6. convert to BDD

```
abc 01> read comp.blif
abc 02> collapse
abc 03> show_bdd -g
abc 03> Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-140-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Missing charsets in String to FontSet conversion
Warning: Cannot convert string "-efont-biwidth-medium-r-normal--16-*-*-*-*-*-iso10646-1,-gnu-unifont-medium-r-normal--16
-*-*-*-*-*-iso10646-1,-adobe-helvetica-medium-r-normal--14-*-*-*-*-*-*-*,-jis-fixed-medium-r-*--16-*-*-*-*-*-jisx0208.19
83-0,-*-*-medium-r-*--16-*-*-*-*-*-*-*,*" to type FontSet
Warning: Missing charsets in String to FontSet conversion
Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-120-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Cannot convert string "-*-Helvetica-Medium-R-Normal--*-100-*-*-P-*-ISO8859-1" to type FontStruct
Warning: Cannot convert string "-*-Helvetica-Bold-R-Normal--*-120-*-*-P-*-ISO8859-1" to type FontStruct
```

7. visualize the BDD



3.

(a)

(1)

Compared with Command aig, Command stash improves the overall running speed, but the overall area is increase as well.

For logic network in AIG

The results is

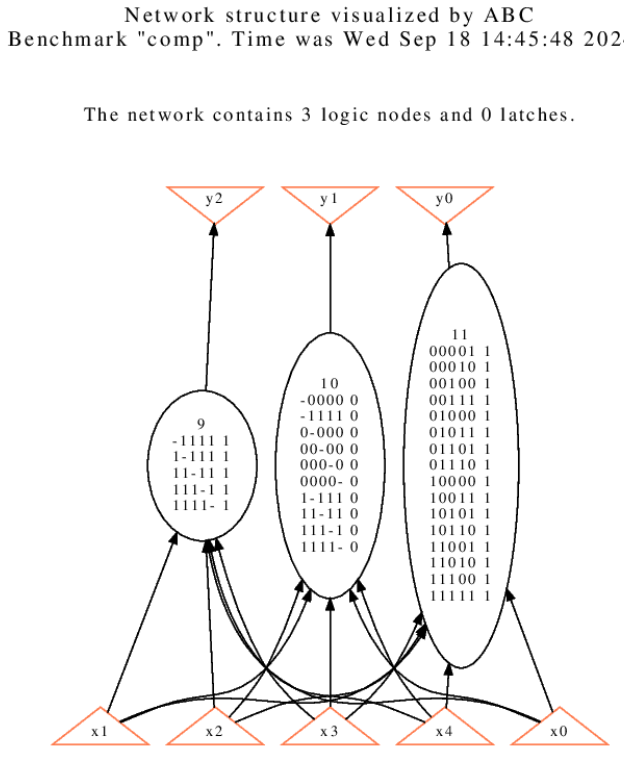
```
abc 01> read comp.blif
abc 02> aig
abc 02> aig
Error: The logic network is already in the AIG form.
abc 02> print_stats
comp                        : i/o =    5/    3  lat =    0  nd =     3  edge =     15  aig  =    65  lev = 1
```

For structurally hashed AIG

The results is

```
abc 01> read comp.blif
abc 02> strash
abc 03> print_stats
comp                        : i/o =    5/    3  lat =    0  and =     59  lev =  8
```

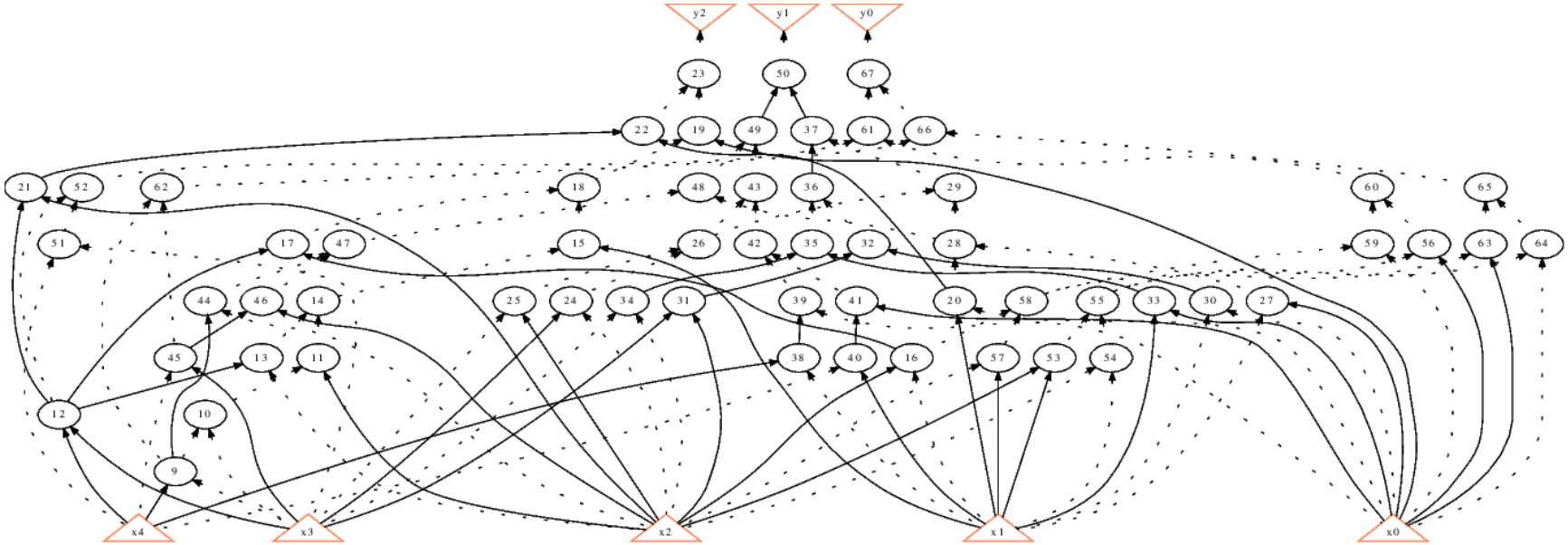
The following graph is logic network in AIG



The following graph is structurally hashed AIG

Network structure visualized by ABC
Benchmark "comp". Time was Wed Sep 18 14:39:16 2024.

The network contains 59 logic nodes and 0 latches.



(2)

Compared with logic network in BDD, although the path of collapsed BDD is the same, the number on each node will be different with each input of show. The guess is that the collapse instruction is to optimize the operation logic, so it may be based on the merged after each optimization. The situation is rearranged. In addition, the number in the cube of collapsed BDD is smaller, which means that the logic and efficiency are more optimized than the logic network in BDD.

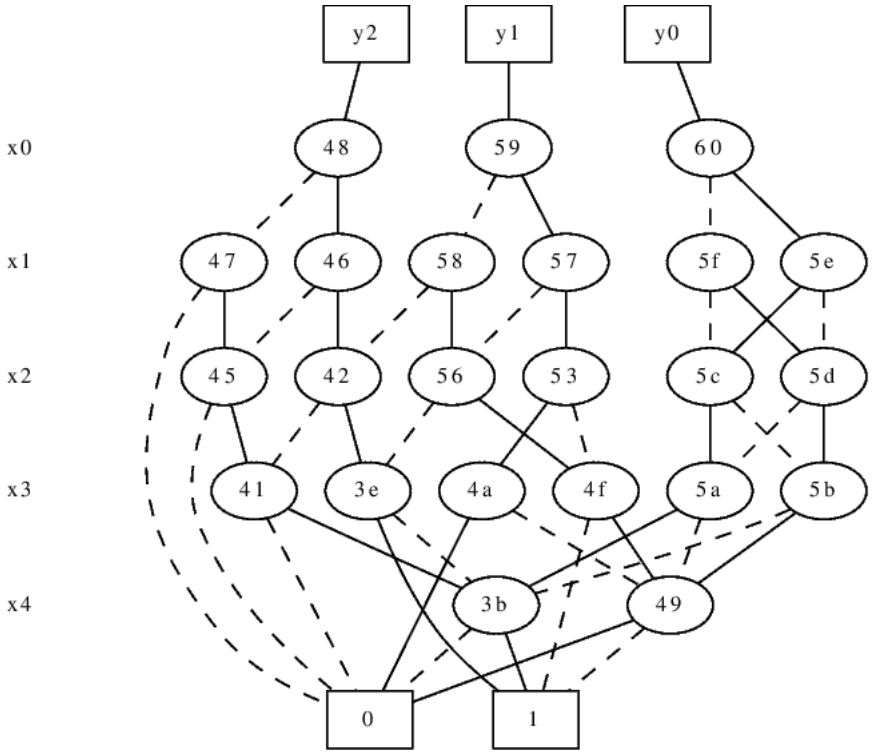
For logic network in BDD

```
abc 01> read comp.blif
abc 02> bdd
abc 02> print_stats
comp                      : i/o =    5/    3  lat =    0  nd =     3  edge =     15  bdd  =    21  lev = 1
```

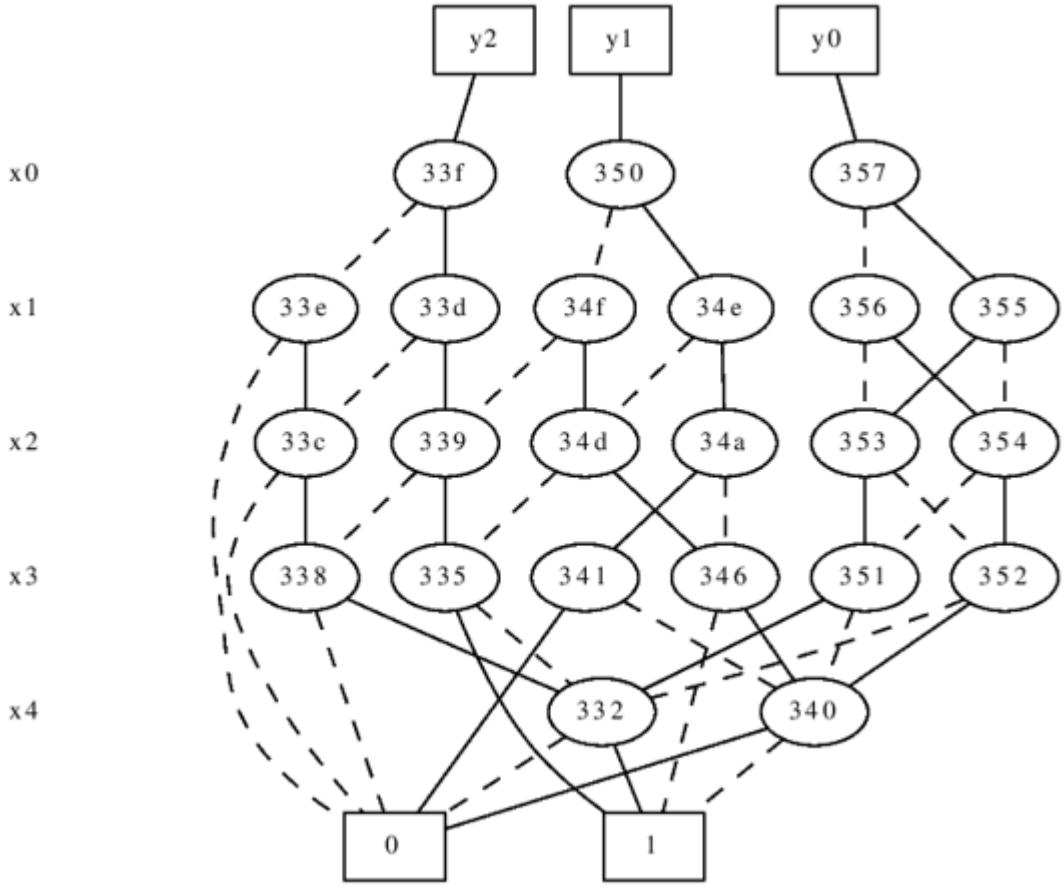
For collapsed BDD

```
abc 01> read comp.blif
abc 02> collapse
abc 03> print_stats
comp                      : i/o =    5/    3  lat =    0  nd =     3  edge =     15  bdd  =    21  lev = 1
```

The following graph is logic network in BDD



The following graph is collapsed BDD



(b)The logic network with node function expressed in sum-of-products

```
abc 01> read comp.blif
abc 02> strash
abc 03> st
abc 04> multi -m
abc 05> sop
abc 05> fx
abc 05> resyn2
abc 09> show
```