LSV HW1 r08943104 Chun-Yao Chiang

Part 1

(a)

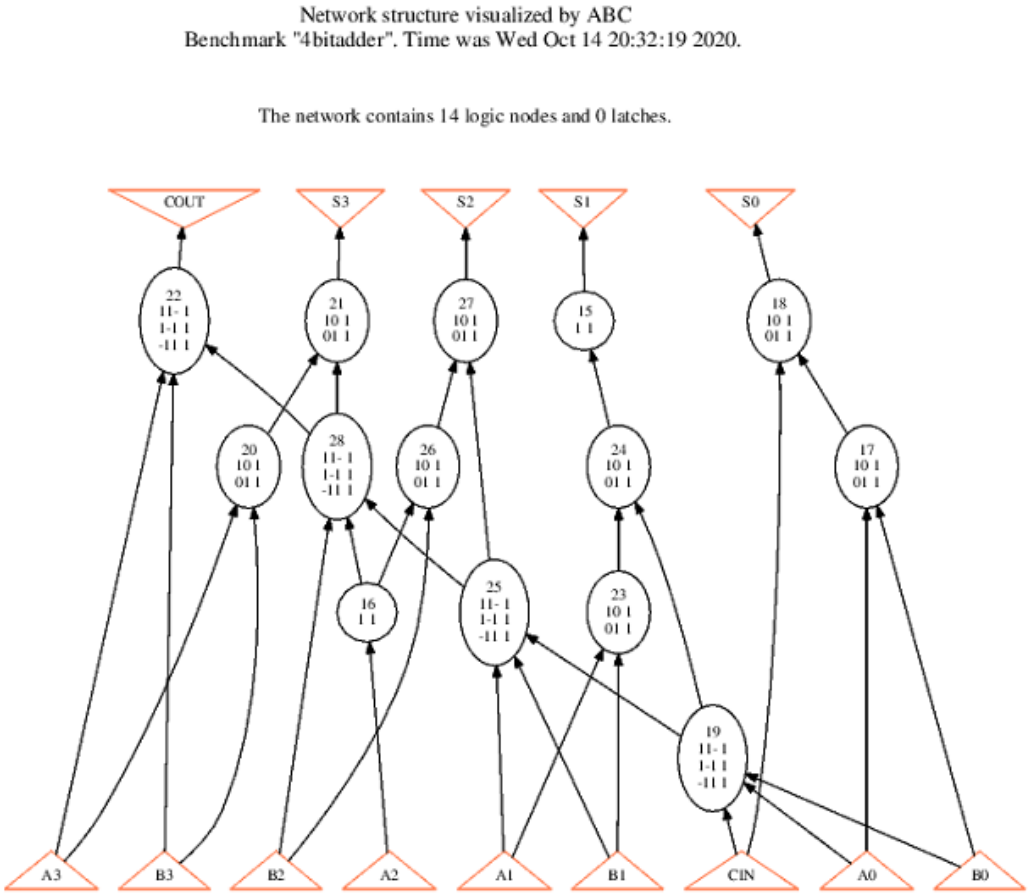
BLIF file name: 4bitadder.blif

(b)

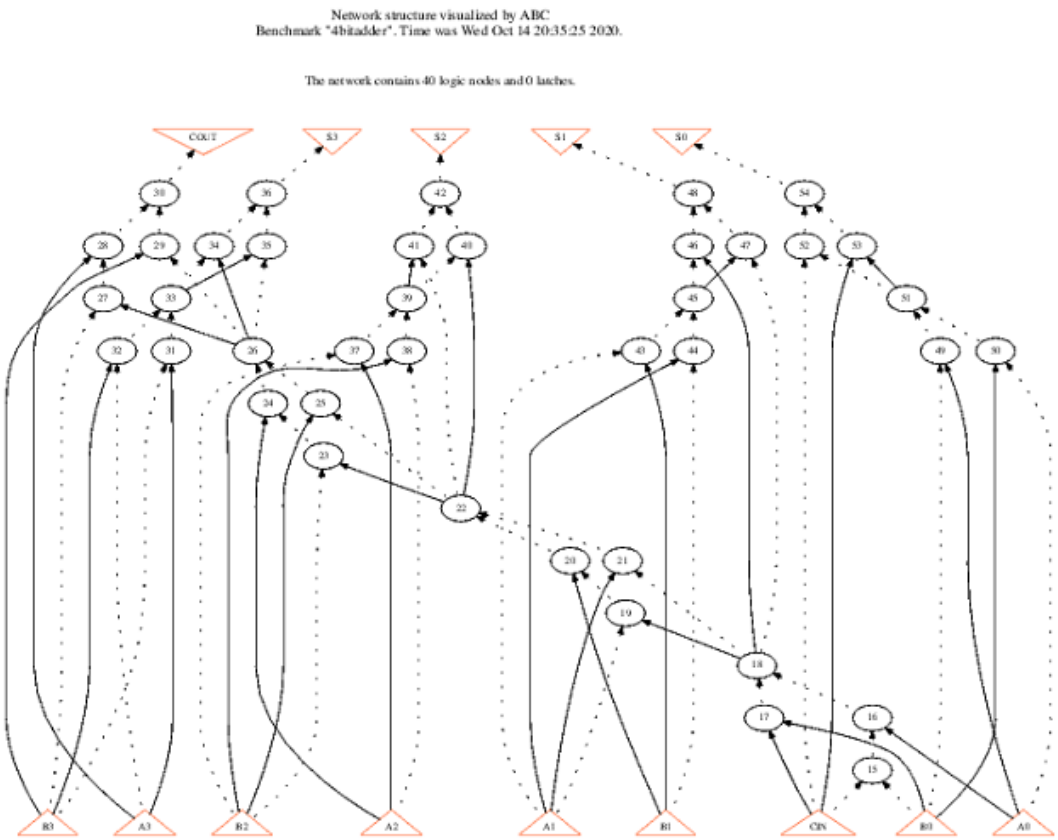
Here are the result of request command:

```
abc 01> read lsv/pa1/4bitadder.blif
Hierarchy reader flattened 4 instances of logic boxes and left 0 black boxes.
abc 02> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =    30  cube =    30  lev = 4
abc 02> show
abc 02> strash
abc 03> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  and =    40  lev = 12
abc 03> show
abc 03> collapse
abc 04> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =     5  edge =    33  bdd  =    43  lev = 1
abc 04> show_bdd
```

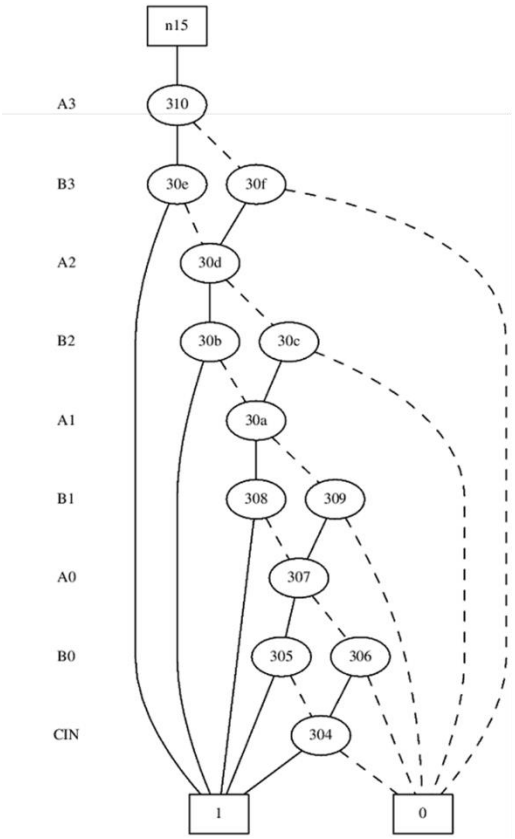
show(original graph)



show(after strash)



show_bdd



Part 2

(a)

```
abc 01> read lsv/pa1/4bitadder.blif
Hierarchy reader flattened 4 instances of logic boxes and left 0 black boxes.
abc 02> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =     30  cube =    30  lev = 4
abc 02> aig
abc 02> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =     30  aig  =    40  lev = 4
abc 02> strash
abc 03> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  and =     40  lev = 12
abc 03> read lsv/pa1/4bitadder.blif
Hierarchy reader flattened 4 instances of logic boxes and left 0 black boxes.
abc 04> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =     30  cube =    30  lev = 4
abc 04> bdd
abc 04> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =     30  bdd  =    32  lev = 4
abc 04> collapse
abc 05> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =     5  edge =     33  bdd  =    43  lev = 1
```

1. logic network in AIG vs. structurally hashed AIG
   Command “aig”: It will transfer the representation in each node from cube to aig. The structure of logic network still the same.
   Command “strash”: It will break down all the node with aig to the representation of a aig.
2. logic network in BDD vs. collapsed BDD
   Command “bdd”: It will transfer the representation in each node from cube to aig. The structure of logic network still the same.
   Command “strash”: It will collapse all the node with BDD to construct global BDDs.

(b)

sequence of ABC command(s) to covert it to a logic network with node function expressed in sum-of-products (SOP):

>read lsv\pa1\4bitadder.blif
>strash
>renode
>sop

```
abc 01> read lsv/pa1/4bitadder.blif
Hierarchy reader flattened 4 instances of logic boxes and left 0 black boxes.
abc 02> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    14  edge =     30  cube =    30  lev = 4
abc 02> strash
abc 03> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  and =     40  lev = 12
abc 03> renode
abc 04> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    23  edge =     57  aig  =    62  lev = 8
abc 04> sop
abc 04> print_stats
4bitadder                 : i/o =    9/    5  lat =    0  nd =    23  edge =     57  cube =    50  lev = 8
```