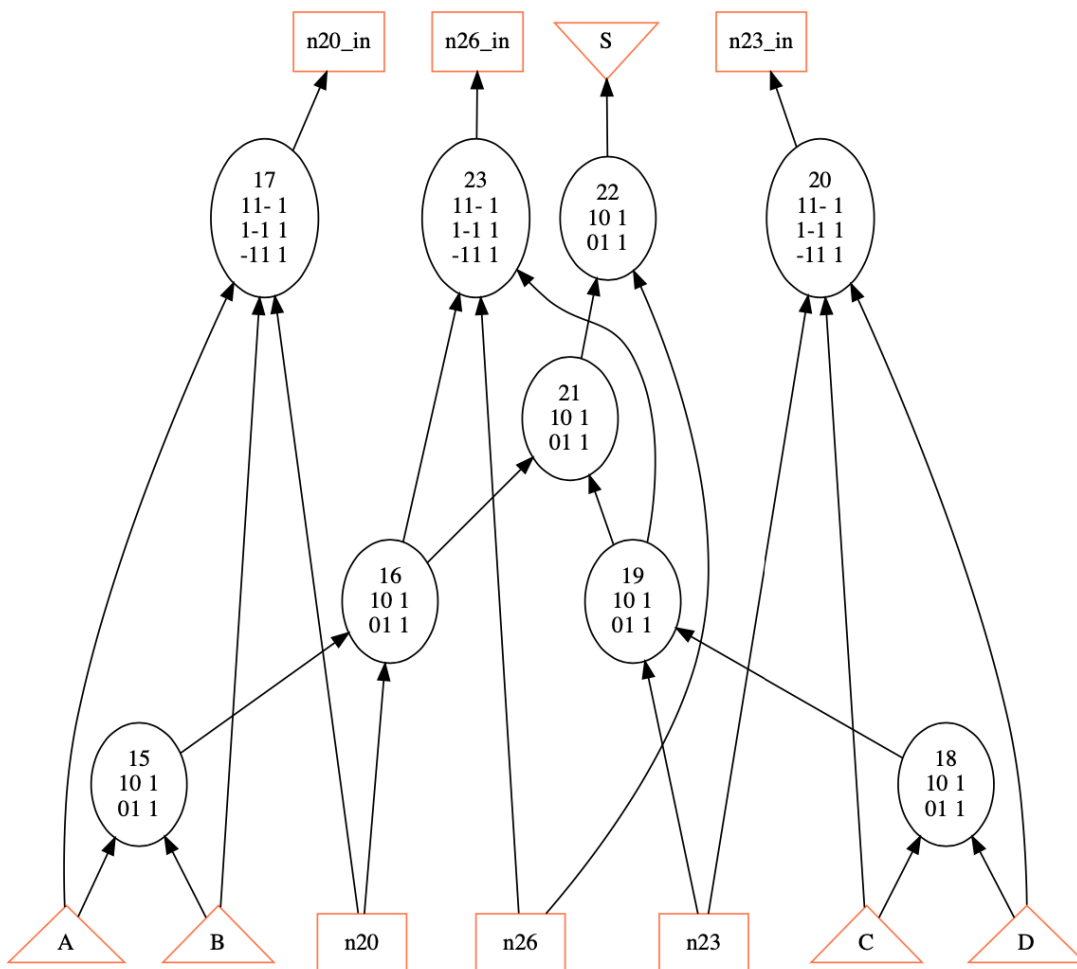### 1. [Using ABC]

```
abc 01> read ./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

Network structure visualized by ABC
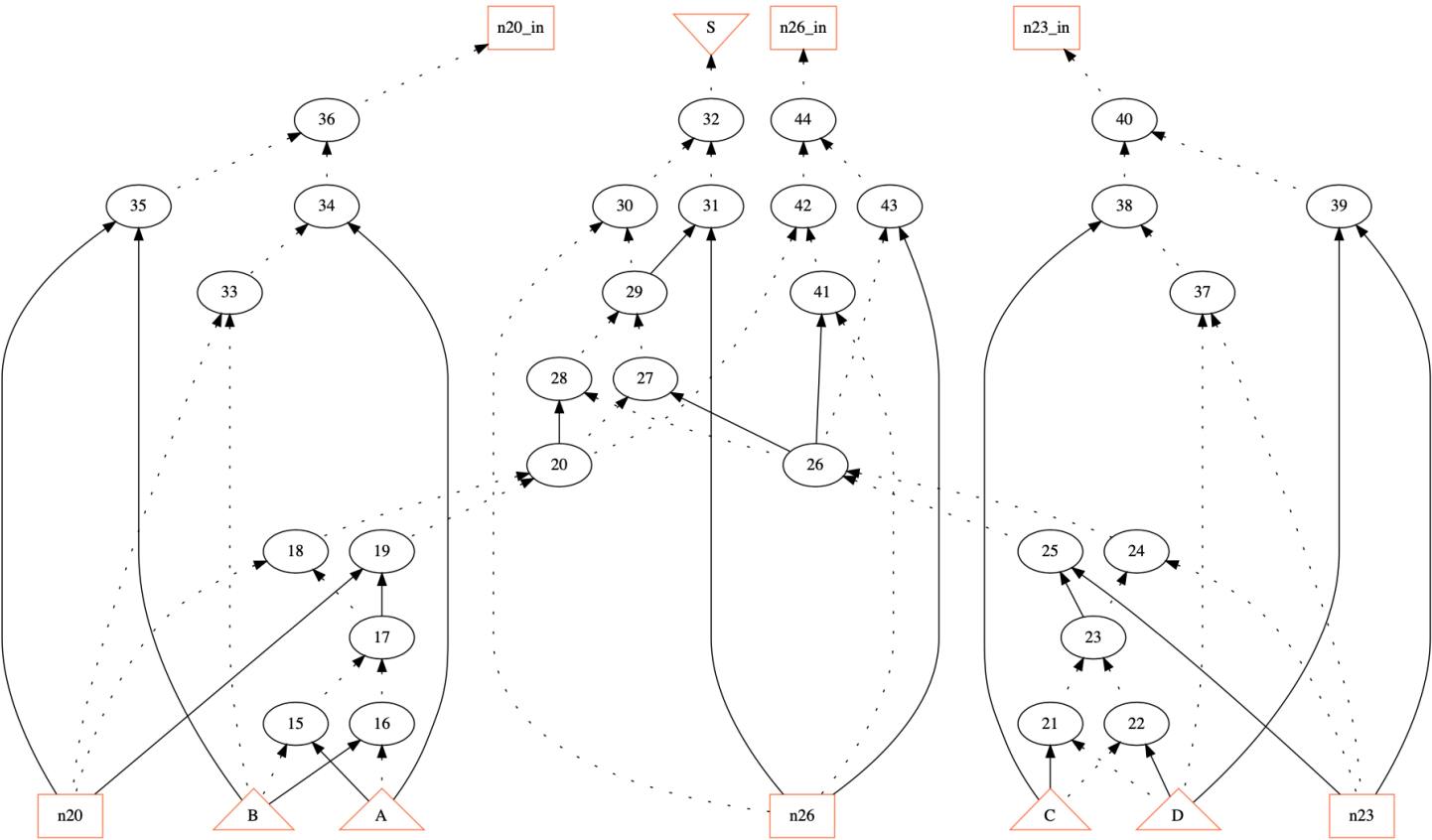Benchmark "4bitadder_s". Time was Sun Oct 3 17:52:00 2021.

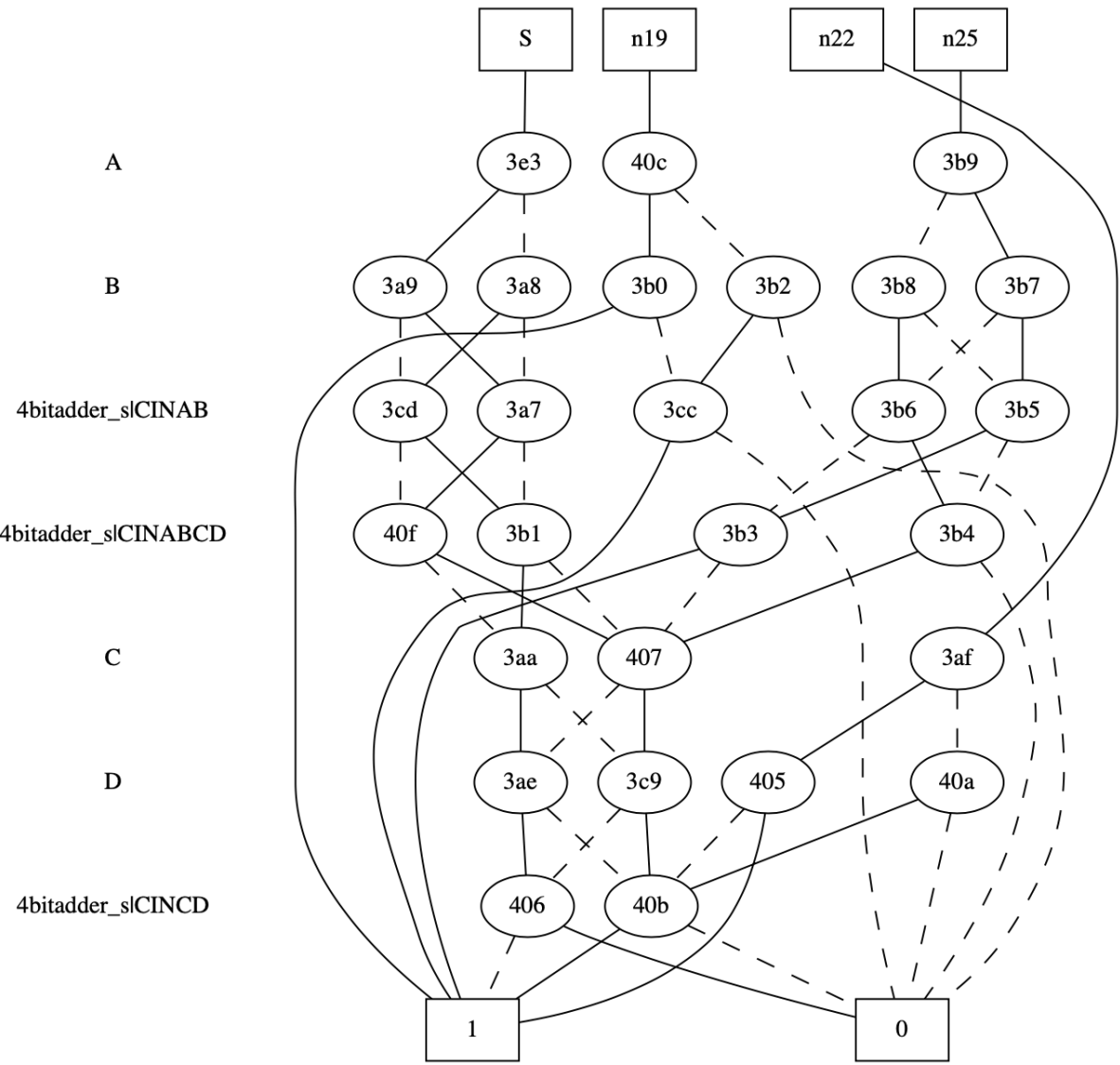The network contains 9 logic nodes and 3 latches.

strash+show

Network structure visualized by ABC
Benchmark "4bitadder_s". Time was Sun Oct 3 19:28:49 2021.

The network contains 30 logic nodes and 3 latches.

collapse+ show_bdd –g

2. [ABC Boolean Function Representations]

(A1)
aig: converts functions into AIG(and with invert edge)
Strash: do structural hashing than transform to aig

```
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 02> aig
abc 02> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  nd =     9  edge =     21  aig =    30  lev = 4
abc 02> strash
abc 03> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  and =     30  lev = 8
abc 03>
```

(A2)
BDD:convert function to BDD(locally)
Collapse: flattern the netlist than convert to a global BDD

```
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 02> bdd
abc 02> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  nd =     9  edge =     21  bdd =    24  lev = 4
abc 02> collapse
abc 03> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  nd =     4  edge =     20  bdd =    25  lev = 1
abc 03>
```

(B)
Commend: Logic after strash => SOPs

```
abc 01> read 4bitadder_s.blif
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 02> strash
abc 03> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  and =     30  lev = 8
abc 03> logic
abc 04> print_stats
4bitadder_s                     : i/o =    4/    1  lat =    3  nd =    30  edge =     60  cube =    30  lev = 8
abc 04>
```