LSV PA#1 Report

B07901056 張凱鈞

Part 1.

(b) 3. Logic network

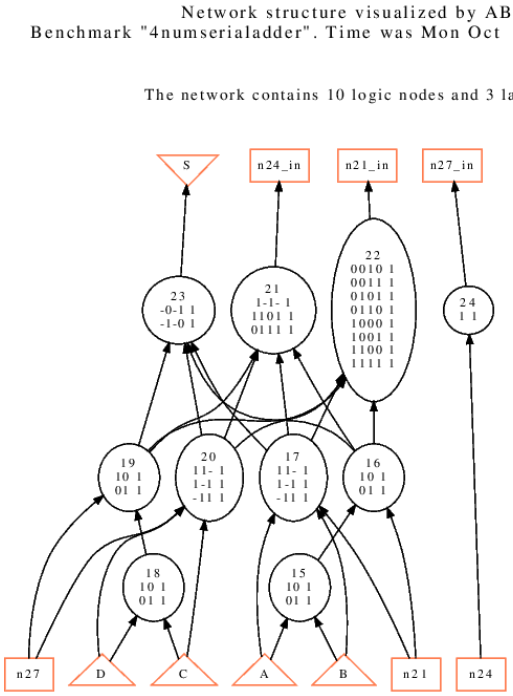

Fig. 1-1 Logic Network

5. AIG

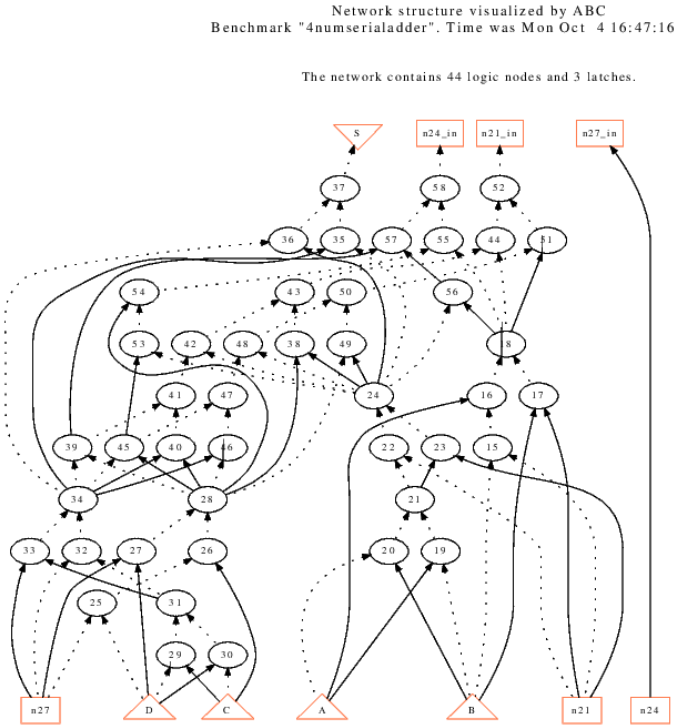

Fig. 1-2 AIG

7. BDD

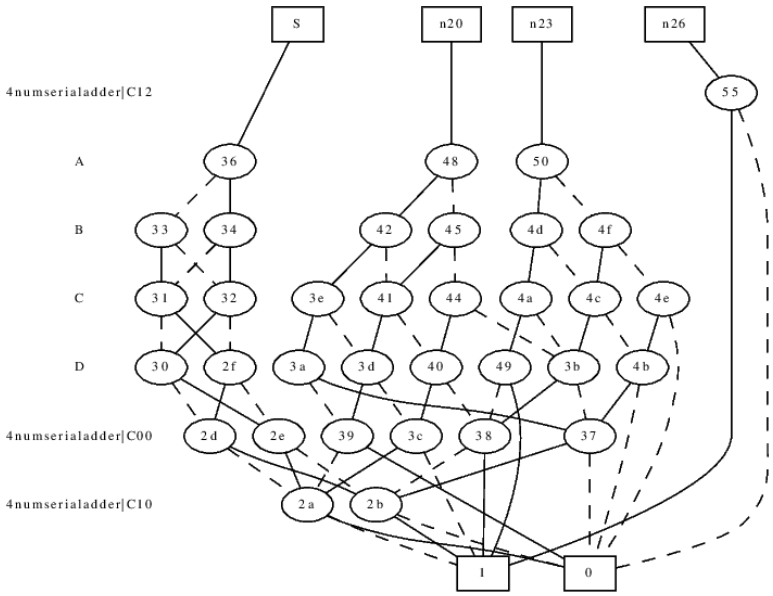

Fig. 1-3 BDD

Part 2.

(a) 1. As the following figures show, the command *"aig"* only changes the representation of local functions into AIG form (Fig. 2-2), while the command *"strash"* converts the whole network into a structurally hashed AIG (Fig. 1-2).

```
abc 09> read lsv_fall_2021/pa1/adder.blif
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 10> aig
abc 10> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  nd =    10  edge =    27  aig  =    46  lev = 3
abc 10> strash
abc 11> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  and =    44  lev = 10
```

Fig. 2-1 The whole network becomes AIG after "strash" (only AND gates), while "aig" only changes local function representation

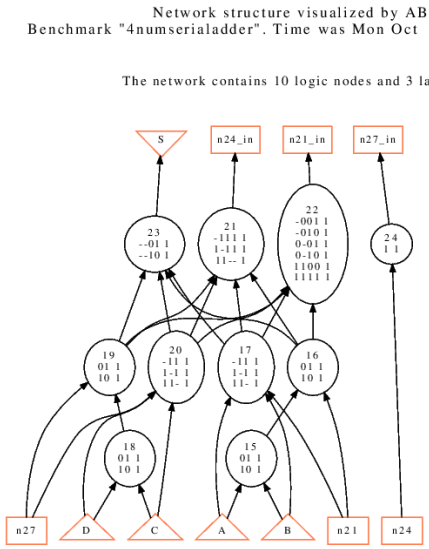

Fig. 2-2 The logic network after command *"aig"*/*"bdd"* and *"show"*

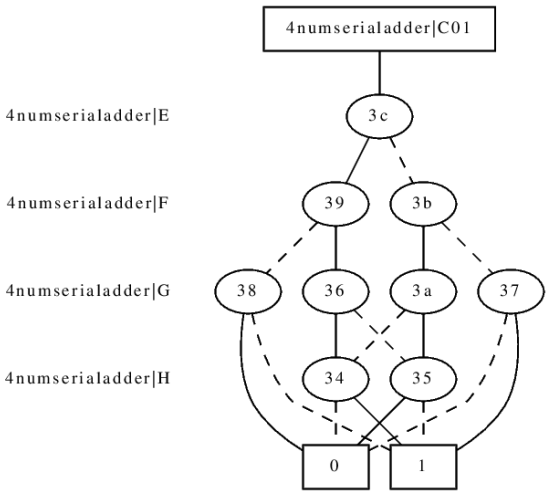

Fig. 2-3 The BDD representation of the node *n22* (by *"show_bdd n22"*)

2. Similarly, the command *"bdd"* only changes the representation of local functions into BDD form (Fig. 2-2, Fig. 2-3), while the command *"collapse"* converts the whole network into a BDD (Fig. 1-3).

```
abc 01> read lsv_fall_2021/pa1/adder.blif
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 02> bdd
abc 02> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  nd =    10  edge =     27  bdd  =    30  lev = 3
abc 02> collapse
abc 03> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  nd =     4  edge =     19  bdd  =    28  lev = 1
```

Fig. 2-4 It's shown that the network structure after *"collapse"* is different with the structure after *"bdd"*

(b) Use *"renode"* to convert the AIG into a logic network first, then use *"sop"* to change node function expression into SOP form.

```
abc 04> read lsv_fall_2021/pa1/adder.blif
Hierarchy reader flattened 3 instances of logic boxes and left 0 black boxes.
abc 05> strash
abc 06> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  and =     44  lev = 10
abc 06> renode
abc 07> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  nd =    21  edge =     45  aig  =    42  lev = 6
abc 07> sop
abc 07> print_stats
4numserialadder             : i/o =    4/    1  lat =    3  nd =    21  edge =     45  cube =    32  lev = 6
```

Fig. 2-5