

# PA1 Report

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## 1. 2-(b)

### Command Line Screenshots:

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

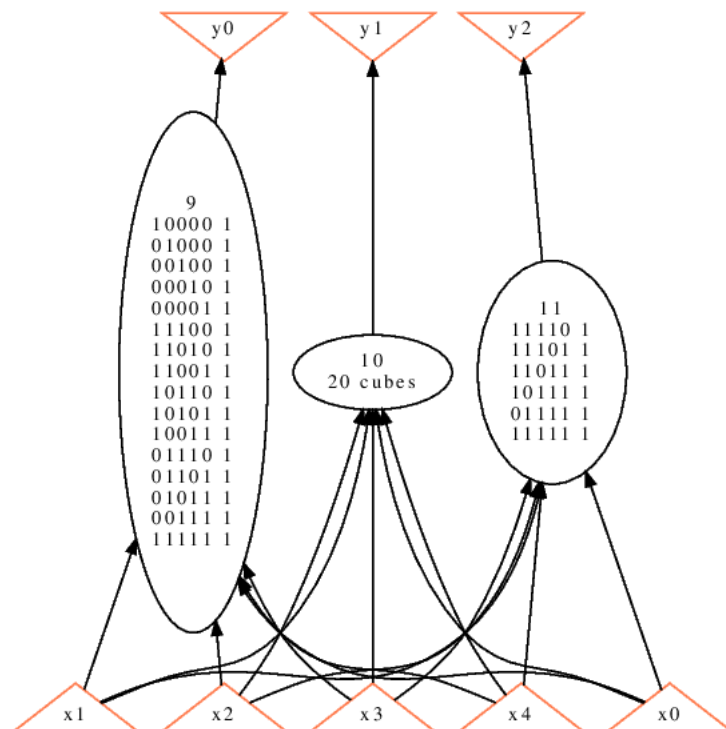
```
abc 02> strash
abc 03> show
```

```
abc 03> collapse
abc 04> show_bdd -g
```

### Screenshot for “show” right after read:

Network structure visualized by ABC  
Benchmark "comp". Time was Thu Sep 19 17:13:43 2024.

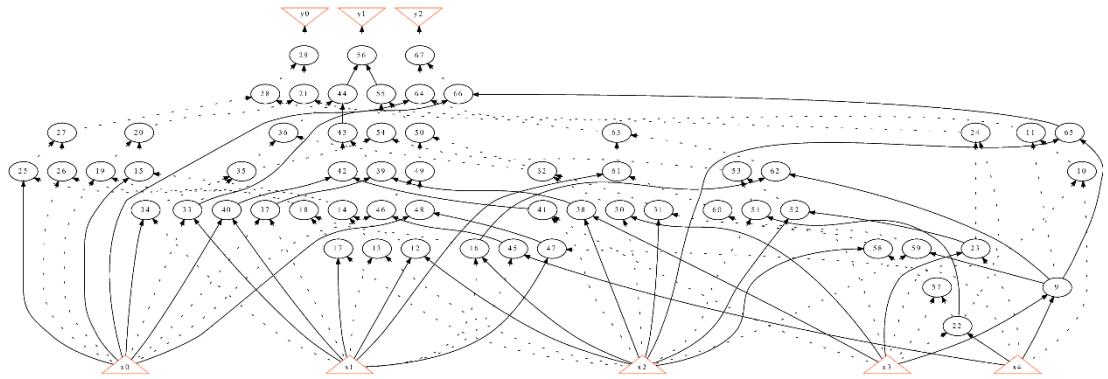
The network contains 3 logic nodes and 0 latches.



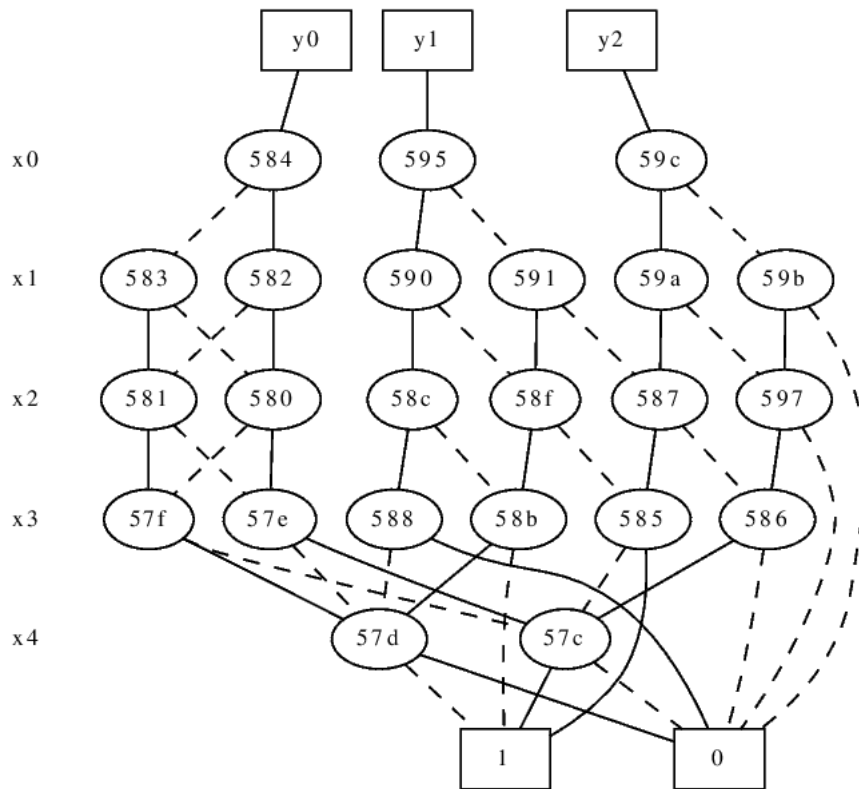
### Screenshot for “show” after strash:

Network structure visualized by ABC  
Benchmark "comp". Time was Thu Sep 19 17:15:53 2024.

The network contains 59 logic nodes and 0 latches.



Screenshot for “show” after collapse:



## 2. 3-(a)

### Screenshots for AIG part:

```
abc 02> aig
abc 02> ps
comp          : i/o = 5/ 3 lat = 0 nd = 3 edge = 15 aig = 65 lev = 1

abc 02> strash
abc 03> ps
comp          : i/o = 5/ 3 lat = 0 and = 59 lev = 8
```

### Comments:

As we can see from the stats, the original AIG have 65 ands and only one level. As for AIG after structural hashing, the number of and gates decrease from 65 to 59, and the level increase to 8.

From observation, we can conclude that structural hashing is indeed working as intended, finding the common structure and combine it as one to decrease the number of and gates needed. Note that this however increase the level needed.

### Screenshots for BDD part:

```
abc 02> bdd
abc 02> ps
comp          : i/o = 5/ 3 lat = 0 nd = 3 edge = 15 bdd = 21 lev = 1

abc 02> collapse
abc 03> ps
comp          : i/o = 5/ 3 lat = 0 nd = 3 edge = 15 bdd = 21 lev = 1
```

### Comments:

As we can see from the stats, the original BDD representation is the same after collapse, this tells us that the original BDD representation was already in its most form.

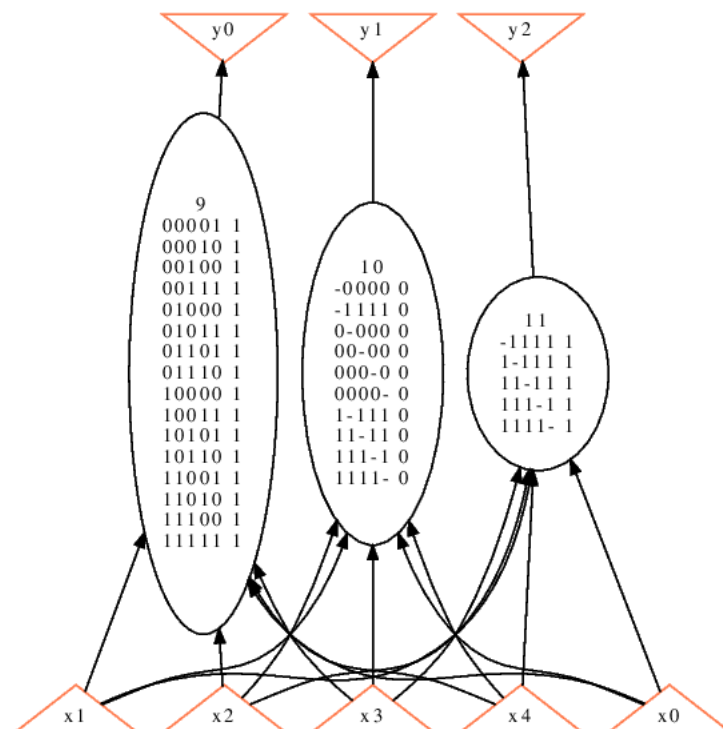
Note that for this particular case, the BDD representation is more compact than the AIG representation, as it only needs 21 nodes compared to AIG's 59 gates.

### 3. 3-(b)

```
abc 01> read comp.blif
abc 02> strash
abc 03> collapse
abc 04> sop
abc 04> ps
comp : i/o = 5/ 3 lat = 0 nd = 3 edge = 15 cube = 31 lev = 1
abc 04> show
```

Network structure visualized by ABC  
Benchmark "comp". Time was Thu Sep 19 17:32:37 2024.

The network contains 3 logic nodes and 0 latches.



#### Comments:

To convert the already structural hashed AIG into SOP representation, I first use collapse to turn it into two level and-or structure, and then transform into SOP representation.