

## B07901075 李彥儒 report

(i) My implementation

My implementation is the same as that of the lecture note as follows:

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let k = 0
repeat_1
  if  $\text{BMC}_k(S_0, F) = \text{SAT}$ , answer reachable
   $R = S_0$ 
  let i = 0
  repeat_2
     $S_{i+1} = \text{Img}'(S_i, C)$ 
    if  $(\text{BMC}_k(S_{i+1}, F) = \text{SAT})$  break repeat_2
     $R' = R \vee S_{i+1}$ 
    if  $R' = R$  answer unreachable
     $R = R'$ 
    increase i
  end repeat_2
  increase k
end repeat_1
    
```

(ii) My verification results

(1) Basic

Design	Result	time
a.v	All monitors are safe	0.2 second
b.v	p3 violated	44.69 seconds
c.v	Only z3 is safe	0.02 second

(2) Vending (vending\_abs.v is the abstracted vending design)

Design	Result	Time
vending.v	Can only prove p is violated	Timeout for t and q
vending_abs.v	p is violated, t and q are safe	1.46 second

(3) Hwmcc

sat.dofile

Design	Result	Time
6s307rb06.aig	Monitor "51631" is violated.	9.55 seconds
6s374b029.aig	Monitor "~v3_Internal_Net_378552" is violated.	191.3 seconds
6s388b07.aig	Monitor "34349" is violated.	0.11 seconds
abp4pold.aig	Monitor "954" is violated.	105.1 seconds
bob9234spec7neg.aig	Monitor "159" is violated.	38.13 seconds

bobpci215.aig	Monitor "~v3_Internal_Net_4468" is violated.	22.86 seconds
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unsat.dofile

Design	Result	Time
6s136.aig	Monitor "32243" is safe.	75.13 seconds
6s206rb025.aig	Monitor "181380" is safe.	5.53 seconds
6s221rb18.aig	Monitor "75884" is safe.	80.41 seconds
6s326rb02.aig	Monitor "32247" is safe.	204.2 seconds
6s327rb10.aig	Monitor "31901" is safe.	1.47 seconds
6s380b129.aig	Monitor "53298" is safe.	3.3 seconds
6s6.aig	Monitor "833" is safe.	51.5 seconds
pdtpmsfpmult.aig	Monitor "~v3_Internal_Net_510" is safe.	6 seconds
pj2018.aig	Monitor "26897" is safe.	119 seconds

(iii) Compare with ref program and other model checker

(1) Compare with ref program

Compared to the ref program, my program is about 2~3 times slower in general.  
Yet the use of memory is almost the same.

(2) Compare with other model checker

Compared to my model checker in homework 3 on the abstracted vending machine, the result is as follows :

Model checker	Time	Memory
BDD	131.6 seconds	514 mega bytes
SAT	1.29 second	6.469 mega bytes

From the table above, we can see that sat solver is much more efficient than BDD in both of the means of time and memory.