

# LINGI2143 - Assignment 2 : Verification Phase

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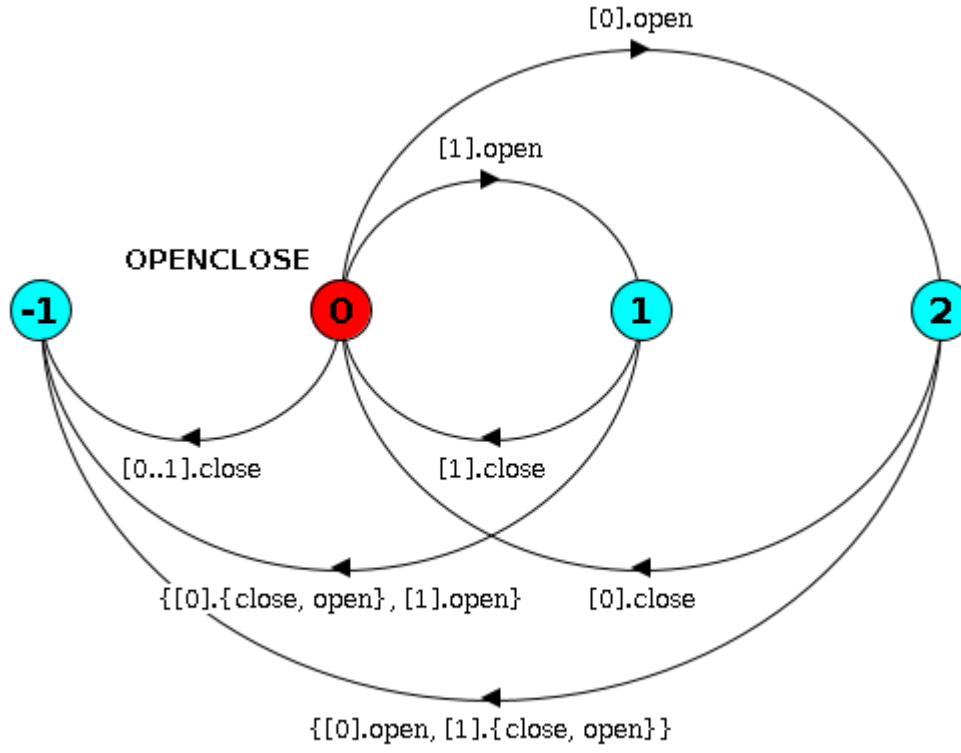
## 1 Introduction

With this report we have 5 files : *electionring.lts* and *nominalring.lts* from the first assignment, *Abstract.lts* contains the code for the minimal FSP models, *OpenClose.lts* contains the FSP property *OPENCLOSE* and *CrashRing.lts* contains the FLTL properties *ALLFAIR*, *MUTEX*, *NODUPCLAIM*, *NOCRASH* and *FAIR* and the FSP model *CRASHRING*.

## 2 ABSTRACTS

	Alphabet	# of states	Minimization time	Cumulated time
ABTRACT0	$[0..2].\{\{\text{close},\text{open}\},\{\text{rcv},\text{snd}\}.\{\text{claim}[0..2]\},\text{token}\}\}$	5652	351	351
ABTRACT1	$[0..2].\{\{\text{close},\text{open}\},\text{rcv}.\{\text{claim}[0..2]\},\text{snd.token}\}\}$	4826	357	708
ABTRACT2	$[0..2].\{\{\text{close},\text{open}\},\{\text{rcv},\text{snd}\}.\text{token}\}\}$	2212	1236	1944
ABTRACT3	$[0..2].\{\{\text{close},\text{open}\},\text{snd.token}\}\}$	1867	52	1996
ABTRACT4	$[0..2].\{\text{close},\text{open}\}$	772	27286	29282
ELECTIONSERVICE(3)	$[0..2].\{\text{close},\text{open}\}$	740	$\infty$	$\infty$

### 3 OPENCLOSE LTS



### 4 OPENCLOSE violation trace

Here is a trace that violates the rules that only one node can access in the same time to the resource. We can see that node 0 and node 1 are opening in the same time the resource.

```
0.snd.claim.0
1.snd.claim.1
2.snd.claim.2
1.rcv.claim.0
2.rcv.claim.1
1.snd.claim.0
0.rcv.claim.2
0.snd.claim.0
1.rcv.claim.0
2.snd.claim.1
2.rcv.claim.0
0.rcv.claim.1
```

```

0.snd.claim.0
1.snd.claim.0
2.snd.claim.0
0.rcv.claim.0
2.snd.claim.2
0.rcv.claim.2
2.snd.claim.2
2.rcv.claim.0
1.rcv.claim.0
0.snd.claim.0
0.rcv.claim.2
1.snd.claim.0
2.snd.claim.0
0.rcv.claim.0
1.rcv.claim.0
2.rcv.claim.0
1.snd.claim.0
2.snd.claim.0
0.rcv.claim.0
2.snd.claim.2
2.rcv.claim.0
1.snd.claim.1
0.snd.token
1.rcv.token
1.open
0.snd.claim.0
0.rcv.claim.2
2.snd.claim.0
0.rcv.claim.0
0.open
ERROR

```

## 5 ALLFAIR violation trace

Here is a trace that violates the rules that only one node can access in the same time to the resource. We can see that node 1 and node 0 are opening in the same time the resource.

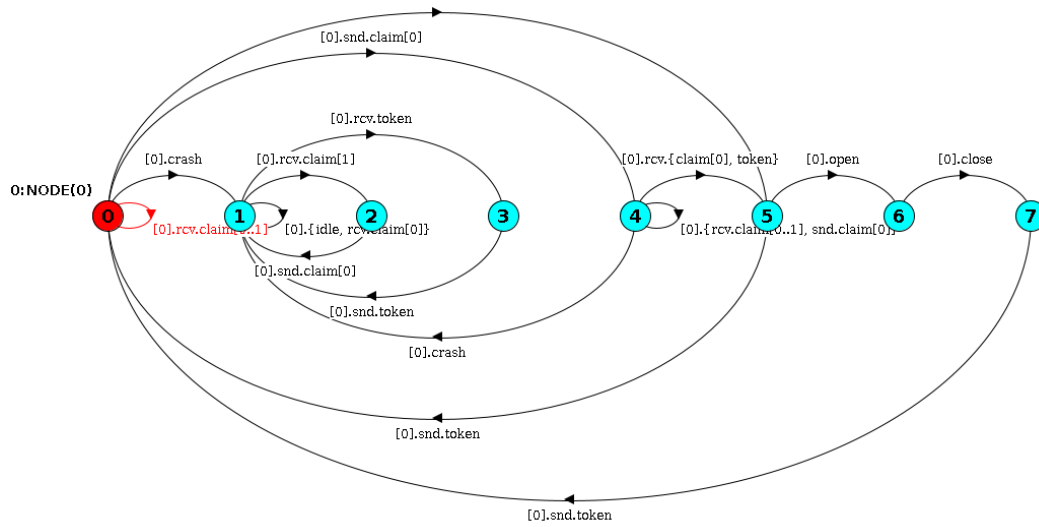
```

0.snd.claim.0
1.snd.claim.1
2.snd.claim.2
1.rcv.claim.0
2.rcv.claim.1
1.snd.claim.0
0.rcv.claim.2
0.snd.claim.0

```

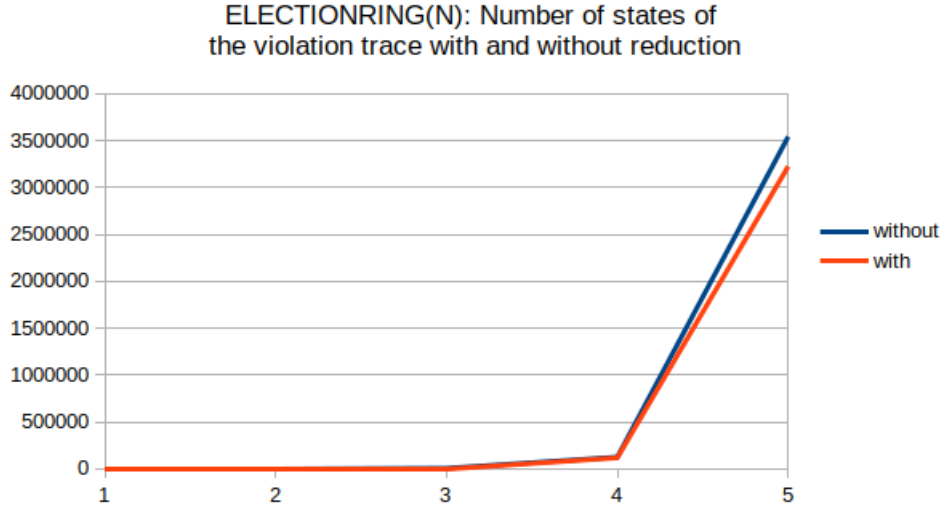
1.rcv.claim.0  
2.snd.claim.1  
2.rcv.claim.0  
0.rcv.claim.1  
0.snd.claim.0  
1.snd.claim.0  
2.snd.claim.0  
0.rcv.claim.0  
2.snd.claim.2  
0.rcv.claim.2  
2.snd.claim.2  
2.rcv.claim.0  
1.rcv.claim.0  
0.snd.claim.0  
0.rcv.claim.2  
1.snd.claim.0  
2.snd.claim.0  
0.rcv.claim.0  
1.rcv.claim.0  
2.rcv.claim.0  
1.snd.claim.0  
2.snd.claim.0  
0.rcv.claim.D  
2.snd.claim.2  
2.rcv.claim.0  
1.snd.claim.1  
0.snd.token  
1.rcv.token  
1.open  
0.snd.claim.0  
0.rcv.claim.2  
2.snd.claim.0  
0.rcv.claim.0  
0.open  
ERROR

## 6 LTS of CRASHING node

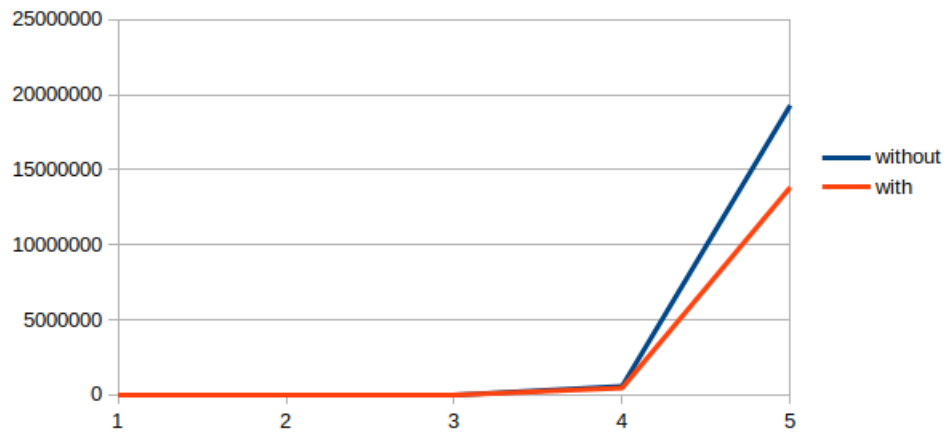


## 7 MUTEX checking

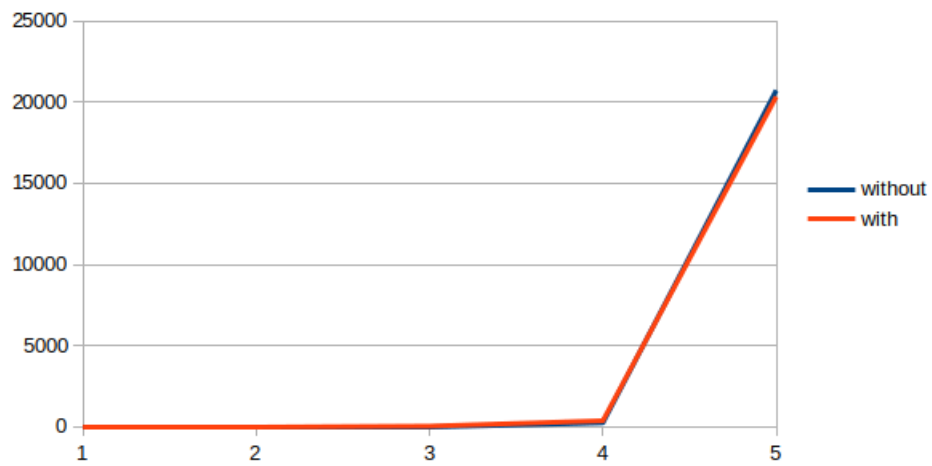
Here are our results for the number of states, transitions, time and length of violation trace for checking MUTEX.

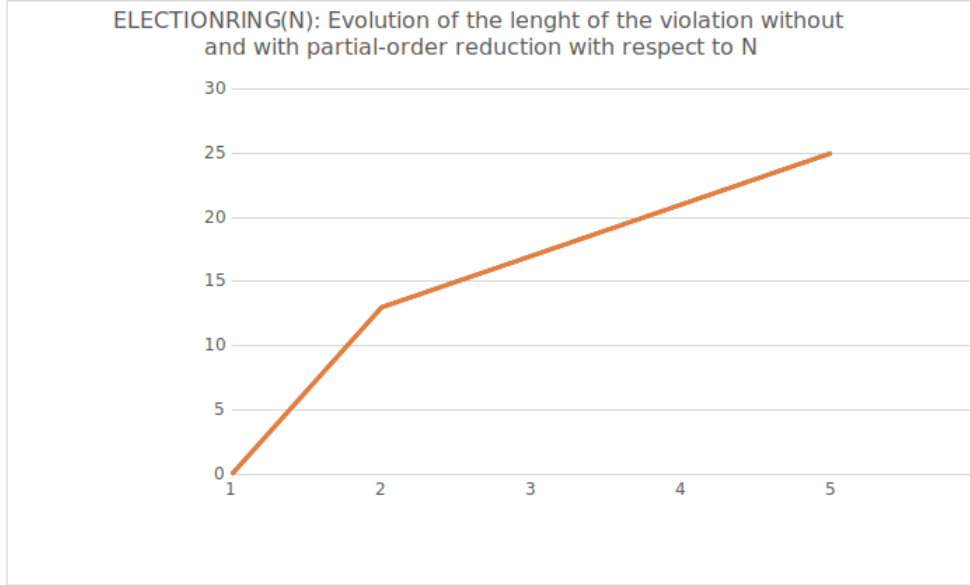


ELECTIONRING(N): Number of transitions of the violation trace with and without reduction



ELECTIONRING(N): Time in ms of the violation trace with and without reduction





## 8 ELECTIONRING(N) supertrace

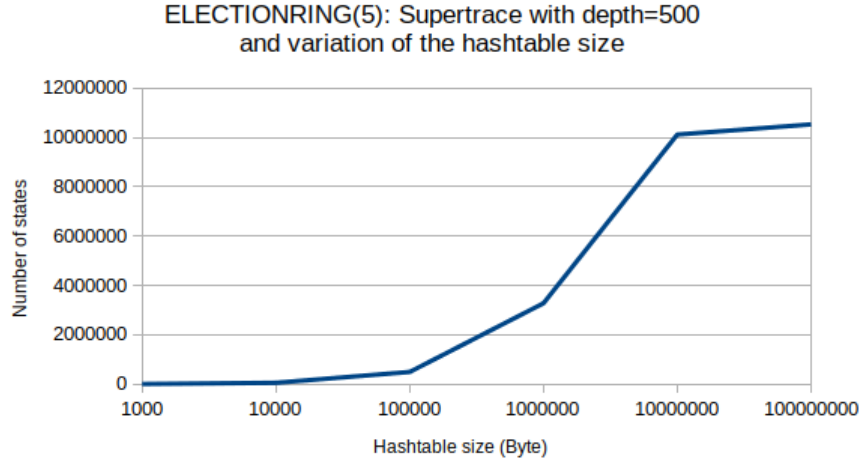
ELECTIONRING(N) : Supertrace (with 100MB hashtable and search depth 500) violation trace of MUTEX

N=	1	2	3	4	5
# states	11	266	8309	304720	10526841
# transition	19	633	24629	304720	10526841
Time	0	0	11	347	12808
Trace length	0	35	85	147	130

## 9 ELECTIONRING(5) supertrace

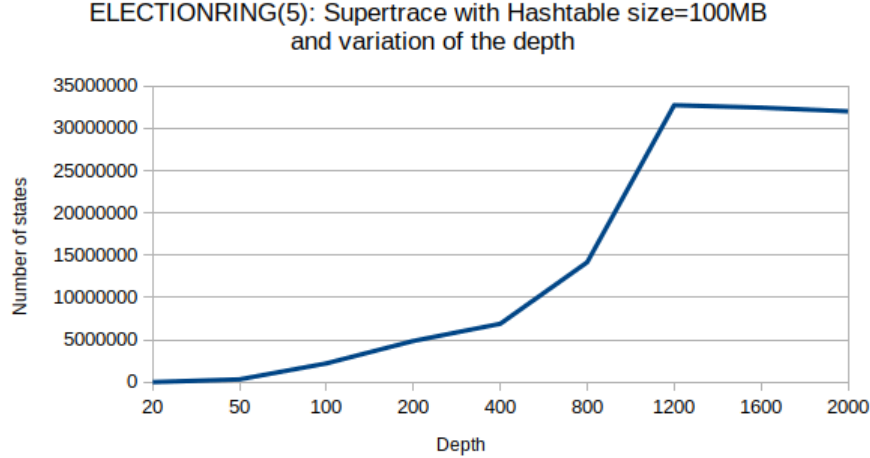
ELECTIONRING(5) : Supertrace (with depth = 500) and variation of hashtable size for violation trace of MUTEX

Hashtable size	1000	10 000	100 000	1 000 000	10 000 000	100 000 000
# states	5813	53 684	494 423	3 277 203	10 114 567	10 526 841
# transition	32439	281 678	2 447 876	14 236 411	44 418 005	46 748 651
Time	49	89	658	4023	12 496	13 272
Trace length	0	0	0	93	132	130



ELECTIONRING(5) : Supertrace with hashtable size = 100MB and variation of the depth  
for violation trace of MUTEX

Depth	20	50	100	200	400	800	1200	1600	2000
# states	3600	325 012	2 217 753	4 871 479	6 894 210	14 167 548	32 735 643	32 447 420	32 010 000
# transition	28 337	1 933 074	10 474 652	21 441 657	29 975 302	58 211 753	127 859789	126 747 119	124 660 250
Time	12	466	658	6251	8596	17 234	39 139	38 770	37 810
Trace length	0	0	0	61	0	217	285	285	285



We can see on these results that to obtain the shortest violation trace with must have a small depth (around 200) and that the hashtable size should not be too high and not too low, a size of 1MB is sufficient.