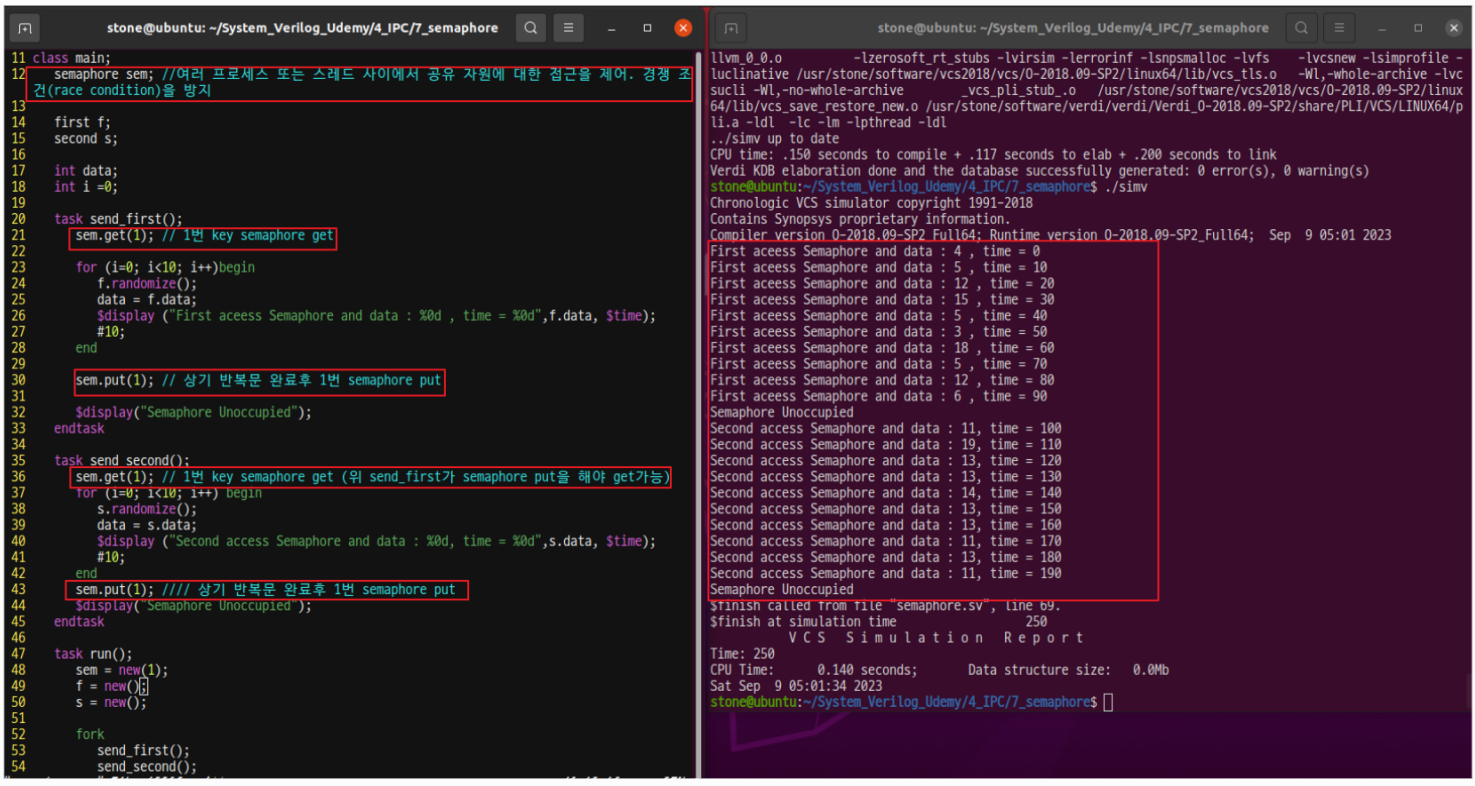
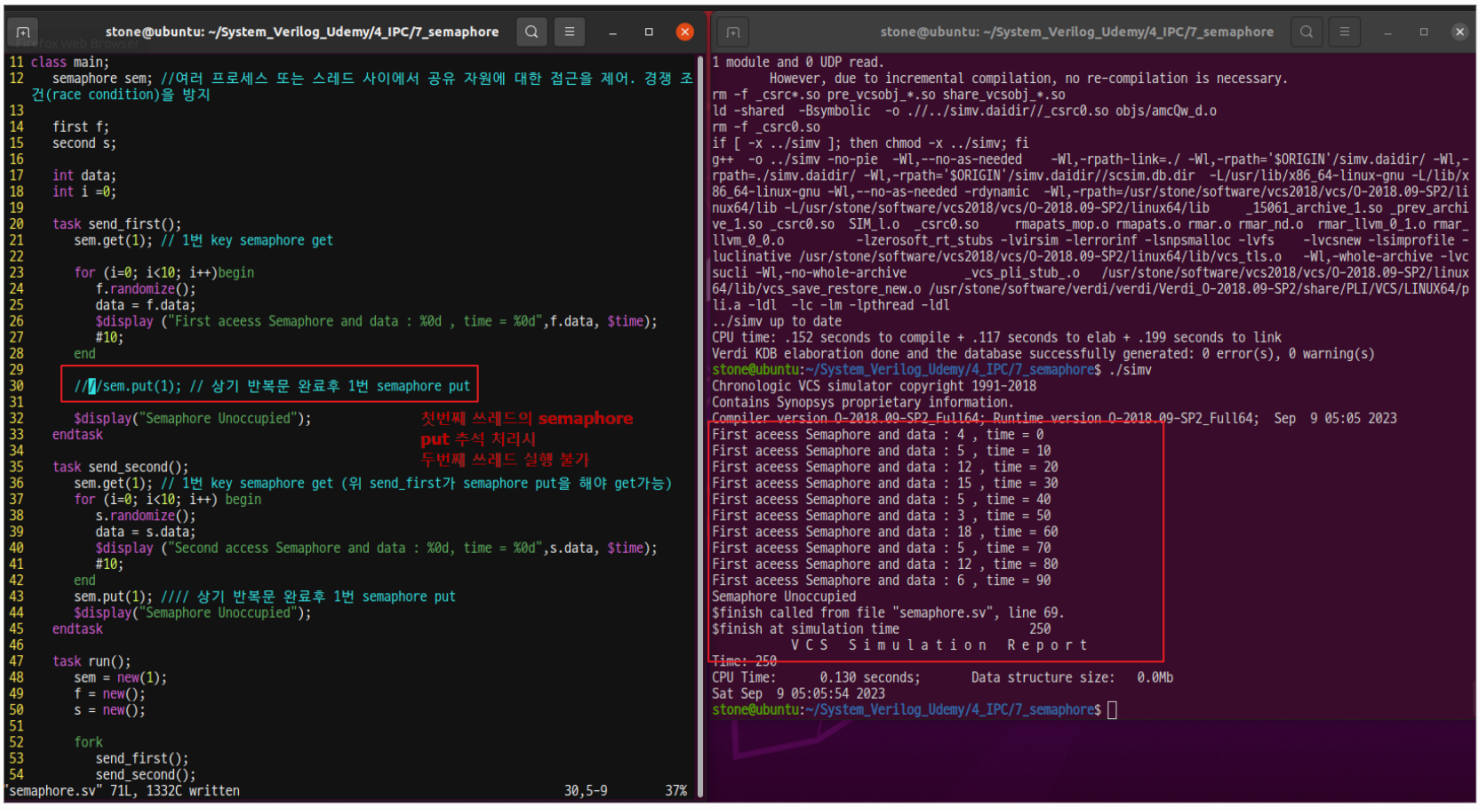

stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore
11 class main;
12 semaphore sem; //여러 프로세스 또는 스레드 사이에서 공유 자원에 대한 접근을 제어. 경쟁 조건(race condition)을 방지
13
14 first f;
15 second s;
16
17 int data;
18 int i =0;
19
20 task send_first();
21 sem.get(1); // 1번 key semaphore get
22
23 for (i=0; i<10; i++)begin
24 f.randomize();
25 data = f.data;
26 $display ("First aceess Semaphore and data : %0d , time = %0d",f.data, $time);
27 #10;
28 end
29
30 sem.put(1); // 상기 반복문 완료후 1번 semaphore put
31
32 $display("Semaphore Unoccupied");
33 endtask
34
35 task send_second();
36 sem.get(1); // 1번 key semaphore get (위 send_first가 semaphore put을 해야 get가능)
37 for (i=0; i<10; i++) begin
38 s.randomize();
39 data = s.data;
40 $display ("Second access Semaphore and data : %0d, time = %0d",s.data, $time);
41 #10;
42 end
43 sem.put(1); //// 상기 반복문 완료후 1번 semaphore put
44 $display("Semaphore Unoccupied");
45 endtask
46
47 task run();
48 sem = new(1);
49 f = new();
50 s = new();
51
52 fork
53 send_first();
54 send_second();
stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore
llvm_0_0.o -lzerosoft_rt_stubs -lvirsim -lerrorinf -lsnpsmalloc -lvfs -lvcsnew -lsimprofile -luclinative /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_tls.o -Wl,-whole-archive -lvcsucli -Wl,-no-whole-archive _vcs_pli_stub_.o /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_save_restore_new.o /usr/stone/software/verdi/verdi/Verdi_O-2018.09-SP2/share/PLI/VCS/LINUX64/pli.a -ldl -lc -lm -lpthread -ldl
../simv up to date
CPU time: .150 seconds to compile + .117 seconds to elab + .200 seconds to link
Verdi KDB elaboration done and the database successfully generated: 0 error(s), 0 warning(s)
stone@ubuntu:~/System_Verilog_Udemy/4_IPC/7_semaphore$ ./simv
Chronologic VCS simulator copyright 1991-2018
Contains Synopsys proprietary information.
Compiler version O-2018.09-SP2_Full64; Runtime version O-2018.09-SP2_Full64; Sep 9 05:01 2023
First aceess Semaphore and data : 4 , time = 0
First aceess Semaphore and data : 5 , time = 10
First aceess Semaphore and data : 12 , time = 20
First aceess Semaphore and data : 15 , time = 30
First aceess Semaphore and data : 5 , time = 40
First aceess Semaphore and data : 3 , time = 50
First aceess Semaphore and data : 18 , time = 60
First aceess Semaphore and data : 5 , time = 70
First aceess Semaphore and data : 12 , time = 80
First aceess Semaphore and data : 6 , time = 90
Semaphore Unoccupied
Second access Semaphore and data : 11, time = 100
Second access Semaphore and data : 19, time = 110
Second access Semaphore and data : 13, time = 120
Second access Semaphore and data : 13, time = 130
Second access Semaphore and data : 14, time = 140
Second access Semaphore and data : 13, time = 150
Second access Semaphore and data : 13, time = 160
Second access Semaphore and data : 11, time = 170
Second access Semaphore and data : 13, time = 180
Second access Semaphore and data : 11, time = 190
Semaphore Unoccupied
$finish called from file "semaphore.sv", line 69.
$finish at simulation time 250
VCS Simulation Report
Time: 250
CPU Time: 0.140 seconds; Data structure size: 0.0Mb
Sat Sep 9 05:01:34 2023
stone@ubuntu:~/System_Verilog_Udemy/4_IPC/7_semaphore$


stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore
11 class main;
12 semaphore sem; //여러 프로세스 또는 스레드 사이에서 공유 자원에 대한 접근을 제어. 경쟁 조건(race condition)을 방지
13
14 first f;
15 second s;
16
17 int data;
18 int i =0;
19
20 task send_first();
21 sem.get(1); // 1번 key semaphore get
22
23 for (i=0; i<10; i++)begin
24 f.randomize();
25 data = f.data;
26 $display ("First aceess Semaphore and data : %0d , time = %0d",f.data, $time);
27 #10;
28 end
29
30 //sem.put(1); // 상기 반복문 완료후 1번 semaphore put
31
32 $display("Semaphore Unoccupied");
33 endtask
34
35 task send_second();
36 sem.get(1); // 1번 key semaphore get (위 send_first가 semaphore put을 해야 get가능)
37 for (i=0; i<10; i++) begin
38 s.randomize();
39 data = s.data;
40 $display ("Second access Semaphore and data : %0d, time = %0d",s.data, $time);
41 #10;
42 end
43 sem.put(1); //// 상기 반복문 완료후 1번 semaphore put
44 $display("Semaphore Unoccupied");
45 endtask
46
47 task run();
48 sem = new(1);
49 f = new();
50 s = new();
51
52 fork
53 send_first();
54 send_second();
"semaphore.sv" 71L, 1332C written 30,5-9 37%
첫번째 쓰레드의 semaphore put 주석 처리시
두번째 쓰레드 실행 불가
stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore
1 module and 0 UDP read.
However, due to incremental compilation, no re-compilation is necessary.
rm -f _csrc*.so pre_vcsobj_*.so share_vcsobj_*.so
ld -shared -Bsymbolic -o .//../simv.daidir//_csrc0.so objs/amcQw_d.o
rm -f _csrc0.so
if [-x ../simv]; then chmod -x ../simv; fi
g++ -o ../simv -no-pie -Wl,--no-as-needed -Wl,-rpath-link=./ -Wl,-rpath='$ORIGIN'/simv.daidir/ -Wl,-rpath=./simv.daidir/ -Wl,-rpath='$ORIGIN'/simv.daidir//scsim.db.dir -L/usr/lib/x86_64-linux-gnu -L/lib/x86_64-linux-gnu -Wl,--no-as-needed -rdynamic -Wl,-rpath=/usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib -L/usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib _15061_archive_1.so _prev_archive_1.so _csrc0.so SIM_l.o _csrc0.so rmapats_mop.o rmapats.o rmar.o rmar_nd.o rmar_llvm_0_1.o rmar_llvm_0_0.o -lzerosoft_rt_stubs -lvirsim -lerrorinf -lsnpsmalloc -lvfs -lvcsnew -lsimprofile -luclinative /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_tls.o -Wl,-whole-archive -lvcsucli -Wl,-no-whole-archive _vcs_pli_stub_.o /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_save_restore_new.o /usr/stone/software/verdi/verdi/Verdi_O-2018.09-SP2/share/PLI/VCS/LINUX64/pli.a -ldl -lc -lm -lpthread -ldl
../simv up to date
CPU time: .152 seconds to compile + .117 seconds to elab + .199 seconds to link
Verdi KDB elaboration done and the database successfully generated: 0 error(s), 0 warning(s)
stone@ubuntu:~/System_Verilog_Udemy/4_IPC/7_semaphore$ ./simv
Chronologic VCS simulator copyright 1991-2018
Contains Synopsys proprietary information.
Compiler version O-2018.09-SP2_Full64; Runtime version O-2018.09-SP2_Full64; Sep 9 05:05 2023
First aceess Semaphore and data : 4 , time = 0
First aceess Semaphore and data : 5 , time = 10
First aceess Semaphore and data : 12 , time = 20
First aceess Semaphore and data : 15 , time = 30
First aceess Semaphore and data : 5 , time = 40
First aceess Semaphore and data : 3 , time = 50
First aceess Semaphore and data : 18 , time = 60
First aceess Semaphore and data : 5 , time = 70
First aceess Semaphore and data : 12 , time = 80
First aceess Semaphore and data : 6 , time = 90
Semaphore Unoccupied
$finish called from file "semaphore.sv", line 69.
$finish at simulation time 250
VCS Simulation Report
Time: 250
CPU Time: 0.130 seconds; Data structure size: 0.0Mb
Sat Sep 9 05:05:54 2023
stone@ubuntu:~/System_Verilog_Udemy/4_IPC/7_semaphore$

stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore

```
10
11 class main;
12   semaphore sem; //여러 프로세스 또는 스레드 사이에서 공유 자원에 대한 접근을 제어. 경쟁 조건(race condition)을 방지
13
14   first f;
15   second s;
16
17   int data;
18   int i =0;
19
20   task send_first();
21     //sem.get(1); // 1번 key semaphore get
22
23     for (i=0; i<10; i++)begin
24        f.randomize();
25        data = f.data;
26        $display ("First aceess Semaphore and data : %0d , time = %0d",f.data, $time);
27        #10;
28     end
29
30     //sem.put(1); // 상기 반복문 완료후 1번 semaphore put
31
32     $display("Semaphore Unoccupied");
33   endtask
34
35   task send_second();
36     //sem.get(1); // 1번 key semaphore get (위 send_first가 semaphore put을 해야 get가능)
37     for (i=0; i<10; i++) begin
38        s.randomize();
39        data = s.data;
40        $display ("Second access Semaphore and data : %0d, time = %0d",s.data, $time);
41        #10;
42     end
43     //sem.put(1); //// 상기 반복문 완료후 1번 semaphore put
44     $display("Semaphore Unoccupied");
45   endtask
46
47   task run();
48      sem = new(1);
49      f = new();
50      s = new();
51
52      fork
53         send_first();
54         send_second();
55      join
56   endtask
57 endclass
58
```

stone@ubuntu: ~/System_Verilog_Udemy/4_IPC/7_semaphore

```
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and may be used and disclosed only as authorized in a license agreement
controlling such use and disclosure.

Parsing design file 'semaphore.sv'
Top Level Modules:
       tb
No TimeScale specified
Starting vcs inline pass...
1 module and 0 UDP read.
         However, due to incremental compilation, no re-compilation is necessary.
rm -f _csrc*.so pre_vcsobj_*.so share_vcsobj_*.so
ld -shared  -Bsymbolic  -o .//../simv.daidir//_csrc0.so objs/amcQw_d.o
rm -f _csrc0.so
if [ -x ../simv ]; then chmod -x ../simv; fi
g++  -o ../simv -no-pie  -Wl,--no-as-needed    -Wl,-rpath-link=./ -Wl,-rpath='$ORIGIN'/simv.daidir/ -Wl,-rpath=./simv.daidir/ -Wl,-rpath='$ORIGIN'/simv.daidir//scsim.db.dir  -L/usr/lib/x86_64-linux-gnu -L/lib/x86_64-linux-gnu -Wl,--no-as-needed -rdynamic  -Wl,-rpath=/usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib -L/usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib
  _4377_archive_1.so _prev_archive_1.so _csrc0.so  SIM_l.o  _csrc0.so     rmapats_mop.o rmapats.o rmar.o rmar_nd.o  rmar_llvm_0_1.o rmar_llvm_0_0.o          -lzerosoft_rt_stubs -lvirsim -lerrorinf -lsnpsmalloc -lvfs    -lvcsnew -lsimprofile -luclinative /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_tls.o   -Wl,-whole-archive -lvcsucli -Wl,-no-whole-archive        _vcs_pli_stub_.o   /usr/stone/software/vcs2018/vcs/O-2018.09-SP2/linux64/lib/vcs_save_restore_new.o /usr/stone/software/verdi/verdi/Verdi_O-2018.09-SP2/share/PLI/VCS/LINUX64/pli.a -ldl  -lc -lm -lpthread -ldl
../simv up to date
CPU time: .254 seconds to compile + .125 seconds to elab + .227 seconds to link
Verdi KDB elaboration done and the database successfully generated: 0 error(s), 0 warning(s)
stone@ubuntu:~/System_Verilog_Udemy/4_IPC/7_semaphore$ ./simv
Chronologic VCS simulator copyright 1991-2018
Contains Synopsys proprietary information.
Compiler version O-2018.09-SP2_Full64; Runtime version O-2018.09-SP2_Full64;  Sep  9 06:03 2023
First aceess Semaphore and data : 4 , time = 0
Second access Semaphore and data : 11, time = 0
First aceess Semaphore and data : 5 , time = 10
Second access Semaphore and data : 19, time = 10
First aceess Semaphore and data : 12 , time = 20
Second access Semaphore and data : 13, time = 20
First aceess Semaphore and data : 15 , time = 30
Second access Semaphore and data : 13, time = 30
First aceess Semaphore and data : 5 , time = 40
Second access Semaphore and data : 14, time = 40
First aceess Semaphore and data : 3 , time = 50
Semaphore Unoccupied
Semaphore Unoccupied
$finish called from file "semaphore.sv", line 69.
$finish at simulation time                  250
           V C S   S i m u l a t i o n   R e p o r t
Time: 250
```

Semaphore 미적용시 Fork Join 의
Thread 간의 Race 상태놓임