SE PRACTICAL EXAM

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Odd Number

1) Demonstrate use of Undefined parameters with annotations in Splint tool and C Compiler.

CODE:

```c
#include <stdio.h>

int main()
{   int y=0,z=0;
    printf("use Undefined parameters with annotations : %d",&x);
    printf("y: %d",&y);
    printf("z: %d",&z);
    return 0;
}
```

OUTPUT:

```
root@Sourabh: /mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam# splint q1.c
Splint 3.1.2 --- 20 Feb 2018

q1.c: (in function main)
q1.c:5:62: Unrecognized identifier: x
  Identifier used in code has not been declared. (Use -unrecog to inhibit
  warning)
q1.c:5:61: Format argument 1 to printf (%d) expects int gets <any> *: &x
  Type of parameter is not consistent with corresponding code in format string.
  (Use -formattype to inhibit warning)
   q1.c:5:58: Corresponding format code
q1.c:6:20: Format argument 1 to printf (%d) expects int gets int *: &y
   q1.c:6:17: Corresponding format code
q1.c:7:20: Format argument 1 to printf (%d) expects int gets int *: &z
   q1.c:7:17: Corresponding format code

Finished checking --- 4 code warnings
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam#
```

2) Write a C program to indicate null pointer and dereferenced pointer and Run Splint for this C code and report the error generated.

CODE:

```c
#include <stdio.h>
char firstChar1(/*@null@*/ char *s)
{
    return *s;
}
char firstChar2(/*@null@*/ char *s)
{
    if (s == NULL)
        return '\0';
    return *s;
}
int main()
{
    printf("\n\n->derefencing null ptr\n\n");
    return 0;
}
```

OUTPUT:

```
root@Sourabh: /mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam# splint q2.c
Splint 3.1.2 --- 20 Feb 2018

q2.c: (in function firstChar1)
q2.c:4:13: Dereference of possibly null pointer s: *s
  A possibly null pointer is dereferenced.  Value is either the result of a
  function which may return null (in which case, code should check it is not
  null), or a global, parameter or structure field declared with the null
  qualifier. (Use -nullderef to inhibit warning)
   q2.c:2:34: Storage s may become null

Finished checking --- 1 code warning
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam#
```

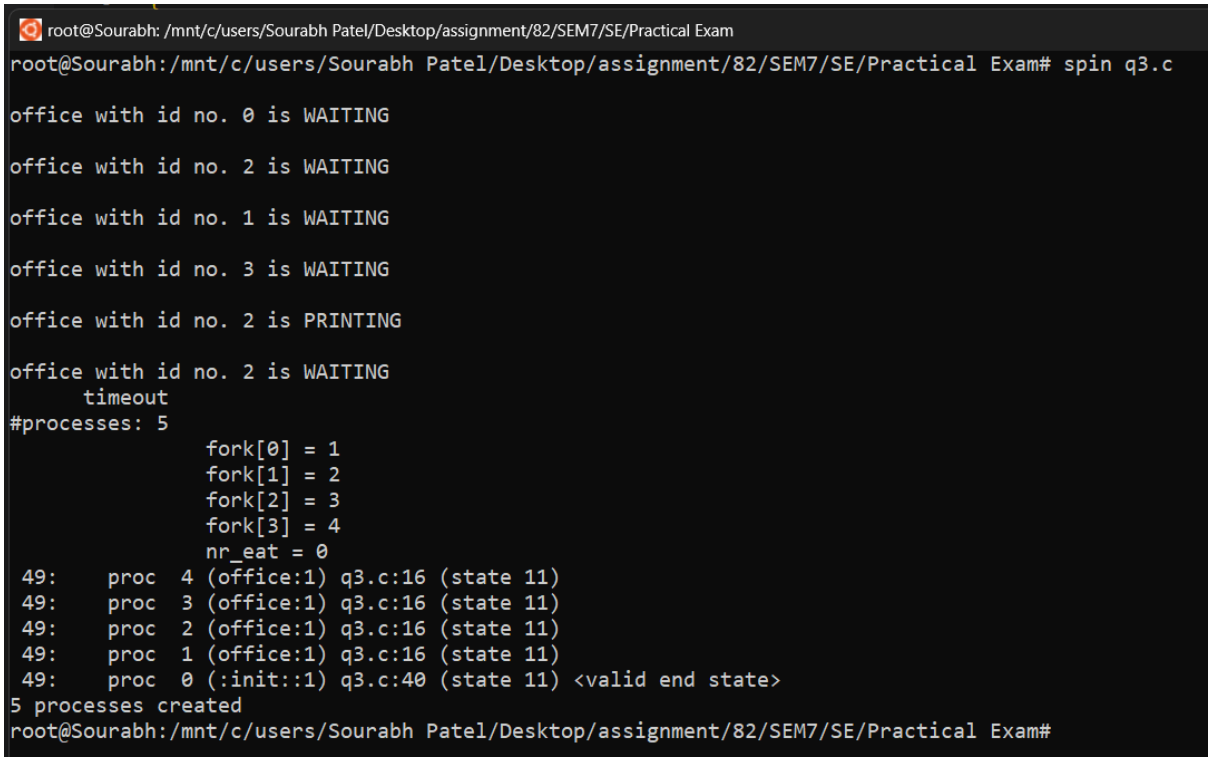
3) Model an office where two computer systems are hooked up to a single printer. Establish mutual exclusion between the two computer systems using a global variable and atomic "test & set" operations. Verify in SPIN model that it is never the case that both systems print at the same time.

CODE:

```
#define N 4
byte fork[N];
byte nr_eat;
proctype office(byte id)
{    Think:
        printf("\noffice with id no. %d is WAITING\n",id);
        if
        :: atomic { fork[id] == 0 -> fork[id] = id + 1; };
        :: atomic { fork[(id + 1)%N] == 0 -> fork[(id + 1)%N] = id + 1; };
        fi;
    One:
        if
        :: atomic
        {
            fork[id] == id + 1 -> fork[(id + 1)%N] == 0 -> fork[(id + 1)%N] =
id + 1;
            nr_eat++;
        }
        :: atomic
        {
            fork[id] == 0 -> fork[(id + 1)%N] == id + 1 -> fork[id] = id + 1;
            nr_eat++;
        }
        fi;
    Eat:
        printf("\noffice with id no. %d is PRINTING\n",id);
        d_step { nr_eat--; fork[(id + 1)%N] = 0; fork[id] = 0;}
    goto Think;
}

init {
    atomic
    {
        byte i = 0;
        do
        :: i < N -> run office(i); i++;
        :: else -> break;
        od;
    }
}
```

OUTPUT:


root@Sourabh: /mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam# spin q3.c
office with id no. 0 is WAITING
office with id no. 2 is WAITING
office with id no. 1 is WAITING
office with id no. 3 is WAITING
office with id no. 2 is PRINTING
office with id no. 2 is WAITING
timeout
#processes: 5
fork[0] = 1
fork[1] = 2
fork[2] = 3
fork[3] = 4
nr_eat = 0
49: proc 4 (office:1) q3.c:16 (state 11)
49: proc 3 (office:1) q3.c:16 (state 11)
49: proc 2 (office:1) q3.c:16 (state 11)
49: proc 1 (office:1) q3.c:16 (state 11)
49: proc 0 (:init::1) q3.c:40 (state 11) <valid end state>
5 processes created
root@Sourabh:/mnt/c/users/Sourabh Patel/Desktop/assignment/82/SEM7/SE/Practical Exam#