Computer Security

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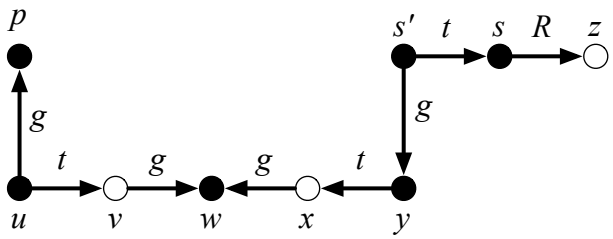
Question 1: Take-Grant protection model

Prove that, in the Take-Grant Protection Model, it holds that:

Question 2: Take-Grant protection model

Let G_0 be the protection graph:



1. Give a sequence of rule applications showing *can.share*(R, z, p, G_0) is true.
2. Is *can.share*(t, s', p, G_0) true? Why or why not?
3. Show *can.steal*(R, z, p, G_0) is true and list the conspirators.

Question 3: Optional - Assembler control flow

- Compile the C source given below with GCC
- Print out the generated assembler code and try to follow the control flow within the program
  - Where are the recursive calls?
  - Where are the if statements?
  - Where are the loops?
  - How are parameters and return values passed?
- It may be interesting to compile it with different optimization levels (none, -O1, -O2) and see how different this simple program can be.

Listing 1: Recursive Fibonacci

```
1  #include<stdio.h>
2
3  int Fibonacci(int);
4
5  int main(void) {
6     int n = 16, i = 0, c;
7
8     printf("Fibonacci series up to: %d\n", n);
9
10    for (c = 1; c <= n; c++) {
11       printf("%d\n", Fibonacci(i));
12       i++;
13    }
14
15    return 0;
16 }
17
18 int Fibonacci(int n) {
19    if (n == 0) {
20       return 0;
21    } else if (n == 1) {
22       return 1;
23    } else {
24       return ( Fibonacci(n - 1) + Fibonacci(n - 2));
25    }
26 }
```