CS314: HW5 Solution, Spring 2014

Problem 1

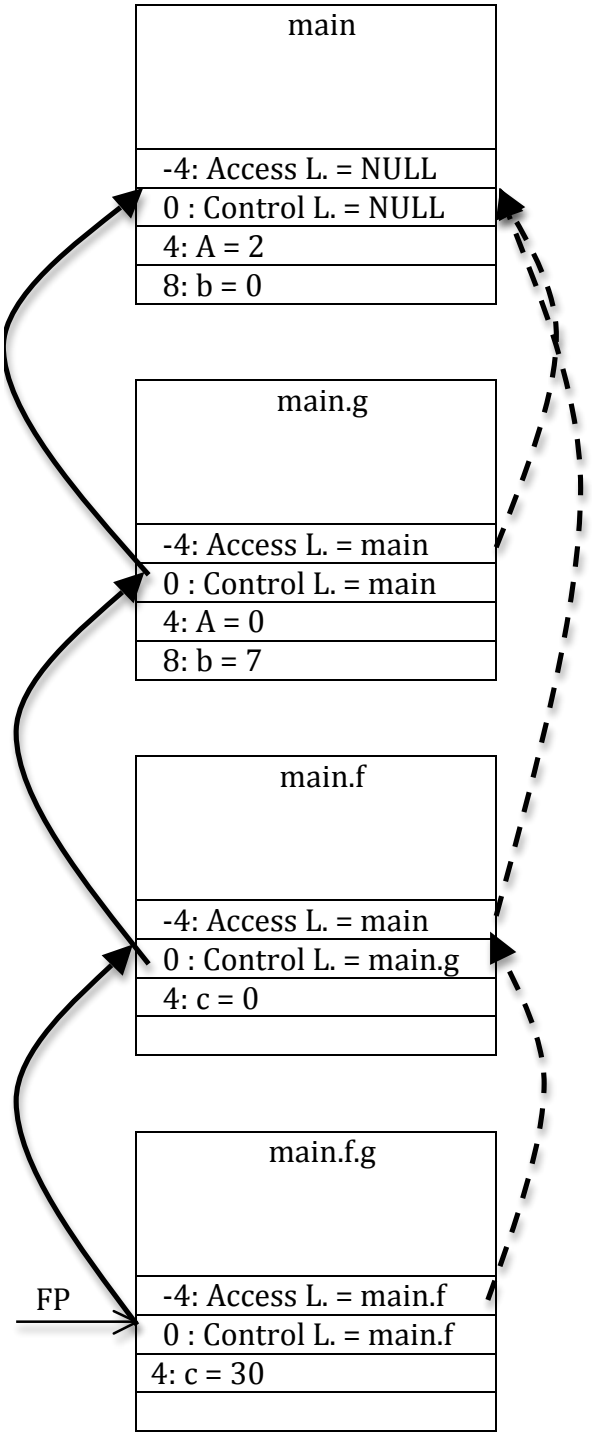
(*1*): 0, 0, 30
(*2*): 5, 3
(*3*): 0
(*4*): 0, 7
(*5*): 2, 3
(*6*): 2, 0

Problem 2.1

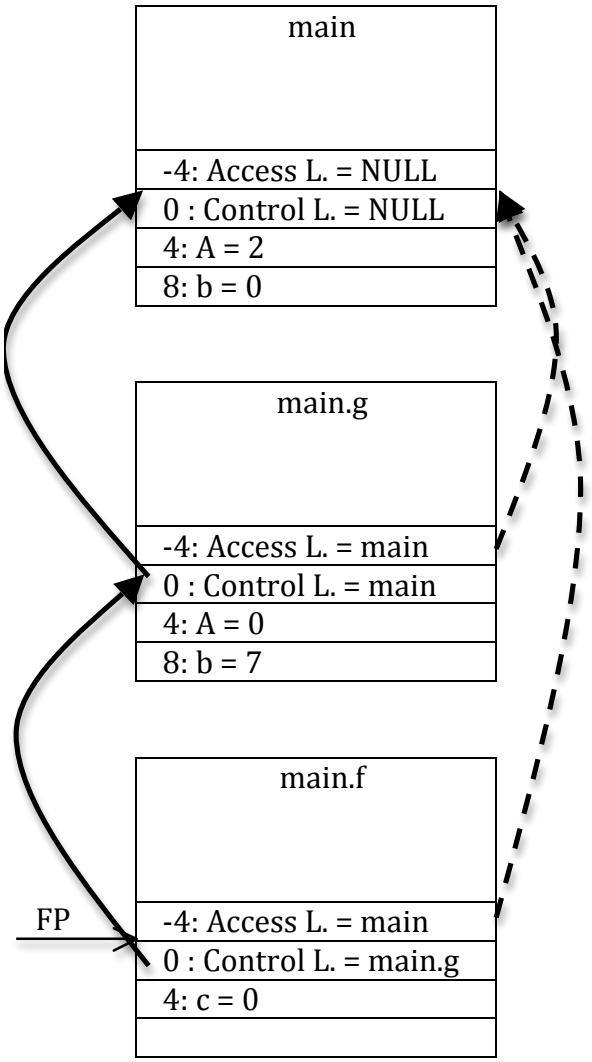
```
program main()
{
 int A , (1.2);
procedure f()
{
        int (2,1);
        procedure g()
        {
                 int (3,1);
                (3,1)= 30;
                ... = ...(1,2)...//<<<-------- (*A*)
                print A,(1,2),(3,1); )  //<<<-------- (*1*)
                end g;
        }
        print A,b; //<<<-------- (*2*)
        A = 0; 1,2)  = 0; (2,1) = 0;
        call g();
        print (2,1); //<<<-------- (*3*)
        end f;
}
procedure g()
{
        int A, (2,2);
        A = 5; (2,2) = 7;
        call f();l
        print A, (2,2); //<<<-------- (*4*)
        end g;
}

A= 2; (1,2) = 3
print A,(1,2); //<<<----------(*5*)
call g();
print A , (1,2); //<<<----------(*6*)

end
}
```

Problem 2.2

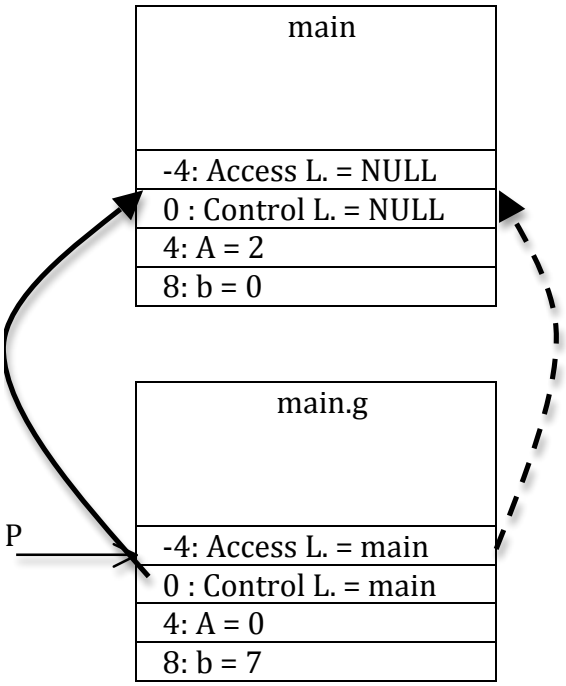
At Point (*1*)



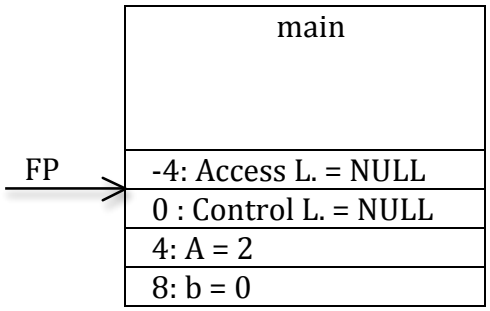
At Point (*3*)


main
-4: Access L. = NULL
0 : Control L. = NULL
4: A = 2
8: b = 0
main.g
-4: Access L. = main
0 : Control L. = main
4: A = 0
8: b = 7
main.f
FP
-4: Access L. = main
0 : Control L. = main.g
4: c = 0

At Point (*4*)



At Point (*6*)



Problem 2.3

Variable “b” is represented by (level, offset) pair (1,2).
Code has to be generated for access to (1,2) at level 3 since main.f.g is at level 3.

```
LOADI #8 => r1   // offset of variable in bytes from FP
LOADI #-4 =>  r2 // offset of access link in bytes from FP

ADD r0, r2 => r3  // address of access link in current frame
LOAD r3 => r4    //  address of most recent frame at level 2
ADD  r4 r2 => r5 // address of access link in level 2 frame
LOAD r5 => r6    // address of most recent frame at level 1

ADD r6 r1 => r7  // address of second local variable in level 1 (main) frame
LOAD r7 => r8    // get content of variable b
```