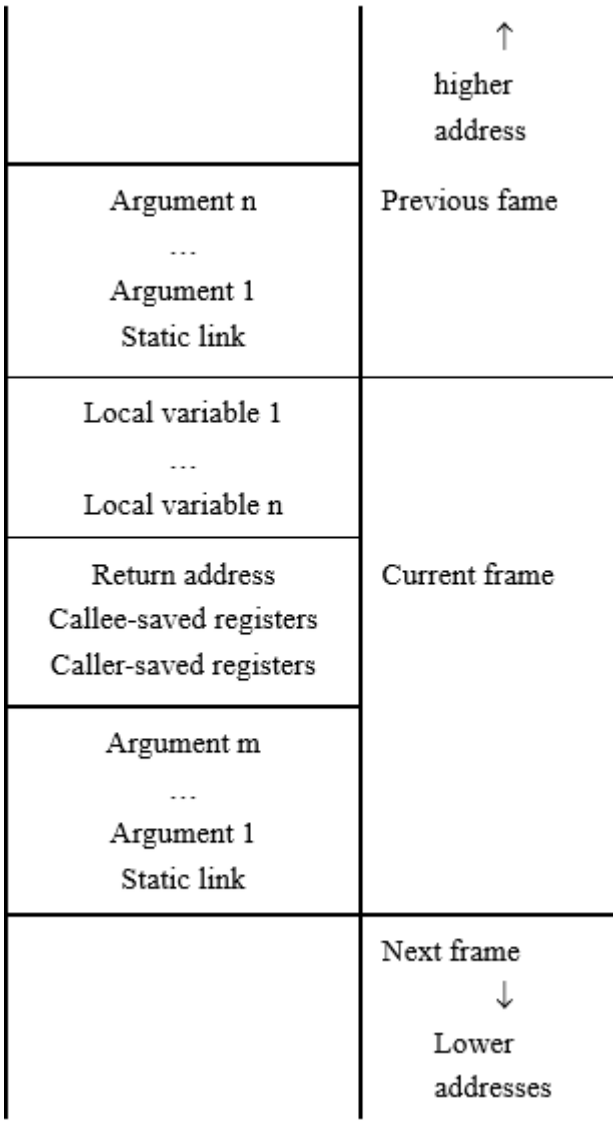
Homework 4

Due: December 1st

Activation Record

Suppose we are using the following frame structure:



The register r1-r3 is caller-save and r4-r6 is callee-save, and no argument will be passed by any register. Besides, all callee-save registers used in a function will be pushed onto stack before it executes. Consider the execution of program() in the following code. Please complete the activation records when the function fun() is just about to finish:

NOTE:

1. The registers and locals used in each function are annotated in their declaration.
2. You should indicate which addresses the static links point to by drawing arrows.

```
function program() : int =
    /* INFO of function program
    used registers: non
    spilled variables: retVal
    return address: P     */
    let
        var retVal := 0

        function foo(a:int, b:int) =
            /* INFO of function foo
            used registers: r1, r2, r4
            spilled variables: non
            return address: A       */
            let
                function bar(c:int) =
                /* INFO of function bar
                used registers: r2, r4, r6
                spilled variables: ret
                return address: C       */
                let
                    var ret := 0;
                    in ret := fun(a, b, c);
                    print(ret)
                end

            /* body of function foo */
            in bar(5);
        end

    function fun(d:int, e:int, f:int) : int =
        /* INFO of function fun
        used registers: r1, r3, r5
        spilled variables: output
        return address: B         */
        let
            var output := 0
            in if d > 0 then output := e – f
            else output := f – e ;
            output

    /* body of function program */
    in foo(3, 4);    retVal
end
```

static link		Previous fame
retVal	local variables	frame of program
P	return address of program	
4	arguments	
3		
static link	static link	
A	return address of foo	frame of foo
r4	callee-saved registers	
r1	caller-saved registers	
r2		
5	arguments	
static link	static link	
ret	local variables	frame of bar
C	return address of bar	
r4	callee-saved registers	
r6		
r2	caller-saved registers	
c	arguments	
b		
a		
static link	static link	
output	local variables	frame of fun
B	return address of fun	
r5	callee-saved registers	