

Compilers

Assignment 3: Code Generation

Deadline: 2011-03-28, 2:30 PM

2011-02-29

1- The Assignment: (based on Appel Exercise 6.3)

Consider the following C procedure:

```
int g (int x[], int *y);
int f(int a, int b){
    int c[3], e;
    e = 1;
    while (e != 0)
        e = g(c, &b);
    return c[1] + b;
}
```

In C, **int*** is the type pointer to **int**, **&b** computes the address (*pointer*) of **b**, and passing an array as a parameter passes the address (*pointer*) of the array not a copy of it.

The target machine is a **32-bit RISC with 4-byte integers**, a stack pointer register **SP**, a return address register **RA**, eight general purpose registers **R0** to **R7**, and the following instruction set:

goto label	
if reg < opnd goto label	(==, >=, etc)
move dst, opnd	assign opnd to dst
add dst, reg1, opnd2	assign reg1 plus opnd2 to dst
	ditto for sub, mul, and, or,
	leftshift, etc
load dst, (reg1 + opnd2)	read integer from memory at
	reg1+opnd2
store (reg1 + opnd1), opnd3	write integer (opnd3) to memory
	at reg1+opnd2
call label	set RA to next instruction then
	jump to label
return	jump to the address in RA

Each dst must be a register, and each opnd must be a register or an integer constant.

The function call conventions are that parameters are passed in registers **R0** and **R1**, the return value is returned in **R0**, and a function call may destroy any general-purpose register and **RA**. The stack grows from high to low addresses, and **SP** should always point to the lowest word of the current stack frame.

Generate assembly code for the procedure **f**. Apart from the statements and expressions, include the code for setting up the stack frame, storing registers in the stack frame, and fetching registers from the stack frame.

2- The Report

The report should be printed from a computer (hand-written reports can be difficult to read), and should include a front page with your name, email address, the name of the course, and the number of the assignment. The assignment can be solved either individually or in groups (up to 2 students/group).

You can leave the report in my room (room number 5, besides Mr. Salar's room, ground floor), or put it in my mail box at the Secretary's room (Nergiz's room).

PLEASE, do NOT send it by email!