

# Princeton University

## COS 217: Introduction to Programming Systems

### SPARC Subroutine Calling Conventions

Recall: Register `i6` is the same as `fp`, and register `o6` is the same as `sp`.

When subroutine `f` calls subroutine `g`...

In `f`:

- (1) Store actual parameters 1 to 6 in `o0-o5`.
- (2) Store actual parameters 7, 8, ... in memory locations `o6/sp + 92`, `o6/sp + 96`, ...
- (3) Execute "call `g`".  
  
    Store register `pc` in `o7`.  
    Note: `o7` thus stores the address of the call instruction.  
    Jump to the instruction at label `g`.
- (4) But before executing the "jumped to" instruction, execute the delay instruction that follows the "call" instruction.

In `g`:

- (5) Execute "save `%sp, -N, %sp`".  
  
    Compute the sum of `-N` and the current value of `o6/sp`.  
    Slide the register window forward.  
    Let the former `o0-o7` registers be known as the `i0-i7` registers.  
    Note: The former `o6/sp` is now known as `i6/fp`.  
    Thus `i6/fp` marks the previous top of the stack.  
    Note: The former `o7` is now known as `i7`.  
    Thus `g` must eventually return based upon the value in `i7`.  
    Create a new set of `i0-i7` and `o0-o7` registers.  
    [Save oldest register window in stack if necessary.]  
    Store the sum (computed above) in `o6/sp`.  
    Note: Thus a new stack frame is pushed onto the stack.
- (6) Use formal parameters in `i0-i5` and `i6/fp + 92`, `i6/fp + 96`, ... to compute return value(s).
- (7) Store return values in `i0-i5`.
- (8) Execute "ret".  
  
    Jump to `i7 + 8`  
    Jump to the instruction after the delay instruction after the call instruction.
- (9) But before executing the "jumped to" instruction, execute the delay instruction that follows the "ret" instruction, that is, "restore".  
  
    Slide the register window backward.  
    Restore the old set of `i0-i7` and `o0-o7` registers.  
    Note: The `i6/fp` register is restored to its previous state.  
    Let the former `i0-i7` registers be known as `o0-o7`.  
    Note: The former `i6/fp` is now known as `o6/sp`.  
    Note: The former `i7` is now known as `o7`.  
    [Load current register window from stack if necessary.]  
    Note: Thus a stack frame is popped from the stack.

In `f`:

- (10) Retrieve `g`'s return values from `o0-o5`.