Handling recursive procedure calls

Example. Compute factorial (n)

```c
int fact (int n)
{
    if (n < 1) return (1);
    else return (n * fact(n-1))
}
```

(Plan) Put n in $a0. Result should be available in $v0.

```
fact:    subi $sp, $sp, 8
        sw $ra, 4($sp)
        sw $a0, 0($sp)
```

$sp (current top of the stack)
calling program

```

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procedure fact

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```
Now test if \( n < 1 \) (i.e. \( n = 0 \)). In that case return 0 to \( $v0 \).

```
slti $t0, $a0, 1  # if \( n \geq 1 \) then goto L1
beq $t0, $zero, L1
addi $v0, $zero, 1  # return 1 to $v0
addi $sp, $sp, 8   # pop 2 items from stack
jr $ra            # return
L1:  subi $a0, $a0, 1  # decrement n
    jal fact      # call fact with \((n - 1)\)
```

Now, we need to compute \( n \ast \text{fact}(n-1) \)

```
lw  $a0, 0($sp)   # restore argument n
lw  $ra, 4($sp)  # restore return address
addi $sp, $sp, 8 # pop 2 items
mult $v0, $a0, $v0 # return \( n \ast \text{fact}(n-1) \)
jr  $ra          # return to caller
```