

```

int
main(int argc, char *argv)
{
    printf("The factorial of 10 is %d\n",
           fact(10));
}

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

main:   subu $sp, $sp, 32
        sw  $ra, 20($sp)
        sw  $fp, 16($sp)
        addu $fp, $sp, 28

        li  $a0, 10
        jal fact

0x0040003C   la  $a0, STRING
            move $a1, $v0
            jal printf

            lw  $ra, 20($sp)
            lw  $fp, 16($sp)
            addu $sp, $sp, 32
            jr  $ra

fact:   subu $sp, $sp, 32
        sw  $ra, 20($sp)
        sw  $fp, 16($sp)
        addu $fp, $sp, 28
        sw  $a0, 0($fp)
        lw  $v0, 0($fp)
        bgtz $v0, L2
        li  $v0, 1
        j   L1

L2:    lw  $v1, 0($fp)
        subu $v0, $v1, 1
        move $a0, $v0
        jal fact

0x00400090   lw  $v1, 0($fp)
            mul $v0, $v0, $v1

L1:    lw  $ra, 20($sp)
        lw  $fp, 16($sp)
        addu $sp, $sp, 32
        jr  $ra

```


Linux Stack

State as main is entered

		\$sp=0x7fffe730
		\$fp=0x00000000
		\$ra=0x00400018
0x7fffe730	0x????????	\$a0=0x00000000

State as fact is entered for the second time

0x7fffe6f0	0x7fffe72c 0x0040003C	
0x7fffe70c	10	
0x7fffe710	0x00000000 0x00400018	\$sp=0x7fffe6f0
0x7fffe72c		\$fp=0x7fffe70c
0x7fffe730	0x????????	\$ra=0x00400090
		\$a0=0x00000009

State after main sets up stack and before fact is called

0x7fffe710	0x00000000 0x00400018	\$sp=0x7fffe710
0x7fffe72c		\$fp=0x7fffe72c
0x7fffe730	0x????????	\$ra=0x00400018
		\$a0=0x0000000a

State after fact sets up stack and before fact is called a third time

0x7fffe6d0	0x7fffe70c 0x00400090	
0x7fffe6ec	9	
0x7fffe6f0	0x7fffe72c 0x0040003C	
0x7fffe70c	10	
0x7fffe710	0x00000000 0x00400018	\$sp=0x7fffe6d0
0x7fffe72c		\$fp=0x7fffe6ec
0x7fffe730	0x????????	\$ra=0x00400090
		\$a0=0x00000008

State as fact is entered for the first time

0x7fffe710	0x00000000 0x00400018	\$sp=0x7fffe710
0x7fffe72c		\$fp=0x7fffe72c
0x7fffe730	0x????????	\$ra=0x0040003c
		\$a0=0x0000000a

State after fact sets up stack and before fact is called a second time

0x7fffe6f0	0x7fffe72c 0x0040003C	
0x7fffe70c	10	
0x7fffe710	0x00000000 0x00400018	\$sp=0x7fffe6f0
0x7fffe72c		\$fp=0x7fffe70c
0x7fffe730	0x????????	\$ra=0x0040003c
		\$a0=0x00000009

Windows Stack

State as main is entered

		\$sp=0x7ffff6a0
		\$fp=0x00000000
		\$ra=0x00400018
0x7ffff6a0	0x????????	\$a=0x00000000

State as fact is entered for the second time

0x7ffff660	0x7ffff69c 0x0040003C	
0x7ffff67c	10	
0x7ffff680	0x00000000 0x00400018	
0x7ffff69c		\$sp=0x7ffff660
0x7ffff6a0	0x????????	\$fp=0x7ffff67c
		\$ra=0x00400090
		\$a=0x00000009

State after main sets up stack and before fact is called

0x7ffff680	0x00000000 0x00400018	
0x7ffff69c		\$sp=0x7ffff680
0x7ffff6a0	0x????????	\$fp=0x7ffff69c
		\$ra=0x00400018
		\$a=0x0000000a

State after fact sets up stack and before fact is called a third time

0x7ffff640	0x7ffff67c 0x00400090	
0x7ffff65c	9	
0x7ffff660	0x7ffff69c 0x0040003C	
0x7ffff67c	10	
0x7ffff680	0x00000000 0x00400018	
0x7ffff69c		\$sp=0x7ffff640
0x7ffff6a0	0x????????	\$fp=0x7ffff65c
		\$ra=0x00400090
		\$a=0x00000008

State as fact is entered for the first time

0x7ffff680	0x00000000 0x00400018	
0x7ffff69c		\$sp=0x7ffff680
0x7ffff6a0	0x????????	\$fp=0x7ffff69c
		\$ra=0x0040003c
		\$a=0x0000000a

State after fact sets up stack and before fact is called a second time

0x7ffff660	0x7ffff69c 0x0040003C	
0x7ffff67c	10	
0x7ffff680	0x00000000 0x00400018	
0x7ffff69c		\$sp=0x7ffff660
0x7ffff6a0	0x????????	\$fp=0x7ffff67c
		\$ra=0x0040003c
		\$a=0x00000009