Compiler Construction
PA02: Simple Assembler Programs

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Abstract

This is a demonstration of some simple MIPS programs that are ideal candidates for testing a basic compiler's output.

1 The Code

1.1 Hello World!

```
.data
hello_string: .ascii "Hello World!\n\0"

.text
main:
    li $v0, 4
    la $a0, hello_string
    syscall

    li $v0, 10
    syscall
```

1.2 Iterative Factorial

```
.text
.globl main
.globl iterative_factorial

main:
    subu $sp, $sp, 4
    sw $ra, ($sp)
    subu $sp, $sp, 4
    sw $s0, ($sp)


    li $a0, 10

    jal iterative_factorial
    nop
    move $s0, $v0


    lw $s0, ($sp)
    addu $sp, $sp, 4
    lw $ra, ($sp)
    addu $sp, $sp, 4

    li $v0, 10
    syscall

iterative_factorial:
    subu $sp, $sp, 4
    sw $ra, ($sp)
    subu $sp, $sp, 4
    sw $s0, ($sp)
    subu $sp, $sp, 4
    sw $s1, ($sp)

    move $s0, $a0
    li $s1, 1
```

```
blt $s0, 0, factorial_error
nop
factorial_loop:
    ble $s0, 1, end_factorial
    nop

    mul $s1, $s1, $s0
    sub $s0, $s0, 1

    j factorial_loop

factorial_error:
    li $s1, -1

end_factorial:
    move $v0, $s1

    lw $s1, ($sp)
    addu $sp, $sp, 4
    lw $s0, ($sp)
    addu $sp, $sp, 4
    lw $ra, ($sp)
    addu $sp, $sp, 4

    jr $ra
```