CENG311

MIPS Examples 2

Branch and Jump Instructions

- beq Rs1, Rs2, Label # branch to Label if Rs1==Rs2
- bne Rs1, Rs2, Label # branch to Label if Rs1!=Rs2
- blt Rs1, Rs2, Label # branch to Label if Rs1 < Rs2
- bgt Rs1, Rs2, Label # branch to Label if Rs1 > Rs2
- ble Rs1, Rs2, Label # branch to Label if Rs1 <= Rs2
- bge Rs1, Rs2, Label # branch to Label if Rs1 >= Rs2
- b Label # unconditional branch to Label

- j Label #jump to label starting the subroutine
- jal Label #jump and link to label starting the subroutine
- jr Rs #jump to address specified by register Rs

if condition

```
main:
    .
    .
    .
    beq $t0, $t1, target
    .
    .
    .
target:
    li $v0, 1
    move $a0, $t0
    syscall
```

if else

```
main:
    .
    .
    .
    bgt $t0, $t1, target
    li $v0, 1
    move $a0, $t0
    syscall
    b target2
    .
    .
    .
target:
    li $v0, 1
    move $a0, $t0
    syscall
target2:
    li $v0, 10
    syscall
```

Example-1

- Take two numbers from the user
- If they are equal, print that the numbers are equal
- Otherwise print the greater one

Loops

```
main:
    .
    .
    .
loop:
    .
    .
    .
    bne $t2, $zero, loop
```

Example-2

- Print:
  - ‘Number is: 1’
  - ‘Number is: 2’
  - .
  - .
  - .
  - ‘Number is 10’

Functions

```
main:
    .
    .
    .
    jal someFunction
    .
    .
    .
someFunction:
    .
    .
    .
    jr $ra
```

Example-3

- Define two numbers
- Add them in a function
- Print the result after return

Recursion

- Store local variables and return address on stack

```
subu $sp, $sp, 8
sw   $ra, 0($sp)
sw   $s0, 4($sp)
```

- Load from stack

```
lw $ra, 0($sp)
lw $s0, 4($sp)
addu $sp, $sp, 8
```

Example-4

- Write recursive factorial function