FIT1008 – Intro to Computer Science
Tutorial 3

Semester 1, 2017

Objectives of this tutorial

- To understand how to implement decisions and loops in MIPS.

Exercise 1

Consider the following uncommented MIPS code:

```
max:    addi $sp, $sp, -8
        sw $ra, 4($sp)
        sw $fp, 0($sp)
        addi $fp, $sp, 0
        addi $sp, $sp, -4

        lw $t0, 8($fp)
        lw $t1, 12($fp)
        slt $t0, $t1, $t0
        beq $t0, $0, one

        lw $t0, 8($fp)
        sw $t0, -4($fp)
        j end

one:    lw $t0, 12($fp)
        sw $t0, -4($fp)

end:    lw $v0, -4($fp)
        addi $sp, $sp, 4
        lw $fp, 0($sp)
        lw $ra, 4($sp)
        addi $sp, $sp, 8
        jr $ra
```

(i) Comment the code.

(ii) What does this program do?

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Exercise 2

Consider the following Python code:

```python
n = int(input("Enter integer: "))

while (n > 1):
    print(n)
    if n % 2 == 0:
        n = n//2
    else:
        n = 3*n + 1
print(n)
```

(i) Translate the above program into MIPS. Try to make your translation as faithful as possible.

Exercise 3

(i) Using Python, code a program that reads in a list of integers and prints the product of the even elements in the list. It is recommended to use a **while** structure instead of **for** in your loops. This will make your translation to MIPS easier.

(ii) Translate your code to MIPS [1].

[1] For the sake of brevity, assume that the array has been read in, and that a label `list` in the data segment contains the address of the first element of the array

Exercise 4

(i) Explain how the instructions **sll** and **sra** can be used to do multiplication and division in special cases.

(ii) Write some MIPS code to show how to use a shift instruction to perform the multiplication 8×6.