Computer Systems and -architecture

MIPS: Recursion

1 Ba INF 2011-2012

Ruben Van den Bossche
ruben.vandenbossche@ua.ac.be

Sam Verboven
sam.verboven@ua.ac.be

Time Schedule

Exercises are made individually. Put all your files in a tgz archive, as explained on the course's website, and submit your solution to the exercises on Blackboard.

- Deadline: **December 19, 23u55**

Exercises

Write a MIPS program for the MARS simulator for each of the following exercises. As always, document your solution well (use #).

1. Write a MIPS program that reads an integer n (using a syscall), and calculates the fibonacci numbers from 1 to n. Use a recursive procedure! The fibonacci numbers are defined as follows:
$F_0 = 0$
$F_1 = 1$
$F_i = F_{i-2} + F_{i-1}$ for $i > 1$

2. Write a MIPS program that reads two integers a and b, and calculates the greatest common divisor.

   - Write a (leaf) `remainder` procedure that takes two arguments a and b, and calculates the remainder of the division of a and b.
   - Write a (recursive) procedure `gcd` with two arguments a and b, which calculates the greatest common divisor using this recursive definition:

$$gcd(x,y) = \begin{cases} x & : \text{ if } y = 0 \\ gcd(y, remainder(x,y)) & : \quad x \geq y \text{ and } y > 0 \end{cases} \tag{1}$$