KULeuven

DistriNet
Research Group

Exercise classes computer architecture and system software

Yves Younan
DistriNet, Department of Computer Science
Katholieke Universiteit Leuven
Belgium
Yves.Younan@cs.kuleuven.ac.be

Overview

- System calls
- Labels
- Sections
- SPIM Commands
- Useful links

System calls

- Way of communicating with the operating system
- Allows a program to do certain things
  - Read from standard input
  - Write to standard output
  - Terminate the program
  - And lots of other cool stuff

System calls

- Load the requested system call in v0
- Execute the instruction syscall
  - li $v0, 10
  - syscall
  - Exits the program
  - li $v0, 4
  - la $a0, address
  - syscall
  - Prints the string at address

Labels

- A label is denoted with name:
- Loading the address of a label into a register is possible using the la instruction

Sections

- Program memory is divided into multiple segments:
  - Text segment contains all code and is read-only
  - Data segment contains global and static variables and dynamic memory
  - Stack segment contains the stack
- Using sections in programs:
  - .data
  - str: .asciiz “Hello world”
  - .text
  - la $a0, str

SPIM

- MIPS32 simulator
- Runs on:
  - Linux, Mac OSX: spim and xspim
  - Windows: spim and PCSpim
- Contains a debugger
- Simulates some system calls

SPIM commands

- load “filename”: loads the file into memory
- reinitialize : clears memory (needed when you modify a file and load it again)
- run : runs the program
- breakpoint addr : stops the program when control reaches addr (also works for labels)
- list : lists all breakpoints
- delete addr : deletes a breakpoint

SPIM commands

- step <N> : run <N> instructions (default 1)
- continue : continue running the program (after break)
- print $X : print register X
- print_all_regs, print_all_regs_hex
- print addr : print the contents of memory address

Useful links

- Slides: http://fort-knox.org/?q=taxonomy/term/5
- SPIM quick-reference: https://www.cs.tcd.ie/~waldroj/itral/spim_ref.html
- SPIM: http://www.cs.wisc.edu/~larus/spim.html
- Appendix A: http://www.cs.wisc.edu/~larus/HP_AppA.pdf
- PCSpim: http://www.cs.wisc.edu/~larus/PCSpim.pdf
- XSpim: http://www.cs.wisc.edu/~larus/xspim.pdf
- Spim: http://www.cs.wisc.edu/~larus/spim.pdf