

MP1 – System Calls

Jin Heo – CS423 TA

Tarek Abdelzaher – CS423 Instructor

Goal

- Familiarize you with the virtualized environment
 - Set up QEMU Virtual Machine environment
 - Familiarize yourself with the Linux kernel development environment
 - Configure and compile the kernel
 - Implement a system call
 - Add a system call by changing the kernel
 - Boot the custom kernel in QEMU for testing
-

Accounts and Machines

- Dedicated machine is prepared by TSG
 - csil-vmserve1.cs.uiuc.edu
 - Total 8 CPU cores
 - Remote SSH access
 - Important: Do not run it in your csil home directory! **It will crash the server.**
 - Mounted from the department file server
-

Install QEMU

- QEMU
 - Open source machine emulator and virtualizer.
 - <http://www.qemu.org/about.html>
 - QEMU 0.10.5
 - <http://download.savannah.gnu.org/releases/qemu/qemu-0.10.5.tar.gz>
 - /home/class/sp10/cs423/mp1/qemu-0.10.5.tar.gz
-

Install and Compile Linux Kernel

- Linux kernel
 - 2.6.28.10
 - <http://www.kernel.org/pub/linux/kernel/v2.6/linux-2.6.28.10.tar.bz2>
 - /home/class/sp10/cs423/mp1/linux-2.6.28.10.tar.bz2
 - Configure (default configuration except network) and compile
 - NOTE: We will create a 64bit Linux kernel
 - If you'd like to work on a local machine, work on 64bit Linux. **Don't compile the kernel in 32bit Linux**
 - `uname -m`
 - x86_64
-

Running Linux in QEMU

- Create your own disk image
 - We provide the base disk image (Ubuntu)
 - /home/class/sp10/cs423/mp1/ubuntu_noboot.img
 - Create your own disk image
 - a COW (copy on write) image
 - Boot the system in QEMU
 - Boot the kernel compiled with the disk image created
-

Implementing a System Call

- Add a system call that reports information about a file
 - Tutorial "[Kernel command using Linux system calls](#)"
[/home/class/sp10/cs423/mp1/ubuntu_noboot.img](#)
 - Linux Programmer's Manual about system calls
 - `man -s 2 intro`
 - A very brief introduction
 - How error is returned and `errno` are handled
 - `stat()` manpage
 - `man -s 2 stat`
 - `sys_newstat()` implementation
 - [Linux Cross Reference](#)
<http://lxr.linux.no/#linux+v2.6.28.10/>
 - Very useful walk-through the kernel source
-

Testing the Added System Call

- Boot the custom kernel (with the added system call) in QEMU
 - Implement and run a user program executing the system call in QEMU
-

Deliverables/Grading

- Graded on
 - The code you wrote
 - both the system call and user space code that invokes it
 - README explaining your changes
 - What should be submitted
 - C source code for user program
 - Makefile
 - mp1.patch for kernel difference
 - README
 - Which files changed in the kernel
 - How they fit together
 - Any issues
 - No compile errors please!
-

Submission

- Email the TA by 10:00am (i.e., before class) on Feb 8th.
 - Send an email with the subject line including “CS423 SP10 MP1”
 - You can resubmit your work anytime before the deadline.
-