Assignment 1: Installation of Minix Kernel

The goals of this assignment are:

1. Installing latest Minix OS (version 3.3.0) on your PC which you can use in your future assignments
2. Customizing the kernel and verify that you can print from the kernel so that you have at least rudimentary debugging capabilities
3. Installing X system on Minix and executing HelloWorld.c program on X Terminal
4. Achieving goals 1-2 also for your choice of Linux OS flavors like Ubuntu, Debian, SuSE, Fedora, etc

This assignment should be done by each student individually during the 1st week of August. At the end of this assignment, you should have your own installation of latest Minix and your favourite Linux flavour that can be used in future assignments.

The assignment should be uploaded on google classroom page for this course. Please upload the following in a tar ball with name YourRollNo-Asgn1.zip or YourRollNo-Asgn1.tgz:
1. Brief statement that you have successfully installed Minix and Linux on your target system, and that you are able to execute programs and recompile and reinstall the operating system. If you are not able to do so, a brief description of what you have been able to achieve.

2. Brief description of your installation, including whether on a virtual machine VM (and if so, which one) or on what hardware, and if on actual hardware, whether you have a dedicated machine or a machine that multi-boots minix and other operating systems. Also (whether on real hardware or on a VM), the size of your disk and the amount of memory available to the OS.

3. Copy of the parts of the file exec.c modified as explained below (starting two lines before the first change and ending two lines after your last change). This may be kept as a separate file in your tar ball with name exec.c_modifications

Installation

Most of the effort in this assignment will go towards installing Minix and your choice of Linux OS. You must select a target platform, whether a VM or actual hardware. VMs include qemu/KVM, virtualbox, Bochs, and Vmware. Bochs may be the slowest, but will run on non-x86 platforms. Follow the instructions at the Minix 3 Documentation for the latest. You follow these instructions, which include

1. Partitioning the hard disk -- note that minix cannot handle partitions larger than 128GB.
2. booting minix from the CD (or the simulator/VM equivalent)
3. starting the setup script

After installing Minix (and Linux), you need to rebuild the entire operating system. You may have questions while doing this. Refer Reading Material given at the end for some of the answers.

Customizing your Kernel

You need to print the name of every command (for example, ls, man, more) being executed on the shell/X terminal. To do this, you have to modify file servers/pm/exec.c appropriately, then upload your changes (not the entire exec.c file, please) and the 2 lines before and after your changes (my own solution changes a single line, so I would send 5 lines total). For example, if a process executes /bin/ls, your code should print to the console "executing /bin/ls". This mainly confirms that you are executing the kernel you think you are executing, yet not get in the way of running Minix. After

making these changes, recompile Minix Kernel and make sure your kernel is printing each command that is executed.

You could also try cross-compiling this modified kernel on your native OS on your PC. Refer http://wiki.minix3.org/en/DevelopersGuide/Crosscompiling for more details.

Finally, once you have verified that everything works, upload the changes to exec.c as exec.c_modifications, then change them back so you have a "normal" Minix OS that you can use in future assignments.

X System on Minix

Follow these instructions to install X Window system on your Minix OS.
http://wiki.minix3.org/en/UsersGuide/IntroductionToX
Launch terminal in X, and run HelloWorld.c program on it. Ensure that you follow Coding Style given on Google Classroom Page for writing your own HelloWorld.c

Linux

Dual-boot your machine to also boot some version of linux, or if using a simulator/VM, have another virtual machine that will run your choice of Linux distribution. Distributions of Linux that may be relatively easy to install include Ubuntu and Linux Mint, Gentoo (if you have plenty of disk space on your machine), Puppy Linux if you want a really small distribution, and Fedora or Open Suse for more enterprise-oriented distributions. Instead of Linux, you may do this for OpenBSD. One of the goals of the OpenBSD project is a more secure operating system.
Once you have installed your additional system, get the kernel sources (e.g. from http://www.kernel.org/ for Linux), compile them, and install the kernel. For Linux, this can require paying attention to the many, many options, or sticking with the defaults.
Finally, figure out where the exec system call is defined, and change the implementation of that system call to print the command being executed like you did it for Minix.

Deliverables in a zipped file on google classroom: Deadline 9th August 2015 at 5:00 pm

- All modified files with proper documentation and comments clearly marking your additions.
- Readable Report in Word or Latex.

Grading Policy

50% of marks for the report and other files submitted on Google Classroom. So, spend solid time in preparing well readable, grammatically accurate report. Do not copy from others/NET, those who found involved in plagiarism get FR GRADE. Rest of marks for evaluation done by TAs in the 2nd week of Aug 2015.

Late Policy: No late submissions are entertained.
Evaluation Schedule: 10-15th August 2015 in CSE Teaching Labs. Timings will be announced later by TAs.

Reading Materials and other Useful Links

1. Minix3 Wiki: http://wiki.minix3.org/en/

2. Minix Installation: http://wiki.minix3.org/en/UsersGuide/DoingInstallation
3. Overview of Minix: http://www.minix3.org/docs/jorrit-herder/osr-jul06.pdf and http://www.minix3.org/docs/login-2010.pdf
4. Minix Documentation: http://www.minix3.org/documentation/index.html

Note: This assignment is same as the first project given last year. You can discuss with your seniors to get more help. But you can not copy from their code.