CSE430 Class Project #3 – Install and Build Linux

This project is designed to give you experience with the Linux operating system. Linux is a free operating system and has become very popular. In August 2011 Linux celebrated its 20th year since its first public announcement. Since then it has been widely used in the server arena and is now becoming best known in the smart-phone and tablet universe as the underlying operating system behind Android.

Desktop versions of Linux abound and our project will make use of the Ubuntu distribution of Linux. Since your computers are already set-up for whatever operating system you enjoy, we will be using a virtual machine for this project that allows Ubuntu to be installed on your host operating (most people use windows) as an application.

The goal of this project will be to install a free virtual machine player from VMware, and then use the player as a platform to install Ubuntu and build the latest kernel. You will then run some applications on Ubuntu and report your findings. This will require several gigabytes of space on your computer.

Steps to follow:

1. VMware player is found here: <http://www.vmware.com/products/player/overview.html>. You will need to register if you haven’t already. There is no cost involved. Choose the player appropriate for your host OS, download and install. For Mac OS X users use VMware fusion as a 30 day free trial. It can be found here: <https://my.vmware.com/group/vmware/evalcenter?p=vmware-fusion4>. If you already have VMware or another VM installed on your system you can skip this step.
2. Go to [www.ubuntu.com](http://www.ubuntu.com) and manually download the 32 bit desktop version of Ubuntu. You will have a large new .iso file when you are finished. Depending on your internet bandwidth, this could take a long time.
3. Start the VMware player and create a new virtual machine. Use the .iso file containing Ubuntu as the installer disk image. Follow the directions. Give Ubuntu a password, it requires one. Use at least 20 GB as the maximum disk size, Split the virtual disk into multiple files. Go with the recommended parameters for memory etc. for the other settings.
4. In preparation for compiling applications and kernel objects to run in the Ubuntu development environment we need to have the kernel source code and associated utilities available on your copy of Ubuntu. The following commands executed in a Ubuntu terminal CLI will download the kernel source code and produce an installation image that will allow you to upgrade to the latest kernel and subsequently make modifications to it. Please take screen shots to show the outcome of each step and report these in a word document (or equivalent). Please comment on any difficulties you may encounter and the solutions you came up with.
5. In preparation for the following steps it is advisable to use the program *Software Updater* to fully update your copy of Ubuntu before proceeding.

Step 1 – In your running Ubuntu OS make a directory for kernel development. This is done in the local home directory not the root directory.

mkdir cse430

cd cse430

Step 2 – Download and install the utilities needed to perform the compile and packaging of the kernel. We start by first updating the package list. After that we can download all of the needed packages. Some will have already been installed so this is a shotgun approach but should capture any missing utilities.

sudo apt-get update

sudo apt-get install dpkg-dev kernel-package gcc libc6-dev binutils make bin86 module-init-tools gawk gzip grep libncurses5-dev

Step 3 – The next instruction downloads and decompresses the source code for the latest kernel from the Ubuntu source tree. Do not use root (sudo) for this.

apt-get source linux-image-$(uname -r)

Step 4 – This step will take the longest. We must first a) change the working directory to be the top level source directory for the kernel. We can then b) configure the kernel. For now we will retain the default configuration so just exit after the configurator starts. c) The last preparatory step is to clean the build environment. This will cause everything to be rebuilt. d) The last command will take several hours to complete so be sure your computer is plugged in and is not set to sleep. For some computers it may take all night. Do not use any root privileges in this step.

cd linux-3.5.0 (or whatever version is loaded)

make menuconfig

make-kpkg clean

fakeroot make-kpkg --initrd --revision=1.0.cse430 kernel\_image

Step 5 – This step will show you your current revision of the OS (Note: *Software Updater* also updated the kernel) and then update the kernel to match your source code. You must reboot (shutdown command) to use the new kernel. You can verify the update by displaying the version again.

cat /proc/version

sudo dpkg -i ../linux-image-3.5.7.2\_1.0.cse430\_i386.deb (this line changes according to the actual release number)

sudo shutdown -r now

cat /proc/version

1. Show me a screenshot of step 5. Show me some screenshots of your running VM with setup parameters and some screenshots of running Ubuntu applications. This could be a game or a system utility, etc.
2. Turn in your report with comments to the Blackboard.