

CSE 390, Autumn 2012

Homework 10 ("Final"): Linux Desktop Achievements

Due Thursday, December 13, 2012, 11:00 PM

This assignment focuses on using Linux as a desktop operating system. In this document are several tasks (called "achievements" similarly to achievements earned in online games). You will complete several achievements of your choice. Each achievement has a particular set of files or results that must be reached in order to complete it. Turn in: 1) A file called **Homework10.txt** that describes what computer you used for each achievement (it is fine to use different computers for different achievements), 2) the appropriate files for your achievements of choice.

Some achievements are easier to perform from your own Linux box or virtual box; others can just as easily be performed from a CSE basement Linux machine. We **do not recommend using attu** because you will need a graphical desktop.

To receive credit for this "final exam" assignment, every student must finish 8 achievements. If you need to make up a homework assignment to earn your 14 points for the quarter, you can complete an additional 6 achievements to earn an additional 2 points for a total of 14 achievements (or 3 achievements to earn one point). You may want to do 1 or 2 extra achievements in case you don't successfully complete one that you attempt.

Many achievements involve performing Linux tasks you **have not been taught in class**. A point of this assignment is self-discovery and teaching yourself new things as you solve achievements. You should search the web to help solve achievements. We suggest phrases involving your distribution, e.g. "Ubuntu 9.10 rip CD" or "Fedora 15 play DVD".

The Achievements

The following is the list of allowed achievements. Ones that are best completed from your own home Linux box or virtual box (because they require root access and/or installing software) are marked "(H)"; others that can be done from a CSE basement Linux machine are marked "(C)". In the last lab upgrade a few things were changed making some of the "C" options harder than they were previously or maybe not even possible. I have listed those as "C?" I would definitely be interested to know if you are able to complete some of these in the lab - but I would not pick them as your first ones to attempt. Detailed descriptions of each achievement are on the following pages.

If you have an achievement idea that isn't in the list, please contact the instructor and ask if we will allow it.

- **Achievement A:** Take a screenshot of the desktop (required) (H,C)
- **Achievement B:** Change your desktop background wallpaper (H,C)
- **Achievement C:** Crop and edit a photo (H,C)
- **Achievement D:** Copy photos from a digital camera to Linux (H,C)
- **Achievement E:** Create a Microsoft Word document using LibreOffice (H,C)
- **Achievement F:** Install a new font on Linux (H)
- **Achievement G:** Set up a printer / Print a document (H)
- **Achievement H:** Switch X11 window managers (H)
- **Achievement I:** Connect remotely to a Windows box (H,C)
- **Achievement J:** Play a DVD movie (H,C?)
- **Achievement K:** Make a copy of a DVD (H,C?)
- **Achievement L:** Copy MP3 files onto an iPod or other portable music device (H)
- **Achievement M:** Rip a CD into a set of .mp3 (or .ogg or .flac) files (H,C)
- **Achievement N:** Burn a CD from a .ISO image file (H,C?)
- **Achievement O:** Install an application from the package manager and from a .deb/.rpm file (H)
- **Achievement P:** Install and run jGRASP on Linux (H,C)
- **Achievement Q:** Install and play a video game (H)
- **Achievement R:** Make your Linux graphical user interface look like a Windows or Mac interface (H,C?)
- **Achievement S:** Play a Flash video on Youtube (H)
- **Achievement T:** Download something using Bittorrent (H,C?)
- **Achievement U:** Install and run a non-traditional web browser (H,C)
- **Achievement V:** Send instant messages to a friend from Linux (H,C)
- **Achievement W:** Run a Windows app in Linux using Wine (H,C?)
- **Achievement X:** Make an internet phone call with Skype (H)
- **Achievement Y:** Install a virtual machine of another OS inside your Linux system (H)
- **Achievement Z:** Set up a local Apache web server on your Linux box (H)
- **Achievement OMG:** Compile your own Linux kernel (H)

Achievement A: Take a screenshot of the desktop (required) (H,C)

Figure out how to take a screenshot of your Linux desktop. Modern Linux includes this ability built-in if you know where to find it. Take a screenshot of your desktop in any state you like, and save it as `A-screenshot.png`. Turn in this `.png` file to prove that you have successfully earned this achievement.

Achievement B: Change your desktop background wallpaper (H,C)

Figure out how to set the background wallpaper image of your desktop to be another custom image of your choice. **Don't choose an image that is built in or comes with the Linux system;** go find your own image online or anywhere you like. Take a screenshot of your desktop with the new wallpaper as `B-wallpaper.png` and turn it in.

Achievement C: Crop and edit a photo (H,C)

Basic photo editing is something that many people find useful. Linux can certainly do this with the right software. (One such program is "The GIMP.") Download the file `C-image.jpg` from the course web site. Run a Linux image editor of your choice to edit the file and do two things: 1) Crop the image so as to include the dog's head only. (Cropping means to trim away some pixels from the edges of the image. Most image editors have a crop tool that you can use to do this.) 2) Perform at least one other edit of your choice (resize, edit colors, etc.). Turn in two files: 1) a screenshot of your edited photo viewed in the image editor of your choice: `C-image-editing.png`, 2) your modified image `C-image-new.jpg`.

Achievement D: Copy photos from a digital camera to Linux (H,C)

Linux used to have a bad reputation in terms of connecting external devices such as thumb drives, printers, and digital cameras. But it's come a long way. Almost all name-brand digital cameras work right away if you plug them in. For this achievement, plug in your digital camera to your Linux box and figure out how to copy some photos from the camera to your Linux desktop. To prove you have completed this achievement, take a screenshot of the software you are using to copy the photos out of the camera while you are doing that; also open one of the photos in an image viewer program and take a second screen shot of that. Save the files as `D-camera1.png` and `D-camera2.png`, and turn them in.

Achievement E: Create a Microsoft Word document using LibreOffice (H,C)

Linux doesn't directly support Microsoft Word, but if you want to edit Word documents, there are things you can do. The most common solution is to run LibreOffice, a Linux clone of MS Office with similar applications that is able to read and save MS Office file types, as well as its own "OpenDocument" file types (`.odt` for a Word-like document, `.ods` for an Excel-like spreadsheet, and `.odp` for a PowerPoint-like presentation). To complete this achievement, download the LibreOffice document `E-document.odt` on the course web site. Modify it (as described inside it) to include your own name and info about you. Turn in two files: 1) a screenshot of you editing the file in LibreOffice: `E-document-editing.png` and 2) the edited document saved in Microsoft Word format as a file named `E-document.doc`.

Achievement F: Install a new font on Linux (H)

Linux distributions already include lots of fonts. But some fonts aren't included by default. In particular, some of Microsoft's fonts such as Calibri, Consolas, Tahoma, and Verdana aren't installed by default on Linux. For this achievement, figure out how to install some new fonts into your Linux system, either from some kind of pre-made installer you find on the web, or from the original `.ttf` (stands for "TrueType Font") files posted on the course web site. Prove that you have completed this achievement by posting a screenshot of your Linux desktop running an application that is using one or more of your newly installed fonts. For example, you could load LibreOffice and create a short Writer document with some "Hello world" text, and set that text to be displayed in the new font, then take the screenshot. Save your screenshot as a file named `F-font.png` and turn it in.

Achievement G: Set up a printer / Print a document (H)

Linux now recognizes many kinds of printers out of the box. In many cases, you can simply plug in your printer, follow any message prompts that pop up, and it will set up the proper drivers and software for you. (Some printers, such as several HP printers, may need various software to be installed or packages added from your package manager. You may need to do a web search to find out how to do this.) For this achievement, set up a printer on your Linux box, and use it to print any document of your choice. Prove that you have completed this achievement by sliding the printed page under the

instructor's office door, and/or by taking a screenshot(s) of yourself setting up the printer driver and printing the document. Save these files with names such as `G-print1.png`, `G-print2.png`, etc. and turn them in.

Achievement H: Switch X11 window managers (H)

Part of Linux's versatility is that it can be run with any of several different graphical window managers and desktop environments. A window manager is a program that runs on top of Linux's X11 GUI subsystem; a window manager has various rules to control the positions, sizes, borders, fonts, and other settings of the graphical applications that are currently running on your Linux system. Larger window management systems sometimes include more complex logic and configuration settings and are therefore called desktop environments. Two examples of large desktop environments are Gnome (the default on Ubuntu and Fedora) and KDE. Some examples of smaller window managers are `fvwm`, `IceWM`, `OpenBox`, and `Fluxbox`. One advantage of using a smaller, more lightweight window manager is that it can make your Linux system run faster if it is an older computer or has fewer resources.

For this achievement, figure out how to install another window manager or desktop environment onto your Linux box. (Some of them are available in your distribution's package manager.) Then figure out how to change your system's settings so that you can run the other window manager. Prove that you have completed this achievement by taking a screenshot of your desktop and saving it as `H-wm.png` and turning it in. (Note: The application or hotkey you have been using to take a screenshot may be a feature that is/was provided by your former desktop environment. So one part of this challenge is to figure out, how do I now take a screenshot if I'm not using that desktop environment anymore? You might need to install a new separate piece of software for taking screenshots; search your distro's package manager or online.)

Achievement I: Connect remotely to a Windows box (H,C)

Although Linux is a full-featured and powerful operating system, there are still times when it is useful to connect to a Windows machine to perform specific tasks. For this achievement, use the remote desktop program described in class to connect remotely to a Windows computer such as one of the virtual desktop infrastructure nodes: <http://vdi.cs.washington.edu/vdi/>. Once you've connected to the Windows system, run at least one Windows program in it that is visible on the screen. To prove you have completed this achievement, take a screenshot of your Linux desktop (so that we can see the Linux OS on the outside, and the smaller window containing the Windows desktop on the inside), save it as `I-remote.png`, and turn it in.

Achievement J: Play a DVD movie (H,C?)

By default, most Linux distributions do not include software to play DVD discs, because the algorithm to decompress DVD data (called "CSS") is copyrighted and therefore cannot be distributed as open source software without charging for royalties. But this ability can be installed into Linux as an extra download. Figure out how to make your Linux box capable of playing DVDs by searching the web. Install the proper software and play any DVD of your choice. To prove you have completed this achievement, take a screenshot of your Linux desktop while running the DVD player software (so that we can see the Linux GUI as well as the DVD video), save it as `J-dvd.png`, and turn it in.

Achievement K: Make a copy of a DVD (H,C?)

With the right software, it can be simple to make a backup copy of a DVD disc in Linux (only one that you legally own and paid for, of course!). Figure out a program that can make backups of DVDs using a DVD-R burner. (This achievement requires that your Linux box have a DVD recording drive.) Run the DVD backup program and make a copy of any DVD of your choice. Take a screenshot of the program as you are in the midst of making the copy. Save your screenshot as `K-dvdcopy.png`, and turn it in. If you don't have a DVD recorder drive, we will also allow you to modify this achievement to instead "rip" the DVD into a video file on your hard drive, in a format of your choice. Take a screenshot of your movie player software playing this video file, give it the same file name shown above, and turn it in.

Achievement L: Copy MP3 files onto an iPod or other portable music device (H)

Many Windows and Mac users run Apple's iTunes software to copy music files to/from an iPod. Linux doesn't support iTunes, but several free programs have been written to allow copying files to an iPod, such as `SharePod` or `gtkPod`. Search the web or your Linux distribution's package manager to find such a program and use it to copy some new music file(s) to your iPod/music player of your choice. Take one or more screenshots of the program running; choose suitable screenshots that make it clear that you have successfully copied the files to the device (perhaps a "Before" and "After" screenshot). Save these files with names such as `L-ipod1.png`, `L-ipod2.png`, etc. and turn them in.

Achievement M: Rip a CD into a set of .mp3 (or .ogg or .flac) files (H,C)

Nowadays everyone wants to abandon their music discs into more versatile digital music files. The most common compressed digital music format is MPEG Layer-3 (.mp3), but other formats are also popular on Linux, such as the free Ogg Vorbis (.ogg) and the Free Lossless Audio Codec (.flac). For this achievement, figure out how to rip a CD using software such as Sound Juicer, Grip, or KaudioCreator. Grab a CD of your choice (you may have to ask your mom or dad for one!), put it into the Linux box's CD-ROM drive, and use the software to extract the songs from the CD as music files in the format of your choice. (You may need to install an audio encoder, such as `lame`, to create .mp3 files.) Once you've ripped the songs, play one of them with a music player of your choice. Prove that you completed this achievement by taking two screenshots: One of the CD ripping software in action, and one of the music player software playing the song. Save these files with names such as `M-rip1.png`, `M-rip2.png`, etc. and turn them in.

Achievement N: Burn a CD from a .ISO image file (H,C?)

Burn a CD of the latest version of Ubuntu or Fedora onto a blank recordable CD. To do this, download the .ISO image file from the Linux distribution's web site to your Linux box's hard disk. A .ISO file is a large single file (500-700 megabytes in size) that contains the entire contents of a CD-ROM. Use appropriate .ISO image burning software to burn the .ISO image onto a blank CD. (The standard Gnome Linux file manager includes some basic CD/DVD Creator features, or you can use a more advanced program such as `k3b` or `Brasero`. To prove that you have completed this achievement, write a label on your burned Linux CD with a marker that includes the distro's name and your name, such as "Ubuntu 10.4, provided by Jane Smith." Slide your burned Linux CD under the instructor's office door.

Achievement O: Install an application from the package manager & from a .deb/.rpm file (H)

Though Linux has a reputation of being difficult for installing software, it has come a long way. Most distributions of Linux have "package managers" that make it easy to install programs. Ubuntu's is called Synaptic. But these package managers only list programs that have been explicitly added by the makers of that distribution. To install other programs, many distributions have standard archive formats that compress an application into a single installer file. On Ubuntu these files have extension `.deb` (for "Debian," another Linux distribution on which Ubuntu is based), and on Fedora they have extension `.rpm` (for "Red Hat Package Manager" since Fedora is based on a Linux distribution named Red Hat).

For this achievement, install at least **two new programs** into your Linux box: one from your distribution's package manager, and one from an archive such as a `.deb` or `.rpm` file. (*Some examples of programs that aren't in the package manager but are distributed as .deb/.rpm: Google Earth, Skype, Opera web browser.*) To prove that you have completed the achievement, take a screenshot of yourself installing the program from the package manager and then running the program, and take a screenshot of yourself unpacking the `.deb/.rpm` file (you can usually do this by just double-clicking it in your Linux file manager) and running that program. Save these files with names such as `O-install1.png`, `O-install2.png`, etc. and turn them in.

Achievement P: Install and run jGRASP on Linux (H,C)

In CSE 142/143 we used the Java editor jGRASP to compile and run our programs. jGRASP is available for Linux as well, but it doesn't have an installer like most programs. For this achievement, figure out how to download jGRASP from <http://jgrasp.org/> and run it on Linux. It doesn't come in a `.deb` or `.rpm`; you'll have to decompress it and figure out how to run what's inside. Look for readme files or installation instructions inside the archive. Prove that you were successful by taking a screenshot of your Linux jGRASP running any Java program. Save the file as `P-jgrasp.png` and turn it in.

Achievement Q: Install and play a video game (H)

They say Linux doesn't do games. Hogwash! There are lots of games available for Linux, though there may not be as many as for Windows. For this achievement, install a game of your choice onto your Linux box and run it. It can't be one of the ones that is already pre-installed with the Linux system, but it can be one from your distribution's package manager. Or it can be some other game you like that is not part of the package manager. (Try <http://www.penguspy.com> for a good list or if you are feeling adventurous you can compile and run a Rogue-like game (e.g. `netHack`, `ADOM`).) Download/run the game and take a screenshot of yourself playing it. Save the file as `Q-game.png` and turn it in.

Achievement R: Make your Linux graphical user interface look like a Windows or Mac (H,C?)

Some people like to use Linux but prefer the looks of the Windows or Mac user interface. Luckily, Linux is flexible enough to allow you to install various theme packages to make your Linux box look as though it were a Windows box or Mac. You can install Microsoft fonts and window decorations, or a Mac-like "dock" program and Mac fonts and window borders. For this achievement, make your Linux box look as much like another OS as you can, and take a screenshot that shows off your work. Save the file as `R-fakeos.png` and turn it in.

Achievement S: Play a Flash video on Youtube (H)

The videos on Youtube and some other web sites are shown using software called the Adobe Flash Player, a plug-in program that runs inside of your web browser. Most distributions of Linux do not install the Flash player by default because it is not free open source software. But you can search for information about how to install the Flash player yourself. For this achievement, install the Flash player on your Linux box and use it to view a video of your choice on Youtube. Prove that you were successful by taking a screenshot of your browser playing the Youtube video. Save the file as `S-youtube.png` and turn it in. Note: you will not receive credit for doing this achievement on the CSE lab machines.

Achievement T: Download something using Bittorrent (H,C?)

Bittorrent is a peer-to-peer (P2P) file transfer protocol that allows lots of computers to work together to share files. Rather than the traditional model of downloading an entire file from one remote system, Bittorrent maintains lists of other people who have downloaded parts of the file, and each sends some of its bytes to the other computers; so the downloading load is shared across many machines.

For this achievement, run a Bittorrent client program (many Linux distributions come with one pre-installed) and use it to download a torrented file of your choice. (Note: There are many legal uses of Bittorrent, such as to download Linux .ISO files.) To do this, you first need to download a small .torrent file to open in the Bittorrent client to guide the rest of the download. Legal .torrent files can be found in places such as a Linux distribution's web site or <http://www.clearbits.net/>. To prove that you have completed this achievement, take a screenshot of your Bittorrent client downloading the file of your choice. Save the file as `T-torrent.png` and turn it in.

Achievement U: Install and run a non-traditional web browser (H,C)

Lots of people use Internet Explorer web browser because that's what comes with Windows. Many people also know how to install and use Firefox. And most Mac people run the Safari browser because that's the default on that operating system. But there are lots of other great web browsers out there, such as Opera, Chrome, and SeaMonkey.

For this achievement, download one of these web browsers, and install it onto your Linux system. Run the browser and use it to surf to a web site of your choice. Take a screenshot of the browser displaying one of your favorite web sites; save the screenshot as `U-browser.png` and turn it in. Note: you may not run Chrome in the CSE labs for this achievement. *(In general it is okay if your work on one achievement "double dips" with another achievement. For example, if you complete this achievement, you will be well on your way to completing Achievement O: Install an application.)*

Achievement V: Send instant messages to a friend from Linux (H,C)

There are several different instant messaging systems now such as AOL Instant Messenger (AIM), Microsoft Live Messenger / MSN Messenger, Yahoo! Messenger, and Google Talk. Each of these systems has its own installable chat client program, and many of these chat clients don't run on Linux. But the messaging systems' communication protocols are open (or have been cracked), so Linux is able to provide its own clone programs that can connect to the instant messaging networks and allow you to send and receive IMs. Some, such as Pidgin, Kopete, and Empathy, even allow you to connect to many/all of the services at once from the same program.

For this achievement, find and run an instant messaging program on your Linux system. (Many Linux distributions pre-install such a program; or you can install one of your own.) Supply the program with the information about your IM account's user name, password, etc. and use it to connect to the server. Start a chat conversation with a buddy of your choice. Prove that you have completed this achievement by taking a screenshot of the chat program showing your buddy list and chat conversation with your buddy; save the screenshot as `V-im.png` and turn it in.

Achievement W: Run a Windows app in Linux using Wine (H,C?)

Wine (a recursive acronym, short for "Wine is not an emulator") is a program that provides a compatibility layer that allows Windows applications to run on Linux, without the need for a virtual machine. Wine can be useful if you want to use Linux but still have a small number of Windows apps you want to run. Many Linux distributions include Wine in their package managers, but most do not install it by default, so you may need to install it on your own system. For this achievement, use Wine to install and run a Windows app of your choice. Some apps you could try to install are TextPad, Notepad++, WinZip, or MS Office (a bit harder!). To prove that you have completed this achievement, take a screenshot of your Linux system running the Windows app under Wine; save the screenshot as `W-wine.png` and turn it in.

Achievement X: Make an internet phone call with Skype (H)

Skype is an app that allows users to make telephone calls over the internet to other Skype users (for free) or to real telephones (for a small charge). It is a great way to keep in touch with family and friends who are far away, particularly overseas. There is a version for Windows, Mac, and Linux. For this achievement, install Skype on your Linux box; it is not likely to be in your package manager, but you can get a .deb or .rpm file as described in Achievement O. Once you've installed Skype, use it to make a call to another Skype user or to someone's telephone. You may need to create a (free) Skype account if you do not already have one. Prove that you have completed this achievement by taking a screenshot of your Skype program while you are in the middle of your phone call; save the screenshot as `X-skype.png` and turn it in.

Achievement Y: Install a virtual machine of another OS inside your Linux system (H)

Some of you set up VirtualBox to run a fake Linux system inside your Windows or Mac box. Now let's take it in the other direction. If you're running your own Linux system, install VirtualBox (or another VM app) and use it to install a virtual machine for another OS inside your Linux box! The other OS can be anything other than your current Linux distribution. That is, it can be a Windows VM, a Mac OS X VM (Do a web search for "OSX86" for how to do that!), or a different Linux distribution (such as a Fedora VM inside an Ubuntu box). Prove that you were successful by taking a screenshot of your system running the virtual machine. The screenshot should clearly show your actual Linux box's desktop around the outside, along with the virtual machine in a window on the inside. Save the file as `Y-vm.png` and turn it in.

Achievement Z: Set up a local Apache web server on your Linux box (H)

One of the great strengths of Linux is that a cheap Linux box can make a great web server or file server. For this achievement, install the Apache web server software on your machine and set it up so that your machine is listening for web requests on your home's local network. Create a very short and simple HTML page that says "Hello, world!" or any other text of your choice, and place it into the proper directory so that Apache will serve up the page. Prove that you have completed this achievement by taking a screenshot of your web browser fetching your newly hosted web page. The URL in the browser's address bar should be visible and should begin with `http://localhost/...` to make it clear that you are fetching the document from your local system. Save the file as `Z-screenshot.png` and turn it in.

Achievement OMG: Compile your own Linux kernel (difficult!) (H)

An amazing thing about Linux is that the very guts and core of the operating system, the kernel, can be examined and even modified by the user. Most users don't need to do this, since Linux distributions include a pre-compiled kernel to use. But it can be useful to compile your own kernel for many reasons. For example, the kernel that comes with your distribution can become out of date, so compiling your own can give new OS features, bug fixes, or higher performance. Also, some devices and programs can install special drivers or code into the kernel to enable new OS functionality.

For this challenging achievement, figure out how to download and compile your own Linux kernel. The official kernel can be found at the web site <http://kernel.org/>. (We don't recommend this achievement unless you've used Linux a fair amount and are willing to get your hands a bit dirty, or possibly mess up your Linux setup and have to fix it!) Download the kernel, compile it (using its Makefile! See, Makefiles are useful.), and install it into your system. The kernel downloadable package and web site give instructions for how to do this, and you can do a web search for more help. Set up your system to use the new kernel, and reboot to start using it. Prove that you have completed this achievement by taking two screenshots: One of yourself in process of building/compiling the kernel, and another once you have booted up using it; open a terminal and type `uname -a` to display the full version of your kernel. If you did this achievement correctly, it should show brand new information about your awesome new kernel's version. Give us a screenshot of that terminal window. Save your two files as `OMG-kernel1.png` and `OMG-kernel2.png`. Show us what you're made of!