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Introduction to Unix

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Outlines Today

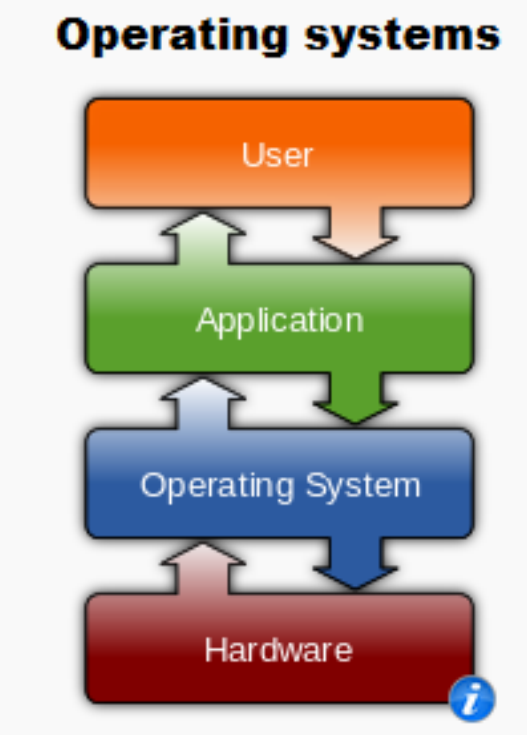
- What is Operating System?
- What is Unix?
- Set up Homework Environment

What is OS?

- Operating System is a collection of software
  - It manages computer hardware resources
    - E.g. how multiple programs share a single CPU?
    - E.g. how programs share the same memory?
    - E.g. how to enable the keyboard?
    - E.g. how to store files on hard disk?

What is OS?

- It provides common services for users and computer programs.
  - User Interface, e.g. issuing commands and mouse click.
  - System Calls
    - low level functions can be used by applications.
    - E.g. programs that sends information over network.



Picture from wikipedia.org

What is OS?

- Examples of OS
  - Andriod,
  - BSD
  - iOS
  - OS X
  - Windows 7 and 8
  - Linux

What is Unix?

- A multitasking, multi-user computer operating system that exists in many variants.
  - Multitasking: running many applications at the same time.
  - Multi-user: more than one users can use the system at the same time.

What is Unix?

- One of the first widely-used operating systems.
- First invented by AT&T's Bell Labs.
- Developed in C language.
- Basis for many modern OS.
  - Mac OS X

What is Unix?

- Narrowly defined: a time-sharing operating system kernel: a program controls the resources of a computer and allocates them among users.
  - Let users run programs.
  - It controls peripheral devices.
  - It provides a file system.

What is Unix/Linux?

- Broadly defined: includes not only the kernel, but also essential programs like compilers, editors, command languages and so on.

Short History of Unix

- In 1960s The ambitious project MULTICS (Multiplexed Information and Computing System) fails, but a number of seminal ideas (like pipes and shells) are proposed.
- In 1969 Ken Thompson, Dennis Ritchie (et al.) start working on a file system, and name their system UNICS, which is later changed to UNIX.
  - UNIX was small, simple and clean, and distributed freely to many universities, where it becomes popular.

Short History of Unix

- 1973 Thompson and Ritchie rewrote UNIX in C (while most of the operating systems at that time were written in assembly).
- 1981 Berkley UNIX 4.1 BSD: vi, C shell, virtual memory.
- 1991 Linux, GNU, and others: similar to UNIX, but their source code rewritten, very popular and widespread, free
  - Currently, X/Open is responsible for developing UNIX
  - Many Linux Distributions: Ubuntu, Fedora, Debian, ...

Current Unix Flavors

- The Open Group owns the UNIX trademark.
  - Only allows its use for certified OS compliant with its standard.
  - The term Unix is often used informally to denote any OS that closely resembles the trademarked system.
    - Apple's OS X (bearing certification)
    - Linux is the most popular non-certified Unix-like OS.

Current Unix Flavors

- Berkeley Software Distribution (BSD)
- Sun's Solaris
- GNU/Linux
- Mac OS X

BSD

- Developed by students and faculty at UC Berkeley.
- Forked from the proprietary version back in the 80s
- Has since split into many additional flavors
  - NetBSD, OpenBSD, and FreeBSD
- Spawned a popular open-source software license (the BSD License!)
- Primary competitor to Linux among free OSes

Solaris

- Commercial offshoot of BSD
- Designed to run on Sun's SPARC servers, since ported to x86
- Most of the source code was recently released for the OpenSolaris project. (They stop it recently)

Linux

- Pieced together by a Finnish guy named Linus Torvalds starting in 1991.
- Built over the internet using message boards (Usenet).
- Designed to a UNIX-like standard, but not a direct descendant.
- Linux technically only refers to the OS core, the kernel – without other programs it cannot really do anything.

GNU

- GNU = Gnu is Not Unix
- Movement in the 80s to build a free OS
- Created many very popular tools
- Unix like but uses no Unix code

GNU vs. Linux

- Linux is the kernel: the program in the system that allocates the machines resources to the other programs that you run.
- Linux is normally used in combination with the GNU operating system: the whole system is basically GNU with Linux added, or GNU/Linux.

GNU vs. Linux

- Like BSD, GNU/Linux has a variety of favors called distributions. These versions generally have different design goals (security, speed, desktop use) and package a unique set of tools with the kernel to achieve them.
- Hundreds of distributions
  - Popular distributions include RedHat, Ubuntu, SuSE, Slackware, Gentoo
- Saying “GNU/Linux" every time is tedious, so we will just refer to the entire system as Linux".

Mac OS

- Built using a BSD-based kernel which was renamed Darwin.
- Arguably the most popular desktop version of UNIX.
- A pretty, easy to use experience built on a powerful frame.
- It can run any POSIX-compliant source code.
  - Portable Operating System Interface is a family of standards specified by the IEEE for maintaining compatibility between operating systems.

Install Debian In Virtual Box

- Debian is one of distributions of Linux OS.
- We use debian in this class.
- Steps to set up Debian in Virtual Box,
  - 1. Download/install a virtual box. https://www.virtualbox.org/wiki/Downloads
  - 2. Download and unzip debian http://virtualboxes.org/images/debian/
    - (Use the last one, number 5)

Install Debian In Virtual Box

- Steps to set up Debian in Virtual Box,
  - 3. Open the virtual box and click the new button. Type debian then hit next.
  - 4. Choose the amount of memory to save for it then hit next.
  - 5. Choose to use an **existing virtual disk**, then click the folder and navigate to where you unzipped debian in step 2.
  - 6. Start up the virtual machine, password is reverse.

Remote Loggin CSLinux Machine

- For most of homeworks and labs, you have to do it on the cslinux machine.
- You have to remote log in cslinux.eastern.ewu.edu

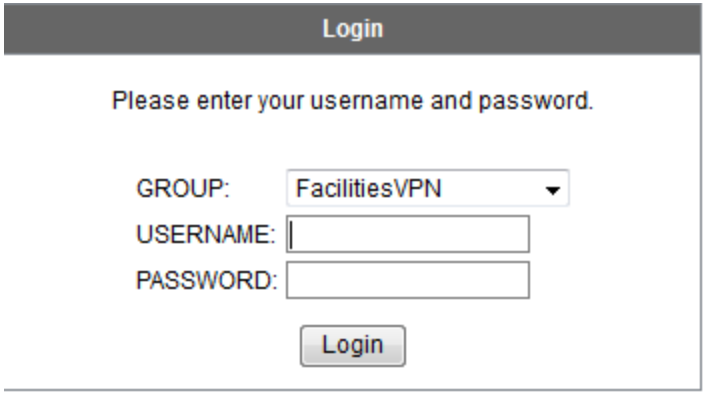
Remote Loggin CSLinux Machine

- Steps to set up access to cslinux.eastern.ewu.edu
- If you always visit the cslinux server on campus, you can go directly to step 6.
- 1, In your internet browser, type in

  https://studentvpn.ewu.edu

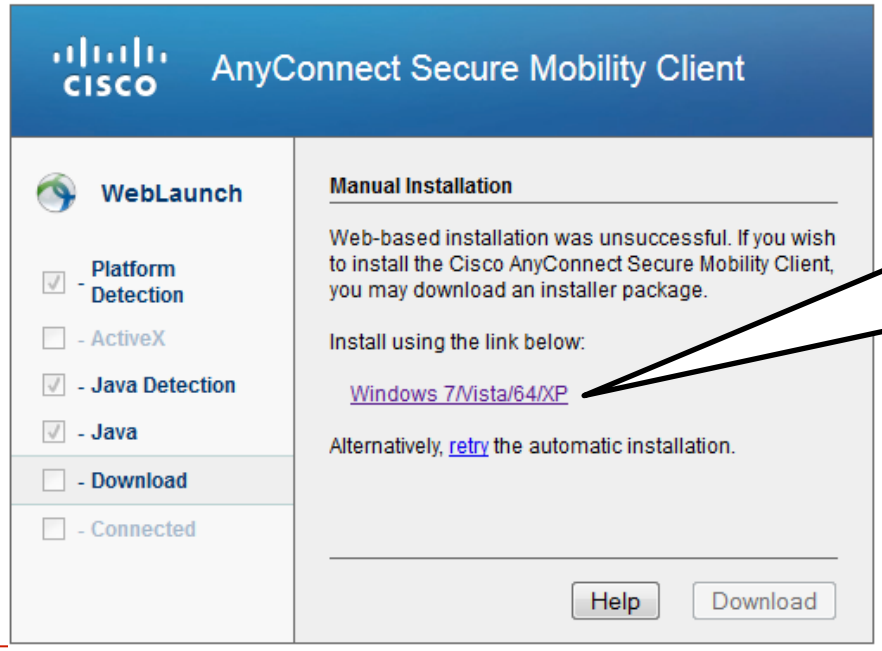
Remote Loggin CSLinux Machine

- 2,
  - type in your eagleNet/canvas username and password, then click Login button.



Remote Loggin CSLinux Machine

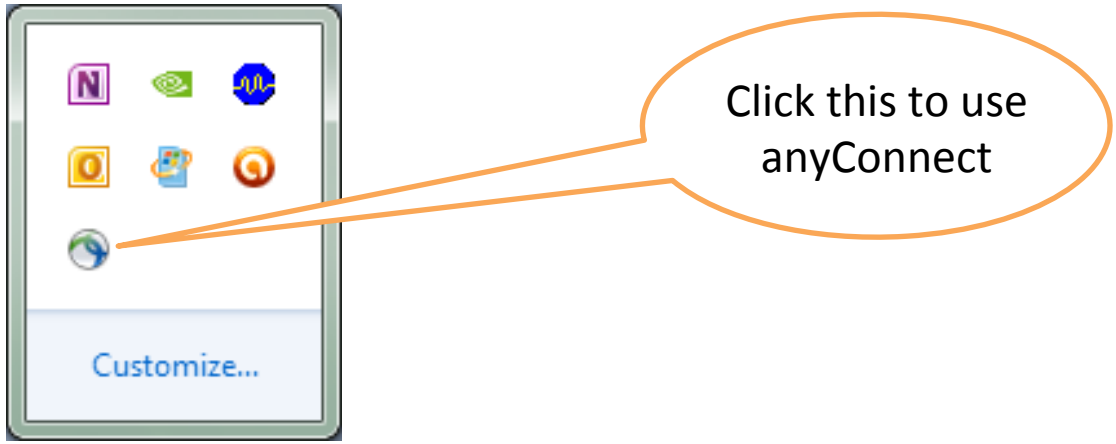
- 3, After successfully loggin VPN, you see windows below. You can click the link and manually install AnyConnect on your computer.



click here to download anyconnect.exe file and install it

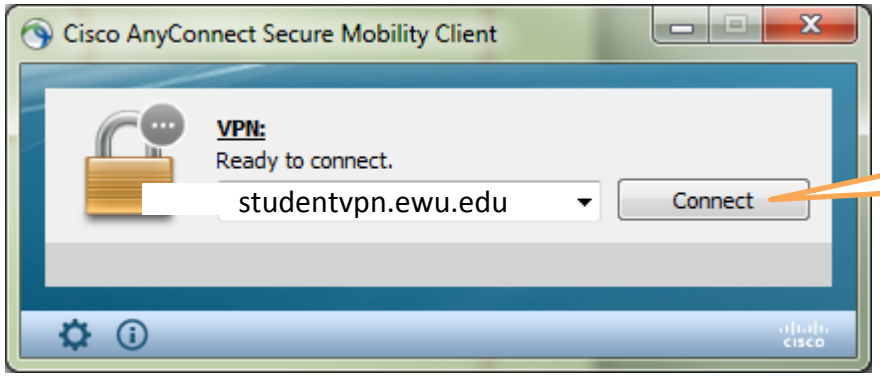
Remote Loggin CSLinux Machine

- Step 4,
  - After launch anyConnect from start menu, at the bottom right of the task bar (depends on the OS you use) you see this icon,



Remote Loggin CSLinux Machine

- Step 5,
  - Choose one of the vpn URL, then connect.



Remote Loggin CSLinux Machine

- Step 6 for Windows users(Mac and Linux users can skip this step)
  - Download and install WinSCP from
    - http://winscp.net/eng/download.php
    - For example, file saved is winscp518.setup.exe
    - double click and install WinScp

Remote Loggin CSLinux Machine

- Step 7 only for Windows users
  - Start WinSCP and remote log in.
- For Mac and Linux users can remote loggin on the terminal using

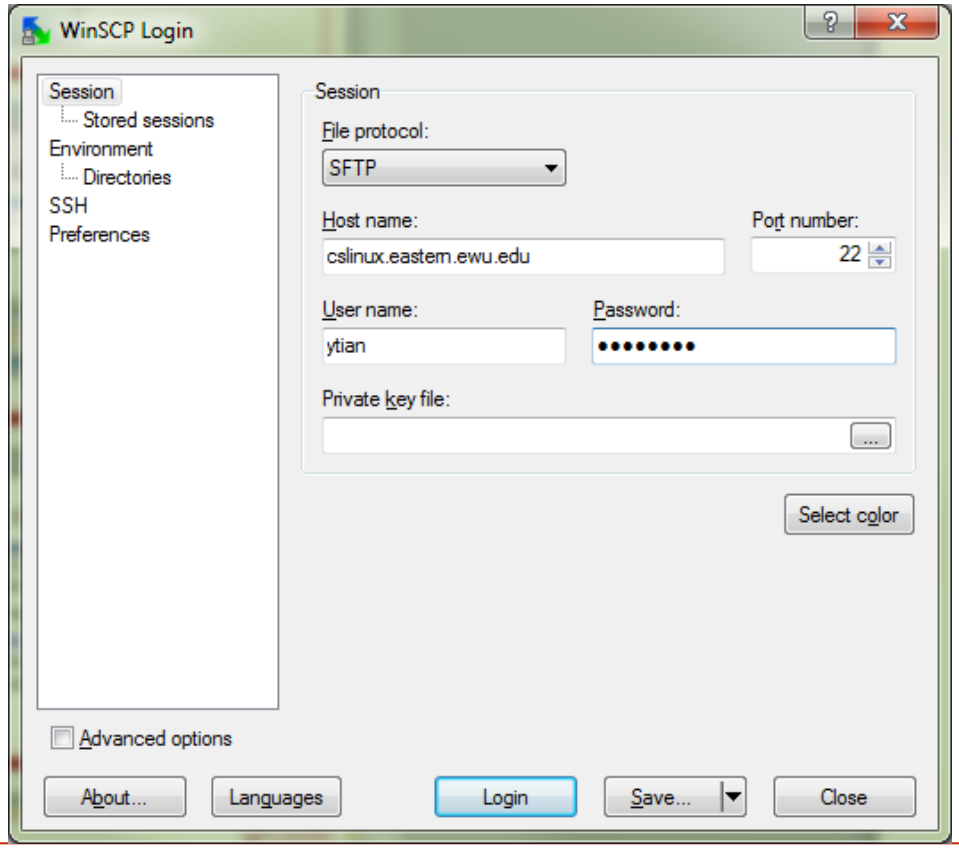
  ssh username@cslinux.eastern.ewu.edu

  OR for file transfer using:

  sftp username@cslinux.eastern.ewu.edu

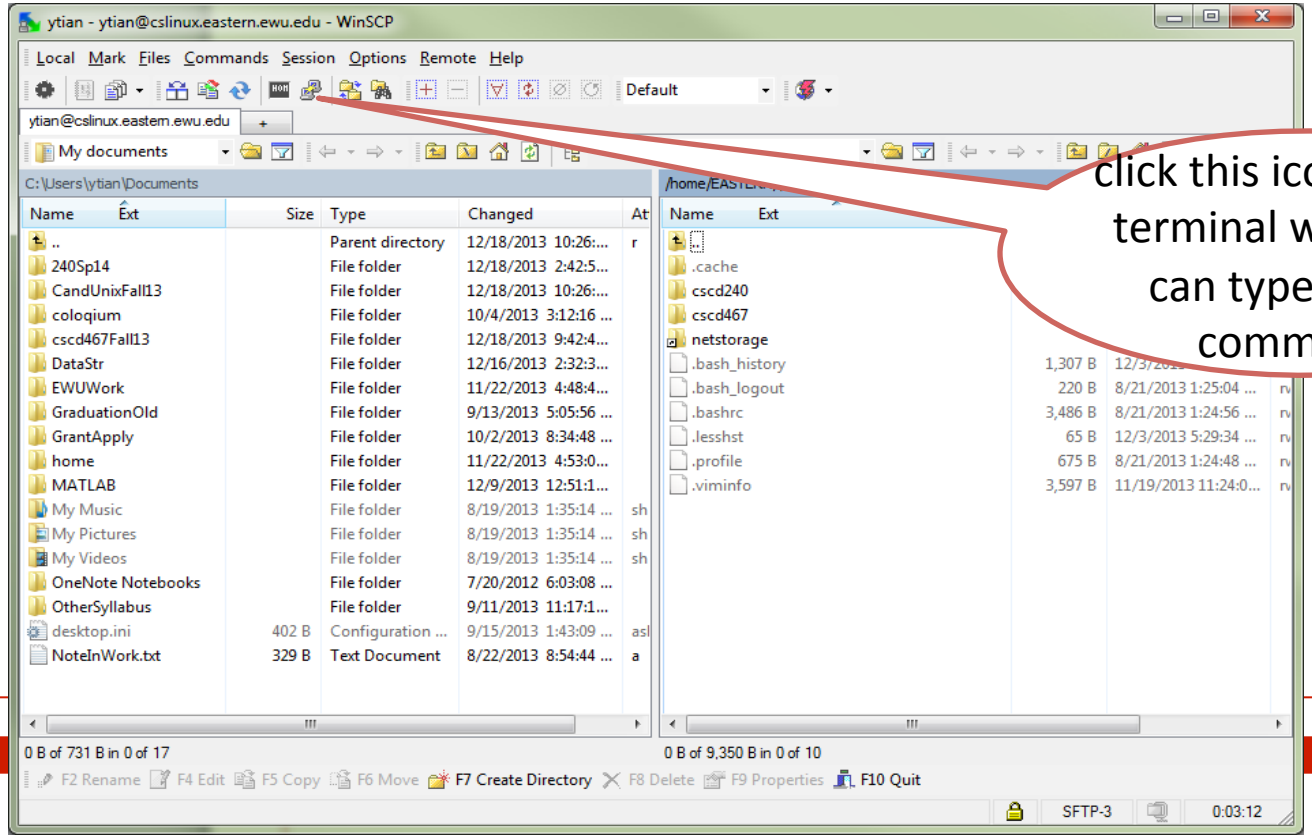
Remote Loggin CSLinux Machine

- Step 7 for Windows users



Remote Loggin CSLinux Machine

- Step 8 for Windows users, after login you see icon below. If not, You can download and install puTTy at the bottom of this page: http://winscp.net/download/putty-0.63-installer.exe



Homework Today

- Install Virtual Box and Debian 6 VM on your computer.
- Set up remote access to cslinux computer
- Understand what is Unix?

Next class

- Unix File System Commands