Lab 1

CentOS Linux Installation on VirtualBox

Outcomes:

By the end of this lab, you will know how to:

- Create a virtual machine in VirtualBox. VirtualBox is a free, cross platform virtualization system.
- Install the latest version of CentOS 7 Linux in that virtual machine (we recommend using the Minimal ISO), and add a user. CentOS is a widely used free distribution based on Red Hat Enterprise Linux.
- Recover the root password on a CentOS install. The method of root password recovery varies between distributions, what is most important is that you learn the concept.
- Minimize which services run at start on your system. This is an important step for security purposes, and one you will be automating.
- Use and configure 'sudo'. Sudo allows non-administrative users to run commands with elevated privileges.

Rubric:

Out of 10 points total

- Lab checkoff (2 points): GRUB password & Recover the root password on a CentOS install
- Lab checkoff (5 points): Minimize which services run at start on your system. -2 points if you do not comment why you are turning off services.
- Lab checkoff (3 points): Use and configure 'sudo'.

Turnin

- Submit the script that you wrote (with the extension .txt rather than .sh) to turn off services to iLearn, in 'Lab 1', for your lab section. The checkoff is not valid (you get zero points) without this submission.

Part 1: Virtual Machine Creation

You are going to create a new Linux virtual machine with 8 GB of disk space and 1024 MB of memory.

Procedure

- Download VirtualBox for your machine from the official websites download page
- Use the download to install the VirtualBox software
- Start VirtualBox and configure the virtual machine as follows:
- The name of the virtual machine should be “Centos”.
- Operating system: Linux
- Version: Red Hat (64 bit)
- Base Memory Size: 1024 MB (should be default)

- You will “Create a virtual hard disk now”
- Use the default VirtualBox Disk Image (VDI) with a size of 8 GB (should be default), choose “Dynamically allocated” for the storage type (should be default).
- On the menu on the left hand side of the screen that appears after you've done the basic setup, look under the 'Network' category on the resulting menu, and verify that "Adapter 1" is set to "NAT".

Part 2: CentOS Linux installation

You will install CentOS linux from an iso (DVD) image.
Procedure

- Download the CentOS 7 DVD ISO image from the official websites download page
- Go back to VirtualBox, and double click on 'Storage' (this will bring up the storage management interface); highlight 'Empty', under 'Controller: IDE'.
- Next, look over to the right, on the storage management interface, and you should see a section titled 'Attributes'. Click on the icon next to the 'CD/DVD Drive' section, and add the iso mentioned in 1 from the drop down menu, "Choose a virtual CD/DVD disk file".
- Choose the CentOS 7 DVD ISO that you downloaded previously and hit “ok”
- Start the virtual machine. It will boot off of the ISO image that you specified.
- Select "Install CentOS 7" from the boot menu.
- Follow instructions. The critical non-default steps are listed here in the order you will encounter them:
- If your installation starts to perform a media test, hit “esc” to skip it. It is irrelevant because we are not using physical media
- Say “yes” if warned about erasing all data.
- Perform the following steps in the CentOS 7 Installation Screen:
    - In the Date & Time menu change the city from the default “New York” to “Los Angeles”
    - In the Software Selection menu make sure that “Minimal Install” is selected. This will install the OS without the GUI which is typical for servers
    - In the Network & Host Name section set the host name to your CS login.
    - Also click on "Configure Network", select the only available network connection (ti should be enp0s3), select "Edit" and then select "Automatically connect to this network when it is available"
        - If no network interface is shown during this step of the installation then you can modify the /etc/sysconfig/network-scripts/ifcfg-enp0s3 file to have `ONBOOT=yes`. Restart the server after making this change for it to take effect.
    - When asked which type of installation you would like, select "Create Custom Layout"
    - In the installation destination section choose “I will configure partitioning”
- Once the installation starts, set a root password. Make sure to choose a good and strong password!

- Once the install has finished, reboot the system. You may see that the system attempts to boot off the CD again. If this is the case, close the window for the VM, by going to “Machine”->”Close” selecting “Power off ”, and go into the “System” settings, and remove the disk from the virtual CD drive.
- Login as root using the username root and the password you set during installation
- Turn of SELinux by editing /etc/selinux/config. If you are not familiar with vi, you can use another text editor such as nano or emacs. Change the line in the file 'SELINUX=enforcing' to 'SELINUX=disabled'.
- Update all packages by running 'yum update'. This is important to ensure that the OS is up to date.
- Reboot.
- Create an account for yourself using 'useradd'. 'man useradd' for options if you want to do something other than the default. You will need to set up a password for the account using the 'passwd' command. Make sure that the new account has the same username as your CS account.
- Log in with the account to make sure it works.
- **Note**: Once installation is complete, using VirtualBox, take a snapshot of the virtual machine to provide the ability to roll back to a clean installation.

Part 3: Setting a GRUB Bootloader Password

Once you have installed CentOS you will need to add a password to your bootloader. Because the bootloader will allow you to log into secured portions of the kernel to perform rescue operations or to boot to other kernels which may not respect any permissions you have set it is as important (if not more important) to secure as the your root account.

Follow this tutorial (https://www.myrandomtips.com/linux/centos7/set-grub-password-centos7/) to create a bootloader password hash and add that to the GRUB configuration files. Make sure to remember this bootloader password as you’ll need it for the next step. Note that because you don’t have access to your mouse on your minimal server installation you will need to use output redirection to save the output hash to use in the GRUB configuration file.

After you have set the bootloader password, reset your machine and verify that going into the GRUB editor for one of the kernels (with ‘e’ at the GRUB menu) now requires a password.

Checkoff: Once you have verified that the bootloader now requires a password, reboot your machine again and demo this to your TA.

Part 4: Root password recovery

Now that you have secured your GRUB with a bootloader password, you should follow these directions (https://www.unixmen.com/reset-root-password-centos-7/) to reset your root password by logging into the kernel in single user mode.

Separate from this lab and as an exercise for the reader, what could you do if you forgot the bootloader password as well?

Part 5: Minimize services that run at boot time

Important: when you work on this topic, create a bash script that contains all of the commands that you run to turn off services that would otherwise run at boot. You will be turning in this script to iLearn, and you won't receive credit for the lab without it. This script will be the first introduction to automation you have in the course. You could take the script and run it on a newly installed system, and it would reliably turn off the same services that you have it turn off in the lab.

Here are general background resources which may be useful; as far as specific services, you are expected to do independent research on those individually:

- A walkthrough on how to use systemctl on CentOS 7 to modify the systems boot services. https://www.theurbanpenguin.com/managing-linux-services/
- Some recommendations for services to leave alone or kill. Note that this is neither definitive or authoritative. Some services may exist on a server that are not listed, and depending on use case some services may need to be left running where this guide recommends disabling them. You still need to make justifications based on your use case. https://www.cyberciti.biz/faq/linux-default-services-which-are-enabled-at-boot/

For each service you turn off, you should comment in the script what that service does and why you are turning it off. If you don't do this, you'll receive 2 fewer points on the lab.

Checkoff: show the TA the status of your boot services by running the appropriate systemd command to list services and answering any questions about why you did or did not disable particular services.

Part 6: Give an ordinary user privileges to restart the network service

Use 'sudo' and the sudoer file to provide the user you created above the ability to restart the 'network' service, but no other sudo privileges. You should see the network service still active in the list of services above in the topic above. Use any available resources – man pages, the book, internet research, configuration files on the server itself, in order to do this.

Hint: It requires adding one line of configuration to one file. Once you have this set up, demo it to the TA.

Checkoff: Restart the network service as your new user. Show that the user can not perform other sudoer actions, e.g. ‘sudo cat /etc/shadow/‘

Extra: VirtualBox to Host Sharing

In order to create a shared folder that will allow you to easily transfer files between your VritualBox and your host machine, please follow these instructions.