

This assignment assumes you have read Chapters 2, 3, 4 and 5 of Sobell. Some specific cross-references may also be given in the questions below.

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## CentOS Setup and Configuration

For this assignment, you will set up a working local CentOS 8 installation, and then perform some basic shell configuration tasks. You will duplicate several of the configuration tasks on your rlogin account. These are intended to make your Linux account more user-friendly and more secure.

In recent terms, we have required a live demonstration with a TA in order to confirm your completion of the tasks given below. For the current semester, we will adapt to the need for remote consultations:

- Each of you will be assigned to a specific TA via an announcement on the course Forum board.
- You will then show your assigned TA that you have completed these tasks, via a Zoom session or similar technology, no later than the posted due date for this assignment.

### Task 1

If you already have installed a CentOS 8 virtual machine, or you are running a CentOS 8 install as your primary OS, you may skip this part, unless you prefer to start off with a clean installation. Note that CentOS 7 (or earlier) will NOT be acceptable; the CS Department has updated its servers to CentOS 8, and all grading of assignments will be performed on CentOS 8; since CentOS 8 has much newer versions of some critical tools than CentOS 7, the use of CentOS 7 will likely encounter difficulties, and we will not compensate for those.

Install VirtualBox 6.1 (or later) and 64-bit CentOS 8<sup>[1]</sup> on your own computer. Alternatively, you may run a bootable installation of CentOS 8 on your computer, or on a flash drive. Earlier distributions of VirtualBox are acceptable; so is running CentOS 7 as your host OS, or using other virtualization tools (such as VMware), but we do not support doing so.

There are copious notes on the course website showing how to install VirtualBox, and instructions for installing CentOS on it. Most of the errors students encounter doing this can be solved by correctly following the instructions in those notes.

### Task 2

Download the supplied tar file and unpack it in your home directory on your local CentOS 8 installation. Modify the `.bash_profile` and/or `.bashrc` files, and otherwise use Linux commands, so that the following hold for your local CentOS account:

1. Set the bash shell prompt so that it includes the current command number, your user name, the host name, and the current working directory, like so:

```
1020 wmcquain@centosvm in stuff >
```

2. Set the default file permissions so that newly-created files will allow NO access privileges for users in either category `group` or category `other`. (This is really important for your rlogin account. Hint: see `umask`.) You can test this by using the `touch` command to create a new, empty file and then using `ls` to view the permissions for that file.
3. Create a subdirectory `~/2505`, with a subdirectory `~/2505/L02` to use when working on the next Linux assignment. I suggest you create a subdirectory for each subsequent course assignment, unless the assignment requires working on rlogin.
4. Create a subdirectory `~/bin` to hold useful utility programs you may create or receive, and a directory `~/temp` to hold files you create for some temporary purpose.
5. Add the current working directory (`./`) to be the last directory in your path. This means that if you create a program yourself that has the same name as a system utility, your program will not run unless you prefix a path (e.g., `'./'`).

6. Add the directory `~/bin` to be the first directory in your path. This means that if you create or receive special utilities and place them in your `bin` directory, they will, by default, override system utilities with the same name.
7. You will have to explore the available Linux commands for this part. Define some aliases so that:
  - a. the command shortcut `h` can be used to display a listing of recently-used commands
  - b. the command shortcut `hg` can be used to display commands stored in the history that contain a specified string; for example, to display recent calls to `tar`:

```
hg tar
```

I find this to be very useful when I'm compiling and testing code.

For an added challenge (but not extra credit)... implement this so that it shows only commands that contain the specified string as the actual command. That is, `hg tar` might show these commands:

```
214 tar cvf ../c04Files.tar *
220 tar tvf c07Files.tar
293 tar xf /media/share/2505Fall2019.tar -C ./previous/
```

but it would not show these:

```
324 cp c08Files.tar ~/2505/c08
341 man tar
```

I implemented my version as a *shell function*, not as an alias. You'll have to do some extra reading if you want to do that.

Some of the changes required above are related to the discussion of aliases in Chapter 8 of Sobell.

### Task 3

Make all of the changes from Task 2 in your `rlogin` account. Most of those changes are just a convenience or a matter of taste, but the default permissions are vital for accounts on a shared machine! The simplest way to apply these changes to your `rlogin` account is to use `scp` to transfer the relevant configuration files from your local CentOS to `rlogin`<sup>[2]</sup>.

<sup>[1]</sup> My personal experience has been that VirtualBox 6.1.10 seems to be fine. Earlier versions of VirtualBox are likely to encounter issues.

However, if you are running Windows 10 as your host OS, and Hyper-V is enabled, you are likely to encounter problems, because Hyper-V does not coexist peacefully with other hypervisors.

Recent releases of VirtualBox are claimed to be compatible with Hyper-V. My experience, so far, does not confirm that claim.

Links on the course website provide some advice for dealing with those.

My experience is that, although I can create a CentOS virtual machine on Hyper-V, that installation runs too slowly to be usable. In that case, if you must deal with the conflict between Hyper-V and VirtualBox, I advise either setting up a bootable installation of CentOS **on a flash drive**, or disabling Hyper-V and running VirtualBox with Hyper-V turned off.

<sup>[2]</sup> Occasionally, a student manages to mess up their settings on `rlogin` in such a way that their `PATH` variable is empty or invalid, and that may make it seem impossible to do anything to fix your `rlogin` configuration. One way to deal with that:

- Before you make any changes, copy the initial `.bashrc` and `.bash_profile` files from your `rlogin` account to your local machine, using `scp` or using an `ssh` client. Do not put these files into the home directory on your local machine, since that would overwrite the configuration files you have created there.
- If your `rlogin` account is messed up, use `scp` or an `ssh` client to transfer the backup files from your local machine back to `rlogin`.

If all else fails, email [techstaff@cs.vt.edu](mailto:techstaff@cs.vt.edu) and request that your account be fixed. The course staff cannot do this.