# Hands-on Projects

These projects should be completed in the order given and should take a total of three hours to complete.

## Project 2-1

In this hands-on project, you install Fedora 26 Linux within a virtual machine on a Windows computer.

1. **Please see the attached power point to configure VirtualBox for use with Fedora 26.**
2. Start and then connect to your Fedora Linux virtual machine using your virtualization software.
3. At the Fedora Live welcome screen select “Start Fedora-Workstation-Live 26” and press Enter to load the live media image into system memory.
4. Select “Install to Hard Drive” option.
5. At the Welcome to Fedora 26 screen, select English (United States) if necessary, and press Continue.
6. On the Installation Summary page, ensure Date & Time settings are correct. If not, you will need to manually change this setting.
7. On the Installation Summary page, ensure Keyboard settings are correct. If not, you will need to manually change this setting.
8. On the Installation Summary page, click Network & Host Name. **Enter your username based on your Hawk e-mail address**. For example, my e-mail is durksea@iit.edu so my hostname would be **durksea.iit.edu**. Click Apply and then click Done to go back to the Summary page.
9. On the Installation Summary page, click Installation Destination. You should see that your 30GB virtual disk is **already selected** and called **sda**. Under **Other Storage Options** select the **I will configure partitioning** radio button and then click done.
10. At the Manual Partitioning screen, ensure partitioning scheme is LVM and then select the link **Click here to create them automatically**. This will create several partitions.
    1. Highlight the **/ (fedora-root)** partition, **reduce** the Desired Capacity to **15.00 GiB**, and click Update Settings (you may need to scroll down to see this button).
    2. Click the + at the bottom left above available space (which should be **11.99GiB**) and select **/home** as the **Mount Point** and the desired capacity to **5 GiB** and click add mount point. You should now have **5.99** **GiB** of available space. **This will leave some free space on our first disk for a later exercise.**
    3. Press Done and then click Accept Changes when prompted.
11. At the Installation Summary page, click Begin Installation.
12. During the installation process, click **Root Password,** supply a password of **LNXrocks!**, and press Done. Next, click **User Creation** and enter your **full name** and ensure your **user name** is **user1** and password of **LNXrocks!** then press Done.
13. When the installation has finished, click Quit. This will return you to your Fedora live desktop.
14. Click the power icon in the upper-right corner, select the power icon that appears, and click Power Off to shut down your Fedora Live installation image.
15. In the Settings for your virtual machine in your virtualization software, unmount the ISO file (mounted during PowerPoint lab – follow those steps to remove) from the virtual CD/DVD drive. **If this step is not completed, you will boot back into the ISO image and not into the virtual hard drive.**
16. Finally, start your Fedora Linux virtual machine using your virtualization software to boot into your new Fedora Linux OS.
17. Once at the Fedora login screen, this is a perfect time to **take a VM snapshot**. This will allow you to revert to the current state of the OS (without the need to go through this lab again) in case any severe error should occur rendering the system unusable. Be sure to enter a description that makes sense, you may need to rely on these later in the semester.

## Project 2-2

In this hands-on project, you explore some command-line terminals on a Linux system and enter some basic commands into the BASH shell.

1. Boot your Fedora Linux virtual machine. Login to your Gnome desktop environment as **user1** using password **LNXrocks!** and open up a terminal window.
2. The first time you log into the desktop, you will be prompted to select desktop preferences.
   1. At the Welcome screen, ensure that English (United States) is selected and click Next.
   2. At the Input Sources screen, ensure that the English (US) keyboard layout is selected and click Next.
   3. At the Privacy screen, keep the defaults and click Next.
   4. At the Online Accounts screen, click **Skip** to bypass personal account configuration.
   5. On the Thank You screen, click Start using Fedora.
3. Observe the GNOME desktop. Use your mouse to select the Activities menu in the upper-left corner of your screen, select the Show Applications icon (at the bottom left of the application panel, 3x3 grid of circles), and then navigate to Utilities. Right click on Terminal and select “**Add to Favorites**.” Click on the terminal (also called command prompt) icon to open a BASH shell prompt.
4. After your Linux system has been loaded, you are placed at a graphical terminal. For now, instead of utilizing the graphical terminal, press **Ctrl+Alt+F3** to switch to a command-line terminal and then log in to the terminal using the user name of **root** and the password of **LNXrocks!**.
5. At the command prompt, type **date** and press Enter to view the current date and time. Now, type **Date** (**with the capital D**) and press Enter. You will see the error command not found.
6. Switch to a different command-line terminal by pressing **Ctrl+Alt+F5** and log in to the terminal using the user name of **user1** and the password of **LNXrocks!**.
7. At the command prompt, type **who** and press Enter to view the users logged in to the system.
8. Switch back to the terminal by pressing **Ctrl+Alt+F3**. Notice you did not need to log back in.
9. At the command prompt, type the following on one line:

**clear; reset; who; w; whoami; id; date; cal** and press Enter.

1. **Place screenshot here.**

## Project 2-3

In this hands-on project, you will install the virtual box guest addition tools that provide enhancements to the following:

* Mouse pointer integration
* Shared folders
* Better video support
* Seamless windows (no ctrl key)
* Shared clipboard

1. Boot your Fedora Linux virtual machine. Login to your Gnome desktop environment as **user1** using password **LNXrocks!** and open up a terminal window.
2. At the command prompt, type **who** and press Enter to view the users logged in to the system.
3. At the command prompt, type **su -** (***yes include the dash***) and press Enter to switch to the root user. Supply the root user password (**LNXrocks!**) when prompted.
4. At the command prompt, type **yum -y update** to update your system. **This will take around 20 minutes.**
5. Once this is completed we will need to install a few additional packages. At the command **yum -y install kernel-devel dkms gcc-c++** and press Enter.
6. We will need to reboot the system to make use of the newly installed kernel. At the command prompt, type **reboot** and press Enter.
7. Login to your chosen desktop environment as **user1** using password **LNXrocks!** and open up a terminal window.
8. At the command prompt, type **su -** (***yes include the dash***) and press Enter to switch to the root user. Supply the root user password (**LNXrocks!**) when prompted.
9. At the top of the Virtual Box window, click Devices -> **Insert Guest Additions CD Image** which should prompt you to run the program. You will need to put the password for super user, (**LNXrocks!**) when prompted. This should open up a terminal window and install the needed kernel modules. Once complete select Devices -> Shared Clipboard -> Host to Guest to be able to copy and paste from the labs to the virtual machine. Reboot the system by typing **reboot** at the command line.

## Project 2-4

In this hands-on project, you log in to a graphical terminal in Fedora Linux and interact with the GNOME and KDE desktops.

1. Boot your Fedora Linux virtual machine. Login to your chosen desktop environment as **user1** using password **LNXrocks!** and open up a terminal window.
2. At the command prompt, type **su -** (***yes include the dash***) and press Enter to switch to the root user. Supply the root user password (**LNXrocks!**) when prompted.
3. By default, the Gnome desktop is installed in Fedora 26. To download and install additional desktop environments from the Internet, type **yum -y groupinstall "KDE Plasma Workspaces" "Xfce Desktop" "LXDE Desktop" "Cinnamon Desktop" "MATE Desktop"** and press Enter. This may take several minutes, depending on your Internet speed. The **yum** command will be discussed in more detail in Chapter 11.
4. Click the power icon in the upper-right corner, select the power icon that appears, click your name and select log out.
5. At the Fedora login screen, click **user1** and then click the **cog wheel icon** (gear looking icon) next to the Sign In button. Select **Plasma**, supply the password for **user1** (**LNXrocks!**), and click Sign In. **You may need to reboot your system if you do not see the newly installed desktop environments.**
6. Click the Fedora start button in the lower left of the desktop and navigate to Applications, System, Terminal to start a command-line shell. Review the differences between the GNOME desktop environment and KDE.
7. At the command prompt, type **echo $SHELL** and press Enter to view your current shell.
8. Click the Fedora start button, navigate to Leave, Log out, and click Logout to exit the KDE desktop.
9. At the Fedora login screen, click **user1** and then click the **cog wheel icon** next to the Sign In button. Select the other desktop environments (**LXDE, Cinnamon, MATE, XFCE**) and review the layout of each.
10. **Provide screenshot of the desktop environment you like best**.

## Project 2-5

In this hands-on project, you use and protect shell metacharacters.

1. Switch to a command-line terminal by pressing **Ctrl+Alt+F3** and log in to the terminal using the user name of **root** and the password of **LNXrocks!**.
2. At the command prompt, type **date; who** and press Enter to run the date command immediately followed by the who command.
3. At the command prompt, type **echo This is OK** and press Enter to display a message on the terminal screen.
4. At the command prompt, type **echo Don’t do this** and press Enter. Press the **Ctrl and c** keys together to cancel your command and return to a BASH shell prompt.
5. At the command prompt, type **echo “Don’t do this”** and press Enter.
6. At the command prompt, type **echo Don\’t do this** and press Enter.
7. At the command prompt, type **echo $SHELL** and press Enter to view the expansion of a variable using a shell metacharacter. Next, type **echo $TEST** and press Enter to find out what happens when a variable that does not exist is used in a command.
8. At the command prompt, type **echo You have $4.50** and press Enter.
9. At the command prompt, type **echo ‘You have $4.50’** (single quotes) and press Enter.
10. At the command prompt, type **echo “You have $4.50”** and press Enter.
11. At the command prompt, type **echo You have \$4.50** and press Enter.
12. At the command prompt, type **echo My name is ‘whoami’** (single quotes). Now type **echo My name is `whoami`** (**Note: These are back quotes which is on the same key as ~**)
13. **Place screenshot here.**
14. Type **exit** and press Enter to log out of your shell.

## Project 2-6

In this hands-on project, you find information about commands using help utilities.

1. Press **Ctrl+Alt+F3** to switch to a command-line terminal, and then log in to the terminal using the user name of **root** and the password of **LNXrocks!**.
2. At the command prompt, type **man -k cron** and press Enter to view a list of manual pages that have the word “cron” in the name or description. Use Table 2-8 to determine what type of manual pages are displayed. If you do not see any output from the **man -k** command, run the **mandb** command to generate the manual page’s index.
3. At the command prompt, type **apropos cron** and press Enter. Compare this to the output of the man -k command.
4. At the command prompt, type **man crontab** and press Enter to view the manual page for the crontab command. Observe the syntax of the crontab command and press **q** when finished to quit the manual page and return to your command prompt.
5. At the command prompt, type **man 5 crontab** and press Enter to view the manual page for the crontab file format. Observe the syntax of the crontab file format and press **q** when finished to quit the manual page and return to your command prompt.
6. At the command prompt, type **info** and press Enter to view a list of available GNU info pages. When finished, press **q** to quit the info utility.
7. At the command prompt, type **info date** and press Enter to view syntax information regarding the date command, and press **q** to quit the info utility when finished.
8. At the command prompt, type **help** to view a list of BASH shell functions that have documentation. If the list is too long for your terminal, press the Shift and Page Up keys simultaneously to shift one page up to view the top of the list. Then press the Shift and Page Down keys simultaneously to shift one page down to view your command prompt again.
9. At the command prompt, type **help exit** to view information on the exit command, a function of your BASH shell.
10. **Place screenshot here.**
11. Type **exit** and press Enter to log out of your shell.

## Project 2-7

In this hands-on project, you properly shut down your Linux system.

1. Press **Ctrl+Alt+F3** to switch to a command-line terminal, and then log in to the terminal using the user name of **root** and the password of **LNXrocks!**.
2. At the command prompt, type **poweroff** to shut down your Linux system immediately.