

# Red Hat Enterprise Linux 8 Installation

Lenovo ThinkStation P620



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## Section 1 - BIOS Setup & Preinstallation Steps

The first step before installing Linux is to make sure the system BIOS is setup correctly. Follow the steps below to ensure a few BIOS settings are set appropriately.

- Boot into BIOS setup by pressing the function F1 key at the “Lenovo” splash screen.

A black rectangular splash screen with the word "Lenovo" in white, sans-serif font centered in the middle. The trademark symbol (TM) is visible to the right of the word.

Lenovo™



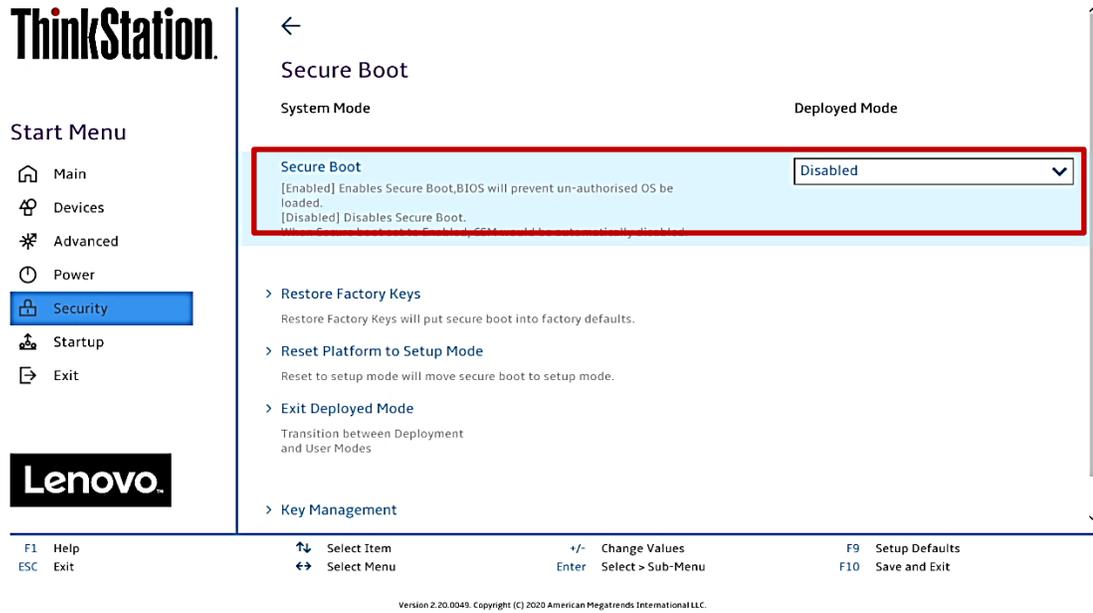
- On the main start menu within BIOS setup, select the “Security” option.

The screenshot shows the BIOS Setup interface for a ThinkStation. On the left, the 'Start Menu' is visible with options: Main, Devices, Advanced, Power, Security (highlighted with a red box), Startup, and Exit. The main area displays the 'Security' settings. At the top, there are three password fields: 'Supervisor Password', 'Power-On Password', and 'System Management Password', all currently set to 'Not Installed'. Below these are three configuration sections: 'Set Password Encryption Algorithm' (set to 'SHA-256 Hash'), 'Set Supervisor Password', and 'Set Power-On Password'. The bottom of the screen shows navigation keys: F1 Help, ESC Exit, arrow keys for 'Select Item' and 'Select Menu', +/- for 'Change Values', Enter for 'Select > Sub-Menu', F9 for 'Setup Defaults', and F10 for 'Save and Exit'. A version number 'Version 2.20.0049' is printed at the bottom.

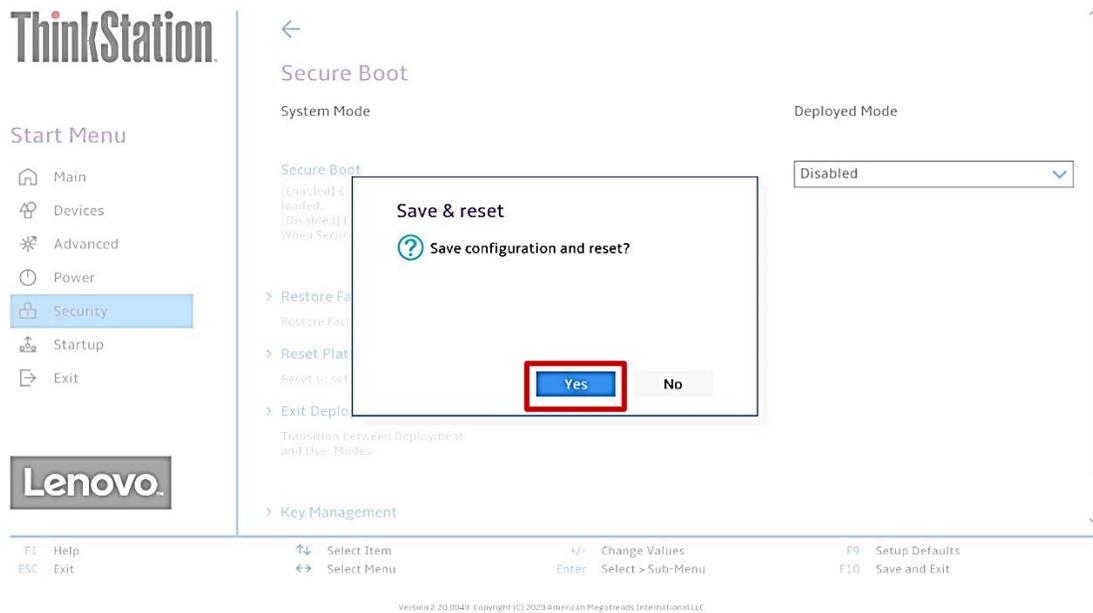
- On the “Security” menu tab, scroll down and select the “Secure Boot” option.

This screenshot shows the same BIOS Setup interface, but with the 'Security' menu tab selected. The 'Start Menu' on the left is the same, but 'Security' is now highlighted with a blue bar. In the main area, the 'Secure Boot' option is highlighted with a red box. The 'Secure Boot' section is expanded, showing the text: 'Secure Boot flow control. Secure Boot is possible only if System runs in User Mode'. Other options visible include 'BIOS Password At Boot Device List' (set to 'No'), 'Smart USB Protection' (set to 'Disabled'), 'Hard Disk Password', 'TCG Feature Setup', and 'System Event Log'. The navigation keys and version number at the bottom are identical to the previous screenshot.

- Set the “Secure Boot” drop-down option to “Disabled”.



- Press the function F10 key to “Save & Exit” the BIOS setup menu and select “Yes” on the pop-up window that’ll appear.



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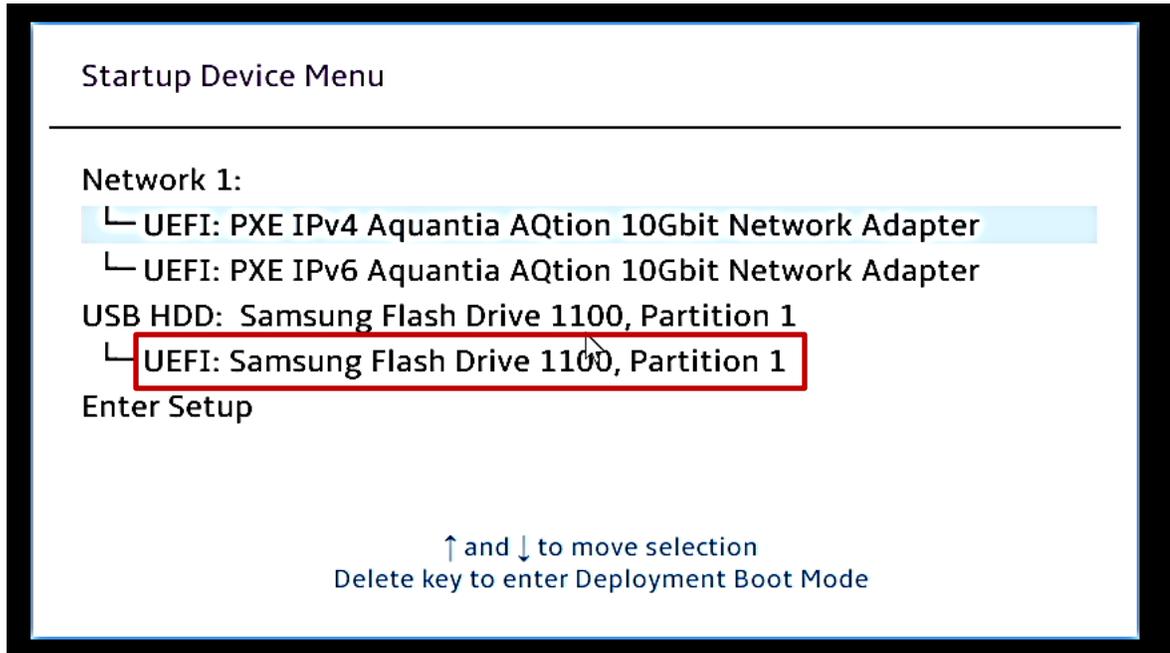
## Section 2 – Installing Red Hat Enterprise Linux 8

Please refer to the following instructions and screenshots on how to install RedHat Enterprise Linux (RHEL) 8 on the Lenovo ThinkStation P620.

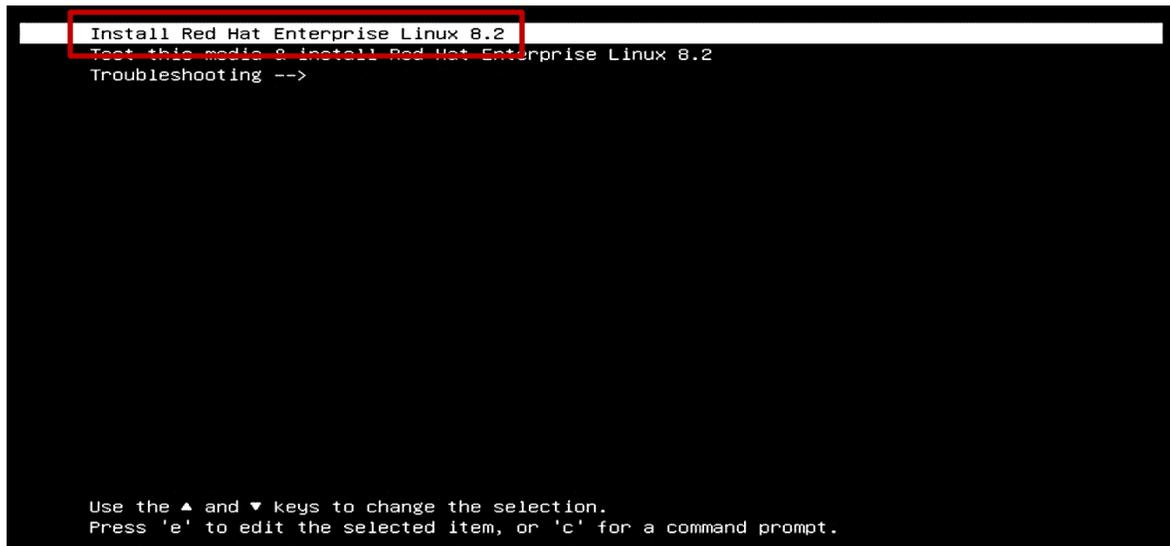
- Insert the RHEL 8 installation media either through USB or CD/DVD.
- Power on the system and press the function F12 key when the Lenovo splash screen appears.

A screenshot of the Lenovo splash screen, which is a solid black rectangle with the word "Lenovo" in white, sans-serif font centered in the middle.

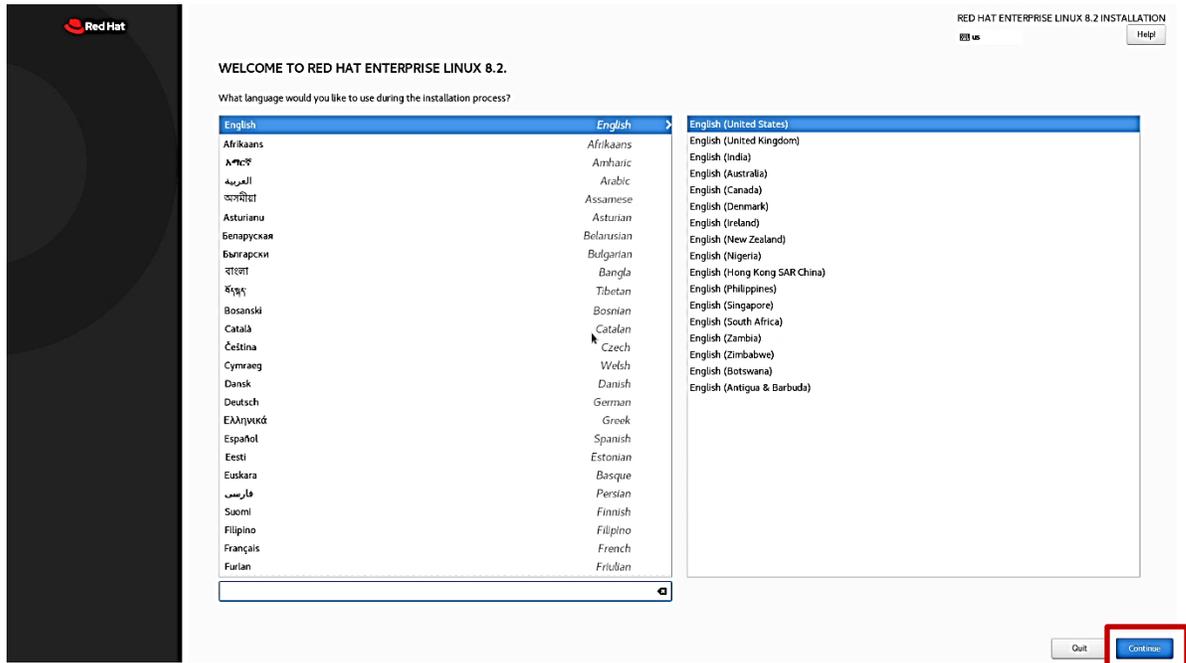
- Select the Linux bootable installation media from the Startup Device Menu.



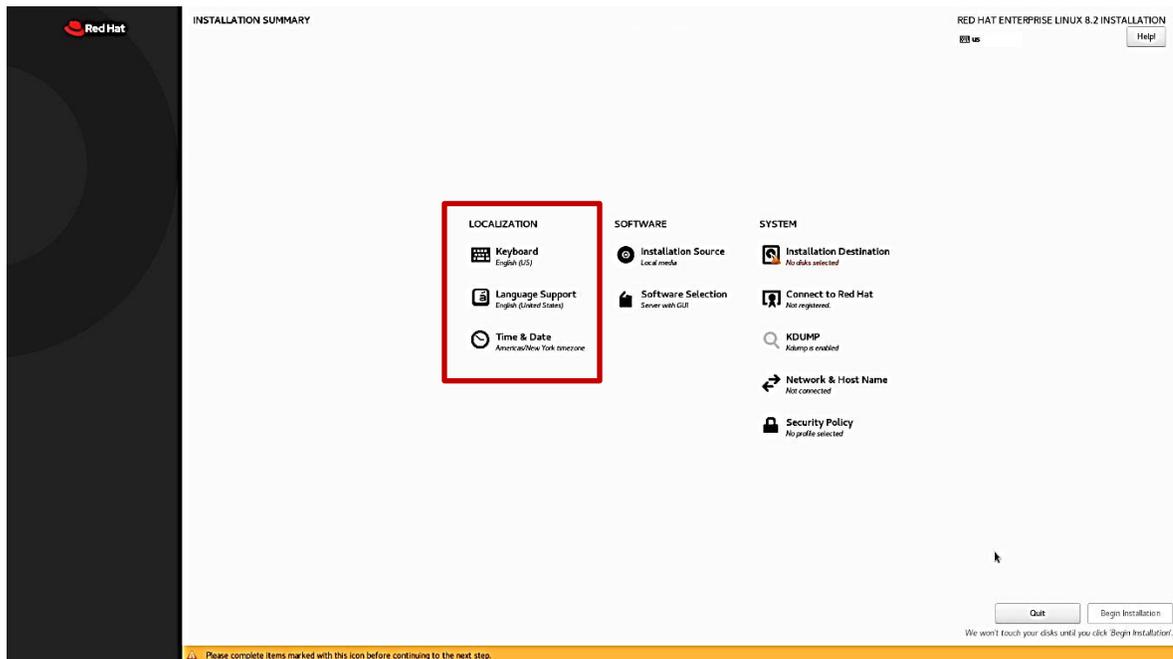
- Select the “Install Red Hat Enterprise Linux 8.2” option from the GRUB boot menu and press enter.



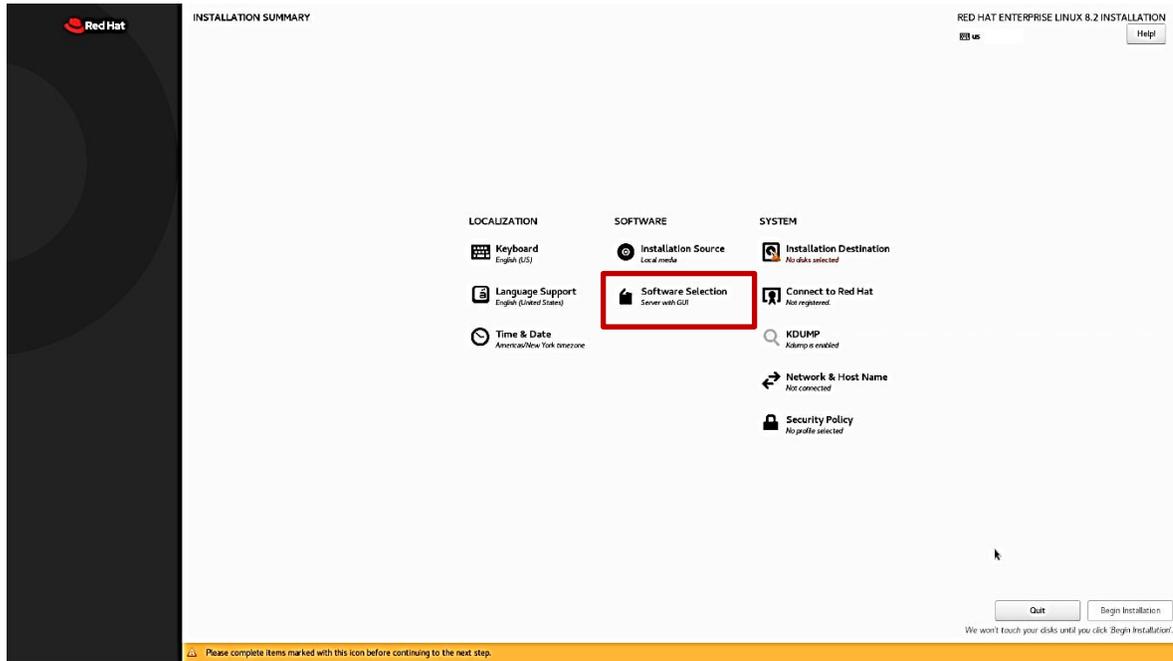
- The Red Hat Enterprise Linux Welcome Screen should appear. Select the appropriate language and “Continue”.



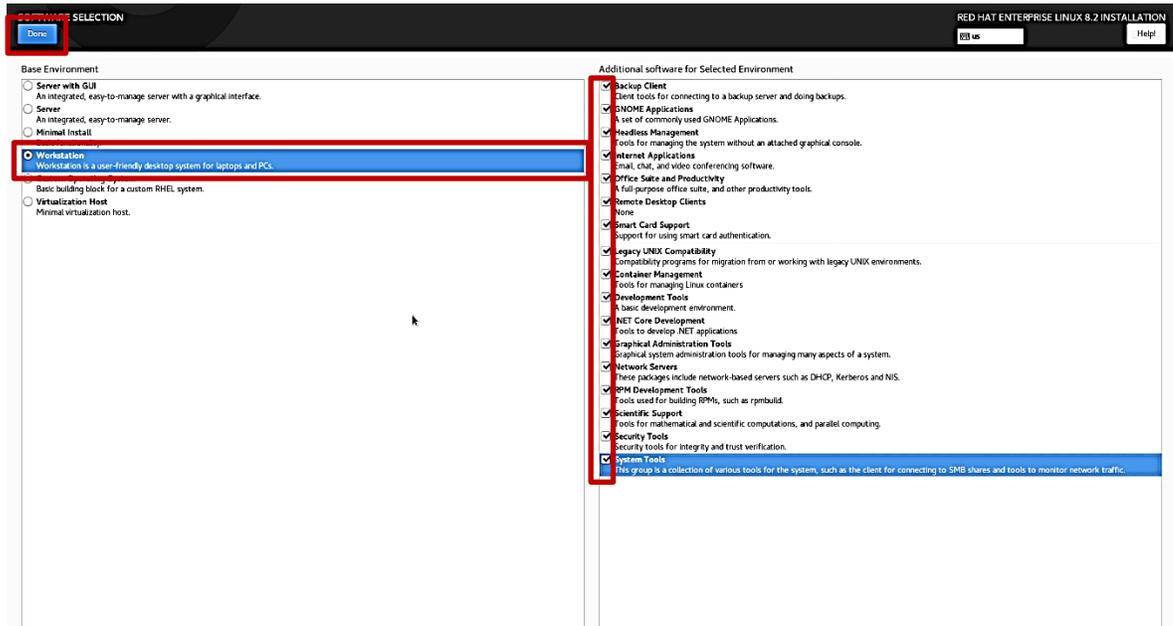
- Adjust the “Keyboard”, “Language Support”, and “Time & Date” accordingly by selecting each one. Or, leave the default settings.



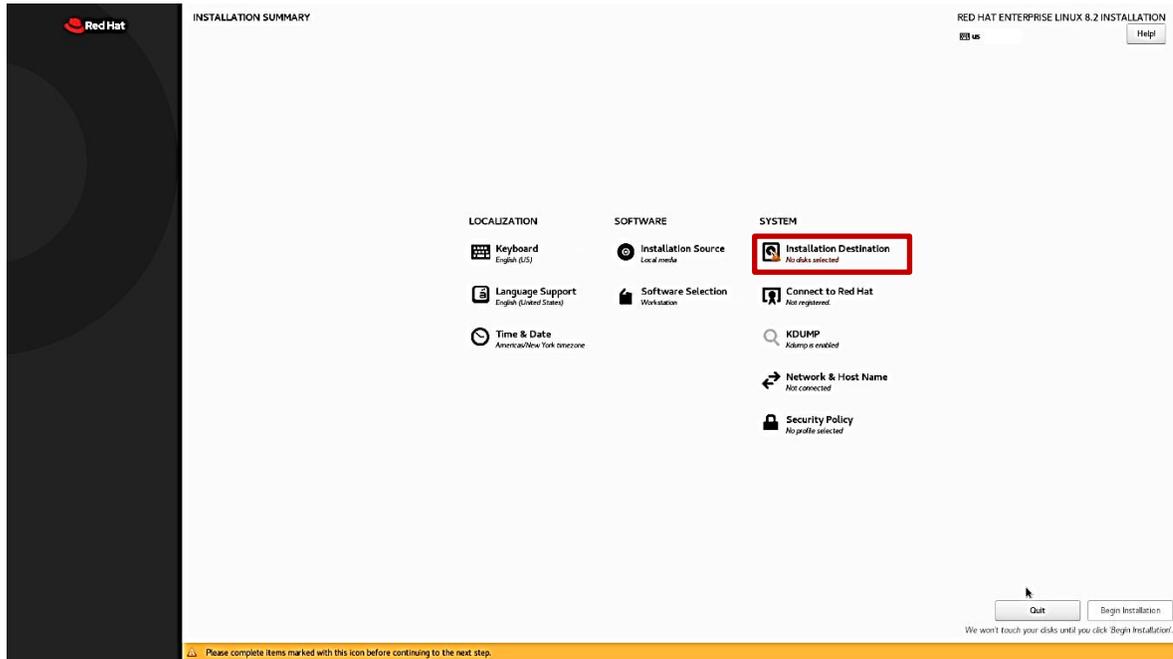
- Select the “Software Selection” and choose the type of software to install.



- Select the type of “Base Environment” as well as each “Add-Ons” to install. In this example, “Workstation” was selected for the “Base Environment” and all “Add-Ons” were selected.

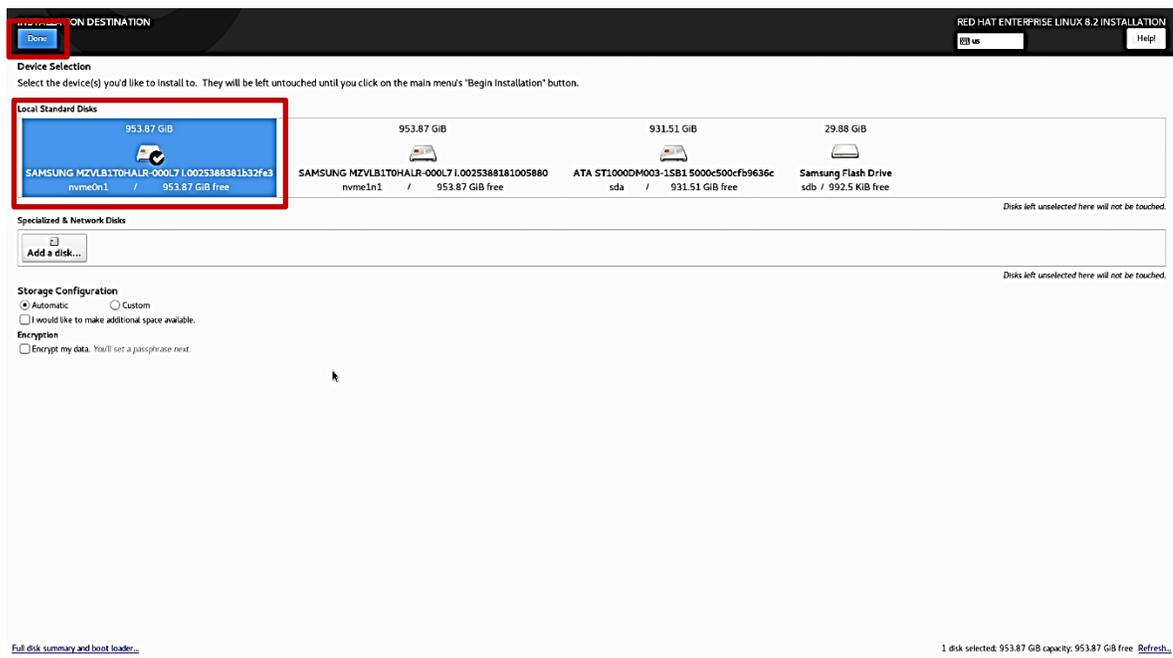


- Select “Installation Destination”.

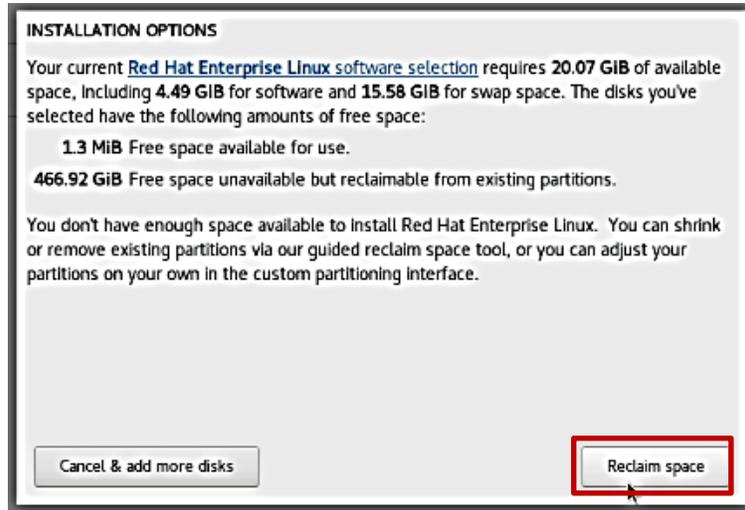


- Select the device on where to install the operating system. In this example, the first NVMe drive was selected.

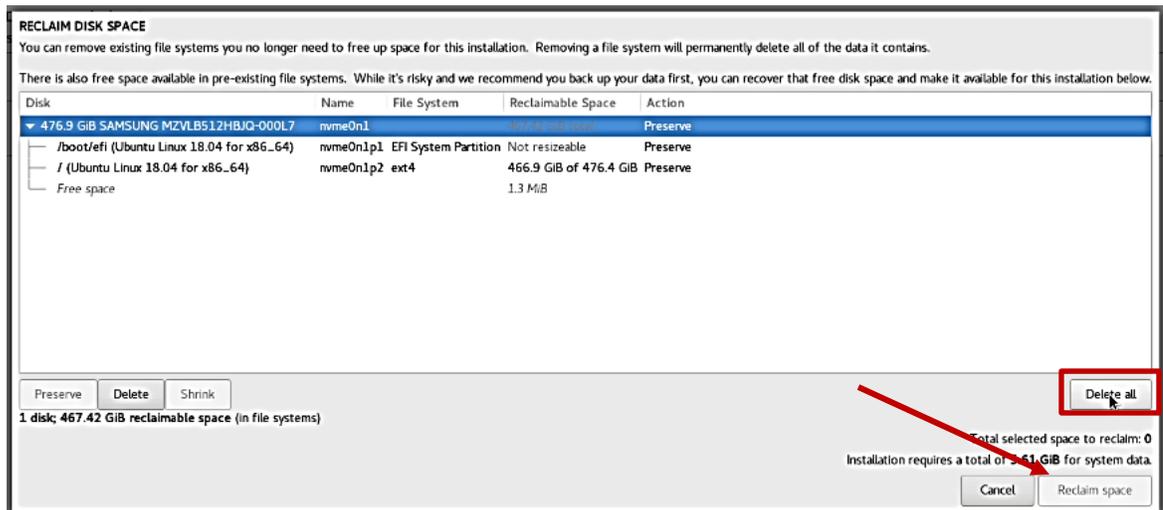
*For AMD RAID arrays, see Section 3 below.*



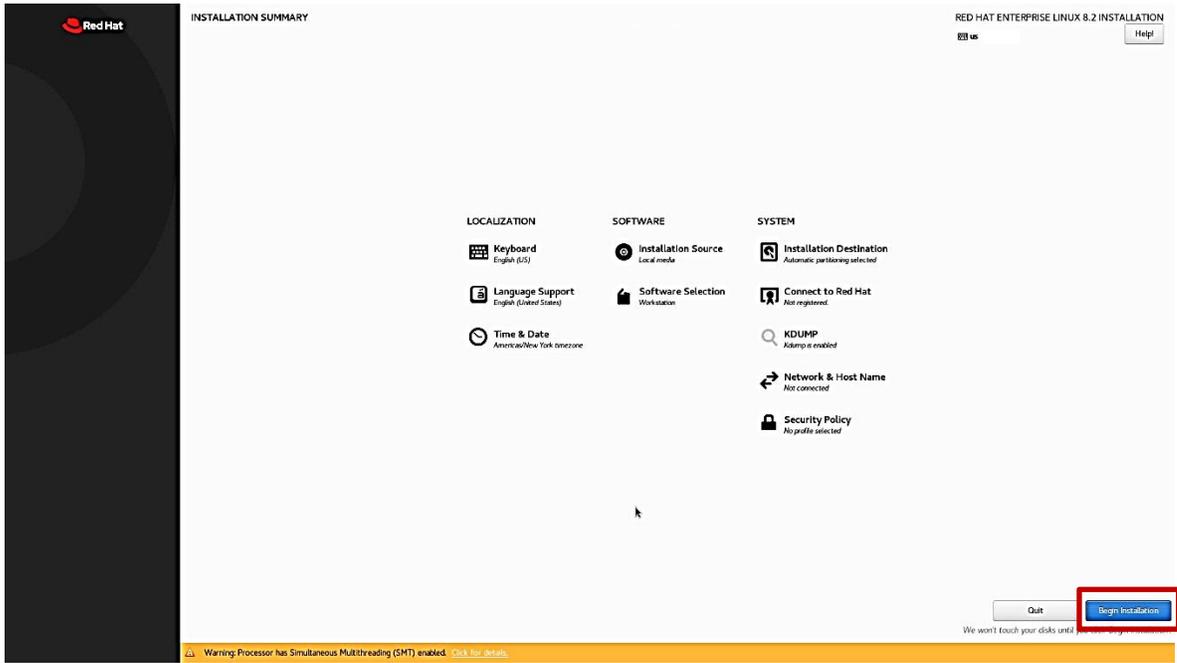
- For storage devices with previous partitions created, select “Reclaim space”.



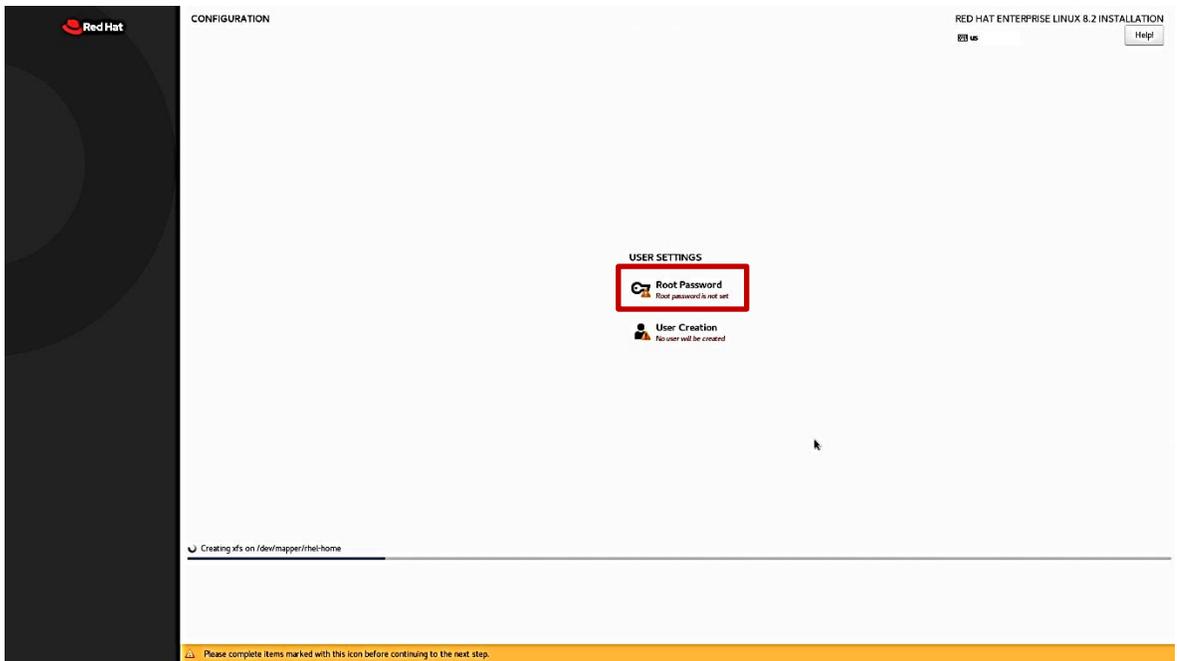
- Select “Delete all” to delete all the previously created partitions or select each partition to delete and select the “Delete” option. When done, select “Reclaim space” button at the bottom.



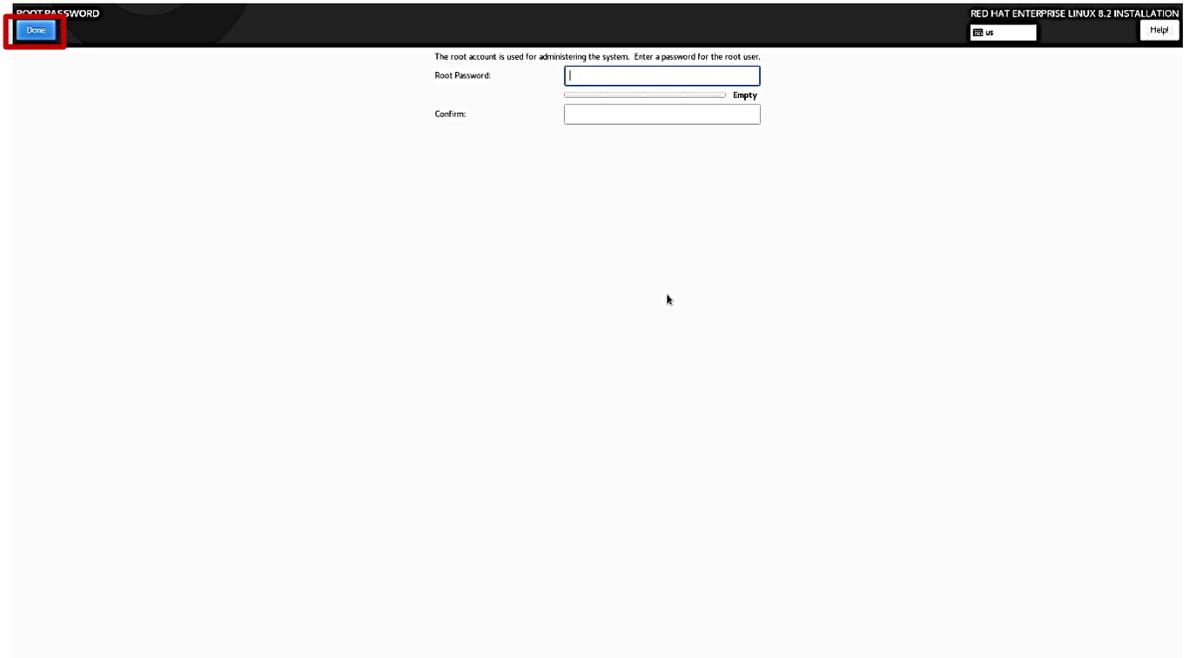
- Select “Begin Installation” at the bottom right.



- Select “Root Password”.



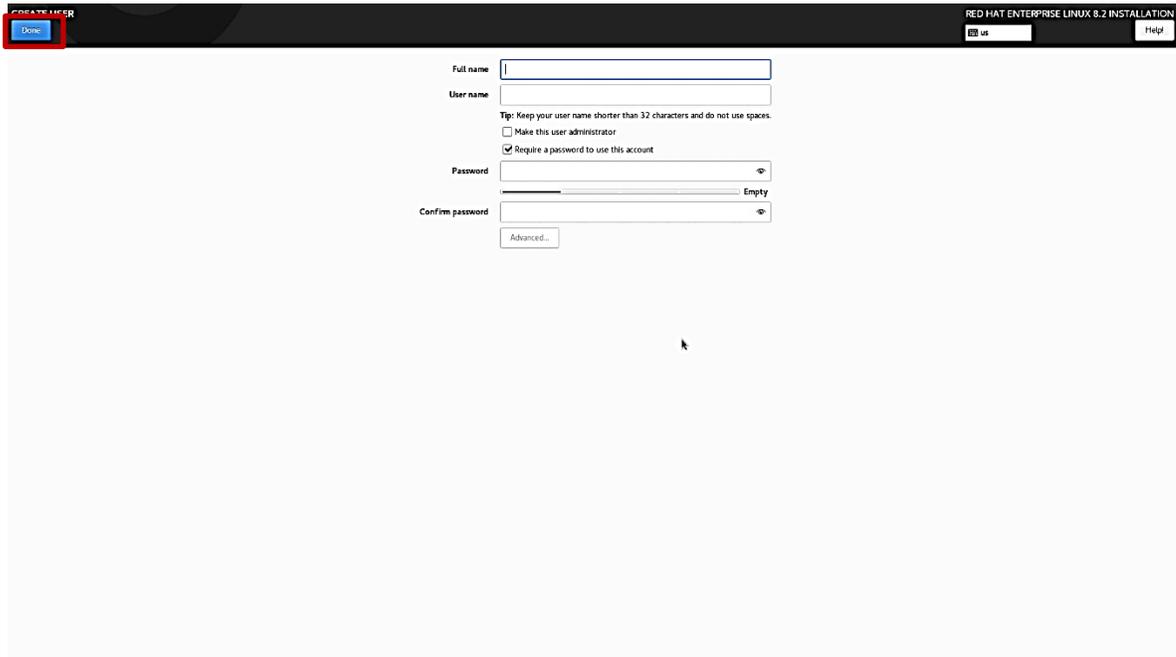
- Enter a root password in both of the boxes below and select “Done” in the upper left.



- Select “User Creation”.



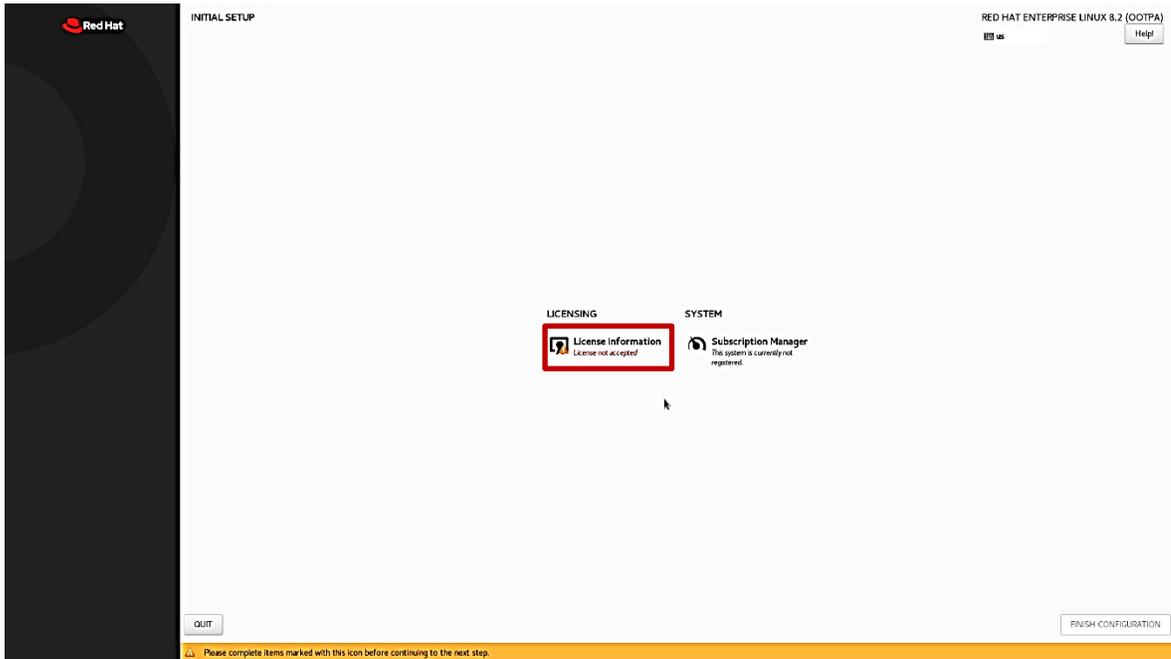
- Fill in the appropriate boxes below and select “Done” in the upper left.



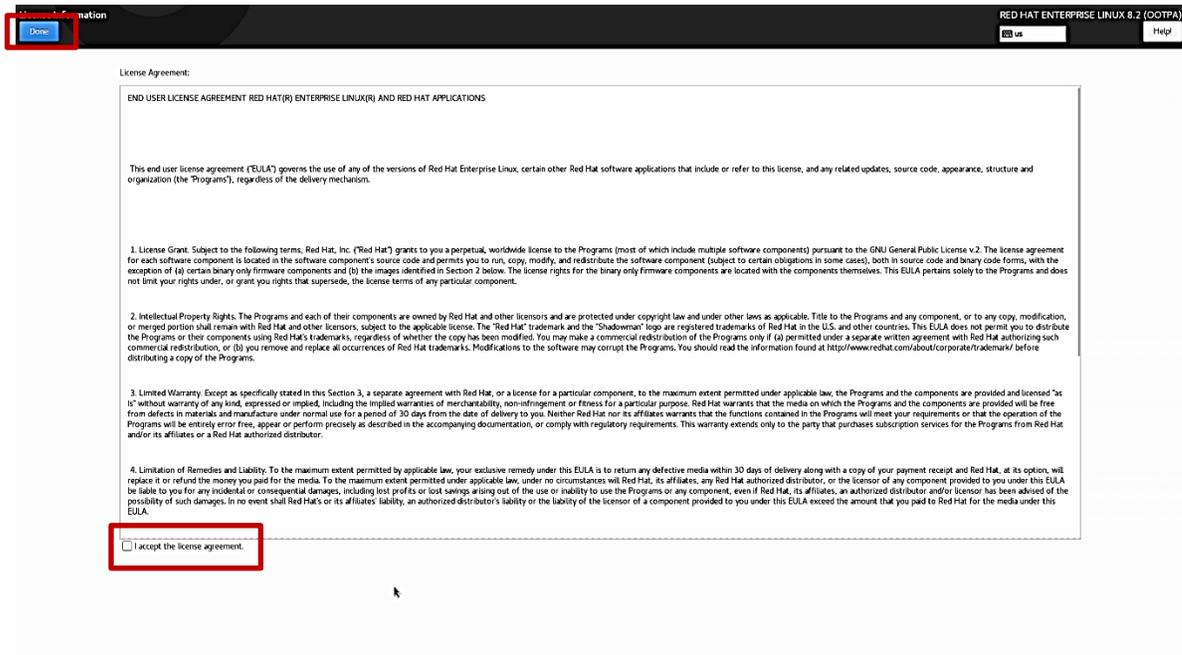
- Once the installation completes, select “Reboot” at the bottom right.



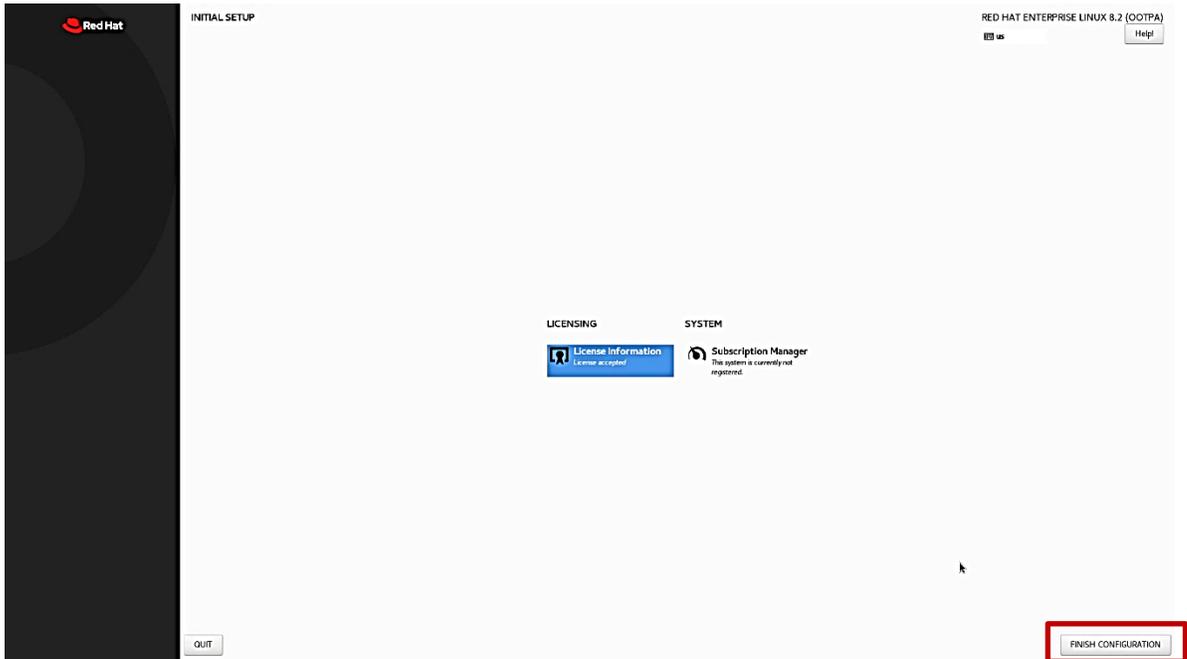
- Select the “License Information” box.



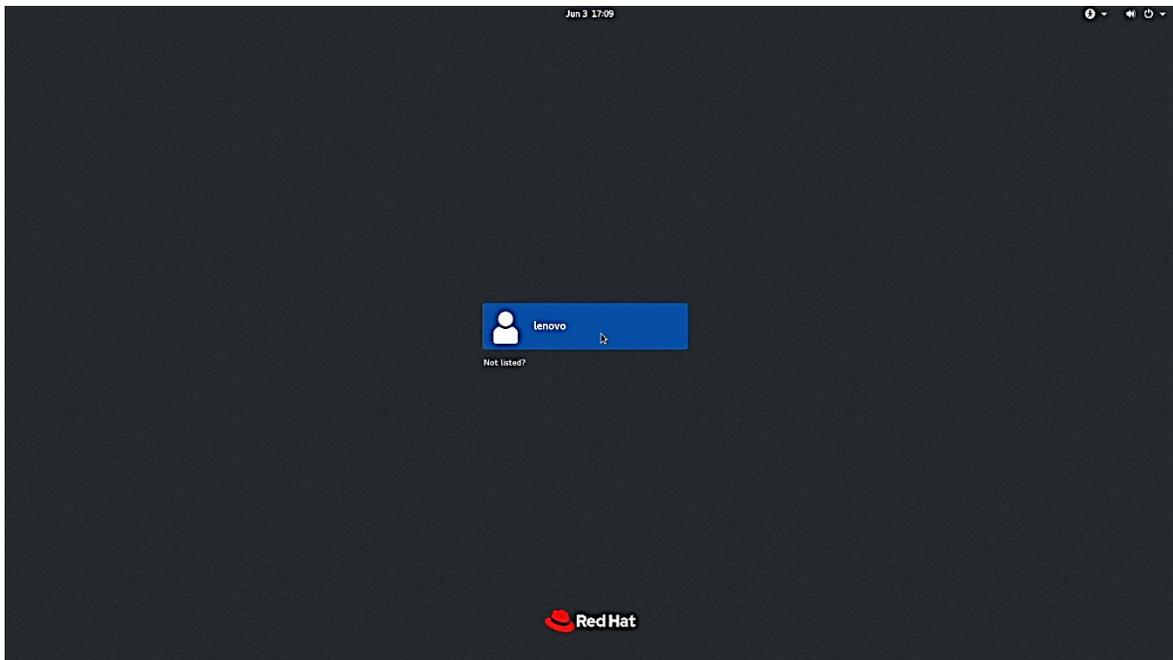
- Select the box at the bottom left of the “License Agreement” page and “Done” in the upper left.



- Select “FINISH CONFIGURATION”.



- Log in to the Linux Desktop using the login credentials created above.



- Red Hat Enterprise Linux 8.x Desktop screen.



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## Section 3 – RAID Array Installation

Please refer to the following instructions and screenshots on how to install RedHat Enterprise Linux (RHEL) 8 utilizing RAID arrays on the Lenovo ThinkStation P620.

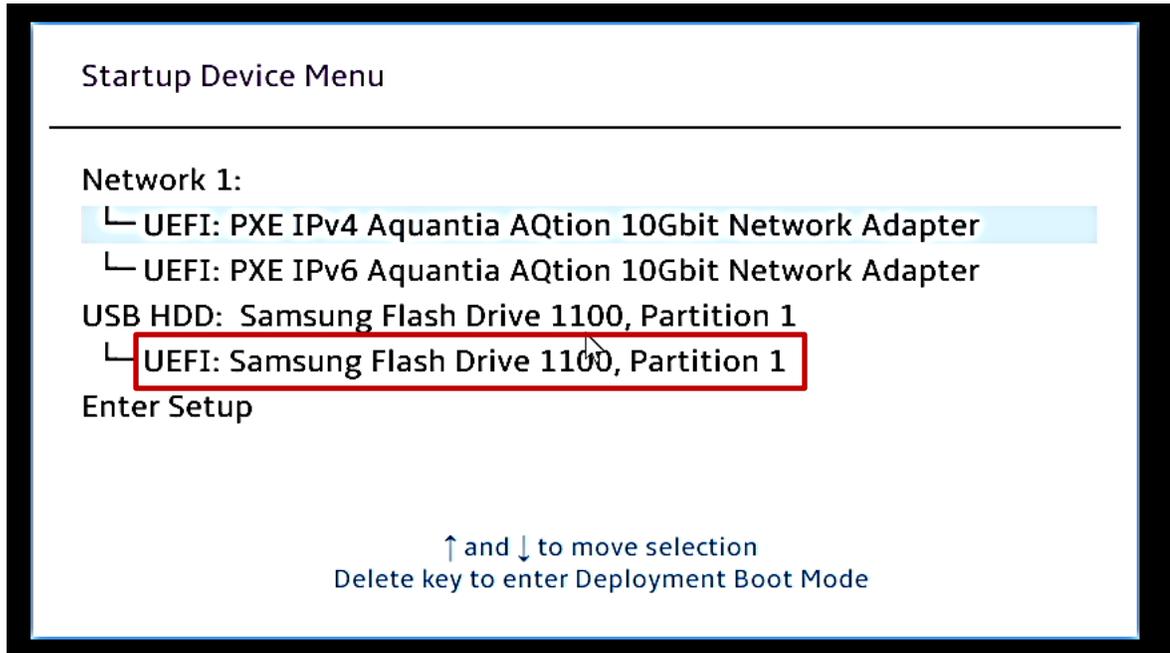
**Note:** This is assuming storage RAID is already set up and configured in BIOS.

- Download the Linux AMD storage RAID driver from the Lenovo support site and put the direct \*.iso file onto the root of a USB flash drive.
- Insert the RHEL 8 installation media either through USB or CD/DVD.
- Power on the system and press the function F12 key when the Lenovo splash screen appears.

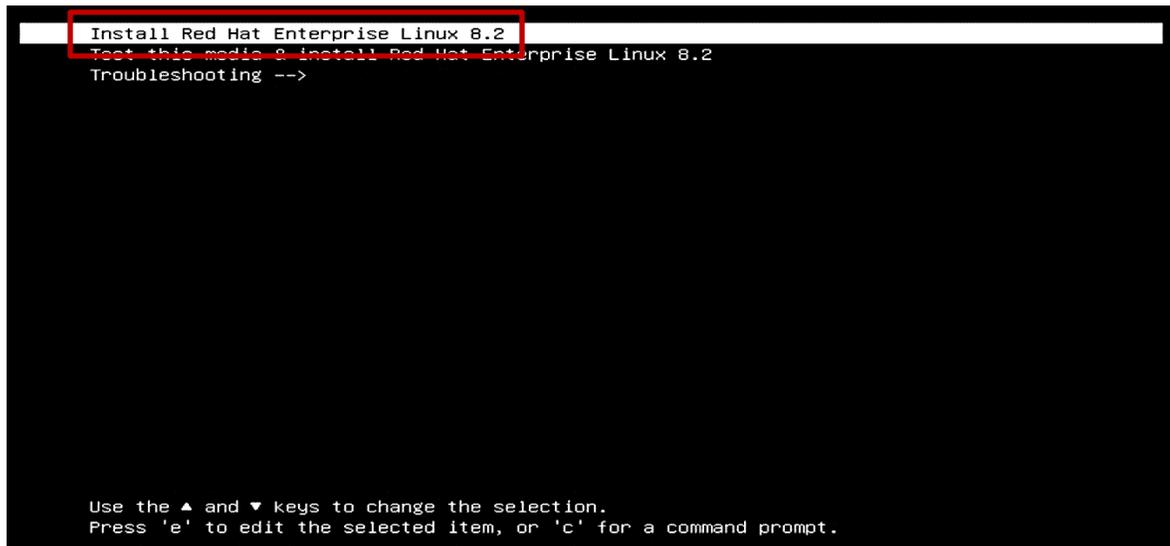
A black rectangular splash screen with the white "Lenovo" logo centered in the middle.

Lenovo™

- Select the Linux bootable installation media from the Startup Device Menu.



- Select the “Install Red Hat Enterprise Linux 8.2” option from the GRUB boot menu, and press ‘e’.



- Add the following lines to the end of the Linux kernel command parameter and press CTRL-X.

*“inst.dd modprobe.blacklist=ahci modprobe.blacklist=nvme nomodeset”*

```
setparams 'Install Red Hat Enterprise Linux 8.2'

linuxefi /images/pxeboot/vmlinuz inst.stage2=hd:LABEL=RHEL-8-2-0- quiet inst.dd modprobe.b\
lacklist=ahci modprobe.blacklist=nvme nomodeset_
initrdefi /images/pxeboot/initrd.img
```

- At the “Driver Disk Device Selection” menu, insert the USB flash drive with the Linux AMD RAID driver iso file into a USB port of the system. Press “r” to refresh the menu options.

```
(Page 1 of 0) Driver disk device selection
  /DEVICE  TYPE      LABEL          UUID
# to select, 'r'-refresh, or 'c'-continue: r
```

- Enter the number for the USB flash drive containing the Linux AMD RAID driver.

In this example, number two was the option for the USB device with the driver. Therefore, the user would input “2” followed by ‘Enter’.

```
(Page 1 of 1) Driver disk device selection
  /DEVICE  TYPE      LABEL          UUID
  1) sda1   vfat        RHEL-8-2-0-    B4EE-306F
  2) sdb1   vfat        RHEL-8-2-0-    2A87-80EC
# to select, 'r'-refresh, or 'c'-continue: 2
```

- Press “1” for the number next to the correct iso file.

```
(Page 1 of 1) Choose driver disk ISO file
  1) /media/DD-2/dd-rcraid-RHEL8-4.18.0-193.el8.x86_64.iso
# to select, or 'c'-continue: 1
```

- Press “1” again to toggle the section for the \*.rpm file.

```
(Page 1 of 1) Select drivers to install
  1) [ ] /media/DD-3/rpms/x86_64/kmod-rcraid-9.3.0-4.18.0.193.el8.x86_64.x86_64.rpm
# to toggle selection, or 'c'-continue: 1
```

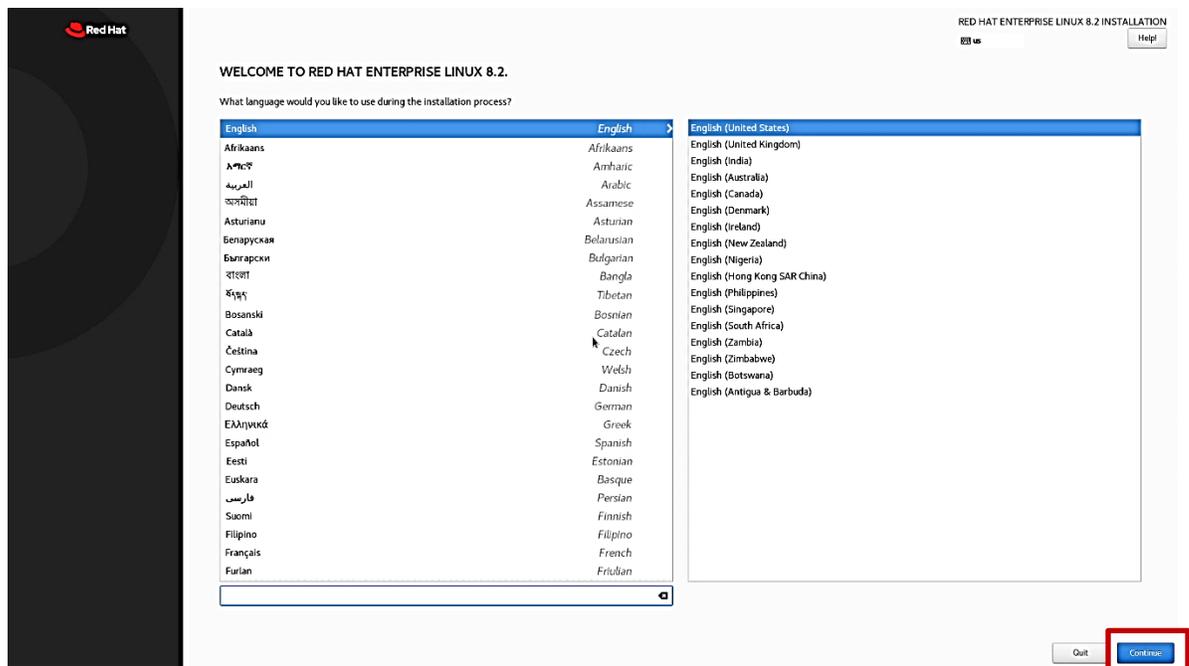
- Press “C” to continue loading the driver.

```
(Page 1 of 1) Select drivers to install
1) [x] /media/DD-3/rpms/x86_64/kmod-rcraid-9.3.0-4.18.0.193.el8.x86_64.x86_64.rpm
# to toggle selection, or 'c'-continue: c
```

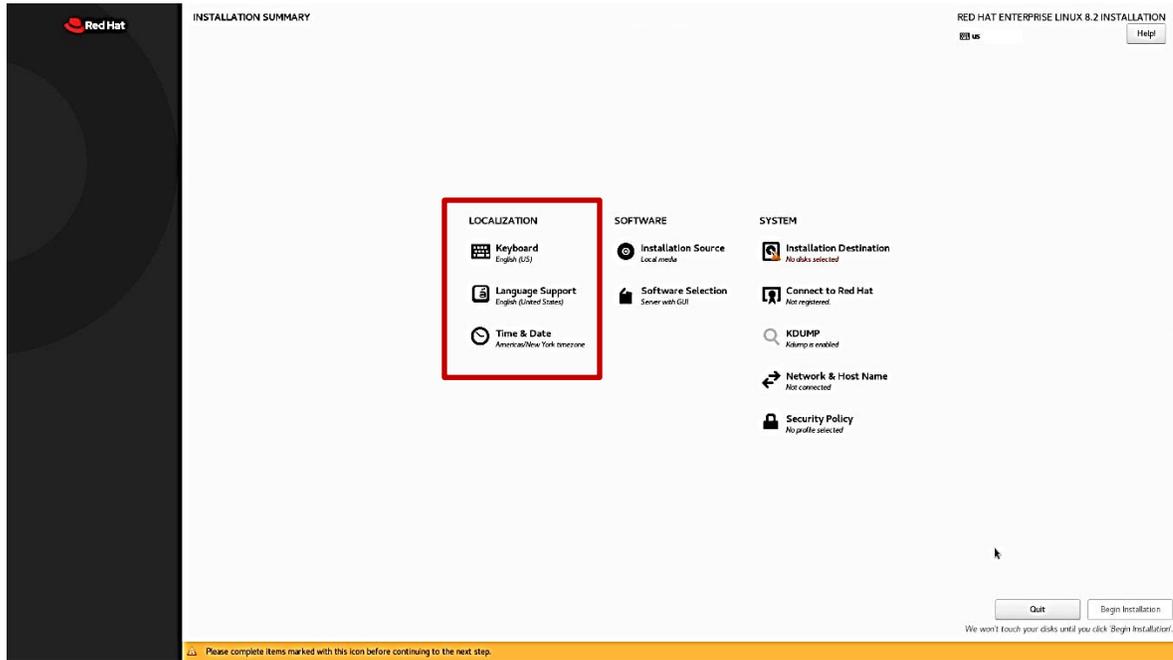
- Press “C” again to continue with the installation.

```
(Page 1 of 1) Driver disk device selection
/DEVICE TYPE LABEL UUID
1) sda1 vfat RHEL-8-2-0- B4EE-306F
2) sdb1 vfat 2A87-80EC
# to select, 'r'-refresh, or 'c'-continue: c
```

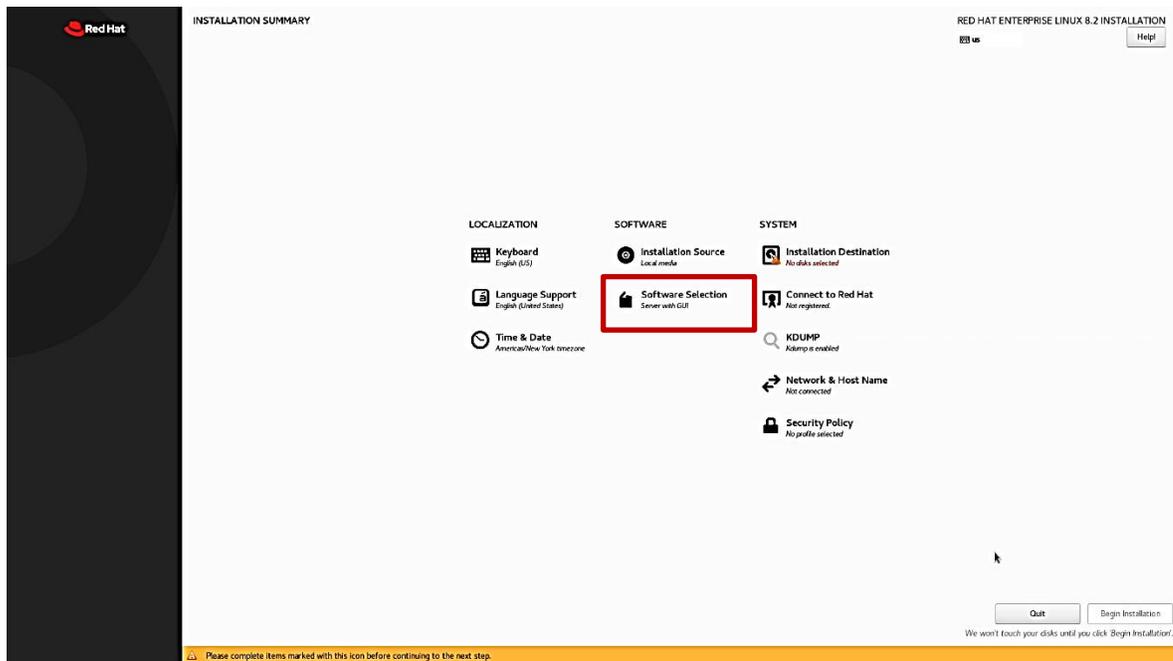
- The Red Hat Enterprise Linux Welcome Screen should appear. Select the appropriate language and “Continue”.



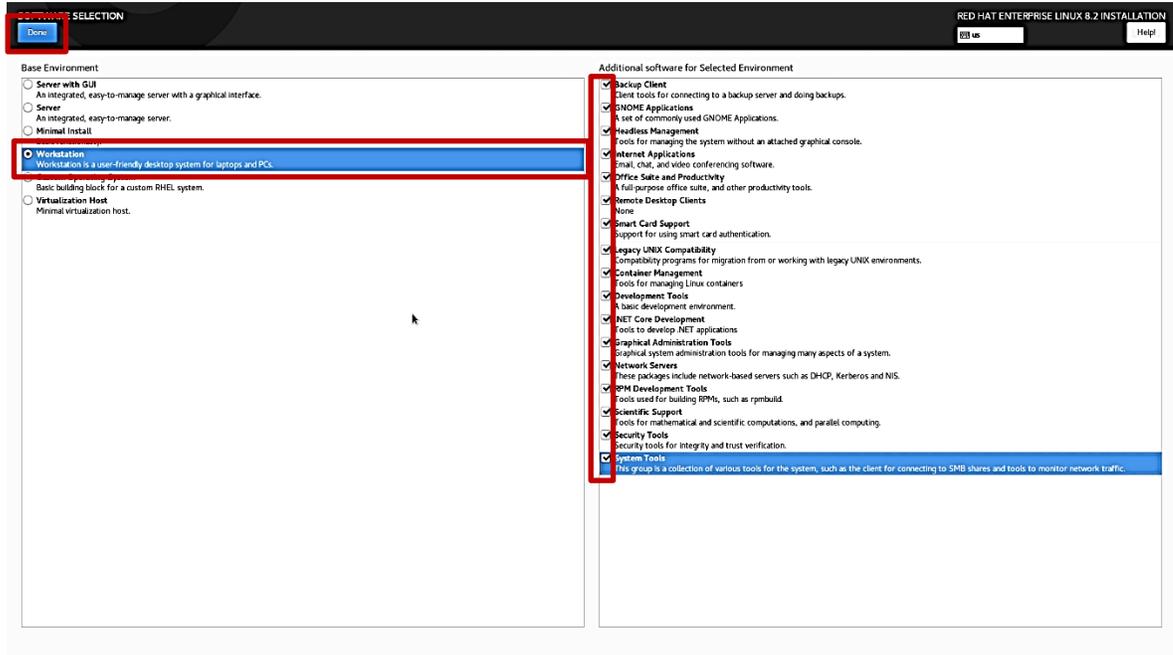
- Adjust the “Keyboard”, “Language Support”, and “Time & Date” accordingly by selecting each one. Or, leave the default settings.



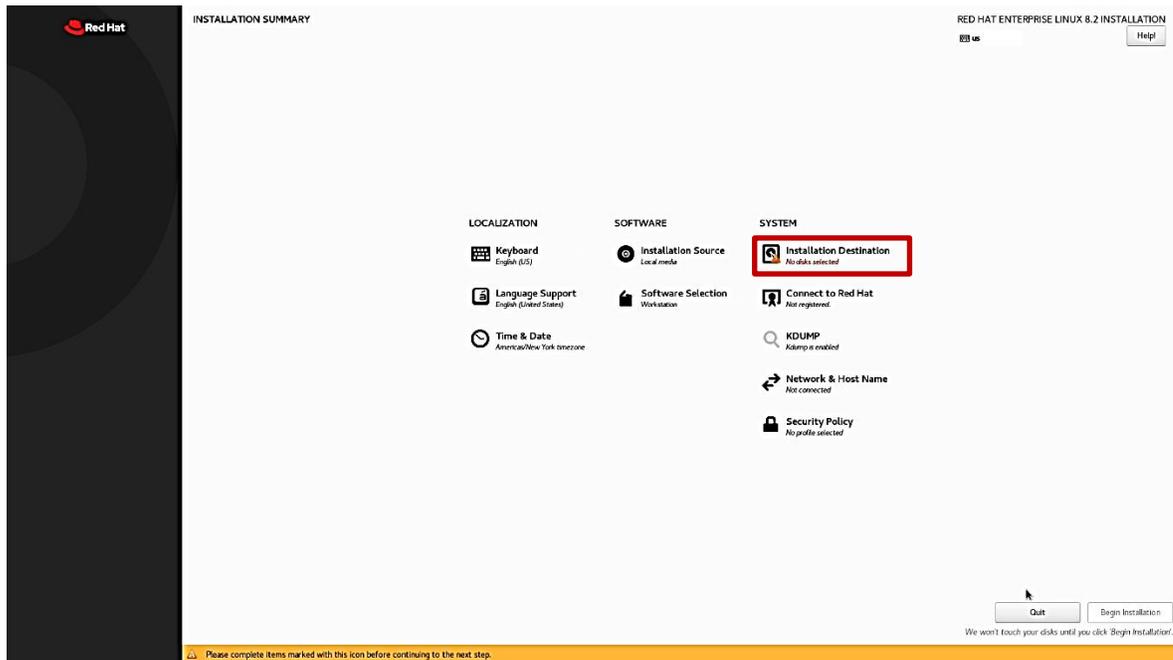
- Select the “Software Selection” and choose the type of software to install.



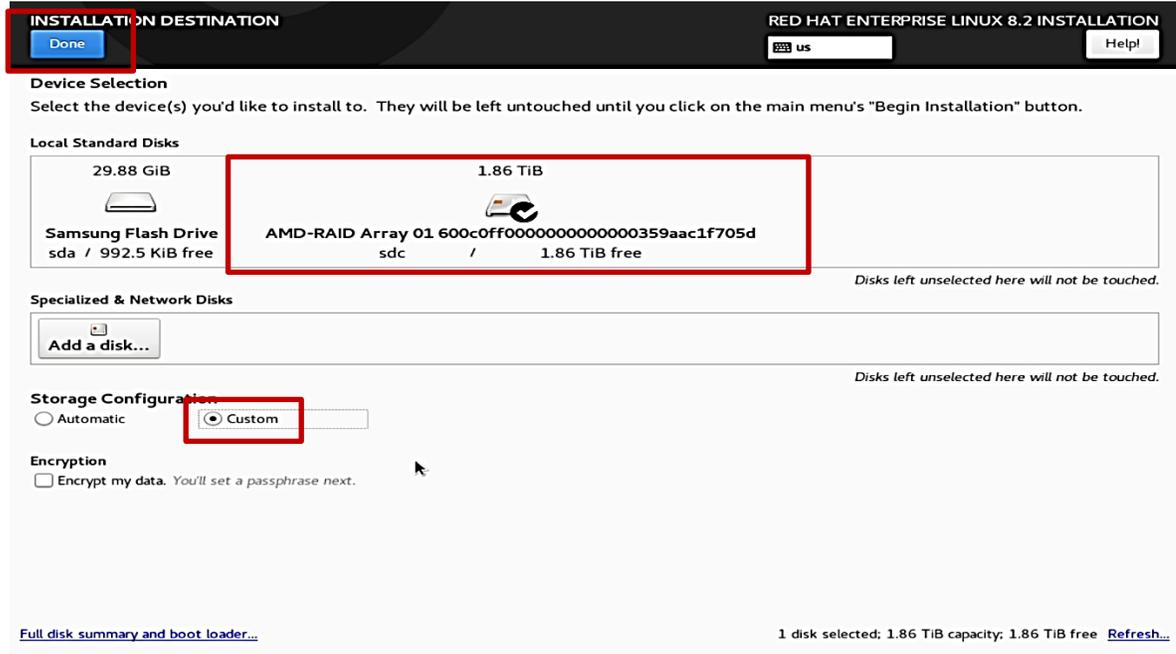
- Select the type of “Base Environment” as well as each “Add-Ons” to install. In this example, “Workstation” was selected for the “Base Environment” and all “Add-Ons” were selected.



- Select “Installation Destination”.



- Select the “AMD-RAID Array 01” under “Local Standard Disks”, “Custom” under the “Storage Configuration”, and “Done” in the upper left corner.



**INSTALLATION DESTINATION** RED HAT ENTERPRISE LINUX 8.2 INSTALLATION

[Done](#) [Help!](#)

**Device Selection**  
Select the device(s) you'd like to install to. They will be left untouched until you click on the main menu's "Begin Installation" button.

**Local Standard Disks**

29.88 GiB Samsung Flash Drive sda / 992.5 KiB free	1.86 TiB AMD-RAID Array 01 600c0ff000000000000359aac1f705d sdc / 1.86 TiB free
--	--

*Disks left unselected here will not be touched.*

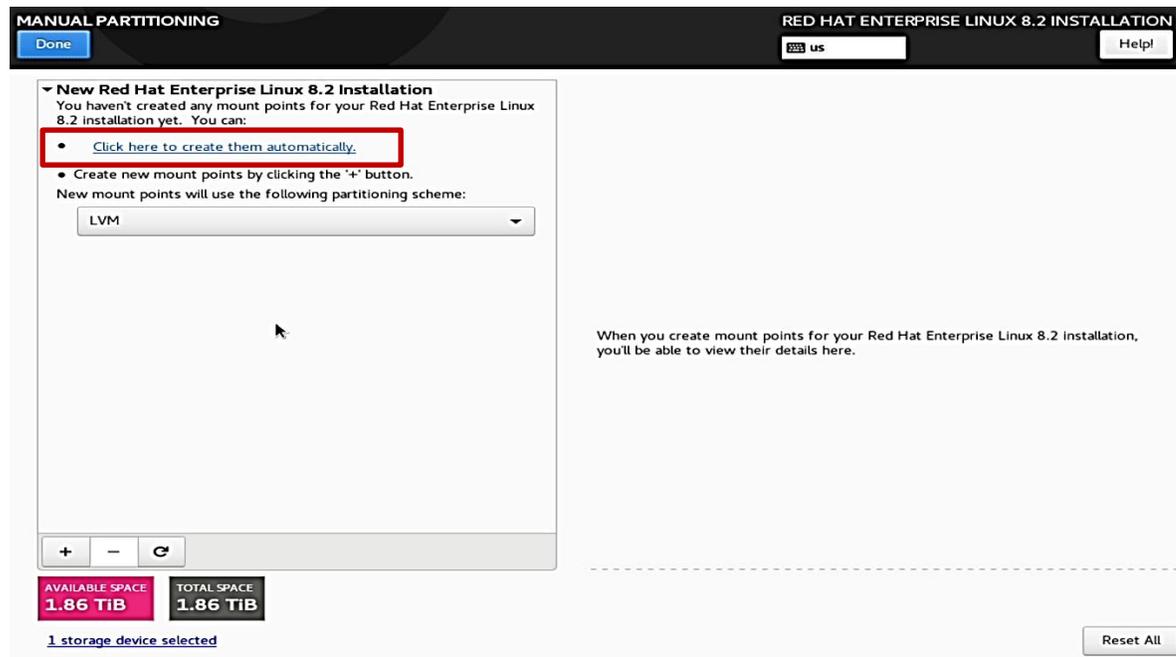
**Specialized & Network Disks**  
[Add a disk...](#)  
*Disks left unselected here will not be touched.*

**Storage Configuration**  
 Automatic  
 Custom

**Encryption**  
 Encrypt my data. You'll set a passphrase next.

[Full disk summary and boot loader...](#) 1 disk selected; 1.86 TiB capacity; 1.86 TiB free [Refresh...](#)

- Select the link “Click here to create them automatically”.



**MANUAL PARTITIONING** RED HAT ENTERPRISE LINUX 8.2 INSTALLATION

[Done](#) [Help!](#)

**New Red Hat Enterprise Linux 8.2 Installation**  
You haven't created any mount points for your Red Hat Enterprise Linux 8.2 installation yet. You can:

- [Click here to create them automatically.](#)
- Create new mount points by clicking the '+' button.

New mount points will use the following partitioning scheme:  
LVM

When you create mount points for your Red Hat Enterprise Linux 8.2 Installation, you'll be able to view their details here.

[+](#) [-](#) [↻](#)

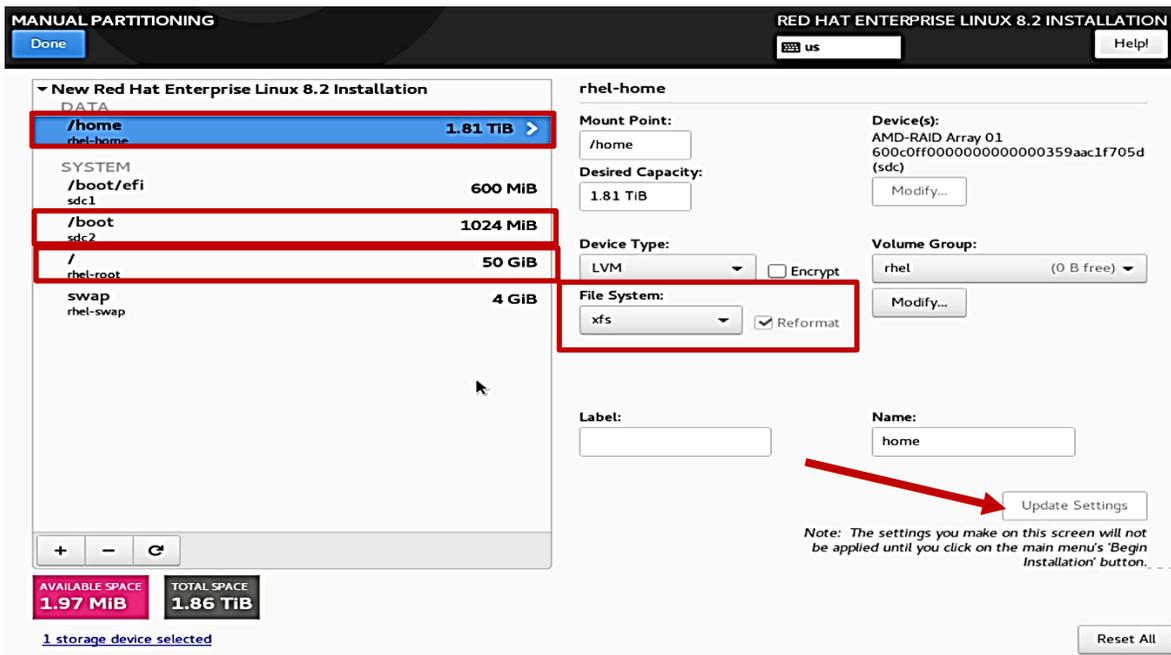
**AVAILABLE SPACE** 1.86 TiB **TOTAL SPACE** 1.86 TiB

[1 storage device selected](#) [Reset All](#)

- Select each of the following partitions and change the file system type from “xfs” to “ext4”.
  - DATA -> /home
  - SYSTEM -> /boot
  - SYSTEM -> /rhel-root

**Note:** When you change the File System for each partition, you must select the “Update Settings” option for each one.

When finished, select the “Done” option in the upper left corner.



**MANUAL PARTITIONING** RED HAT ENTERPRISE LINUX 8.2 INSTALLATION

Done us Help

▼ New Red Hat Enterprise Linux 8.2 Installation

**DATA**

- /home** 1.81 TiB
- rhel-home

**SYSTEM**

- /boot/efi** 600 MiB
- sdcl
- /boot** 1024 MiB
- sdcl
- /** 50 GiB
- rhel-root
- swap
- rhel-swap

rhel-home

Mount Point: /home

Desired Capacity: 1.81 TiB

Device(s): AMD-RAID Array 01 600c0ff000000000000000359aac1f705d (sdc)

Device Type: LVM  Encrypt

File System: xfs  Reformat

Volume Group: rhel (0 B free)

Label:

Name: home

Update Settings

Note: The settings you make on this screen will not be applied until you click on the main menu's 'Begin Installation' button.

Reset All

AVAILABLE SPACE: 1.97 MiB TOTAL SPACE: 1.86 TiB

1 storage device selected

- Select “Accept Changes”.

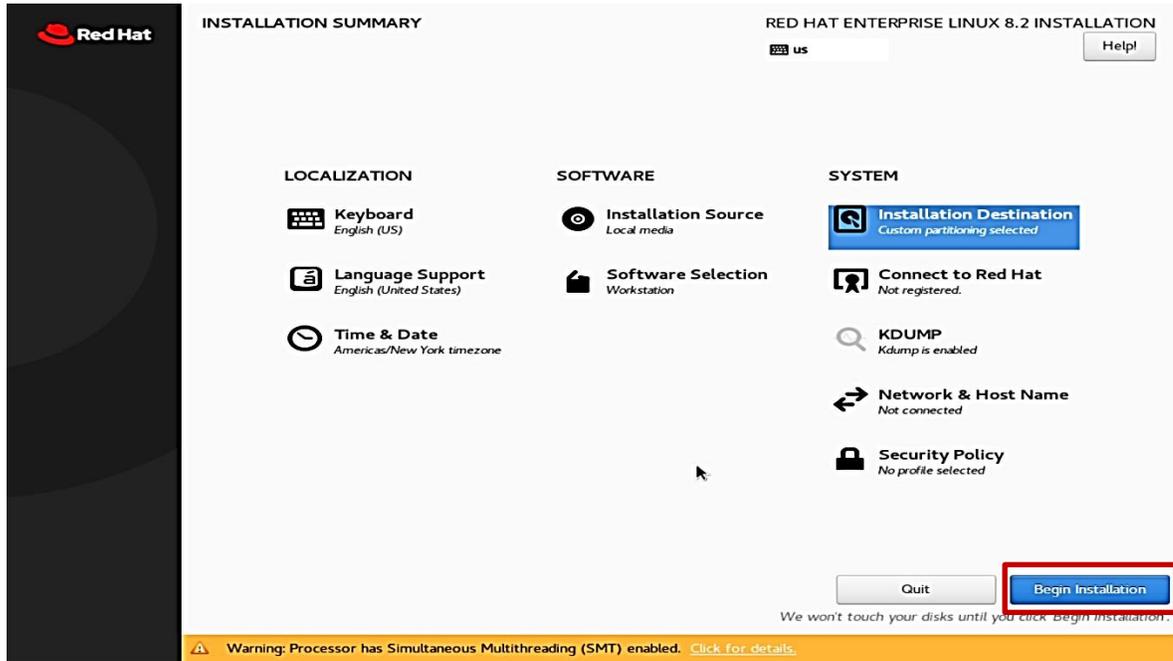
**SUMMARY OF CHANGES**

Your customizations will result in the following changes taking effect after you return to the main menu and begin installation:

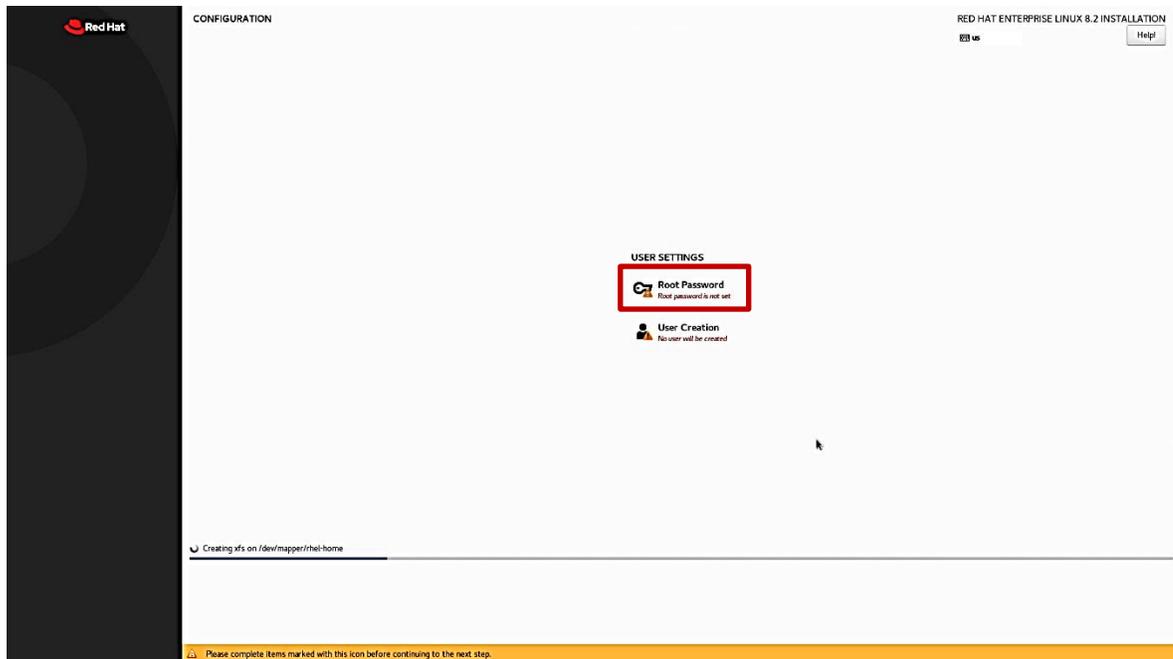
Order	Action	Type	Device	Mount Point
1	Destroy Format	Unknown	AMD-RAID Array 01 600c0ff000000000000000359aac1f705d (sdc)	
2	Create Format	partition table (GPT)	AMD-RAID Array 01 600c0ff000000000000000359aac1f705d (sdc)	
3	Create Device	partition	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	
4	Create Format	EFI System Partition	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	/boot/efi
5	Create Device	partition	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	
6	Create Device	partition	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	
7	Create Format	ext4	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	/boot
8	Create Format	physical volume (LVM)	sdcl on AMD-RAID Array 01 600c0ff000000000000000359aac1f705d	
9	Create Device	lvmlv	rhel	
10	Create Device	lvmlv	rhel-swap	
11	Create Format	swap	rhel-swap	
12	Create Device	lvmlv	rhel-home	

Cancel & Return to Custom Partitioning **Accept Changes**

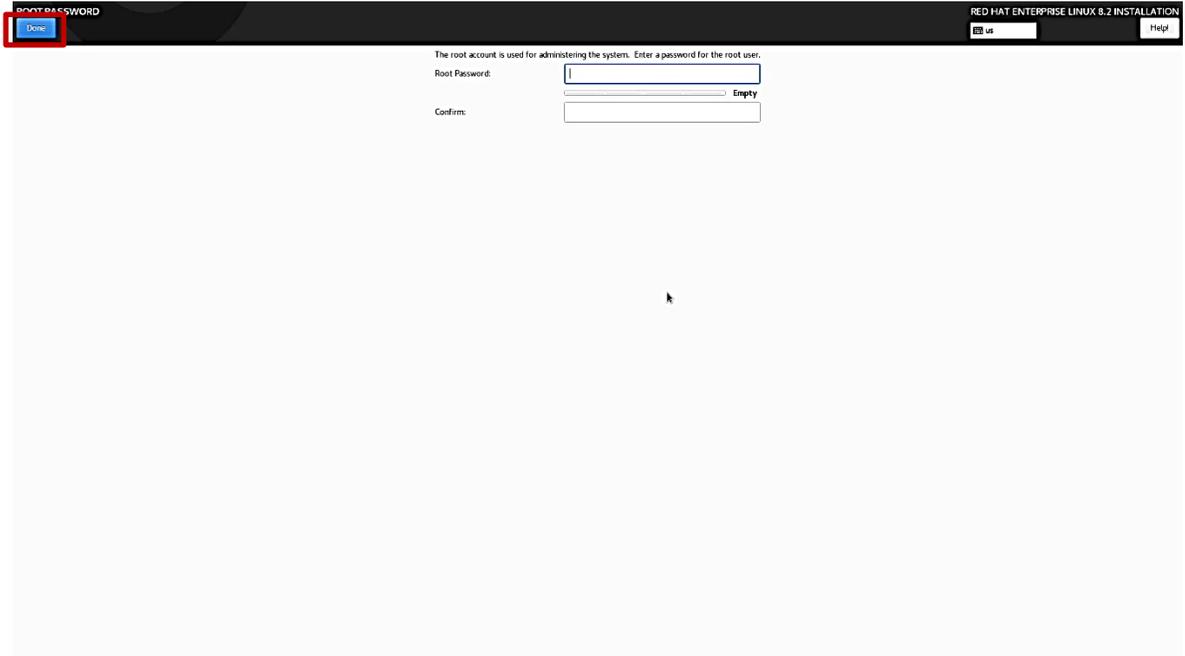
- Select “Begin Installation”.



- Select “Root Password”.



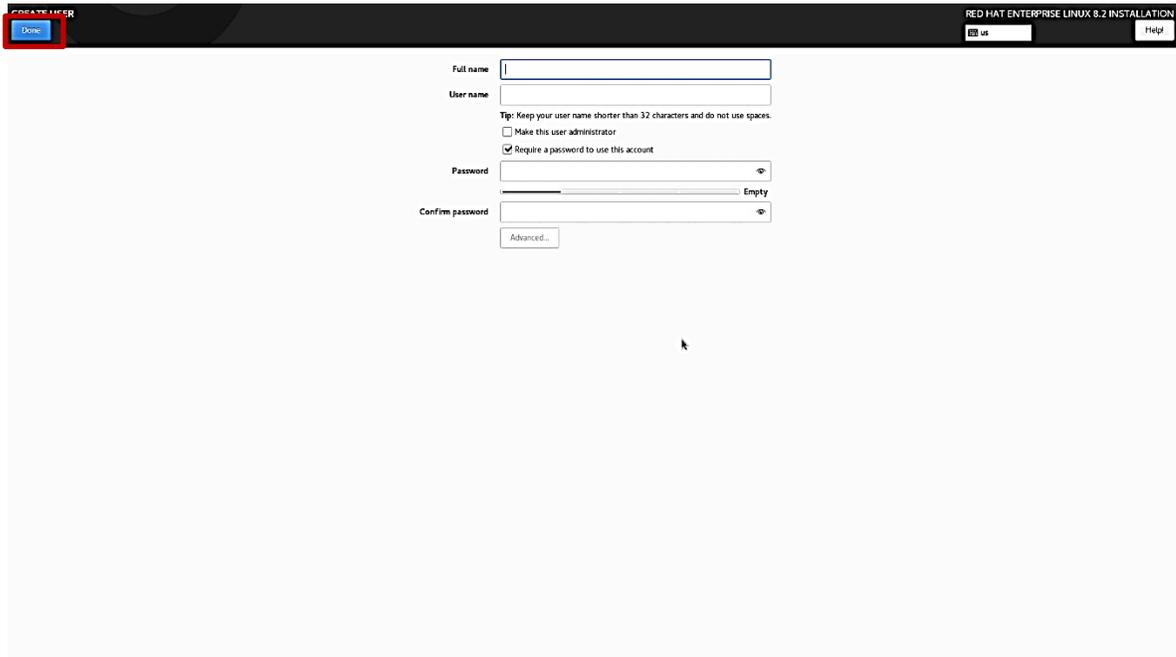
- Enter a root password in both boxes below and select “Done” in the upper left.



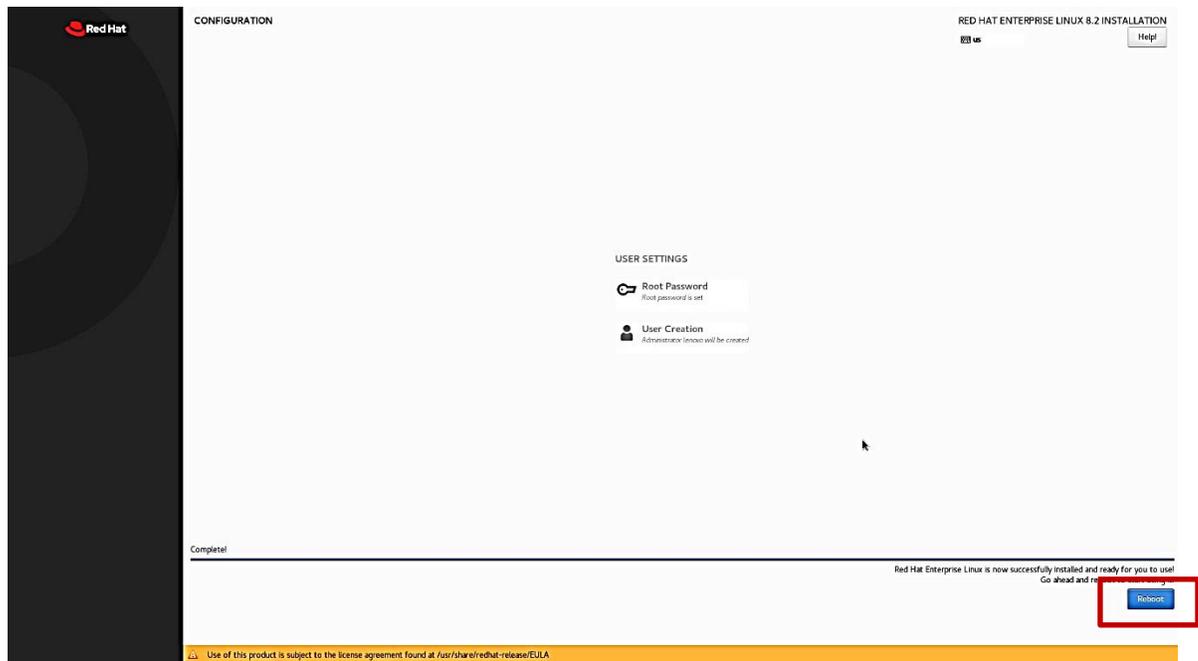
- Select “User Creation”.



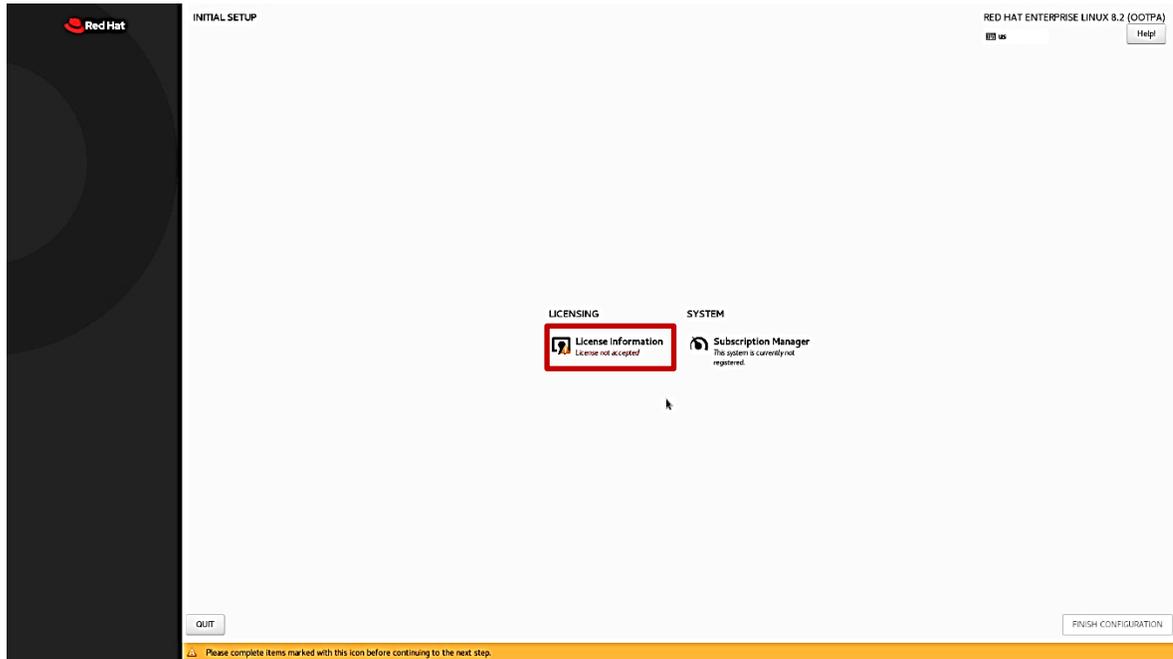
- Fill in the appropriate boxes below and select “Done” in the upper left.



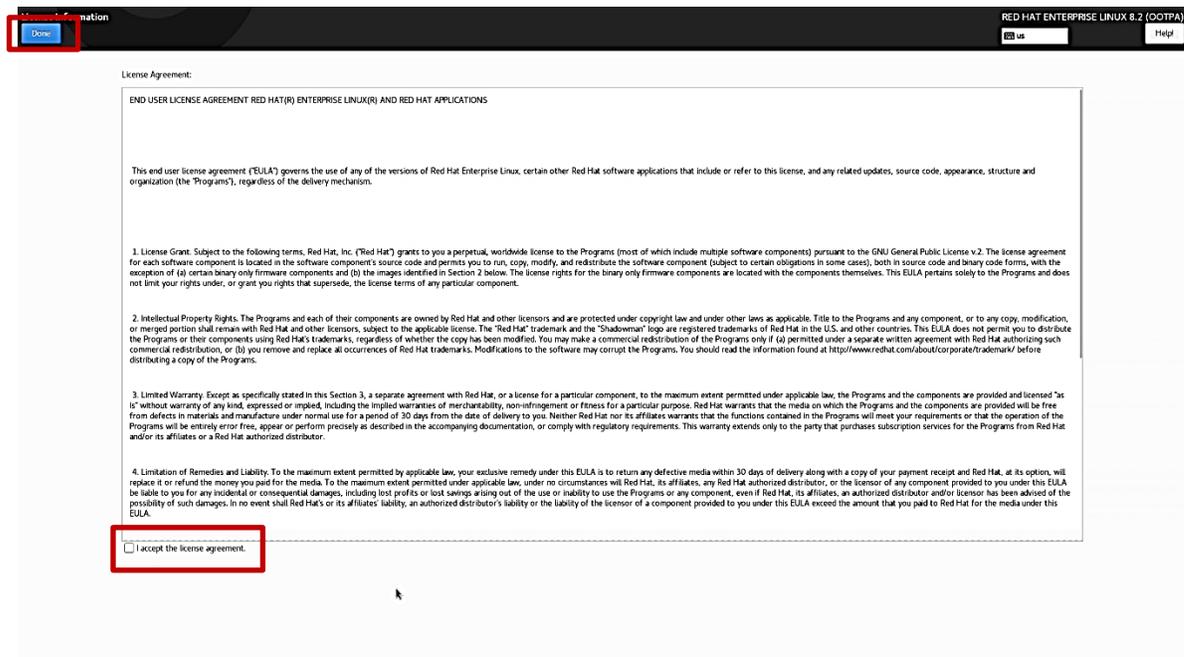
- Once the installation completes, select the “Reboot” option.



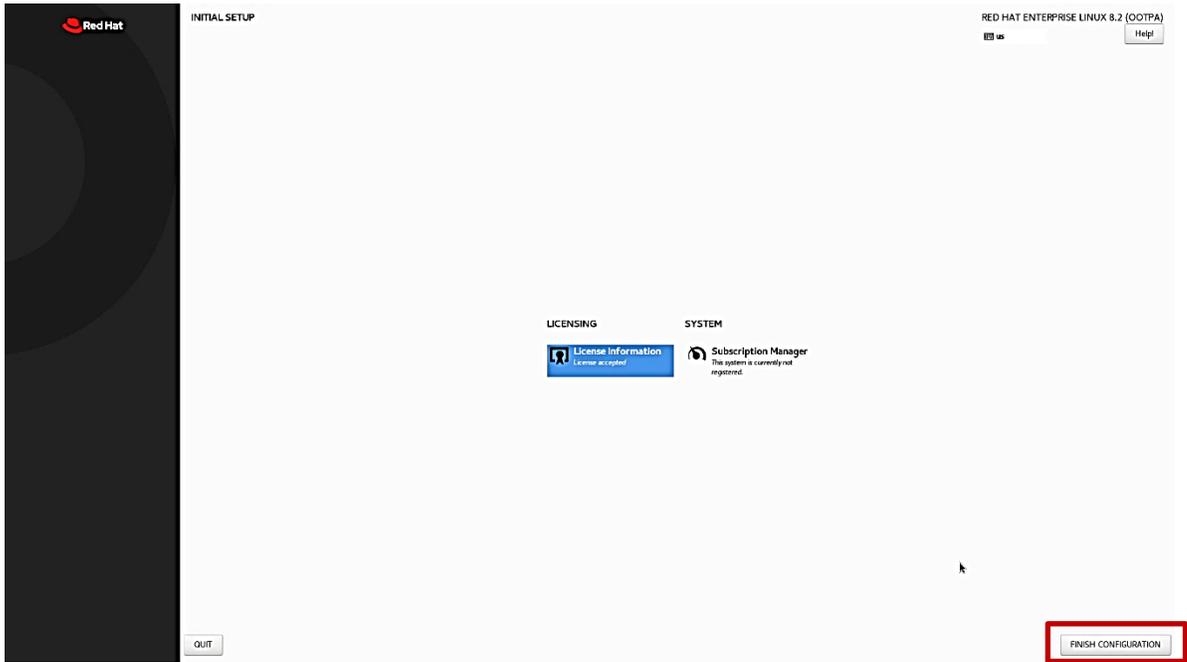
- Select the “License Information” box.



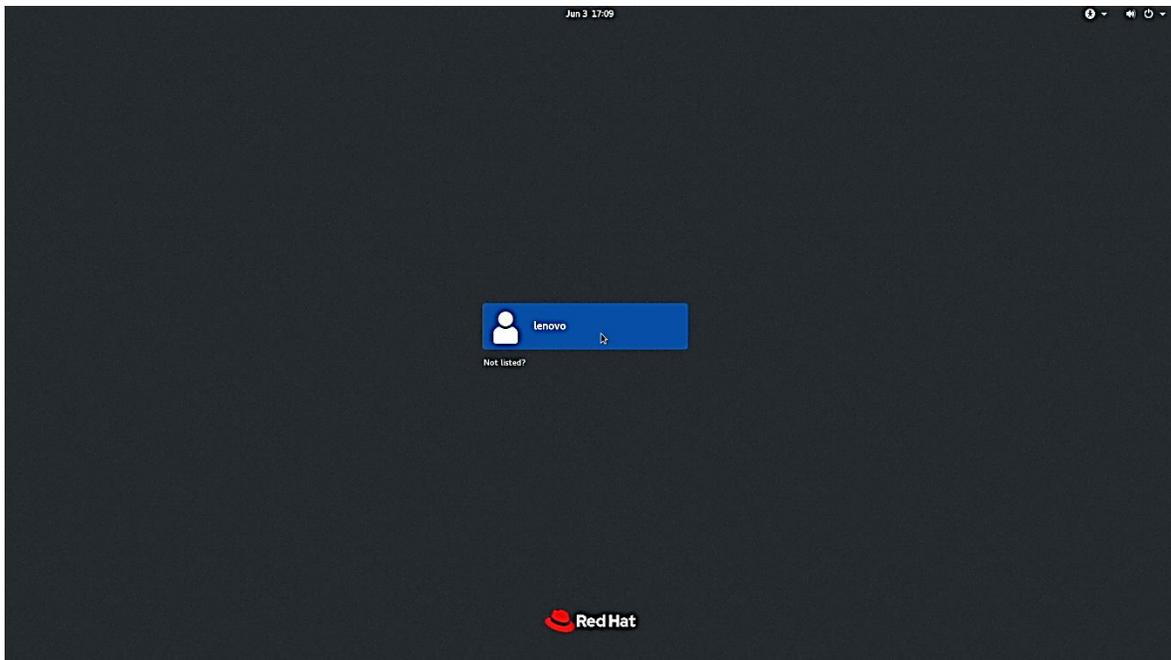
- Select the box at the bottom left of the “License Agreement” page and “Done” in the upper left.



- Select “FINISH CONFIGURATION”.



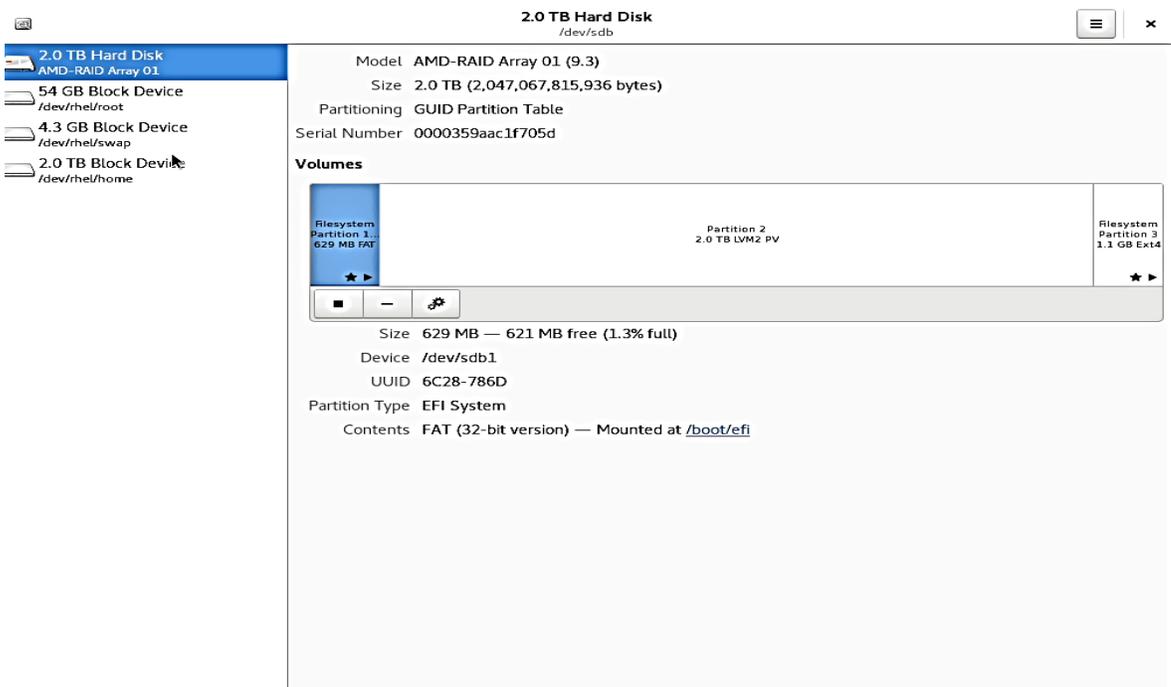
- Log in to the Linux Desktop using the login credentials created above.



- Red Hat Enterprise Linux 8 Desktop screen.



- Disk Configuration Utility.



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## Section 4 – RAIDXpert2 Management Application

*Optional:* AMD has a RAIDXpert2 Management Application for AMD RAID arrays. Please refer to the following instructions and screenshots on how to install this AMD management utility on the Lenovo ThinkStation P620.

- Download the Linux AMD RAIDXpert2 Management Application from the Lenovo support site directly onto the Linux desktop.
- Open a terminal window from within the Linux desktop and browse to the correct location path for the driver package.

```
[root@DESKTOP-8CPLKEV RAIDXpert2_RHEL_Ubuntu_Linux_930_00180]# ls
9.3.0-00180_linux RAIDXpert2.tgz rcadm
RAIDXpert2_Linux_installguide.docx ReadMe.rtf
[root@DESKTOP-8CPLKEV RAIDXpert2_RHEL_Ubuntu_Linux_930_00180]#
```

- Extract the contents of the \*.tgz file using the following command:

```
"tar xzvf 9.3.0-00180_linux RAIDXpert2.tgz -C /opt"
```

```
[root@DESKTOP-8CPLKEV RAIDXpert2_RHEL_Ubuntu_Linux_930_00180]# tar xzvf 9.3.0-00180_linux RAIDXpert2.tgz -C /opt
```

- Change directory path to where the package was extracted to from above:

```
"cd /opt/RAIDXpert2/bin"
```

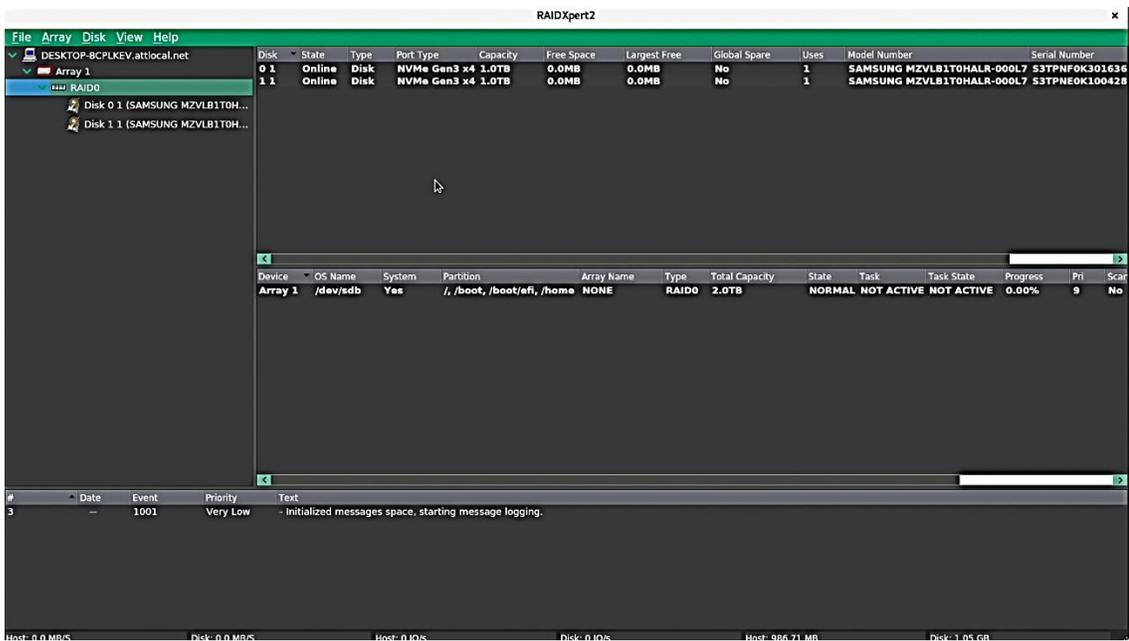
```
[root@DESKTOP-8CPLKEV RAIDXpert2_RHEL_Ubuntu_Linux_930_00180]# cd /opt/RAIDXpert2/bin
[root@DESKTOP-8CPLKEV bin]# ls
RAIDXpert2 rcadm
```

- To launch the AMD RAIDXpert2 Management Application, run the following command:

`“./RAIDXpert2 &”`

```
[root@DESKTOP-8CPLKEV bin]# ls
RAIDXpert2  rcadm
[root@DESKTOP-8CPLKEV bin]# ./RAIDXpert2 &
```

- RAIDXpert2 Management Application



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## Section 5 – Setting up the *YUM* Repository

In order to download and install packages and other system dependencies, it's a good idea to setup the yum repository. Follow the instructions below to do so.

### → Users with a valid Red Hat Enterprise Linux subscription:

From within the Linux desktop, open a terminal window and run the following Linux commands:

```
# subscription-manager register
```

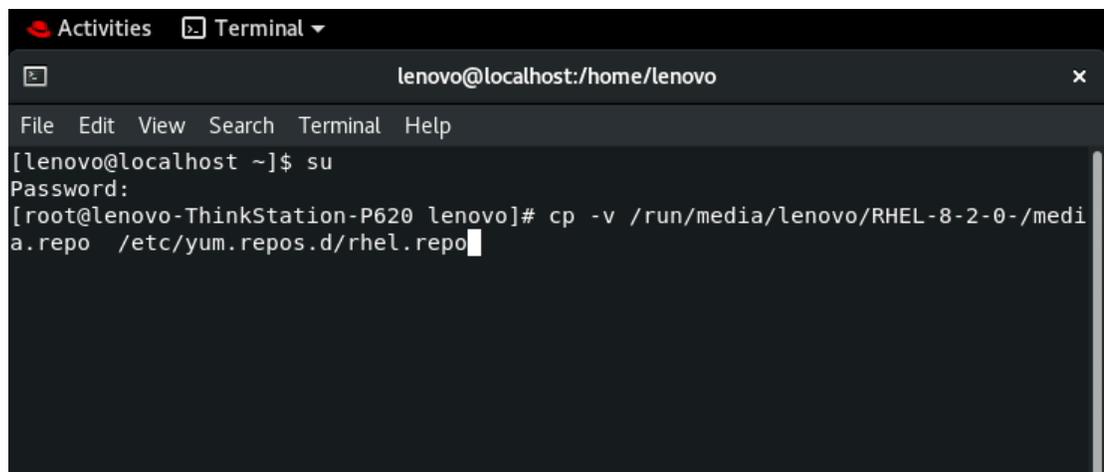
- This will require a valid Red Hat username and password.

```
# subscription-manager subscribe
```

```
# subscription-manager auto-attach
```

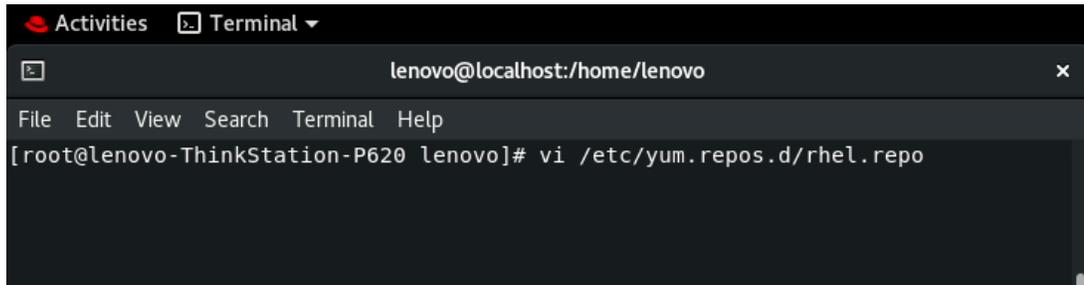
### → Users without a valid Red Hat Enterprise Linux subscription:

- Open a terminal window from within the Linux desktop, login as root, and mount the Red Hat Enterprise Linux installation media within the Linux desktop.
- Copy “media.repo” from the installation source to ‘/etc/yum.repos.d/’ directory.



```
Activities Terminal
lenovo@localhost:~/home/lenovo
File Edit View Search Terminal Help
[lenovo@localhost ~]$ su
Password:
[root@lenovo-ThinkStation-P620 lenovo]# cp -v /run/media/lenovo/RHEL-8-2-0-/media.repo /etc/yum.repos.d/rhel.repo
```

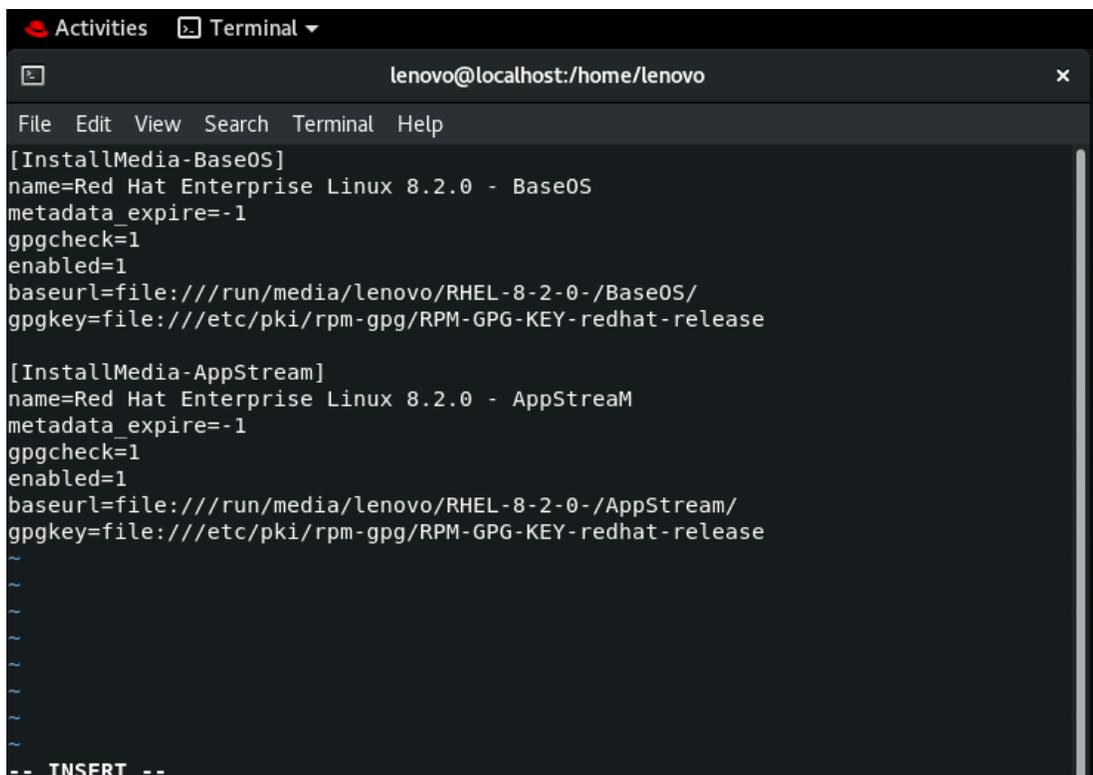
- Using a text editor, edit the *rhel.repo* file copied over from the installation media from the previous step.



```
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
[root@lenovo-ThinkStation-P620 lenovo]# vi /etc/yum.repos.d/rhel.repo
```

- Add the following text into the *rhel.repo* file.

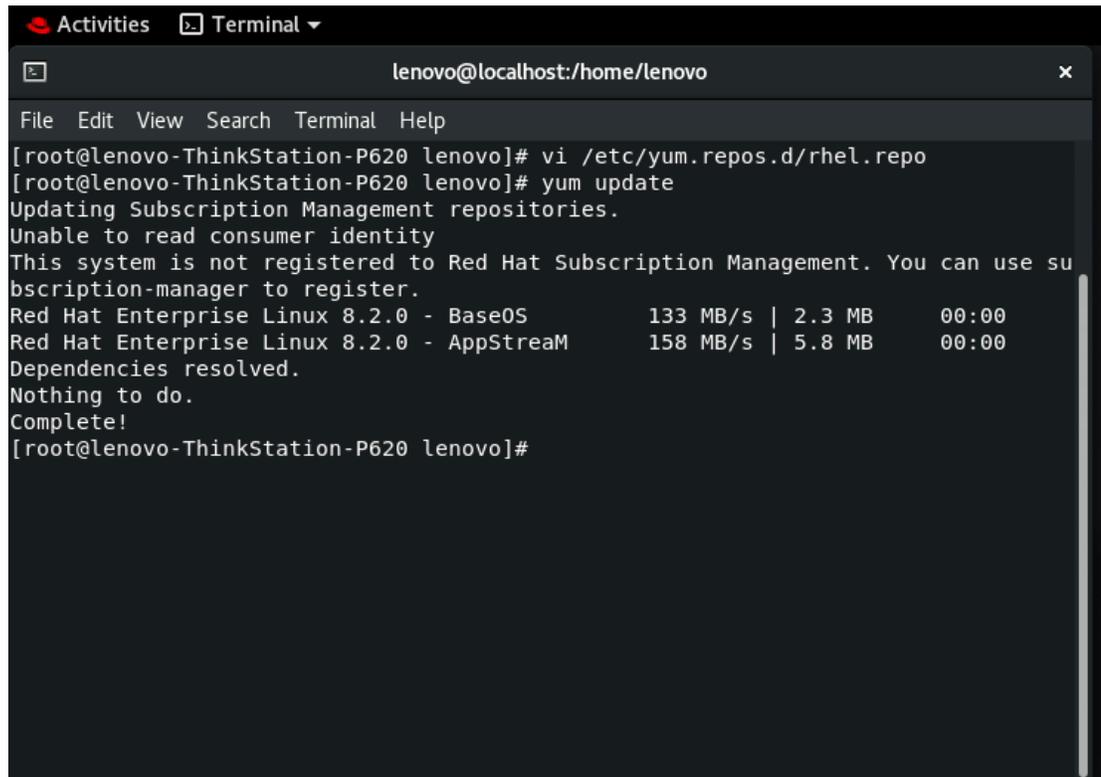
*Note: The “baseurl” lines below may be different depending on the mount location to the installation media.*



```
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
[InstallMedia-BaseOS]
name=Red Hat Enterprise Linux 8.2.0 - BaseOS
metadata_expire=-1
gpgcheck=1
enabled=1
baseurl=file:///run/media/lenovo/RHEL-8-2-0-/BaseOS/
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release

[InstallMedia-AppStream]
name=Red Hat Enterprise Linux 8.2.0 - AppStream
metadata_expire=-1
gpgcheck=1
enabled=1
baseurl=file:///run/media/lenovo/RHEL-8-2-0-/AppStream/
gpgkey=file:///etc/pki/rpm-gpg/RPM-GPG-KEY-redhat-release
~
~
~
~
~
-- INSERT --
```

- Update the repository source list by executing “yum update”.



```
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
[root@lenovo-ThinkStation-P620 lenovo]# vi /etc/yum.repos.d/rhel.repo
[root@lenovo-ThinkStation-P620 lenovo]# yum update
Updating Subscription Management repositories.
Unable to read consumer identity
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Red Hat Enterprise Linux 8.2.0 - BaseOS          133 MB/s | 2.3 MB    00:00
Red Hat Enterprise Linux 8.2.0 - AppStreaM      158 MB/s | 5.8 MB    00:00
Dependencies resolved.
Nothing to do.
Complete!
[root@lenovo-ThinkStation-P620 lenovo]#
```



## Section 6 – Installing the Aquantia LAN Driver

The onboard Aquantia LAN driver is not native to RHEL 8 on Lenovo P620 system. In order to make your LAN working, follow the steps below.

- Navigate to the directory where the Aquantia LAN driver is stored and unzip it.

```
lenovo@localhost:/home/lenovo/Documents/Linux
File Edit View Search Terminal Help
[root@localhost lenovo]# cd Documents/
[root@localhost Documents]# ls
L6ETN02US14WSUSI.zip
[root@localhost Documents]# unzip L6ETN02US14WSUSI.zip
Archive: L6ETN02US14WSUSI.zip
  extracting: atlantic.tar.gz
    inflating: README.txt
  extracting: version.txt
[root@localhost Documents]# ls
atlantic.tar.gz  L6ETN02US14WSUSI.zip  README.txt  version.txt
```

- Untar the “atlantic.tar.gz” file by using the following command.

```
[root@localhost Documents]# tar xzf atlantic.tar.gz
[root@localhost Documents]# ls
atlantic.tar.gz  L6ETN02US14WSUSI.zip  Linux  README.txt  version.txt
[root@localhost Documents]# cd Linux/
[root@localhost Linux]# ls
aq_cfg.h          aq_hw.h           aq_pci_func.h    aq_trace.c       hw_atl2
aq_common.h      aq_hw_utils.c    aq_phy.c         aq_trace.h       Kconfig
aq_compat.c      aq_hw_utils.h    aq_phy.h         aq_tsn.c         macsec
aq_compat.h      aq_macsec.c      aq_ptp.c         aq_tsn.h         Makefile
aq_drvinfo.c     aq_macsec.h      aq_ptp.h         aq_utils.h       README.txt
aq_drvinfo.h     aq_main.c        aq_ring.c        aq_vec.c         release_notes.txt
aq_ethtool.c     aq_main.h        aq_ring.h        aq_vec.h         rpm-src.spec
aq_ethtool.h     aq_nic.c         aq_rss.h         build-deb.sh     ver.h
aq_filters.c     aq_nic.h         aq_sysfs.c       dkms.sh
aq_filters.h     aq_pci_func.c    aq_sysfs.h       hw_atl
```

- Install all prerequisites using the following commands-
  - dnf groupinstall "Development Tools"

```

Activities Terminal
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
Red Hat Enterprise Linux 8.2.0 - BaseOS      133 MB/s | 2.3 MB    00:00
Red Hat Enterprise Linux 8.2.0 - AppStream  158 MB/s | 5.8 MB    00:00
Dependencies resolved.
Nothing to do.
Complete!
[root@lenovo-ThinkStation-P620 lenovo]# dnf groupinstall "Development Tools"
Updating Subscription Management repositories.
Unable to read consumer identity
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Last metadata expiration check: 0:00:33 ago on Wed 03 Jun 2020 05:30:27 PM EDT.
Dependencies resolved.
=====
Package                Architecture      Version           Repository        Size
=====
Installing Groups:
Development Tools

Transaction Summary
=====
Is this ok [y/N]: y
Complete!
[root@lenovo-ThinkStation-P620 lenovo]#

```

- dnf install elfutils-libelf-devel

```

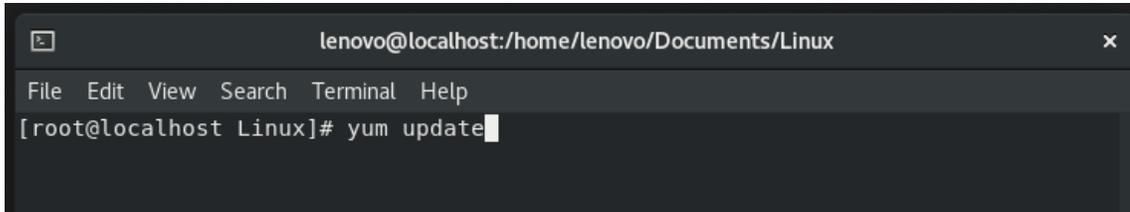
Activities Terminal
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
Is this ok [y/N]: y
Complete!
[root@lenovo-ThinkStation-P620 lenovo]# dnf install elfutils-libelf-devel
Updating Subscription Management repositories.
Unable to read consumer identity
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Last metadata expiration check: 0:01:00 ago on Wed 03 Jun 2020 05:30:27 PM EDT.
Dependencies resolved.
=====
Package                Arch      Version           Repository        Size
=====
Installing:
elfutils-libelf-devel  x86_64   0.178-7.el8      InstallMedia-Base05  58 k
Installing dependencies:
zlib-devel             x86_64   1.2.11-13.el8    InstallMedia-Base05  57 k

Transaction Summary
=====
Install 2 Packages

```

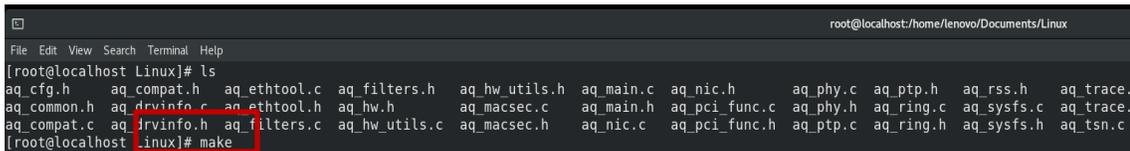
**\*Note:** If you don't have a valid RHEL subscription, install the packages above from the installation media. This will require manual intervention steps to modify the yum repository. See Section 4 above. Once done modifying the yum repository, install "Development Tools" and "elfutils-libelf-devel" as mentioned in the beginning of this step.

- Update the package list with the "yum update" command.



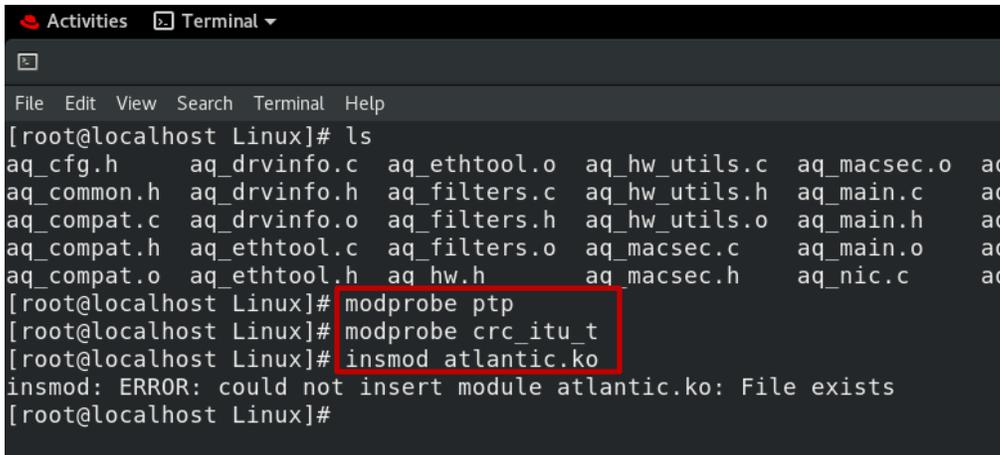
```
lenovo@localhost:/home/lenovo/Documents/Linux
File Edit View Search Terminal Help
[root@localhost Linux]# yum update
```

- Navigate to the Aquantia LAN driver directory and compile the modules inside the "Linux" folder using "make".



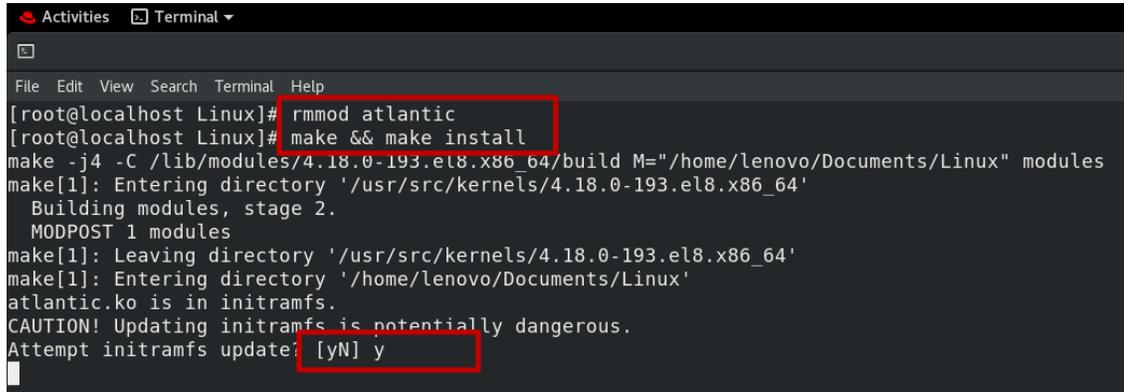
```
root@localhost:/home/lenovo/Documents/Linux
File Edit View Search Terminal Help
[root@localhost Linux]# ls
aq_cfg.h      aq_compat.h  aq_ethtool.c  aq_filters.h  aq_hw_utils.h  aq_main.c    aq_nic.h      aq_phy.c      aq_ptp.h      aq_rss.h      aq_trace.
aq_common.h  aq_drvinfo.c aq_ethtool.h  aq_hw.h       aq_macsec.c    aq_main.h    aq_pci_func.c aq_phy.h      aq_ring.c    aq_sysfs.c    aq_trace.
aq_compat.c  aq_drvinfo.h aq_filters.c  aq_hw_utils.c aq_macsec.h    aq_nic.c     aq_pci_func.h aq_ptp.c      aq_ring.h    aq_sysfs.h    aq_tsn.c
[root@localhost Linux]# make
```

- Load the dependencies and the module using the following list of commands-  
 modprobe ptp  
 modprobe crc\_itu\_t  
 insmod atlantic.ko



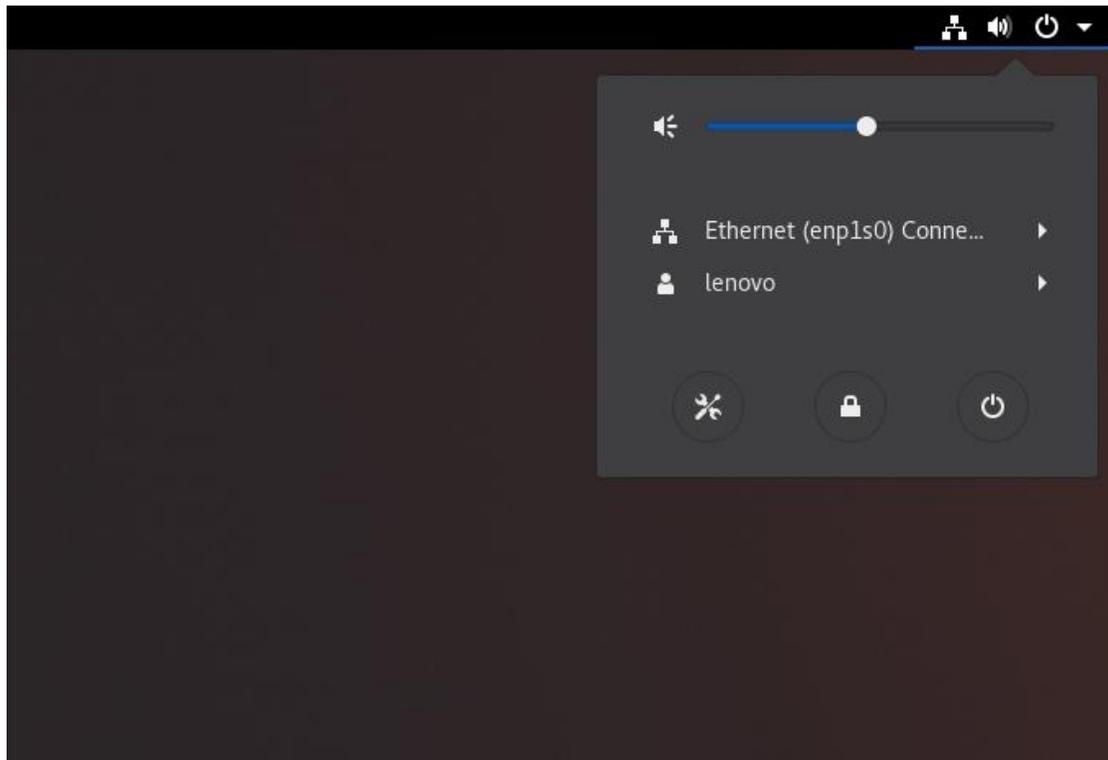
```
Activities Terminal
File Edit View Search Terminal Help
[root@localhost Linux]# ls
aq_cfg.h      aq_drvinfo.c  aq_ethtool.o  aq_hw_utils.c  aq_macsec.o  aq
aq_common.h  aq_drvinfo.h  aq_filters.c  aq_hw_utils.h  aq_main.c    aq
aq_compat.c  aq_drvinfo.o  aq_filters.h  aq_hw_utils.o  aq_main.h    aq
aq_compat.h  aq_ethtool.c  aq_filters.o  aq_macsec.c    aq_main.o    aq
aq_compat.o  aq_ethtool.h  aq_hw.h       aq_macsec.h    aq_nic.c     aq
[root@localhost Linux]# modprobe ptp
[root@localhost Linux]# modprobe crc_itu_t
[root@localhost Linux]# insmod atlantic.ko
insmod: ERROR: could not insert module atlantic.ko: File exists
[root@localhost Linux]#
```

- Unload and install the driver in the system using “rmmod atlantic” and “make && make install” commands. Type “y” for yes for attempting initramfs update.



```
Activities Terminal
File Edit View Search Terminal Help
[root@localhost Linux]# rmmod atlantic
[root@localhost Linux]# make && make install
make -j4 -C /lib/modules/4.18.0-193.el8.x86_64/build M="/home/lenovo/Documents/Linux" modules
make[1]: Entering directory '/usr/src/kernels/4.18.0-193.el8.x86_64'
Building modules, stage 2.
MODPOST 1 modules
make[1]: Leaving directory '/usr/src/kernels/4.18.0-193.el8.x86_64'
make[1]: Entering directory '/home/lenovo/Documents/Linux'
atlantic.ko is in initramfs.
CAUTION! Updating initramfs is potentially dangerous.
Attempt initramfs update: [yN] y
```

- Reboot the system or run the command “modprobe atlantic” and verify if the LAN is working.



- To check your IP from the terminal window, run the command “ip addr” or “ifconfig -a”.

```
lenovo@localhost:~  
File Edit View Search Terminal Help  
inet6 ::1/128 scope host  
    valid_lft forever preferred_lft forever  
2: enp34s0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc mq state DOWN group default qlen 1000  
    link/ether 00:17:b6:00:a7:55 brd ff:ff:ff:ff:ff:ff  
3: enp1s0: <BROADCAST,MULTICAST,UP,LOWER_UP> mtu 1500 qdisc mq state UP group default qlen 1000  
    link/ether 00:17:b6:00:00:00 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.1.38/24 brd 192.168.1.255 scope global dynamic noprefixroute enp1s0  
        valid_lft 259182sec preferred_lft 259182sec  
    inet6 2606:a000:111a:c656::1e/128 scope global dynamic noprefixroute  
        valid_lft 604780sec preferred_lft 604780sec  
    inet6 2606:a000:111a:c656:f28c:8386:96d3:12ef/64 scope global dynamic noprefixroute  
        valid_lft 604764sec preferred_lft 604764sec  
    inet6 fe80::60bf:6b93:3bc0:ee0f/64 scope link noprefixroute  
        valid_lft forever preferred_lft forever  
4: virbr0: <NO-CARRIER,BROADCAST,MULTICAST,UP> mtu 1500 qdisc noqueue state DOWN group default qlen 1000  
    link/ether 52:54:00:37:0b:93 brd ff:ff:ff:ff:ff:ff  
    inet 192.168.122.1/24 brd 192.168.122.255 scope global virbr0  
        valid_lft forever preferred_lft forever  
5: virbr0-nic: <BROADCAST,MULTICAST> mtu 1500 qdisc fq_codel master virbr0 state
```



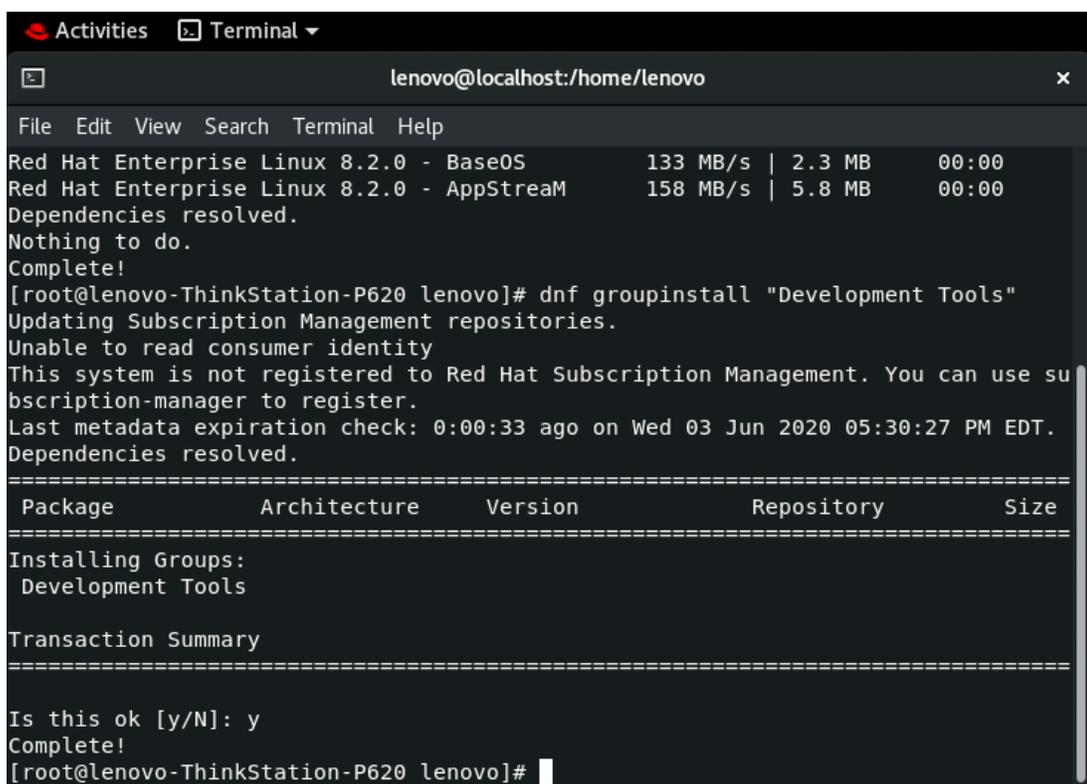
---

## Section 7 – Installing the Nvidia Graphics Driver

In order to get optimal performance out of the Nvidia GPU, it is a good idea to install the proprietary Nvidia graphics driver. Follow the instructions below to do so.

- Download the latest Nvidia graphics driver for the appropriate Nvidia GPU from [here](#).
- Install all prerequisites using the following commands:

```
# dnf groupinstall "Development Tools"
```



```
Activities Terminal
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
Red Hat Enterprise Linux 8.2.0 - BaseOS 133 MB/s | 2.3 MB 00:00
Red Hat Enterprise Linux 8.2.0 - AppStream 158 MB/s | 5.8 MB 00:00
Dependencies resolved.
Nothing to do.
Complete!
[root@lenovo-ThinkStation-P620 lenovo]# dnf groupinstall "Development Tools"
Updating Subscription Management repositories.
Unable to read consumer identity
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Last metadata expiration check: 0:00:33 ago on Wed 03 Jun 2020 05:30:27 PM EDT.
Dependencies resolved.
=====
Package Architecture Version Repository Size
=====
Installing Groups:
Development Tools
Transaction Summary
=====
Is this ok [y/N]: y
Complete!
[root@lenovo-ThinkStation-P620 lenovo]#
```

```
# dnf install elfutils-libelf-devel
```

```

Activities Terminal
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
Is this ok [y/N]: y
Complete!
[root@lenovo-ThinkStation-P620 lenovo]# dnf install elfutils-libelf-devel
Updating Subscription Management repositories.
Unable to read consumer identity
This system is not registered to Red Hat Subscription Management. You can use su
bscription-manager to register.
Last metadata expiration check: 0:01:00 ago on Wed 03 Jun 2020 05:30:27 PM EDT.
Dependencies resolved.
=====
Package                Arch      Version      Repository      Size
=====
Installing:
elfutils-libelf-devel  x86_64    0.178-7.el8  InstallMedia-Base05  58 k
Installing dependencies:
zlib-devel             x86_64    1.2.11-13.el8  InstallMedia-Base05  57 k
Transaction Summary
=====
Install 2 Packages

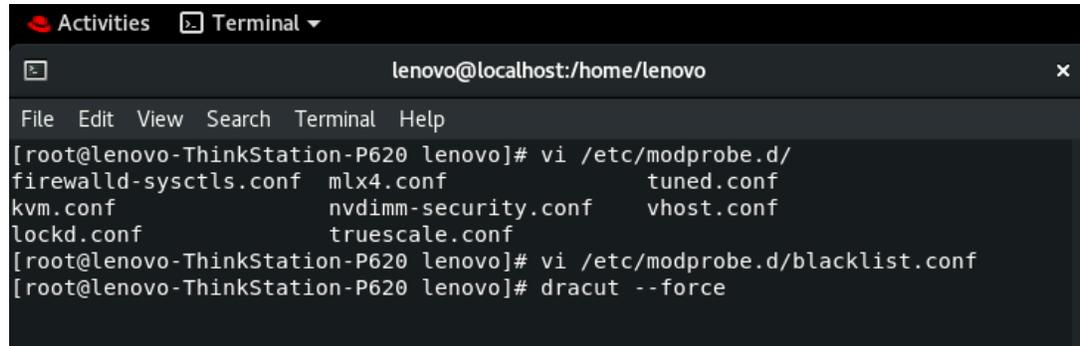
```

**Note:** If you do not have a valid RHEL subscription, then install the packages above from the Red Hat Enterprise Linux installation media. This will likely require manual intervention steps to modify the yum repository. See Section 4 above.



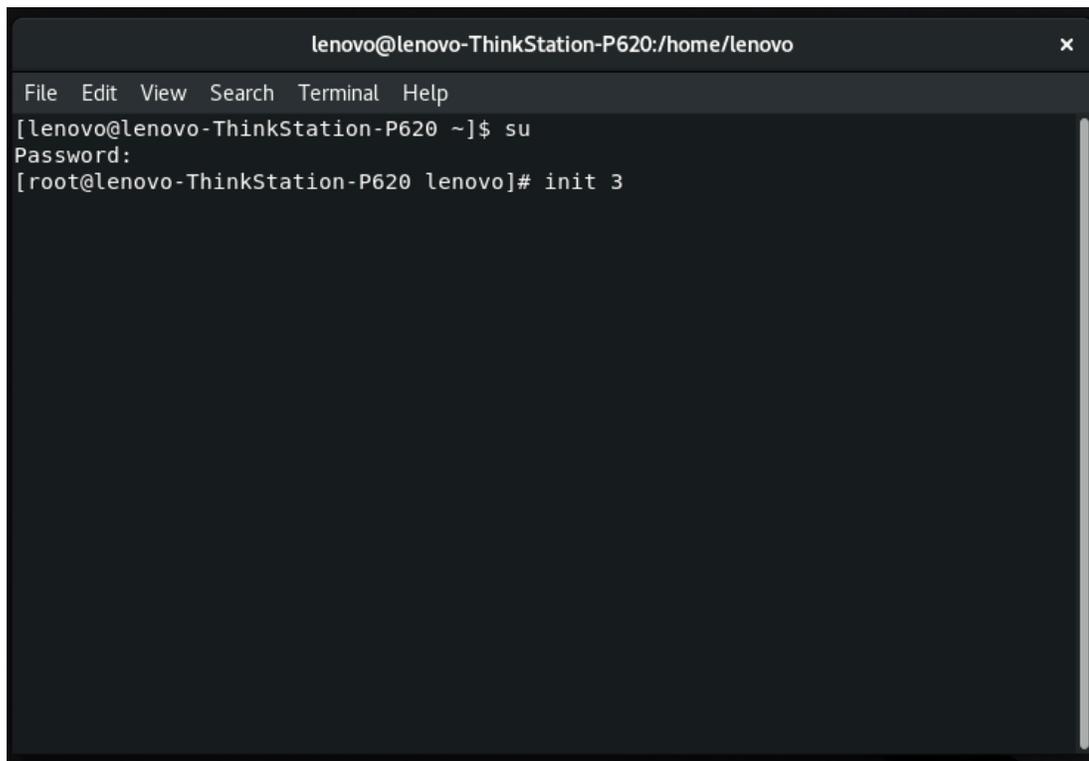
- Run the following command to update the initramfs file.

```
# dracut -force
```



```
lenovo@localhost:/home/lenovo
File Edit View Search Terminal Help
[root@lenovo-ThinkStation-P620 lenovo]# vi /etc/modprobe.d/
firewalld-sysctls.conf  mlx4.conf          tuned.conf
kvm.conf               nvdimmm-security.conf  vhost.conf
lockd.conf             truescale.conf
[root@lenovo-ThinkStation-P620 lenovo]# vi /etc/modprobe.d/blacklist.conf
[root@lenovo-ThinkStation-P620 lenovo]# dracut --force
```

- Reboot the system.
- Open a terminal window from within the Linux desktop, log in as root, and execute the command “init 3”.



```
lenovo@lenovo-ThinkStation-P620:/home/lenovo
File Edit View Search Terminal Help
[lenovo@lenovo-ThinkStation-P620 ~]$ su
Password:
[root@lenovo-ThinkStation-P620 lenovo]# init 3
```

- Log in as root, change directory path to the download directory to where the Nvidia driver was downloaded.

```
[lenovo@lenovo-ThinkStation-P620 ~]$ cd /home/lenovo/Downloads/
[lenovo@lenovo-ThinkStation-P620 Downloads]$ ls
NVIDIA-Linux-x86_64-440.82.run
[lenovo@lenovo-ThinkStation-P620 Downloads]$
```

- Make the Nvidia driver executable.

# chmod +x Nvidia-\*

```
[lenovo@lenovo-ThinkStation-P620 Downloads]$ chmod +x NVIDIA-Linux-x86_64-440.82.run
[lenovo@lenovo-ThinkStation-P620 Downloads]$ ls
NVIDIA-Linux-x86_64-440.82.run
[lenovo@lenovo-ThinkStation-P620 Downloads]$
```

- Run the driver executable.

# ./Nvidia\*

```
[lenovo@lenovo-ThinkStation-P620 Downloads]$ ./NVIDIA-Linux-x86_64-440.82.run
```

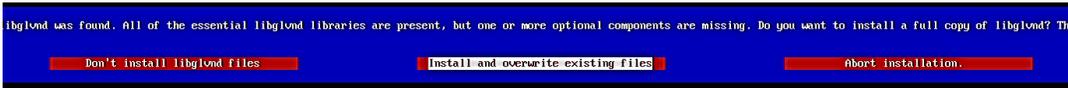
- The driver installation should start.

```
NVIDIA Accelerated Graphics Driver for Linux-x86_64
...
Building kernel modules
...
15%
```

- Select “Yes” to install Nvidia’s 32-bit compatible libraries.



- Select “Install and overwrite existing files”.



- Driver installation continues.



- Select “Yes” update the X configuration file.



- Select “OK” to acknowledge driver installation is complete.



- Execute the following command to verify the Nvidia driver is installed and loaded.

```
# nvidia-smi
```

```
[root@lenovo-ThinkStation-P620 Downloads]# nvidia-smi
Wed Jun  3 17:40:26 2020
+-----+
| NVIDIA-SMI 440.82                Driver Version: 440.82          CUDA Version: 10.2         |
+-----+
| GPU   Name           Persistence-M| Bus-Id        Disp.A | Volatile Uncorr. ECC |
| Fan  Temp  Perf    Pwr:Usage/Cap|  Memory-Usage | GPU-Util  Compute M. |
+-----+-----+
|    0   Quadro P620         Off   | 00000000:61:00.0 Off |                  N/A |
| 44%    51C    P0     N/A /  N/A |  0MiB / 1991MiB |      2%    Default  |
+-----+-----+

+-----+
| Processes:                         GPU Memory |
|  GPU       PID    Type   Process name                     Usage    |
+-----+-----+
| No running processes found         |
+-----+
[root@lenovo-ThinkStation-P620 Downloads]#
```



---

## Section 8 – Revision History

Version	Date	Author	Changes/Updates
1.0	7/15/2020	Jason Moebs	Initial launch release