information technology & management

viabiliity

INTRO TO OPEN SOURCE

ILLINOIS INSTITUTE OF TECHNOLOGY

Installing Linux & Basic Usage

Sean Hughes-Durkin

ITMO/IT-O 456 Fall 2017

Information Technology & Management Programs

School of Applied Technology

Objectives

- Prepare for and install Fedora Linux using best practices
- Outline the structure of the Linux interface
- Enter basic shell commands and find command documentation
- Properly shut down the Linux operating system

Preparing for Linux Installation

- All OSs require a minimum set of hardware components to function properly
  - Can be obtained from manual or file in DVD of OS, or from vendor website
- Each individual hardware component should be checked against the Hardware Compatibility List (HCL) found on the vendor's Web site

Preparing for Linux Installation

- You can check your hardware compatibility with the following sites
  - http://www.fsf.org/resources/hw
  - http://www.linux-drivers.org/

Preparing for Linux Installation

- Fedora minimum requirements:
  - 6GB free disk space
  - 2GB RAM
- Fedora recommended requirements
  - More than 6GB
  - 2GB+
  - One processor core/thread for virtualization
- The better the CPU/more RAM and dedicated GPU will run much better

Preparing for Linux Installation

- Identify configuration settings for the Linux operating system
  - Computer's host name
  - Network configuration parameters
  - Specific software packages to be installed
- Create pre-installation checklist to document hardware and software information

Sample Preinstallation Checklist

Hardware or Software Item	Description
CPU (Type & MHz)	Intel Core i9-7900X @ 3.30GHz
RAM (MB)	32GB
Keyboard model & layout	Corsair Gaming K70 LUX RGB Mechanical Keyboard
Mouse model & device	Logitech G502 Proteus Spectrum
Hard disk type (Primary Master, etc.)	Primary Master
Hard disk size (GB)	1TB
Hostname	itmo456.iit.edu
Network Card Internet Protocol Configuration (IP Address, Netmask, Gateway, DNS Servers, DHCP)	DHCP: not used IP Address: 192.168.6.188 Netmask: 255.255.255.0 Gateway: 192.168.6.1 DNS Servers: 200.10.2.1, 200.10.82.79
Packages to install	Gnome desktop Squid Apache Samba GIMP Emacs
Video card make and model	Acer XG270HU 27" 1ms 144HZ
Video card RAM (MB)	8GB
Monitor make & model	Samsung Synchmaster 551s

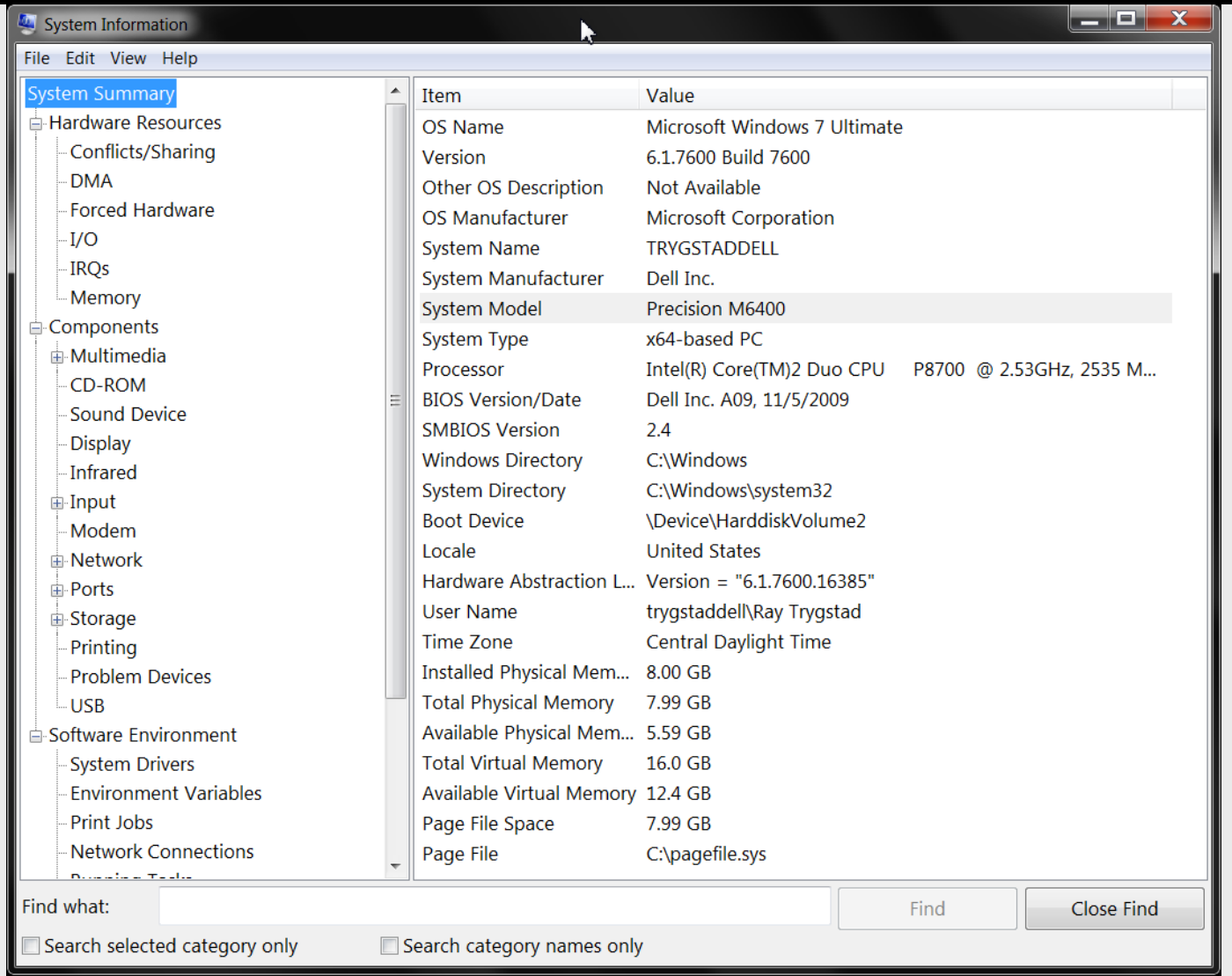
Gathering Hardware Information

- Tools and resources to check hardware against a preinstallation checklist:
  - Computer manuals
  - Windows System Information tool (if Windows already installed)
  - Windows Device Manager (if Windows already installed)

Gathering Hardware Information

LINUX & OPEN SOURCE

The Windows System Information tool – Win 7



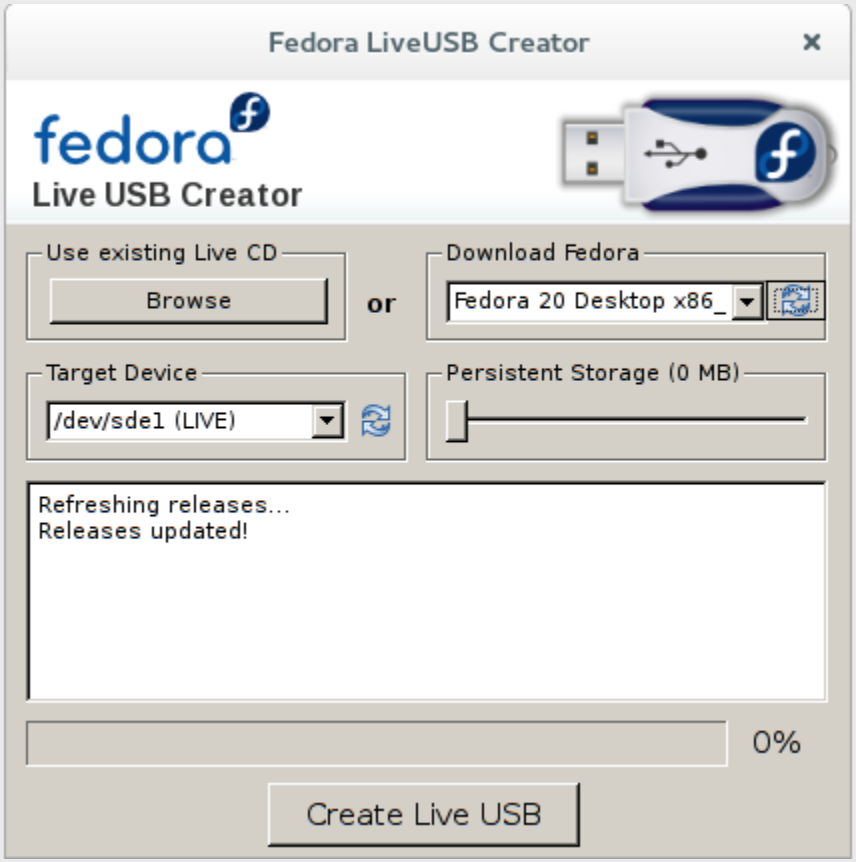
Understanding Installation Media

- The most common source for Linux packages and installation program is DVD media
  - To install from DVD, place the Linux DVD in the DVD drive and turn on the computer
- Most Linux distributions provide a Web site from which you can download DVD images (called ISO images)
  - Can be written to a blank writable DVD using disc burning software

Understanding Installation Media

- Many Linux Web sites also allow you to download a bootable live media DVD image
  - A fully functional graphical Linux OS is loaded into RAM
  - Allows you to test the OS on your computer to ensure all hardware drivers were detected properly
- If computer does not have a DVD drive
  - Install Linux by imaging the DVD or live media DVD image to a USB flash drive

Understanding Installation Media



Fedora LiveUSB Creator

Virtualization Software

- Virtualization software
  - Used to run an OS within an existing OS concurrently
- Virtualization software products available:
  - Microsoft Hyper-V
  - VMWare
  - Oracle VM VirtualBox

Virtualization Software

- Virtual machine (VM guest)
  - Each OS that is run within virtualization software
- Virtual machine host (VM host)
  - The underlying OS running the virtualization software

Understanding Installation Media

- To install Linux as a VM
  - Download the standard DVD or live media DVD ISO image to a directory on your VM host
  - Open virtualization software and choose to create a new virtual machine
  - Specify the location of the appropriate ISO image
  - Virtualization software will boot from the ISO image directly

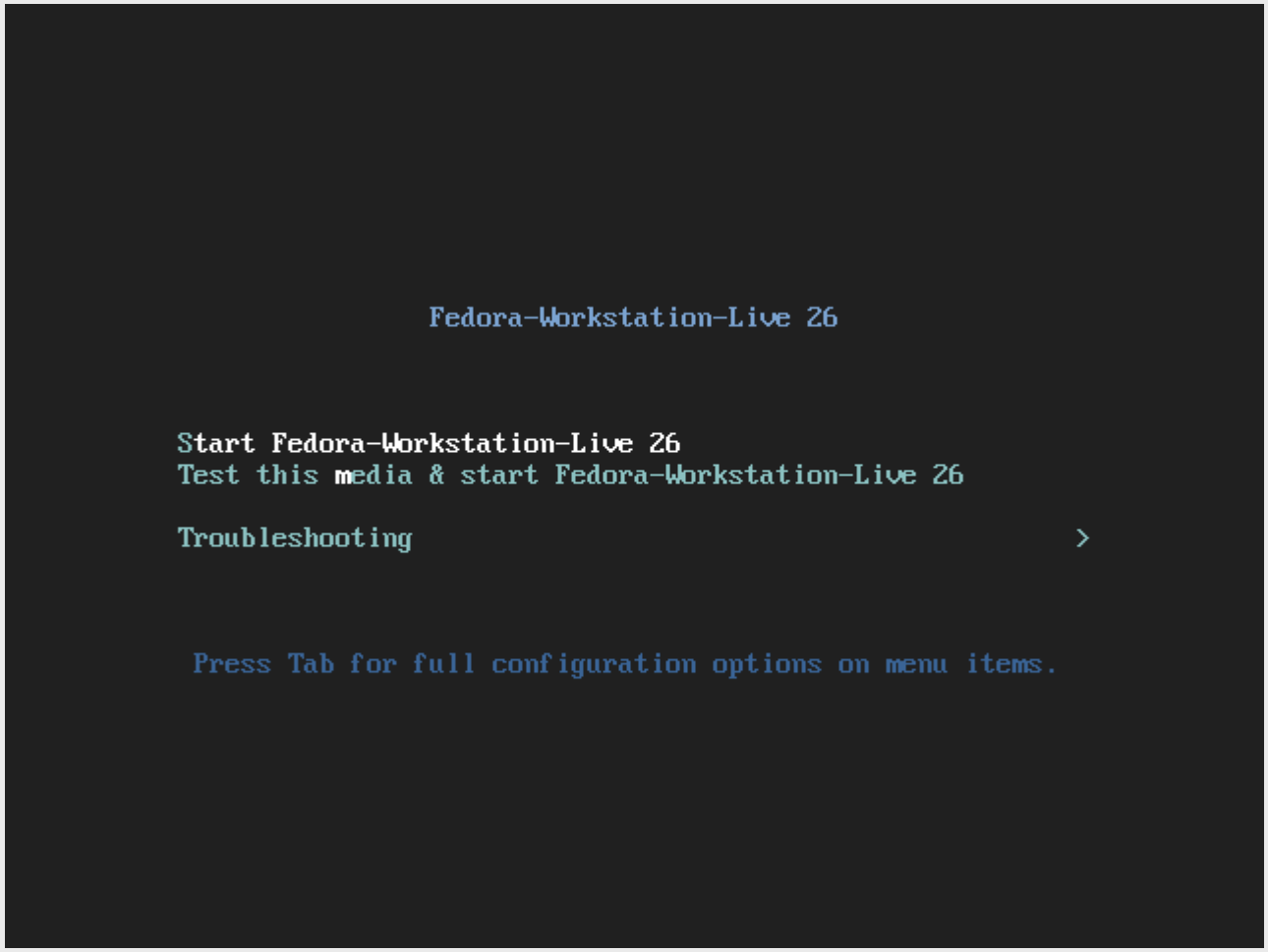
Performing the Installation

- The installation program for Fedora Linux involves the following general stages:
  - Starting the installation
  - Choosing an installation language as well as localization and system options
  - Configuring disk partitions and filesystems
  - Configuring user accounts

Starting the Installation

- Boot from Fedora Linux DVD
- You will be prompted to:
  - Start the installation
  - Perform troubleshooting actions
- If you select the troubleshooting option, you will be presented with four additional options
  - *Start Fedora Live in basic graphics mode*
  - *Test this media & start Fedora Live*
  - *Run a memory test*
  - *Boot from local drive*

Starting the Installation



Beginning a Fedora installation

Starting the Installation

- In most cases, the troubleshooting options are not necessary when installing Fedora Linux
- Simply choose *Start Fedora Live* to start a live Fedora system
  - Once loaded, you will be presented with a welcome screen that prompts you to install Fedora Linux on permanent storage
- If you choose *Install to Hard Drive*, the Fedora installation program will start

Starting the Installation

Try or Install Fedora

Installation Language & System Options

- You will be prompted to choose installation language
- Keyboard model and layout automatically detected
- Network interface is set to obtain network configuration automatically using the DHCP protocol
- Date and time are automatically obtained from the Internet
  - If your network has Internet connectivity

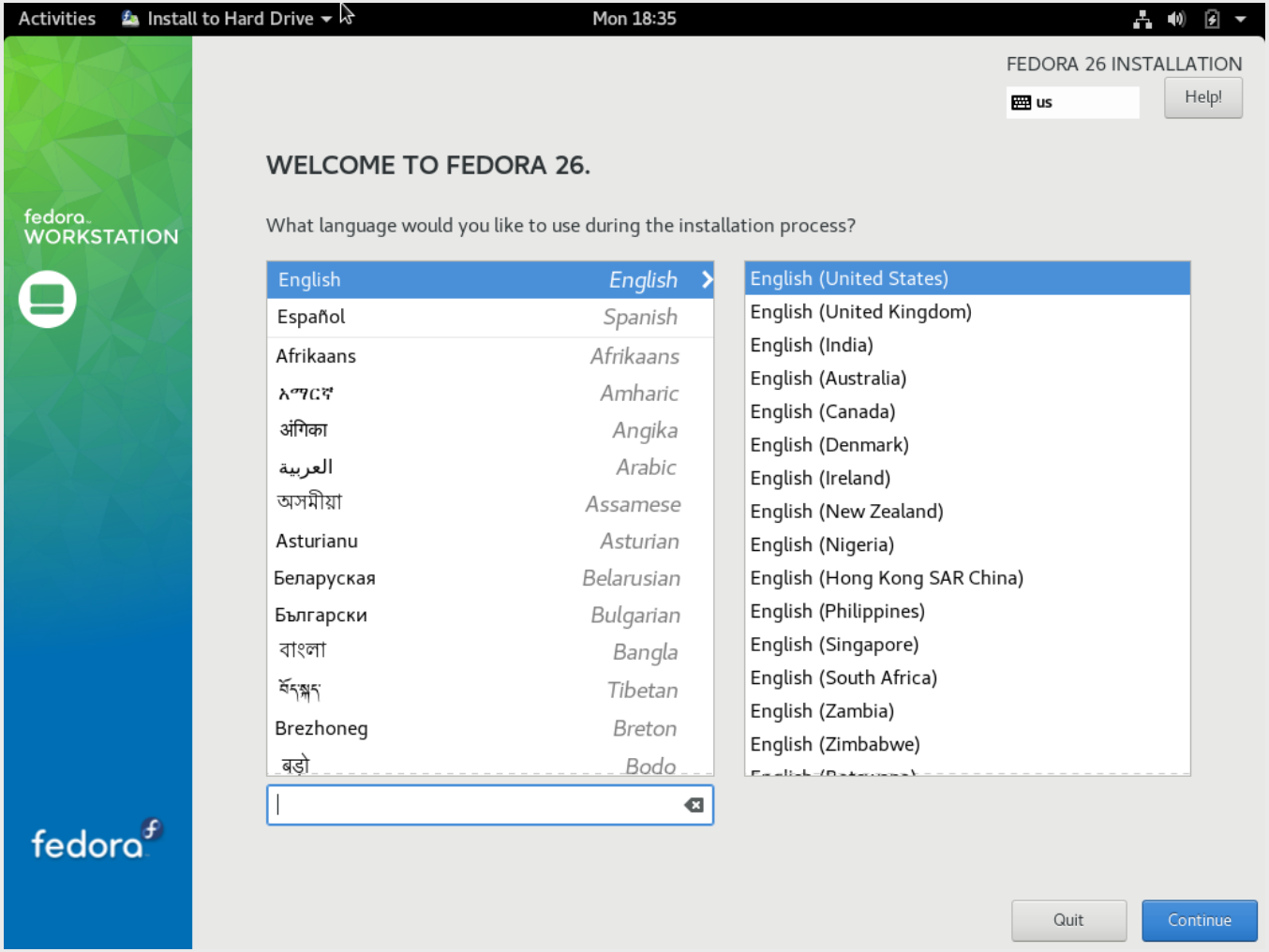
Choosing Language and Keyboard

- Allowed to choose installation language
- Choose keyboard configuration
  - Keyboard model and layout automatically detected

Choosing Storage Type

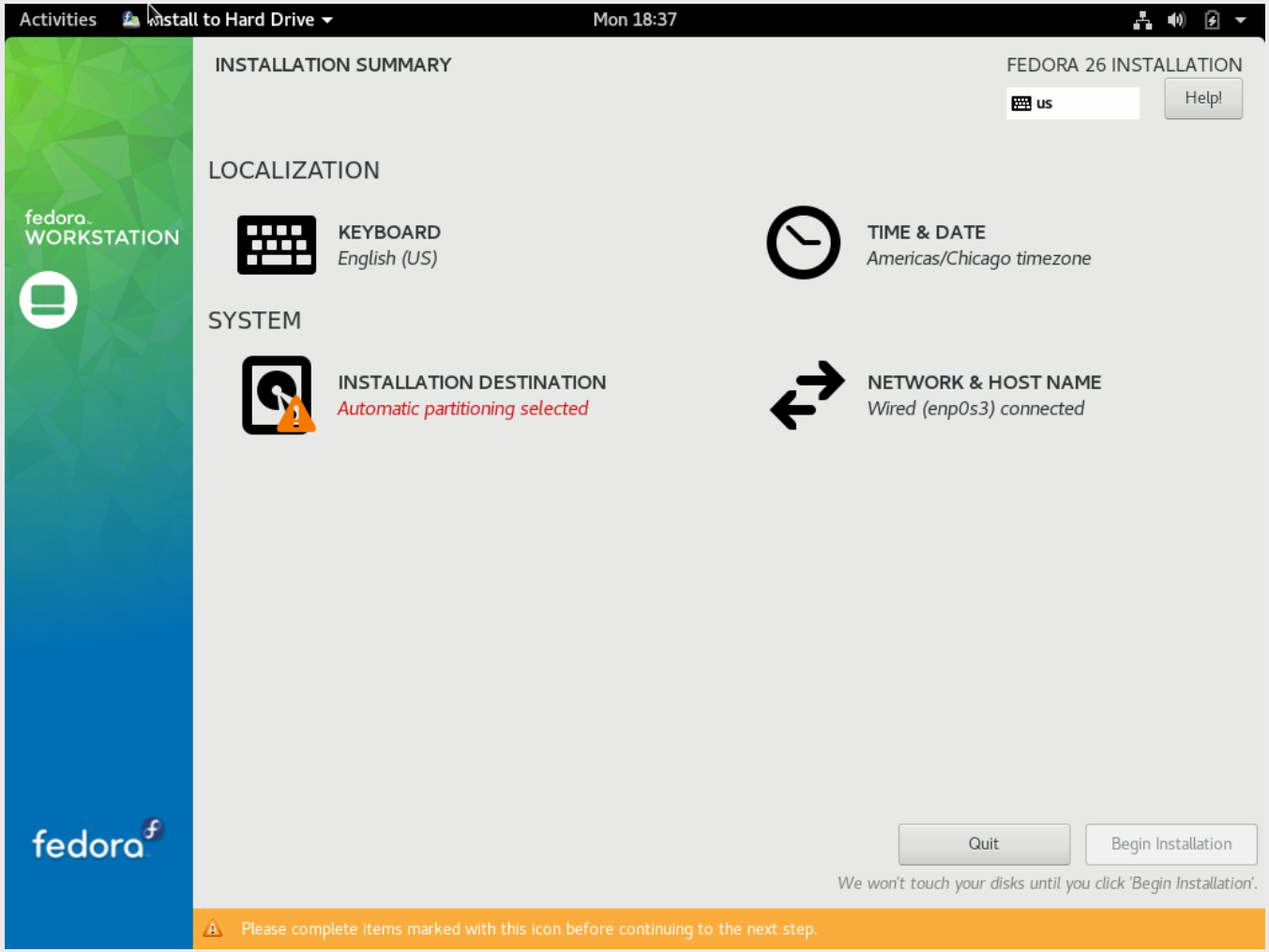
- Select types of storage devices used to host the Linux OS
  - For internal or locally attached hard drive installation, select Basic Storage Devices
  - For installation on SAN, select Specialized Storage Devices

Choosing Language & Keyboard



Selecting an installation language

Installation Language & Options



Main Fedora installation menu

Installation Language & Options

- You must manually select an installation destination before installation can continue
  - Select a permanent storage device that will contain the Linux OS
  - For internal or locally attached hard drive installation, select **`Local Standard Disks`**
  - For installation on SAN or DASD, select **`Specialized & Network Disks`**

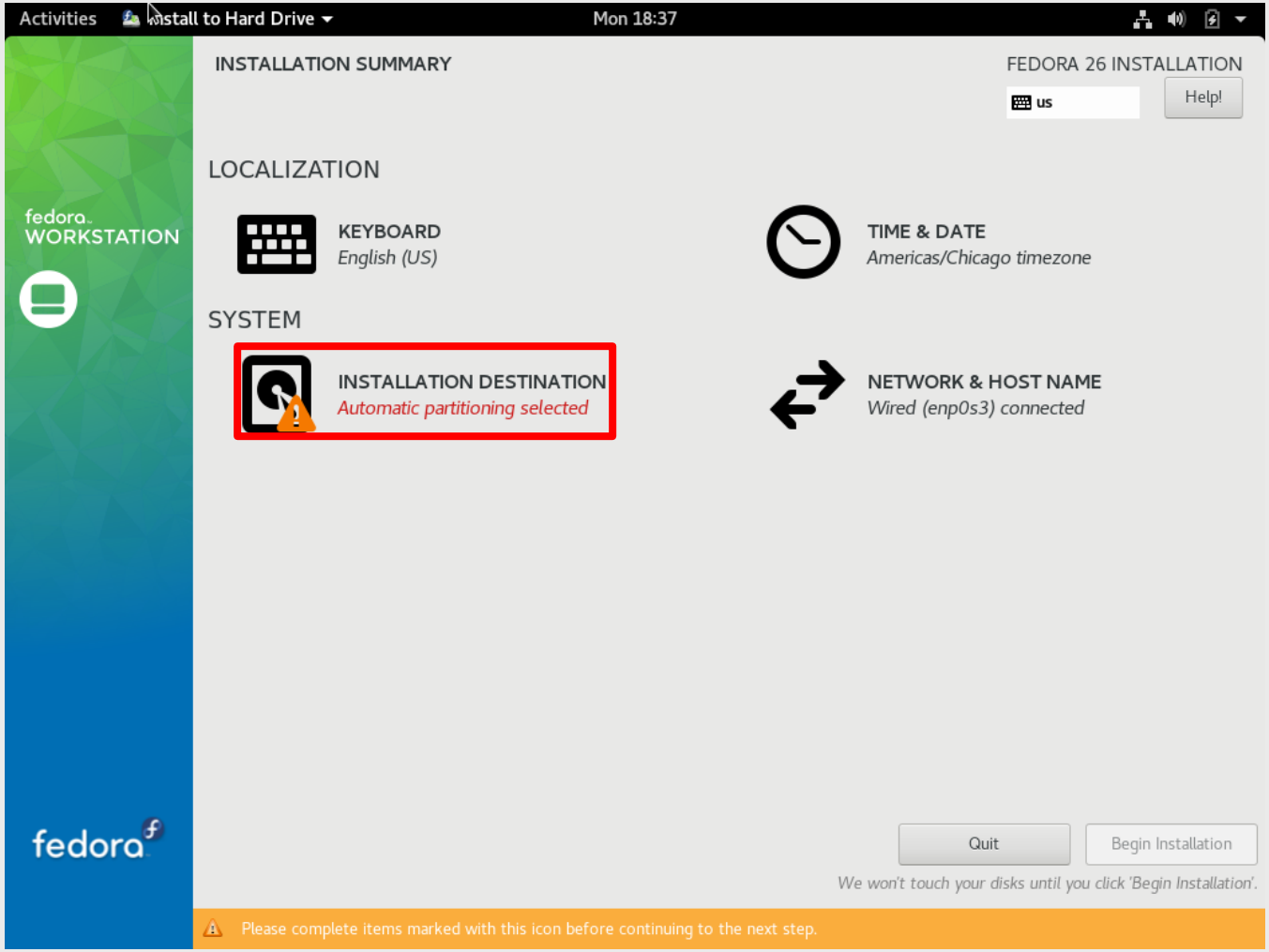
Installation Language & Options

- Most common storage devices for storing Linux OS are hard disks
  - Parallel Advanced Technology Attachment (PATA)
  - Serial Advanced Technology Attachment (SATA)
  - Small Computer Systems Interface (SCSI)

Installation Language & Options

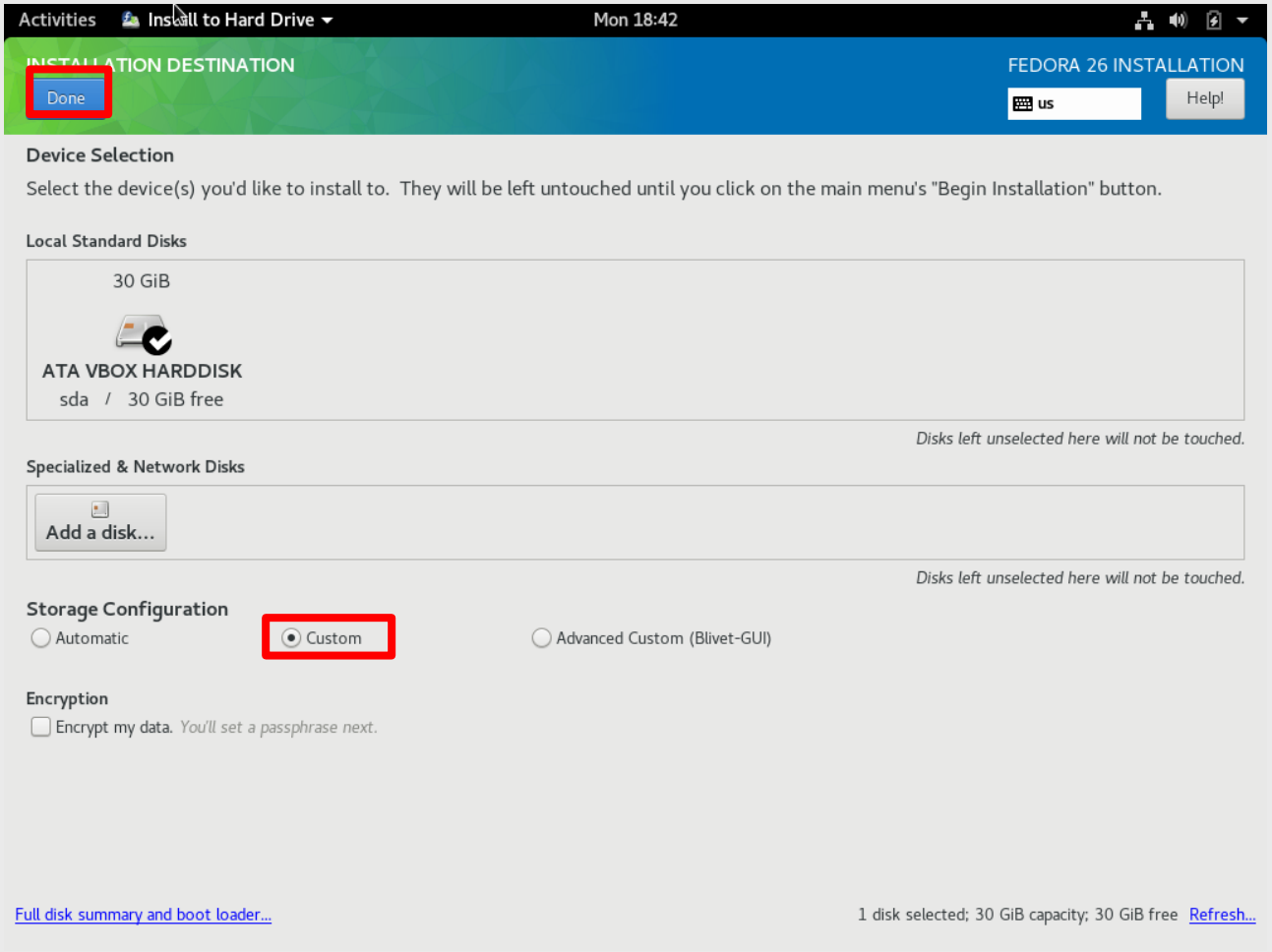
- Click on Installation Destination icon
  - You will see a list of all permanent storage devices in your system
  - If you have multiple disk devices, select the disk that will be used to contain Linux
- You can also install Linux on an external Storage Area Network (SAN), Direct Access Storage Device (DASD), or firmware Redundant Array of Inexpensive Disks (RAID) device

Configuring Storage Devices



Initial drive detection/setup

Configuring Storage Devices



Initial drive configuration

Configuring Storage Devices

- Each hard disk is divided into partitions
  - Partitions are formatted with filesystems
    - Filesystem is a structure that specifies how data should reside on the hard disk
  - Maximum four primary partitions
  - Extended partition can be divided into logical drives
- Master Boot Record (MBR): a table of all partition information for a certain hard disk or SSD

Configuring Storage Devices

Description	Linux Name	Windows Name
First primary SATA disk	sda	
First primary partition on the primary master SATA HDD	sda1	C:
Second primary partition on the primary master SATA HDD	sda2	D:
Third primary partition on the primary master SATA HDD	sda3	E:
Fourth primary partition on the primary master SATA HDD (EXTENDED)	sda4	F:
First logical drive in the extended partition on the primary master SATA HDD	sda5	G:
Second logical drive in the extended partition on the primary master SATA HDD	sda6	H:
Third logical drive in the extended partition on the primary master SATA HDD	sda7	I:

Example of a partitioning scheme for a primary master SATA hard disk

Configuring Storage Devices

- Filesystems can be accessed by Linux if attached (mounted) to a certain directory
- Fedora installation program can automatically create partitions
  - Generally a good practice to manually partition
- Linux typically requires only two partitions
  - Partition mounted to the root directory
  - Partition for virtual memory (swap memory)
    - Area on hard disk used to store information normally residing in physical memory (RAM)
  - These are minimum required, not ideal

Configuring Storage Devices

Directory	Description	Recommended Size
/	Root (primary) partition; contains all directories not present on other filesystems	Depends on size & number of other filesystems present, but is typically 10GB or more
/boot	Contains the Linux kernel and boot files	500MB
/home	Default location for user home directories	200MB per user
/usr	System commands and utilities	Depends on the packages installed—typically 20GB or more
/usr/local	Location for most additional programs	Depends on packages installed—typically 20GB or more
/opt	An alternate location for additional programs (Solaris-style)	Depends on the packages installed—typically 20GB or more
/var	Contains log files and spools	Depends on whether the Linux system is used as a print server (which contains a large spool). For print servers 10GB or more is typical. For other systems 2GB or more is usually sufficient.
/tmp	Holds temporary files created by programs	500MB

Configuring Storage Devices

- Different types of filesystems
  - Ext2: Used on most Linux computers
  - Ext3: Performs journaling
  - Ext4: Performs journaling w/checksums
    - Backward compatible with ext3 and ext2
    - Supports 64-bit storage limits
    - Fedora default
- Journaling: keeps track of the information written to the hard drive in a data structure know as a journal, typically a circular log

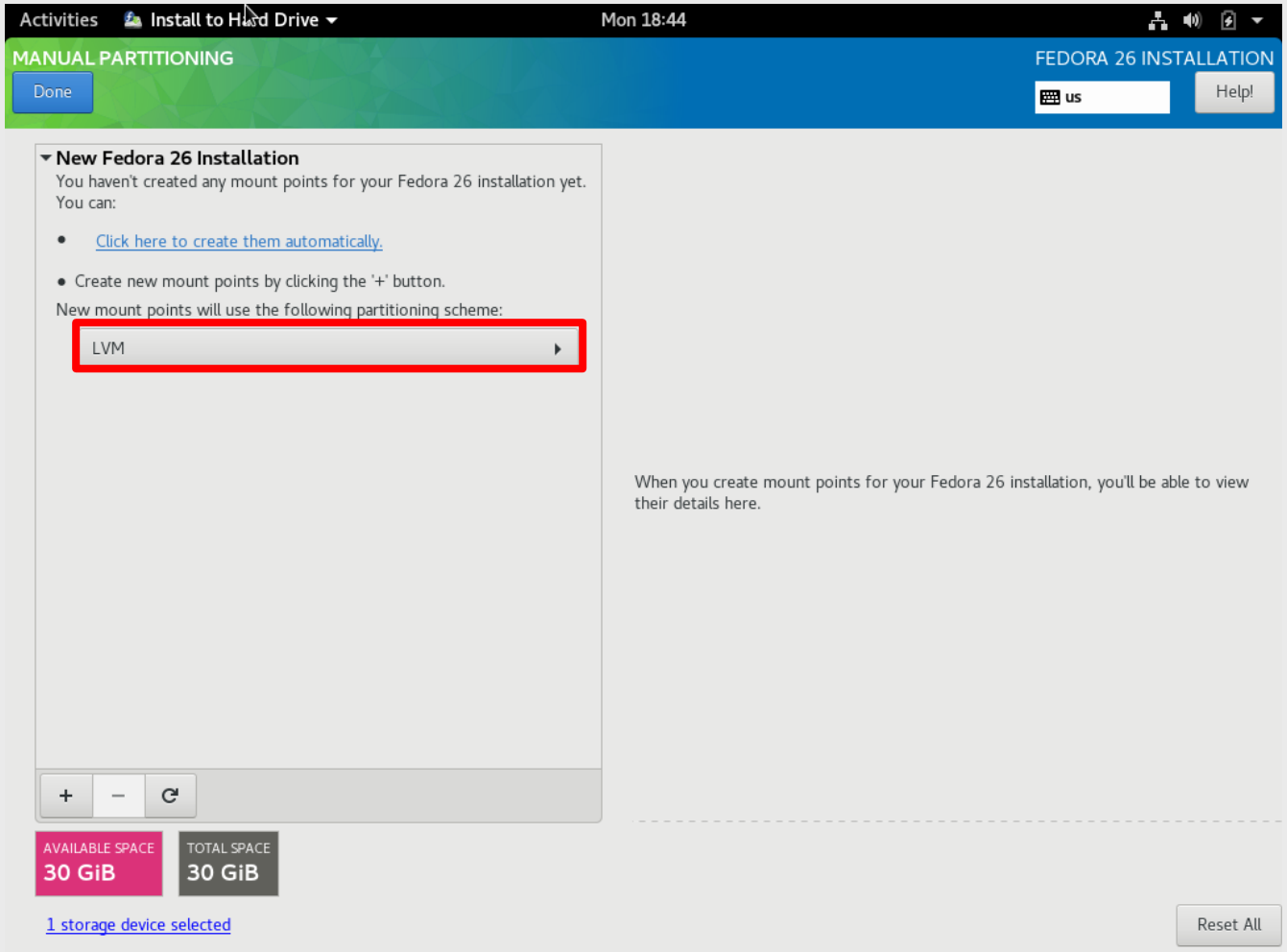
Configuring Storage Devices

- Once an installation destination has been selected, the installation program will prompt you to choose:
  - The partitioning scheme
  - Whether the number and type of disk partitions should be configured automatically
  - If partition contents should be automatically encrypted

Configuring Storage Devices

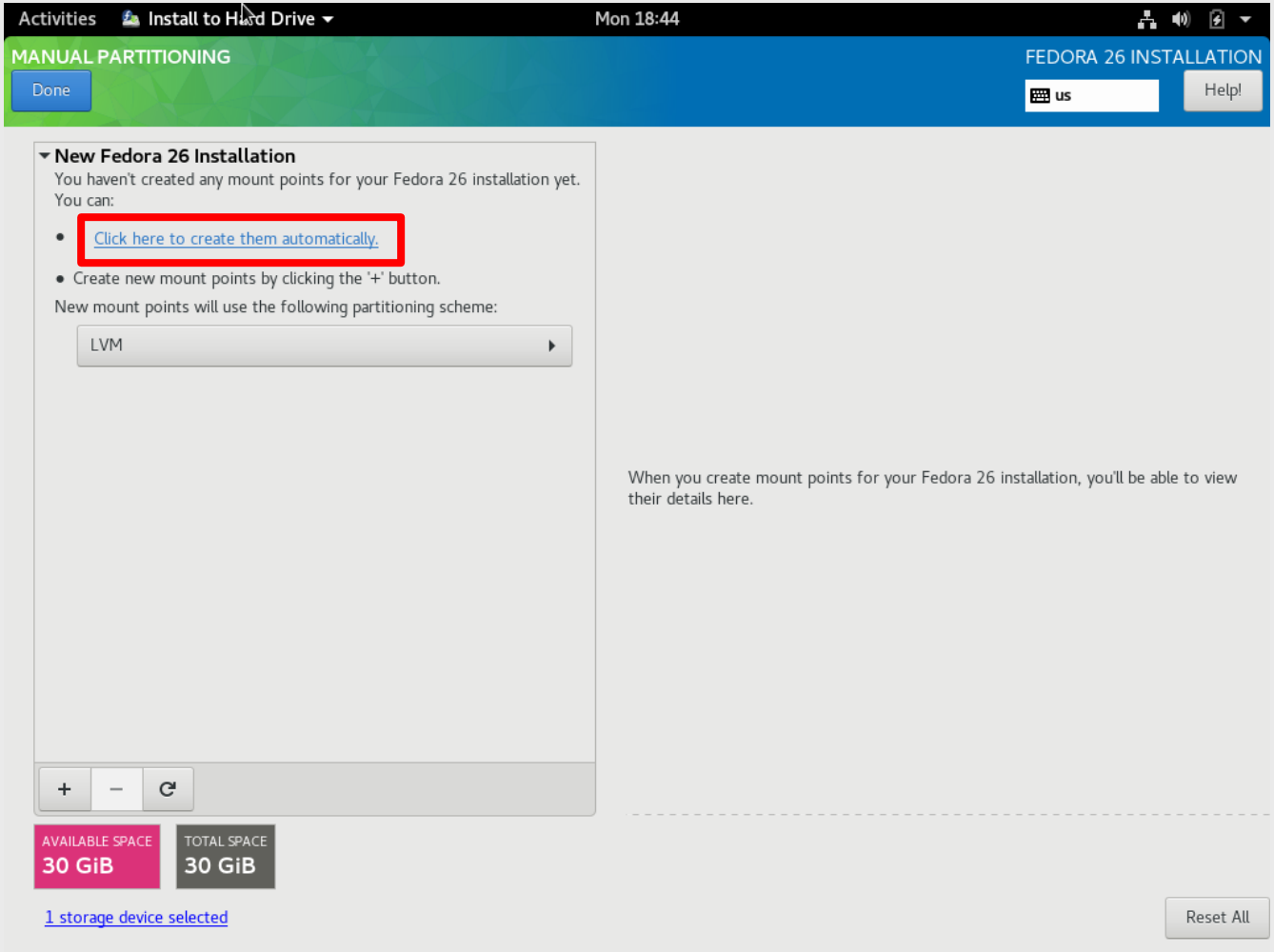
- Instead of standard partitions, you can choose a partition scheme that creates logical volumes:
  - Using the Logical Volume Manager (LVM)
  - Easy to expand/reduce volumes while disks are online – no reboots
  - Much easier to manage vs standard partitions

Configuring Storage Devices



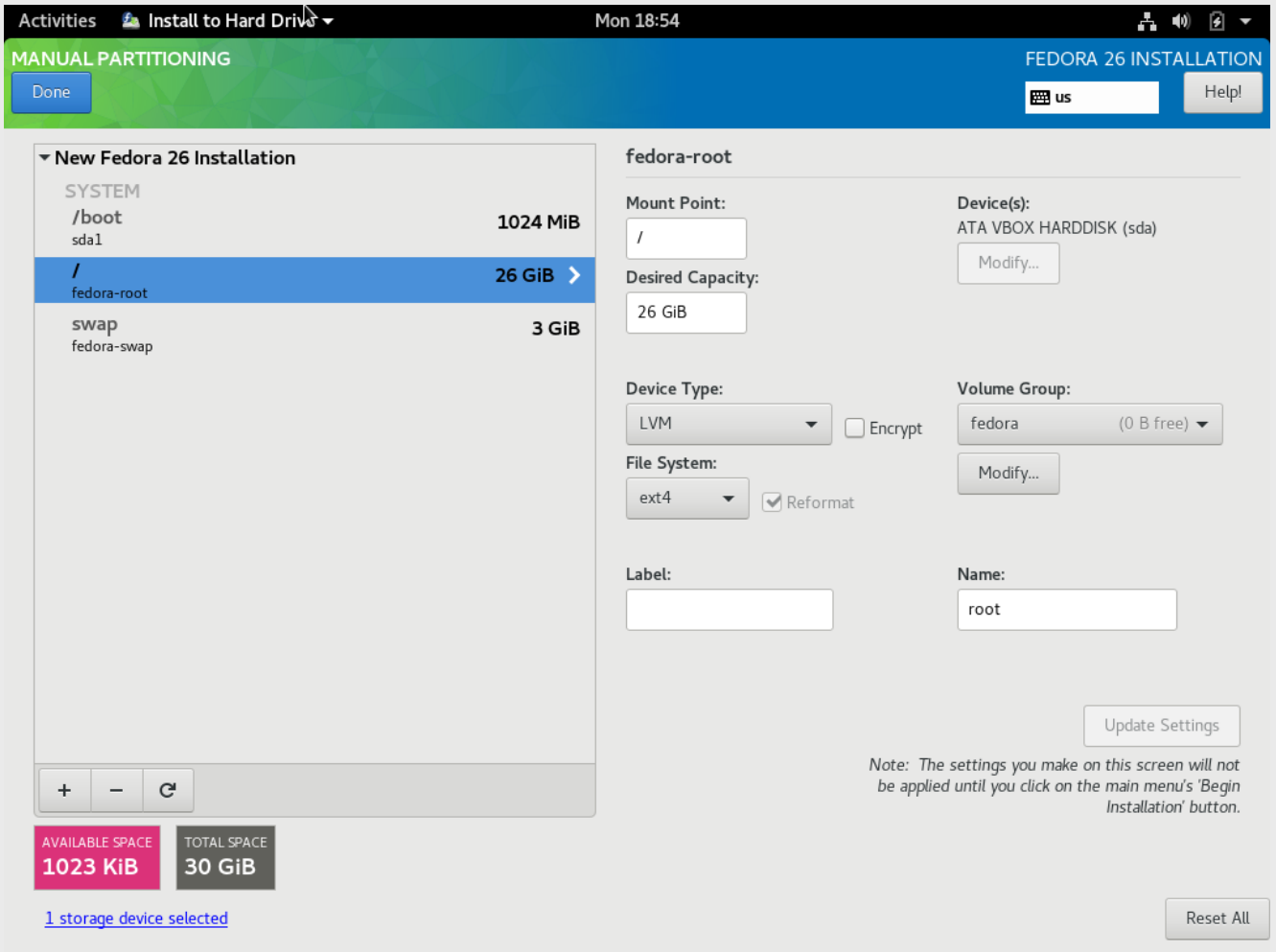
Selecting disk partitioning options (LVM)

Configuring Storage Devices



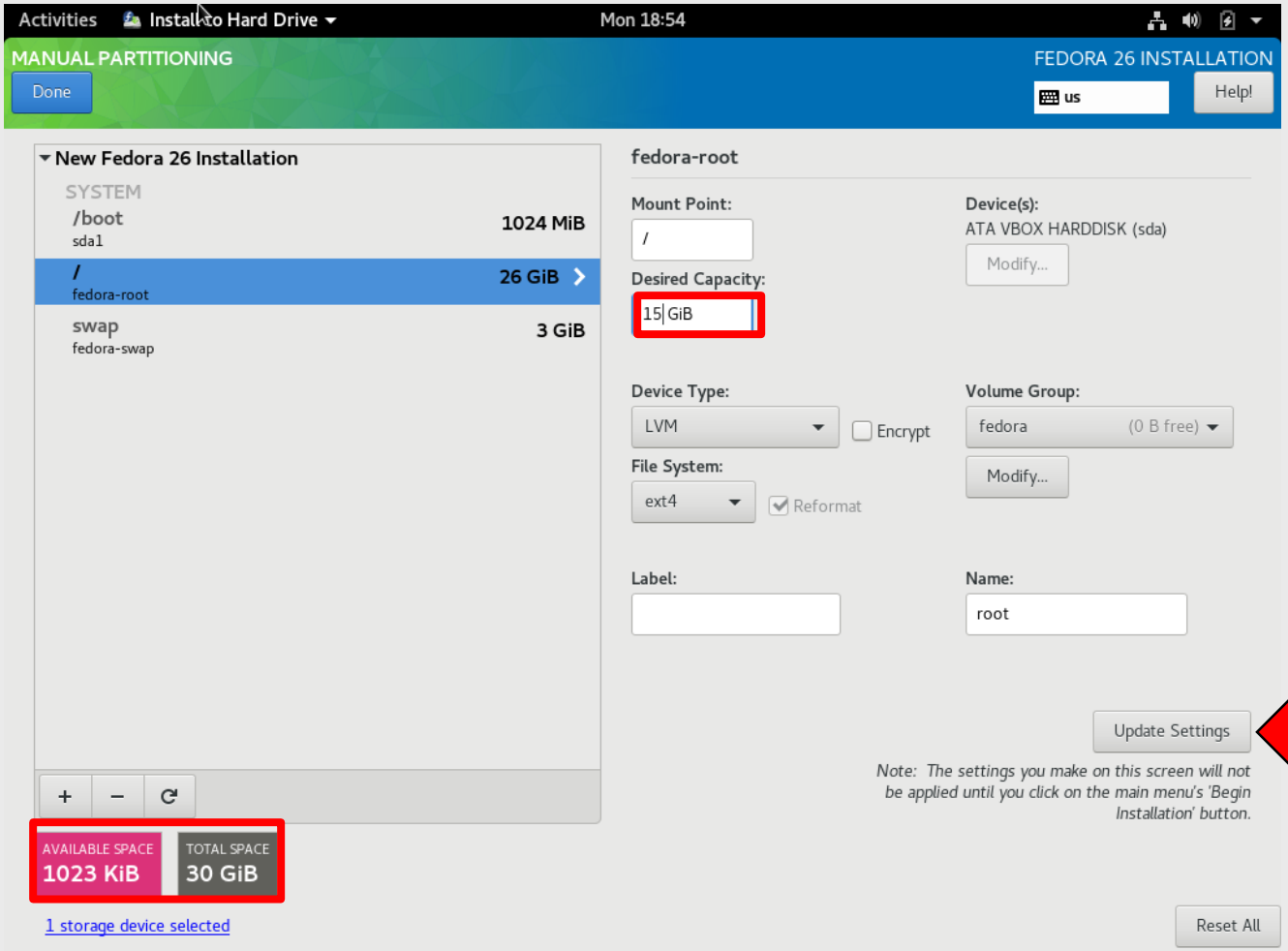
Partitions can be created automatically

Configuring Storage Devices



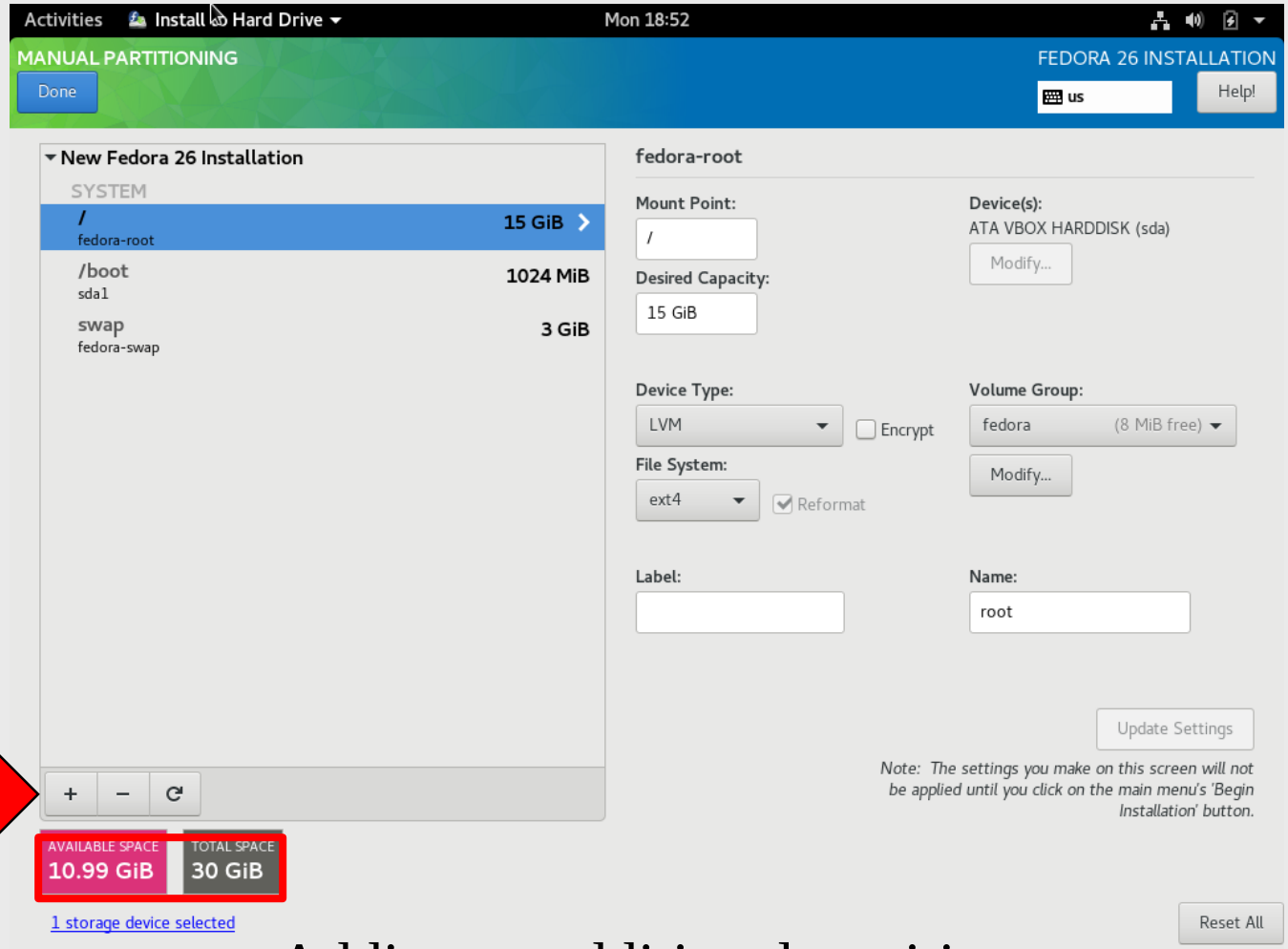
Default partitions

Configuring Storage Devices



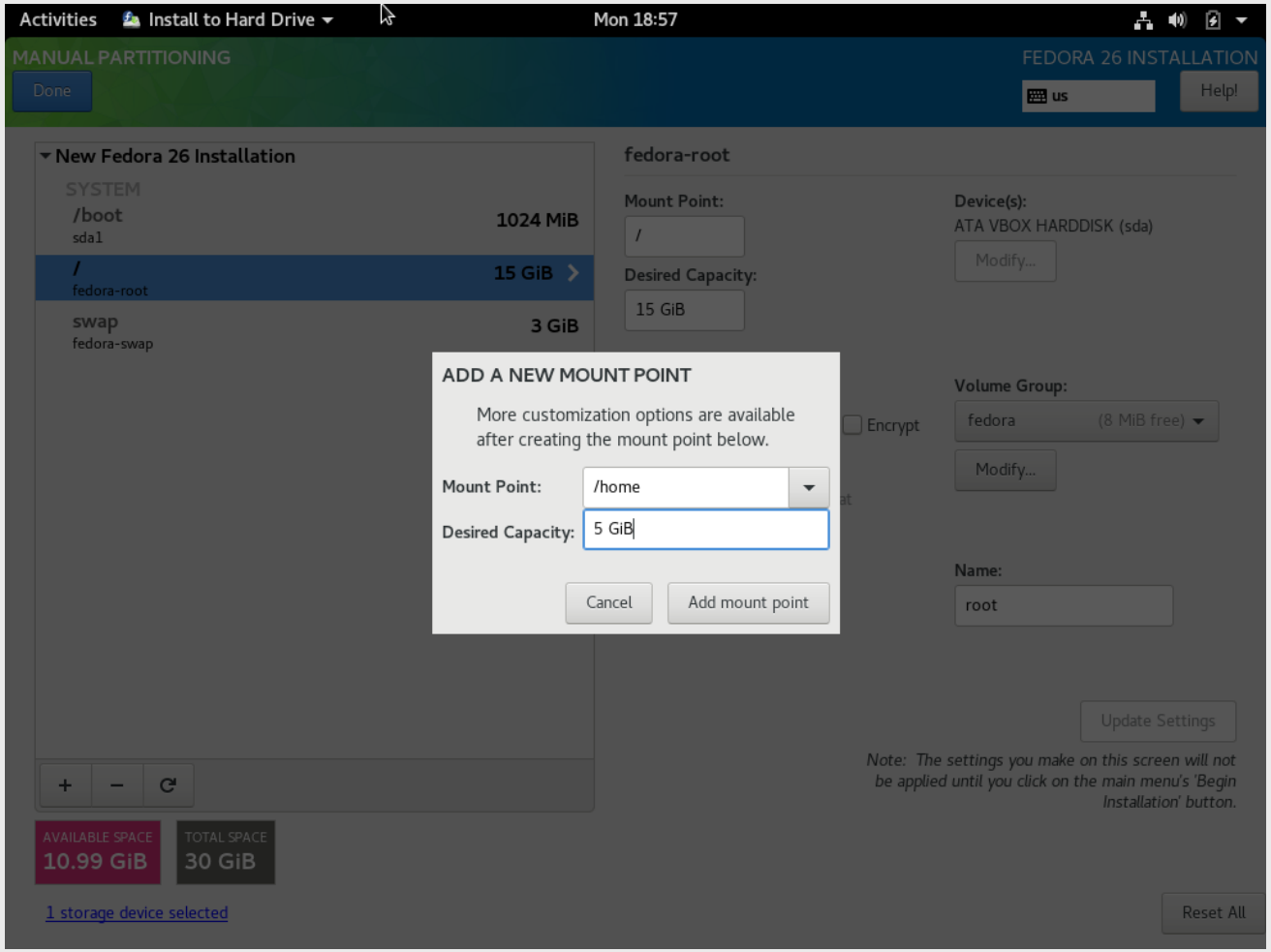
Reducing partition capacity

Configuring Storage Devices



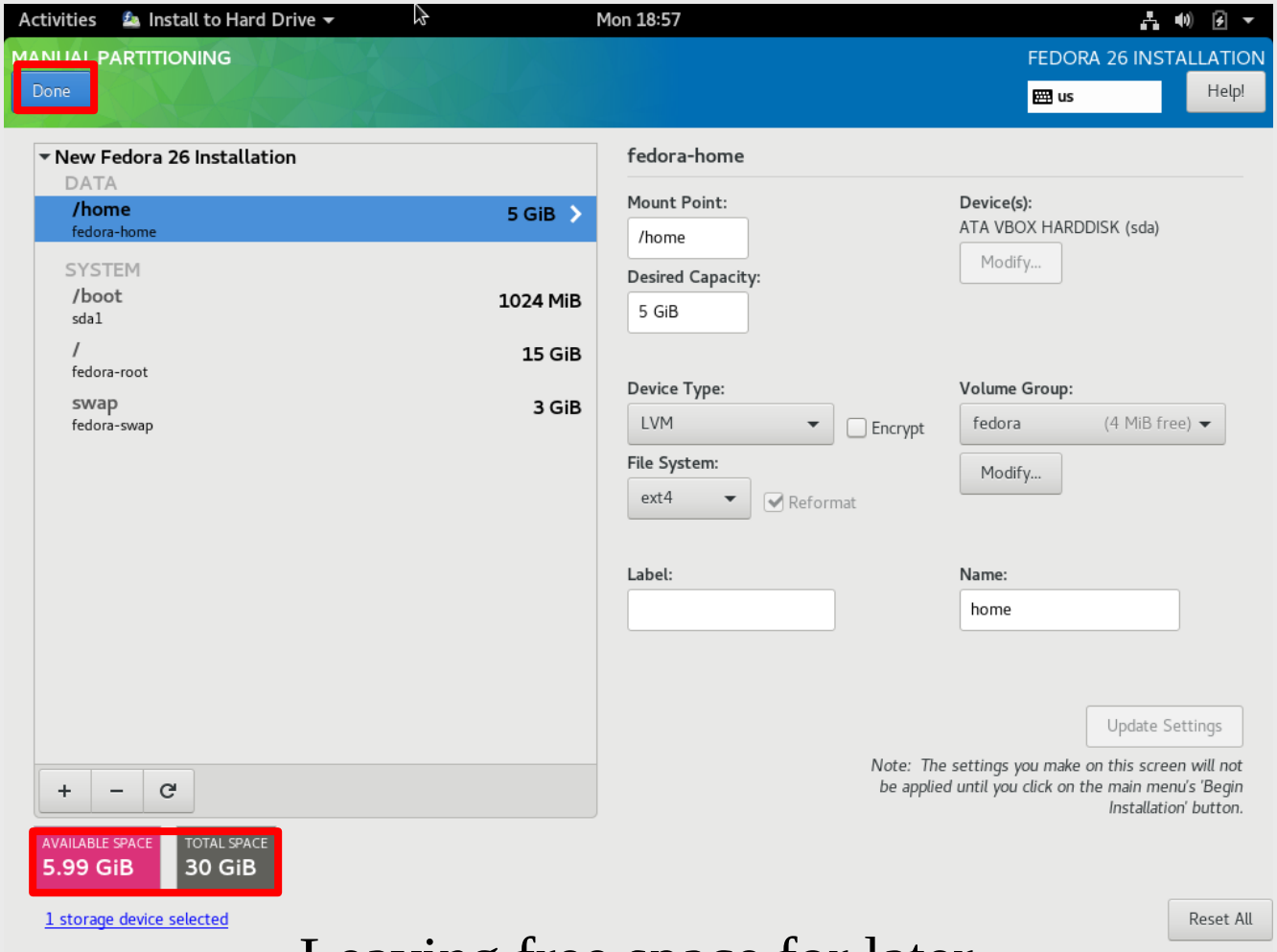
Adding an additional partition

Configuring Storage Devices



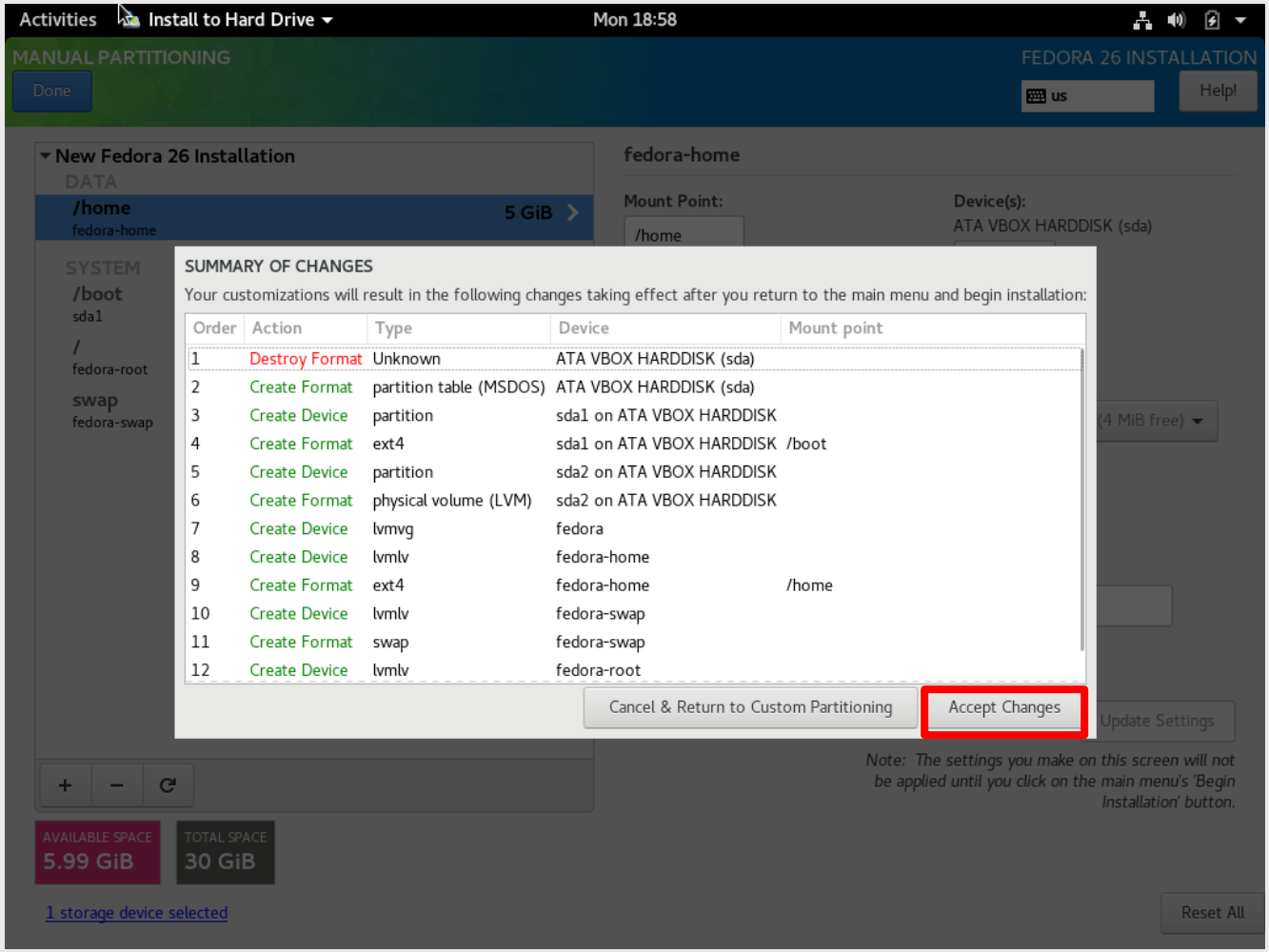
Select mount point and capacity

Configuring Storage Devices



Leaving free space for later

Configuring Storage Devices

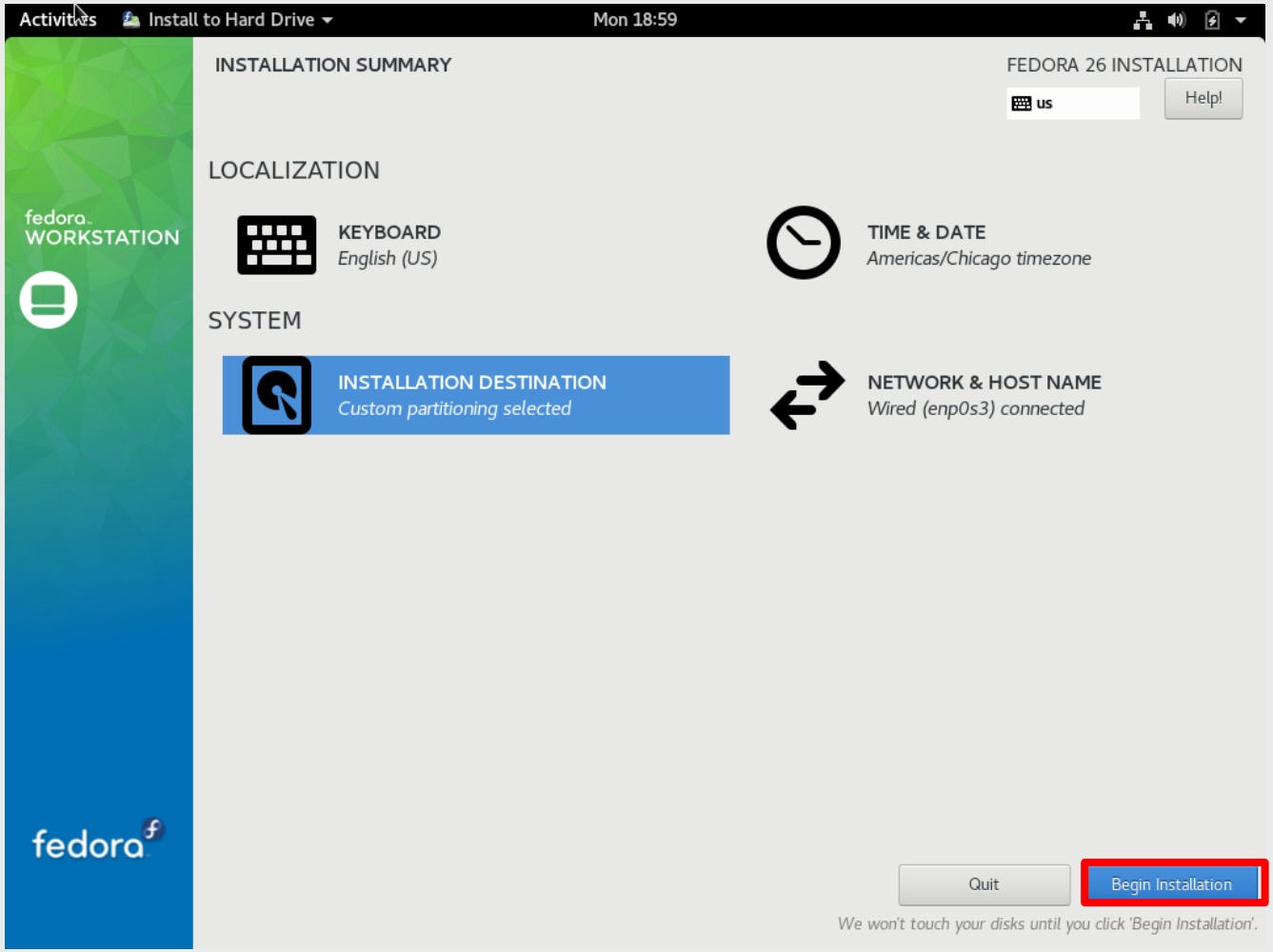


Accept the changes we have made

Configuring User Accounts

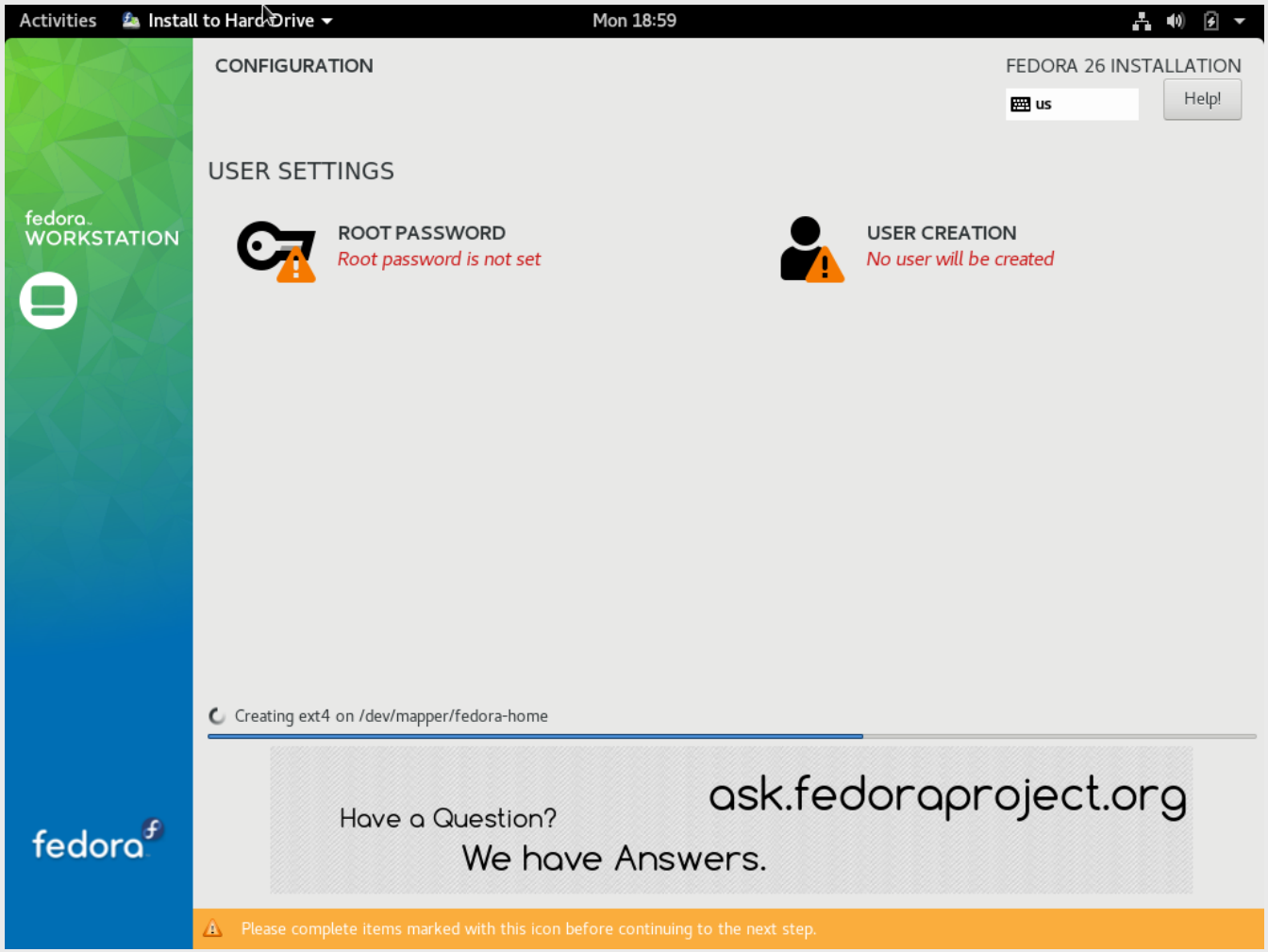
- Authentication: Users log in via valid user name and password
- Configure two user accounts
  - Administrator account (root): full rights to system
  - Regular user account
- The installation program prompts you to configure the password for the root user
  - As well as create a new user account
- Next, click the *Quit* button to exit the installation program

Beginning the Installation



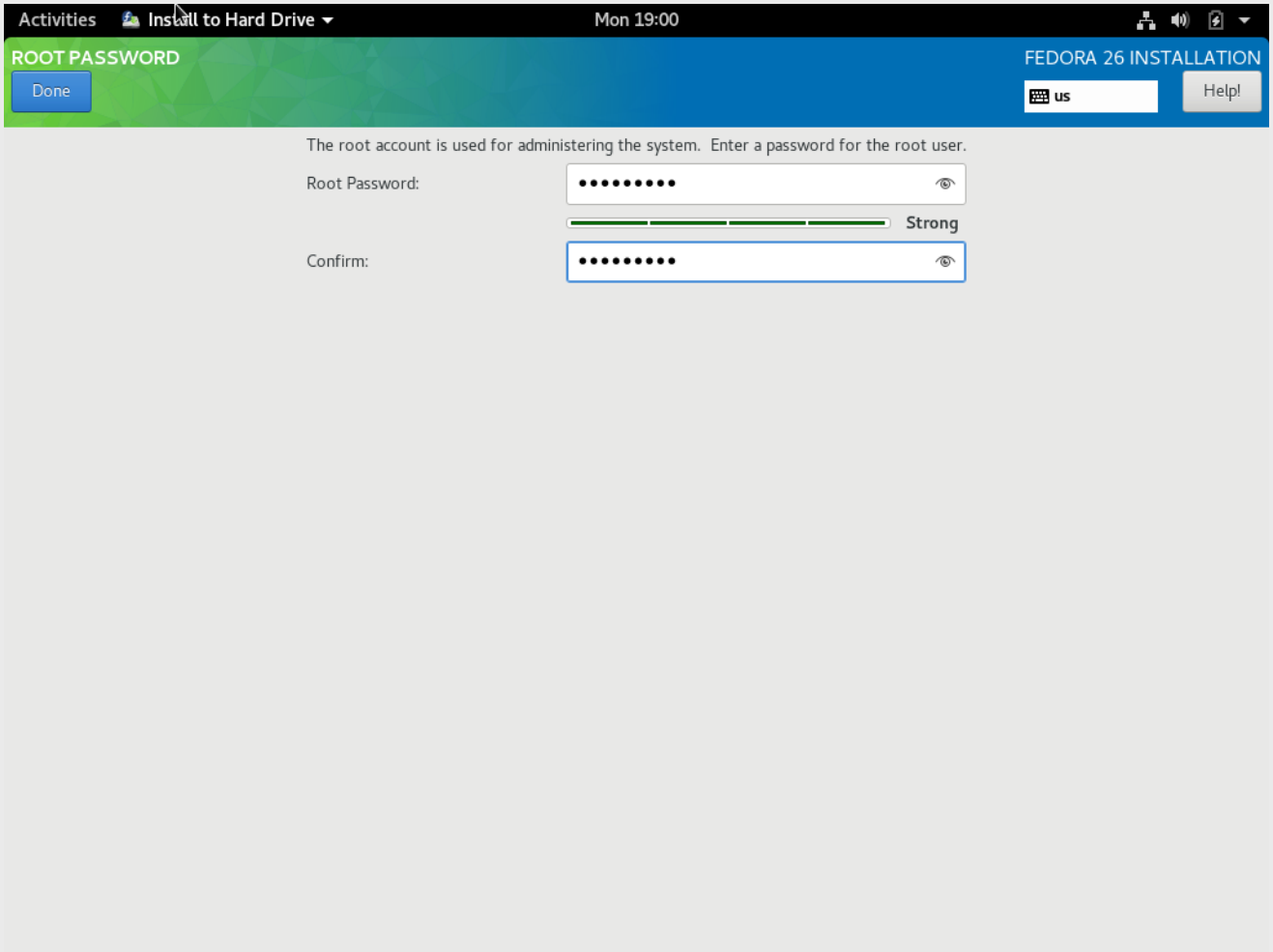
Begin the installation

Configuring User Accounts



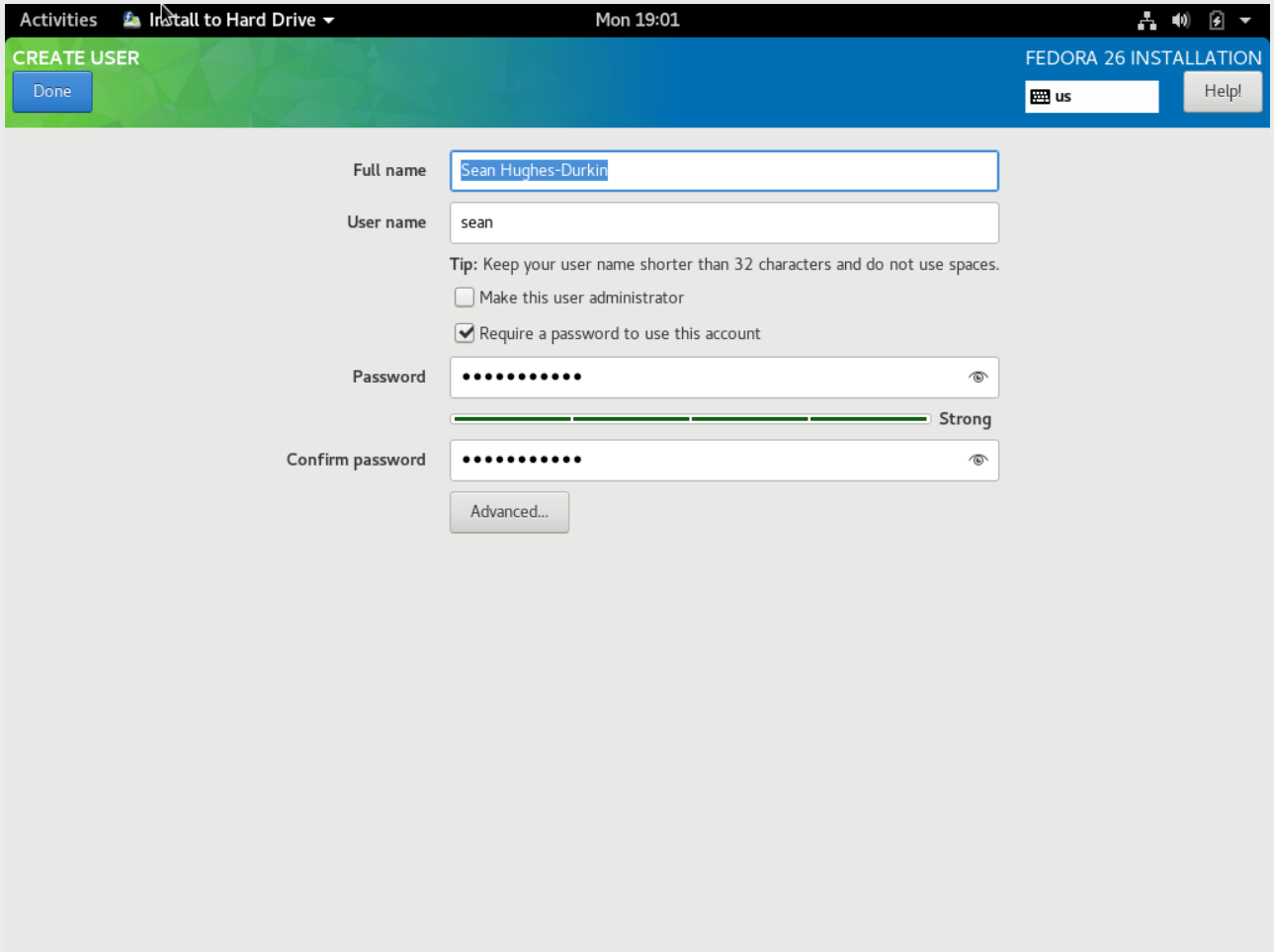
Setup root password and create user account

Configuring User Accounts



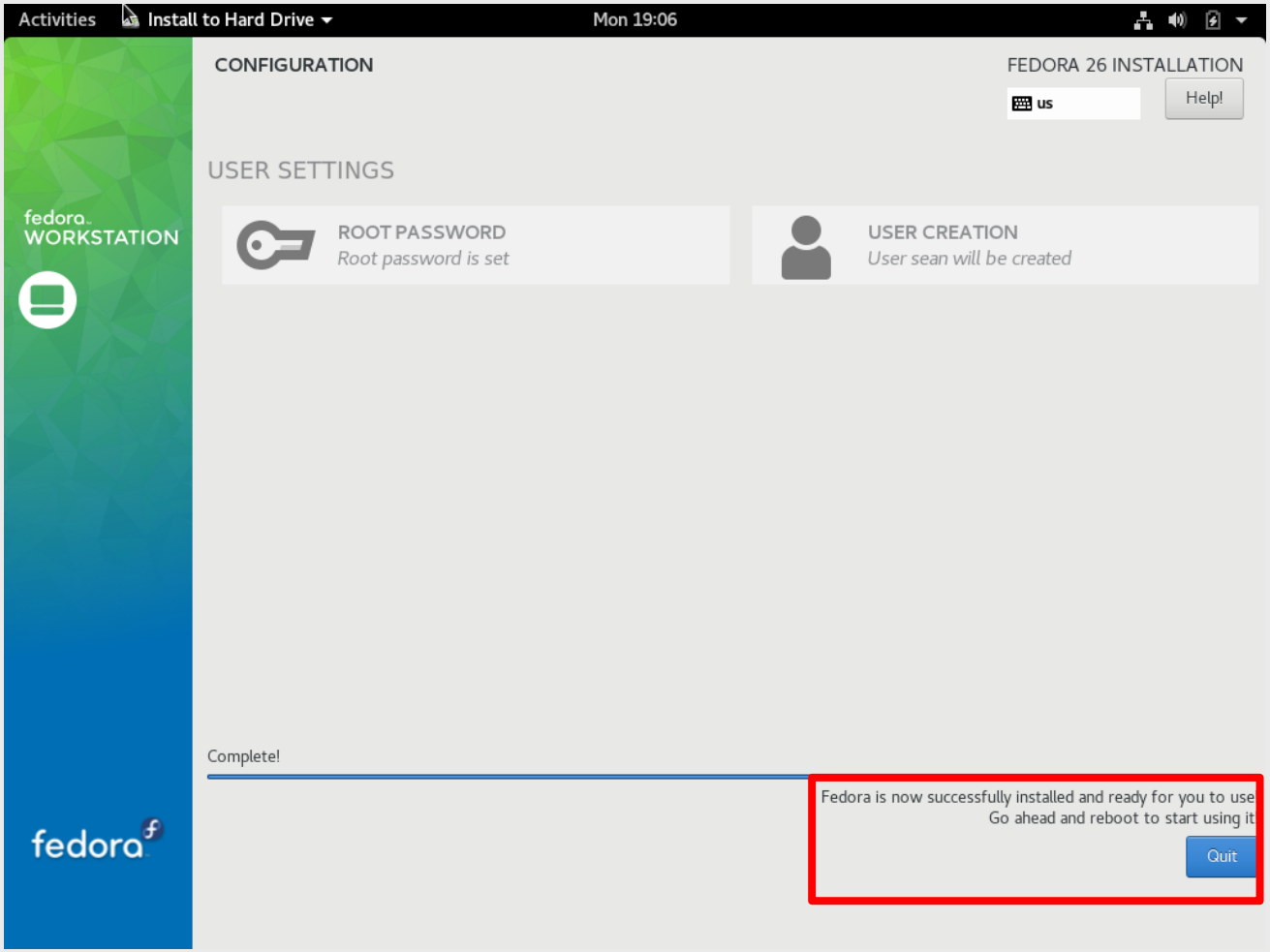
Create root password

Configuring User Accounts



Create user account and password

Completing the Installation

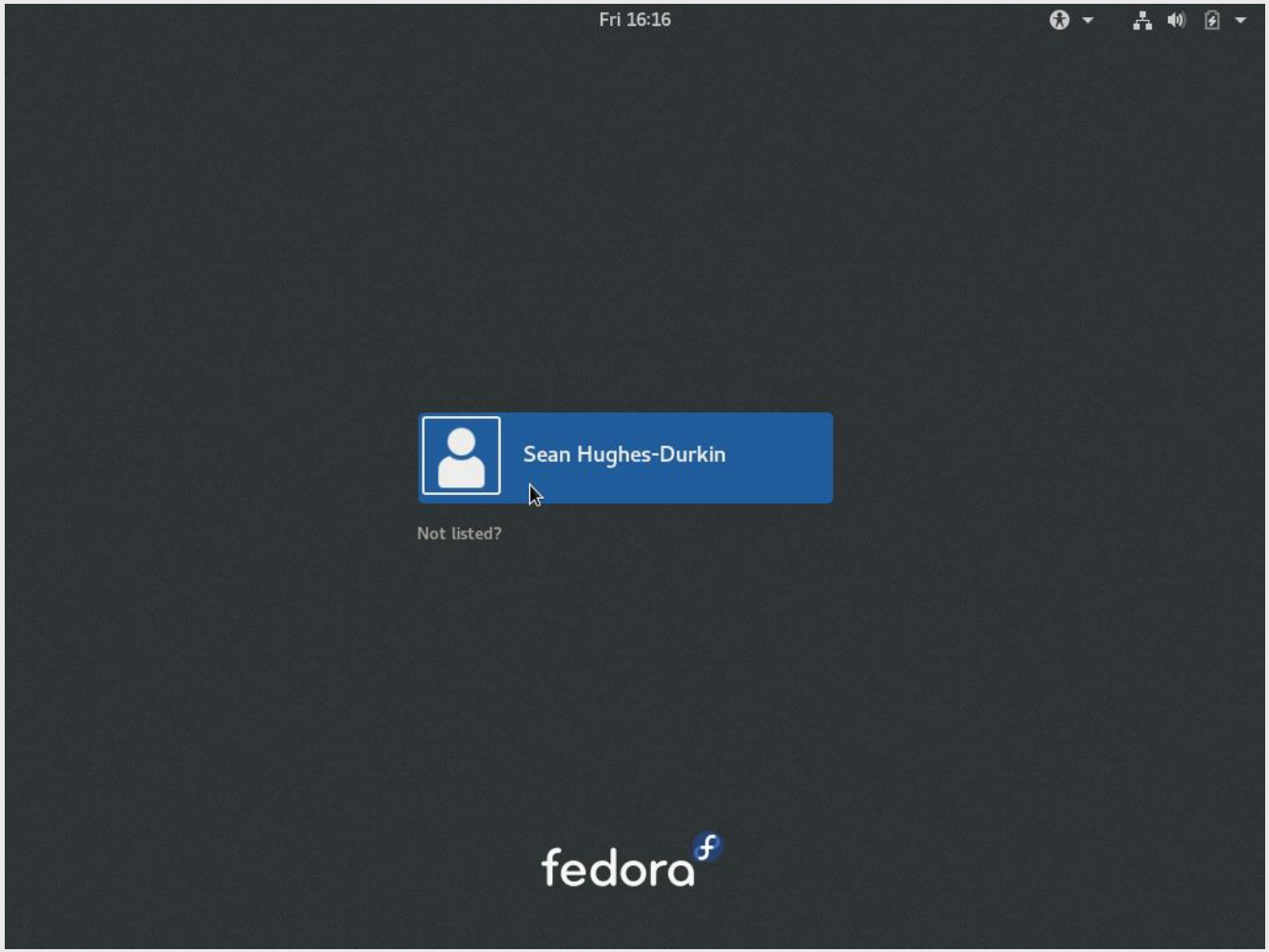


Installation complete

Completing the Firstboot Wizard

- Complete the installation
  - License agreement
  - User accounts and authentication
  - Set date and time
- Log in with user account for daily tasks

Completing the Firstboot Wizard



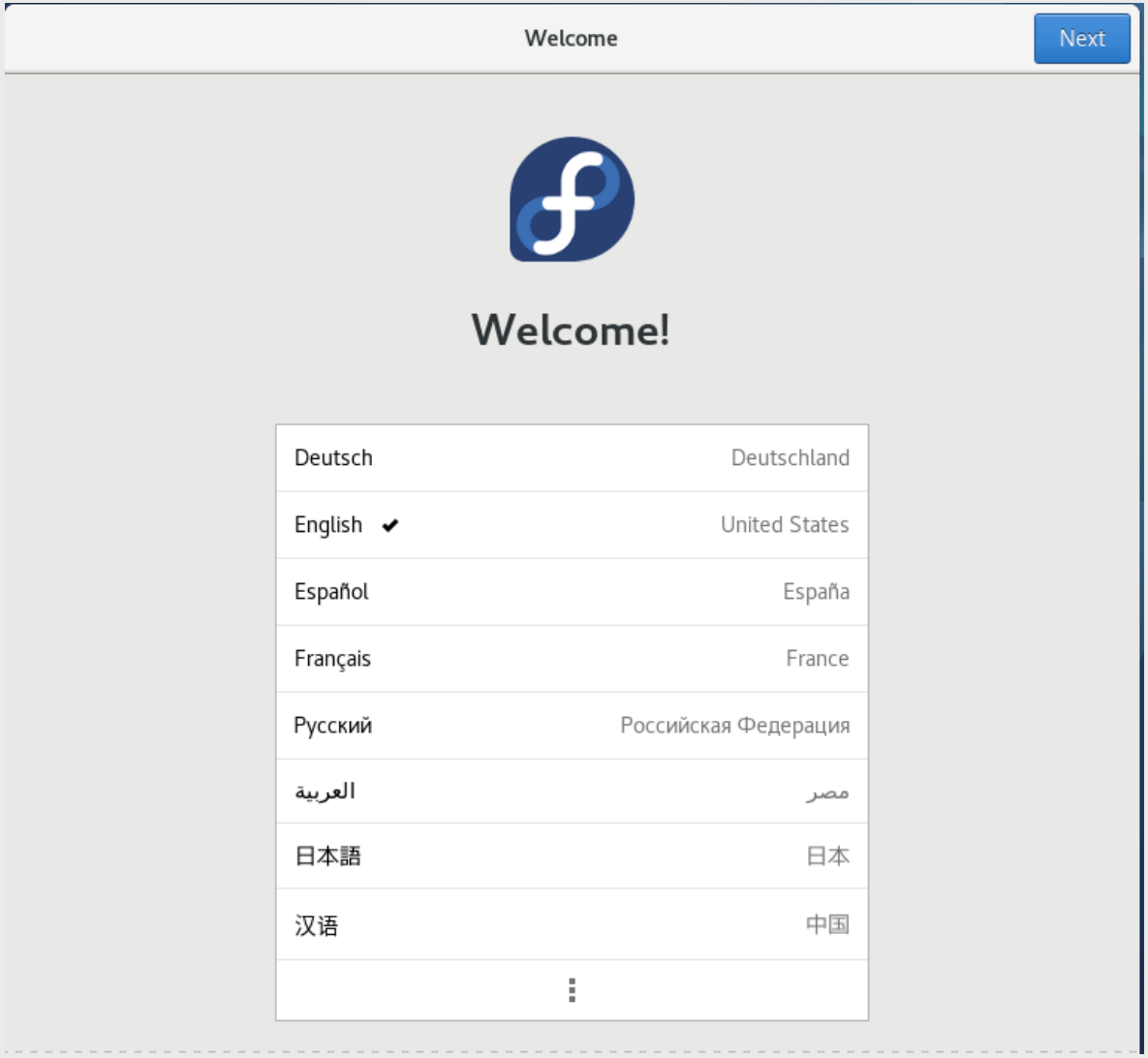
Select your name to login

Completing the Firstboot Wizard

Enter password to sign in

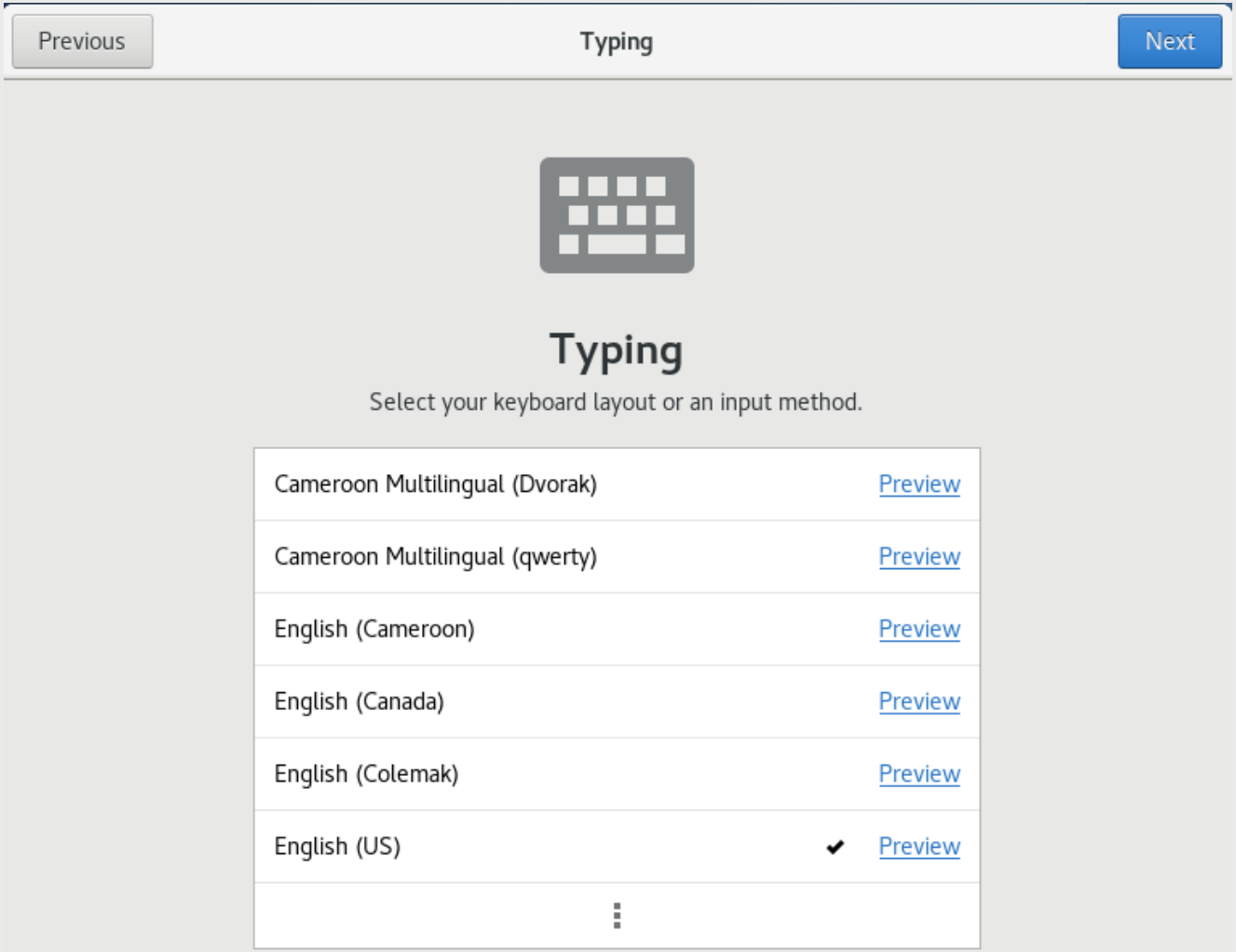
Completing the Firstboot Wizard

The Firstboot Wizard



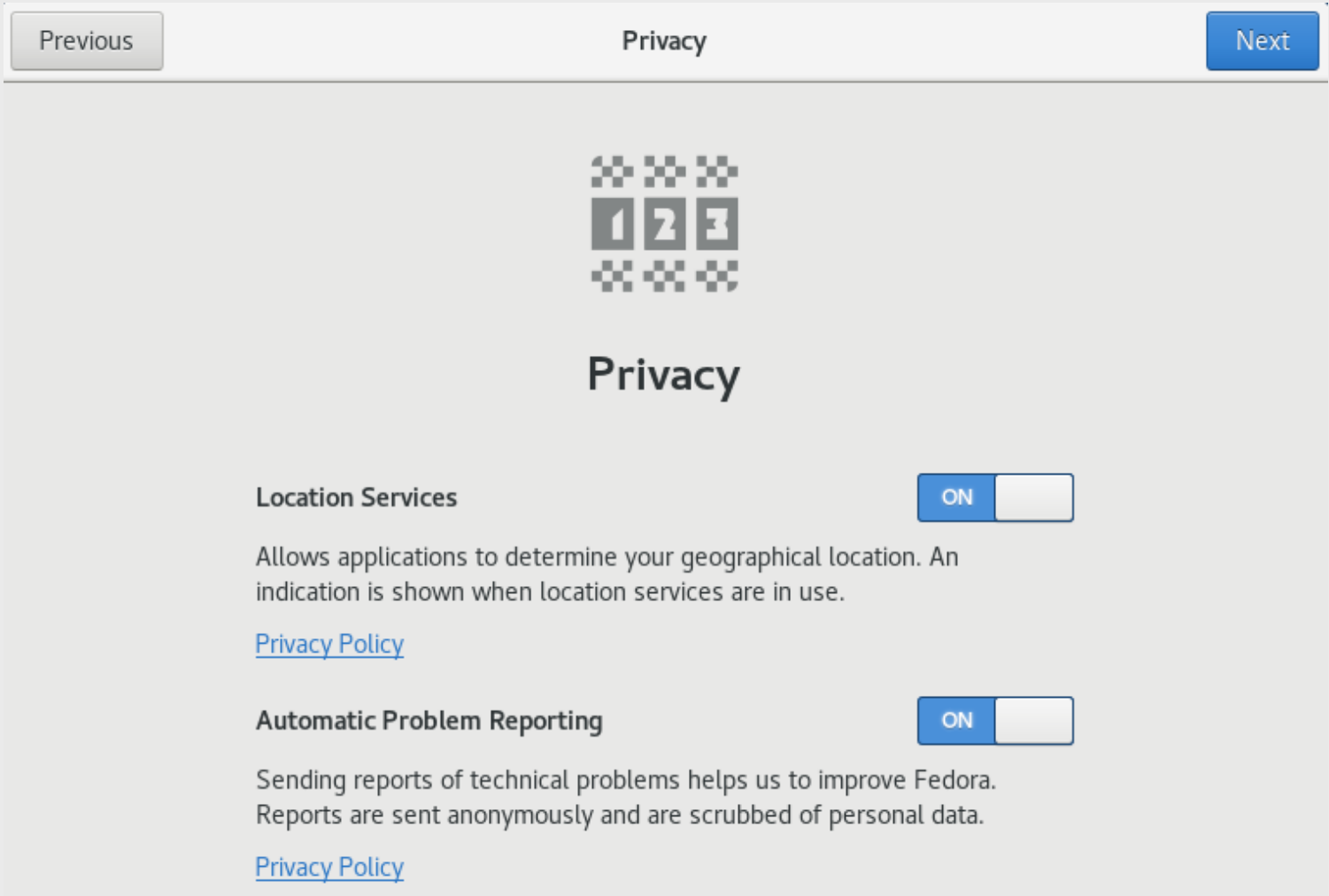
Completing the Firstboot Wizard

Typing



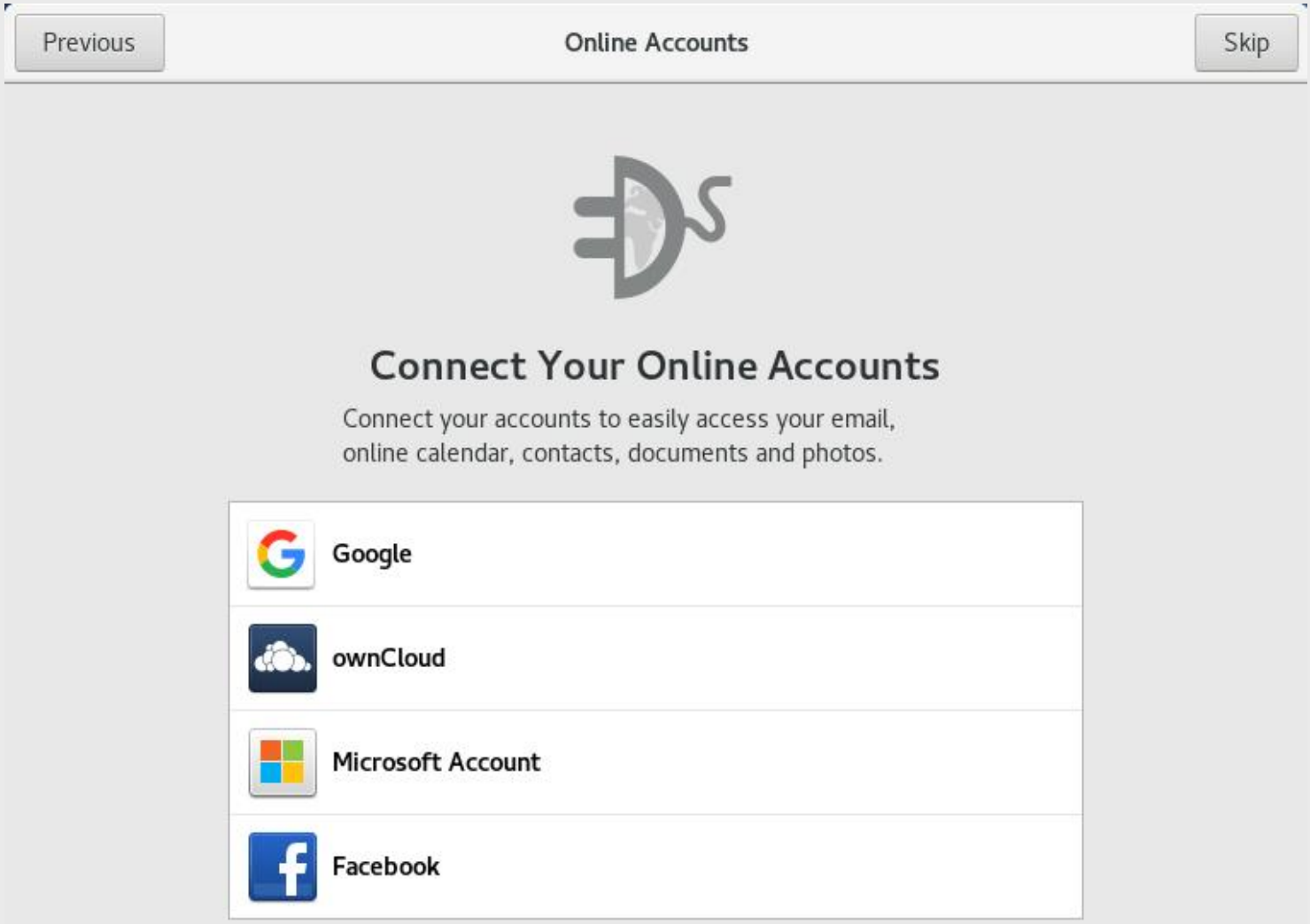
Completing the Firstboot Wizard

Privacy



Completing the Firstboot Wizard

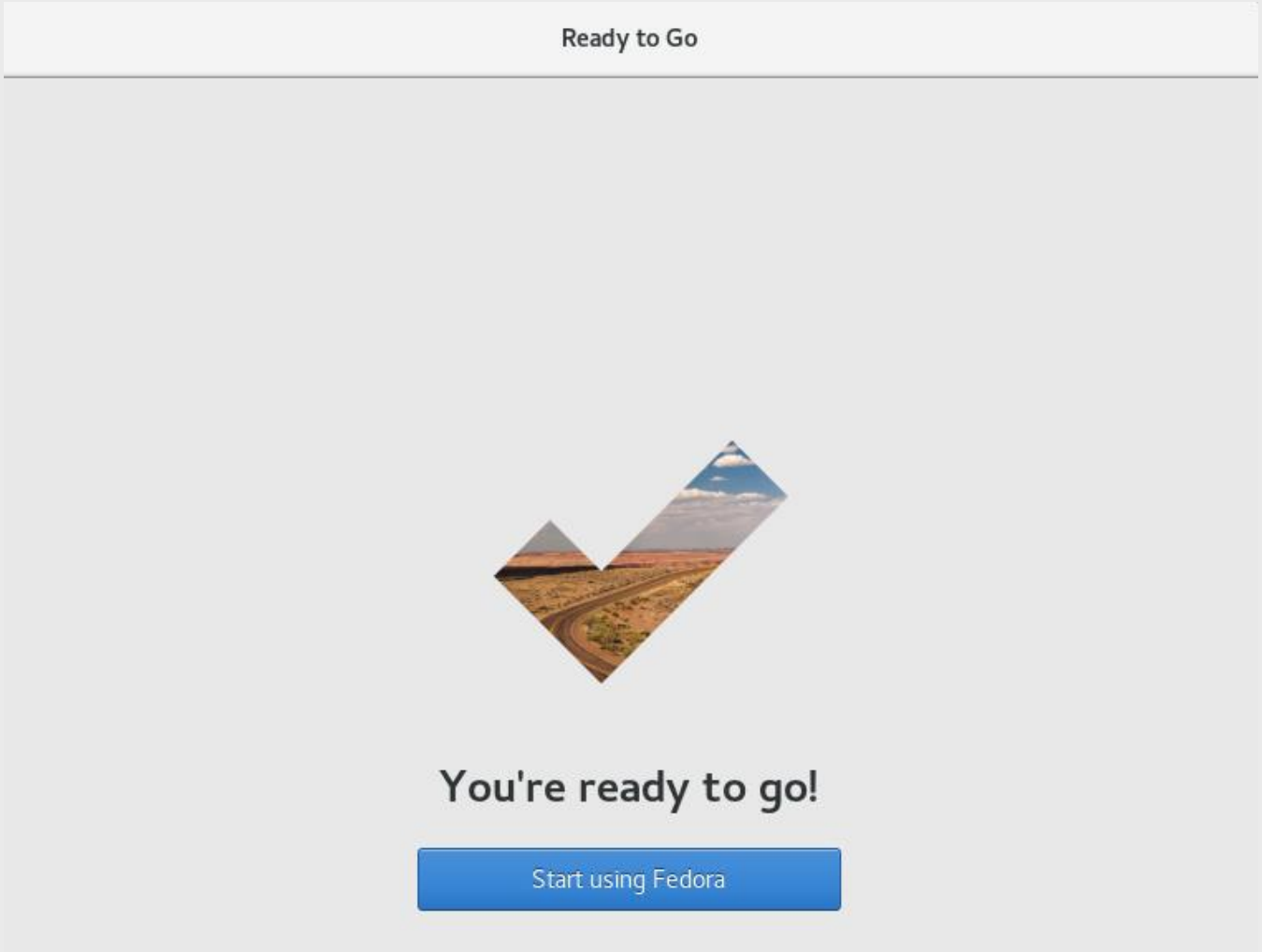
Skip to Start GNOME



Completing the Firstboot Wizard

Start

GNOME



Completing the Firstboot Wizard

The GNOME desktop

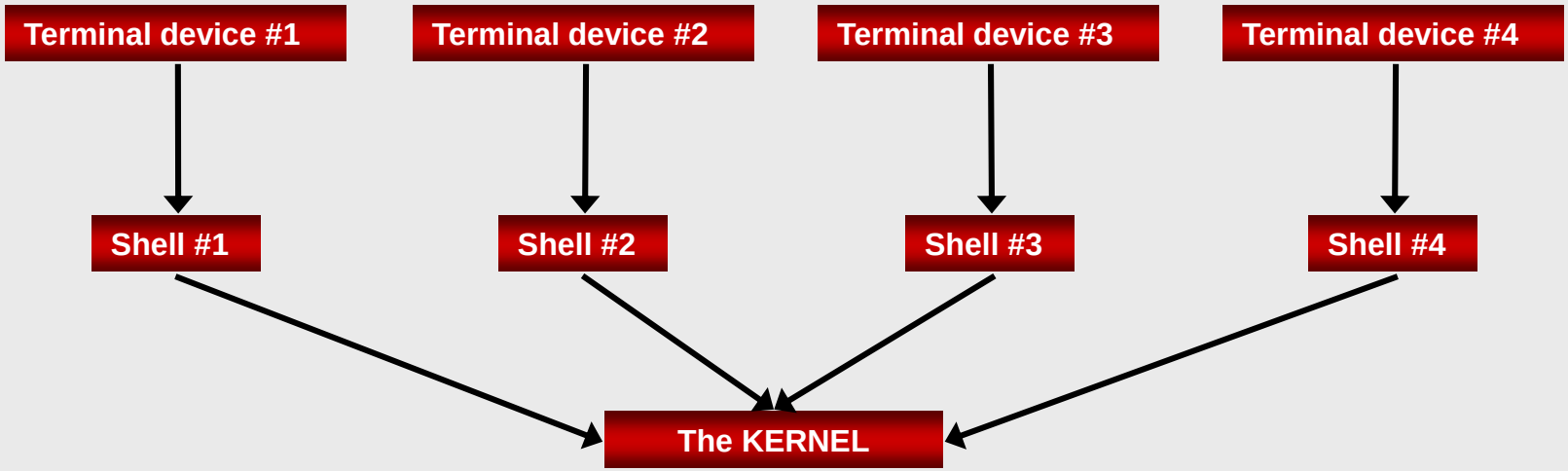
Basic Linux Usage

- It is essential to understand:
  - The different types of user interface
  - Basic tasks, such as:
    - Command execution
    - Obtaining online help
    - Shutting down the Linux system

Shells, Terminals & the Kernel

- Terminal
  - Channel that allows a certain user to log in and communicate with the shell via a user interface
- Shell
  - User interface accepts input from the user and passes input to the kernel for processing
  - Default Linux shell is the **BASH Shell (Bourne Again Shell)**
- Linux allows multiple terminals
  - Each terminal can utilize a different shell
  - For now, we will utilize the BASH shell in all terminals

Shells, Terminals & the Kernel



Shells, terminals, and the kernel

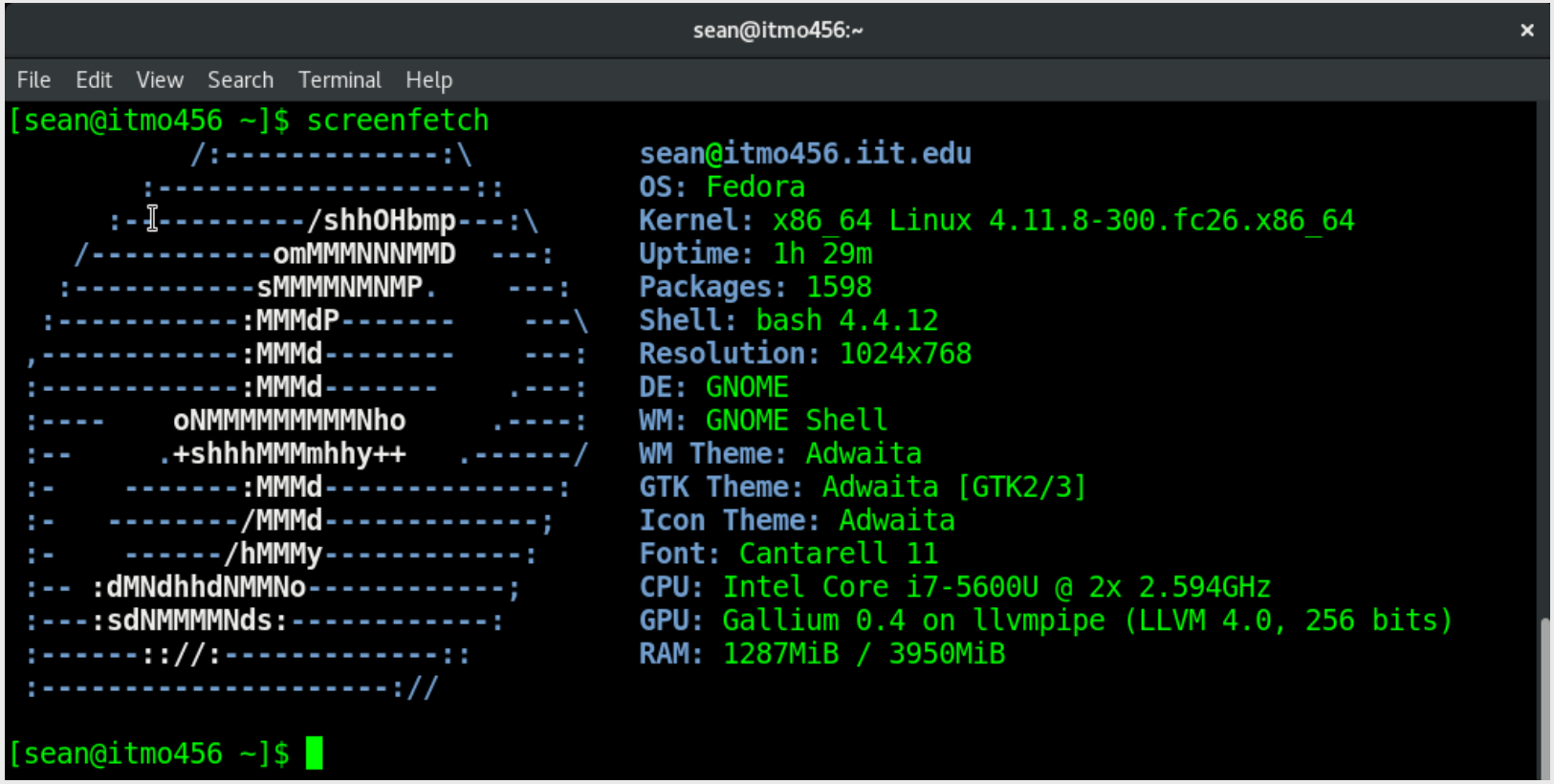
Shells, Terminals & the Kernel

- Graphical Terminal Emulator
  - Start GUI environment on top of BASH shell OR
  - Switch to a graphical terminal
    - e.g., GNOME Display Manager (gdm)
- From the local server, use key combinations to change to separate command-line terminal
  - Such as **`Ctrl+Alt+F2`**
  - GUI terminal much more ideal to utilize

Shells, Terminals & the Kernel

- Command-line terminal may be accessed from GUI environment
- Command prompt layout:
  - Username: sean
  - Hostname: itmo456
  - Current Directory: ~
  - Root user: **#**
  - Regular user: **$**
  - Example: [sean@itmo456 ~] $

Shells, Terminals & the Kernel



GNOME GUI Terminal utilizing the BASH shell

Shells, Terminals & the Kernel

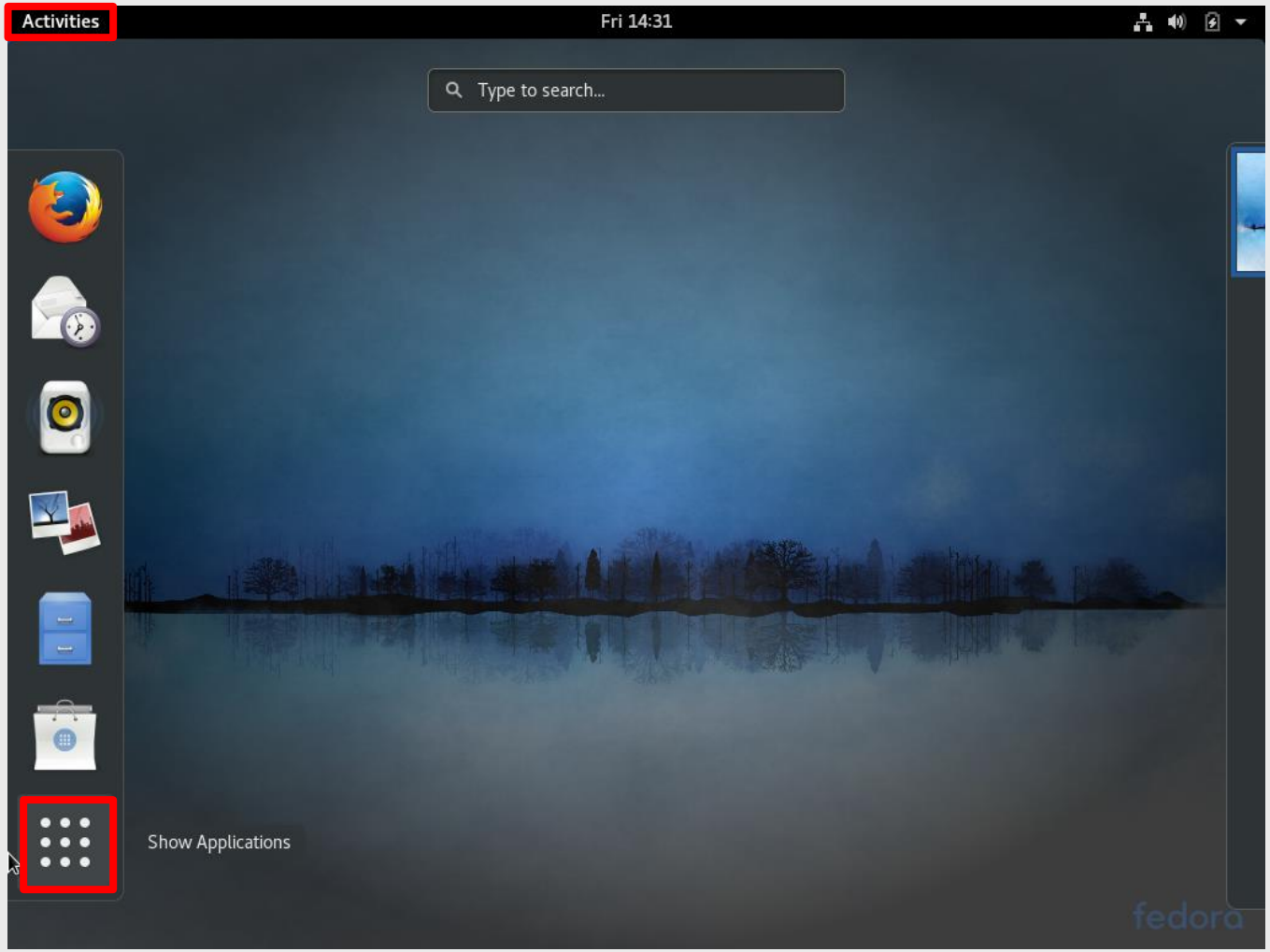
Terminal Name	Key Combination	Login Type
tty1*	[Ctrl]+[Alt]+F1	graphical
tty2*	[Ctrl]+[Alt]+F2	command-line
tty3*	[Ctrl]+[Alt]+F3	command-line
tty4*	[Ctrl]+[Alt]+F4	command-line
tty5*	[Ctrl]+[Alt]+F5	command-line
tty6*	[Ctrl]+[Alt]+F6	command-line

***Terminal can be GUI or command-line due to utilizing the next available tty**

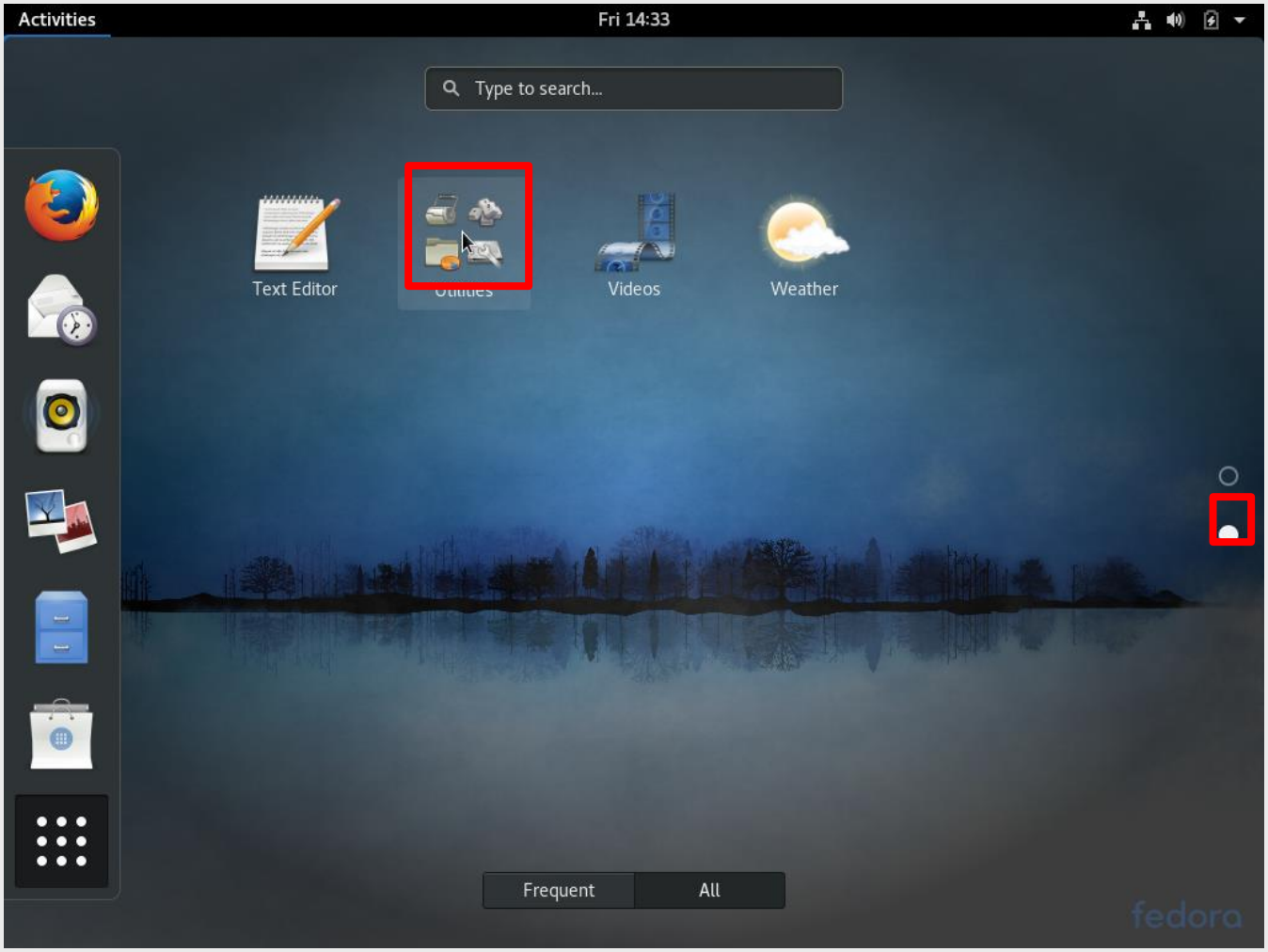
Shells, Terminals & the Kernel

- The default GUI environment in Fedora Linux is GNOME
- Graphical command-line terminal may be accessed from GNOME by accessing the **`Activities`** menu in the upper left of the desktop
  - Navigate to **`Show Applications (3 dots x 3 dots bottom left), Utilities, Terminal`**
  - Utilize the search box for **`terminal`**

Shells, Terminals & the Kernel

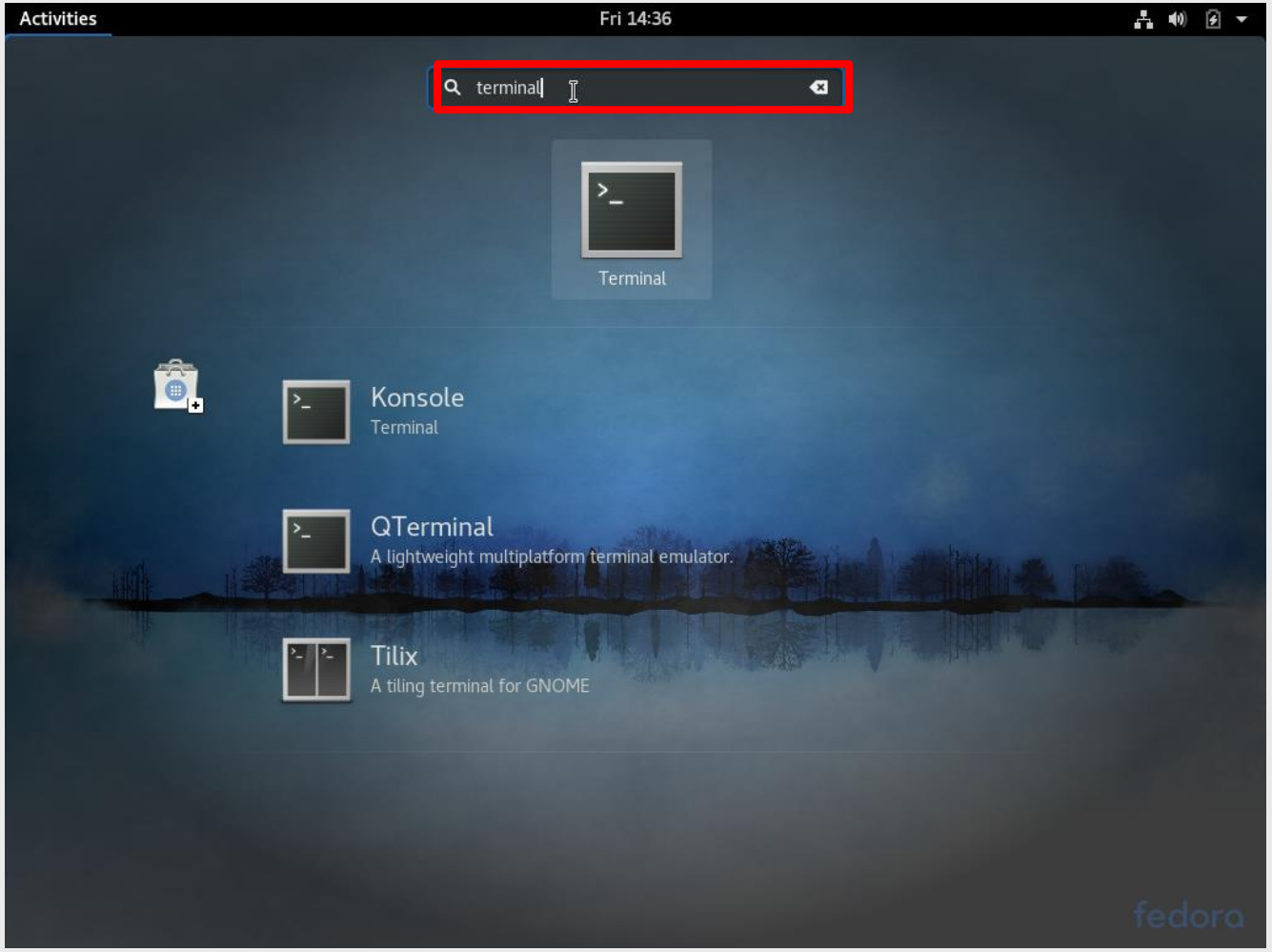


Shells, Terminals & the Kernel

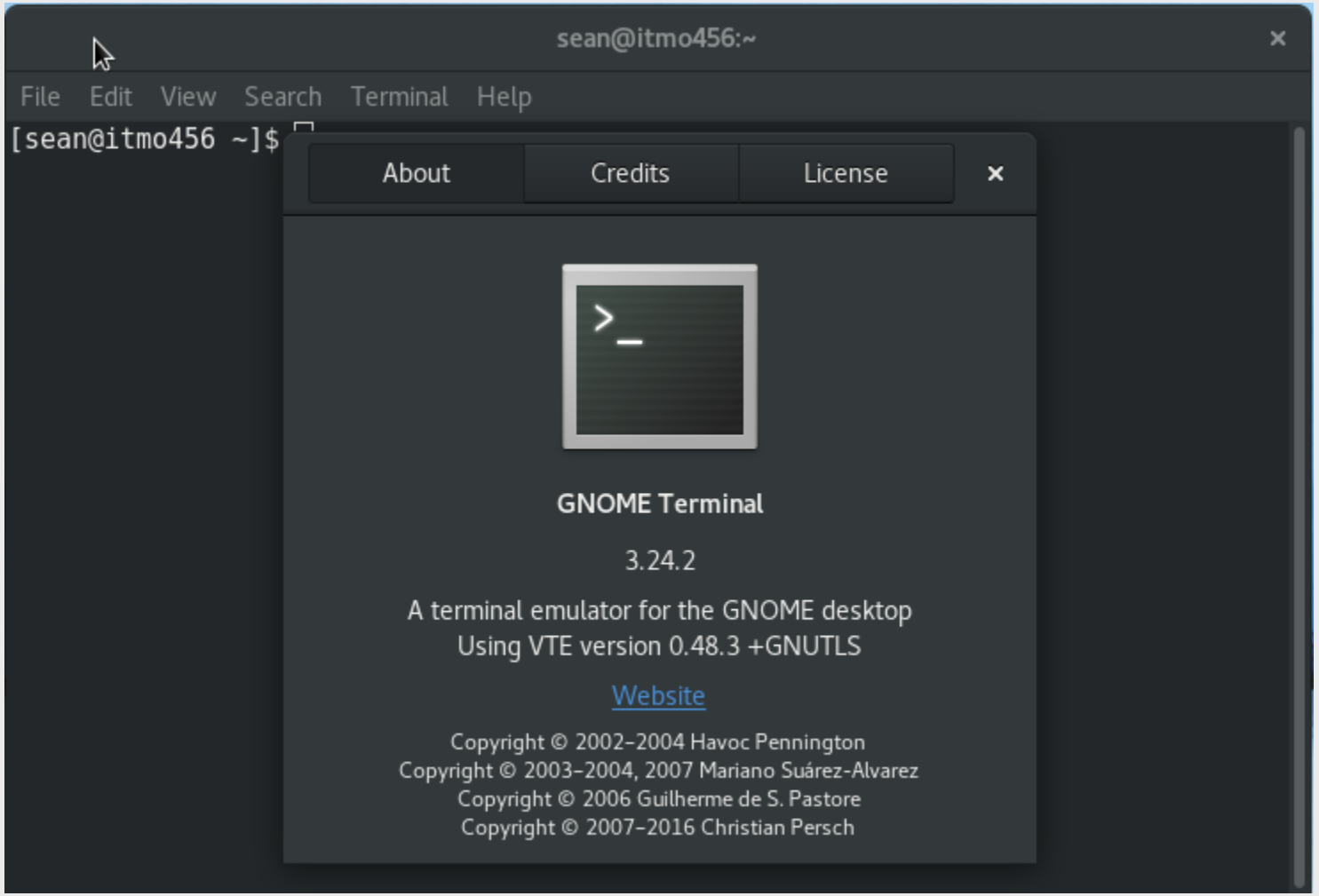


Shells, Terminals & the Kernel

Shells, Terminals & the Kernel

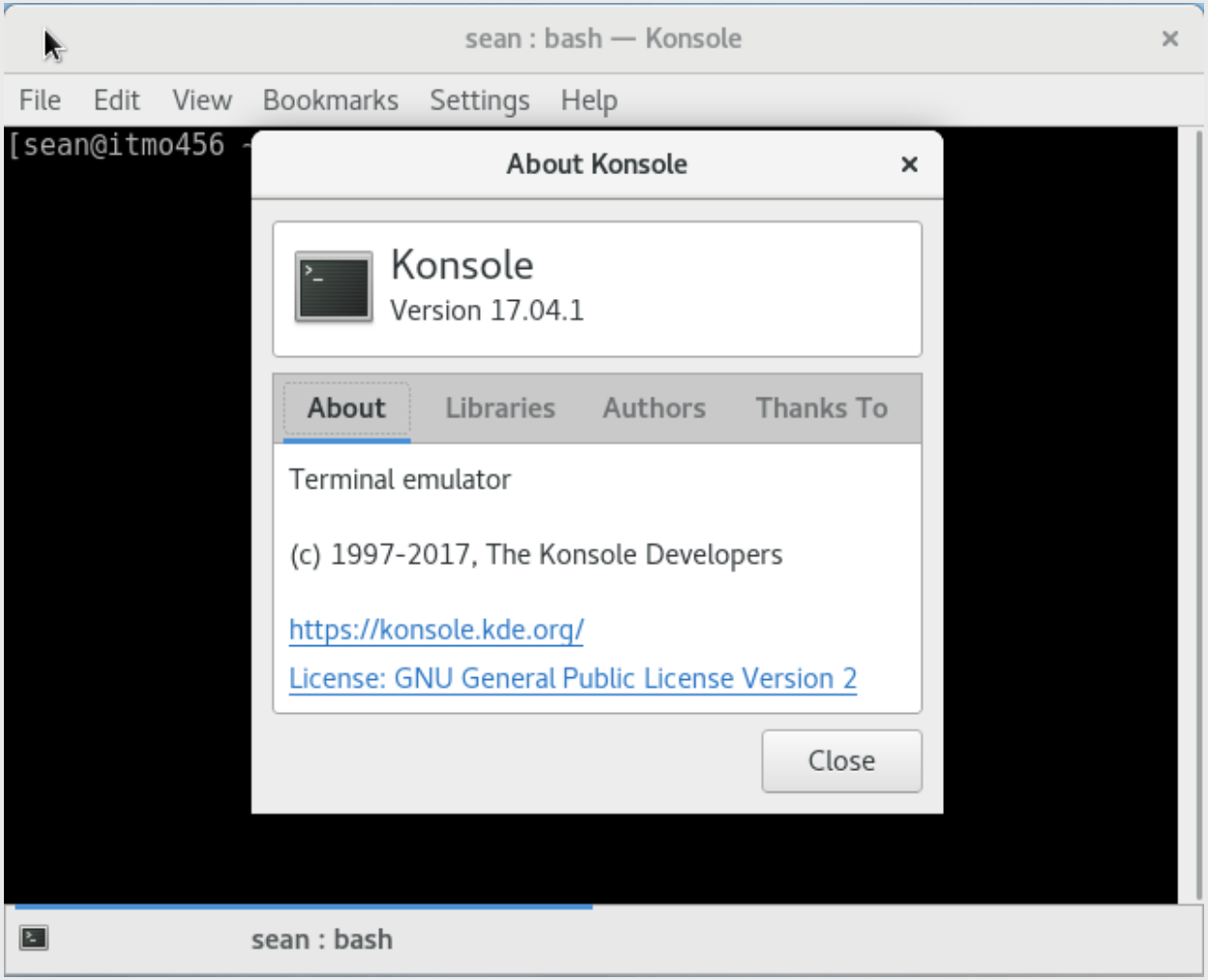


Shells, Terminals & the Kernel



A Gnome Terminal

Shells, Terminals & the Kernel



A KDE Terminal

Basic Shell Commands

- Commands
  - Indicate name of program to execute
  - Case sensitive
- Options
  - Specific letters starting with “-” or words starting with “--” appearing after command
  - Alter way command works; are optional
- Arguments
  - Specify a command’s working parameters
  - Can be optional

Basic Shell Commands

LINUX & OPEN SOURCE

command
option added

argument added

```
[sean@localhost ~]$ ls
Desktop  Documents  Downloads  Music  Pictures  Public  Templates  Videos
[sean@localhost ~]$ ls -l
total 32
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Desktop
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Documents
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Downloads
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Music
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Pictures
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Public
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Templates
drwxr-xr-x. 2 sean sean 4096 Nov 29 18:35 Videos
[sean@localhost ~]$ ls -l /
total 62
lrwxrwxrwx.   1 root root     7 Dec 11  2013 bin -> usr/bin
dr-xr-xr-x.   6 root root  1024 Nov 30 12:18 boot
drwxr-xr-x.  20 root root  3300 Jan 17 12:47 dev
drwxr-xr-x. 143 root root 12288 Jan 17 12:47 etc
drwxr-xr-x.   3 root root  4096 Nov 29 18:34 home
lrwxrwxrwx.   1 root root     7 Dec 11  2013 lib -> usr/lib
lrwxrwxrwx.   1 root root     9 Dec 11  2013 lib64 -> usr/lib64
drwx------.   2 root root 16384 Dec 11  2013 lost+found
drwxr-xr-x.   2 root root  4096 Aug  7  2013 media
drwxr-xr-x.   3 root root  4096 Nov 29 18:34 mnt
drwxr-xr-x.   2 root root  4096 Aug  7  2013 opt
dr-xr-xr-x. 187 root root     0 Jan 17 12:48 proc
dr-xr-x---.   9 root root  4096 Jan 17 13:30 root
drwxr-xr-x.  43 root root  1140 Jan 17 13:05 run
lrwxrwxrwx.   1 root root     8 Dec 11  2013 sbin -> usr/sbin
drwxr-xr-x.   2 root root  4096 Aug  7  2013 srv
dr-xr-xr-x.  13 root root     0 Jan 17 12:48 sys
drwxrwxrwt.  13 root root   440 Jan 17 13:39 tmp
drwxr-xr-x.  12 root root  4096 Dec 11  2013 usr
drwxr-xr-x.  21 root root  4096 Jan 17 12:48 var
```

Basic Shell Commands

Command	Description
`clear`	Clears the terminal screen
`reset`	Resets your terminal to default terminal settings
`who`	Displays currently logged-in users
`w`	Displays currently logged-in users and their tasks
`whoami`	Displays your login name
`id`	Displays the numbers associated with your user account and group names, commonly referred to as User IDs (UIDs) and Group ID (GIDs)
`date`	Displays the current date and time
`cal`	Displays the calendar for the current month
`exit`	Exits out of your current shell

Some common Linux commands

Basic Shell Commands

LINUX & OPEN SOURCE

```
[sean@localhost ~]$ who
sean     :0           2016-01-17 13:05 (:0)
sean     pts/0        2016-01-17 13:05 (:0)
[sean@localhost ~]$ w
 13:31:58 up 43 min,  2 users,  load average: 0.00, 0.01, 0.05
USER     TTY        LOGIN@   IDLE   JCPU   PCPU WHAT
sean     :0        13:05   ?xdm?  54.79s  0.09s gdm-session-worker [pam/gdm-pas
sean     pts/0     13:05    1.00s  0.05s  0.00s w
[sean@localhost ~]$ whoami
sean
[sean@localhost ~]$ id
uid=1000(sean) gid=1000(sean) groups=1000(sean) context=unconfined_u:unconfined_
r:unconfined_t:s0-s0:c0.c1023
[sean@localhost ~]$ date
Sun Jan 17 13:32:29 CST 2016
[sean@localhost ~]$ cal
    January 2016
Su Mo Tu We Th Fr Sa
                1  2
 3  4  5  6  7  8  9
10 11 12 13 14 15 16
17 18 19 20 21 22 23
24 25 26 27 28 29 30
31
[sean@localhost ~]$
```

Shell Metacharacters

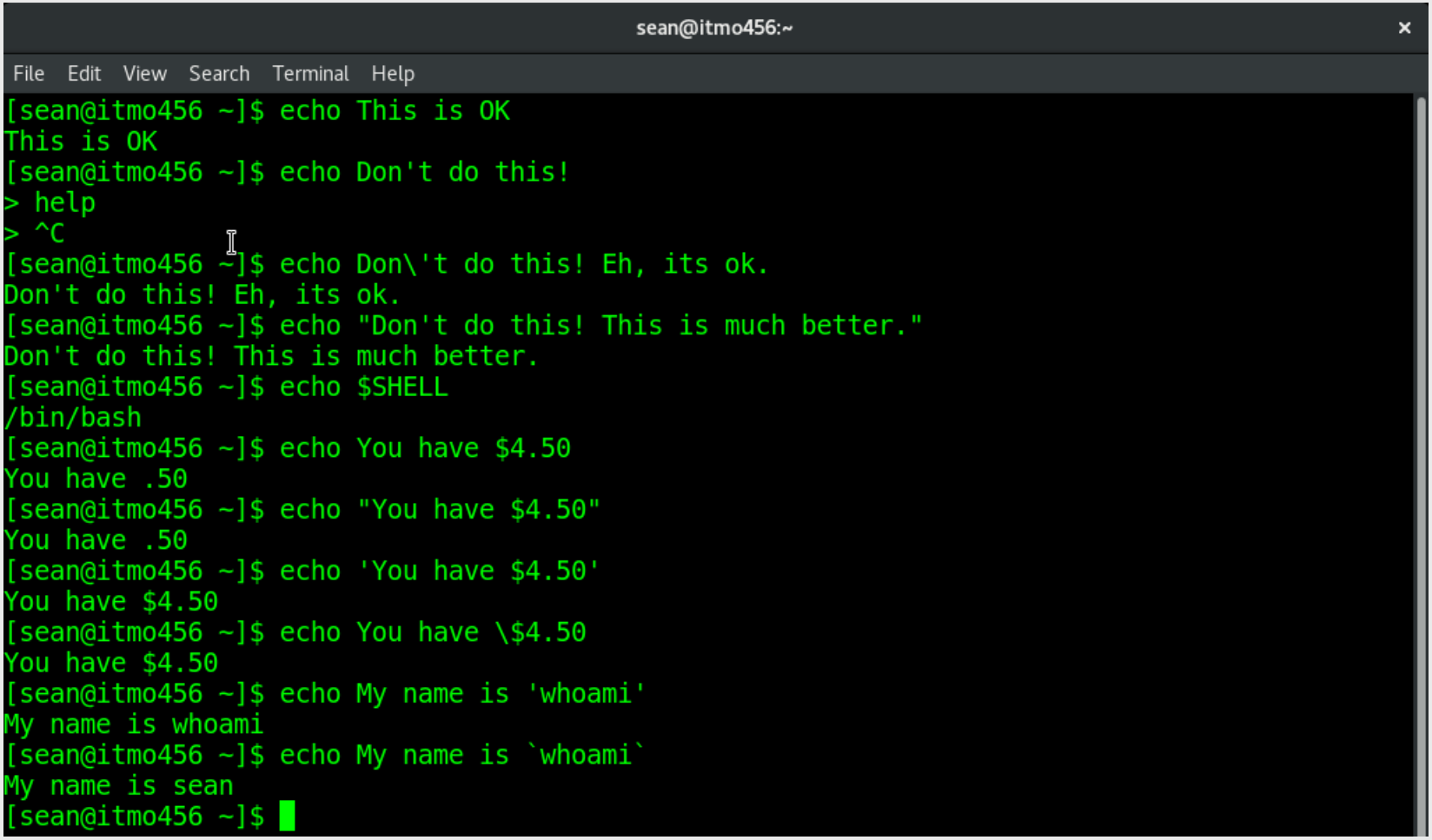
- Metacharacters
  - Key combinations that have special meaning
  - One of the most commonly used metacharacters is the **$** character
    - Refers to a variable
  - Avoid use of metacharacters when typing commands unless using their special functionality
  - Single quotation marks ‘ ’ protect metacharacters from being interpreted specially by the shell

Shell Metacharacters

Command	Description
$	Shell variable
~	Special home directory variable
&	Background command execution
;	Command termination
< << >> >	Input/output redirection
|	Command piping
*?[]	Shell wildcards
‘ “ \	Metacharacter quotes
`	Command substitution
( ) { }	Command grouping

Common BASH Shell metacharacters

Shell Metacharacters



Getting Command Help

- Linux distributions often contain more than 1000 different Linux commands in common configurations
- Manual pages
  - Most common form of documentation for Linux commands; aka “man” pages
  - At command prompt, type **`man`** followed by **section** followed by a **command** name
  - Contain different sections
  - Keyword searchable
    - **`man -k cron`**
    - **`apropos cron`**

Getting Command Help

Manual Page Section	Description
1	Commands any user may execute
2	Linux system calls
3	Library routines
4	Special device files
5	File formats
6	Games
7	Macro packages
8	Commands that only the root user may execute
9	Linux kernel routines
n	New commands not categorized yet

Manual page section numbers

Getting Command Help


```
[sean@localhost ~]$ man -k cron
anacrontab (5)       - configuration file for Anacron
anacron (8)          - runs commands periodically
cron (8)             - daemon to execute scheduled commands
crond (8)            - daemon to execute scheduled commands
crontab (1)          - maintains crontab files for individual users
crontab (5)          - files used to schedule the execution of programs
crontabs (4)         - configuration and scripts for running periodical jobs
[sean@localhost ~]$ apropos cron
anacrontab (5)       - configuration file for Anacron
anacron (8)          - runs commands periodically
cron (8)             - daemon to execute scheduled commands
crond (8)            - daemon to execute scheduled commands
crontab (1)          - maintains crontab files for individual users
crontab (5)          - files used to schedule the execution of programs
crontabs (4)         - configuration and scripts for running periodical jobs
[sean@localhost ~]$ man cron
```

Getting Command Help

LINUX & OPEN SOURCE

```
CRON(8)                    System Administration                    CRON(8)

NAME
       crond - daemon to execute scheduled commands

SYNOPSIS
       crond [-c | -h | -i | -n | -p | -P | -s | -m<mailcommand>]
       crond -x [ext,sch,proc,pars,load,misc,test,bit]

DESCRIPTION
       Cron  is  started  from  /etc/rc.d/init.d or /etc/init.d when classical
       sysvinit scripts are used. In case systemd is enabled, then  unit  file
       is  installed  into  /lib/systemd/system/crond.service  and  daemon  is
       started by systemctl start crond.service command.  It  returns  immedi-
       ately,  thus, there is no need to need to start it with the '&' parame-
       ter.

       Cron searches /var/spool/cron for crontab files which are  named  after
       accounts in /etc/passwd; The found crontabs are loaded into the memory.
       Cron also searches for /etc/anacrontab and any files in the /etc/cron.d
       directory,  which have a different format (see crontab(5)).  Cron exam-
       ines all stored crontabs and checks each job to see if it needs  to  be
       run  in  the  current  minute.   When executing commands, any output is
       mailed to the owner of the crontab (or to the  user  specified  in  the
 Manual page cron(8) line 1 (press h for help or q to quit)
```

Getting Command Help

- Info pages
  - Set of local, easy-to-read command syntax documentation
  - At command prompt, type **`info`** followed by a command name
  - Originally intended to replace the man command in Linux
- Some commands do not have manual or info pages
  - Usually functions that are built into the BASH shell

Getting Command Help


```
File: *manpages*,  Node: cron,  Up: (dir)

CRON(8)                        System Administration                        CRON(8)



NAME
       crond - daemon to execute scheduled commands

SYNOPSIS
       crond [-c | -h | -i | -n | -p | -P | -s | -m<mailcommand>]
       crond -x [ext,sch,proc,pars,load,misc,test,bit]

DESCRIPTION
       Cron  is  started  from  /etc/rc.d/init.d or /etc/init.d when classical
       sysvinit scripts are used. In case systemd is enabled, then  unit  file
       is  installed  into  /lib/systemd/system/crond.service  and  daemon  is
       started by systemctl start crond.service command.  It  returns  immedi-
       ately,  thus, there is no need to need to start it with the '&' parame-
       ter.

       Cron searches /var/spool/cron for crontab files which are  named  after
       accounts in /etc/passwd; The found crontabs are loaded into the memory.
-----Info: (*manpages*)cron, 171 lines --Top-------------------------------------
Welcome to Info version 5.1. Type h for help, m for menu item.
```

The root user

- The system administrator account in Linux is named “root”
  - System-wide commands can only be issued by root
  - System-wide configurations can only be modified by root
  - Some systems allow root-level privileges using the **sudo** command

The root user

- Best practice is log in as a regular user and become root by the **`su`** (substitute-user) command
  - **`su`** with no username specified sets the user as **`root`**
  - Must give the root password to become root using **`su`**
  - **`root`** can become any user using the command **`su - username`**

Root in Ubuntu

- Ubuntu will not allow you to log in as the root user
- Root commands are issued from the command line using **`sudo`** which will ask you for your password
  - You can open a persistent root command-line session by entering **`sudo su - or sudo –s or sudo -i`**
- Fedora can be configured to use **`sudo`**

Easy **sudo** setup

- Add your user to the **wheel** group as it is pre-configured to allow root level sudo access
- As the root user
  - **`usermod -G wheel sean`**
  - **`ie: usermod -G group username`**
- Now your user account can use sudo rather than becoming root

Shutting Down the Linux System

- The OS handles writing data from computer memory to the disk drives
  - Simply turning off power to the computer might result in damaged user and system files
- Issue the **`shutdown`** command
  - Can halt or reboot your computer after a certain period of time
- To stop the shutdown
  - Press **`Ctrl and c`** keys and then issue the command **`shutdown -c`** to cancel the shutdown

Shutting Down the Linux System

Command	Description
`shutdown -h +4m`	Halts your system in four minutes
`shutdown -r +4m`	Reboots your system in four minutes
`shutdown -h now`	Halts your system immediately
`shutdown -r now`	Reboots your system immediately
`shutdown -c`	Cancels a scheduled shutdown
`halt`	Halts your system immediately
`poweroff`	Halts your system immediately and powers down the computer
`reboot`	Reboots your system immediately

Commands to hald and reboot the Linux OS

Summary

- Prior to installation
  - Verify hardware requirements using HCL
  - Create preinstallation checklist
- Most software information can be specified at installation
  - Network configuration and package selection should be carefully planned before installation
- You can obtain Linux installation media by downloading an ISO image from the Internet
  - Can be written to a DVD or USB flash drive

Summary

- Installation prompts for language, boot loader, hard disk partitions, network configuration, firewall configuration, time zone, user accounts, authentication, and package selection
- Users must log in to a terminal and receive a shell before they are able to interact with the Linux system and kernel

Summary

- From any type of terminal you can enter commands, options, and arguments at a shell prompt to perform system tasks, obtain command help, or shut down Linux
- Shells are case sensitive and understand a variety of special characters called shell metacharacters, which should be protected if their special meaning is not required

The End…

- Questions?