

OSL640: INTRODUCTION TO OPEN SOURCE SYSTEMS

WEEK 7:

INSTALLING LINUX / LIVE LINUX DISTRIBUTIONS

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LESSON 1 TOPICS

Installing Linux

- Purpose / Linux Distributions
- Linux Installation Methods

Live Linux Distributions

- Purpose
- Run **Red Hat Enterprise Linux (RHEL)** from your **home** computer (as a **Virtual Machine**)

Week 7 Tutorial

- INVESTIGATIONS 1 & 2

INSTALLING LINUX

Having a Linux system on your home computer provides access to a large library of **open source software**.

Also, installing your own version of Linux on your notebook or desktop computer teaches you how to:

- **Work in the Linux environment**
- **Run graphical applications**
- **Perform routine Linux OS administration tasks**



TRADITIONAL LINUX INSTALLATION

STEPS:

1. Select a **Linux Distribution** and **download** a Linux Distribution Install **ISO** file to your Computer (**Note:** Be aware of any required Hardware Requirements for the Linux OS prior to installation.)

Knoppix Link: <https://www.knopper.net/knoppix-mirrors/index-en.html>

2. Burn a Linux Distribution **CD/DVD**, or **USB Key**.

How to Burn CD: [Install Knoppix Linux](#)

How to Burn USB Key: [How to Boot Knoppix from USB](#)

3. For most distributions, the installation involves a **guided graphical environment**.

Download KNOPPIX via BitTorrent

<http://torrent.unix-ag.uni-kl.de/>

Download KNOPPIX from Mirrors

Most of the following institutions have good connections to the German research networks (this is particularly useful for students and educators). They have graciously agreed to set up limited hosting areas for downloading the bootable KNOPPIX GNU/Linux ISO images:

Download from	Protocol	Site Sponsor		
ftp://uni-kl.de	[rsync CD] [rsync DVD] [ftp CD] [ftp DVD] [http CD] [http DVD]	Technische Universität Kaiserslautern ¹⁾		
ftp://knoppix.nl	[rsync CD] [rsync DVD] [ftp CD] [ftp DVD] [http CD] [http DVD]	HCC Unix.gp 2.SGBit Link (Netherlands) ²⁾		
mirror.kodinos.net	[rsync CD] [rsync DVD]	KoDios.Net Dronen (Netherlands)		
ftp://gwdg.de	[ftp CD] [ftp DVD] [http CD] [http DVD]	Gesellschaft für wissenschaftliche Datenverarbeitung mbH Göttingen		
sunsite.informatik.rwth-aachen.de	[ftp]	[http]	Rheinisch-Westfälische Technische Hochschule Aachen	
hallfax.rwth-aachen.de	[rsync]	[ftp]	[http]	Rheinisch-Westfälische Technische Hochschule Aachen
ftp://tu-chemnitz.de		[ftp]	[http]	TU Chemnitz
www.technik3d.com			[http CD] [http DVD]	Technic3D (Online Hardware Magazin)
ftp://plusline.de	[rsync]	[ftp]		Plus.Line AG (Internet Provider)
ftp://uni-erlangen.de		[ftp]	[http]	Friedrich-Alexander-Universität Erlangen-Nürnberg (also IPv6)
knoppix.ftp.fu-berlin.de		[ftp]		Freie Universität Berlin
ftp://tu-wg.de	[rsync]	[ftp]	[http]	Technische Universität Braunschweig
ftp://de.univ-frankfurt.de		[ftp]		Johann Wolfgang Goethe-Universität Frankfurt am Main
www.artfiles.org			[http]	Artfiles New Media GmbH
ftp://freenet.de		[ftp]	[http]	Freenet.de
ftp://tu-ilmannau.de		[ftp]	[http]	TU Ilmenau
ftp://rs.uni-wuerzburg.de		[ftp]		Universität Würzburg
ftp://uab.de		[ftp]	[http]	UX0.De
mirror.netcologne.de	[rsync]	[ftp]	[http]	NetCologne GmbH
ftp://free.fr		[ftp]		ProXad (France)
Bmla.Botk.hu	[rsync]	[ftp]	[http]	Semmelweis Orvostudományi Egyetem (Budapest, Hungary)
mirrors.csi1.org	[rsync]		[http]	Universidad de Chile (Santiago, Chile)
ftp://klid.de		[ftp]	[http]	Kommerzielle Linux-Interessenten / Danmark

LINUX INSTALLATION METHODS

Standalone Installation

Linux is the only OS on the computer.

Any existing data on disk will be **erased**.



LINUX INSTALLATION METHODS

Dual-boot / Multi-boot Installation

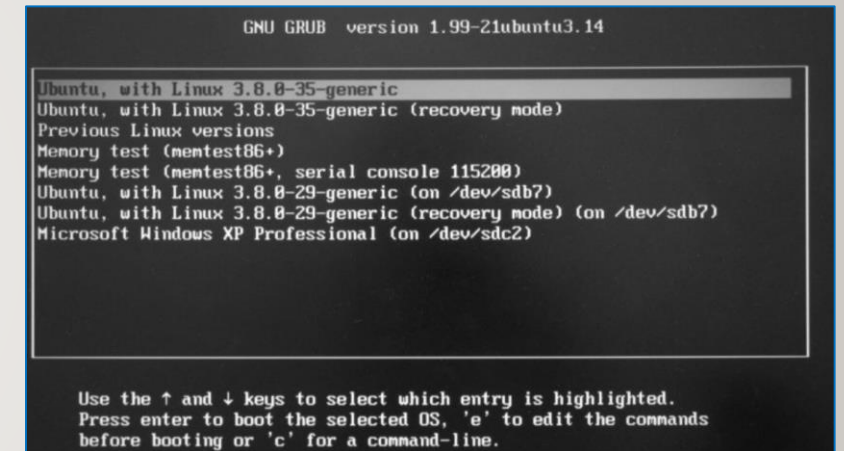
A **boot menu** allows the user to select the desired OS.

Advantages of Dual-Boot or Multi-Boot:

- This option provides a method to access your computer if one OS **fails to boot-up**.
- **Access the Windows partition** if your Windows OS cannot boot-up.
- This booting method is great for **troubleshooting** (for example: boot into Linux OS to eliminate a hardware issue).

Installation Tips:

- It is recommended to **back up important data** before proceeding.
- It is recommended to **install** the Linux operating system **last**, as other operating systems may NOT offer a **multi-boot option**.



```
GNU GRUB version 1.99-21ubuntu3.14

Ubuntu, with Linux 3.8.0-35-generic
Ubuntu, with Linux 3.8.0-35-generic (recovery mode)
Previous Linux versions
Memory test (memtest86+)
Memory test (memtest86+, serial console 115200)
Ubuntu, with Linux 3.8.0-29-generic (on /dev/sdb7)
Ubuntu, with Linux 3.8.0-29-generic (recovery mode) (on /dev/sdb7)
Microsoft Windows XP Professional (on /dev/sdc2)

Use the ↑ and ↓ keys to select which entry is highlighted.
Press enter to boot the selected OS, 'e' to edit the commands
before booting or 'c' for a command-line.
```

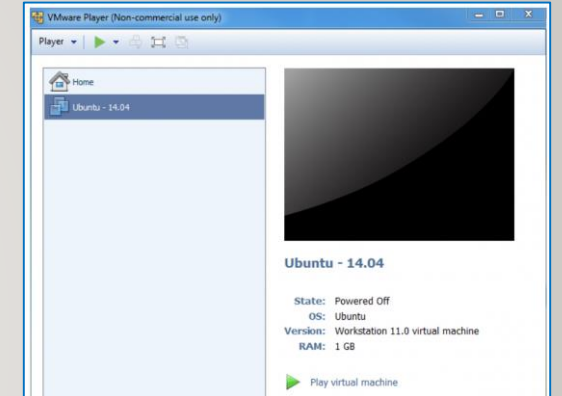

LINUX INSTALLATION METHODS

Virtualization Machine Installation

Virtualization is the process of running a **virtual instance** of a computer system in a layer **abstracted** from the actual hardware.

Reference: <https://opensource.com/resources/virtualization>

The virtualized (**guest**) operating system is installed and run in a window under another (**host**) computer's operating system. Special **software** is used to manage the entire process, referred to as the **hypervisor**.



LINUX INSTALLATION METHODS

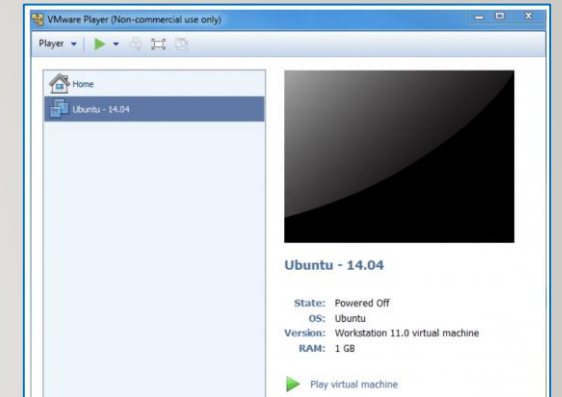
Virtualization Machine Installation

Advantages of Virtualization:

- You can run VM from an **ISO image file** or a **VM file**.
- One or more virtual machines can be run at the same time.
- The **guest OS shares hardware** with the **host OS** and possibly other virtualized systems.
- The **guest** systems have **network access** through the host.

Installation Tips:

- Virtualization requires a **compatible processor**: not all processors support that feature.
- Your **BIOS** should be set to enable **Virtualization**.
- Popular VM software for **Windows, Apple** and **Linux** OS include:
 - VMware
 - Oracle Virtual Box



RUNNING LIVE LINUX

Live Linux CD/DVD/USB

A live CD (also live DVD, live disc, or live operating system) is a complete bootable computer installation including operating system which runs directly from a CD-ROM or similar storage device into a computer's memory, rather than loading from a hard disk drive.

A Live CD allows users to run an operating system for any purpose without installing it or making any changes to the computer's configuration. Live CDs can run on a computer without secondary storage, such as a hard disk drive, or with a corrupted hard disk drive or file system, allowing data recovery.

Reference: https://en.wikipedia.org/wiki/Live_CD

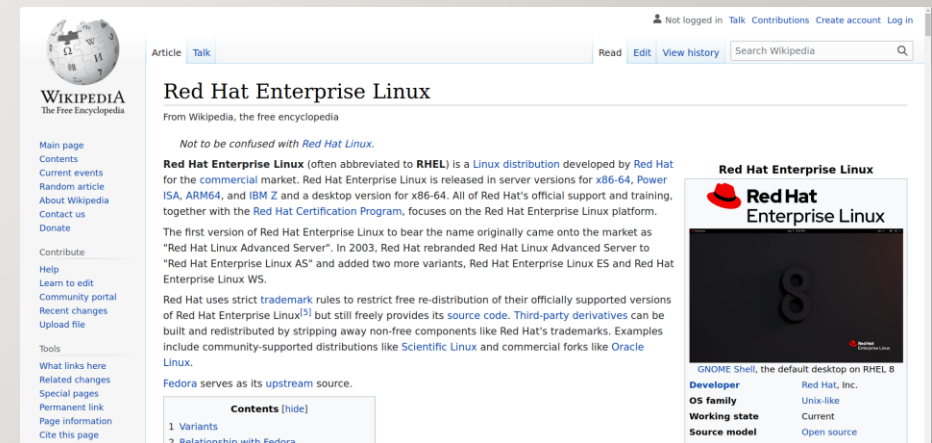


INSTALLING LINUX (RED HAT ENTERPRISE LINUX)

Tutorial 7 (in OSL640 WIKI)

Tutorial 7 contained in the Weekly Schedule of the OSL640 WIKI allows a person to **install** the Red Hat Enterprise Linux as a Virtual Machine. This can be useful for many tasks such as testing server configurations or code (web pages and databases) in a virtual test (or **development**) environment before deploying to a live (or **production**) server.

In this tutorial, you will install a virtual machine, install some software within that virtual machine and connect to the matrix server. These skills will be used in **OSL740**.



LIVE LINUX

Getting Practice

You can get practice by performing the **Week 7 Tutorial:**

- [INVESTIGATION 1: CREATING A RED HAT ACCOUNT AND DOWNLOADING THE ISO](#)
- [INVESTIGATION 2: CREATING A VIRTUAL MACHINE IN VMWARE AND INSTALLING RED HAT ENTERPRISE LINUX](#)
- [LINUX PRACTICE QUESTIONS](#)

LESSON II TOPICS

Administrative Access

- Super User (Root)
- Sudo, Visudo

Common System Administration Tasks

- Testing network connectivity: **ping**
- Installing software using your package management tools: **dnf** in **Red Hat Enterprise Linux (RHEL)**

Week 7 Tutorial

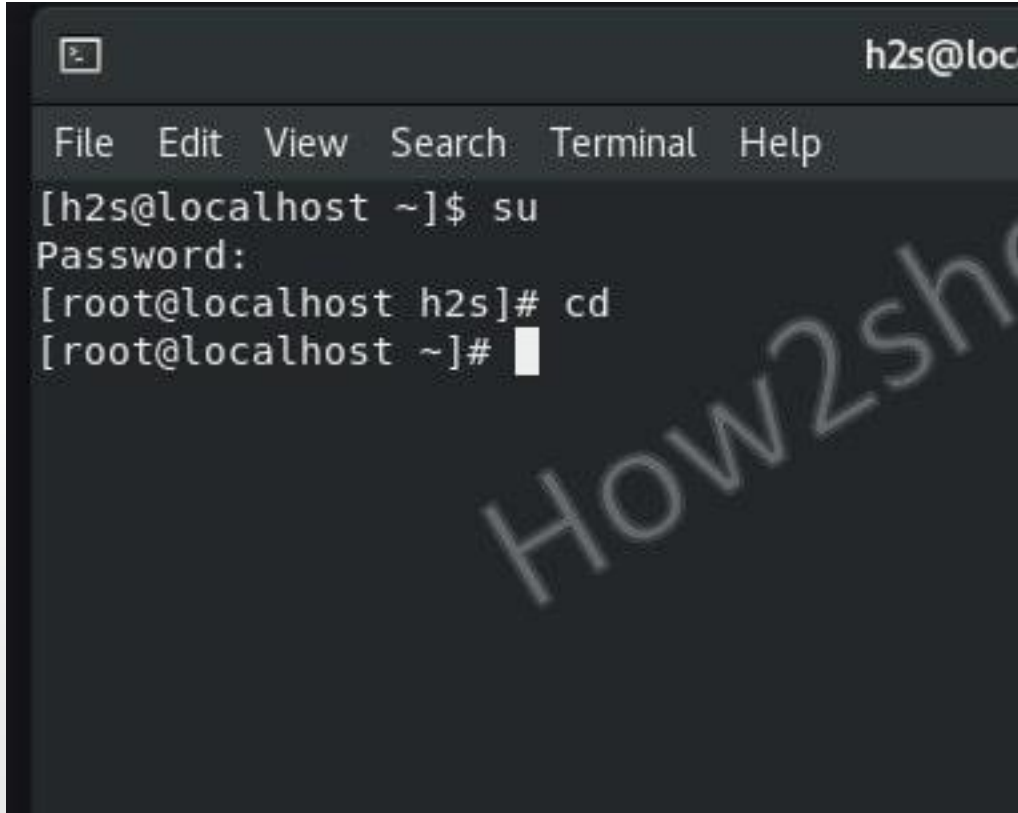
- INVESTIGATION 3
- 

ROOT AKA SUPER USER

- One of the things that makes Linux secure and less susceptible to viruses is the need for Root access to install software.
- The root user aka super user has full administrative access to the system.
- For this reason you should be very careful what you are doing any time you switch to the root user to execute commands.
- Commands like **rm -rf /*** can be extremely damaging to a Linux system if executed with elevated (root) privileges (**Warning:** Do not ever execute this command). Why?

SWITCHING TO ROOT

- You can switch to the root user (assuming you have the password) by issuing the command **su** without any argument (or alternatively **su -**).
- **DO NOT** try this in Matrix, as unauthorized attempts to switch to root are logged. An excessive number of these could get you into trouble.



```
h2s@loc
File Edit View Search Terminal Help
[h2s@localhost ~]$ su
Password:
[root@localhost h2s]# cd
[root@localhost ~]#
```

The image shows a terminal window with a dark background and white text. The window title is 'h2s@loc'. The menu bar includes 'File', 'Edit', 'View', 'Search', 'Terminal', and 'Help'. The terminal content shows the user 'h2s' at 'localhost' in the '~' directory. They enter the command 'su', which prompts for a password. After the password is entered, the prompt changes to '[root@localhost h2s]#', indicating the user is now root. The user then enters 'cd', and the prompt changes to '[root@localhost ~]#', indicating they are now in the root directory. A large, semi-transparent watermark 'How2sh' is visible diagonally across the terminal output.

SUDO

- As you can imagine providing all users who require administrative access the root password is highly insecure. Fortunately, there is another command in Linux that is a better option for this (and commonly used in industry). This is **sudo**.
- Sudo originally stood for **superuser do** (and is still commonly referred to this way), though the meaning has been expanded to **substitute user do** as you can use sudo for more than just running commands with root (elevated) privileges.
- Using sudo is like “Run as Administrator” in Windows. You would issue the **sudo** command in front of any command you wish to execute with root (elevated) privileges. You will then be prompted for your password. IF the system has been configured to allow you sudo access, your command will execute.
- One of the advantages to having administrators use sudo instead of switching to root is any changes made on the system while using sudo are logged to the system log using your regular user.
- Additionally, users can be configured to have access to only certain commands via sudo.

VISUDO

- In Linux, everything is a file. This is an important concept to remember when configuring systems and network services.
- Who is allowed to issue the **sudo** command is detailed in the file **/etc/sudoers**.
- While you can edit this file directly using a text editor like **Vi** or **Nano**, it is not recommended.
- Instead you should edit this by using the command **visudo**.
- **visudo** puts you into a special editing mode allowing you to edit the file while simultaneously locking the file (so two users cannot edit it at the same time) and checking the file for correct syntax.

TESTING NETWORK CONNECTIVITY

- In NWK680 you should have learned about the ping command, which is used to test network connectivity.
- Ping works the same in every Operating System (Cisco IOS, Windows, Linux or macOS).
- Ping can be used to test connectivity to an IP address or Fully Qualified Domain Name (FQDN).
- Simply issue: **ping** followed by the IP address or FQDN you wish to try to reach.
- Linux requires a network connection to install software or update the system. It is a good idea to test your network connection using **ping** before trying to do this.

PACKAGE MANAGEMENT / INSTALLING SOFTWARE

- Installing software in Linux requires both an active Internet connection and knowledge of which package management tool to use for your distribution (or distro). Linux software and updates come from special sources hosted on other servers, known as repositories (or repos). All the major Linux distros host their own repos, though anyone can host a repository for a distribution - and many organizations do. Due to the Open Source nature of Linux, certain repos may contain specialized software that is not available in the main repository (such as EPEL - Extra Packages for Enterprise Linux); or they may contain a mirror of the main repo.
- Red Hat based Linux distributions use DNF (Dandified Yum).
- This is an update of YUM (Yellowdog Updater, Modified).
- Both of these operate as a front end for RPM (Red Hat Package Manager). These are used in Red Hat based Linux distros, such as Red Hat Enterprise Linux and Fedora. The advantages of DNF and YUM over RPM is that they resolve dependencies (meaning if the software you are installing requires other software, they will install that as well). RPM does not do this, which can lead to a situation commonly referred to as dependency hell in industry.
- Installing software or updates always requires **root** or **sudo** access.



INSTALLING SOFTWARE

Getting Practice

You can get practice by performing the **Week 7 Tutorial:**

- [INVESTIGATION 3: INSTALLING THE GLOBAL PROTECT VPN AND CONNECTING TO MATRIX FROM YOUR VIRTUAL MACHINE](#)
- [LINUX PRACTICE QUESTIONS](#)