Assignment No: 3

Student Name: Rohaan Advani   **MIS:** 111903151

Course Teacher: Tanuja R Pattanshetti
Course Coordinator: Harish D Gadage

Aim: Study and Install Cent Operating System

Theory:

1. **Steps to Install Cent Operating System:**

   STEP1: Download CentOS 7
   To download the official and up-to-date CentOS 7 ISO file, navigate to https://www.centos.org/download/.

   Step 2: Create Bootable USB
   Now that you have downloaded the ISO image, you can create a bootable USB, burn it on a DVD or load the image on a VM. Select the CentOS 7 ISO image, Insert the USB flash, Find the USB and select it in the *Select drive* step, Click **Flash.**

   Step 3: Boot the CentOS ISO File
   Upon booting the CentOS 7 ISO file, you can begin the installation process. To do so, select **Install CentOS 7**. That will start the installer's graphical interface. If you are booting from a USB, click the **Install to Hard Drive** icon on the desktop. That will open the installation wizard.

   Step 4: Install CentOS

   Before starting the installation process, itself, select which language you would like to use during installation. The default option is English.

   Click **Continue** to confirm your selection.

   All items marked with a warning icon must be configured before you begin the installation.

   System configurations outlined below may differ based on use case.

   To set a date and time for the system, click the **Date & Time** icon under the *Localization* heading. Select a region/time zone on the map of the world as seen below. Once you have selected your time zone, hit **Done** to save your changes.

   Select the **Keyboard** option under the *Localization* heading to set the keyboard layout.

The system default is *English (US)* and the language you selected in the initial window. Click the **plus** icon to add more layouts. Move a layout to the top of the list to make it the default option.

Click the **Options** button to define a key combination for switching between keyboard layouts. When you are satisfied with the settings defined, select the **Done** button to confirm the changes.

Next, select the **Language Support** option under the *Localization* heading. The language selected in the ***Welcome to CentOS 7*** window will be the default system language. If necessary, select additional languages and hit the **Done** button once you are finished.

Select the Software Selection option under the *Software* heading. You will see a list of predefined **Base Environment** options and optional add-ons. This part entirely depends on your needs.

- **Minimal Install.** This is the most flexible and least resource-demanding option. Excellent for production environment servers. Be prepared to customize the environment.
- **Predefined Server Options.** If you are 100% certain about the role of your server and don't want to customize it for its role, select one of the predefined server environments.
- **GNOME Desktop and KDE Plasma Workspaces.** These environments include a full graphical user interface.

Click the **Installation Destination** option under the *System* heading. Check your machine's storage under the *Local Standard Disks* heading. CentOS 7 will be installed on the selected disk.

Select the ***I will configure partitioning*** checkbox and choose **Done.**

If you want to use other file systems (such as **ext4** and **vfat**) and a non-LVM partitioning scheme, such as **btrfs**. This will initiate a configuration pop-up where you can set up your partitioning manually.

This is an advanced option that depends on your requirements.

KDUMP is enabled by default.

To disable the KDUMP kernel crash dumping mechanism, select the **KDUMP** option under the *System* heading and uncheck the ***Enable kdump*** checkbox. Click the **Done** button to confirm your changes.

Note: KDUMP captures system information at the time of a crash. It helps you diagnose the cause of the crash. When enabled, kdump reserves a portion of system memory.

Click the *Network & Host Name* option under the *System* heading.

For the hostname, type in the fully qualified domain name of your system.

Select **Configure…** and select to add **IPv4** settings or **IPv6** settings depending on what you have. Add static IP addresses to help identify your computer on the network. Bear in mind that your network environment's settings define these values.

Select the **Security Policy** option under the *System* heading. Choose a profile from the list and hit **Select profile.** Hit the **Done** button to confirm your selection.

Once everything is set up according to your liking, hit **Begin Installation** to start the install. This will start the initial installation process.

To define the root user, select the **Root Password** icon.

Select a **Root Password** and re-enter it in **Confirm** field.

Root user accounts should consist of at least 12 characters, including uppercase and lowercase letters, numbers, and special characters. We cannot stress enough the importance of a well-defined root password.

Click the **Done** button to proceed.

To begin, select the **User Creation** option.

Add a new system account user by defining the **full name**, **user name**, and **password**. We recommend you check the ***Make this user administrator*** and ***Require a password to use this account*** checkboxes. This will grant the user root privileges.

After you fill in all of the fields and define a **secure password**, select **Done** in the upper-left corner of the screen.

Wait for the installation process to complete.

Before you start using your new CentOS installation, reboot the system. Click the **Reboot** button.

Log into the system by using the credentials you defined previously.

2. **CentOS** (from **Community Enterprise Operating System**) is a Linux distribution that provides a free and open-source community-supported computing platform, functionally compatible with its upstream source, Red Hat Enterprise Linux (RHEL). In January 2014, CentOS announced the official joining with Red Hat while staying independent from RHEL, under a new CentOS governing board.

3. **Features of CENT OS:**

    Your desktop background:

    - The GUI version of CentOS 8'S GNOME Shell rebased to version 3.28.
    - The GNOME session, as well as the GNOME display manager, use the Wayland like the default display server.

    The networking arena:

    The networking part of the CentOS 8 has been spruced with the following changes:

    - CentOS is now distributed with the TCP networking stack version 4.16, that provides higher performances, better scalability as well as more stability.
    - The networking stack being upgraded to the upstream version 4.18.
    - Iptables are now replaced with the nftables framework due to the default network packet filtering facility.
    - The nftables framework is the designated successor to the iptablesip6tables, ebtables as well as arptables tools. It also provides a single framework for both IPv4 as well as IPV6 protocols.
    - The firewall daemon now uses the nftables because of its default backend.
    - It supports IPVLAN virtual network drivers which enable the network connectivity for multiple containers.
    - NetworkManager supports the single root I/O virtualization (SR-IOV). NetworkManager allows configuring some attributes of the VFs like MAC address, VLAN, spoof checking settings and allowing bitrates.

    Software Management:

    The YUM package manager is based on the DNF technology and provides support for the modular content, increased performance and also a well-designed stable API for the integration with tooling. Installing the software is ensured by the new version of the YUM tool, which is based on the DNF technology (YUM v4). The previous version i.e. CentOS 7 used YUM v3 and mentioned enhancements had been made on YUM v4:

    - Increased performance
    - Support for the modular content
    - Well-designed stable API for the integration with tooling.

    YUM v4 has compatibility with YUM v3 when using from the command line, editing or creating configuration files. Because of this, you can use the yum command and its specific options in the same way as you use on CentOS 8. Another thing is that CentOS 8 is distributed with the RPM 4.14 which is actually different from the RPM 4.11 along with much more enhancements.

    Languages, web servers, and databases:

You will have the programming languages in your new Cent OS 8 such as:

- Python 3.6 and its limited support for Python 2.7. None of the version of Python is installed by default.
- The dynamic programming languages such as new Node.js, PHP 7.2, Ruby 2.5, Perl 5.26, SWIG 3.0 are available.
- The database servers distributed with CentOS/ RHEL 8 such as Maria DB 10.3, MySQL 8.0, Postgre SQL 10, Postgre SQL 9.6 and Redis 5.
- The web servers such as Apache HTTP server 2.4 and the nginx 1.14. The squid has also been updated to version 4.4 and also a new proxy caching server such as Varnish Cache 6.0 is included.

Virtualization:

Now, you need to encounter the following changes if we concern about virtualization.

- CentOS 8 is now distributed with qemu-kvm 2.12 with − Q35 guest machine types support, UEFI guest boot support, vCPU hot plug and hot unplug, NUMA tuning and pinning in the guest as well as guest I/0 threading.
- The SEV (Secure Encrypted Virtualization) feature for the AMD EPYC host machines that use KVM hypervisor.
- The EMU emulator introducing the sandboxing feature. The QEMU sandboxing provides the configurable limitations to make the virtual machines much more secure.
- The KVM virtualization supports the user-mode instruction prevention (UMIP) feature that can help in preventing the user-space applications from accessing the system-wide settings.
- The KVM virtualization also supports the 5-level paging feature that increases the physical and virtual address space which the host and guest systems can use.
- NVIDIA vGPU is also now compatible with the VNC console.
- Ceph storage is also supported by the KVM virtualization on many CPU architectures that are supported by Red Hat.
- Q35, a modern PCI Express-based machine type is also supported by RHEL 8 virtualization. The entire virtual machines created in RHEL 8 are set to use Q35 PC machine type by default.
- The nested virtualization is available on IBM Power 9.
- The KVM virtualization is also used in CentOS 8 Hyper-V virtual machines.

Installation and Image creation:

CentOS 8 uses the Anaconda installer that supports the LUKS2 disk encryption format. The LUKS2 disk encryption format provides better features, let us have an instance, as it extends the capabilities of the on-disk format and gives flexible ways of storing metadata. Additionally, Anaconda has been extended to handle the features related to application streams. It includes modules, streams as well as profiles. The kickstart scripts can now

enable the module and stream combinations, install the module profiles as well as install the modular packages.

Security Details:

In CentOS 8, now the tighter security features have been added to the brand-new release as following:

- CentOS supports for Open SSL 1.1.1 and TLS 1.3. It also enables you to secure customer's data with the latest standards for crypto protection.
- CentOS comes with the system-wise cryptographic policies that help you with cryptographic compliance management. You don't need to modify and tune the specific applications.
- Open SSH has been rebased to the 7.8p 1 version having no support for SSH version 1 protocol, Blowfish/CAST/RC4 ciphers, hmac-ripemd160 message authentication code.

Kernel and OS:

- CentOS 8 is also based on Fedora 28 and upstream Kernel 4.18. Let us know what is available on this Kernel:
- ARM 52-bit physical addressing 64-bit ARM architectures. So, this provides a larger address space compared to the prior 48-bit physical addressing.
- The I/O memory management unit (IOMMU) code in the Linux kernel has been updated for supporting the 5-level page tables.
- Spectre V2 mitigation default changed from IBRS to Retpolines. For the use cases, where complete Spectre V2 mitigation is desired.

Conclusion:

Cent OS Has **Great Software Support**

Now that you have learned about the origins, reasons, and aspects of security, you can determine the appropriate course of action with regard to Red Hat Enterprise Linux. It is important to know what factors and conditions make up security in order to plan and implement a proper strategy. With this information in mind, the process can be formalized and the path becomes clearer as you delve deeper into the specifics of the security process.

Course Teacher Name:
Tanuja R Pattanshetti

Assignment No: 3