Linux installation

DAT151
January 12, 2026

AlmaLinux information

- Read the AlmaLinux release notes to find specific information on installation of AlmaLinux 10.1:
  - https://almalinux.org/
  - https://wiki.almalinux.org/release-notes/10.1.html

Before you install

Remember to take backup of all that you do not want to loose...

... in all partitions!!!

Planning (1)

- What distribution?
- Dual (multi) boot?
- New installation or upgrade?
  - Some distros allow upgrade to new major release
  - Anyway... Take a backup first!
- Partitioning?
- Encrypted disks?
- Secure Boot?

Planning (2)

- What software and services to install?
  - Lots of space? Fun to have many programs/services
  - Secure system? Good idea to have few programs/services installed
  - Advice, install a minimum, and then add packages as needed

What is required from your system?

Check

- Release notes
  - AlmaLinux 10.1 Release Notes
- Distributions often specify requirements
  - Red Hat Enterprise Linux technology capabilities and limits
- Forums
- Howtos

Installation media (1)

- Installation DVDs
  - A lot of software packages
  - Do not need to be connected to Internet
  - Must anyway update software from Internet
- Live image
  - Runs system directly from CD/DVD/USB stick
  - Can check that system runs on PC without installing anything.
  - Can also be used as a “rescue” CD/DVD/USB stick
  - Fewer software packages – usually a lot to install afterwards
  - Live images for AlmaLinux

Installation media (2)

- Boot/NetBoot image
  - Same as installation DVD, but software packages are downloaded from Internet
  - Image only used to boot the system during installation
  - Packages are downloaded from Internet during the installation
- Minimal image
  - Similar to installation DVD, but with a minimum of packages
  - Can install a very limited console only OS
- USB stick
  - Same images as for DVD/CD
  - Image must be transferred to USB:
    - Linux: dd command:
      `dd if=AlmaLinux-10-latest-x86_64-boot.iso of=/dev/sd<X>`
      - Replace <X> with the correct character. Use e.g. *lsblk* to find the character.
    - Windows: E.g. Rufus, Etcher
  - Observe, file copy to USB stick will not work

Rescue mode

- In installer boot window, select “Troubleshooting”, then “Rescue a AlmaLinux system”
  - Starts system from CD/DVD/USB without installing anything
- You can mount partitions from hard disk (more later)
- Can check for errors in the system
- Can also use a live CD/DVD/USB to run Linux without installing.
  - Live CD/DVD can also allow to install Linux.

AlmaLinux

- Functionally compatible with its upstream source, Red Hat Enterprise Linux (RHEL)
  - Changed logos etc.
  - First release on March 30, 2021
- Free
- No access to RedHat official support
- Information for RHEL are in generally applicable for AlmaLinux

CentOS

- RedHat clone, similar to AlmaLinux
- January 2014, CentOS joined with Red Hat while staying independent from RHEL
- RedHat has decided that CentOS 8 was the last CentOS version
- AlmaLinux and Rocky Linux was created as a response to RedHat discontinuing CentOS

CentOS stream

- A rolling-release distro that tracks just ahead of Red Hat Enterprise Linux (RHEL) development
- Positioned as a midstream between Fedora and RHEL
- CentOS stream is based on Fedora, and RedHat will be based on CentOS stream
  - CentOS stream will continue, but no more CentOS versions.
- EL-versions (RHEL, AlmaLinux and Rocky Linux) are in general more stable than Fedora (10 year life time for RHEL, new Fedora versions twice a year)
  - But, Fedora has more software and has more features
  - Fedora can be upgraded to new major release, but not RHEL
  - Some Fedora packages for EL are available in the EPEL repository
  - Packages from Fedora can be repacked for EL, but can require some tweaking
    - Mock is a useful tool

Download AlmaLinux

- Official
- Mirror sites (e.g.):
  - UiB
  - Public active mirrors
- Version 10 images in “10/isos/x86_64/”
- Recommend for lab:
  - AlmaLinux-10-x86_64-dvd.iso (8.3GiB), or
  - AlmaLinux-10-x86_64-boot.iso (927MiB)
    - Will download packages from internet during install.
- The above images are for x86-64-v3.
- For older CPUs, use the x86_64_v2 images.

Installation

- Burn CD/DVD or create USB stick before you come to the lab!
- Test on your own computer that you can boot from the media.
  - Abort the process when meet with the installer GUI
  - Nothing is installed if you do not continue the installation process
- See also: How to download and write images

Start installation

- Check CD/DVD/USB?
  - ...to make sure that there are no errors
    - Takes some time! (Not necessary...)

Anaconda

- Installation program for RedHat and clones
- Requires some memory (OK in the lab)
- Try text mode installation if the normal install mode does not work
  - In boot window, select “Troubleshooting”, then install using text mode

In the lab (1)

- UEFI or BIOS (legacy boot)
  - Computers at lab have UEFI firmware
  - Use the UEFI boot for DAT151
- The DHCP server at the lab will assign the IP address printed on the machine to your computer.
- If you still choose to use a static network configuration, use:
  - IP printed on computer,
  - Netmask 255.255.252.0
  - Gateway 10.0.0.1
  - DNS server 10.0.0.185
- Create a user and give the user system privileges
- Enable the root account.
  - Useful if problems during boot

In the lab (2)

- Partition disk manually (see the next slides)
  - Set up your own partitions (at least / and swap)
  - UEFI boot also need */boot/efi*
  - Common also to have a separate partition */boot*.
    - Older GRUB version had rather limited file system support
- Select “Server with GUI” of “Workstation” installation
  - Select extra packages if you want, but
  - this can also be done later
- Standard installation medium only with Gnome desktop
  - Servers very often do not need a graphical interface
  - Other desktop environments are available if using a live image

Partitions (from chapter 20)

- Fixed size subsection of a storage device
  - Can format each partition separately
- Partitions can be formatted during installation
- Can chose not to format existing partitions, e.g. a Windows partition, partition with user data etc.
  - */usr/*local
  - */home*
  - */var*
  - Windows partitions

Partition table

- Must exist on the disk before you can create partitions
- Contains information about the partitions on the storage device
- Edited when you change partitions
- Exist two different disk partition table types:
  - The legacy *Master Boot Record*
    - MBR – Master Boot Record
    - UEFI Legacy boot simulates MBR
  - The modern *GUID Partition Table*
    - GPT - GUID Partition Table
    - Used by UEFI, Unified Extensible Firmware Interface
    - GUID - Globally Unique Identifier
- Details on MBR and GUID in chapter 2 of Unix book.

Logical Volumes (LV)

- Partition is managed by OS, not computer firmware
- Named logical partition
- Can be changed/resized dynamically
- LVM = Logical Volume Manager
  - AlmaLinux uses LVM as default for most partitions
- Btrfs, file-system and logical partitions
  - Default for Fedora 37 and later
  - Supported also by AlmaLinux
  - Logical partitions are dynamic in size

Physical and logical partitions

- The partitions created on the disks and seen by the computer firmware are the physical partitions.
- The LVM logical partitions are handled by and seen by the Linux kernel.
- The LVM partitions are stored on physical partitions.
- A physical partition can have many LVM logical partitions.
- A LVM logical partition can extend several physical partitions and disks.

Root partition

Must have:

- / (root): main file system
  - All other directories are subdirectory of /
  - Other file systems mounted as subdirectories

Boot partition

Can have:

- /boot:
  - Contains the kernel and other files necessary at startup
  - Required if LVM
    - Required by the installer program, not GRUB
  - A few hundred MiB to a few GiB (2GiB is plenty)
    - My laptop has 335 MiB of data in the */boot* partition
  - Usual to have /boot as the first partition
    - Machines with old BIOS can not start from partitions that pass cylinder 1023.

UEFI boot partition

- UEFI boot requires a physical partition */boot/efi*
  - Not required if using legacy mode with UEFI (simulates BIOS boot)
- A few hundred MiB
  - My laptop has 108MiB of data in the */boot/efi* partition
- Details in chapter 2

Swap partition

Usual to have:

- Swap:
  - Separate partition for swap give better performance
    - Can alternatively swap to files
  - 1-2 times RAM
    - Computers rich on RAM may not need swap
  - More disks – can be advantage with one swap area per disk
  - No mount point for swap
  - Can be a compressed RAM disk, i.e. no disk partition

More partitions

Can also have

- /home – home directories
  - Useful when reinstalling
  - Necessary if limits on users disk usage
  - Useful on workstations, but not necessarily on servers with no regular users
- /var – system logs and server data, e.g. MariaDB databases
  - Can be useful on servers to keep data from server programs
- /tmp – temporary files that can be deleted
  - Modern distros often store /tmp in RAM, i.e. no disk partition
    - Deleted on computer halt
  - If limited space for /tmp – some applications can fail

More partitions:

- Easier to take backup
- Can waste space, i.e. some partitions are full, other with free space
- Btrfs – Partition size is dynamic and given by its content

Partitions for lab machine

Recommend at least:

- */* - root partition
- */boot*
- */boot/efi* for UEFI boot
- swap - swap partition
- An empty partition of at least 10GiB for later use

File systems

Have to set up a file systems on the partitions to be able to use them.

- RHEL/AlmaLinux: ext3 / ext4 / XFS/BTRFS
  - XFS default from RHEL 7.0
- MS Windows: fat16, fat32, ntfs
- Mac: HFS / HFS+
- Can use different file systems on different partitions.

Mount point

- Addressing refers to the / directory – called root directory
- Mount point shows where the file system is in relation to /, e.g.:
  - /home
  - /usr/local
  - /var
- Overview of mount points for file systems:
  - df
  - mount
  - findmnt
  - systemctl --type=mount list-units
  - lsblk

Log files from installation

- Check logs from installation
  - Specially important if something goes wrong…
- Log files from installation in
  - /var/log/anaconda
- Parameters used by installer is stored in a kickstart file:
  - /root/anaconda-ks.cfg

Booting

Problems during booting?

- Messages are copied to /var/log/messages
  - True if syslogd is used, default if AlmaLinux 10
- Status of startup scripts with command journalctl

Command: dmesg

- Prints messages from kernel buffer ring