

Linux installation

CentOS information

- Read the CentOS release notes to find specific information on installation of CentOS 7:
 - <http://www.centos.org/>

Before you install

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

... in all partitions!!!

Planning (1)

- Which distribution?
- •Dual (multi) boot?
- New installation or upgrade?
 - upgrade tries to keep user data
 - Anyway... Take a backup first!
- Partitioning?

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

What is required from your system?

Check

- Release notes
- Distributions often have lists on their web pages
- 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
- LiveCD/DVD
 - Runs system directly from CD/DVD
 - Check that system runs on PC without changing anything.
 - Can also be used as a “rescue” CD/DVD
 - Few software packages – usually a lot to install afterwards

Installation media (2)

- NetBoot CD
 - same as installation DVD, but software packages are downloaded from Internet
 - CD only used to boot the system during installation, packages downloaded
- USB stick
 - Can use USB stick instead of DVD/CD
 - Same images as for DVD/CD, but may be more complicated, see:
 - <https://wiki.centos.org/HowTos/InstallFromUSBkey>

Rescue mode

- In boot window, select “troubleshooting”, then “Rescue a Centos7 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 live CD/DVD to check start without installing.
 - Live CD/DVD usually also allows to install Linux.

CentOS

- From RHEL – changed logos etc.
- Free
- No access to RedHat official support
- Information in RHEL and CentOS for a generally applicable
- Much more stable than Fedora (10 year life time for RHEL, new Fedora version twice a year)
 - But, Fedora support much more software and has many more features
 - E.g. video playback support is bad in CentOS
 - Some Fedora packages are packed for CentOS.
 - Source packages from Fedora can be repacked for CentOS, but often require some tweaking:
 - The packages explicitly remove features if CentOS.

Download CentOS

- Official: <http://www.centos.org/>
- Mirror sites (e.g.):
 - Nearest: http://mirrorlist.centos.org/?release=7&arch=x86_64&repo=os
 - Bergen: <http://centos.uib.no/>
 - Oslo: <http://ftp.uninett.no/pub/linux/centos>
- Version 7 images in [.../7/isos/x86_64/](#)
- Recommend:
 - DVD: CentOS-7-x86_64-DVD-1708.iso OR
 - CD: CentOS-7-x86_64-NetInstall-1708.iso OR
 - LiveCD: CentOS-7-x86_64-LiveGNOME-1708.iso

Before the lab Tuesday

- Burn CD/DVD or create USB before you come to the lab!
- Test on your own computer that you can boot from the media.
 - Abort the process when met with the installer GUI
 - Nothing is installed if you do not continue the installation process

Start installation

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

Anaconda

- Installation program for CentOS
- Requires some memory (ok in the lab)
- Try text version if graphical does not work

In the lab (1)

- UEFI/BIOS
 - Computers have UEFI firmware
 - Use Legacy Boot (BIOS compatible) due to dual boot with existing Windows
- Use IP printed on computer – use static network configuration
- IP for DNS and Gateway in Assignment 0
- Remember to configure network to be enabled on boot
- Root password given in lecture (same for all computers)

In the lab (2)

- Partition disk manually
 - Set up your own partitions (at least /, /home, swap)
 - Do not use LVM – will complicate later lab exercise
 - Don't delete Windows partitions
- Select “Standard desktop” installation
 - Extra packages if you want
- KDE or Gnome desktops (or both...)
 - Use Gnome if you have no favourite, since the lecturer has more knowledge with Gnome

Partitions (from chapter 20)

- Fixed size subsection of a storage device
 - Can format each partition separately
 - Each partition has a device file
- Partitions can be formatted during installation
- Can chose not to format existing partitions, e.g. a Windows partition, user data etc.

Tools for partitioning

- Disk Druid (during installation)
- parted or gparted (GNOME GUI)
- cfdisk
- fdisk
- sfdisk
- List partition table:
 - `fdisk -l`
 - `Parted -l`
- Remember to take backup before repartitioning!

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
- Alternatives:
 - Master Boot Record (MBR) – Legacy boot
 - GUID Partition Table (GPT) – UEFI (Unified Extensible Firmware Interface)
- Details on MBR and GUID in chapter 2.

Logical Volumes (LV)

- Appears as a logical partition,
- Can be changed/extended dynamically
- LVM = Logical Volume Manager
 - CentOS uses LVMs as default
- Use normal partitions in the lab!
 - We will use LVMs later in the course

Partition types with MBR

- Primary (maximum 4)
- Extended (norsk: utvida)
 - Partition that contains sub-partitions called logical partitions
 - Maximum 1 extended partition per disk
- Maximum 63 partitions per disk

Partitions (1)

Must have:

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

Partitions (2)

Can have:

- /boot:
 - Contains the kernel and other files necessary at startup
 - Must have /boot if boot loader can not read /
 - Can not be in LVM (can not boot from LVM)
 - A few hundred MB
 - Usual to have /boot as first partition
 - Machines with old BIOS can not start from partitions that pass cylinder 1023.

Partitions (3)

Usual to have:

- Swap:
 - Separate partition for swap give better performance
 - Can alternatively swap to a 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

Partitions (4)

Can also have

- /home – home directories
 - Useful when reinstalling
 - Limit user's disk usage
- /var – system logs
- /tmp – temporary files that can be deleted
 - Modern distros often store /tmp in RAM
 - Give limited space for /tmp – some applications can fail

More partitions -> easier to take backup

Partitions (5)

- Recommend at least:
- / - root partition
- /home - user files
- swap - swap partition

File systems

Have to install file systems on the partitions to be able to use them.

- RHEL/CentOS: ext3 / ext4 / XFS (default from 7.0)
- MS Windows: fat16, fat32, ntfs
- Mac: HFS / HFS+
- Can install 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
 - The file /etc/fstab

In the lab...

- Description on how to make dual-boot work on the lab machines in Assignment 0
 - Come back to this next lecture (about booting)
- Use dual-boot in the lab!
 - Do not delete the Windows partition(s)

Log files

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

Kickstart file

- Automatic installation file
- More about kickstart in the [RedHat installation guide](#)
- Validate your kickstart file: `ksvalidator anaconda-ks.cfg`
- Put the kickstart file in
 - Removable media (cd, usb)
 - Disk
 - Network share
 - Boot option `inst.ks=`
- Using a kickstart file :
 - Add the `ks` option to the kernel line in the GRUB window at installation.
 - Add the `ks` option to the kernel line before creating the installation media
- Can also use PXE server for automatic inst
 - The computer boots the installation media from the net.
 - Used by systems like Foreman and Canonical MAAS to take control over bare metal.

Booting

Problems during booting?

- Messages copied to `/var/log/messages`

Command: `dmesg`

- Prints last messages from `/var/log/messages`

Boot process

- Firmware (BIOS/UEFI) loads the boot loader (GRUB)
- Boot loader loads the kernel into memory and executes the kernel
- Initialization tasks
 - probes for hardware (kernel loads device driver modules)
 - start initial process
 - check and mount file systems
 - execute startup scripts

GRUB

Grand Unified Boot Loader

- Default for most Intel based UNIX and Linux systems
- Details in chapter 2
- Can load any operating system (also MS Windows...)
- If Windows, the os-prober program should have created a stanza for windows.
- An Windows entry can be added by hand inside /etc/grub.d/, i.e. to /etc/grub.d/40_custom:

```
menuentry "windows"{  
    set root=(hd0,1)  
    chainloader (hd0,1)+1  
}
```

- Update grub.cfg:
 - grub2-mkconfig -o /boot/grub2/grub.cfg

Boot process with GRUB

- Details in chapter 2
- Legacy boot:
 - BIOS gives control to MBR during booting
 - MBR runs GRUB code stored in the dead zone before first partition
- UEFI boot:
 - GRUB code stored in ESP (EFI system partition) /boot/efi
 - UEFI
 - UEFI locates the efi partition and GRUB path from NVRAM
- GRUB reads configurations from /boot and gives control to Linux kernel located in /boot
 - The /boot partition file systems must be readable for GRUB
 - Can not use LVM for /boot