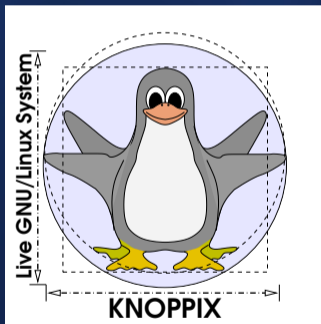


KNOPPIX

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What is KNOPPIX?

KNOPPIX (Knopper's Unix System) is a collection of GNU/Linux software running completely from CD, DVD, flashdisk or over the network, with automatic hardware detection and configuration.

KNOPPIX can be used as an ad-hoc productive working system, for data rescue and forensics, teaching and learning platform. Installation on harddisk is not necessary. Because of its transparent decompression, up to 2GB of software can be installed on a single CD (9 GB on a single-layer DVD).

What is not KNOPPIX?

- ⇒ A demo,
 - it's made for real work –
- ⇒ another GNU/Linux distribution,
 - it is a preinstalled and preconfigured Debian GNU/Linux system with original packages from all available branches (stable, testing, unstable, experimental, on a reasonable choice between stability and actuality –
- ⇒ promotional gratis software.
 - it's always the "unrestricted fully-featured product" –

Why does KNOPPIX exist?

- ⇒ Personal studies of operating systems, learning about live systems from small rescue CDs (1999),
- ⇒ have your personal system with your favourite software in your pocket, more or less computer-agnostic, containing all the tools for daily work,
- ⇒ base for specialized derivatives like kiosk systems, school software, fallback and gaming platform,
- ⇒ experimenting with new software without potentially killing a harddisk installation.

Why Debian?

- ⇒ KNOPPIX version 1.5 was based on RedHat (TM), switched to **Debian** with version 2.0,
- ⇒ easily upgradeable, semi-automatic conversion of configuration files and very good handling of dependencies, up-/downgrades,
- ⇒ vendor-independent.

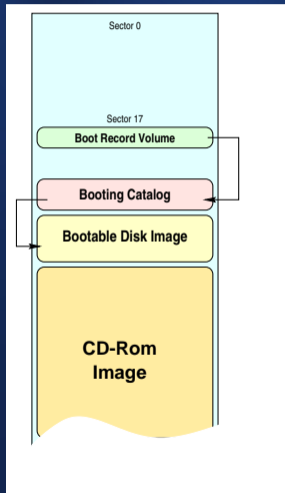
The idea behind



Plug in flashdisk (or CD/DVD), do **nothing** for a minute, start working with the ready configured desktop system.

How does it work? (1)

1. "No Emulation CD bootloader"
isolinux (called by the BIOS in real mode) loads Linux Kernel and Initial Ramdisk from iso9660 filesystem (CD), or syslinux (flash disk) or pxelinux (net boot).



How does it work? (2)

2. `/init` from initial ramdisk `minirt.gz` finds and mounts CD/DVD/disk containing the KNOPPIX directory.

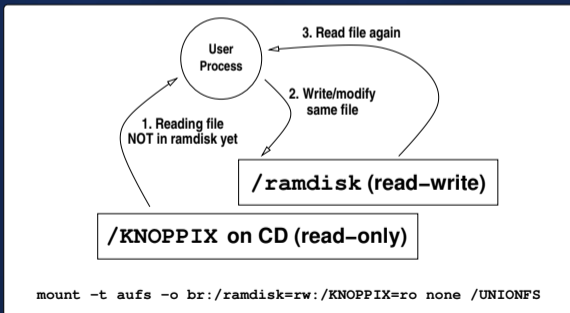
How does it work? (3)

3. **KNOPPIX/KNOPPIX***, which contains the 3:1 compressed Linux file system (also on iso9660+Rockridge), is mounted via **cloop**.

```
insmod cloop file=/mnt-system/KNOPPIX/KNOPPIX
mount -r /dev/cloop /KNOPPIX
```

How does it work? (4)

4. **aufs** merges the read-only (transparently cloop-decompressed) iso filesystem(s) with a read/write ramdisk or harddisk image to make it look+feel like we are running from a r/w harddisk installation.



How does it work? (5)

5. `/etc/init.d/knoppix-autoconfig` runs `udev` and creates configuration files like `/etc/X11/xorg.conf` via `hwsetup` and `/etc/fstab` via `udev+rebuildfstab`.
6. Things that can run independent from hardware-related setup, such as starting up system services (cups, bluetooth), are parallelized for faster start.
7. Additional services, if desired, can be added in `/etc/rc.local`.

How does it work? (6)

8. LXDE starts up with normal user (**knoppix**) privileges.

KNOPPIX Kernel & Hardware detection

- ⇒ Static part contains most of the available IDE/SATA/PATA/USB-Storage controllers,
Why? The static kernel detects and initializes hardware much faster and more stable than udev (just personal experience)
- ⇒ modules inside the ramdisk support special controllers (if needed),
- ⇒ modules inside the compressed filesystem part are loaded by udev for detected hardware,
(just graphics cards and framebuffer are blacklisted and are loaded by knoppix-autoconfig later, in order to support graphics options and KMS, also firmware for some adapters).

Debugging and boot options

Some hardware fails to be configured automatically because of weak hardware design. For these (like broken ACPI/APIC/LAPIC), you can try various kernel options on bootup. Also, hints can be sent to the hardware detection/configuration scripts using the boot commandline (`knoppix-cheatcodes.txt`).

Breakpoints can be activated in the boot progress using the `debug` cheatcode.

```
knoppix vga=791 xmodule=fbdev acpi=off  
noapic nolapic pnpbios=off pci=bios  
...
```

Saving your work and configuration

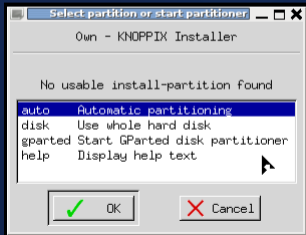
Using `aufs`, it is possible to add a permanently writable layer on top of the volatile ramdisk, allowing to use a harddisk image (`KNOPPIX/knoppix-data.img`), optionally encrypted, as home directory and system overlay.

This way, not only personal data, but also changed (or removed) configuration files and newly installed or changed software packages can be permanently written to removable media like USB-sticks or harddisks.

This feature is called "persistent KNOPPIX-image" and does not require any special boot options.

Installation on harddisk?!

- ⇒ was not initially planned,
- ⇒ often asked-for (it's an easy way to quickly install a preconfigured Debian system),
- ⇒ happens to work occasionally using the "sudo own" install script.



Licenses

- ⇒ The software collection itself + all KNOPPIX scripts, tools & add-ons: GNU GENERAL PUBLIC LICENSE V2
- ⇒ Individual packages from Debian: Primarily GPL and other free software licenses as stated in the package documentation, but also other licenses if they allow „unrestricted redistribution for all purposes“. The degree of tolerance towards binary-only components (like firmware) varies with the licenses used.

A brief history of KNOPPIX

- 1998-99** Discovered **bootable business cards**, trying to figure out how they work, experimenting with bootable regular size CDs.
- 2000** Presented first experimental results (Knoppix 1.0, based on RedHat 4.x) at the Atlanta Linux Showcase. Added+rewrote cloop (based on **Paul 'Rusty' Russells** work for the linuxcare bbc).
- 2001** Switched to Debian because of easier upgrade.
- 2002-2004** Filling the single-CD version with various software.
- 2005** Added unionfs (later aufs), added persistent image feature, split into DVD (full) and CD (Microknoppix) version.
- 2008** Added ADRIANE Audio Desktop accessibility feature for blind computer users.
- today** Updates, add-ons, changing software selection.

Flavours

The KNOPPIX download edition comes in three versions:

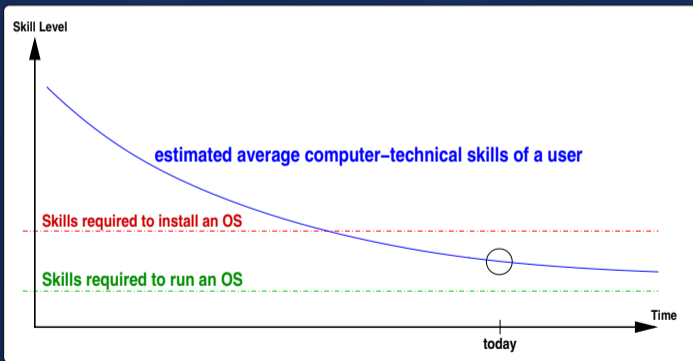
- The CD "Microknoppix" edition (2GB → 700MB):
 - "Best of Desktop": LXDE, LibreOffice, Firefox, Internet Tools,
 - Rescue + Forensic Tools
 - only small development portfolio
- The DVD "Maxi" edition (9GB → 4GB):
 - base system from the CD version, plus
 - more utilities, games, office/productivity suites
 - various desktop systems (also KDE, GNOME and others)
 - development/ide: GCC, Java, mono, eclipse,
 - games.
- The CD "ADRIANE" edition (booting with `adriane` by default)

Things that KNOPPIX does "the wrong way"

- ⇒ It is more "static" than "modular",
- ⇒ packages are not installed on user's own selection,
- ⇒ configuration files are modified from the original,
- ⇒ circumvention of the "normal" boot process in Debian,
- ⇒ it uses reiserfs for the (optional) hard-disk installation.

Attempt of a justification

People want to try GNU/Linux on a regular computer, but installation is still a big barrier for newbies.



Disclaiming common myths

- ⇒ KNOPPIX does NOT read the configuration of a previously installed Windows system,
- ⇒ KNOPPIX does NOT save or modify any data on harddisk (if you don't explicitly request so),
- ⇒ KNOPPIX does NOT have a secret default password or key for remote or local logins,
- ⇒ KNOPPIX does NOT overclock your hardware,
- ⇒ KNOPPIX does NOT use special hardware drivers, just the vanilla `kernel.org` kernel plus `cloop` plus `aufs`.

Building KNOPPIX

Up to version 5.3, KNOPPIX was building itself as root file system.

Since version 6.0, the KNOPPIX development system uses a "Filesystem" directory for the file system tree, and a Makefile for different build stages.

```
# Build the german dvd version, full build
make knoppix dvd de initrd compressed iso

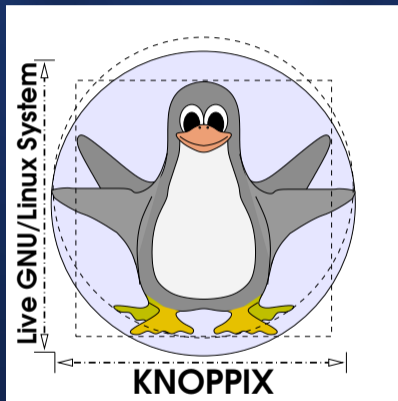
# Only set boot options & rebuild the .iso
# for starting with ADRIANE in english
make adriane en iso
```

Platform

Some live systems using all or parts of KNOPPIX:

- ⇒ EduKnoppix,
- ⇒ JuxLala,
- ⇒ KnoppMyth,
- ⇒ Quantian,
- ⇒ Damn Small Linux,
- ⇒ ADRIANE (fully integrated into Knoppix since version 6.0),
- ⇒ LINBO,
- ⇒ some Kiosk surf stations and Video players.

Questions & Answers



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