## debian-installer internals

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ast, Present and uture

Walkthrough

ey components

idebs

Discussion

Past, Present and Future - a short introduction

Walkthrough the installation process

D-I key components

Interesting udebs

Past, Present and Future

Walkthrough

Key components

- ▶ d-i is nearly release quality (rc1 underway)
- Porting to most architectures almost done
- ▶ Bug squashing and fine tuning for release
- ▶ No big changes anymore before releasing Sarge

Past, Present and Future

Valkthrough

Key components

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- ► Well done graphical front-end
- Custom installers made easy
- Automated or unattended installs
- ► Install without reboot?
- **...**
- ► (The modular design makes additions easy)

# Stage 0: booting Goal: Get the installer running

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Outline

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# Stage 0: booting

Goal: Get the installer running

Walkthrough

### Standard path:

- 1. Booting of the computer by the BIOS, OpenFirmware, ...
- Loading of the boot-loader from CD-ROM
- 3. Loading of the kernel and initial ramdisk
- 4. Starting the kernel

- Booting from another OS (loadlin, BootX)

- ▶ Booting from USB memory stick

## Standard path:

- Booting of the computer by the BIOS, OpenFirmware, ...
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## Additional paths:

- Booting from another OS (loadlin, BootX)
- ▶ Network Boot (PXE, TFTP, ...)
- Loading of kernel and initial ramdisk from floppy
- ▶ Booting from USB memory stick

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Goal: setup access to additional components



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Goal: setup access to additional components

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- Setup shm filesystem, copy initrd content and pivot\_root into it
- 2. Choose installation language, country and keyboard
- First hardware detection
- 4. Different paths depending on installation medium
  - Network configuration on netboot and floppy installs
  - CD drive detection on CD-ROM installs
  - Detection of other medias containing installer components
- Load additional installer components (from cdrom, network or iso-image)

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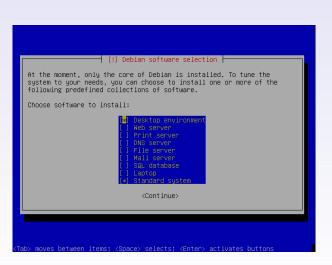
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## 1. Partition disks and assign mount points

- Set up clock (UTC/local), timezone, root password, user
- Install base system (from cdrom, network or iso-image)
- 4. Install a few additional packages and kernel
- 5. Configure apt for target system and install tasks
- 6. Install boot loader
- 7. Reboot into installed system

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GCD3

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## Summary: advantages and features of d-i

d-i internals

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### Advantages

- Easy default installs
  - "Wizard style" guided installation
  - Reasonable default options
  - ► Minimum of questions asked
- Possibility of expert installs for fine tuning
- Modular design makes additions easy

## Normal Linux system, but

- Very specific purpose
- Mainly running only one program
- ► Root filesystem in a RAM disk
- Configured to run on almost any hardware

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Discussion

## Minimal Debian packages: udebs

- Normal Debian packages (technically)
- ▶ Not policy compliant
  - No documentation and copyright files
  - ▶ File ending .udeb
  - Reduced to minimal size

## Types of udebs

- Perform an installation step
  - Provide a menu item (Choose language, Install the base system, ...)
  - Postinst script to perform actions
- Contain support files
  - Kernel modules
  - ▶ Programs (discover, busybox, ...)
  - Libraries (full libc, libparted, ...)

Companion: udpkg - a stripped down dpkg

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### Debconf

- ► All user input uses debconf
- Reimplementation of debconf in C
- Separation of protocol, storage back-end and front-end
  - Preseeding the debconf database for automated installs
  - Different front-ends for different purposes
- ▶ Standard debconf tools can be used for i18n
- New developments
  - ▶ Plug-ins
  - ▶ Pass through

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## Priority

- Each question has its priority (low, medium, high or critical)
- D-I runs at a given priority (normally at high)
- Questions below the current priority are not shown (default answer)
- ► The priority is dynamically lowered on error (and raised on subsequent success)
- Priority critical mainly used in combination with preseeding

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Discussion

### Front-ends

- Standard newt front-end
- ► Text front-end
- Graphical GTK front-end (new for Etch)
- **...**



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Main-menu after booting the installer

## main-menu - Choosing the Next Step

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<b>debian</b> GNU/Linux			
Debian installer main menu			
This is the main menu for the Debian installer.  Choose the next step in the install process:			
Choose language			_
Select a keyboard layout			
Detect and mount CD-ROM			
Load installer components from CD			
Detect network hardware			
Configure the network			
Choose a mirror of the Debian archive			
Detect disks Partition disks			
Configure time zone Configure the clock			
Set up users and passwords			
Install the base system			
Configure the package manager			
Select and install software			
Install the GRUB boot loader on a hard disk			
Install the LILO boot loader on a hard disk			
Continue without host loader			
Finish the installation			
Change debconf priority			
Check the CD-ROM(s) integrity			
Save debug logs			-
	Screenshot	Go Back	Continue

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Full main-menu after loading of additional components

Future

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udebs

- Central component controlling the installation process
- ► A debconf "select" question
- Not shown in default installs
- ▶ More than a menu
  - Dynamically adds items as new udebs are installed
  - Chooses next action based on menu item number, provides and dependencies
  - Calls udpkg to run postinst scripts

## Space is very limited

- No PERL, no Python, no ... (insert your favourite scripting language)
- d-i should fit on 2 floppies (kernel and initrd)
- d-i should be able to install with minimal RAM (currently approx. 32MB)

## Programs either in C or shell (busybox)

- ▶ Shell prefered: easier to debug (set -x) and maintain
- ▶ Shell prefered: "live changes" possible
- Only stripped down tools from busybox
- ▶ nano: editor (and pager)
- ► C where shell is not feasible (anna, kbd-chooser, ...)

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### locale-/kbd-chooser Packages: localechooser, kbd-chooser

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### localechooser lists all available translations

- localechooser is the first screen shown on ordinary d-i installs
- Everything shown after this should continue localized
- Language choice affects defaults for country and keyboard selection
- Which languages are available depends on frontend
- Language and country together determine default locale (UTF-8)

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Packages: udev, discover1, ddetect (ethdetect, hw-detect, hw-detect-full)

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### Hardware detection

- ► For 2.4 based installs: discover
- ► For 2.6 based installs: udev

## anna and retrievers

Packages: anna, {net,cdrom,floppy}-retriever

[?] Load installer components Most things you will need will be loaded automatically. The listed installer components all have low priority and are probably not necessary, but may be interesting to some users. Note that if you select a component that requires others, those components will also be loaded. Installer components to load: baseconfig-udeb: Run base-config from within debian-installer britty-modules-2.4.26-1-386-di: Braille support cdrom-detect: Detect CDROM devices and mount the CD debian-edu-profile-udeb: Choose Skolelinux profile di-utils-exit-installer: Exit installer demo download-installer: Download installer components eyms-udeb: EVMS module for debian-installer (Gn. Back) (Continue)

anna's not nearly apt, but for Debian installer, it will do

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# anna and retrievers Packages: anna, {net,cdrom,floppy}-retriever

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## system to download/install additional components

- installs all udebs with priority standard or higher
- resolves dependencies
- changes to the list of selected udebs are possible at debconf priority smaller than medium

udebs are downloaded/installed by retrievers

- net-retriever to download from a Debian mirror
- cdrom-retriever to install from a mounted CD-ROM (or loop mounted iso-image)
- ► floppy-retriever to install some udebs from floppy and rerun anna afterwards

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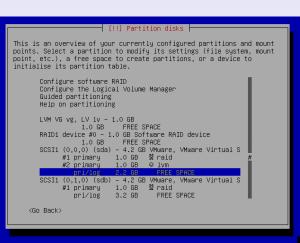
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### partman - partitioning and mount points Packages: partman-\*, mdcfg, lvmcfg

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Partman's main screen

### **Features**

- Multiple filesystem support:
  - ▶ ext2/3
  - reiserfs
  - ▶ ifs
  - xfs
- Based on libparted
- Support for LVM and software RAID
- Automatic and manual partitioning
- ▶ New: automatic partitioning using LVM

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## Split into several small udebs:

- One for each supported filesystem
- Simple to add support for new filesystems
- Additional udebs for architecture support
- Any addition can be implemented in its own udeb

"Client/Server" architecture

- ► Server written in C performs actions using libparted
- ► Clients written in Shell send commands over FIFOs

Partman would be a topic for a talk on its own.

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os-prober, nobootloader

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Install the GRUB boot loader on a hard disk It seems that this installation of Debian is the only operating system on this computer. If so, it should be safe to install the GRUB boot loader to the master boot record of your first hard drive. Warning: If the installer failed to detect another operating system that is present on your computer, modifying the master boot record will make that operating system temporarily unbootable, though GRUB can be manually configured later to boot it. Install the GRUB boot loader to the master boot record? <Go Back> <No>>

Packages: {aboot, delo, grub, lilo, palo, yaboot, ...}-installer,

grub-installer asking where to install grub

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- Separate small udebs to install the boot loader
- ▶ Grub currently default on i386
- Special os-prober udeb to detect other operating systems and to offer multiboot
- nobootloader udeb to skip bootloader installation on systems that don't need a boot loader

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It's your turn now!