

Debian Live Manual

Debian Live Project <debian-live@lists.debian.org>

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Debian Live Manual

About

1. About this manual

The main goal of this manual is to serve as a single access point to all documentation related to the Debian Live project. While it is primarily focused on helping you build a live system and not on end-user topics, an end-user may find some useful information in these sections: <The Basics> covers preparing images to be booted from media or the network, and <Customizing run time behaviours> describes some options that may be specified at the boot prompt, such as selecting a keyboard layout and locale, and using persistence.

Some of the commands mentioned in the text must be executed with superuser privileges which can be obtained by becoming the root user via `su` or by using `sudo`. To distinguish between commands which may be executed by an unprivileged user and those requiring superuser privileges, commands are prepended by `$` or `#` respectively. This symbol is not a part of the command.

1.1 For the impatient

While we believe that everything in this manual is important to at least some of our users, we realize it is a lot of material to cover and that you may wish to experience early success using the software before delving into the details. Therefore, we have provided three tutorials in the <Examples> section designed to teach you image building and customization basics. Read <Using the examples> first, followed by <Tutorial 1: A standard image>, <Tutorial 2: A web browser utility> and finally <Tutorial 3: A personalized image>. By the end of these tutorials, you will have a taste of what can be done with Debian Live. We encourage you to return to more in-depth study of the manual, perhaps next reading <The basics>, skimming or skipping <Building a netboot image>, and finishing by reading the <Customization overview> and the chapters that follow it. By this point, we hope you are thoroughly excited by what can be done with Debian Live and motivated to read the rest of the manual, cover-to-cover.

1.2 Terms

- **Live system** : An operating system that can boot without installation to a hard drive. Live systems do not alter local operating system(s) or file(s) already installed on the computer hard drive unless instructed to do so. Live systems are typically booted from media such as CDs, DVDs or USB sticks. Some may also boot over the network.
- **Debian Live** : The Debian sub-project which maintains the *live-boot*, *live-build*, *live-config*, and *live-manual* packages.

- **Debian Live system** : A live system that uses software from the Debian operating system that may be booted from CDs, DVDs, USB sticks, over the network (via netboot images), and over the Internet (via boot parameter `fetch=URL`). 11
- **Host system** : The environment used to create the live system. 12
- **Target system** : The environment used to run the live system. 13
- **live-boot** : A collection of scripts used to boot live systems. *live-boot* was formerly a part of *live-initramfs*. 14
- **live-build** : A collection of scripts used to build customized Debian Live systems. *live-build* was formerly known as *live-helper*, and even earlier known as *live-package*. 15
- **live-config** : A collection of scripts used to configure a live system during the boot process. *live-config* was formerly a part of *live-initramfs*. 16
- **live-manual** : This document is maintained in a package called *live-manual*. 17
- **Debian Installer (d-i)** : The official installation system for the Debian distribution. 18
- **Boot parameters** : Parameters that can be entered at the bootloader prompt to influence the kernel or *live-config*. 19
- **chroot** : The `chroot` program, `chroot(8)`, enables us to run different instances of the GNU/Linux environment on a single system simultaneously without rebooting. 20
- **Binary image** : A file containing the live system, such as `binary.iso` or `binary.img`. 21
- **Target distribution** : The distribution upon which your live system will be based. This can differ from the distribution of your host system. 22
- **Squeeze/Wheezy/Sid (stable/testing/unstable)** : Debian codenames for releases. At the time of writing, **Squeeze** is the current **stable** release and **Wheezy** is the current **testing** release. **Sid** will always be a synonym for the **unstable** release. Throughout the manual, we tend to use codenames for the releases, as that is what is supported by the tools themselves. 23

The **stable** distribution contains the latest officially released distribution of Debian. The **testing** distribution is the staging area for the next **stable** release. A major advantage of using this distribution is that it has more recent versions of software relative to the **stable** release. The **unstable** distribution is where active development of Debian occurs. Generally, this distribution is run by developers and those who like to live on the edge. 24

1.3 Authors 25

A list of authors (in alphabetical order): 26

- Ben Armstrong 27
- Brendan Sleight 28

- Chris Lamb 29
- Daniel Baumann 30
- Franklin Piat 31
- Jonas Stein 32
- Kai Hendry 33
- Marco Amadori 34
- Mathieu Geli 35
- Matthias Kirschner 36
- Richard Nelson 37
- Trent W. Buck 38

1.4 Contributing to this document 39

This manual is intended as a community project and all proposals for improvements and contributions are extremely welcome. The preferred way to submit a contribution is to send it to the mailing list. Please see the section `<Contact>` for more information. 40

When submitting a contribution, please clearly identify its copyright holder and include the licensing statement. Note that to be accepted, the contribution must be licensed under the same license as the rest of the document, namely, GPL version 3 or later. 41

The sources for this manual are maintained using the Git version control system. You can check out the latest copy by executing: 42

```
$ git clone git://live.debian.net/git/live-manual.git 43
```

Prior to submission of your contribution, please preview your work. To preview the *live-manual*, ensure the packages needed for building are installed by executing: 44

```
# apt-get install make po4a sisu-complete libnokogiri-ruby 45
```

You may build the *live-manual* from the top level directory of your Git checkout by executing: 46

```
$ make build 47
```

Since it takes a while to build the manual in all supported languages, you may find it convenient when proofing to build for only one language, e.g. by executing: 48

```
$ make build LANGUAGES=en 49
```

1.4.1 Applying patches 50

Anyone can directly commit to the repository. However, we ask you to send bigger changes to the mailing list to discuss them first. To push to the repository, you must follow this procedure: 51

- Fetch the public commit key: 52


```
$ mkdir -p ~/.ssh/identity.d 53
$ wget http://live.debian.net/other/keys/git@live.debian.net \
-O ~/.ssh/identity.d/git@live.debian.net
$ wget http://live.debian.net/other/keys/git@live.debian.net.pub \
-O ~/.ssh/identity.d/git@live.debian.net.pub
$ chmod 0600 ~/.ssh/identity.d/git@live.debian.net*
```
- Add the following section to your openssh-client config: 54


```
$ cat >> ~/.ssh/config << EOF 55
Host live.debian.net
  Hostname live.debian.net
  User git
  IdentityFile ~/.ssh/identity.d/git@live.debian.net
EOF
```
- Check out a clone of the manual through ssh: 56


```
$ git clone git@live.debian.net:/live-manual.git 57
$ cd live-manual && git checkout debian-next
```
- Note that you should commit any changes on the debian-next branch, not on the 58
 debian branch.
- After editing the files in manual/en/, please call the `commit` target in the top level 59
 directory to sanitize the files and update the translation files:


```
$ make commit 60
```
- After sanitizing, commit the changes. Write commit messages that consist of full, 61
 useful sentences in English, starting with a capital letter and ending with a full
 stop. Usually, these will start with the form `Fixing/Adding/Removing/Correcting/-
 Translating', e.g.


```
$ git commit -a -m "Adding a section on applying patches." 62
```
- Push the commit to the server: 63


```
$ git push 64
```

1.4.2 Translation 65

To submit a translation for a new language, follow these three steps: 66

- Translate the about_manual.ssi.pot, about_project.ssi.pot and index.html.in.pot files 67
 to your language with your favourite editor (such as poedit). Send translated files
 to the mailing list. Once we have reviewed your submission, we will add the new
 language to the manual (providing the po files) and will enable it in the autobuild.
- Once the new language is added, you can randomly start translating all po files in 68
 manual/po/.

- Don't forget you need `make commit` to ensure the translated manuals are updated from the po files, before `git commit -a` and `git push`. 69

2. About the Debian Live Project 70

2.1 Motivation 71

2.1.1 What is wrong with current live systems 72

When Debian Live was initiated, there were already several Debian based live systems available and they are doing a great job. From the Debian perspective most of them have one or more of the following disadvantages: 73

- They are not Debian projects and therefore lack support from within Debian. 74
- They mix different distributions, e.g. **testing** and **unstable** . 75
- They support i386 only. 76
- They modify the behaviour and/or appearance of packages by stripping them down to save space. 77
- They include packages from outside of the Debian archive. 78
- They ship custom kernels with additional patches that are not part of Debian. 79
- They are large and slow due to their sheer size and thus not suitable for rescue issues. 80
- They are not available in different flavours, e.g. CDs, DVDs, USB-stick and netboot images. 81

2.1.2 Why create our own live system? 82

Debian is the Universal Operating System: Debian has a live system to show around and to accurately represent the Debian system with the following main advantages: 83

- It would be a subproject of Debian. 84
- It reflects the (current) state of one distribution. 85
- It runs on as many architectures as possible. 86
- It consists of unchanged Debian packages only. 87
- It does not contain any packages that are not in the Debian archive. 88
- It uses an unaltered Debian kernel with no additional patches. 89

2.2 Philosophy 90

2.2.1 Only unchanged packages from Debian “main” 91

We will only use packages from the Debian repository in the “main” section. The non-free section is not part of Debian and therefore cannot be used for official live system images. 92

We will not change any packages. Whenever we need to change something, we will do that in coordination with its package maintainer in Debian. 93

As an exception, our own packages such as *live-boot*, *live-build* or *live-config* may temporarily be used from our own repository for development reasons (e.g. to create development snapshots). They will be uploaded to Debian on a regular basis. 94

2.2.2 No package configuration of the live system 95

In this phase we will not ship or install sample or alternative configurations. All packages are used in their default configuration as they are after a regular installation of Debian. 96

Whenever we need a different default configuration, we will do that in coordination with its package maintainer in Debian. 97

A system for configuring packages is provided using `debconf` in `lb config` (use `--preseed FILE`) allowing custom configured packages to be installed in your custom produced Debian Live images, but for official live images only default configuration will be used. For more information, please see [‹Customization overview›](#). 98

Exception: There are a few essential changes needed to bring a live system to life (e.g. configuring `pam` to allow empty passwords). These essential changes have to be kept as minimal as possible and should be merged within the Debian repository if possible. 99

2.3 Contact 100

- **Mailing list** : The primary contact for the project is the mailing list at <http://lists.debian.org/debian-live/>. You can email the list directly by addressing your mail to debian-live@lists.debian.org. The list archives are available at <http://lists.debian.org/debian-live/>. 101
- **IRC** : A number of users and developers are present in the `#debian-live` channel on irc.debian.org (OFTC). When asking a question on IRC, please be patient for an answer. If no answer is forthcoming, please email the mailing list. 102
- **BTS** : The Debian Bug Tracking System (BTS) contains details of bugs reported by users and developers. Each bug is given a number, and is kept on file until it is marked as having been dealt with. For more information, please see [‹Reporting bugs›](#). 103

- **Wiki** : The Debian Live wiki at <http://wiki.debian.org/DebianLive> is a place to gather information, discuss applied technologies, and document frameworks of Debian Live systems that go beyond the scope of this document. 104

User 105

3. Installation 106

3.1 Requirements 107

Building Debian Live images has very few system requirements: 108

- Super user (root) access 109
- An up-to-date version of *live-build* 110
- A POSIX-compliant shell, such as *bash* or *dash*. 111
- *debootstrap* or *cdebootstrap* 112
- Linux 2.6.x 113

Note that using Debian or a Debian-derived distribution is not required - *live-build* will run on almost any distribution with the above requirements. 114

3.2 Installing live-build 115

You can install *live-build* in a number of different ways: 116

- From the Debian repository 117
- From source 118
- From snapshots 119

If you are using Debian, the recommended way is to install *live-build* via the Debian repository. 120

3.2.1 From the Debian repository 121

Simply install *live-build* like any other package: 122

```
# apt-get install live-build 123
```

or 124

```
# aptitude install live-build 125
```

3.2.2 From source

126

live-build is developed using the Git version control system. On Debian based systems, this is provided by the *git* package. To check out the latest code, execute:

```
$ git clone git://live.debian.net/git/live-build.git
```

128

You can build and install your own Debian package by executing:

129

```
$ cd live-build
$ dpkg-buildpackage -rfakeroot -b -uc -us
$ cd ..
```

130

Now install whichever of the freshly built `.deb` files you were interested in, e.g.

131

```
# dpkg -i live-build_2.0.8-1_all.deb
```

132

You can also install *live-build* directly to your system by executing:

133

```
# make install
```

134

and uninstall it with:

135

```
# make uninstall
```

136

3.2.3 From 'snapshots'

137

If you do not wish to build or install *live-build* from source, you can use snapshots. These are built automatically from the latest version in Git and are available on <http://live.debian.net/debian/>.

138

3.3 live-boot and live-config

139

Note: You do not need to install *live-boot* or *live-config* on your system to create customized Debian Live systems. However, doing so will do no harm and is useful for reference purposes. If you only want the documentation, you may now install the *live-boot-doc* and *live-config-doc* packages separately.

140

3.3.1 From the Debian repository

141

Both *live-boot* and *live-config* are available from the Debian repository as per [Installing live-build](#).

142

3.3.2 From source

143

To use the latest source from git, you can follow the process below. Please ensure you are familiar with the terms mentioned in [Terms](#).

144

- Checkout the *live-boot* and *live-config* source

145

```
$ git clone git://live.debian.net/git/live-boot.git 146
$ git clone git://live.debian.net/git/live-config.git
```

Consult the *live-boot* and *live-config* man pages for details on customizing if that is your reason for building these packages from source. 147

- Build *live-boot* and *live-config* .deb files 148

You must build either on your target distribution or in a chroot containing your target platform: this means if your target is **Wheezy** then you should build against **Wheezy** 149

Use a personal builder such as *pbuilder* or *sbuid* if you need to build *live-boot* for a target distribution that differs from your build system. For example, for **Wheezy** live images, build *live-boot* in a **Wheezy** chroot. If your target distribution happens to match your build system distribution, you may build directly on the build system using *dpkg-buildpackage* (provided by the *dpkg-dev* package): 150

```
$ cd live-boot 151
$ dpkg-buildpackage -b -uc -us
$ cd ../live-config
$ dpkg-buildpackage -b -uc -us
```

- Use all generated .deb files 152

As *live-boot* and *live-config* are installed by *live-build* system, installing the packages in the host system is not sufficient: you should treat the generated .deb files like any other custom packages. Please see <Customizing package installation> for more information. You should pay particular attention to <Additional repositories>. 153

3.3.3 From 'snapshots' 154

You can let *live-build* automatically use the latest snapshots of *live-boot* and *live-config* by configuring a third-party repository in your *live-build* configuration directory. Assuming you have already created a configuration tree in the current directory with *lb config*: 155

```
$ lb config --archives live.debian.net 156
```

4. The basics 157

This chapter contains a brief overview of the build process and instructions for using the three most commonly used image types. The most versatile image type, *iso-hybrid*, may be used on a virtual machine, optical media or USB portable storage device. In certain special cases, such as the use of persistence, *usb-hdd* may be more suitable for USB devices. The chapter finishes with instructions for building and using a *net* type image, which is a bit more involved due to the setup required on the server. This is a slightly advanced topic for anyone who is not familiar already with netbooting, but is included here because once the setup is done, it is a very convenient way to test and 158

deploy images for booting on the local network without the hassle of dealing with image media.

Throughout the chapter, we will often refer to the default filenames produced by *live-build*. If you are downloading a prebuilt image instead, the actual filenames may vary.

4.1 What is a live system?

A live system usually means an operating system booted on a computer from a removable medium, such as a CD-ROM or USB stick, or from a network, ready to use without any installation on the usual drive(s), with auto-configuration done at run time (see <Terms>).

With Debian Live, it's a Debian GNU/Linux operating system, built for one of the supported architectures (currently amd64, i386, powerpc and sparc). It is made from the following parts:

- **Linux kernel image** , usually named `vmlinuz*`
- **Initial RAM disk image (initrd)** : a RAM disk set up for the Linux boot, containing modules possibly needed to mount the System image and some scripts to do it.
- **System image** : The operating system's filesystem image. Usually, a SquashFS compressed filesystem is used to minimize the Debian Live image size. Note that it is read-only. So, during boot the Debian Live system will use a RAM disk and `union' mechanism to enable writing files within the running system. However, all modifications will be lost upon shutdown unless optional persistence is used (see <Persistence>).
- **Bootloader** : A small piece of code crafted to boot from the chosen media, possibly presenting a prompt or menu to allow selection of options/configuration. It loads the Linux kernel and its initrd to run with an associated system filesystem. Different solutions can be used, depending on the target media and format of the filesystem containing the previously mentioned components: isolinux to boot from a CD or DVD in ISO9660 format, syslinux for HDD or USB drive booting from a VFAT partition, extlinux for ext2/3/4 and btrfs partitions, pxelinux for PXE netboot, GRUB for ext2/3/4 partitions, etc.

You can use *live-build* to build the system image from your specifications, set up a Linux kernel, its initrd, and a bootloader to run them, all in one media-dependant format (ISO9660 image, disk image, etc.).

4.2 First steps: building an ISO hybrid image

Regardless of the image type, you will need to perform the same basic steps to build an image each time. As a first example, execute the following sequence of *live-build* commands to create a basic ISO hybrid image containing just the Debian standard

system without X.org. It is suitable for burning to CD or DVD media, and also to copy onto a USB stick.

First, run the `lb config` command. This will create a “config/” hierarchy in the current directory for use by other commands: 170

```
$ lb config 171
```

No parameters are passed to `lb config`, so defaults for all of its various options will be used. See <The `lb config` command> for more details. 172

Now that the “config/” hierarchy exists, build the image with the `lb build` command: 173

```
# lb build 174
```

This process can take a while, depending on the speed of your network connection. When it is complete, there should be a `binary-hybrid.iso` image file, ready to use, in the current directory. 175

4.3 Using an ISO hybrid live image 176

After either building or downloading an ISO hybrid image, which can be obtained at <<http://www.debian.org/CD/live/>>, the usual next step is to prepare your media for booting, either CD-R(W) or DVD-R(W) optical media or a USB stick. 177

4.3.1 Burning an ISO image to a physical medium 178

Burning an ISO image is easy. Just install `wodim` and use it from the command-line to burn the image. For instance: 179

```
# apt-get install wodim 180
```

```
$ wodim binary-hybrid.iso
```

4.3.2 Copying an ISO hybrid image to a USB stick 181

ISO images prepared with the `isohybrid` command, like the images produced by the default `iso-hybrid` binary image type, can be simply copied to a USB stick with the `dd` program or an equivalent. Plug in a USB stick with a size large enough for your image file and determine which device it is, which we hereafter refer to as `${USBSTICK}`. This is the device file of your key, such as `/dev/sdb`, not a partition, such as `/dev/sdb1`! You can find the right device name by looking in `dmesg`'s output after plugging in the stick, or better yet, `ls -l /dev/disk/by-id`. 182

Once you are certain you have the correct device name, use the `dd` command to copy the image to the stick. **This will definitely overwrite any previous contents on your stick!** 183

```
$ dd if=binary-hybrid.iso of=${USBSTICK} 184
```

4.3.3 Booting the live media

185

The first time you boot your live media, whether CD, DVD, USB key, or PXE boot, some setup in your computer's BIOS may be needed first. Since BIOSes vary greatly in features and key bindings, we cannot get into the topic in depth here. Some BIOSes provide a key to bring up a menu of boot devices at boot time, which is the easiest way if it is available on your system. Otherwise, you need to enter the BIOS configuration menu and change the boot order to place the boot device for the live system before your normal boot device.

186

Once you've booted the media, you are presented with a boot menu. If you just press enter here, the system will boot using the default entry, `Live` and default options. For more information about boot options, see the "help" entry in the menu and also the `live-boot` and `live-config` man pages found within the live system.

187

Assuming you've selected `Live` and booted a default desktop live image, after the boot messages scroll by, you should be automatically logged into the user account and see a desktop, ready to use. If you've booted a console-only image, such as `standard` or `rescue` flavour prebuilt images, you should be automatically logged in on the console to the user account and see a shell prompt, ready to use.

188

4.4 Using a virtual machine for testing

189

It can be a great time-saver for the development of live images to run them in a virtual machine (VM). This is not without its caveats:

190

- Running a VM requires enough RAM for both the guest OS and the host and a CPU with hardware support for virtualization is recommended.
- There are some inherent limitations to running on a VM, e.g. poor video performance, limited choice of emulated hardware.
- When developing for specific hardware, there is no substitute for running on the hardware itself.
- Occasionally there are bugs that relate only to running in a VM. When in doubt, test your image directly on the hardware.

191

192

193

194

Provided you can work within these constraints, survey the available VM software and choose one that is suitable for your needs.

195

4.4.1 Testing an ISO image with QEMU

196

The most versatile VM in Debian is QEMU. If your processor has hardware support for virtualization, use the `qemu-kvm` package; the `qemu-kvm` package description briefly lists the requirements.

197

First, install `qemu-kvm` if your processor supports it. If not, install `qemu`, in which case

198

the program name is `qemu` instead of `kvm` in the following examples. The `qemu-utils` package is also valuable for creating virtual disk images with `qemu-img`.

```
# apt-get install qemu-kvm qemu-utils 199
```

Booting an ISO image is simple: 200

```
$ kvm -cdrom binary-hybrid.iso 201
```

See the man pages for more details. 202

4.4.2 Testing an ISO image with `virtualbox-ose` 203

In order to test the ISO with `virtualbox-ose`: 204

```
# apt-get install virtualbox-ose virtualbox-ose-dkms 205
```

```
$ virtualbox
```

Create a new virtual machine, change the storage settings to use `binary-hybrid.iso` as the CD/DVD device, and start the machine. 206

Note: For live systems containing X.org that you want to test with `virtualbox-ose`, you may wish to include the VirtualBox X.org driver package, `virtualbox-ose-guest-x11`, in your *live-build* configuration. Otherwise, the resolution is limited to 800x600. 207

```
$ echo virtualbox-ose-guest-x11 >> config/package-lists/my.list.chroot 208
```

4.5 Building a USB/HDD image 209

Building a USB/HDD image is similar to ISO hybrid in all respects except you specify `-b usb-hdd` and the resulting filename is `binary.img` which cannot be burnt to optical media. It is suitable for booting from USB sticks, USB hard drives, and various other portable storage devices. Normally, an ISO hybrid image can be used for this purpose instead, but if you have a BIOS which does not handle hybrid images properly, or want to use the remaining space on the media for some purpose, such as a persistence partition, you need a USB/HDD image. 210

Note: if you created an ISO hybrid image with the previous example, you will need to clean up your working directory with the `lb clean` command (see <The `lb clean` command>): 211

```
# lb clean --binary 212
```

Run the `lb config` command as before, except this time specifying the USB/HDD image type: 213

```
$ lb config -b usb-hdd 214
```

Now build the image with the `lb build` command: 215

```
# lb build 216
```

When the build finishes, a `binary.img` file should be present in the current directory. 217

4.6 Using a USB/HDD image

218

The generated binary image contains a VFAT partition and the syslinux bootloader, ready to be directly written on a USB stick. Since using a USB/HDD image is just like using an ISO hybrid image on USB, follow the instructions in <Using an ISO hybrid live image>, except use the filename `binary.img` instead of `binary-hybrid.iso`.

219

4.6.1 Testing a USB/HDD image with Qemu

220

First, install QEMU as described above in <Testing an ISO image with QEMU>. Then run `kvm` or `qemu`, depending on which version your host system needs, specifying `binary.img` as the first hard drive.

221

```
$ kvm -hda binary.img
```

222

4.6.2 Using the space left on a USB stick

223

To use the remaining free space after copying `binary.img` to a USB stick, use a partitioning tool such as `gparted` or `parted` to create a new partition on the stick. The first partition will be used by the Debian Live system.

224

```
# gparted ${USBSTICK}
```

225

After the partition is created, where `${PARTITION}` is the name of the partition, such as `/dev/sdb2`, you have to create a filesystem on it. One possible choice would be `ext4`.

226

```
# mkfs.ext4 ${PARTITION}
```

227

Note: If you want to use the extra space with Windows, apparently that OS cannot normally access any partitions but the first. Some solutions to this problem have been discussed on our <mailing list>, but it seems there are no easy answers.

228

Remember: Every time you install a new `binary.img` on the stick, all data on the stick will be lost because the partition table is overwritten by the contents of the image, so back up your extra partition first to restore again after updating the live image.

229

4.7 Building a netboot image

230

The following sequence of commands will create a basic netboot image containing the Debian standard system without X.org. It is suitable for booting over the network.

231

Note: if you performed any previous examples, you will need to clean up your working directory with the `lb clean` command:

232

```
# lb clean --binary
```

233

Run the `lb config` command as follows to configure your image for netbooting:

234

```
$ lb config -b net --net-root-path "/srv/debian-live" --net-root-server 235
"192.168.0.1"
```

In contrast with the ISO and USB/HDD images, netbooting does not, itself, serve the 236
filesystem image to the client, so the files must be served via NFS. The `--net-root-`
`path` and `--net-root-server` options specify the location and server, respectively, of
the NFS server where the filesystem image will be located at boot time. Make sure these
are set to suitable values for your network and server.

Now build the image with the `lb build` command: 237

```
# lb build 238
```

In a network boot, the client runs a small piece of software which usually resides on 239
the EPROM of the Ethernet card. This program sends a DHCP request to get an IP
address and information about what to do next. Typically, the next step is getting a
higher level bootloader via the TFTP protocol. That could be pxelinux, GRUB, or even
boot directly to an operating system like Linux.

For example, if you unpack the generated `binary-net.tar.gz` archive in the `/srv/-` 240
`debian-live` directory, you'll find the filesystem image in `live/filesystem.squashfs`
and the kernel, `initrd` and `pxelinux` bootloader in `tftpbboot/debian-live/i386`.

We must now configure three services on the server to enable netboot: the DHCP 241
server, the TFTP server and the NFS server.

4.7.1 DHCP server 242

We must configure our network's DHCP server to be sure to give an IP address to the 243
netbooting client system, and to advertise the location of the PXE bootloader.

Here is an example for inspiration, written for the ISC DHCP server `isc-dhcp-server` 244
in the `/etc/dhcp/dhcpd.conf` configuration file:

```
# /etc/dhcp/dhcpd.conf - configuration file for isc-dhcp-server 245

ddns-update-style none;

option domain-name "example.org";
option domain-name-servers ns1.example.org, ns2.example.org;

default-lease-time 600;
max-lease-time 7200;

log-facility local7;

subnet 192.168.0.0 netmask 255.255.255.0 {
    range 192.168.0.1 192.168.0.254;
    next-server servername;
    filename "pxelinux.0";
}
```

4.7.2 TFTP server

246

This serves the kernel and initial ramdisk to the system at run time.

247

You should install the `tftpd-hpa` package. It can serve all files contained inside a root directory, usually `/srv/tftp`. To let it serve files inside `/srv/debian-live/tftpboot`, run as root the following command:

248

```
# dpkg-reconfigure -plow tftpd-hpa
```

249

and fill in the new tftp server directory when being asked about it.

250

4.7.3 NFS server

251

Once the guest computer has downloaded and booted a Linux kernel and loaded its `initrd`, it will try to mount the Live filesystem image through a NFS server.

252

You need to install the `nfs-kernel-server` package.

253

Then, make the filesystem image available through NFS by adding a line like the following to `/etc/exports`:

254

```
/srv/debian-live *(ro,async,no_root_squash,no_subtree_check)
```

255

and tell the NFS server about this new export with the following command:

256

```
# exportfs -rv
```

257

Setting up these three services can be a little tricky. You might need some patience to get all of them working together. For more information, see the `syslinux` wiki at <http://syslinux.zytor.com/wiki/index.php/PXELINUX> or the Debian Installer Manual's TFTP Net Booting section at <http://d-i.alioth.debian.org/manual/en.i386/ch04s05.html>. They might help, as their processes are very similar.

258

4.7.4 Netboot testing HowTo

259

Netboot image creation is made easy with *live-build* magic, but testing the images on physical machines can be really time consuming.

260

To make our life easier, we can use virtualization. There are two solutions.

261

4.7.5 Qemu

262

- Install `qemu`, `bridge-utils`, `sudo`.

263

Edit `/etc/qemu-ifup`:

264

```
#!/bin/sh
sudo -p "Password for $0:" /sbin/ifconfig $1 172.20.0.1
echo "Executing /etc/qemu-ifup"
echo "Bringing up $1 for bridged mode..."
sudo /sbin/ifconfig $1 0.0.0.0 promisc up
```

265

```
echo "Adding $1 to br0..."
sudo /usr/sbin/brctl addif br0 $1
sleep 2
```

Get, or build a grub-floppy-netboot (in the svn).

Launch qemu with "-net nic,vlan=0 -net tap,vlan=0,ifname=tun0"

4.7.6 VMWare Player

- Install VMWare Player ("free as in beer" edition)
- Create a PXETester directory, and create a text file called `pxe.vmx` inside
- Paste this text inside:

```
#!/usr/bin/vmware
config.version = "8"
virtualHW.version = "4"
memsize = "512"
MemAllowAutoScaleDown = "FALSE"

ide0:0.present = "FALSE"
ide1:0.present = "FALSE"
floppy0.present = "FALSE"
sound.present = "FALSE"
tools.remindInstall = "FALSE"

ethernet0.present = "TRUE"
ethernet0.addressType = "generated"

displayName = "Test Boot PXE"
guestOS = "other"

ethernet0.generatedAddress = "00:0c:29:8d:71:3b"
uuid.location = "56 4d 83 72 5c c4 de 3f-ae 9e 07 91 1d 8d 71 3b"
uuid.bios = "56 4d 83 72 5c c4 de 3f-ae 9e 07 91 1d 8d 71 3b"
ethernet0.generatedAddressOffset = "0"
```

- You can play with this configuration file (e.g. change memory limit to 256)
- Double click on this file (or run VMWare player and select this file).
- When running just press space if that strange question comes up...

5. Overview of tools

This chapter contains an overview of the three main tools used in building Debian Live systems: *live-build*, *live-boot* and *live-config*.

5.1 live-build

278

live-build is a collection of scripts to build Debian Live systems. These scripts are also referred to as “commands”.

279

The idea behind *live-build* is to be a framework that uses a configuration directory to completely automate and customize all aspects of building a Live image.

280

Many concepts are similar to those in the debhelper Debian package tools written by Joey Hess:

281

- The scripts have a central location for configuring their operation. In debhelper, this is the `debian/` subdirectory of a package tree. For example, `dh_install` will look, amongst others, for a file called `debian/install` to determine which files should exist in a particular binary package. In much the same way, *live-build* stores its configuration entirely under a `config/` subdirectory.
- The scripts are independent - that is to say, it is always safe to run each command.

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283

Unlike debhelper, *live-build* contains a tool to generate a skeleton configuration directory, `lb config`. This could be considered to be similar to tools such as `dh-make`. For more information about `lb config`, please see [‹The lb config command›](#).

284

The remainder of this section discusses the three most important commands:

285

- **lb config** : Responsible for initializing a Live system configuration directory. See [‹The lb config command›](#) for more information.
- **lb build** : Responsible for starting a Live system build. See [‹The lb build command›](#) for more information.
- **lb clean** : Responsible for removing parts of a Live system build. See [‹The lb clean command›](#) for more information.

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5.1.1 The lb config command

289

As discussed in [‹live-build›](#), the scripts that make up *live-build* read their configuration with the `source` command from a single directory named `config/`. As constructing this directory by hand would be time-consuming and error-prone, the `lb config` command can be used to create skeleton configuration folders.

290

Issuing `lb config` without any arguments creates a `config/` subdirectory which it populates with some default settings, and a skeleton `auto/` subdirectory tree.

291

```
$ lb config
P: Considering defaults defined in /etc/live/build.conf
P: Creating config tree
```

292

Using `lb config` without any arguments would be suitable for users who need a very basic image, or who intend to later provide a more complete configuration via `auto/config` (see [‹Managing a configuration›](#) for details).

293

Normally, you will want to specify some options. For example, to include the `gnome` package list in your configuration:

```
$ lb config -p gnome
```

It is possible to specify many options, such as:

```
$ lb config --binary-images net --hostname live-machine --username live-user  
...
```

A full list of options is available in the `lb_config` man page.

5.1.2 The `lb build` command

The `lb build` command reads in your configuration from the `config/` directory. It then runs the lower level commands needed to build your Live system.

5.1.3 The `lb clean` command

It is the job of the `lb clean` command to remove various parts of a build so subsequent builds can start from a clean state. By default, `chroot`, `binary` and `source` stages are cleaned, but the cache is left intact. Also, individual stages can be cleaned. For example, if you have made changes that only affect the binary stage, use `lb clean --binary` prior to building a new binary. See the `lb_clean` man page for a full list of options.

5.2 The `live-boot` package

live-boot is a collection of scripts providing hooks for the `initramfs-tools`, used to generate an `initramfs` capable of booting live systems, such as those created by *live-build*. This includes the Debian Live ISOs, netboot tarballs, and USB stick images.

At boot time it will look for read-only media containing a `/live/` directory where a root filesystem (often a compressed filesystem image like `squashfs`) is stored. If found, it will create a writable environment, using `aufs`, for Debian like systems to boot from.

More information on initial ramfs in Debian can be found in the Debian Linux Kernel Handbook at <http://kernel-handbook.alioth.debian.org/> in the chapter on `initramfs`.

5.3 The `live-config` package

live-config consists of the scripts that run at boot time after *live-boot* to configure the live system automatically. It handles such tasks as setting the hostname, locales and timezone, creating the live user, inhibiting cron jobs and performing autologin of the live user.

6. Managing a configuration

309

This chapter explains how to manage a live configuration from initial creation, through successive revisions and successive releases of both the *live-build* software and the live image itself.

310

6.1 Use `auto` to manage configuration changes

311

Live configurations rarely are perfect on the first try. You'll likely need to make a series of revisions until you are satisfied. However, inconsistencies can creep into your configuration from one revision to the next if you aren't careful. The main problem is, once a variable is given a default value, that value will not be recomputed from other variables that may change in later revisions.

312

For example, when the distribution is first set, many 'dependent' variables are given default values that suit that distribution. However, if you later decide to change the distribution, those dependent variables continue to retain old values that are no longer appropriate.

313

A second, related problem is that if you run `lb config` and then upgrade to a new version of *live-build* that has changed one of the variable names, you will discover this only by manual review of the variables in your `config/*` files, which you will then need to use to set the appropriate option again.

314

All of this would be a terrible nuisance if it weren't for `auto/*` scripts, simple wrappers to the `lb config`, `lb build` and `lb clean` commands that are designed to help you manage your configuration. Simply create an `auto/config` script containing `lb config` command with all desired options, and an `auto/clean` that removes the files containing configuration variable values, and each time you `lb config` and `lb clean`, these files will be executed. This will ensure that your configuration is kept internally consistent from one revision to the next and from one *live-build* release to the next (though you will still have to take care and read the documentation when you upgrade *live-build* and make adjustments as needed).

315

6.2 Example `auto` scripts

316

Use `auto` script examples such as the following as the starting point for your new *live-build* configuration. Take note that when you call the `lb` command that the `auto` script wraps, you must specify `noauto` as its parameter to ensure that the `auto` script isn't called again, recursively. Also, don't forget to ensure the scripts are executable (e.g. `chmod 755 auto/*`).

317

```
auto/config
```

318

```
#!/bin/sh
lb config noauto \
  --package-lists "standard" \
```

319

```

    "${@}"
auto/clean 320
    #!/bin/sh 321
    lb clean noauto "${@}"
    rm -f config/binary config/bootstrap \
        config/chroot config/common config/source
    rm -f binary.log
auto/build 322
    #!/bin/sh 323
    lb build noauto "${@}" 2>&1 |tee binary.log

```

We now ship example auto scripts with *live-build* based on the examples above. You may copy those as your starting point. 324

```
$ cp /usr/share/live/build/examples/auto/* auto/ 325
```

Edit `auto/config`, changing or adding any options as you see fit. In the example above, `--package-lists standard` is set to the default value. Change this to an appropriate value for your image (or delete it if you want to use the default) and add any additional options in continuation lines that follow. 326

7. Customization overview 327

This chapter gives an overview of the various ways in which you may customize a Debian Live system. 328

7.1 Build time vs. boot time configuration 329

Live system configuration options are divided into build-time options which are options that are applied at build time and boot-time options which are applied at boot time. Boot-time options are further divided into those occurring early in the boot, applied by the *live-boot* package, and those that happen later in the boot, applied by *live-config*. Any boot-time option may be modified by the user by specifying it at the boot prompt. The image may also be built with default boot parameters so users can normally just boot directly to the live system without specifying any options when all of the defaults are suitable. In particular, the argument to `lb --bootappend-live` consists of any default kernel command line options for the Live system, such as persistence, keyboard layouts, or timezone. See `<Customizing locale and language>`, for example. 330

Build-time configuration options are described in the `lb config` man page. Boot-time options are described in the man pages for *live-boot* and *live-config*. Although the *live-boot* and *live-config* packages are installed within the live system you are building, it is recommended that you also install them on your build system for easy reference when you are working on your configuration. It is safe to do so, as none of the scripts contained within them are executed unless the system is configured as a live system. 331

7.2 Stages of the build

332

The build process is divided into stages, with various customizations applied in sequence in each. The first stage to run is the **bootstrap** stage. This is the initial phase of populating the chroot directory with packages to make a barebones Debian system. This is followed by the **chroot** stage, which completes the construction of chroot directory, populating it with all of the packages listed in the configuration, along with any other materials. Most customization of content occurs in this stage. The final stage of preparing the live image is the **binary** stage, which builds a bootable image, using the contents of the chroot directory to construct the root filesystem for the Live system, and including the installer and any other additional material on the target media outside of the Live system's filesystem. After the live image is built, if enabled, the source tarball is built in the **source** stage.

333

Within each of these stages, there is a particular sequence in which commands are applied. These are arranged in such a way as to ensure customizations can be layered in a reasonable fashion. For example, within the **chroot** stage, preseeds are applied before any packages are installed, packages are installed before any locally included files or patches are applied, and hooks are run later, after all of the materials are in place.

334

7.3 Supplement lb config with files

335

Although `lb config` does create a skeletal configuration in the `config/` directory, to accomplish your goals, you may need to provide additional files in subdirectories of `config/`. Depending on where the files are stored in the configuration, they may be copied into the live system's filesystem or into the binary image filesystem, or may provide build-time configurations of the system that would be cumbersome to pass as command-line options. You may include things such as custom lists of packages, custom artwork, or hook scripts to run either at build time or at boot time, boosting the already considerable flexibility of `debian-live` with code of your own.

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7.4 Customization tasks

337

The following chapters are organized by the kinds of customization task users typically perform: <Customizing package installation>, <Customizing contents> and <Customizing locale and language> cover just a few of the things you might want to do.

338

8. Customizing package installation

339

Perhaps the most basic customization of a Debian live system is the selection of packages to be included in the image. This chapter guides you through the various build-time options to customize `live-build`'s installation of packages. The broadest choices influencing which packages are available to install in the image are the distribution and

340

archive areas. To ensure decent download speeds, you should choose a nearby distribution mirror. You can also add your own repositories for backports, experimental or custom packages, or include packages directly as files. You can define your own lists of packages to include, use *live-build*'s predefined lists, use `taskset` tasks, or a combination of all three. Finally, a number of options give some control over `apt`, or if you prefer, `aptitude`, at build time when packages are installed. You may find these handy if you use a proxy, want to disable installation of recommended packages to save space, or need to control which versions of packages are installed via APT pinning, to name a few possibilities.

8.1 Package sources 341

8.1.1 Distribution, archive areas and mode 342

The distribution you choose has the broadest impact on which packages are available to include in your live image. Specify the codename, which defaults to `wheezy` for the **Wheezy** version of *live-build*. Any current distribution carried in the Debian archive may be specified by its codename here. (See `<Terms>` for more details.) The `--distribution` option not only influences the source of packages within the archive, but also instructs *live-build* to behave as needed to build each supported distribution. For example, to build against the `*unstable*` release, **Sid**, specify:

```
$ lb config --distribution sid 344
```

Within the distribution archive, archive areas are major divisions of the archive. In Debian, these are `main`, `contrib` and `non-free`. Only `main` contains software that is part of the Debian distribution, hence that is the default. One or more values may be specified, e.g.

```
$ lb config --archive-areas "main contrib" 346
```

Experimental support is available for some Debian derivatives through a `--mode` option. By default, this option is set to `debian`, even if you are building on a non-Debian system. If you specify `--mode ubuntu` or `--mode emdebian`, the distribution names and archive areas for the specified derivative are supported instead of the ones for Debian. The mode also modifies *live-build* behaviour to suit the derivatives.

Note: The projects for whom these modes were added are primarily responsible for supporting users of these options. The Debian live project, in turn, provides development support on a best-effort basis only, based on feedback from the derivative projects as we do not develop or support these derivatives ourselves. 348

8.1.2 Distribution mirrors 349

The Debian archive is replicated across a large network of mirrors around the world so that people in each region can choose a nearby mirror for best download speed. Each of the `--parent-mirror-*` options governs which distribution mirror is used at 350

various stages of the build. Recall from <Stages of the build> that the **bootstrap** stage is when the chroot is initially populated by *debootstrap* with a minimal system, and the **chroot** stage is when the chroot used to construct the live system's filesystem is built. Thus, the corresponding mirror switches are used for those stages, and later, in the **binary** stage, the `--parent-mirror-binary` and `--parent-mirror-binary-security` values are used, superceding any mirrors used in an earlier stage.

8.1.3 Distribution mirrors used at build time

351

To set the distribution mirrors used at build time to point at a local mirror, it is sufficient to set `--parent-mirror-bootstrap`, `--parent-mirror-chroot-security` and `--parent-mirror-chroot-backports` as follows.

352

```
$ lb config --parent-mirror-bootstrap http://localhost/debian/ \
           --parent-mirror-chroot-security http://localhost/debian-security/ \
           --parent-mirror-chroot-backports http://localhost/debian-backports/
```

353

The chroot mirror, specified by `--parent-mirror-chroot`, defaults to the `--parent-mirror-bootstrap` value.

354

8.1.4 Distribution mirrors used at run time

355

The `--parent-mirror-binary*` options govern the distribution mirrors placed in the binary image. These may be used to install additional packages while running the live system. The defaults employ `cdn.debian.net`, a service that chooses a geographically close mirror based on the user's IP number. This is a suitable choice when you cannot predict which mirror will be best for all of your users. Or you may specify your own values as shown in the example below. An image built from this configuration would only be suitable for users on a network where "mirror" is reachable.

356

```
$ lb config --parent-mirror-binary http://mirror/debian/ \
           --parent-mirror-binary-security http://mirror/debian-security/
```

357

8.1.5 Additional repositories

358

You may add more repositories, broadening your package choices beyond what is available in your target distribution. These may be, for example, for backports, experimental or custom packages. To configure additional repositories, create `config/archives/your-repository.list.chroot`, and/or `config/archives/your-repository.list.binary` files. As with the `--parent-mirror-*` options, these govern the repositories used in the **chroot** stage when building the image, and in the **binary** stage, i.e. for use when running the live system.

359

For example, `config/archives/live.list.chroot` allows you to install packages from the debian live snapshot repository at live system build time.

360

```
deb http://live.debian.net/ sid-snapshots main contrib non-free
```

361

If you add the same line to `config/archives/live.list.binary`, the repository will be added to your live system's `/etc/apt/sources.list.d/` directory. 362

If such files exist, they will be picked up automatically. 363

You should also put the GPG key used to sign the repository into `config/archives/-your-repository.gpg.{binary,chroot}` files. 364

Note: some preconfigured package repositories are available for easy selection through the `--archives` option, e.g. for enabling live snapshots, a simple command is enough to enable it: 365

```
$ lb config --archives live.debian.net 366
```

8.2 Choosing packages to install 367

There are a number of ways to choose which packages *live-build* will install in your image, covering a variety of different needs. You can simply name individual packages to install in a package list. You can also choose predefined lists of packages, or use APT tasks. And finally, you may place package files in your `config/` tree, which is well suited to testing of new or experimental packages before they are available from a repository. 368

8.2.1 Package lists 369

Package lists are a powerful way of expressing which packages should be installed. The list syntax supports included files and conditional sections which makes it easy to build lists from other lists and adapt them for use in multiple configurations. You can use predefined package lists, providing in a modular fashion package selections from each of the major desktop environments and some special purpose lists, as well as standard lists the others are based upon. You can also provide your own package lists, or use a combination of both. 370

Note: The behaviour of *live-build* when specifying a package that does not exist is determined by your choice of APT utility. See <Choosing apt or aptitude> for more details. 371

8.2.2 Predefined package lists 372

The simplest way to use lists is to specify one or more predefined lists with the `--package-lists` option. For example: 373

```
$ lb config --package-lists "gnome rescue" 374
```

The default location for the list files on your system is `/usr/share/live/build/package-lists/`. To determine the packages in a given list, read the corresponding file, paying attention to included files and conditionals as described in the following sections. 375

8.2.3 Local package lists

376

You may supplement the predefined lists using local package lists stored in `config/package-lists/`.

377

Package lists that exist in this directory need to have a `.list` suffix in order to be processed, and then an additional stage suffix, `.chroot` or `.binary` to indicate which stage the list is for.

378

Note: If you don't specify the stage suffix, the list will be used for both stages. Normally, you want to specify `.list.chroot` so that the packages will only be installed in the live filesystem and not have an extra copy of the `.deb` placed on the media.

379

8.2.4 Local binary package lists

380

To make a binary stage list, place a file suffixed with `.list.binary` in `config/package-lists/`. These packages are not installed in the live filesystem, but are included on the live media under `pool/`. You would typically use such a list with one of the non-live installer variants. As mentioned above, if you want this list to be the same as your `chroot` stage list, simply use the `.list` suffix by itself.

381

8.2.5 Extending a provided package list using includes

382

The package lists that are included with *live-build* make extensive use of includes. Refer to these in the `/usr/share/live/build/package-lists/` directory, as they serve as good examples of how to write your own lists.

383

For example, to make a list that includes the predefined `gnome` list plus `iceweasel`, create `config/package-lists/my.list.chroot` with the following contents:

384

```
#include <gnome>
iceweasel
```

385

8.2.6 Using conditionals inside package lists

386

Any of the *live-build* configuration variables stored in `config/*` (minus the `LB_` prefix) may be used in conditional statements in package lists. Generally, this means any `lbconfig` option uppercased and with dashes changed to underscores. But in practice, it is only the ones that influence package selection that make sense, such as `DISTRIBUTION`, `ARCHITECTURE` or `ARCHIVE_AREAS`.

387

For example, to install `ia32-libs` if the `--architecture amd64` is specified:

388

```
#if ARCHITECTURE amd64
ia32-libs
#endif
```

389

You may test for any one of a number of values, e.g. to install `memtest86+` if either

390

--architecture i386 or --architecture amd64 is specified:

```
#if ARCHITECTURE i386 amd64
memtest86+
#endif
```

391

You may also test against variables that may contain more than one value, e.g. to install `vrms` if either `contrib` or `non-free` is specified via `--archive-areas`:

392

```
#if ARCHIVE_AREAS contrib non-free
vrms
#endif
```

393

A conditional may surround an `#include` directive:

394

```
#if ARCHITECTURE amd64
#include <gnome-full>
#endif
```

395

The nesting of conditionals is not supported.

396

8.2.7 Tasks

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The Debian Installer offers the user choices of a number of preselected lists of packages, each one focused on a particular kind of system, or task a system may be used for, such as “Graphical desktop environment”, “Mail server” or “Laptop”. These lists are called “tasks” and are supported by APT through the “Task:” field. You can specify one or more tasks in *live-build* by putting them in a list in `config/task-lists/`, as in the example below.

398

```
$ lb config
$ echo "mail-server file-server" >> config/task-lists/my.list.chroot
```

399

The primary tasks available in the Debian Installer can be listed with `taskse1 --list-tasks` in the live system. The contents of any task, including ones not included in this list, may be examined with `taskse1 --task-packages`.

400

8.2.8 Desktop and language tasks

401

Desktop and language tasks are special cases that need some extra planning and configuration. Live images are different from Debian Installer images in this respect. In the Debian Installer, if the medium was prepared for a particular desktop environment flavour, the corresponding task will be automatically installed. Thus, there are internal `gnome-desktop`, `kde-desktop`, `lxde-desktop` and `xfce-desktop` tasks, none of which are offered in `taskse1`'s menu. Likewise, there are no menu entries for tasks for languages, but the user's language choice during the install influences the selection of corresponding language tasks.

402

When developing a desktop live image, the image typically boots directly to a working desktop, the choices of both desktop and default language having been made at build time, not at run time as in the case of the Debian Installer. That's not to say that a live

403

image couldn't be built to support multiple desktops or multiple languages and offer the user a choice, but that is not *live-build*'s default behaviour.

Because there is no provision made automatically for language tasks, which include such things as language-specific fonts and input-method packages, if you want them, you need to specify them in your configuration. For example, a GNOME desktop image containing support for Japanese might include these tasks:

```
$ lb config
$ echo "gnome-desktop desktop standard laptop" >>
config/task-lists/my.list.chroot
$ echo "japanese japanese-desktop japanese-gnome-desktop" >>
config/task-lists/my.list.chroot
```

Since desktop tasks are “internal” tasks, for every desktop flavour task included in the image, the corresponding value, if it differs from the default, “gnome”, must be pre-seeded in the “tasksel/desktop” debconf variable or else tasksel will not recognize and install it. Thus:

```
$ lb config
$ echo 'tasksel tasksel/desktop multiselect kde' >>
config/preseed/my.preseed.chroot
```

This parameter can take multiple values, e.g. “lxde xfce” instead of “kde”.

8.3 Installing modified or third-party packages

Whilst it is against the philosophy of Debian Live, it may sometimes be necessary to build a Live system with modified versions of packages that are in the Debian repository. This may be to modify or support additional features, languages and branding, or even to remove elements of existing packages that are undesirable. Similarly, “third-party” packages may be used to add bespoke and/or proprietary functionality.

This section does not cover advice regarding building or maintaining modified packages. Joachim Breitner's ‘How to fork privately’ method from <http://www.joachim-breitner.de/blog/archives/282-How-to-fork-privately.html> may be of interest, however. The creation of bespoke packages is covered in the Debian New Maintainers' Guide at <http://www.debian.org/doc/maint-guide/> and elsewhere.

There are two ways of installing modified custom packages:

- `packages.chroot`
- Using a custom APT repository

Using `packages.chroot` is simpler to achieve and useful for “one-off” customizations but has a number of drawbacks, whilst using a custom APT repository is more time-consuming to set up.

8.3.1 Using `packages.chroot` to install custom packages

416

To install a custom package, simply copy it to the `config/packages.chroot/` directory. Packages that are inside this directory will be automatically installed into the live system during build - you do not need to specify them elsewhere.

417

Packages **must** be named in the prescribed way. One simple way to do this is to use `dpkg-name`.

418

Using `packages.chroot` for installation of custom packages has disadvantages:

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- It is not possible to use secure APT.
- You must install all appropriate packages in the `config/packages.chroot/` directory.
- It does not lend itself to storing Debian Live configurations in revision control.

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421

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8.3.2 Using an APT repository to install custom packages

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Unlike using `packages.chroot`, when using a custom APT repository you must ensure that you specify the packages elsewhere. See `<Choosing packages to install>` for details.

424

Whilst it may seem unnecessary effort to create an APT repository to install custom packages, the infrastructure can be easily re-used at a later date to offer updates of the modified packages.

425

8.3.3 Custom packages and APT

426

live-build uses APT to install all packages into the live system so will therefore inherit behaviours from this program. One relevant example is that (assuming a default configuration) given a package available in two different repositories with different version numbers, APT will elect to install the package with the higher version number.

427

Because of this, you may wish to increment the version number in your custom packages' `debian/changelog` files to ensure that your modified version is installed over one in the official Debian repositories. This may also be achieved by altering the live system's APT pinning preferences - see `<APT pinning>` for more information.

428

8.4 Configuring APT at build time

429

You can configure APT through a number of options applied only at build time. (APT configuration used in the running live system may be configured in the normal way for live system contents, that is, by including the appropriate configurations through `config/includes.chroot/`.) For a complete list, look for options starting with `apt` in the `lb_config` man page.

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8.4.1 Choosing apt or aptitude

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You can elect to use either `apt` or `aptitude` when installing packages at build time. Which utility is used is governed by the `--apt` argument to `lb config`. Choose the method implementing the preferred behaviour for package installation, the notable difference being how missing packages are handled.

432

- `apt`: With this method, if a missing package is specified, the package installation will fail. This is the default setting.
- `aptitude`: With this method, if a missing package is specified, the package installation will succeed.

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434

8.4.2 Using a proxy with APT

435

One commonly required APT configuration is to deal with building an image behind a proxy. You may specify your APT proxy with the `--apt-ftp-proxy` or `--apt-http-proxy` options as needed, e.g.

436

```
$ lb config --apt-http-proxy http://proxy/
```

437

8.4.3 Tweaking APT to save space

438

You may find yourself needing to save some space on the image media, in which case one or the other or both of the following options may be of interest.

439

If you don't want to include APT indices in the image, you can omit those with:

440

```
$ lb config --apt-indices false
```

441

This will not influence the entries in `/etc/apt/sources.list`, but merely whether `/var/lib/apt` contains the indices files or not. The tradeoff is that APT needs those indices in order to operate in the live system, so before performing `apt-cache search` or `apt-get install`, for instance, the user must `apt-get update` first to create those indices.

442

If you find the installation of recommended packages bloats your image too much, you may disable that default option of APT with:

443

```
$ lb config --apt-recommends false
```

444

The tradeoff here is that if you don't install recommended packages for a given package, that is, "packages that would be found together with this one in all but unusual installations" (Debian Policy Manual, section 7.2), some packages that you actually need may be omitted. Therefore, we suggest you review the difference turning off `recommends` makes to your packages list (see the `binary.packages` file generated by `lb build`) and re-include in your list any missing packages that you still want installed. Alternatively, if you find you only want a small number of recommended packages left out, leave `recommends` enabled and set a negative APT pin priority on selected packages to prevent them from being installed, as explained in `<APT pinning>`.

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8.4.4 Passing options to apt or aptitude

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If there is not an `lb config` option to alter APT's behaviour in the way you need, use `--apt-options` or `--aptitude-options` to pass any options through to your configured APT tool. See the man pages for `apt` and `aptitude` for details.

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8.4.5 APT pinning

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For background, please first read the `apt_preferences(5)` man page. APT pinning can be configured either for build time, or else for run time. For the former, create `config/chroot_apt/preferences`. For the latter, create `config/includes.chroot/etc/apt/preferences`.

449

Let's say you are building a **Wheezy** live system but need all the live packages that end up in the binary image to be installed from **Sid** at build time. You need to add **Sid** to your APT sources and pin it so that only the packages you want are installed from it at build time and all others are taken from the target system distribution, **Wheezy**. The following will accomplish this:

450

```
$ echo "deb http://mirror/debian sid main" > config/archives/sid.list.chroot
$ cat >> config/chroot_apt/preferences <<END
Package: live-boot live-boot-initramfs-tools live-config
live-config-sysvinit
Pin: release n=sid
Pin-Priority: 600

Package: *
Pin: release n=sid
Pin-Priority: 1
END
```

451

Note: Wildcards can be used in package names (e.g. **Package: live-***) with Apt version 0.8.14 or higher. This means that it works with **Wheezy** using:

452

```
$ lb config --distribution wheezy
```

453

Negative pin priorities will prevent a package from being installed, as in the case where you do not want a package that is recommended by another package. Suppose you are building an LXDE image using `--package-lists lxde` option, but don't want the user prompted to store wifi passwords in the keyring. This list includes `gdm`, which depends on `gksu`, which in turn recommends `gnome-keyring`. So you want to omit the recommended `gnome-keyring` package. This can be done by adding the following stanza to `config/chroot_apt/preferences`:

454

```
Package: gnome-keyring
Pin: version *
Pin-Priority: -1
```

455

9. Customizing contents

456

This chapter discusses fine-tuning customization of the live system contents beyond merely choosing which packages to include. Includes allow you to add or replace arbitrary files in your Debian Live image, hooks allow you to execute arbitrary commands at different stages of the build and at boot time, and preseeding allows you to configure packages when they are installed by supplying answers to debconf questions.

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9.1 Includes

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While ideally a Debian live system would include files entirely provided by unmodified Debian packages, it is sometimes convenient to provide or modify some content by means of files. Using includes, it is possible to add (or replace) arbitrary files in your Debian Live image. *live-build* provides three mechanisms for using them:

459

- Chroot local includes: These allow you to add or replace files to the chroot/Live filesystem. Please see <Live/chroot local includes> for more information.
- Binary local includes: These allow you to add or replace files in the binary image. Please see <Binary local includes> for more information.
- Binary includes: These allow you to add or replace Debian specific files in the binary image, such as the templates and tools directories. Please see <Binary includes> for more information.

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Please see <Terms> for more information about the distinction between the “Live” and “binary” images.

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9.1.1 Live/chroot local includes

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Chroot local includes can be used to add or replace files in the chroot/Live filesystem so that they may be used in the Live system. A typical use is to populate the skeleton user directory (`/etc/skel`) used by the Live system to create the live user's home directory. Another is to supply configuration files that can be simply added or replaced in the image without processing; see <Live/chroot local hooks> if processing is needed.

465

To include files, simply add them to your `config/includes.chroot` directory. This directory corresponds to the root directory (`/`) of the live system. For example, to add a file `/var/www/index.html` in the live system, use:

466

```
$ mkdir -p config/includes.chroot/var/www
$ cp /path/to/my/index.html config/includes.chroot/var/www
```

467

Your configuration will then have the following layout:

468

```
-- config
  [...]
  |-- includes.chroot
  |   `-- var
```

469

```
|           |-- www
|           |-- index.html
[...]
```

Chroot local includes are installed after package installation so that files installed by packages are overwritten. 470

9.1.2 Binary local includes 471

To include material such as documentation or videos on the media filesystem so that it is accessible immediately upon insertion of the media without booting the Live system, you can use binary local includes. This works in a similar fashion to chroot local includes. For example, suppose the files `~/video_demo.*` are demo videos of the live system described by and linked to by an HTML index page. Simply copy the material to `config/includes.binary/` as follows: 472

```
$ cp ~/video_demo.* config/includes.binary/ 473
```

These files will now appear in the root directory of the live media. 474

9.1.3 Binary includes 475

live-build has some standard files (like documentation) that gets included in the default configuration on every live media. This can be disabled with: 476

```
$ lb config --includes none 477
```

Otherwise, the material will be installed by *live-build* in `/includes/` by default on the media filesystem, or else you can specify an alternate path with `--includes`. 478

9.2 Hooks 479

Hooks allow commands to be performed in the chroot and binary stages of the build in order to customize the image. 480

9.2.1 Live/chroot local hooks 481

To run commands in the chroot stage, create a hook script with a `.chroot` suffix containing the commands in the `config/hooks/` directory. The hook will run in the chroot after the rest of your chroot configuration has been applied, so remember to ensure your configuration includes all packages and files your hook needs in order to run. See the example chroot hook scripts for various common chroot customization tasks provided in `/usr/share/live/build/examples/hooks` which you can copy or symlink to use them in your own configuration. 482

9.2.2 Boot-time hooks

483

To execute commands at boot time, you can supply *live-config* hooks as explained in the “Customization” section of its man page. Examine *live-config*'s own hooks provided in `/lib/live/config/`, noting the sequence numbers. Then provide your own hook prefixed with an appropriate sequence number, either as a chroot local include in `config/includes.chroot/lib/live/config/`, or as a custom package as discussed in `<Installing modified or third-party packages>`.

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9.2.3 Binary local hooks

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To run commands in the binary stage, create a hook script with a `.binary` suffix containing the commands in the `config/hooks/` directory. The hook will run after all other binary commands are run, but before `binary_checksums`, the very last binary command. The commands in your hook do not run in the chroot, so take care to not modify any files outside of the build tree, or you may damage your build system! See the example binary hook scripts for various common binary customization tasks provided in `/usr/share/live/build/examples/hooks` which you can copy or symlink to use them in your own configuration.

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9.3 Preseeding Debconf questions

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Files in the `config/preseed/` directory suffixed with `.preseed` followed by the stage (`.chroot` or `.binary`) are considered to be debconf preseed files and are installed by *live-build* using `debconf-set-selections` during the corresponding stage.

488

For more information about debconf, please see `debconf(7)` in the `debconf` package.

489

10. Customizing run time behaviours

490

All configuration that is done during run time is done by *live-config*. Here are some of the most common options of *live-config* that users are interested in. A full list of all possibilities can be found in the manpage of *live-config*.

491

10.1 Customizing the live user

492

One important consideration is that the live user is created by *live-boot* at boot time, not by *live-build* at build time. This not only influences where materials relating to the live user are introduced in your build, as discussed in `<Live/chroot local includes>`, but also any groups and permissions associated with the live user.

493

You can specify additional groups that the live user will belong to by preseeding the `passwd/user-default-groups` debconf value. For example, to add the live user to the `fuse` group, add the following preseed under `config/preseed/` for the chroot stage:

494

```
$ lb config 495
$ echo user-setup passwd/user-default-groups string audio cdrom \
dip floppy video plugdev netdev powerdev scanner bluetooth fuse \
>> config/preseed/my.preseed.chroot
```

It is also possible to change the default username “user” and the default password “live”. 496
If you want to do that for any reason, you can easily achieve it as follows:

To change the default username you can simply specify it in your config: 497

```
$ lb config --bootappend-live "username=live-user" 498
```

One possible way of changing the default password is by means of a hook as described 499
in <Boot-time hooks>. In order to do that you can use the “passwd” hook from /usr/-
share/doc/live-config/examples/hooks, prefix it accordingly (e.g. 200-passwd) and
add it to config/includes.chroot/lib/live/config/

10.2 Customizing locale and language 500

When the live system boots, language is involved in three steps: 501

- the locale generation 502
- setting the keyboard layout for the console 503
- setting the keyboard layout for X 504

The default locale when building a Live system is “locales=en_US.UTF-8”. To define the 505
locale that should be generated, use the locales parameter in the --bootappend-live
option of lb config, e.g.

```
$ lb config --bootappend-live "locales=de_CH.UTF-8" 506
```

This parameter can also be used at the kernel command line. You can specify a locale 507
by a full language_country.encoding word.

Both the console and X keyboard configuration depend on the keyboard-layouts 508
parameter of the --bootappend-live option. Valid options for X keyboard layouts can
be found in /usr/share/X11/xkb/rules/base.xml (rather limited to two-letters country
codes). To find the value (the two characters) corresponding to a language try search-
ing for the english name of the nation where the language is spoken, e.g:

```
$ grep -i sweden -C3 /usr/share/X11/xkb/rules/base.xml |grep name 509
<name>se</name>
```

To get the locale files for German and Swiss German keyboard layout in X use: 510

```
$ lb config --bootappend-live "locales=de_CH.UTF-8 keyboard-layouts=ch" 511
```

A list of the valid values of the keyboards for the console can be figured with the following 512
command:

```
$ for i in $(find /usr/share/keymaps/ -iname "*kmap.gz"); \ 513
do basename $i |head -c -9; echo; done |sort |less
```

Alternatively, you can use the console-setup package, a tool to let you configure con- 514

sole layout using X (XKB) definitions; you can then set your keyboard layout more precisely with `keyboard-layouts`, `keyboard-variant`, `keyboard-options` and `keyboard-model` variables; *live-boot* will use also these parameters for X configuration. For example, to set up a French system with a French-Dvorak layout (called Bepo) on a Type-Matrix keyboard, both in console and X11, use:

```
$ lb config --bootappend-live \  
    "locales=fr_FR.UTF-8 keyboard-layouts=fr keyboard-variant=bepo  
keyboard-model=tm2030usb" 515
```

10.3 Persistence 516

A live cd paradigm is a pre-installed system which runs from read-only media, like a cdrom, where writes and modifications do not survive reboots of the host hardware which runs it. 517

A Debian Live system is a generalization of this paradigm and thus supports other media in addition to CDs; but still, in its default behaviour, it should be considered read-only and all the run-time evolutions of the system are lost at shutdown. 518

Persistence is a common name for different kinds of solutions for saving across reboots some, or all, of this run-time evolution of the system. To understand how it could work it could be handy to know that even if the system is booted and run from read-only media, modification to the files and directories are written on writable media, typically a ram disk (tmpfs) and ram disks' data do not survive reboots. 519

The data stored on this ramdisk should be saved on a writable persistent medium like a Hard Disk, a USB key, a network share or even a session of a multisession (re)writable CD/DVD. All these media are supported in Debian Live in different ways, and all but the last one require a special boot parameter to be specified at boot time: `persistent`. 520

10.3.1 Full persistence 521

By 'full persistence' it is meant that instead of using a tmpfs for storing modifications to the read-only media (with the copy-on-write, COW, system) a writable partition is used. In order to use this feature a partition with a clean writable supported filesystem on it labeled "live-rw" must be attached on the system at boot time and the system must be started with the boot parameter 'persistent'. This partition could be an ext2 partition on the hard disk or on a usb key created with, e.g.: 522

```
# mkfs.ext2 -L live-rw /dev/sdb1 523
```

See also <Using the space left on a USB stick>. 524

If you already have a partition on your device, you could just change the label with one of the following: 525

```
# tune2fs -L live-rw /dev/sdb1 # for ext2,3,4 filesystems 526
```

But since live system users cannot always use a hard drive partition, and considering 527

that most USB keys have poor write speeds, `full' persistence could be also used with just image files, so you could create a file representing a partition and put this image file even on a NTFS partition of a foreign OS, with something like:

```
$ dd if=/dev/null of=live-rw bs=1G seek=1 # for a 1GB sized image file 528
$ /sbin/mkfs.ext2 -F live-rw
```

Then copy the `live-rw` file to a writable partition and reboot with the boot parameter ``persistent'`. 529

10.3.2 Home automounting 530

If during the boot a partition (filesystem) image file or a partition labeled `home-rw` is discovered, this filesystem will be directly mounted as `/home`, thus permitting persistence of files that belong to e.g. the default user. It can be combined with full persistence. 531

10.3.3 Snapshots 532

Snapshots are collections of files and directories which are not mounted while running but which are copied from a persistent device to the system (`tmpfs`) at boot and which are resynced at reboot/shutdown of the system. The content of a snapshot could reside on a partition or an image file (like the above mentioned types) labeled `live-sn`, but it defaults to a simple `cpio` archive named `live-sn.cpio.gz`. As above, at boot time, the block devices connected to the system are traversed to see if a partition or a file named like that could be found. A power interruption during run time could lead to data loss, hence a tool invoked `live-snapshot --refresh` could be called to sync important changes. This type of persistence, since it does not write continuously to the persistent media, is the most flash-based device friendly and the fastest of all the persistence systems. 533

A `/home` version of snapshot exists too and its label is `home-sn.*`; it works the same as the main snapshot but it is only applied to `/home`. 534

Snapshots cannot currently handle file deletion but full persistence and home automounting can. 535

10.3.4 Persistent SubText 536

If a user would need multiple persistent storage of the same type for different locations or testing, such as `live-rw-nonwork` and `live-rw-work`, the boot parameter `persistent-subtext` used in conjunction with the boot parameter `persistent` will allow for multiple but unique persistent media. An example would be if a user wanted to use a persistent partition labeled `live-sn-subText` they would use the boot parameters of: `persistent persistent-subtext=subText`. 537

10.3.5 Partial remastering

538

The run-time modification of the tmpfs could be collected using `live-snapshot` in a squashfs and added to the cd by remastering the iso in the case of `cd-r` or adding a session to multisession `cd/dvd(rw)`; `live-boot` mounts all `/live` filesystem in order or with the module `boot` parameter.

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11. Customizing the binary image

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11.1 Bootloader

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`live-build` uses `syslinux` as bootloader by default, which is by default configured to pause indefinitely at its splash screen. To adjust this, you can pass `--syslinux-timeout TIMEOUT` to `lb config`. The value is specified in units of seconds. A timeout of 0 (zero) disables the timeout completely. For more information please see `syslinux(1)`.

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11.2 ISO metadata

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When creating an ISO9660 binary image, you can use the following options to add various textual metadata for your image. This can help you easily identify the version or configuration of an image without booting it.

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- `LB_ISO_APPLICATION/--iso-application NAME`: This should describe the application that will be on the image. The maximum length for this field is 128 characters. 545
- `LB_ISO_PREPARER/--iso-preparer NAME`: This should describe the preparer of the image, usually with some contact details. The default for this option is the `live-build` version you are using, which may help with debugging later. The maximum length for this field is 128 characters. 546
- `LB_ISO_PUBLISHER/--iso-publisher NAME`: This should describe the publisher of the image, usually with some contact details. The maximum length for this field is 128 characters. 547
- `LB_ISO_VOLUME/--iso-volume NAME`: This should specify the volume ID of the image. This is used as a user-visible label on some platforms such as Windows and Apple Mac OS. The maximum length for this field is 32 characters. 548

12. Customizing Debian Installer

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Debian Live system images can be integrated with Debian Installer. There are a number of different types of installation, varying in what is included and how the installer operates.

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Please note the careful use of capital letters when referring to the “Debian Installer” in this section - when used like this we refer explicitly to the official installer for the Debian system, not anything else. It is often seen abbreviated to “d-i”.

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12.1 Types of Debian Installer

The three main types of installer are:

“Regular” Debian Installer : This is a normal Debian Live image with a separate kernel and initrd which (when selected from the appropriate bootloader) launches into a standard Debian Installer instance, just as if you had downloaded a CD image of Debian and booted it. Images containing a live system and such an otherwise independent installer are often referred to as “combined images”.

On such images, Debian is installed by fetching and installing .deb packages using `debootstrap` or `cdebootstrap`, from the local media or some network-based network, resulting in a standard Debian system being installed to the hard disk.

This whole process can be preseeded and customized in a number of ways; see the relevant pages in the Debian Installer manual for more information. Once you have a working preseeded file, `live-build` can automatically put it in the image and enable it for you.

“Live” Debian Installer : This is a Debian Live image with a separate kernel and initrd which (when selected from the appropriate bootloader) launches into an instance of the Debian Installer.

Installation will proceed in an identical fashion to the “Regular” installation described above, but at the actual package installation stage, instead of using `debootstrap` to fetch and install packages, the live filesystem image is copied to the target. This is achieved with a special udeb called `live-installer`.

After this stage, the Debian Installer continues as normal, installing and configuring items such as bootloaders and local users, etc.

Note: to support both normal and live installer entries in the bootloader of the same live media, you must disable `live-installer` by preseeded `live-installer/enable=false`.

“Desktop” Debian Installer : Regardless of the type of Debian Installer included, `d-i` can be launched from the Desktop by clicking on an icon. This is user friendlier in some situations. In order to make use of this, the `debian-installer-launcher` package needs to be included.

Note that by default, `live-build` does not include Debian Installer images in the images, it needs to be specifically enabled with `lb config`. Also, please note that for the “Desktop” installer to work, the kernel of the live system must match the kernel `d-i` uses for the specified architecture. For example:

```
$ lb config --architecture i386 --linux-flavours 486 \  
  --debian-installer live  
$ echo debian-installer-launcher >> config/package-lists/my.list.chroot
```

12.2 Customizing Debian Installer by preseeded

As described in the Debian Installer Manual, Appendix B at <http://www.debian.org/releases/>

stable/i386/apb.html>, “Preseeding provides a way to set answers to questions asked during the installation process, without having to manually enter the answers while the installation is running. This makes it possible to fully automate most types of installation and even offers some features not available during normal installations.” This kind of customization is best accomplished with *live-build* by placing the configuration in a `preseed.cfg` file included in `config/binary_debian-installer/`. For example, to preseed setting the locale to `en_US`:

```
$ echo "d-i debian-installer/locale string en_US" \  
>> config/binary_debian-installer/preseed.cfg
```

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12.3 Customizing Debian Installer content

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For experimental or debugging purposes, you might want to include locally built `d-i` component udeb packages. Place these in `config/packages.binary/` to include them in the image. Additional or replacement files and directories may be included in the installer initrd as well, in a similar fashion to `<Live/chroot local includes>`, by placing the material in `config/binary_debian-installer-includes/`.

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Project

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13. Reporting bugs

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Debian Live is far from being perfect, but we want to make it as close as possible to perfect - with your help. Do not hesitate to report a bug: it is better to fill a report twice than never. However, this chapter includes recommendations how to file good bug reports.

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For the impatient:

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- Always check first the image status updates on our homepage at `<http://live.debian.net/>` for known issues. 573
- Always try to reproduce the bug with the **most recent versions** of *live-build*, *live-boot*, and *live-config* before submitting a bug report. 574
- Try to give **as specific information as possible** about the bug. This includes (at least) the version of *live-build*, *live-boot*, and *live-config* used and the distribution of the live system you are building. 575

13.1 Known issues

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Because Debian **testing** and Debian **unstable** distributions are a moving target, when you specify either as the target system distribution, a successful build may not always be possible.

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If this causes too much difficulty for you, do not build a system based on **testing** or

578

unstable , but rather, use **stable** . *live-build* does always default to the **stable** release.

Currently known issues are listed under the section `status' on our homepage at <http://live.debian.net/>. 579

It is out of the scope of this manual to train you to correctly identify and fix problems in packages of the development distributions, however, there are two things you can always try: If a build fails when the target distribution is **testing** , try **unstable** . If **unstable** does not work either, revert to **testing** and pin the newer version of the failing package from **unstable** (see [APT pinning](#) for details). 580

13.2 Rebuild from scratch 581

To ensure that a particular bug is not caused by an uncleanly built system, please always rebuild the whole live system from scratch to see if the bug is reproducible. 582

13.3 Use up-to-date packages 583

Using outdated packages can cause significant problems when trying to reproduce (and ultimately fix) your problem. Make sure your build system is up-to-date and any packages included in your image are up-to-date as well. 584

13.4 Collect information 585

Please provide enough information with your report. At least include the exact version of *live-build* version where the bug is encountered and steps to reproduce it. Please use common sense and include other relevant information if you think that it might help in solving the problem. 586

To make the most out of your bug report, we require at least the following information: 587

- Architecture of the host system 588
- Version of *live-build* on the host system 589
- Version of *live-boot* on the live system 590
- Version of *live-config* on the live system 591
- Version of *debootstrap* and/or *cdebootstrap* on the host system 592
- Architecture of the live system 593
- Distribution of the live system 594
- Version of the kernel on the live system 595

You can generate a log of the build process by using the `tee` command. We recommend doing this automatically with an `auto/build` script; (see <Managing a configuration> for details).

```
# lb build 2>&1 |tee build.log
```

At boot time, *live-boot* stores a log in `/var/log/live.log` (or `/var/log/live-boot.log`).

Additionally, to rule out other errors, it is always a good idea to tar up your `config/` directory and upload it somewhere (do **not** send it as an attachment to the mailing list), so that we can try to reproduce the errors you encountered. If this is difficult (e.g. due to size) you can use the output of `lb config --dump` which produces a summary of your config tree (i.e. lists files in subdirectories of `config/` but does not include them).

Remember to send in any logs that were produced with English locale settings, e.g. run your *live-build* commands with a leading `LC_ALL=C` or `LC_ALL=en_US`.

13.5 Isolate the failing case if possible

If possible, isolate the failing case to the smallest possible change that breaks. It is not always easy to do this, so if you can't manage it for your report, don't worry. However, if you plan your development cycle well, using small enough change sets per iteration, you may be able to isolate the problem by constructing a simpler 'base' configuration that closely matches your actual configuration plus just the broken change set added to it. If you have a hard time sorting out which of your changes broke, it may be that you are including too much in each change set and should develop in smaller increments.

13.6 Use the correct package to report the bug against

Where does the bug appear?

13.6.1 At build time whilst bootstrapping

live-build first bootstraps a basic Debian system with `debootstrap` or `cdebootstrap`. Depending on the bootstrapping tool used and the Debian distribution it is bootstrapping, it may fail. If a bug appears here, check if the error is related to a specific Debian package (most likely), or if it is related to bootstrapping tool itself.

In both cases, this is not a bug in Debian Live, but rather in Debian itself which we can not fix this directly. Please report such a bug against the bootstrapping tool or the failing package.

13.6.2 At build time whilst installing packages

live-build installs additional packages from the Debian archive and depending on the

Debian distribution used and the daily archive state, it can fail. If a bug appears here, check if the error is also reproducible on a normal system.

If this is the case, this is not a bug in Debian Live, but rather in Debian - please report it against the failing package. Running `debootstrap` separately from the Live system build or running `lb bootstrap --debug` will give you more information. 610

Also, if you are using a local mirror and/or any of sort of proxy and you are experiencing a problem, please always reproduce it first by bootstrapping from an official mirror. 611

13.6.3 At boot time 612

If your image does not boot, please report it to the mailing list together with the information requested in <Collect information>. Do not forget to mention, how/when the image failed, in Qemu, Virtualbox, VMWare or real hardware. If you are using a virtualization technology of any kind, please always run it on real hardware before reporting a bug. Providing a screenshot of the failure is also very helpful. 613

13.6.4 At run time 614

If a package was successfully installed, but fails while actually running the Live system, this is probably a bug in Debian Live. However, 615

13.7 Do the research 616

Before filing the bug, please search the web for the particular error message or symptom you are getting. As it is highly unlikely that you are the only person experiencing a particular problem, there is always a chance that it has been discussed elsewhere, and a possible solution, patch, or workaround has been proposed. 617

You should pay particular attention to the Debian Live mailing list, as well as the homepage, as these are likely to contain the most up-to-date information. If such information exists, always include the references to it in your bug report. 618

In addition, you should check the current bug lists for *live-build*, *live-boot*, and *live-config* to see whether something similar has been reported already. 619

13.8 Where to report bugs 620

The Debian Live project keeps track of all bugs in the Debian Bug Tracking System (BTS). For information on how to use the system, please see <<http://bugs.debian.org/>>. You can also submit the bugs by using the `reportbug` command from the package with the same name. 621

In general, you should report build time errors against the *live-build* package, boot time errors against *live-boot*, and run time errors against *live-config*. If you are unsure of 622

which package is appropriate or need more help before submitting a bug report, please send a message to the mailing list and we will help you to figure it out.

Please note that bugs found in distributions derived from Debian (such as Ubuntu and others) should **not** be reported to the Debian BTS unless they can be also reproduced on a Debian system using official Debian packages.

14. Coding Style

This chapter documents the coding style used in *live-boot* and others.

14.1 Compatibility

- Don't use syntax or semantics that are unique to the Bash shell. For example, the use of array constructs.
- Only use the POSIX subset - for example, use `$(foo)` over ``foo``.
- You can check your scripts with ``sh -n`` and ``checkbashisms``.

14.2 Indenting

- Always use tabs over spaces.

14.3 Wrapping

- Generally, lines are 80 chars at maximum.
- Use the “Linux style” of line breaks:

Bad:

```
if foo; then
    bar
fi
```

Good:

```
if foo
then
    bar
fi
```

- The same holds for functions:

Bad:

```
foo () {
    bar
}
```

Good: 642

```
foo ()
{
    bar
}
```

643

14.4 Variables 644

- Variables are always in capital letters. 645
- Variables that used in `lb config` always start with `LB_` prefix. 646
- Internal temporary variables in *live-build* should start with the `<=underscore>LB_` prefix. 647
- Local variables start with *live-build* `<=underscore><=underscore>LB_` prefix. 648
- Variables in connection to a boot parameter in *live-config* start with `LIVE_`. 649
- All other variables in *live-config* start with `_` prefix. 650
- Use braces around variables; e.g. write `${F00}` instead of `$F00`. 651
- Always protect variables with quotes to respect potential whitespaces: write `"${F00}"` not `${F00}`. 652
- For consistency reasons, always use quotes when assigning values to variables: 653

Bad: 654

```
F00=bar 655
```

Good: 656

```
F00="bar" 657
```

- If multiple variables are used, quote the full expression: 658

Bad: 659

```
if [ -f "${F00}"/foo/"${BAR}"/bar ]
then
    foobar
fi 660
```

Good: 661

```
if [ -f "${F00}/foo/${BAR}/bar" ]
then
    foobar
fi 662
```

14.5 Miscellaneous

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- Use “|” (without the surround quotes) as a separator in calls to sed, e.g. “sed -e 664
`s|'|” (without “”).
- Don't use the test command for comparisons or tests, use “[” “]” (without “”); e.g. 665
”if [-x /bin/foo]; ...“ and not ”if test -x /bin/foo; ...“.
- Use case wherever possible over test, as it's easier to read and faster in execution. 666

15. Procedures

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This chapter documents the procedures within the Debian Live project for various tasks 668
that need cooperation with other teams in Debian.

15.1 Udeb Uploads

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Before committing releases of a udeb in d-i svn, one has to call: 670

```
$ ../../scripts/l10n/output-l10n-changes . -d 671
```

15.2 Major Releases

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Releasing a new stable major version of Debian includes a lot of different teams working 673
together to make it happen. At some point, the Live team comes in and builds live
system images. The requirements to do this are:

- A mirror containing the released versions for the debian, debian-security and debian- 674
volatile archive which the debian-live buildd can access.
- The names of the image need to be known (e.g. debian-live-VERSION-ARCH- 675
FLAVOUR.iso).
- The packagelists need to have been updated. 676
- The data from debian-cd needs to be synced (udeb exclude lists). 677
- The includes from debian-cd needs to be synced (README.*, doc/*, etc.). 678
- Images are built and mirrored on cimage.debian.org. 679

15.3 Point Releases

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- Again, we need updated mirror of debian, debian-security and debian-volatile. 681
- Images are built and mirrored on cimage.debian.org. 682
- Send announcement mail. 683

15.3.1 Point release announcement template

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An announcement mail for point releases can be generated using the template below and the following command:

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```
$ sed \  
-e 's|%major%|5.0' \  
-e 's|%minor%|5.0.2' \  
-e 's|%codename%' \  
-e 's|%release_mail%|2009/msg00007.html'
```

686

Please check the mail carefully before sending and pass it to others for proof-reading.

687

```
Debian Live images for Debian GNU/Linux %major% updated
```

688

The Debian Live project is pleased to announce the availability of updated Live images for its stable distribution Debian GNU/Linux %major% (codename "%codename%").

The images are available for download at:

```
<http://cdimage.debian.org/cdimage/release/current-live/>
```

This update incorporates the changes made in the %minor% point release, which adds corrections for security problems to the stable release along with a few adjustments for serious problems. A full list of the changes may be viewed at:

```
<http://lists.debian.org/debian-announce/%release_mail%>
```

It also includes the following Live-specific changes:

- * [INSERT LIVE-SPECIFIC CHANGE HERE]
- * [INSERT LIVE-SPECIFIC CHANGE HERE]
- * [LARGER ISSUES MAY DESERVE THEIR OWN SECTION]

URLs

Download location of updated images:

```
<http://cdimage.debian.org/cdimage/release/current-live/>
```

Debian Live project homepage:

```
<http://live.debian.net/>
```

The current stable distribution:

```
<http://ftp.debian.org/debian/dists/stable>
```

stable distribution information (release notes, errata etc.):

```
<http://www.debian.org/releases/stable/>
```

Security announcements and information:

<<http://www.debian.org/security/>>

About Debian

The Debian Project is an association of Free Software developers who volunteer their time and effort in order to produce the completely free operating system Debian GNU/Linux.

About Debian Live

Debian Live is an official sub-project of Debian which produces Debian systems that do not require a classical installer. Images are available for CD/DVD discs, USB sticks and PXE netbooting as well as a bare filesystem images for booting directly from the internet.

Contact Information

For further information, please visit the Debian Live web pages at

<<http://live.debian.net/>> or alternatively send mail to

<debian-live@lists.debian.org>.

Examples

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16. Examples

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This chapter covers example builds for specific use cases with Debian Live. If you are new to building your own Debian Live images, we recommend you first look at the three tutorials in sequence, as each one teaches new techniques that will help you use and understand the remaining examples.

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16.1 Using the examples

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To use these examples you need a system to build them on that meets the requirements listed in <Requirements> and has *live-build* installed as described in <Installing live-build>.

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Note that, for the sake of brevity, in these examples we do not specify a local mirror to use for the build. You can speed up downloads considerably if you use a local mirror. You may specify the options when you use `lb config`, as described in <Distribution mirrors used at build time>, or for more convenience, set the default for your build system in `/etc/live/build.conf`. Simply create this file and in it, set the corresponding

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`LB_PARENT_MIRROR_*` variables to your preferred mirror. All other mirrors used in the build will be defaulted from these values. For example:

```
LB_PARENT_MIRROR_BOOTSTRAP="http://mirror/debian" 695
LB_PARENT_MIRROR_CHROOT_SECURITY="http://mirror/debian-security"
LB_PARENT_MIRROR_CHROOT_BACKPORTS="http://mirror/debian-updates"
```

16.2 Tutorial 1: A standard image 696

Use case: Create a simple first image, learning the basics of *live-build*. 697

In this tutorial, we will build a default ISO hybrid Debian Live image containing only base packages (no Xorg) and some Debian Live support packages, as a first exercise in using *live-build*. 698

You can't get much simpler than this: 699

```
$ mkdir tutorial1 ; cd tutorial1 ; lb config 700
```

Examine the contents of the `config/` directory if you wish. You will see stored here a skeletal configuration, ready to customize or, in this case, use immediately to build a default image. 701

Now, as superuser, build the image, saving a log as you build with `tee`. 702

```
# lb build 2>&1 |tee binary.log 703
```

Assuming all goes well, after a while, the current directory will contain `binary-hybrid.iso`. 704 This ISO hybrid image can be booted directly in a virtual machine as described in [Testing an ISO image with Qemu](#) and [Testing an ISO image with virtualbox-ose](#), or else imaged onto optical media or a USB flash device as described in [Burning an ISO image to a physical medium](#) and [Copying an ISO hybrid image to a USB stick](#), respectively.

16.3 Tutorial 2: A web browser utility 705

Use case: Create a web browser utility image, learning how to apply customizations. 706

In this tutorial, we will create an image suitable for use as a web browser utility, serving as an introduction to customizing Debian Live images. 707

```
$ mkdir tutorial2 708
$ cd tutorial2
$ lb config -p lxde
$ echo iceweasel >> config/package-lists/my.list.chroot
```

Our choice of LXDE for this example reflects our desire to provide a minimal desktop environment, since the focus of the image is the single use we have in mind, the web browser. We could go even further and provide a default configuration for the web browser in `config/includes.chroot/etc/iceweasel/profile/`, or additional support 709

packages for viewing various kinds of web content, but we leave this as an exercise for the reader.

Build the image, again as superuser, keeping a log as in <Tutorial 1>:

```
# lb build 2>&1 |tee binary.log
```

Again, verify the image is OK and test, as in <Tutorial 1>.

16.4 Tutorial 3: A personalized image

Use case: Create a project to build a personalized image, containing your favourite software to take with you on a USB stick wherever you go, and evolving in successive revisions as your needs and preferences change.

Since we will be changing our personalized image over a number of revisions, and we want to track those changes, trying things experimentally and possibly reverting them if things don't work out, we will keep our configuration in the popular `git` version control system. We will also use the best practice of autoconfiguration via `auto` scripts as described in <Managing a configuration>.

16.4.1 First revision

```
$ mkdir -p tutorial3/auto
$ cp /usr/share/live/build/examples/auto/* tutorial3/auto/
$ cd tutorial3
```

Edit `auto/config` to read as follows:

```
#!/bin/sh

lb config noauto \
  --architecture i386 \
  --linux-flavours 686-pae \
  --package-lists lxde \
  "${@}"
```

Now populate your local package list:

```
$ echo "iceweasel xchat" >> config/package-lists/my.list.chroot
```

First, `--architecture i386` ensures that on our `amd64` build system, we build a 32-bit version suitable for use on most machines. Second, we use `--linux-flavours 686-pae` because we don't anticipate using this image on much older systems. Third, we've chosen the `lxde` package list to give us a minimal desktop. And finally, we have added two initial favourite packages: `iceweasel` and `xchat`.

Now, build the image:

```
# lb build
```

Note that unlike in the first two tutorials, we no longer have to type `2>&1 |tee binary.log` as that is now included in `auto/build`.

Once you've tested the image (as in <Tutorial 1>) and are satisfied it works, it's time to initialize our `git` repository, adding only the auto scripts we just created, and then make the first commit:

```
$ git init
$ git add auto
$ git commit -a -m "Initial import."
```

16.4.2 Second revision

In this revision, we're going to clean up from the first build, add the `vlc` package to our configuration, rebuild, test and commit.

The `lb clean` command will clean up all generated files from the previous build except for the cache, which saves having to re-download packages. This ensures that the subsequent `lb build` will re-run all stages to regenerate the files from our new configuration.

```
# lb clean
```

Now append the `vlc` package to our local package list in `config/package-lists/my.list.chroot`:

```
$ echo vlc >> config/package-lists/my.list.chroot
```

Build again:

```
# lb build
```

Test, and when you're satisfied, commit the next revision:

```
$ git commit -a -m "Adding vlc media player."
```

Of course, more complicated changes to the configuration are possible, perhaps adding files in subdirectories of `config/`. When you commit new revisions, just take care not to hand edit or commit the top-level files in `config` containing `LB_*` variables, as these are build products, too, and are always cleaned up by `lb clean` and re-created with `lb config` via their respective auto scripts.

We've come to the end of our tutorial series. While many more kinds of customization are possible, even just using the few features explored in these simple examples, an almost infinite variety of different images can be created. The remaining examples in this section cover several other use cases drawn from the collected experiences of users of Debian Live.

16.5 A VNC Kiosk Client

Use case: Create an image with *live-build* to boot directly to a VNC server.

Make a build directory and create a skeletal configuration in it built around the standard-`x11` list, including `gdm3`, `metacity` and `xvnc4viewer`, disabling `recommends` to make a minimal system:

```

$ mkdir vnc_kiosk_client 743
$ cd vnc_kiosk_client
$ lb config -a i386 -k 686-pae -p standard-x11 \
  --apt-recommends false
$ echo "gdm3 metacity xvnc4viewer" >> config/package-lists/my.list.chroot

```

Create the directory `/etc/skel` and put a custom `.xsession` in it for the default user that will launch metacity and start xvncviewer, connecting to port 5901 on a server at 192.168.1.2:

```

$ mkdir -p config/includes.chroot/etc/skel 745
$ cat > config/includes.chroot/etc/skel/.xsession <<END
#!/bin/sh

/usr/bin/metacity &
/usr/bin/xvncviewer 192.168.1.2:1

exit
END

```

Build the image: 746

```
# lb build 747
```

Enjoy. 748

16.6 A base image for a 128M USB key 749

Use case: Create a standard image with some components removed in order to fit on a 128M USB key with space left over to use as you see fit. 750

When optimizing an image to fit a certain media size, you need to understand the trade-offs you are making between size and functionality. In this example, we trim only so much as to make room for additional material within a 128M media size, but without doing anything to destroy integrity of the packages contained within, such as the purging of locale data via the `localepurge` package, or other such “intrusive” optimizations. Of particular note, you should not use `--bootstrap-flavour minimal` unless you really know what you're doing, as omitting priority important packages will most likely produce a broken live system. 751

```

$ lb config -k 486 -p minimal --apt-indices false \
  --memtest none --apt-recommends false --includes none 752

```

Now, build the image in the usual way: 753

```
# lb build 2>&1 |tee binary.log 754
```

On the author's system at time of writing, the above configuration produced a 78Mbyte image. This compares favourably with the 166Mbyte image produced by the default configuration in `<Tutorial 1>`. 755

The biggest space-saver here, compared to building a standard image on an `i386` architecture system, is to select only the 486 kernel flavour instead of the default `-k "486` 756

686-pae". Leaving off APT's indices with `--apt-indices false` also saves a fair amount of space, the tradeoff being that you need to `apt-get update` before using `apt` in the live system. Choosing the `minimal` package list leaves out the large `locales` package and associated utilities. Dropping recommended packages with `--apt-recommends false` saves some additional space, at the expense of omitting some packages you might otherwise expect to be there, such as `firmware-linux-free` which may be needed to support certain hardware. The remaining options shave off additional small amounts of space. It's up to you to decide if the functionality that is sacrificed with each optimization is worth the loss in functionality.

16.7 A localized KDE desktop and installer

Use case: Create a KDE desktop image, localized for Brazilian Portuguese and including an installer.

We want to make an iso-hybrid image for i386 architecture using our preferred desktop, in this case KDE, containing all of the same packages that would be installed by the standard Debian installer for KDE.

Our initial problem is the discovery of the names of the appropriate language tasks. Currently, `live-build` cannot help with this. While we might get lucky and find this by trial-and-error, there is a tool, `grep-dctrl`, which can be used to dig it out of the task descriptions in `tasksel-data`, so to prepare, make sure you have both of those things:

```
# apt-get install dctrl-tools tasksel-data
```

Now we can search for the appropriate tasks, first with:

```
$ grep-dctrl -FTest-lang pt_BR /usr/share/tasksel/descs/debian-tasks.desc
-sTask
Task: brazilian-portuguese
```

By this command, we discover the task is called, plainly enough, `brazilian-portuguese`. Now to find the related tasks:

```
$ grep-dctrl -FEnhances brazilian-portuguese
/usr/share/tasksel/descs/debian-tasks.desc -sTask
Task: brazilian-portuguese-desktop
Task: brazilian-portuguese-kde-desktop
```

At boot time we will generate the `pt_BR.UTF-8` locale and select the `pt-latin1` keyboard layout. We will also need to preseed our desktop choice, "kde" so that `tasksel` will install the correct desktop task, as it differs from the default (see <Desktop and languages tasks>). Now let's put the pieces together:

```
$ mkdir live-pt_BR-kde
$ cd live-pt_BR-kde
$ lb config \
  -a i386 \
  -k 486 \
  --bootappend-live "locales=pt_BR.UTF-8 keyboard-layouts=pt-latin1" \
```

```
--debian-installer live
$ echo kde-desktop brazilian-portuguese brazilian-portuguese-desktop \
    brazilian-portuguese-kde-desktop >> config/task-lists/my.list.chroot
$ echo debian-installer-launcher >> config/package-lists/my.list.chroot
$ echo tasksel tasksel/desktop multiselect kde >>
config/preseed/my.preseed.chroot
```

Note that we have included the `debian-installer-launcher` package to launch the installer from the live desktop, and have also specified the 486 flavour kernel, as it is currently necessary to make the installer and live system kernels match for the launcher to work properly.

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