

Debian Live Manual

Debian Live Project [\[debian-live@lists.debian.org\]](mailto:debian-live@lists.debian.org)

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Debian Live Manual

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

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₁ Debian Live Manual

About this manual

1. About this manual

This manual serves as a single access point to all documentation related to the Debian Live Project and in particular applies to the software produced by the project for the Debian bookworm release. An up-to-date version can always be found at <https://live-team.pages.debian.net/live-manual/>

While live-manual 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 downloading prebuilt images and preparing images to be booted from media or the network, either using the web builder or running live-build directly on your system. **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 suggest reading in the following or-

der.

First, read this chapter, **About this manual**, from the beginning and ending with the **Terms** section. Next, skip to the three tutorials at the front of the **Examples** section designed to teach you image building and customization basics. Read **Using the examples** first, followed by **Tutorial 1: A default 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 live systems.

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 live systems 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 (via netboot images, see **Building a netboot image**), and over the Internet (via the boot parameter fetch=URL, see **Webbooting**).

Live medium : As distinct from live system, the live medium refers to the CD, DVD or USB stick where the binary produced by live-build and used to boot the live system is written. More broadly, the term also refers to any place where this binary resides for the purposes of booting the live system, such as the location for the network boot files.

Debian Live Project : The project which maintains, among others, the

live-boot, live-build, live-config, live-tools and live-manual packages.

Host system : The environment used to create the live system.

Target system : The environment used to run the live system.

live-boot : A collection of scripts used to boot live systems.

live-build : A collection of scripts used to build customized live systems.

live-config : A collection of scripts used to configure a live system during the boot process.

live-tools : A collection of additional scripts used to perform useful tasks within a running live system.

live-manual : This document is maintained in a package called live-manual.

Debian Installer (d-i) : The official installation system for the Debian distribution.

Boot parameters : Parameters that can be entered at the bootloader prompt to influence the kernel or live-config.

chroot : The chroot program, `chroot(8)`, enables us to run different instances of the GNU/Linux environment on a single system simultaneously without rebooting.

Binary image : A file containing the live system, such as `live-image-amd64.hybrid.iso` or `live-image-amd64.img`.

Target distribution : The distribution upon which your live system will be based. This can differ from the distribution of your host system.

stable/testing/unstable : The stable distribution, currently codenamed bookworm , contains the latest officially released distribution of Debian. The testing distribution, temporarily codenamed trixie , 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, permanently codenamed sid , is where active development of Debian occurs. Generally, this distribution is run by developers and those who like to live on the edge. Throughout the manual, we tend to use codenames for the releases, such as trixie or sid , as that is what is supported by the tools themselves.

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1.4 Contributing to this document

This manual is intended as a community project and all proposals for improvements and contributions are extremely welcome. Please see the section [Contributing to the project](#) for detailed information on how to fetch the commit key and make good commits.

1.4.1 Applying changes

In order to make changes to the English manual you have to edit the right files in `manual/en/` but prior to the submission of your contribution, please preview your work. To preview the live-manual, ensure the packages needed for building it are installed by executing:

```
# apt-get install make po4a ruby ruby-nokogiri sisu-complete
```

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

```
$ make build
```

Since it takes a while to build the manual in all supported languages, authors may find it convenient to use one of the fast proofing shortcuts when reviewing the new documentation they have added to the English manual. Using `PROOF=1` builds live-manual in html format, but without the segmented html files, and using `PROOF=2` builds live-manual in pdf format, but only the A4 and letter portraits. That is why using either of the `PROOF=` possibilities can save up a considerable amount of time, e.g:

```
$ make build PROOF=1
```

When proofing one of the translations it is possible to build only one language by executing, e.g:

```
$ make build LANGUAGES=de
```

It is also possible to build by document type, e.g:

```
$ make build FORMATS=pdf
```

Or combine both, e.g:

```
$ make build LANGUAGES=de FORMATS=html
```

After revising your work and making sure that everything is fine, do not use `make commit` unless you are updating translations in the commit, and in that case, do not mix changes to the English manual and translations in the same commit, but use separate commits for each. See the [Translation](#) section for more details.

1.4.2 Translation

Note: For the translation of the man pages see [Translation of man pages](#)

In order to translate live-manual, follow these steps depending on whether you are starting a translation from scratch or continue working on an already existing one:

Start a new translation from scratch

Translate the `about`manual.ssi.pot`` , `about`project.ssi.pot`` and `index.html.in.pot`` files in `manual/pot/` to your language with your favourite editor (such as poedit) and send the translated `.po` files to the mailing list to check their integrity. `live-manual`'s integrity check not only ensures that the `.po` files are 100% translated but it also detects possible errors.

Once checked, to enable a new language in the autobuild it is enough to add the initial translated files to `manual/po/-${LANGUAGE}/` and edit `manual/`sisu/home/index.html`` adding the name of the language and its name in English between brackets. And then, add the folder `manual/${LANGUAGE}/` to the file `.gitignore`. Finally, run `make commit`.

Continue with an already started translation

If your target language has already been added, you can randomly continue translating the remaining `.po` files in `manual/po/-${LANGUAGE}/` using your favourite editor (such as poedit) .

Do not forget that you need to run `make commit` to ensure that the translated manuals are updated from the `.po` files and then you can review your changes launching `make build` before `git add .`, `git commit -m Translating...` and `git push`. Remember that since `make build` can take a considerable amount of time, you can proofread languages individually as explained in [Applying changes](#)

After running `make commit` you will see some text scroll by. These are basically informative messages about the processing status and also some hints about what can be done in order to improve `live-manual`. Unless you see a fatal error, you usually can proceed and submit your contribution.

`live-manual` comes with two utilities that can greatly help translators to find untranslated and changed strings. The first one is `make translate`. It

launches a script that tells you in detail how many untranslated strings there are in each `.po` file. The second one, the `make fixfuzzy` target, only acts upon changed strings but it helps you to find and fix them one by one.

Keep in mind that even though these utilities might be really helpful to do translation work on the command line, the use of an specialized tool like poedit is the recommended way to do the task. It is also a good idea to read the Debian localization (l10n) documentation and, specifically to `live-manual`, the [Guidelines for translators](#).

Note: You can use `make clean` to clean your git tree before pushing. This step is not compulsory thanks to the `.gitignore` file but it is a good practice to avoid committing files involuntarily.

74	About the Debian Live Project	87	2.1.2 Why create our own live system?	
		88	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:	
75	2. About the Debian Live Project		It is a subproject of Debian.	89
76	2.1 Motivation		It reflects the (current) state of one distribution.	90
77	2.1.1 What is wrong with current live systems		It runs on as many architectures as possible.	91
78	When Debian Live Project was initiated (around 2006), 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:		It consists of unchanged Debian packages only.	92
			It does not contain any packages that are not in the Debian archive.	93
			It uses an unaltered Debian kernel with no additional patches.	94
79	They are not Debian projects and therefore lack support from within Debian.		2.2 Philosophy	95
80	They mix different distributions, e.g. testing and unstable .		2.2.1 Only unchanged packages from Debian main and non-free-firmware	96
81	They support i386 only.		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.	97
82	They modify the behaviour and/or appearance of packages by stripping them down to save space.		Starting with Debian 12 bookworm we added the non-free-firmware section for better support of modern hardware.	98
83	They include packages from outside of the Debian archive.		We will not change any packages. Whenever we need to change something, we will do that in coordination with its package maintainer in Debian.	99
84	They ship custom kernels with additional patches that are not part of Debian.		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.	100
85	They are large and slow due to their sheer size and thus not suitable for rescue issues.			
86	They are not available in different flavours, e.g. CDs, DVDs, USB-stick and netboot images.			

2.2.2 No package configuration of the live system

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.

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

A system for configuring packages is provided using debconf allowing custom configured packages to be installed in your custom produced live system images, but for the **prebuilt live images** we choose to leave packages in their default configuration, unless absolutely necessary in order to work in the live environment. Wherever possible, we prefer to adapt packages within the Debian archive to work better in a live system versus making changes to the live toolchain or **prebuilt image configurations**. For more information, please see **Customization overview**.

2.3 Contact

Mailing list : The primary contact for the project is the mailing list at <https://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 <https://lists.debian.org/debian-live/>.

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.

BTS : The **Reporting bugs**.

If you are using Debian, the recommended way is to install live-build via the Debian repository. 127

Installation

3. Installation

3.2.1 From the Debian repository 128

3.1 Requirements

Simply install live-build like any other package: 129

Building live system images has very few system requirements for the host system: 130

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

Superuser (root) access

An up-to-date version of live-build

3.2.2 From source 131

A POSIX-compliant shell, such as bash or dash

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: 132

debootstrap

Linux 2.6 or newer

A mount point with dev and exec rights.

```
$ git clone https://salsa.debian.org/live-team/live-build.git
```

```
# mount -i your'mount'point -o dev,exec,remount
```

You can build and install your own Debian package by executing: 134

Note that using Debian or a Debian-derived distribution is not required - live-build will run on almost any distribution with the above requirements. 135

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

3.2 Installing live-build

Now install whichever of the freshly built .deb files you were interested in, e.g. 136

You can install live-build in a number of different ways: 137

From the Debian repository

```
# dpkg -i live-build_4.0-1_all.deb
```

From source

You can also install live-build directly to your system by executing: 138

From snapshots


```
# make install
```

and uninstall it with:

```
# make uninstall
```

3.3 Installing live-boot and live-config

Note: You do not need to install live-boot or live-config on your system to create customized 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.

3.3.1 From the Debian repository

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

3.3.2 From source

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

Checkout the live-boot and live-config sources

```
$ git clone https://salsa.debian.org/live-team/live-boot.git
$ git clone https://salsa.debian.org/live-team/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.

Build live-boot and live-config .deb files

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

Use a personal builder such as pbuilder or sbuilder if you need to build live-boot for a target distribution that differs from your build system. For example, for trixie live images, build live-boot in a trixie 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):

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

Use applicable generated .deb files

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. Since your purpose for building from source is likely to test new things over the short term before the official release, follow [Installing modified or third-party packages](#) to temporarily include the relevant files in your configuration. In particular, notice that both packages are divided into a generic part, a documentation part and one or more back-ends. Include the generic part, only one back-end matching your configuration, and optionally the documentation. Assuming you are building a live image in the current directory and have generated all .deb files for a single version of both packages in the directory above, these bash commands would copy all of the relevant packages including default back-ends:

```
$ cp ../live-boot-`,-initramfs-tools,-doc "*.deb` config/packages.`↵
    chroot/↵
$ cp ../live-config-`,-sysvinit,-doc "*.deb` config/packages.chroot↵
/↵
```

The basics

4. The basics

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 medium or USB portable storage device. In certain special cases, as explained later, the hdd type may be more suitable. The chapter includes detailed instructions for building and using a netboot type image, which is a bit more involved due to the setup required on the server. This is an slightly advanced topic for anyone who is not already familiar with netbooting, but it is included here because once the setup is done, it is a very convenient way to test and deploy images for booting on the local network without the hassle of dealing with image media.

The section finishes with a quick introduction to **webbooting** which is, perhaps, the easiest way of using different images for different purposes, switching from one to the other as needed using the internet as a means.

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 live systems, it's an operating system, built for one of the supported architectures (currently amd64 and arm64). 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 live system image size. Note that it is read-only. So, during boot the 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 medium, 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 medium 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 medium-dependent format (ISO9660 image, disk image, etc.).

4.2 Downloading prebuilt images

You can download one of the prebuilt images from <https://www.debian.org/>

CD/live/. For many of the popular desktop environments (GNOME, Xfce, KDE, etc.) a specific live image is prepared.

If you are unsure which file to download, use the ‘Live GNOME’ image from the ‘stable’ release. You can then skip reading the next sections and run the image in a **virtual machine**.

4.3 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, create a build directory, change to that directory and then execute the following sequence of live-build commands to create a basic ISO hybrid image containing a default live system without X.org. It is suitable for burning to CD or DVD media, and also to copy onto a USB stick.

The name of the working directory is absolutely up to you, but if you take a look at the examples used throughout live-manual, it is a good idea to use a name that helps you identify the image you are working with in each directory, especially if you are working or experimenting with different image types. In this case you are going to build a default system so let’s call it, for example, live-default.

```
$ mkdir live-default && cd live-default
```

Then, run the lb config command. This will create a config/ hierarchy in the current directory for use by other commands:

```
$ lb config
```

No parameters are passed to these commands, so defaults for all of their

various options will be used. See **The lb config command** for more details.

Now that the config/ hierarchy exists, build the image with the lb build command:

```
# lb build
```

This process can take a while, depending on the speed of your computer and your network connection. When it is complete, there should be a live-image-amd64.hybrid.iso image file, ready to use, in the current directory.

Note: If you are building on an amd64 system the name of the resulting image will be live-image-amd64.hybrid.iso. Keep in mind this naming convention throughout the manual.

4.4 Using an ISO hybrid live image

After either building or downloading an ISO hybrid image the usual next step is to prepare your medium for booting, either CD-R(W) or DVD-R(W) optical media or a USB stick.

4.4.1 Burning an ISO image to a physical medium

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

```
# apt-get install xorriso
$ xorriso -as cdrecord -v dev=/dev/sr0 blank=as-needed live-image-↵
amd64.hybrid.iso
```

4.4.2 Copying an ISO hybrid image to a USB stick

ISO images prepared with xorriso, can be simply copied to a USB stick with the cp 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`.

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

```
$ cp live-image-amd64.hybrid.iso $-USBSTICK"
$ sync
```

Note: The sync command is useful to ensure that all the data, which is stored in memory by the kernel while copying the image, is written to the USB stick.

4.4.3 Using the space left on a USB stick

After copying the live-image-amd64.hybrid.iso to a USB stick, the first partition on the device will be filled up by the live system. To use the remaining free space, use a partitioning tool such as gparted or parted to create a new partition on the stick.

```
# gparted $-USBSTICK"
```

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.

```
# mkfs.ext4 $-PARTITION"
```

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.

Remember: Every time you install a new live-image-amd64.hybrid.iso 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.

4.4.4 Booting the live medium

The first time you boot your live medium, 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.

Once you've booted the medium, 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.

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 have booted a console-only image, you should be automatically logged in on the console to the user account and see a shell prompt, ready to use.

examples. The qemu-utils package is also valuable for creating virtual disk images with qemu-img.

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

4.5 Using a virtual machine for testing

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:

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.

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

Booting an ISO image is simple:

```
$ kvm -cdrom live-image-amd64.hybrid.iso -m 4G
```

See the man pages for more details.

Note: For live systems containing a desktop environment that you want to test with qemu, you may wish to include the spice-vdagent package in your live-build configuration. This will automatically adjust the resolution and enable the clipboard between the virtual machine and the host.

```
$ echo "spice-vdagent" >> config/package-lists/spice.list.chroot
```

4.5.2 Testing an ISO image with VirtualBox

In order to test the ISO with virtualbox:

```
# apt-get install virtualbox virtualbox-qt virtualbox-dkms
$ virtualbox
```

Create a new virtual machine, change the storage settings to use live-image-amd64.hybrid.iso as the CD/DVD device, and start the machine.

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

```
$ echo "virtualbox-guest-dkms virtualbox-guest-x11" && config/↵
package-lists/my.list.chroot
```

In order to make the dkms package work, also the kernel headers for the kernel flavour used in your image need to be installed. Instead of manually listing the correct linux-headers package in above created package list, the selection of the right package can be done automatically by live-build.

```
$ lb config --linux-packages "linux-image linux-headers"
```

4.6 Building and using an HDD image

Building an HDD image is similar to an ISO hybrid one in all respects except you specify -b hdd and the resulting filename is live-image-amd64.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, you need an HDD image.

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](#)):

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

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

```
$ lb config -b hdd
```

Now build the image with the lb build command:

```
# lb build
```

When the build finishes, a live-image-amd64.img file should be present in the current directory.

The generated binary image contains a VFAT partition and the syslinux bootloader, ready to be directly written on a USB device. Once again, using an HDD image is just like using an ISO hybrid one on USB. Follow the instructions in [Using an ISO hybrid live image](#), except use the filename live-image-amd64.img instead of live-image-amd64.hybrid.iso.

Likewise, to test an HDD image with Qemu, 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 live-image-amd64.img as the first hard drive.

```
$ kvm -hda live-image-amd64.img
```

4.7 Building a netboot image

The following sequence of commands will create a basic netboot image

containing a default live system without X.org. It is suitable for booting over the network.

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

```
# lb clean
```

In this specific case, a `lb clean -binary` would not be enough to clean up the necessary stages. The cause for this is that in netboot setups, a different `initramfs` configuration needs to be used which `live-build` performs automatically when building netboot images. Since the `initramfs` creation belongs to the `chroot` stage, switching to netboot in an existing build directory means to rebuild the `chroot` stage too. Therefore, `lb clean` (which will remove the `chroot` stage, too) needs to be used.

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

```
$ lb config -b netboot --net-root-path "/srv/debian-live" --net-root-server "192.168.0.2"
```

In contrast with the ISO and HDD images, netbooting does not, itself, serve the filesystem image to the client, so the files must be served via NFS. Different network filesystems can be chosen through `lb config`. 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:

```
# lb build
```

In a network boot, the client runs a small piece of software which usually resides on 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 `live-image-amd64.netboot.tar` archive in the `/srv/debian-live` directory, you'll find the filesystem image in `live/filesystem.squashfs` and the kernel, `initrd` and `pxelinux` bootloader in `tftpboot/`.

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

4.7.1 DHCP server

We must configure our network's DHCP server to be sure to give an IP address to the 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` in the `/etc/dhcp/dhcpd.conf` configuration file:

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

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;
  filename "pxelinux.0";
  next-server 192.168.0.2;
  option subnet-mask 255.255.255.0;
  option broadcast-address 192.168.0.255;
  option routers 192.168.0.1;
"
```

```
/srv/debian-live *(ro,async,no'root'squash,no'subtree'check)
```

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

```
# exportfs -rv
```

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 <https://wiki.syslinux.org/wiki/index.php?title=PXELINUX> or the Debian Installer Manual's TFTP Net Booting section at <https://www.debian.org/releases/stable/amd64/ch04s05.en.html>. They might help, as their processes are very similar.

4.7.2 TFTP server

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

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:

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

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

4.7.3 NFS server

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.

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

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

4.7.4 Netboot testing HowTo

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

To make our life easier, we can use virtualization.

4.7.5 Qemu

Install qemu, bridge-utils, sudo.

Edit /etc/qemu-ifup:

```
#!/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
```

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

Get, or build a grub-floppy-netboot.

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

4.8 Webbooting

Webbooting is a convenient way of retrieving and booting live systems using the internet as a means. The requirements for webbooting are very few. On the one hand, you need a medium with a bootloader, an initial ramdisk and a kernel. On the other hand, a web server to store the squashfs files which contain the filesystem.

4.8.1 Getting the webboot files

As usual, you can build the images yourself or use the **prebuilt files**. Using prebuilt images would be handy for doing initial testing until one can fine tune their own needs. If you have built a live image you will find the files needed for webbooting in the build directory under binary/live/. The files are called vmlinuz, initrd.img and filesystem.squashfs.

It is also possible to extract those files from an already existing iso image. In order to achieve that, loopback mount the image as follows:

```
# mount -o loop image.iso /mnt
```

The files are to be found under the live/ directory. In this specific case, it would be /mnt/live/. This method has the disadvantage that you need to be root to be able to mount the image. However, it has the advantage that it is easily scriptable and thus, easily automated.

But undoubtedly, the easiest way of extracting the files from an iso image and uploading it to the web server at the same time, is using the midnight commander or mc. If you have the genisoimage package installed, the two-pane file manager allows you to browse the contents of an iso file in one pane and upload the files via ftp in the other pane. Even though this method requires manual work, it does not require root privileges.

4.8.2 Booting webboot images

While some users will prefer virtualization to test webbooting, we refer to real hardware here to match the following possible use case which should only be considered as an example.

In order to boot a webboot image it is enough to have the components mentioned above, i.e. vmlinuz and initrd.img in a usb stick inside a directory named live/ and install syslinux as bootloader. Then boot from the usb stick and type fetch=URL/PATH/TO/FILE at the boot options. live-boot will retrieve the squashfs file and store it into ram. This way, it is possible to use the downloaded compressed filesystem as a regular live system. For example:

```
append boot=live components fetch=http://192.168.2.50/images/↵
webboot/filesystem.squashfs
```

Use case: You have a web server in which you have stored two squashfs files, one which contains a full desktop, like for example gnome, and a standard one. If you need a graphical environment for one machine, you can plug your usb stick in and webboot the gnome image. If you need one of the tools included in the second type of image, perhaps for another machine, you can webboot the standard one.

Overview of tools

5. Overview of tools

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

5.1 The live-build package

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

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.

Many concepts are similar to those used to build Debian packages with debhelper:

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, among 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.

Unlike debhelper, live-build provides the tools to generate a skeleton configuration directory. This could be considered to be similar to tools such as `dh-make`. For more information about these tools, read on, since the re-

mainder of this section discusses the four most important commands. Note that the preceding `lb` is a generic wrapper for live-build commands.

`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.

5.1.1 The `lb config` command

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 the initial skeleton configuration tree.

Issuing `lb config` without any arguments creates the `config/` subdirectory which is populated with some default settings in configuration files, and two skeleton trees named `auto/` and `local/`.

```
$ lb config
[2025-02-15 12:34:56] lb config
P: Using http proxy: http://127.0.0.1:3142
P: Creating config tree for a debian/testing/amd64 system
P: Symlinking hooks...
```

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

Normally, you will want to specify some options. For example, to specify which package manager to use while building the image:

```
$ lb config --apt aptitude
```

It is possible to specify many options, such as:

```
$ lb config --binary-images netboot --bootappend-live "boot=live ↵
  components hostname=live-host 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. If your changes invalidate the `bootstrap` and/or `package` caches, e.g. changes to `--mode`, `--architecture`, or `--bootstrap`, you must use `lb clean --purge`. 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 live system 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 `OverlayFS`, for Debian like systems to boot from.

More information on initial ramfs in Debian can be found in the Debian Linux Kernel Handbook at <https://kernel-team.pages.debian.net/kernel-handbook/> 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.

Managing a configuration

6. Managing a configuration

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.

6.1 Dealing with configuration changes

Live configurations rarely are perfect on the first try. It may be fine to pass `lb config` options from the command-line to perform a single build, but it is more typical to revise those options and build again until you are satisfied. To support these changes, you will need auto scripts which ensure your configuration is kept in a consistent state.

6.1.1 Why use auto scripts? What do they do?

The `lb config` command stores the options you pass to it in `config/*` files along with many other options set to default values. If you run `lb config` again, it will not reset any option that was defaulted based on your initial options. So, for example, if you run `lb config` again with a new value for `--binary-images`, any dependent options that were defaulted for the old image type may no longer work with the new ones. Nor are these files intended to be read or edited. They store values for over a hundred options, so nobody, let alone yourself, will be able to see in these which options you actually specified. And finally, if you run `lb config`, then upgrade live-build and it happens to rename an option, `config/*` would still contain variables named after the old option that are no longer valid.

For all these reasons, `auto/*` scripts will make your life easier. They are simple wrappers to the `lb config`, `lb build` and `lb clean` commands that are designed to help you manage your configuration. The `auto/config` script stores your `lb config` command with all desired options, the `auto/clean` script removes the files containing configuration variable values, and the `auto/build` script keeps a `build.log` of each build. Each of these scripts is run automatically every time you run the corresponding `lb` command. By using these scripts, your configuration is easier to read and is kept internally consistent from one revision to the next. Also, it will be much easier for you identify and fix options which need to change when you upgrade live-build after reading the updated documentation.

6.1.2 Use example auto scripts

For your convenience, live-build comes with example auto shell scripts to copy and edit. Start a new, default configuration, then copy the examples into it:

```
$ mkdir mylive && cd mylive && lb config
$ mkdir auto
$ cp /usr/share/doc/live-build/examples/auto/* auto/
```

Edit `auto/config`, adding any options as you see fit. For instance:

```
#!/bin/sh
lb config noauto "
  --distribution stable "
  --binary-images hdd "
  --mirror-bootstrap http://ftp.ch.debian.org/debian/ "
  --mirror-binary http://ftp.ch.debian.org/debian/ "
"$@"
```

Now, each time you use `lb config`, `auto/config` will reset the configuration

based on these options. When you want to make changes to them, edit the options in this file instead of passing them to `lb config`. When you use `lb clean`, `auto/clean` will clean up the `config/*` files along with any other build products. And finally, when you use `lb build`, a log of the build will be written by `auto/build` in `build.log`.

Note: A special `noauto` parameter is used here to suppress another call to `auto/config`, thereby preventing infinite recursion. Make sure you don't accidentally remove it when making edits. Also, take care to ensure when you split the `lb config` command across multiple lines for readability, as shown in the example above, that you don't forget the backslash (at the end of each line that continues to the next.

6.2 Clone a configuration published via Git

Use the `lb config --config` option to clone a Git repository that contains a live system configuration. If you would like to base your configuration on one maintained by the Debian Live Project, look at <https://salsa.debian.org/live-team/> for the repository named `live-images` in the category `Subgroups` and projects. This repository contains the configurations for the live systems **prebuilt images**.

For example, to build a standard image, use the `live-images` repository as follows:

```
$ mkdir live-images && cd live-images
$ lb config --config https://salsa.debian.org/live-team/live-↵
  images.git::debian
$ cd images/standard
```

Edit `auto/config` and any other things you need in the config tree to suit your needs. For example, the unofficial non-free prebuilt images are made by simply adding `--archive-areas main contrib non-free`.

You may optionally define a shortcut in your Git configuration by adding the following to your `~/.gitconfig`:

```
[url "https://salsa.debian.org/live-team/"]
  insteadOf = lso:
```

This enables you to use `lso:` anywhere you need to specify the address of a `salsa.debian.org` git repository. If you also drop the optional `.git` suffix, starting a new image using this configuration is as easy as:

```
$ lb config --config lso:live-images::debian
```

Cloning the entire `live-images` repository pulls the configurations used for several images. If you feel like building a different image after you have finished with the first one, change to another directory and again and optionally, make any changes to suit your needs.

In any case, remember that every time you will have to build the image as superuser: `lb build`

Customizing contents

7. Customization overview

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

7.1 Build time vs. boot time configuration

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.

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.

7.2 Stages of the build

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 medium outside of the Live system's filesystem. After the live image is built, if enabled, the source tarball is built in the `source` stage.

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 are copied, and hooks are run later, after all of the materials are in place.

7.3 Supplement lb config with files

Although `lb config` creates 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.

364 7.4 Customization tasks

365 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.

Customizing package installation

8. Customizing package installation

Perhaps the most basic customization of a 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 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 lists of packages, including metapackages which will install many related packages at once, such as packages for a particular desktop or language. 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

8.1.1 Distribution, archive areas and mode

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 testing. Any current distribution carried in the 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 enable other sources.

For example, to build against the stable release, with security, updates (enabled per default) and additionally proposed-updates and backports, specify:

```
$ lb config --distribution stable --proposed-updates true --↵
backports true
```

Similarly, for the unstable release, sid, which has neither security nor updates, specify:

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

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 non-free"
```

Experimental support is available for some Debian derivatives through a `--mode` option. By default, this option is set to debian only if you are building on a Debian or on an unknown system. If `lb config` is invoked on any of the supported derivatives, it will default to create an image of that derivative. If `lb config` is run in e.g. ubuntu mode, 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.

8.1.2 Distribution mirrors

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 `--mirror-*` options governs which distribution mirror is used at 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 `--mirror-binary` and `--mirror-binary-security` values are used, superseding any mirrors used in an earlier stage.

8.1.3 Distribution mirrors used at build time

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

```
$ lb config --mirror-bootstrap http://localhost/debian/ "
--mirror-chroot-security http://localhost/debian-↵
security/
```

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

8.1.4 Distribution mirrors used at run time

The `--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 `deb.debian.org`, a service that chooses a geographically close mirror based, among other things, on the user's IP family and the availability of the mirrors. 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.

```
$ lb config --mirror-binary http://mirror/debian/ "
--mirror-binary-security http://mirror/debian-security/ ↵
"
--mirror-binary-backports http://mirror/debian-backports↵
/
```

8.1.5 Additional repositories

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 `--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.

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

```
deb http://debian-live.alioth.debian.org/ sid-snapshots main ↵
contrib non-free
```

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.

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

You should also put the ASCII-armored GPG key used to sign the repository into `config/archives/your-repository.key.-binary, chroot` files.

Should you need custom APT pinning, such APT preferences snippets can be placed in `config/archives/your-repository.pref.-binary, chroot` files and will be automatically added to your live system's `/etc/apt/preferences.d/` directory.

Similarly, if you need custom `APT::AUTH.CONF(5)` authentication configuration, this can be placed in `config/archives/your-repository.auth.-binary, chroot` files and will be automatically added to your live system's `/etc/apt/auth.conf.d/` directory.

8.2 Choosing packages to install

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 use metapackages in those lists, or select them using package control file fields. 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.

8.2.1 Package lists

Package lists are a powerful way of expressing which packages should be installed. The list syntax supports conditional sections which makes it easy to build lists and adapt them for use in multiple configurations.

Package names may also be injected into the list using shell helpers at build time.

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.

8.2.2 Using metapackages

The simplest way to populate your package list is to use a task metapackage maintained by your distribution. For example:

```
$ lb config
$ echo task-gnome-desktop > config/package-lists/desktop.list.chroot
```

This supersedes the older predefined list method supported in live-build 2.x. Unlike predefined lists, task metapackages are not specific to the Live System project. Instead, they are maintained by specialist working groups within the distribution and therefore reflect the consensus of each group about which packages best serve the needs of the intended users. They also cover a much broader range of use cases than the predefined lists they replace.

All task metapackages are prefixed `task-`, so a quick way to determine which are available (though it may contain a handful of false hits that match the name but aren't metapackages) is to match on the package name with:

```
$ apt-cache search --names-only ^task -
```

In addition to these, you will find other metapackages with various pur-

poses. Some are subsets of broader task packages, like `gnome-core`, while others are individual specialized parts of a Debian Pure Blend, such as the `education-*` metapackages. To list all metapackages in the archive, install the `debtags` package and list all packages with the `role::metapackage` tag as follows:

```
$ debtags search role::metapackage
```

8.2.3 Local package lists

Whether you list metapackages, individual packages, or a combination of both, all local package lists are stored in `config/package-lists/`. Since more than one list can be used, this lends itself well to modular designs. For example, you may decide to devote one list to a particular choice of desktop, another to a collection of related packages that might as easily be used on top of a different desktop. This allows you to experiment with different combinations of sets of packages with a minimum of fuss, sharing common lists between different live image projects.

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.

The packages in the `.list.chroot` install list are present both in the live system and in the installed system.

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 medium.

8.2.4 Local binary package lists

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 medium 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.

8.2.5 Generated package lists

It sometimes happens that the best way to compose a list is to generate it with a script. Any line starting with an exclamation point indicates a command to be executed within the chroot when the image is built. For example, one might include the line `! grep-aptavail -n -sPackage -FPriority standard`—sort in a package list to produce a sorted list of available packages with Priority: standard.

In fact, selecting packages with the `grep-aptavail` command (from the `dctrl-tools` package) is so useful that live-build provides a Packages helper script as a convenience. This script takes two arguments: field and pattern. Thus, you can create a list with the following contents:

```
$ lb config
$ echo '! Packages Priority standard' & config/package-lists/←
  standard.list.chroot
```

8.2.6 Using conditionals inside package lists

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 `lb config` 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, ARCHITECTURES or ARCHIVEAREAS.

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

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

You may test for any one of a number of values, e.g. to install memtest86+ if either `-architectures i386` or `-architectures amd64` is specified:

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

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`:

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

The nesting of conditionals is not supported.

8.2.7 Removing packages at install time

You can list packages in files with `.list.chroot`live` and `.list.chroot`install` suffixes inside the `config/package-lists` directory. If both a live and an

install list exist, the packages in the `.list.chroot`live` list are removed with a hook after the installation (if the user uses the installer). The packages in the `.list.chroot`install` list are present both in the live system and in the installed system. This is a special tweak for the installer and may be useful if you have `-debian-installer live` set in your config, and wish to remove live system-specific packages at install time.

8.2.8 Summary

The table below shows which configuration files are required to achieve the desired availability of the package.

		X.chroot	X.chroot`live	X	X.binary
Package is installed in the live system	Yes	Yes	Yes	Yes	No
Package removed after installing the live system	No	No	Yes	No	N/A
Package can be installed from the live system without network	N/A	N/A	N/A	Yes *1	Yes

*1: Because the installer needs this package

X = `config/package-lists/custom`name.list`

8.2.9 Desktop and language tasks

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 tasksel'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.

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 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 German might include these task metapackages:

```
$ lb config
$ echo "task-gnome-desktop task-laptop" && config/package-lists/my<←
  .list.chroot
$ echo "task-german task-german-desktop task-german-gnome-desktop" &<←
  && config/package-lists/my.list.chroot
```

8.2.10 Kernel flavour and version

One or more kernel flavours will be included in your image by default, depending on the architecture. You can choose different flavours via the `--linux-flavours` option. Each flavour is suffixed to the default stub `linux-`

image to form each metapackage name which in turn depends on an exact kernel package to be included in your image.

Thus by default, an amd64 architecture image will include the `linux-image-amd64` flavour metapackage, and an i386 architecture image will include the `linux-image-586` metapackage.

When more than one kernel package version is available in your configured archives, you can specify a different kernel package name stub with the `--linux-packages` option. For example, supposing you are building an amd64 architecture image and add the experimental archive for testing purposes so you can install the `linux-image-3.18.0-trunk-amd64` kernel. You would configure that image as follows:

```
$ lb config --linux-packages linux-image-3.18.0-trunk
$ echo "deb http://deb.debian.org/debian/ experimental main" && <←
  config/archives/experimental.list.chroot
```

8.2.11 Custom kernels

You can build and include your own custom kernels, so long as they are integrated within the Debian package management system. The live-build system does not support kernels not built as `.deb` packages.

The proper and recommended way to deploy your own kernel packages is to follow the instructions in the `kernel-handbook`. Remember to modify the ABI and flavour suffixes appropriately, then include a complete build of the `linux` and matching `linux-latest` packages in your repository.

If you opt to build the kernel packages without the matching metapackages, you need to specify an appropriate `--linux-packages` stub as discussed in [Kernel flavour and version](#). As we explain in [Installing modified or](#)

third-party packages, it is best if you include your custom kernel packages in your own repository, though the alternatives discussed in that section work as well.

It is beyond the scope of this document to give advice on how to customize your kernel. However, you must at least ensure your configuration satisfies these minimum requirements:

Use an initial ramdisk.

Include the union filesystem module (i.e. usually OverlayFS).

Include any other filesystem modules required by your configuration (i.e. usually squashfs).

8.3 Installing modified or third-party packages

While it is against the philosophy of a live system, 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 <https://www.debian.org/doc/manuals/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, while using a custom APT repository is more time-consuming to set up.

8.3.1 Using packages.chroot to install custom packages

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.

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

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

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 live system configurations in revision control.

8.3.2 Using an APT repository to install custom packages

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.

While 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.

The APT repository does not necessarily need to be online, you can use

a local repository instead. However, in both cases the repository needs to be signed.

Example:

```
$ gpg --armor --output config/archives/custom`repo`.gpg.key$-EXTENSION" --export-options export-minimal --export $-SIGNING`KEY"
$ cat | EOF & config/archives/custom`repo`.list$-EXTENSION"
deb [signed-by=/etc/apt/trusted.gpg.d/custom`repo`.gpg.key$-EXTENSION".asc] $-URI" $-SUITE" $-COMPONENTS"
EOF
$ echo "$-PACKAGESFROM`REPOSITORY`" & config/package-lists/custom`repo`.list$-EXTENSION"
```

Where:

\$-EXTENSION": the optional stage suffix, see the [summary](#)

\$-SIGNING`KEY": the keyID of the signature of the repository

\$-URI": the URI to the repository, e.g. <http://deb.debian.org/debian/> or file://\$(pwd)/my`local`repository

\$-SUITE": the suite within the repository, e.g. my-debian-based-distro

\$-COMPONENTS": the components within the repository, e.g. main

\$-PACKAGESFROM`REPOSITORY`: the names of the packages to install (dependencies will automatically be installed as well)

8.3.3 Custom packages and APT

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.

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.

8.4 Configuring APT at build time

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.

8.4.1 Choosing apt or aptitude

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.

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.

8.4.2 Using a proxy with APT

One commonly required APT configuration is to deal with building an

image behind a proxy. You may specify your APT proxy with the `--apt-http-proxy` option as needed, e.g.

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

8.4.3 Tweaking APT to save space

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

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

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

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.

If you find the installation of recommended packages bloats your image too much, provided you are prepared to deal with the consequences discussed below, you may disable that default option of APT with:

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

The most important consequence of turning off `recommends` is that `live-boot` and `live-config` themselves recommend some packages that provide important functionality used by most Live configurations.

Two packages which you most probably will want to add again are:

`user-setup` which `live-config` recommends is used to create the live user.

`sudo` which `live-config` recommends is used to obtain root access in the live-image, which is needed to shutdown the computer.

```
$ lb config --apt-recommends false
$ echo "user-setup sudo" & config/package-lists/recommends.list <-
chroot
```

In all but the most exceptional circumstances you need to add back at least some of these `recommends` to your package lists or else your image will not work as expected, if at all. Look at the recommended packages for each of the `live-*` packages included in your build and if you are not certain you can omit them, add them back into your package lists.

The more general consequence is that if you don't install recommended packages for any given package, that is, packages that would be found together with this one in all but unusual installations ([APT pinning](#)).

8.4.4 Passing options to apt or aptitude

If there is not a `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. Note that both options have default values that you will need to retain in addition to any overrides you may provide. So, for example, suppose you have included something from `snapshot.debian.org` for testing purposes and want to specify `Acquire::Check-Valid-Until=false` to make APT happy with the stale Release file, you would do so as per the following example, appending the new option after the default value `--yes`:

```
$ lb config --apt-options "--yes -oAcquire::Check-Valid-Until=false"
```

```
Package: live-*
Pin: release n=sid
Pin-Priority: 600
```

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

Please check the man pages to fully understand these options and when to use them. This is an example only and should not be construed as advice to configure your image this way. This option would not be appropriate for, say, a final release of a live image.

For more complicated APT configurations involving apt.conf options you might want to create a config/apt/apt.conf file instead. See also the other apt-* options for a few convenient shortcuts for frequently needed options.

8.4.5 APT pinning

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/archives/*.pref, config/archives/*.pref.chroot, and config/apt/preferences. For the latter, create config/includes.chroot/etc/apt/preferences.

Let's say you are building a trixie 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 the live packages from it higher, but all other packages from it lower, than the default priority. Thus, only the packages you want are installed from sid at build time and all others are taken from the target system distribution, trixie. The following will accomplish this:

```
$ echo "deb http://mirror/debian/ sid main" > config/archives/sid.list.chroot
$ cat << config/archives/sid.pref.chroot >> EOF
```

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 task-lxde-desktop in config/package-lists/desktop.list.chroot, but don't want the user prompted to store wifi passwords in the keyring. This metapackage depends on lxde-core, which recommends 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/apt/preferences:

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

Customizing contents

9. Customizing contents

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 live system 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.

9.1 Includes

While ideally a live system would include files entirely provided by unmodified 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 live system image. live-build provides two mechanisms for using them:

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.

Please see [Terms](#) for more information about the distinction between the Live and binary images.

9.1.1 Live/chroot local includes

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 [Chroot local hooks](#) if processing is needed.

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:

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

Your configuration will then have the following layout:

```
-- config
[...]\n  |-- includes.chroot\n  -- `-- var\n      |-- `-- www\n      -- `-- index.html\n[...]
```

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

9.1.2 Binary local includes

To include material such as documentation or videos on the medium filesystem so that it is accessible immediately upon insertion of the medium 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:

```
$ cp ~/video/demo.* config/includes.binary/
```

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

9.2 Hooks

Hooks allow commands to be run in the chroot and binary stages of the build in order to customize the image. Depending on whether you are building a live image or a regular system image you have to place your hooks in `config/hooks/live` or `config/hooks/normal` respectively. These are frequently referred to as local hooks because they are executed inside the build environment.

There are also boot-time hooks that allow you to run commands once the image has already been built, during the boot process.

9.2.1 Chroot local hooks

To run commands in the chroot stage, create a hook script with a `.hook.chroot` suffix containing the commands either in the `config/hooks/live` or `config/hooks/normal` directories. 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/doc/live-build/examples/hooks` which you can copy or symlink to use them in your own configuration.

9.2.2 Binary local hooks

To run commands in the binary stage, create a hook script with a `.hook.binary` suffix containing the commands either in the `config/hooks/live` or `config/hooks/normal` directories. 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 not to 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/doc/live-build/examples/hooks` which you can copy or symlink to use them in your own configuration.

9.2.3 Boot-time hooks

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**.

9.3 Preseeding Debconf questions

Files in the `config/preseed/` directory suffixed with `.cfg` 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.

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

Customizing run time behaviours

10. Customizing run time behaviours

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 man page of live-config.

10.1 Customizing the live user

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.

You can specify additional groups that the live user will belong to by using any of the possibilities to configure live-config. For example, to add the live user to the fuse group, you can either add the following file in config/includes.chroot/etc/live/config.conf.d/10-user-setup.conf:

```
LIVE`USER`DEFAULT`GROUPS="audio cdrom dip floppy video plugdev ↵
netdev powerdev scanner bluetooth fuse"
```

or use live-config.user-default-groups=audio,cdrom,dip,floppy,video,plugdev as a boot parameter.

It is also possible to change the default username user and the default password live. 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:

```
$ lb config --bootappend-live "boot=live components username=live ↵
user"
```

One possible way of changing the default password is by means of a hook as described 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. 2000-passwd) and add it to config/includes.chroot/lib/live/config/

10.2 Customizing locale and language

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

the locale generation

setting the keyboard configuration

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

```
$ lb config --bootappend-live "boot=live components locales=de`CH. ↵
UTF-8"
```

Multiple locales may be specified as a comma-delimited list.

This parameter, as well as the keyboard configuration parameters indicated below, can also be used at the kernel command line. You can

specify a locale by language`country (in which case the default encoding is used) or the full language`country.encoding word. A list of supported locales and the encoding for each can be found in `/usr/share/i18n/SUPPORTED`.

Both the console and X keyboard configuration are performed by live-config using the console-setup package. To configure them, use the keyboard-layouts, keyboard-variants, keyboard-options and keyboard-model boot parameters via the `--bootappend-live` option. Valid options for these can be found in `/usr/share/X11/xkb/rules/base.lst`. To find layouts and variants for a given language, try searching for the English name of the language and/or the country where the language is spoken, e.g:

```
$ egrep -i '(!—german.*switzerland)' /usr/share/X11/xkb/rules/↵
base.lst
! model
! layout
  ch                German (Switzerland)
! variant
  legacy            ch: German (Switzerland, legacy)
  de`nodeadkeys     ch: German (Switzerland, eliminate dead keys)
  de`sundeadkeys    ch: German (Switzerland, Sun dead keys)
  de`mac            ch: German (Switzerland, Macintosh)
! option
```

Note that each variant lists the layout to which it applies in the description.

Often, only the layout needs to be configured. For example, to get the locale files for German and Swiss German keyboard layout in X use:

```
$ lb config --bootappend-live "boot=live components locales=de`CH.↵
UTF-8 keyboard-layouts=ch"
```

However, for very specific use cases, you may wish to include other parameters. For example, to set up a French system with a French-Dvorak layout (called Bepo) on a TypeMatrix EZ-Reach 2030 USB keyboard, use:

```
$ lb config --bootappend-live "
  "boot=live components locales=fr`FR.UTF-8 keyboard-layouts=fr↵
  keyboard-variants=bepo keyboard-model=tm2030usb"
```

Multiple values may be specified as comma-delimited lists for each of the keyboard-* options, with the exception of keyboard-model, which accepts only one value. Please see the keyboard(5) man page for details and examples of XKBMODEL, XKBLAYOUT, XKBVARIANT and XKBOPTIONS variables. If multiple keyboard-variants values are given, they will be matched one-to-one with keyboard-layouts values (see setxkbmap(1) -variant option). Empty values are allowed; e.g. to define two layouts, the default being US QWERTY and the other being US Dvorak, use:

```
$ lb config --bootappend-live "
  "boot=live components keyboard-layouts=us,us keyboard-↵
  variants=,dvorak"
```

10.3 Persistence

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.

A 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.

‘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 works it would be handy to know that even if the system is booted and run from read-only media, modifications to the files and directories are written on writable media, typically a ram disk (tmpfs) and ram disks’ data do not survive reboots.

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

If the boot parameter persistence is set (and nopersistence is not set), local storage media (e.g. hard disks, USB drives) will be probed for persistence volumes during boot. It is possible to restrict which types of persistence volumes to use by specifying certain boot parameters described in the live-boot(7) man page. A persistence volume is any of the following:

- a partition, identified by its GPT name.

- a filesystem, identified by its filesystem label.

- an image file located on the root of any readable filesystem (even an NTFS partition of a foreign OS), identified by its filename.

The volume label for overlays must be persistence but it will be ignored unless it contains in its root a file named persistence.conf which is used to fully customize the volume’s persistence, this is to say, specifying the directories that you want to save in your persistence volume after a reboot. See [The persistence.conf file](#) for more details.

Here are some examples of how to prepare a volume to be used for persistence. It can be, for instance, an ext4 partition on a hard disk or on a usb key created with, e.g.:

```
# mkfs.ext4 -L persistence /dev/sdb1
```

See also [Using the space left on a USB stick](#).

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

```
# tune2fs -L persistence /dev/sdb1 # for ext2,3,4 filesystems
```

Here’s an example of how to create an ext4-based image file to be used for persistence:

```
$ dd if=/dev/null of=persistence bs=1 count=0 seek=1G # for a 1GB ↵
    sized image file
$ /sbin/mkfs.ext4 -F persistence
```

Once the image file is created, as an example, to make /usr persistent but only saving the changes you make to that directory and not all the contents of /usr, you can use the union option. If the image file is located in your home directory, copy it to the root of your hard drive’s filesystem and mount it in /mnt as follows:

```
# cp persistence /
# mount -t ext4 /persistence /mnt
```

Then, create the persistence.conf file adding content and unmount the image file.

```
# echo "/usr union" >> /mnt/persistence.conf
# umount /mnt
```

Now, reboot into your live medium with the boot parameter persistence.

10.3.1 The persistence.conf file

A volume with the label persistence must be configured by means of the persistence.conf file to make arbitrary directories persistent. That file, located on the volume's filesystem root, controls which directories it makes persistent, and in which way.

How custom overlay mounts are configured is described in full detail in the persistence.conf(5) man page, but a simple example should be sufficient for most uses. Let's say we want to make our home directory and APT cache persistent in an ext4 filesystem on the /dev/sdb1 partition:

```
# mkfs.ext4 -L persistence /dev/sdb1
# mount -t ext4 /dev/sdb1 /mnt
# echo "/home" && /mnt/persistence.conf
# echo "/var/cache/apt" && /mnt/persistence.conf
# umount /mnt
```

Then we reboot. During the first boot the contents of /home and /var/cache/apt will be copied into the persistence volume, and from then on all changes to these directories will live in the persistence volume. Please note that any paths listed in the persistence.conf file cannot contain white spaces or the special . and .. path components. Also, neither /lib, /lib/live (or any of their sub-directories) nor / can be made persistent using custom mounts. As a workaround for this limitation you can add / union to your persistence.conf file to achieve full persistence.

10.3.2 Using more than one persistence store

There are different methods of using multiple persistence store for differ-

ent use cases. For instance, using several volumes at the same time or selecting only one, among various, for very specific purposes.

Several different custom overlay volumes (with their own persistence.conf files) can be used at the same time, but if several volumes make the same directory persistent, only one of them will be used. If any two mounts are nested (i.e. one is a sub-directory of the other) the parent will be mounted before the child so no mount will be hidden by the other. Nested custom mounts are problematic if they are listed in the same persistence.conf file. See the persistence.conf(5) man page for how to handle that case if you really need it (hint: you usually don't).

One possible use case: If you wish to store the user data i.e. /home and the superuser data i.e. /root in different partitions, create two partitions with the persistence label and add a persistence.conf file in each one like this, # echo /home & persistence.conf for the first partition that will save the user's files and # echo /root & persistence.conf for the second partition which will store the superuser's files. Finally, use the persistence boot parameter.

If a user would need multiple persistence store of the same type for different locations or testing, such as private and work, the boot parameter persistence-label used in conjunction with the boot parameter persistence will allow for multiple but unique persistence media. An example would be if a user wanted to use a persistence partition labeled private for personal data like browser bookmarks or other types, they would use the boot parameters: persistence persistence-label=private. And to store work related data, like documents, research projects or other types, they would use the boot parameters: persistence persistence-label=work.

It is important to remember that each of these volumes, private and work, also needs a persistence.conf file in its root. The live-boot man page contains more information about how to use these labels with legacy names.

10.3.3 Using persistence with encryption

Using the persistence feature means that some sensible data might get exposed to risk. Especially if the persistent data is stored on a portable device such as a usb stick or an external hard drive. That is when encryption comes in handy. Even if the entire procedure might seem complicated because of the number of steps to be taken, it is really easy to handle encrypted partitions with live-boot. In order to use luks, which is the supported encryption type, you need to install cryptsetup both on the machine you are creating the encrypted partition with and also in the live system you are going to use the encrypted persistent partition with.

To install cryptsetup on your machine:

```
# apt-get install cryptsetup
```

To install cryptsetup in your live system, add it to your package-lists:

```
$ lb config
$ echo "cryptsetup cryptsetup-initramfs" & config/package-lists/↵
  encryption.list.chroot
```

Once you have your live system with cryptsetup, you basically only need to create a new partition, encrypt it and boot with the persistence and persistence-encryption=luks parameters. We could have already anticipated this step and added the boot parameters following the usual procedure:

```
$ lb config --bootappend-live "boot=live components persistence ↵
  persistence-encryption=luks"
```

Let's go into the details for all of those who are not familiar with encryption. In the following example we are going to use a partition on a usb stick which corresponds to /dev/sdc2. Please be warned that you need to determine which partition is the one you are going to use in your specific case.

The first step is plugging in your usb stick and determine which device it is. The recommended method of listing devices in live-manual is using ls -l /dev/disk/by-id. After that, create a new partition and then, encrypt it with a passphrase as follows:

```
# cryptsetup --verify-passphrase luksFormat /dev/sdc2
```

Then open the luks partition in the virtual device mapper. Use any name you like. We use live here as an example:

```
# cryptsetup luksOpen /dev/sdc2 live
```

The next step is filling the device with zeros before creating the filesystem:

```
# dd if=/dev/zero of=/dev/mapper/live
```

Now, we are ready to create the filesystem. Notice that we are adding the label persistence so that the device is mounted as persistence store at boot time.

```
# mkfs.ext4 -L persistence /dev/mapper/live
```

To continue with our setup, we need to mount the device, for example in 630
/mnt.

631

```
# mount /dev/mapper/live /mnt
```

632 And create the persistence.conf file in the root of the partition. This is, as
explained before, strictly necessary. See [The persistence.conf file](#).

633

```
# echo "/ union" > /mnt/persistence.conf
```

634 Then unmount the mount point:

635

```
# umount /mnt
```

636 And optionally, although it might be a good way of securing the data we
have just added to the partition, we can close the device:

637

```
# cryptsetup luksClose live
```

638 Let's summarize the process. So far, we have created an encryption
capable live system, which can be copied to a usb stick as explained in
[Copying an ISO hybrid image to a USB stick](#). We have also created an
encrypted partition, which can be located in the same usb stick to carry
it around and we have configured the encrypted partition to be used as
persistence store. So now, we only need to boot the live system. At
boot time, live-boot will prompt us for the passphrase and will mount
the encrypted partition to be used for persistence.

Customizing the binary image

```
prompt 0
timeout 50
```

11. Customizing the binary image

11.1 Bootloaders

live-build uses syslinux and some of its derivatives (depending on the image type) as bootloaders by default. They can be easily customized to suit your needs.

In order to use a full theme, copy `/usr/share/live/build/bootloaders` into `config/bootloaders` and edit the files in there. If you do not want to bother modifying all supported bootloader configurations, only providing a local customized copy of one of the bootloaders, e.g. `isolinux` in `config/bootloaders/isolinux` is enough too, depending on your use case.

When modifying one of the default themes, if you want to use a personalized background image that will be displayed together with the boot menu, add a `splash.png` picture of 640x480 pixels. Then, remove the `splash.svg` file.

There are many possibilities when it comes to making changes. For instance, `syslinux` derivatives are configured by default with a timeout of 0 (zero) which means that they will pause indefinitely at their splash screen until you press a key.

To modify the boot timeout of a default iso-hybrid image just edit a default `isolinux.cfg` file specifying the timeout in units of 1/10 seconds. A modified `isolinux.cfg` to boot after five seconds would be similar to this:

```
include menu.cfg
default vesamenu.c32
```

11.2 ISO metadata

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.

`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.

`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.

`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.

`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.

Customizing Debian Installer

12. Customizing Debian Installer

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.

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.

12.1 Types of Debian Installer

The three main types of installer are:

Normal Debian Installer : This is a normal live system 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, from local media or some network-based network, resulting in a default 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 preseed file, live-build can automatically put it in the image and enable it for you.

Live Debian Installer : This is a live system 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 normal 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 medium, you must disable live-installer by preseeding 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 --debian-installer live
$ echo debian-installer-launcher && config/package-lists/my.list.<↵
chroot
```

12.2 Customizing Debian Installer by preseeding

As described in the Debian Installer Manual, Appendix B at <https://www.debian.org/doc/manuals/debian-installer/section-12.2.html>

[//www.debian.org/releases/stable/amd64/apb.en.html](http://www.debian.org/releases/stable/amd64/apb.en.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/includes.installer/`. For example, to preseed setting the locale to `en_US`:

672

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

673

12.3 Customizing Debian Installer content

674

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/includes.installer/`.

Project

Contributing to the project

13. Contributing to the project

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

Contributions to the project, such as translations and patches, are greatly welcome. Anyone can send merge requests. The projects are hosted on Salsa: <https://salsa.debian.org/live-team> follow Salsa's documentation for instructions on how to contribute.

Even though all commits might be revised, we ask you to use your common sense and make good commits with good commit messages.

Write commit messages that consist of complete, meaningful 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/....

Write good commit messages. The first line must be an accurate summary of the contents of the commit which will be included in the changelog. If you need to make some further explanations, write them below leaving a blank line after the first one and then another blank line after each paragraph. Lines of paragraphs should not exceed 80 characters in length.

Commit atomically, this is to say, do not mix unrelated things in the same commit. Make one different commit for each change you make.

13.1 Translation of man pages

You can also contribute to the project working on the translation of the man pages for the different live-* packages that the project maintains. The procedure is different depending on whether you are starting a translation from scratch or continue working on an already existing one:

Working on an already existing translation

If you want to maintain the translation of an already existing language you have to make your changes to your manpages/po/\$-LANGUAGE"/*.po file or files and then run make rebuild from inside the manpages/ directory. This will update the actual man pages in manpages/\$-LANGUAGE"/*

Starting a new translation from scratch

In order to add a new translation of any of the project's man pages you have to follow a similar procedure. It could be summarized as follows:

Open the manpages/pot/ file or files in your favourite editor, such as poedit, and save it as a .po file in manpages/po/\$-LANGUAGE"/. (You will have to create your \$-LANGUAGE"/ directory).

Run make rebuild from inside the manpages/ directory to create the manpages/\$-LANGUAGE"/ files which will contain the actual man pages.

Remember that you will have to add all the directories and files, then make the commit and finally push to the git server.

Reporting bugs

14. Reporting bugs

Live systems are 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 on how to file good bug reports.

For the impatient:

First check whether the bugs has been reported already. You can see the full list of bugs that are assigned to the live-team at <https://bugs.debian.org/cgi-bin/pkgreport.cgi?maint=debian-live%40lists.debian.org>.

Before submitting a bug report always try to reproduce the bug with the most recent versions of the packages of live-build, live-boot, live-config and live-tools that you're using.

Try to give as specific information as possible about the bug. This includes (at least) the version of live-build, live-boot, live-config, and live-tools used and the distribution of the live system you are building.

14.1 Known issues

Currently known issues are listed in the BTS at <https://bugs.debian.org/cgi-bin/pkgreport.cgi?maint=debian-live%40lists.debian.org>.

Note: Since Debian testing and Debian unstable distributions are moving targets, when you specify either of them as the target system distribution, a successful build may not always be possible.

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

testing or unstable, but rather, use stable. live-build always defaults to the stable release.

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, you can always try the following: If a build fails when the target distribution is testing, try unstable. If unstable does work, revert to testing and pin the newer version of the failing package from unstable (see [APT pinning](#) for details).

14.2 Do the research

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.

You should pay particular attention to the live systems 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.

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

14.3 Rebuild from scratch

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.

14.4 Use up-to-date packages

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. If possible, try to reproduce the bug with the newest code from source, see [Installation](#) for details.

14.5 Collect information

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

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

Architecture of the host system

Distribution of the host system

Version of live-build on the host system

Version of debootstrap on the host system

Architecture of the live system

Distribution of the live system

Version of live-boot on the live system

Version of live-config on the live system

Version of live-tools on the live system

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 2i&1 -- tee build.log
```

At boot time, live-boot and live-config store their logfiles in `/var/log/-live/`. Check them for error messages.

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`.

14.6 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 cannot manage it for your report, do not 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.

732 14.7 Use the correct package to report the bug against

733 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 which package is appropriate or need more help before submitting a bug report, please report it against the debian-live pseudo-package. We will then take care about it and reassign it where appropriate.

734 However, we would appreciate it if you try to narrow it down according to where the bug appears.

735 14.7.1 At build time while bootstrapping

736 live-build first bootstraps a basic Debian system with debootstrap. If a bug appears here, check if the error is related to a specific Debian package (most likely), or if it is related to the bootstrapping tool itself.

737 In both cases, this is not a bug in the live system, but rather in Debian itself and probably we cannot fix it directly. Please report such a bug against the bootstrapping tool or the failing package.

738 14.7.2 At build time while installing packages

739 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.

740 If this is the case, this is not a bug in the live system, 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.

741 Also, if you are using a local mirror and/or any sort of proxy and you are

experiencing a problem, please always reproduce it first by bootstrapping from an official mirror.

14.7.3 At boot time

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 exactly, whether using virtualization 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.

14.7.4 At run time

If a package was successfully installed, but fails while actually running the Live system, this is probably a bug in live-config.

14.8 Where to report bugs

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

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.

Coding Style

15. Coding Style

This chapter documents the coding style used in live systems.

15.1 Compatibility

- Avoid bashisms, the codebase must be POSIX compliant and thus universally compatible.
- Furthermore it must comply with the version of the POSIX specification chosen by the current Debian Policy.
- You can check your scripts with ‘sh -n’ and ‘checkbashisms’.
- Make sure all shell code runs with ‘set -e’.

15.2 Indenting

- Always use tabs over spaces.
- Keep case branch terminators (;;) aligned with the content of the branch, rather than the branch entry.

Good:

```
case "$1" in
    foo)
        foobar
        ;;
    bar)
        foobar
        ;;
```

```
esac
```

15.3 Wrapping

- Generally, lines should be 80 chars at maximum.
- Placement of keywords like then and do should be chosen with good judgement with respect to clutter and readability. For small bits of code in particular it should be preferred to have them on the same line as the prior keyword they relate to (if; for; etc). Only place on the next line where it makes good sense to do so; typically this might only be to comply with maximum line length restrictions. One situation where they should always be placed on the next line is where what they follow is broken up onto multiple lines, and thus it being on a new line creates clear separation between that and the body of code following it. I.e. :

Preferred:

```
if foo; then
    bar
fi

for FOO in $ITEMS; do
    bar
done

if [ "$MY_LOCATION_VARIABLE" = "something" ] && [ -e "$MY_OUTPUT_FILE" ]
then
    MY_OTHER_VARIABLE="$(some`bin $-FOOBAR" — awk -F' ' — ↵
    print $1 " ")"
fi

if [ "$MY_FOO" = "something" ] && [ -e "path/$-FILE`1" ] —
[ "$MY_BAR" = "something`else" ] && [ $-ALLOW = "true" ]
then
    foobar
```

```
fi
```

Awful:

776

Less ideal:

777

```
if [ "$MY_LOCATION_VARIABLE" = "something" ] && [ -e "$MY_OUTPUT_FILE" ]; then
    MY_OTHER_VARIABLE="$(some`bin $-FOOBAR" — awk -F' ' — ↵
    print $1 " ")"
fi
```

```
Foo ()
-
  bar
"
```

Horrible:

```
if [ "$MY_LOCATION_VARIABLE" = "something" ] && [ -e "$MY_OUTPUT_FILE" ] — [ "$MY_LOCATION_VARIABLE" = "something" ↵
-else" ] && [ -e "$MY_OUTPUT_FILE2" ]; then
    MY_OTHER_VARIABLE="$(some`bin $-FOOBAR" — awk -F' ' — ↵
    print $1 " ")"
fi
```

15.4 Variables

778

Variables are always in capital letters.

779

Config variables used in live-build should start with an LB' prefix.

780

Local function variables should be restricted to local scope.

781

Variables in connection to a boot parameter in live-config start with LIVE'.

782

All other variables in live-config start with ' prefix.

783

Use braces around variables; e.g. write "\$-FOO" instead of \$FOO.

784

Always protect variables with quotes to respect potential whitespaces (except where necessary to achieve correct word splitting): write "\$-FOO" not \$-FOO'.

785

For consistency reasons, always use quotes when assigning values to variables:

786

Bad:

787

```
Foo ()
-
  bar
"
```

Bad (inconsistent with existing style):

788

```
FOO=bar
```

Good:

789

```
Foo () -
  bar
"
```

790

```
FOO="bar"
```

If multiple variables are used, prefer quoting the full expression:

Typically bad:

```
if [ -f "$FOO"/foo/"$BAR"/bar ]; then
    foobar
fi
```

Good:

```
if [ -f "$FOO"/foo/"$BAR"/bar ]; then
    foobar
fi
```

15.5 Miscellaneous

Prefer `—` (without the surround quotes) as a separator in calls to `sed`, e.g. `sed -e 's—'` (without `"`).

Don't use the test command for comparisons or tests, use `[` and `]` (without `"`); e.g. `if [-x /bin/foo]; ...` and not `if test -x /bin/foo; ...`

Use `case` wherever it makes code more readable than conditional checks (if `foo`; ... and tests without the actual `if` keyword, e.g. `[-e $FILE] —exit 0`).

Use `Foo`bar` style names for functions, i.e. a capital first letter, then all lowercase, with sensible use of underscores for better readability.

Examples

Examples

16. Examples

This chapter covers example builds for specific use cases with live systems. If you are new to building your own live system 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.

16.1 Using the examples

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](#).

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

```
LB*MIRROR*BOOTSTRAP="http://mirror/debian/"
LB*MIRROR*CHROOT*SECURITY="http://mirror/debian-security/"
LB*MIRROR*CHROOT*BACKPORTS="http://mirror/debian-backports/"
```

16.2 Tutorial 1: A default image

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

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

You can't get much simpler than this:

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

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.

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

```
# lb build 2i&1 — tee build.log
```

Assuming all goes well, after a while, the current directory will contain `live-image-amd64.hybrid.iso`. 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](#), 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

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

customizations.

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

```
$ mkdir tutorial2
$ cd tutorial2
$ lb config
$ echo "task-lxde-desktop firefox-esr" && 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 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 build.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/doc/live-build/examples/auto/* tutorial3/auto/
$ cd tutorial3
```

Edit auto/config to read as follows:

```
#!/bin/sh

lb config noauto "
  --distribution stable "
"$@"
```

Perform lb config to generate the config tree, using the auto/config script you just created:

```
$ lb config
```

Now populate your local package list:

```
$ echo "task-lxde-desktop spice-vdagent hexchat" && config/package-lists/my.list.chroot
```


First, `-distribution stable` ensures that `stable` is used instead of the default `-testing`. Second, we have added `spice-vdagent` for easier testing the image in `qemu`. And finally, we have added an initial favourite package: `hexchat`.

Now, build the image:

```
# lb build
```

Note that unlike in the first two tutorials, we no longer have to type `2;&1` —tee `build.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
$ cp /usr/share/doc/live-build/examples/gitignore .gitignore
$ git add .gitignore auto config
$ git commit -m "Initial import."
```

16.4.2 Second revision

In this revision, we’re going to clean up from the first build, replace the `smplayer` package with `vlc` package, 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 install the `vlc` package before the `lxde` package chooses between `smplayer`, `vlc` and `mplayer-gui` in our local package list in `config/package-lists/my.list.chroot`:

```
$ echo "vlc task-lxde-desktop spice-vdagent hexchat" >> config/package-lists/my.list.chroot
```

Build again:

```
# lb build
```

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

```
$ git commit -a -m "Replacing smplayer with vlc."
```

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 live systems.

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 an skeletal configuration inside it, disabling recommends to make a minimal system. And then create two initial package lists: the first one generated with a script provided by live-build named Packages (see [Generated package lists](#)), and the second one including xorg, gdm3, metacity and xvnc4viewer.

```
$ mkdir vnc-kiosk-client
$ cd vnc-kiosk-client
$ lb config --apt-recommends false
$ echo '! Packages Priority standard' & config/package-lists/↵
  standard.list.chroot
$ echo "xorg gdm3 metacity xtightvncviewer" & config/package-lists/↵
  /my.list.chroot
```

As explained in [Tweaking APT to save space](#) you may need to re-add some recommended packages to make your image work properly.

An easy way to list recommends is using apt-cache. For example:

```
$ apt-cache depends live-config live-boot
```

In this example we found out that we had to re-include several packages recommended by live-config and live-boot: user-setup to make autologin work and sudo as an essential program to shutdown the system. Besides, it could be handy to add live-tools to be able to copy the image to RAM and eject to eventually eject the live medium. So:

```
$ echo "live-tools user-setup sudo eject" & config/package-lists/↵
  recommends.list.chroot
```

After that, create the directory /etc/skel in config/includes.chroot 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
$ cat & config/includes.chroot/etc/skel/.xsession && EOF
#!/bin/sh

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

exit
EOF
```

Build the image:

```
# lb build
```

Enjoy.

16.6 A minimal image for a 512MB USB key

Use case: Create a default image with some components removed in order to fit on a 512MB USB key with a little space left over to use as you see fit.

When optimizing an image to fit a certain media size, you need to understand the tradeoffs you are making between size and functionality. In this example, we trim only so much as to make room for additional material within a 512MB media size, but without doing anything to destroy the 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, we use `--debootstrap-options` to create a minimal system from scratch and `--binary-image hdd` to create an image that can be copied to a USB key.

```
$ lb config --binary-image hdd --apt-indices false --apt-recommends false --debootstrap-options "--variant=minbase" --firmware-chroot false --memtest none
```

To make the image work properly, we must re-add, at least, two recommended packages which are left out by the `--apt-recommends false` option. See [Tweaking APT to save space](#)

```
$ echo "user-setup sudo" && config/package-lists/recommends.list.chroot
```

Additionally, you'll want to have network access, so another two recommended packages need to be re-added:

```
$ echo "ifupdown isc-dhcp-client" && config/package-lists/recommends.list.chroot
```

Now, build the image in the usual way:

```
# lb build 2i&1 --tee build.log
```

On the author's system at the time of writing this, the above configuration produced a 298MiB image. This compares favourably with the 380MiB image produced by the default configuration in [Tutorial 1](#), when `--binary-image hdd` is added.

Leaving off APT's indices with `--apt-indices false` saves a fair amount of

space, the tradeoff being that you need to do an `apt-get update` before using `apt` in the live system. 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. `--debootstrap-options --variant=minbase` bootstraps a minimal system from the start. Not automatically including firmware packages with `--firmware-chroot false` saves some space too. And finally, `--memtest none` prevents the installation of a memory tester.

Note: A minimal system can also be achieved using hooks, like for example the `stripped.hook.chroot` hook found in `/usr/share/doc/live-build/examples/hooks`. It may shave off additional small amounts of space and produce an image of 277MiB. However, it does so by removal of documentation and other files from packages installed on the system. This violates the integrity of those packages and that, as the comment header warns, may have unforeseen consequences. That is why using a minimal `debootstrap` is the recommended way of achieving this goal.

16.7 A localized GNOME desktop and installer

Use case: Create a GNOME desktop image, localized for Switzerland and including an installer.

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

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
```

Note that we have included the `debian-installer-launcher` package to launch the installer from the live desktop. 893

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

888

```
$ grep -dctrl -FTest-lang de /usr/share/tasksel/descs/debian-tasks.↵
desc -sTask
Task: german
```

889 By this command, we discover the task is called, plainly enough, german.
Now to find the related tasks:

890

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

891 At boot time we will generate the `de`CH.UTF-8` locale and select the `ch` keyboard layout. Now let's put the pieces together. Recalling from [Using metapackages](#) that task metapackages are prefixed `task-`, we just specify these language boot parameters, then add standard priority packages and all our discovered task metapackages to our package list as follows:

892

```
$ mkdir live-gnome-ch
$ cd live-gnome-ch
$ lb config "
  --bootappend-live "boot=live components locales=de`CH.UTF-8 ↵
  keyboard-layouts=ch" "
  --debian-installer live
$ echo '! Packages Priority standard' & config/package-lists/↵
standard.list.chroot
$ echo task-gnome-desktop task-german task-german-desktop && ↵
config/package-lists/desktop.list.chroot
$ echo debian-installer-launcher && config/package-lists/installer↵
.list.chroot
```

Appendix

895	Style guide		
896	17. Style guide		
897	17.1 Guidelines for authors		
898	This section deals with some general considerations to be taken into account when writing technical documentation for live-manual. They are divided into linguistic features and recommended procedures.	standings but in general terms you should try to be coherent and before deciding on using British, American or any other English flavour at your discretion, please take a look at how other people write and try to imitate them.	
899	Note: Authors should first read Contributing to this document	Be balanced	907
900	17.1.1 Linguistic features	Do not be biased. Avoid including references to ideologies completely unrelated to live-manual. Technical writing should be as neutral as possible. It is in the very nature of scientific writing.	908
901	Use plain English	Be politically correct	909
902	Keep in mind that a high percentage of your readers are not native speakers of English. So as a general rule try to use short, meaningful sentences, followed by a full stop.	Try to avoid sexist language as much as possible. If you need to make references to the third person singular preferably use they rather than he or she or awkward inventions such as s/he, s(he) and the like.	910
903	This does not mean that you have to use a simplistic, naive style. It is a suggestion to try to avoid, as much as possible, complex subordinate sentences that make the text difficult to understand for non-native speakers of English.	Be concise	911
904	Variety of English	Go straight to the point and do not wander around aimlessly. Give as much information as necessary but do not give more information than necessary, this is to say, do not explain unnecessary details. Your readers are intelligent. Presume some previous knowledge on their part.	912
905	The most widely spread varieties of English are British and American so it is very likely that most authors will use either one or the other. In a collaborative environment, the ideal variety would be International English but it is very difficult, not to say impossible, to decide on which variety among all the existing ones, is the best to use.	Minimize translation work	913
906	We expect that different varieties may mix without creating misunder-	Keep in mind that whatever you write will have to be translated into several other languages. This implies that a number of people will have to do an extra work if you add useless or redundant information.	914
		Be coherent	915
		As suggested before, it is almost impossible to standardize a collaborative document into a perfectly unified whole. However, every effort on your side to write in a coherent way with the rest of the authors will be appreciated.	916
		Be cohesive	917

Use as many text-forming devices as necessary to make your text cohesive and unambiguous. (Text-forming devices are linguistic markers such as connectors).

Be descriptive

It is preferable to describe the point in one or several paragraphs than merely using a number of sentences in a typical changelog style. Describe it! Your readers will appreciate it.

Dictionary

Look up the meaning of words in a dictionary or encyclopedia if you do not know how to express certain concepts in English. But keep in mind that a dictionary can either be your best friend or can turn into your worst enemy if you do not know how to use it correctly.

English has the largest vocabulary that exists (with over one million words). Many of these words are borrowings from other languages. When looking up the meaning of words in a bilingual dictionary the tendency of a non-native speaker of English is to choose the one that sounds more similar in their mother tongue. This often turns into an excessively formal discourse which does not sound quite natural in English.

As a general rule, if a concept can be expressed using different synonyms, it is a good advice to choose the first word proposed by the dictionary. If in doubt, choosing words of Germanic origin (Usually monosyllabic words) is often the right thing to do. Be warned that these two techniques might produce a rather informal discourse but at least your choice of words will be of wide use and generally accepted.

Using a dictionary of collocations is recommended. They are extremely helpful when it comes to know which words usually occur together.

Again it is a good practice to learn from the work of others. Using a search engine to check how other authors use certain expressions may help a lot.

False friends, idioms and other idiomatic expressions

Watch out for false friends. No matter how proficient you are in a foreign language you cannot help falling from time to time in the trap of the so called false friends, words that look similar in two languages but whose meanings or uses might be completely different.

Try to avoid idioms as much as possible. Idioms are expressions that may convey a completely different meaning from what their individual words seem to mean. Sometimes, idioms might be difficult to understand even for native speakers of English!

Avoid slang, abbreviations, contractions...

Even though you are encouraged to use plain, everyday English, technical writing belongs to the formal register of the language.

Try to avoid slang, unusual abbreviations that are difficult to understand and above all contractions that try to imitate the spoken language. Not to mention typical irc and family friendly expressions.

17.1.2 Procedures

Test before write

It is important that authors test their examples before adding them to live-manual to ensure that everything works as described. Testing on a clean chroot or VM can be a good starting point. Besides, it would be ideal if the tests were then carried out on different machines with different hardware to spot possible problems that may arise.

Examples

When providing an example try to be as specific as you can. An example is, after all, just an example.

It is often better to use a line that only applies to a specific case than

using abstractions that may confuse your readers. In this case you can provide a brief explanation of the effects of the proposed example.

There may be some exceptions when the example suggests using some potentially dangerous commands that, if misused, may cause data loss or other similar undesirable effects. In this case you should provide a thorough explanation of the possible side effects.

External links

Links to external sites should only be used when the information on those sites is crucial when it comes to understanding a special point. Even so, try to use links to external sites as sparsely as possible. Internet links are likely to change from time to time resulting in broken links and leaving your arguments in an incomplete state.

Besides, people who read the manual offline will not have the chance to follow those links.

Avoid branding and things that violate the license under which the manual is published

Try to avoid branding as much as possible. Keep in mind that other downstream projects might make use of the documentation you write. So you are complicating things for them if you add certain specific material.

live-manual is licensed under the GNU GPL. This has a number of implications that apply to the distribution of the material (of any kind, including copyrighted graphics or logos) that is published with it.

Write a first draft, revise, edit, improve, redo if necessary

- Brainstorm!. You need to organize your ideas first in a logical sequence of events.

- Once you have somehow organized those ideas in your mind write a first draft.

- Revise grammar, syntax and spelling. Keep in mind that the proper names of the releases, such as trixie or sid , should not be capitalized when referred to as code names. In order to check the spelling you can run the spell target. i.e. make spell

- Improve your statements and redo any part if necessary.

Chapters

Use the conventional numbering system for chapters and subtitles. e.g. 1, 1.1, 1.1.1, 1.1.2 ... 1.2, 1.2.1, 1.2.2 ... 2, 2.1 ... and so on. See markup below.

If you have to enumerate a series of steps or stages in your description, you can also use ordinal numbers: First, second, third ... or First, Then, After that, Finally ... Alternatively you can use bulleted items.

Markup

And last but not least, live-manual uses [SiSU](#) to process the text files and produce a multiple format output. It is recommended to take a look at [SiSU's manual](#) to get familiar with its markup, or else type:

```
$ sisu --help markup
```

Here are some markup examples that may prove useful:

- For emphasis/bold text:

```
*-foo"* or !-foo"! 
```

produces: foo or foo . Use it to emphasize certain key words.

- For italics:


```
/-foo"/
```

974

produces: foo. Use them e.g. for the names of Debian packages.

- For monospace:

```
#-foo"#
```

produces: foo. Use it e.g. for the names of commands. And also to highlight some key words or things like paths.

- For code blocks:

```
code-
    $ foo
    # bar
"code
```

produces:

```
$ foo
# bar
```

Use code- to open and "code to close the tags. It is important to remember to leave a space at the beginning of each line of code.

17.2 Guidelines for translators

This section deals with some general considerations to be taken into account when translating the contents of live-manual.

As a general recommendation, translators should have read and understood the translation rules that apply to their specific languages. Usually, translation groups and mailing lists provide information on how to produce translated work that complies with Debian quality standards.

Note: Translators should also read [Contributing to this document](#). In particular the section [Translation](#)

17.2.1 Translation hints

Comments

The role of the translator is to convey as faithfully as possible the meaning of words, sentences, paragraphs and texts as written by the original authors into their target language.

So they should refrain from adding personal comments or extra bits of information of their own. If they want to add a comment for other translators working on the same documents, they can leave it in the space reserved for that. That is, the header of the strings in the po files preceded by a number sign # . Most graphical translation programs can automatically handle those types of comments.

TN, Translator's Note

It is perfectly acceptable however, to include a word or an expression in brackets in the translated text if, and only if, that makes the meaning of a difficult word or expression clearer to the reader. Inside the brackets the translator should make evident that the addition was theirs using the abbreviation TN or Translator's Note.

Impersonal sentences

Documents written in English make an extensive use of the impersonal form you. In some other languages that do not share this characteristic, this might give the false impression that the original texts are directly

addressing the reader when they are actually not doing so. Translators must be aware of that fact and reflect it in their language as accurately as possible.

False friends

The trap of false friends explained before especially applies to translators. Double check the meaning of suspicious false friends if in doubt.

Markup

Translators working initially with pot files and later on with po files will find many markup features in the strings. They can translate the text anyway, as long as it is translatable, but it is extremely important that they use exactly the same markup as the original English version.

Code blocks

Even though the code blocks are usually untranslatable, including them in the translation is the only way to score a 100% complete translation. And even though it means more work at first because it might require the intervention of the translators if the code changes, it is the best way, in the long run, to identify what has already been translated and what has not when checking the integrity of the .po files.

Newlines

The translated texts need to have the exact same newlines as the original texts. Be careful to press the Enter key or type `\n` if they appear in the original files. These newlines often appear, for instance, in the code blocks.

Make no mistake, this does not mean that the translated text needs to have the same length as the English version. That is nearly impossible.

Untranslatable strings

Translators should never translate:

- The code names of releases (which should be written in lowercase) 995
- The names of programs 996
- The commands given as examples 997
- Metadata (often between colons :metadata:) 998
- Links 999
- Paths 1000

SiSU Metadata, document information

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