

Linux from Scratch

AL GUSTO

THOMAS WALTER



Are you fed up with the quirks of your chosen Linux distribution? Are you worried that migrating to another will just make things worse? If you answer "yes" to both these questions then "Linux From Scratch" may be just what you're looking for.

Most experienced Linux users have gone through at least one "Distribution war" and many have actively taken part in them. The story is the same every time "Red Hat's linuxconf hates my xxx", "SuSE's YaST destroys configurations created manually" or Debian is unsuitable for beginners" and so on. These are just examples, of course, and not personal opinions, so please spare me the flames. But whether you agree or disagree with a particular point of view. The unavoidable fact is that no Linux distribution is perfect. For this very reason, in March 1999 a Linux expert called Gerard Beekmans started a project called "Linux From Scratch" (LFS) see <http://www.linuxfromscratch.org/> for more details. His aim was to write a HOWTO in which the construction of a Linux system is described from the ground up. Now justifiably referred to as a book, LFS is aimed at Linux users who want to find out more about the basic parts of their operating system and how these parts function in unison. And while another HOWTO, "From Power Up To Bash Prompt" (<http://www.netspace.net.au/~gok/power2bash/>) offers a description of the boot procedure and the construction of a minimal system, LFS tells you how to create a complete development system, including a compiler and all the requisite utilities.



Read the recipe book and collect your ingredients

Before we go any further, we must point out that for users who are just starting with Linux, especially

those who have only just decided to jump from the Microsoft camp, Linux From Scratch (LFS) is not a recommended option. For a start you'd find it extremely hard to understand what LFS requires you to do in order to set up a working system.

If, on the other hand, you are an experienced Linux user, you shouldn't have too much trouble understanding exactly what you need to do and why in order to get up and running. The construction of a complete functioning Linux system solely by compiling the requisite source code packages does require some knowledge of the fundamental Unix commands, *cp*, *mv*, *ls* and so on, but these should be tools you use on a daily basis. So, if you can keep a cool head when faced by phrases like "make is started with a parameter *LDLFLAGS=-static*" and can create and process text files with the editor of your own choice, then there is really nothing stopping you from leaving the world of commercial distributions and joining the LFS brigade.

beans on toast or 5 star hotel

The aim of the LFS book is the step by step installation of a complete development system including compiler and all other necessary programs. While the usual distributions force you to use one of their directory structures or boot scripts, and usually create their own standards too, with LFS you get the chance to construct a system according to your own wishes – although you simply stick to the suggestions made in the book, which by the way correspond where possible to the Filesystem Hierarchy Standard (FHS – see <http://www.pathname.com/fhs/>), you can always do your own thing at any point. A ready-made distribution serves as the basis for an

LFS installation, since creating a compiler without compilers would be a little hard to do. Which distribution is used or how old the installed version is doesn't really matter, but it is simpler, and also recommended, to use a distribution that is less than a year old.

The installation of an LFS system takes place in several stages:

- Stage 1 – This covers basic tasks such as creating a new partition, creating the file system etc. An absolutely minimal basic system is then produced which contains the static versions of all programs necessary for compiling.
- Stage 2 – The second stage is devoted to the installation of additional packages into a *chroot* (change root) environment, which form part of an orderly Linux system. In addition, the static programs already created in Stage 1 are replaced by dynamically linked versions.
- Stage 3 – Here the freshly installed system is finally configured, boot scripts are created and, using Lilo, can now be booted.

Am I done?

So, you now have a bootable system, and everything is configured. That's it, right? Actually, no. Admittedly, you can and should be very proud of your efforts but you'll soon find yourself missing all your favourite programs. Basic tips on the installation of major packages, such as the X-Window system, KDE, GNOME and Netscape, can be found at <http://archive.linuxfromscratch.org/lfs-hints/>, however. And if you need a particular source code package then Freshmeat (<http://freshmeat.net/>) should be able to help. Indeed, for source code in general this should be your search engine of choice.

If you encounter problems at any stage, help is always at hand via the very active LFS community. You can usually get help very quickly via one of the mailing lists (see box) or in the LFS IRC (see the web site for details).

Automation for dessert

A project that is very active at the moment is "Automated Linux From Scratch" (ALFS – <http://alfs.linuxfromscratch.org/>). The aim here is to create a program package that allows the automatic installation of LFS systems. At present an XML profile is being worked on that contains all the necessary structures for this task. A similar system in the form of a Makefile already exists. Amongst other things, ALFS will allow you to create a profile mimicking your favourite distribution, or to simultaneously set a system up on several networked computers. Most interesting of all, though, an automated installation profile is being worked on that will install a working Linux system that is 100% compatible with the Linux Standard Base (<http://www.linuxbase.org/>).

Each to his own

There's no getting away from the fact that installing an LFS system does require some hard work. And due to the fact that all packages have to be compiled, installing the system also takes a relatively long time. Indeed, some brave souls are installing LFS on very basic platforms, including non-i386 ones, where compilation can literally take days. Compiling glibc alone on the likes of an m68k platform fitted with 8MB RAM takes no less than 68 hours, for example.

Nevertheless, for those willing to stick with it, LFS offers many rewards, not least of which probably being more detailed knowledge of the Linux system that you ever imagined you'd want. And once the automatic installation development is finished LFS will start to attract a much wider audience, particularly administrators who don't need enormous distributions, want to optimise their system to their processor or because of security concerns want complete control of absolutely every facet of their operating system. ■

LFS Mailing lists

The mailing lists shown below serve as discussion forums on all LFS-relevant topics. Subscriptions are handled via e-mail sent to Istar@linuxfromscratch.org. To subscribe, simply send an e-mail with the Subject subscribe <list name>. Similarly, to be deleted from the list you need to use unsubscribe <list name> in the subject line.

The list names you can use are as follows

lfs-discuss: Discussions specifically relating to the LFS book

lfs-announce: Announcements of new more stable versions

lfs-config: Discussions on configuration problems with software from the LFS book

lfs-appsB>: For problems with software not dealt with in the book

alfs-discuss: Discussions on Automated LFS

alfs-docs: The ALFS Documentation project group

alfs-profile: Development of the ALFS-XML profile and the DTD

In addition, archives of previous mailing lists messages can be found at <http://archive.linuxfromscratch.org/mail-archives/>