



Chapter XIV

**Linux Systems as Network
Infrastructure Components**

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Linux™ has made a lot of noise in the media recently, but wide-scale corporate adoption has been cautious. This chapter introduces the reader to some of the reasons that Linux is going to play an important role as an Internet/network device in the coming years and why corporate technology strategists should consider it for their own environment. First, the term “Linux” is defined via a brief history lesson, and then examples of Linux deployment at each level of the OSI model are given. The reader will recognize the impetus for its rapid development and the explosive growth in its usage.

What is “Linux?”

By now, most everyone has heard something about Linux. Still it seems that there is some confusion concerning exactly what Linux is. Initially, in the early 1990s when Linux was being distributed around universities and research facilities, many scoffed at the idea that an operating system of any utility could be free, not to mention developed by a handful of individuals and students collaborating over the Internet. But Linus Torvalds’ Unix-like kernel for the Intel 80386 architecture was for real, as was his commitment to releasing the source code to this kernel under the GPL (GNU Public License-<http://www.gnu.org>) to make it available to all and prevent commercial exploitation of his work. The GPL is the brainchild of Richard Stallman, the leading advocate and longtime supporter of “free” software (free in the sense of license and distribution).

A kernel alone, however, is of little worth without an operating system around it, and this is where Richard Stallman's second major contribution to Linux occurs. The GNU (GNU is Not Unix) Project had been developing a Unix-like toolset for quite a while, including: a C compiler (gcc), make, emacs (an extensible editor), bison (an alternative to yacc), flex (as opposed to lex), and an entire suite of lesser tools, such as tar and many other system utilities. This body of software, coupled with networking code made available by/porting from the BSD (Berkeley Systems Development) codebase is what comprised early Linux distributions (the kernel together with an installation mechanism and a set of compiled system tools), and remains a major portion of what people refer to when they use the term "Linux" today.

Since the beginning, Linux has enjoyed a great deal of popularity because its open nature invites innovation and improvement, and this attracts highly-skilled contributors. A major contribution has been the porting of the kernel to architectures beyond the x86 family, including Alpha, PowerPC, SPARC and UltraSPARC, Motorola 68k, StrongARM, MIPS, and IBM S/390. In addition to these ports, a large number of distributions have come into existence, some aimed at certain platforms (for example, Yellow Dog Linux is specifically for the PowerPC platform), some targeting specific uses, such as server, router, embedded, or desktop, while yet others cater to given philosophical viewpoints. Debian GNU/Linux is an example of this last genre. It is available for a broad range of platforms and includes packages for servers and desktops, but is completely noncommercial, open and free; there are even several commercial distributions based upon it.

So, the term "Linux" as it is generally used encompasses quite a mixture of history, software, and philosophies: kernel support for various hardware platforms, the GNU toolset and other "free" GPL software, a variety of distribution package managers, and a growing number for commercial software packages. One common thread during its development is that Linux has grown up on the Internet with TCP/IP as its primary networking protocol, and as such, a great deal of networking functionality has been integrated directly into the Linux kernel. Just a short list of networking features in version 2.4 of the Linux kernel includes:

- packet filtering,
- QoS (Quality of Service) queuing mechanisms,
- IP masquerading and aliasing,
- NAT (Network Address Translation),
- packet switching,
- policy-based routing, and
- support for a wide variety of network interfaces.

Beyond the kernel, a great deal of work has been put into networking applications, such as web servers, and also into networking tools like dynamic routing daemons, network monitoring packages and packet sniffers. And because Linux has been networked from the start, many of these tools have achieved a high level of maturity, which is one reason why Linux is being deployed in more and more roles in the network. So, without further ado, let's roll up our sleeves and tour Linux

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