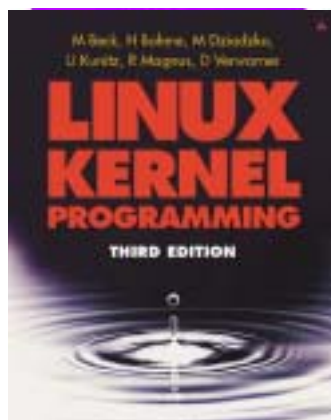# BOOKS

Reviewed by Martin Howse

Linux Kernel Programming Third Edition

Authors: M Beck et al
Publisher: Addison Wesley
ISBN: 0201719754
Price: £34.95

AN EXCELLENT OVERVIEW OF KERNEL INTERNALS SUCH AS MEMORY MANAGEMENT, INTERPROCESS COMMUNICATION AND NETWORKING

The first edition of this classic title included a 1.0.9 kernel on accompanying CD, along with several early distros such as LST for readers without Internet access. Much ground has been covered since then in terms of both functionality and popularity, and this new edition now includes 2.4.4 on CD, and full coverage of the latest version 2.4 kernel.

This is an essential reference work for anyone interested in writing kernel code or a kernel module, providing an excellent overview of kernel internals such as memory management, interprocess communication and networking. Device drivers are well covered with an excellent real world code example dealing with a PC loudspeaker driver. A good level of programming knowledge is obviously demanded as the code snippets and accompanying explanations are often quite concise. This is a boon for the more advanced reader who can cut straight to the heart of the matter with no extraneous padding. Some background to core concepts is included for programmers new to OS theory.

Linux Kernel Programming kicks off with an excellent overview of the kernel, detailing essential data structures and how they interact, main algorithms for process management, and implementation of system calls. This material is backed up with a lengthy appendix describing the implementation of all the system calls in the kernel; an excellent reference for all kernel hackers. The emphasis here is very much on the x86 architecture, but where a system call is simply not available for another architecture, this is made explicit. In chapters such as those dealing with memory management, more is made of the differences between hardware implementations. New features and changes in the latest kernel are also made explicit.

Subsequent chapters covering such topics as the Linux file system and Linux TCP/IP implementation are organised with beautiful simplicity, allowing the reader to easily reference important information. Each chapter is organised with a well written introductory overview section leading to more complex material and longer code snippets. The chapter covering network implementation is exemplary in its clarity and provides useful information which would be difficult to find elsewhere. Appendices provide a handy rundown of kernel-related commands, and kernel functions.

This is undoubtedly one of the greatest introductions to contemporary kernel programming available, and, though concise, is perhaps gentler on the reader than similar titles. If you're looking to gain a deeper understanding of kernel internals in order to get the most from your system or optimise your code, this title is well worth checking out.
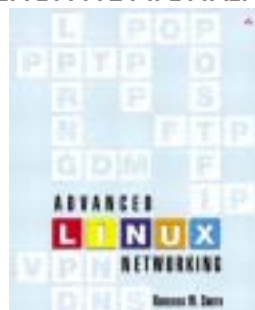
CLASSIC TITLE

Advanced Linux Networking

Author: Roderick W. Smith
Publisher: Addison Wesley
ISBN: 0201774232
Price: £37.99

MUCH-NEEDED BASIC TUTORIAL AND REFERENCE MATERIAL COVERING THE ESSENTIALS OF LINUX NETWORKING

With GNU/Linux much in evidence in hardcore networking scenarios, it makes sense to cram a good amount of serious networking information into one volume, without straying into coverage of desktop or coding issues. This book excels in providing much needed basic tutorial and reference material covering the essentials of Linux networking. Don't let the 'Advanced' in the title put you off; this is the stuff you really need to know if you plan on taking Linux further than a default server install.

From low-level kernel network configuration, through local network and internet services setup, to security and advanced router options, Advanced Linux Networking efficiently provides a complete rundown of all the complex issues involved in achieving a reliable networked service infrastructure. And along the way you'll learn plenty about related topics such as kernel compilation, backup and SysV startup scripts. Background material is kept to a useable minimum, with the emphasis very much on getting the job done efficiently using a range of command line tools and setup utilities. GUI tools such as Linuxconf are presented as options, and setting up and using Webmin is dealt with in good detail. There are plenty of useful examples and helpful tips accompanying the well written step-by-step tutorial material for each topic.

Chapters such as those covering remote GUI access using both X and VNC servers provide exactly the right level of detail with great clarity. And this is information which can often be very difficult to find elsewhere. More advanced topics, such as FreeS/WAN configuration for VPN functionality and running BIND in a chroot jail for greater security, are well covered with clear hands-on examples provided.

Even if you're only thinking of employing a few networked services, the tutorials and reference material will certainly save you both time and headaches. And, given the networked nature of many computing tasks today, this book would also serve as a useful introduction to GNU/Linux within a networked environment.

Professional Open Source Web Services

Authors: Dietrich Ayala et al
Publisher: Wrox
ISBN: 1861007469
Price: £36.99

BOTH SOAP AND XML-RPC ALLOW FOR PLATFORM-NEUTRAL DATA TRANSPORT USING STANDARD WEB PROTOCOLS

In simple terms, Web Services are application components which interact with each other using ubiquitous protocols. Web Services allow for loosely coupled distributed applications, exposing enterprise business functionality

as a software service. SOAP (Simple Object Access Protocol) and XML-RPC (an RPC protocol based on XML) are the two main dialects of Web Services. Both allow for platform-neutral data transport using standard web protocols and, along with UDDI (Universal Description, Discovery and Integration) and WSDL (Web Services Description Language), are the key components of any serious Web Services architecture.

Given the emphasis on inter-operability, open source products are a natural choice for Web Services. This book provides a comprehensive theoretical and practical introduction to the vast array of Web Service components and open source solutions available. How such components fit together in often complex web server architectures is well covered with clear diagrams and real-world case studies. There are plenty of clearly commented code examples covering a wide range of SOAP and XML-RPC implementations in various languages. Apache Axis is a mature SOAP toolkit which is Java-based and can thus be deployed using Tomcat. Tomcat configuration is dealt with in a useful appendix. Heavily code-based tutorials cover simple service deployment and more advanced WSDD (Web Service Deployment Descriptor) and WSDL customisations. The level of detail here is excellent, with good coverage of EJB (Enterprise Java Beans) Web Services deployment using JBoss, Tomcat and Axis. The same level of detail and clear navigation through often complex territory is also offered to those more interested in developing Web Services using languages such as Perl, Python, PHP and C++. SOAP::Lite, ZSI, NuSOAP and gSOAP are just some of the technologies up for grabs, and clear examples demonstrate the appropriate programming techniques.

Professional Open Source Web Services really does form a complete package for those seeking to get down and dirty with some serious Web Services. A vast array of implementations is concisely covered, with attention where necessary to security and installation issues backed up with useful case studies.

Linux Cluster Architecture

SOLID LEARNING EXPERIENCE FOR THOSE SEEKING AN INTRODUCTION TO DISTRIBUTED SYSTEMS ARCHITECTURE

Distributed computing using Pile-of-PC (POPC) clusters has been a pretty hot topic for a good while now, but there is still precious little in-depth material available for those seeking to configure and build such systems. This book aims to cover the hardware, software and OS issues involved in setting up usable distributed systems.

A good working knowledge of C programming and an exposure to Linux, interprocess communication (IPC) and networking are assumed. Code examples illustrating and teaching core concepts are presented from the word go. The focus of Linux Cluster Architecture is the design and implementation of a master-slave concurrent server architecture. Basic hardware and OS setup and configuration for a small POPC cluster is covered, and code examples and background theory deal with coding skills and techniques such as IPC which are used to develop cluster system software for a wide range of tasks.

Building on this solid foundation and with a small cluster now up and running, the design of the master-slave architecture is examined in detail, with longer code snippets and good coverage of performance measurement and analysis issues. Again the emphasis is very much on raw code with helpful comments. The examples and cluster software were coded and tested on a 2.0.30 kernel, so mileage with more recent kernels may vary. Although this book concentrates on the coding and design of a distributed transaction server system, much of the material is useful within a range of distributed settings. Pointers to further material covering supercomputer applications and peer-to-peer networking are included.

Linux Cluster Architecture does a good job of providing a solid learning experience for those seeking an introduction to distributed systems architecture. However, given the high level of skills and knowledge demanded by some of the exercises here, much of the material appears to be far too basic to be helpful to the more advanced user. A more detailed introduction to important packages like MPI and PVM would be of far greater use than the rehashing of basic IPC coding skills found here.

802.11 Wireless Networks

STRESSES OPEN SOURCE SOLUTIONS, SIMPLY BECAUSE THEY AVOID PROPRIETARY LOCK-IN AND ALLOW FOR THE EMERGENCE OF STANDARDS ACROSS THE BOARD

In common with other new and rapidly evolving technologies, 802.11 wireless networking can be difficult to get to grips with for those new to the territory. The number of acronyms can be overwhelming, and it is difficult to see through the hype to underlying issues and principles. However, thanks to this exhaustive work, serious system or network administrators can set about wireless network deployment with the confidence that they have a clear understanding of the underlying protocols and limitations of the current 802.11 implementations.

While other books do an adequate job of explaining how to configure and set up access points and wireless cards, 802.11 Wireless Networks completely unpacks the complex 802.11 protocols from a theoretical point of view and lays the foundations for a clearer understanding of practical issues such as security. Sure, you'll learn how to configure wireless cards under Linux, Windows and OS X systems and how to set up common access points such as the AP-1000, but you'll also gain the confidence to design and deploy large scale wireless networks. Much of the material is bang up to date, with glances forward to the new 802.11a and 802.11g 54Mbits/sec standards. The latest security issues concerning WEP and 802.1x are very much to the fore.

Though not specifically geared towards a free software approach to wireless networking, 802.11 Wireless Networks does stress open source solutions, simply because they avoid proprietary lock-in and allow for the emergence of standards across the board. Building Linux-based access points is briefly covered, and there is excellent material detailing network analysis using open source tools such as Ethereal. 802.11 Wireless Networks runs the whole gamut of wireless, from 802.11 framing, through physical layers such as DSSS, to hardware issues such as antenna. It's highly readable and stimulating, bringing to life tricky issues with great clarity. Complex protocols and data framing issues begin to make sense given the demanding physical constraints of wireless networking.