



TCP/IP AND NFS™

Internetworking in
a UNIX™ Environment

Michael Santifaller

© 1991 Addison-Wesley (Deutschland) GmbH.

Translated from the German edition *TCP/IP und NFS in Theorie und Praxis : UNIX in lokalen Netzen*.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without prior written permission of the publisher.

The programs in this book have been included for their instructional value. They have been tested with care but are not guaranteed for any particular purpose. The publisher does not offer any warranties or representations, nor does it accept any liabilities with respect to the programs.

Many of the designations used by manufacturers and sellers to distinguish their products are claimed as trademarks. Addison-Wesley has made every attempt to supply trademark information about manufacturers and their products mentioned in this book. A list of the trademark designations and their owners appears on p. (x).

Cover designed by Chris Eley and
printed by The Riverside Printing Co. (Reading) Ltd.
Printed in Great Britain by Mackays of Chatham plc, Chatham, Kent.

First printed 1991. Reprinted 1991.

British Library Cataloguing in Publication Data

Santifaller, Michael

TCP/IP and NFS internetworking in a UNIX environment.

1. Computers. Networks

I. Title II. [TCP/IP und NFS in Theorie und Praxis].

English

004.6

ISBN 0-201-54432-6

Library of Congress Cataloging-in-Publication Data

Santifaller, Michael.

[TCP/IP und NFS in Theorie und Praxis. English]

TCP/IP and NFS : internetworking in a UNIX environment / Michael

Santifaller ; translated by Stephen S. Wilson.

p. cm.

Translation of: TCP/IP und NFS in Theorie und Praxis.

Includes bibliographical references and index.

ISBN 0-201-54432-6

1. Local area networks (Computer networks) 2. UNIX (Computer operating system) I. Title.

TK5105.7.S27 1991

004.6'8--dc20

90-26268

Contents

Preface	v
Introduction	1
1 Protocols	5
Why do we need protocols?	6
The Open Systems Interconnection reference model	6
Tasks of a protocol	8
Connection-oriented and connectionless protocols	9
2 Genesis of the TCP/IP architecture	11
The beginnings of ARPANET	12
Goals of the TCP/IP architecture	13
Comparison of OSI and TCP/IP architecture	14
Importance of the Berkeley UNIX implementation	15
3 TCP/IP – layers 1 to 4	17
General specifications	19
Internet Protocol	19
Transmission Control Protocol	30
User Datagram Protocol	42
Internet Control Message Protocol	44
Ethernet and IEEE 802.3	47

viii Contents

	Serial Line IP	53
	X.25	54
4	TCP/IP – layers 5 to 7	55
	TELNET	56
	File Transfer Protocol	61
	Simple Mail Transfer Protocol	64
	Trivial File Transfer Protocol	66
5	Berkeley r-utilities	69
	<i>\$HOME/.rhosts</i> and <i>/etc/hosts.equiv</i>	70
	<i>rlogin</i>	72
	<i>rsh</i>	73
	<i>rcp</i>	74
	<i>ruptime</i> and <i>rwho</i>	76
	<i>rexec</i>	77
6	TCP/IP administration	79
	Loopback driver	80
	Configuration files in <i>/etc</i>	81
	<i>hostname</i>	82
	<i>netstat</i>	83
	<i>ifconfig</i>	90
	<i>arp</i>	91
	<i>ping</i>	91
	<i>trpt</i>	93
	<i>inetd</i>	93
7	Internetworking	97
	Gateways, bridges and routers	98
	Routing	100
	Domain Name Service	104
	Network management	108

8	Introduction to NFS	111
	Presentation of the NFS technology	112
	Steps to network integration	115
	Alternatives to NFS	117
9	NFS protocols	121
	Classification of NFS protocols	122
	Remote Procedure Call	123
	External Data Representation	129
	Port mapper	132
	Network File System protocol	135
	MOUNT protocol	150
	Network Information Service	152
10	Implementation of NFS	157
	NFS software packages	158
	Implementation of NFS under UNIX	159
	Mounting NFS file systems	166
	Diagnosis of RPC and NFS problems	174
	Lock manager	176
	Network Information Service	181
	NFS-based services	192
	NFS specialities	195
	NFS start-up, operation and management	197
	Remote file system organization	199
11	Programmer interfaces	201
	Socket interface	202
	TLI and XTI	205
	RPC/XDR programming	206
	Glossary	213

Explore Litigation Insights

Docket Alarm provides insights to develop a more informed litigation strategy and the peace of mind of knowing you're on top of things.

Real-Time Litigation Alerts



Keep your litigation team up-to-date with **real-time alerts** and advanced team management tools built for the enterprise, all while greatly reducing PACER spend.

Our comprehensive service means we can handle Federal, State, and Administrative courts across the country.

Advanced Docket Research



With over 230 million records, Docket Alarm's cloud-native docket research platform finds what other services can't. Coverage includes Federal, State, plus PTAB, TTAB, ITC and NLRB decisions, all in one place.

Identify arguments that have been successful in the past with full text, pinpoint searching. Link to case law cited within any court document via Fastcase.

Analytics At Your Fingertips



Learn what happened the last time a particular judge, opposing counsel or company faced cases similar to yours.

Advanced out-of-the-box PTAB and TTAB analytics are always at your fingertips.

API

Docket Alarm offers a powerful API (application programming interface) to developers that want to integrate case filings into their apps.

LAW FIRMS

Build custom dashboards for your attorneys and clients with live data direct from the court.

Automate many repetitive legal tasks like conflict checks, document management, and marketing.

FINANCIAL INSTITUTIONS

Litigation and bankruptcy checks for companies and debtors.

E-DISCOVERY AND LEGAL VENDORS

Sync your system to PACER to automate legal marketing.