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Mastering

Networks

William J. Buchanan, BSc (Hons.), CEng, PhD

Senior Lecturer

School of Computing

Napier University

Edinburgh

Series Editor

William Buchanan, BSc (Hons.), CEng, PhD

MACMILLAN

This book is dedicated to the music of Neil Young, REM and Runrig, which has kept me going through the long nights of book writing.

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Preface

Computer networks are a crucial part of many organisations and many users now even have a network connection in their own home. Without networks there would be no Electronic Mail, no Internet access and no Networked Applications. It is one of the fastest moving technologies areas and brings benefits to virtually every country in the world. With the interconnection of networks to the Internet, the world has truly become a Global Village. For many people, especially children, the first place to search for a given topic is the World Wide Web (WWW).

Who would believe the pace of technology over ten short years, such as:

- From networks of tens of computers operating at speeds of a thousands of bits per second to networks with thousands of computers operating at billions of bits per second.
- From organisations which passed paper documents back and forward, to totally paperless organisations.
- From people who sent one letter each month to people who send tens of electronic mails every day?
- From sending letters around the world which would take days or weeks to be arrive to the transmission of information around the world within a second.
- From businesses who relied on central operations to ones that can be distributed around the world, but can communicate as if they were next door.
- From the transmission of message which could be viewed by people and organisation which were not meant to the read the message, to the transmission of messages can only be read by the intended destination (and maybe, space aliens).
- From written signatures that can be easily forged, to digital signatures which are almost impossible to forge, and not only authenticate the sender but also all of the contents of a message.

The number of applications of networks increases by the day, they include:

- Electronic Mail.
- Video Conferencing.
- Downloading Hardware Drivers.
- Distributing Information.
- Multimedia Education.
- Remote Access.
- Application Software Downloads.
- Client/server Processing.
- News Groups.
- Product Information.
- Remote Control/Transmission of Data.
- Chat Programs.
- Daily News Events.
- Information Archives.
- On-line Libraries.
- Electronic Commerce.
- Search Facilities.
- WWW Surfing.
- Sampling Material.

- Centralised Configuration.
- Centralised Software Licence Control.
- Distributed/Centralised Printer/File Facilities.
- Networked Peripherals.
- Source Code Download.
- Direct Access to Experts.
- Special Interest Groups.
- On-line Help.
- Software Registration.
- Distributed Databases.
- Bulletin Boards.
- Internet Telephone.
- Archived/Off-line Conferencing.
- Distributed Databases.
- Digital TV/Hi-fi.

The amount of transmitted information over networks increases by a large factor every year (over the Internet, traffic doubles every 100 days), and the demand for bandwidth seems unlimited. Unfortunately there are many different types of networks, from low-speed single computer connections, to high-speed multiple computer networks. There are also many different types of computer systems, there are different protocols, and so on. It is an exciting area, but also a difficult area to keep up-to-date with. Thus, the main aim of this book is to cover many of the important networking areas, from networking technologies to data encryption. It splits into ten main areas, these are:

1. **Networking Technologies.** Network Topologies, Ethernet (including Fast and Gigabit Ethernet), Token Ring, FDDI, ATM, ISDN and Example MANs.
2. **Networking Protocols.** TCP/IP, ICMP, DNS, ARP, Bootp, IP multicasting, UDP, WinSock, IP Version 6, SPX/IPX and HTTP.
3. **Sockets.** C++/Java/Visual Basic implementation.
4. **World Wide Web.** HTTP, Client/server architecture, Web browsers, Internet resources, URLs, URI, Web browser design, SSL, S-HTTP, Content advisor, Security zones, Microsoft Wallet and Profile assistant.
5. **Network Security/Intranets.** Proxy servers, Firewalls, Filtering routers, Passwords, Extranets, Hacking methods, Hacker problems and Hardware security.
6. **Data Encryption Principles.** Cryptography, Legal issues, Cracking the code, Message hash, Private-Key Encryption, Public-key Encryption, RSA, PGP, Sample PGP encryption.
7. **Authentication.** Shared secret-key authentication, Diffie-Hellman key exchange, Key distribution centre, Digital signatures and PGP authentication.
8. **Electronic Mail.** Architecture, Email addresses, SMTP, X.400 and MIME.
9. **Viruses.** Virus types, Anti-virus programs, Trojan horses, Polymorphic viruses, Stealth viruses, Slow viruses, Retro viruses, Worms and Macro viruses.
10. **Appendices.** Extensive Glossary and Abbreviations, HDLC and RFC listings.

The Macmillan Mastering IT and Computing series is expanding rapidly and this book is another key foundation book in the whole series. Others include:

- Mastering Microsoft Windows, Novell NetWare and UNIX.
- Mastering Java.
- Mastering Pascal and Delphi.
- Mastering Visual Basic.

- Mastering C++.
- Mastering Microsoft Office.
- Mastering Database Design.
- Mastering Structured Analysis and Design.
- Mastering the Internet.
- Mastering Global Information Systems.

Further information can be found on one of the following WWW pages:

<http://www.dcs.napier.ac.uk/~bill/books.html>
http://www.eece.napier.ac.uk/~bill_b/books.html

Help from myself can be sought using one of the following email addresses:

w.buchanan@napier.ac.uk
bill@dcsc.napier.ac.uk

Finally, I would personally like to thank Suzannah Tipple, Isobel Munday and Christopher Glennie at Macmillan for their hard work and their continued support for the Mastering IT and Computing series. Also, I would like to thank my family, Julie, Billy, Jamie and David for their love and understanding.

Dr. William Buchanan

Series Editor,
IT and Computing, Macmillan.

Senior Lecturer,
School of Computing, Napier University.