
THE INTERNET ENCYCLOPEDIA

Volume 1
A-F

Hossein Bidgoli
Editor-in-Chief
California State University
Bakersfield, California



John Wiley & Sons, Inc.

THE INTERNET ENCYCLOPEDIA

Volume 1
A-F

Hossein Bidgoli
Editor-in-Chief
California State University
Bakersfield, California



WILEY

John Wiley & Sons, Inc.

This book is printed on acid-free paper. ☺

Copyright © 2004 by John Wiley & Sons, Inc. All rights reserved.

Published by John Wiley & Sons, Inc., Hoboken, New Jersey.

Published simultaneously in Canada.

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, scanning, or otherwise, except as permitted under Section 107 or 108 of the 1976 United States Copyright Act, without either the prior written permission of the Publisher, or authorization through payment of the appropriate per-copy fee to the Copyright Clearance Center, Inc., 222 Rosewood Drive, Danvers, MA 01923, (978) 750-8400, fax (978) 750-4470, or on the web at www.copyright.com. Requests to the Publisher for permission should be addressed to the Permissions Department, John Wiley & Sons, Inc., 111 River Street, Hoboken, NJ 07030, (201) 748-6011, fax (201) 748-6008, e-mail: permcoordinator@wiley.com.

Limit of Liability/Disclaimer of Warranty: While the publisher and author have used their best efforts in preparing this book, they make no representations or warranties with respect to the accuracy or completeness of the contents of this book and specifically disclaim any implied warranties of merchantability or fitness for a particular purpose. No warranty may be created or extended by sales representatives or written sales materials. The advice and strategies contained herein may not be suitable for your situation. The publisher is not engaged in rendering professional services, and you should consult a professional where appropriate. Neither the publisher nor author shall be liable for any loss of profit or any other commercial damages, including but not limited to special, incidental, consequential, or other damages.

For general information on our other products and services please contact our Customer Care Department within the U.S. at (800) 762-2974, outside the United States at (317) 572-3993 or fax (317) 572-4002.

Wiley also publishes its books in a variety of electronic formats. Some content that appears in print may not be available in electronic books. For more information about Wiley products, visit our web site at www.Wiley.com.

Library of Congress Cataloging-in-Publication Data:

The Internet encyclopedia / edited by Hossein Bidgoli.

p. cm.

Includes bibliographical references and index.

ISBN 0-471-22202-X (CLOTH VOL 1 : alk. paper) – ISBN 0-471-22204-6

(CLOTH VOL 2 : alk. paper) – ISBN 0-471-22203-8 (CLOTH VOL 3 : alk.

paper) – ISBN 0-471-22201-1 (CLOTH SET : alk. paper)

1. Internet–Encyclopedias. I. Bidgoli, Hossein.

TK5105.875.I57I5466 2003

004.67'8'03–dc21

2002155552

Printed in the United States of America

10 9 8 7 6 5 4 3 2 1

To so many fine memories of my brother, Mohsen, for his
uncompromising belief in the power of education.

About the Editor-in-Chief

Hossein Bidgoli, Ph.D., is Professor of Management Information Systems at California State University. Dr. Bidgoli helped set up the first PC lab in the United States. He is the author of 43 textbooks, 27 manuals, and over four dozen technical articles and papers on various aspects of computer applications, e-commerce, and

information systems, which have been published and presented throughout the world. Dr. Bidgoli also serves as the editor-in-chief of *Encyclopedia of Information Systems*.

Dr. Bidgoli was selected as the California State University, Bakersfield's 2001–2002 Professor of the Year.

Editorial Board

Eric T. Bradlow
The Wharton School of the University of
Pennsylvania

Kai Cheng
Leeds Metropolitan University,
United Kingdom

Mary J. Cronin
Boston College

James E. Goldman
Purdue University

Marilyn Greenstein
Arizona State University West

Varun Grover
University of South Carolina

Ephraim R. McLean
Georgia State University, Atlanta

David E. Monarchi
University of Colorado, Boulder

Raymond R. Panko
University of Hawaii at Manoa

Norman M. Sadeh
Carnegie Mellon University

Judith C. Simon
The University of Memphis

Vasja Vehovar
University of Ljubljana, Slovenia

Russell S. Winer
New York University

Contents

Chapter List by Subject Area	xii	Click-and-Brick Electronic Commerce	185
Contributors	xv	<i>Charles Steinfield</i>	
Preface	xxiii	Client/Server Computing	194
Guide to the Internet Encyclopedia	xxvi	<i>Daniel J. McFarland</i>	
Volume 1			
Active Server Pages	1	Common Gateway Interface (CGI) Scripts	218
<i>J. Christopher Sandvig</i>		<i>Stan Kurkovsky</i>	
ActiveX	11	Computer Literacy	229
<i>Roman Erenshteyn</i>		<i>Hossein Bidgoli</i>	
ActiveX Data Objects (ADO)	25	Computer Security Incident Response Teams (CSIRTs)	242
<i>Bhushan Kapoor</i>		<i>Raymond R. Panko</i>	
Application Service Providers (ASPs)	36	Computer Viruses and Worms	248
<i>H.-Arno Jacobsen</i>		<i>Robert Slade</i>	
Authentication	48	Conducted Communications Media	261
<i>Patrick McDaniel</i>		<i>Thomas L. Pigg</i>	
Benchmarking Internet	57	Consumer Behavior	272
<i>Vasja Vehovar and Vesna Dolnicar</i>		<i>Mary Finley Wolfinbarger and Mary C. Gilly</i>	
Biometric Authentication	72	Consumer-Oriented Electronic Commerce	284
<i>James. L. Wayman</i>		<i>Henry Chan</i>	
Bluetooth™—A Wireless Personal Area Network	84	Convergence of Data, Sound, and Video	294
<i>Brent A. Miller</i>		<i>Gary J. Krug</i>	
Business Plans for E-commerce Projects	96	Copyright Law	303
<i>Amy W. Ray</i>		<i>Gerald R. Ferrera</i>	
Business-to-Business (B2B) Electronic Commerce	106	Customer Relationship Management on the Web	315
<i>Julian J. Ray</i>		<i>Russell S. Winer</i>	
Business-to-Business (B2B) Internet Business Models	120	Cybercrime and Cyberfraud	326
<i>Dat-Dao Nguyen</i>		<i>Camille Chin</i>	
Business-to-Consumer (B2C) Internet Business Models	129	Cyberlaw: The Major Areas, Development, and Provisions	337
<i>Diane M. Hamilton</i>		<i>Dennis M. Powers</i>	
Capacity Planning for Web Services	139	Cyberterrorism	353
<i>Robert Oshana</i>		<i>Charles W. Jaeger</i>	
Cascading Style Sheets (CSS)	152	Databases on the Web	373
<i>Fred Condo</i>		<i>A. Neil Yerkey</i>	
C/C++	164	Data Compression	384
<i>Mario Giannini</i>		<i>Chang-Su Kim and C.-C. Jay Kuo</i>	
Circuit, Message, and Packet Switching	176	Data Mining in E-commerce	400
<i>Robert H. Greenfield</i>		<i>Sviatoslav Braynov</i>	

Data Warehousing and Data Marts <i>Chuck Kelley</i>	412	Encryption <i>Ari Juels</i>	686
Denial of Service Attacks <i>E. Eugene Schultz</i>	424	Enhanced TV <i>Jim Krause</i>	695
Developing Nations <i>Nanette S. Levinson</i>	434	Enterprise Resource Planning (ERP) <i>Zinovy Radovilsky</i>	707
DHTML (Dynamic HyperText Markup Language) <i>Craig D. Knuckles</i>	444	E-systems for the Support of Manufacturing Operations <i>Robert H. Lawson</i>	718
Digital Communication <i>Robert W. Heath Jr., and Atul A. Salvekar</i>	457	Extensible Markup Language (XML) <i>Rich Dorfman</i>	732
Digital Divide <i>Jaime J. Dávila</i>	468	Extensible Stylesheet Language (XSL) <i>Jesse M. Heines</i>	755
Digital Economy <i>Nirvikar Singh</i>	477	Extranets <i>Stephen W. Thorpe</i>	793
Digital Identity <i>Drummond Reed and Jerry Kindall</i>	493	Feasibility of Global E-business Projects <i>Peter Raven and C. Patrick Fleenor</i>	803
Digital Libraries <i>Cavan McCarthy</i>	505	File Types <i>Jennifer Lagier</i>	819
Digital Signatures and Electronic Signatures <i>Raymond R. Panko</i>	526	Firewalls <i>James E. Goldman</i>	831
Disaster Recovery Planning <i>Marco Cremonini and Pierangela Samarati</i>	535	Fuzzy Logic <i>Yan-Qing Zhang</i>	841
Distance Learning (Virtual Learning) <i>Chris Dede, Tara Brown-L'Bahy, Diane Ketelhut, and Pamela Whitehouse</i>	549	Volume 2	
Downloading from the Internet <i>Kuber Maharjan</i>	561	Game Design: Games for the World Wide Web <i>Bruce R. Maxim</i>	1
E-business ROI Simulations <i>Edwin E. Lewis</i>	577	Gender and Internet Usage <i>Ruby Roy Dholakia, Nikhilesh Dholakia, and Nir Kshetri</i>	12
E-government <i>Shannon Schelin and G. David Garson</i>	590	Geographic Information Systems (GIS) and the Internet <i>Haluk Cetin</i>	23
Electronic Commerce and Electronic Business <i>Charles Steinfield</i>	601	Global Diffusion of the Internet <i>Nikhilesh Dholakia, Ruby Roy Dholakia, and Nir Kshetri</i>	38
Electronic Data Interchange (EDI) <i>Matthew K. McGowan</i>	613	Global Issues <i>Babita Gupta</i>	52
Electronic Funds Transfer <i>Roger Gate and Alec Nacamuli</i>	624	Groupware <i>Pierre A. Balthazard and Richard E. Potter</i>	65
Electronic Payment <i>Donal O'Mahony</i>	635	Guidelines for a Comprehensive Security System <i>Margarita Maria Lenk</i>	76
Electronic Procurement <i>Robert H. Goffman</i>	645	Health Insurance and Managed Care <i>Etienne E. Pracht</i>	89
E-mail and Instant Messaging <i>Jim Grubbs</i>	660	Health Issues <i>David Lukoff and Jayne Gackenbach</i>	104
E-marketplaces <i>Paul R. Prabhaker</i>	671	History of the Internet <i>John Sherry and Colleen Brown</i>	114

HTML/XHTML (HyperText Markup Language/Extensible HyperText Markup Language)	124	Java	379
<i>Mark Michael</i>		<i>Judith C. Simon and Charles J. Campbell</i>	
Human Factors and Ergonomics	141	JavaBeans and Software Architecture	388
<i>Robert W. Proctor and Kim-Phuong L. Vu</i>		<i>Nenad Medvidovic and Nikunj R. Mehta</i>	
Human Resources Management	150	JavaScript	401
<i>Dianna L. Stone, Eduardo Salas, and Linda C. Isenhour</i>		<i>Constantine Roussos</i>	
Information Quality in Internet and E-business Environments	163	JavaServer Pages (JSP)	415
<i>Larry P. English</i>		<i>Frederick Pratter</i>	
Integrated Services Digital Network (ISDN): Narrowband and Broadband Services and Applications	180	Knowledge Management	431
<i>John S. Thompson</i>		<i>Ronald R. Tidd</i>	
Intelligent Agents	192	Law Enforcement	443
<i>Daniel Dajun Zeng and Mark E. Nissen</i>		<i>Robert Vaughn and Judith C. Simon</i>	
Interactive Multimedia on the Web	204	Law Firms	457
<i>Borko Furht and Oge Marques</i>		<i>Victoria S. Dennis and Judith C. Simon</i>	
International Cyberlaw	216	Legal, Social, and Ethical Issues	464
<i>Julia Alpert Gladstone</i>		<i>Kenneth Einar Himma</i>	
International Supply Chain Management	233	Library Management	477
<i>Gary LaPoint and Scott Webster</i>		<i>Clara L. Sitter</i>	
Internet Architecture	244	Linux Operating System	486
<i>Graham Knight</i>		<i>Charles Abzug</i>	
Internet Censorship	264	Load Balancing on the Internet	499
<i>Julie Hersberger</i>		<i>Jianbin Wei, Cheng-Zhong Xu, and Xiaobo Zhou</i>	
Internet Etiquette (Netiquette)	274	Local Area Networks	515
<i>Joseph M. Kayany</i>		<i>Wayne C. Summers</i>	
Internet Literacy	286	Machine Learning and Data Mining on the Web	527
<i>Hossein Bidgoli</i>		<i>Qiang Yang</i>	
Internet Navigation (Basics, Services, and Portals)	298	Managing a Network Environment	537
<i>Pratap Reddy</i>		<i>Haniph A. Latchman and Jordan Walters</i>	
Internet Relay Chat (IRC)	311	Managing the Flow of Materials Across the Supply Chain	551
<i>Paul L. Witt</i>		<i>Matthias Holweg and Nick Rich</i>	
Internet Security Standards	320	Marketing Communication Strategies	562
<i>Raymond R. Panko</i>		<i>Judy Strauss</i>	
Internet2	334	Marketing Plans for E-commerce Projects	574
<i>Linda S. Bruenjes, Carolyn J. Siccama, and John LeBaron</i>		<i>Malu Roldan</i>	
Intranets	346	Medical Care Delivery	586
<i>William T. Schiano</i>		<i>Steven D. Schwaitzberg</i>	
Intrusion Detection Techniques	355	Middleware	603
<i>Peng Ning and Sushil Jajodia</i>		<i>Robert Simon</i>	
Inventory Management	368	Mobile Commerce	614
<i>Janice E. Carrillo, Michael A. Carrillo, and Anand Paul</i>		<i>Mary J. Cronin</i>	
		Mobile Devices and Protocols	627
		<i>Julie R. Mariga and Benjamin R. Pobanz</i>	
		Mobile Operating Systems and Applications	635
		<i>Julie R. Mariga</i>	

Multimedia	642	Politics	84
<i>Joey Bargsten</i>		<i>Paul Gronke</i>	
Multiplexing	664	Privacy Law	96
<i>Dave Whitmore</i>		<i>Ray Everett-Church</i>	
Nonprofit Organizations	675	Propagation Characteristics of Wireless Channels	124
<i>Dale Nesbary</i>		<i>P. M. Shankar</i>	
Online Analytical Processing (OLAP)	685	Prototyping	135
<i>Joseph Morabito and Edward A. Stohr</i>		<i>Eric H. Nyberg</i>	
Online Auctions	699	Public Accounting Firms	145
<i>Gary C. Anders</i>		<i>C. Janie Chang and Annette Nellen</i>	
Online Auction Site Management	709	Public Key Infrastructure (PKI)	156
<i>Peter R. Wurman</i>		<i>Russ Housley</i>	
Online Banking and Beyond: Internet-Related Offerings from U.S. Banks	720	Public Networks	166
<i>Siaw-Peng Wan</i>		<i>Dale R. Thompson and Amy W. Apon</i>	
Online Communities	733	Radio Frequency and Wireless Communications	177
<i>Lee Sproull</i>		<i>Okechukwu C. Ugweje</i>	
Online Dispute Resolution	745	Real Estate	192
<i>Alan Gaitenby</i>		<i>Ashok Deo Bardhan and Dwight Jaffee</i>	
Online News Services (Online Journalism)	755	Research on the Internet	201
<i>Bruce Garrison</i>		<i>Paul S. Piper</i>	
Online Public Relations	769	Return on Investment Analysis for E-business Projects	211
<i>Kirk Hallahan</i>		<i>Mark Jeffery</i>	
Online Publishing	784	Risk Management in Internet-Based Software Projects	229
<i>Randy M. Brooks</i>		<i>Roy C. Schmidt</i>	
Online Religion	798	Rule-Based and Expert Systems	237
<i>T. Matthew Ciolek</i>		<i>Robert J. Schalkoff</i>	
Online Stalking	812	Secure Electronic Transactions (SET)	247
<i>David J. Loundy</i>		<i>Mark S. Merkow</i>	
Open Source Development and Licensing	819	Secure Sockets Layer (SSL)	261
<i>Steven J. Henry</i>		<i>Robert J. Boncella</i>	
Organizational Impact	832	Securities Trading on the Internet	274
<i>John A. Mendonca</i>		<i>Marcia H. Flicker</i>	
Volume 3		Software Design and Implementation in the Web Environment	286
Passwords	1	<i>Jeff Offutt</i>	
<i>Jeremy Rasmussen</i>		Software Piracy	297
Patent Law	14	<i>Robert K. Moniot</i>	
<i>Gerald Bluhm</i>		Speech and Audio Compression	307
Peer-to-Peer Systems	25	<i>Peter Kroon</i>	
<i>L. Jean Camp</i>		Standards and Protocols in Data Communications	320
Perl	34	<i>David E. Cook</i>	
<i>David Stotts</i>		Storage Area Networks (SANs)	329
Personalization and Customization Technologies	51	<i>Vladimir V. Riabov</i>	
<i>Sviatoslav Braynov</i>			
Physical Security	64		
<i>Mark Michael</i>			

Strategic Alliances <i>Patricia Adams</i>	340	Virtual Teams <i>Jamie S. Switzer</i>	600
Structured Query Language (SQL) <i>Erick D. Slazinski</i>	353	Visual Basic <i>Dennis O. Owen</i>	608
Supply Chain Management <i>Gerard J. Burke and Asoo J. Vakharia</i>	365	Visual Basic Scripting Edition (VBScript) <i>Timothy W. Cole</i>	620
Supply Chain Management and the Internet <i>Thomas D. Lairson</i>	374	Visual C++ (Microsoft) <i>Blayne E. Mayfield</i>	635
Supply Chain Management Technologies <i>Mark Smith</i>	387	Voice over Internet Protocol (IP) <i>Roy Morris</i>	647
Supply Networks: Developing and Maintaining Relationships and Strategies <i>Robert H. Lawson</i>	398	Web-Based Training <i>Patrick J. Fahy</i>	661
Taxation Issues <i>Annette Nellen</i>	413	Webcasting <i>Louisa Ha</i>	674
TCP/IP Suite <i>Prabhaker Mateti</i>	424	Web Content Management <i>Jian Qin</i>	687
Telecommuting and Telework <i>Ralph D. Westfall</i>	436	Web Hosting <i>Doug Kaye</i>	699
Trademark Law <i>Ray Everett-Church</i>	448	Web Quality of Service <i>Tarek Abdelzaher</i>	711
Travel and Tourism <i>Daniel R. Fesenmaier, Ulrike Gretzel, Yeong-Hyeon Hwang, and Youcheng Wang</i>	459	Web Search Fundamentals <i>Raymond Wisman</i>	724
Universally Accessible Web Resources: Designing for People with Disabilities <i>Jon Gunderson</i>	477	Web Search Technology <i>Clement Yu and Weiyi Meng</i>	738
Unix Operating System <i>Mark Shacklette</i>	494	Web Services <i>Akhil Sahai, Sven Graupner, and Wooyoung Kim</i>	754
Usability Testing: An Evaluation Process for Internet Communications <i>Donald E. Zimmerman and Carol A. Akerelrea</i>	512	Web Site Design <i>Robert E. Irie</i>	768
Value Chain Analysis <i>Brad Kleindl</i>	525	Wide Area and Metropolitan Area Networks <i>Lynn A. DeNoia</i>	776
Video Compression <i>Immanuel Freedman</i>	537	Windows 2000 Security <i>E. Eugene Schultz</i>	792
Video Streaming <i>Herbert Tuttle</i>	554	Wireless Application Protocol (WAP) <i>Lillian N. Cassel</i>	805
Virtual Enterprises <i>J. Cecil</i>	567	Wireless Communications Applications <i>Mohsen Guizani</i>	817
Virtual Private Networks: Internet Protocol (IP) Based <i>David E. McDysan</i>	579	Wireless Internet <i>Magda El Zarki, Geert Heijenk and Kenneth S. Lee</i>	831
Virtual Reality on the Internet: Collaborative Virtual Reality <i>Andrew Johnson and Jason Leigh</i>	591	Wireless Marketing <i>Pamela M. H. Kwok</i>	850
		XBRL (Extensible Business Reporting Language): Business Reporting with XML <i>J. Efrim Boritz and Won Gyun No</i>	863

Chapter List by Subject Area

Applications

Delivery of Medical Care
Developing Nations
Digital Libraries
Distance Learning (Virtual Learning)
Downloading from the Internet
Electronic Funds Transfer
E-mail and Instant Messaging
Enhanced TV
Game Design: Games for the World Wide Web
GroupWare
Health Insurance and Managed Care
Human Resources Management
Interactive Multimedia on the Web
Internet Relay Chat (IRC)
Law Enforcement
Law Firms
Library Management
Nonprofit Organizations
Online Banking and Beyond: Internet-Related Offerings
from U.S. Banks
Online Communities
Online Dispute Resolution
Online News Services (Online Journalism)
Online Public Relations
Online Publishing
Online Religion
Politics
Public Accounting Firms
Real Estate
Research on the Internet
Securities Trading on the Internet
Telecommuting and Telework
Travel and Tourism
Video Streaming
Virtual Enterprises
Virtual Teams
Web-Based Training
Webcasting

Design, Implementation, and Management

Application Service Providers (ASPs)
Benchmarking Internet
Capacity Planning for Web Services
Client/Server Computing
E-business ROI Simulations
Enterprise Resource Planning (ERP)
Human Factors and Ergonomics
Information Quality in Internet and E-business
Environments

Load Balancing on the Internet
Managing a Network Environment
Managing Risk in Internet-Based Software Projects
Peer-to-Peer Systems
Project Management Techniques
Prototyping
Return on Investment Analysis for E-business Projects
Software Design and Implementation in the Web
Environment
Structured Query Language (SQL)
Universally Accessible Web Resources: Designing for
People with Disabilities
Usability Testing: An Evaluation Process for Internet
Communications
Virtual Reality on the Internet: Collaborative Virtual
Reality
Web Hosting
Web Quality of Service

Electronic Commerce

Business Plans for E-commerce Projects
Business-to-Business (B2B) Electronic Commerce
Business-to-Business (B2B) Internet Business Models
Business-to-Consumer (B2C) Internet Business Models
Click-and-Brick Electronic Commerce
Collaborative Commerce
Consumer-Oriented Electronic Commerce
E-government
Electronic Commerce and Electronic Business
Electronic Data Interchange (EDI)
Electronic Payment
E-marketplaces
Extranets
Intranets
Online Auction Site Management
Online Auctions
Web Services

Foundation

Computer Literacy
Digital Economy
Downloading from the Internet
Electronic Commerce and Electronic Business
File Types
Geographic Information Systems (GIS) and the Internet
History of the Internet
Internet Etiquette (Netiquette)
Internet Literacy
Internet Navigation (Basics, Services, and Portals)
Multimedia

Value Chain Analysis
 Web Search Fundamentals
 Web Search Technology

Infrastructure

Circuit, Message, and Packet Switching
 Conducted Communications Media
 Convergence of Data, Sound, and Video
 Data Compression
 Digital Communication
 Integrated Services Digital Network (ISDN):
 Narrowband and Broadband Services and
 Applications
 Internet Architecture
 Internet2
 Linux Operating System
 Local Area Networks
 Middleware
 Multiplexing
 Public Networks
 Speech and Audio Compression
 Standards and Protocols in Data Communications
 Storage Area Networks (SANs)
 TCP/IP Suite
 Unix Operating System
 Video Compression
 Voice over Internet Protocol (IP)
 Virtual Private Networks: Internet-Protocol (IP)
 Based
 Wide Area and Metropolitan Area Networks

Legal, Social, Organizational, International, and Taxation Issues

Copyright Law
 Cybercrime and Cyberfraud
 Cyberlaw: The Major Areas, Development,
 and Provisions
 Cyberterrorism
 Digital Divide
 Digital Identity
 Feasibility of Global E-business Projects
 Gender and Internet Usage
 Global Issues
 Health Issues
 International Cyberlaw
 Internet Censorship
 Internet Diffusion
 Legal, Social, and Ethical Issues
 Online Stalking
 Open Source Development and Licensing
 Organizational Impact
 Patent Law
 Privacy Law
 Software Piracy
 Taxation Issues
 Trademark Law

Marketing and Advertising on the Web

Consumer Behavior
 Customer Relationship Management on the Web
 Data Mining in E-commerce
 Data Warehousing and Data Marts
 Databases on the Web
 Fuzzy Logic
 Intelligent Agents
 Knowledge Management
 Machine Learning and Data Mining on the Web
 Marketing Communication Strategies
 Marketing Plans for E-commerce Projects
 Online Analytical Processing (OLAP)
 Personalizations and Customization Technologies
 Rule-Based and Expert Systems
 Wireless Marketing

Security Issues and Measures

Authentication
 Biometric Authentication
 Computer Security Incident Response Teams (CSIRTs)
 Computer Viruses and Worms
 Denial of Service Attacks
 Digital Signatures and Electronic Signatures
 Disaster Recovery Planning
 Encryption
 Firewalls
 Guidelines for a Comprehensive Security System
 Internet Security Standards
 Intrusion Detection System
 Passwords
 Physical Security
 Public Key Infrastructure (PKI)
 Secure Electronic Transmissions (SET)
 Secure Sockets Layer (SSL)
 Virtual Private Networks: Internet Protocol (IP) Based
 Windows 2000 Security

Supply Chain Management

Electronic Procurement
 E-systems for the Support of Manufacturing Operations
 International Supply Chain Management
 Inventory Management
 Managing the Flow of Materials Across the Supply Chain
 Strategic Alliances
 Supply Chain Management
 Supply Chain Management and the Internet
 Supply Chain Management Technologies
 Supply Networks: Developing and Maintaining
 Relationships and Strategies
 Value Chain Analysis

Web Design and Programming

Active Server Pages (ASP)
 ActiveX
 ActiveX Data Objects (ADO)

C/C++
Cascading Style Sheets (CSS)
Common Gateway Interface (CGI) Scripts
DHTML (Dynamic HyperText Markup Language)
Extensible Markup Language (XML)
Extensible Stylesheet Language (XSL)
HTML/XHTML (Hypertext Markup Language/Extensible
HyperText Markup Language)
Java
Java Server Pages (JSP)
JavaBeans and Software Architecture
JavaScript
Perl
Visual Basic Scripting Edition (VBScript)
Visual Basic
Visual C++ (Microsoft)

Web Content Management
Web Site Design
XBRL (Extensible Business Reporting Language):
Business Reporting with XML

Wireless Internet and E-commerce
Bluetooth™—A Wireless Personal Area Network
Mobile Commerce
Mobile Devices and Protocols
Mobile Operating Systems and Applications
Propagation Characteristics of Wireless Channels
Radio Frequency and Wireless Communications
Wireless Application Protocol (WAP)
Wireless Communications Applications
Wireless Internet
Wireless Marketing

Contributors

Tarek Abdelzaher

University of Virginia
Web Quality of Service

Charles Abzug

James Madison University
Linux Operating System

Patricia Adams

Education Resources
Strategic Alliances

Carol A. Akerelrea

Colorado State University
*Usability Testing: An Evaluation Process
for Internet Communications*

Gary C. Anders

Arizona State University West
Online Auctions

Amy W. Apon

University of Arkansas
Public Networks

Pierre A. Balthazard

Arizona State University West
Groupware

Ashok Deo Bardhan

University of California,
Berkeley
Real Estate

Joey Bargsten

University of Oregon
Multimedia

Hossein Bidgoli

California State University,
Bakersfield
*Computer Literacy
Internet Literacy*

Gerald Bluhm

Tyco Fire & Security
Patent Law

Robert J. Boncella

Washburn University
Secure Sockets Layer (SSL)

J. Efrim Boritz

University of Waterloo, Canada
*XBRL (Extensible Business Reporting Language):
Business Reporting with XML*

Sviatoslav Braynov

State University of New York at Buffalo
*Data Mining in E-commerce
Personalization and Customization
Technologies*

Randy M. Brooks

Millikin University
Online Publishing

Colleen Brown

Purdue University
History of the Internet

Tara Brown-L'Bahy

Harvard University
Distance Learning (Virtual Learning)

Linda S. Bruenjes

Lasell College
Internet2

Gerard J. Burke

University of Florida
Supply Chain Management

L. Jean Camp

Harvard University
Peer-to-Peer Systems

Charles J. Campbell

The University of Memphis
Java

Janice E. Carrillo

University of Florida
Inventory Management

Michael A. Carrillo

Oracle Corporation
Inventory Management

Lillian N. Cassel

Villanova University
Wireless Application Protocol (WAP)

J. Cecil

New Mexico State University
Virtual Enterprises

Haluk Cetin

Murray State University
*Geographic Information Systems (GIS) and
the Internet*

Henry Chan

The Hong Kong Polytechnic University, China
Consumer-Oriented Electronic Commerce

C. Janie Chang

San José State University
Public Accounting Firms

Camille Chin

West Virginia University
Cybercrime and Cyberfraud

T. Matthew Ciolek

The Australian National University, Australia
Online Religion

Timothy W. Cole

University of Illinois at Urbana-Champaign
Visual Basic Scripting Edition (VBScript)

Fred Condo

California State University, Chico
Cascading Style Sheets (CSS)

David E. Cook

University of Derby, United Kingdom
Standards and Protocols in Data Communications

Marco Cremonini

Università di Milano, Italy
Disaster Recovery Planning

Mary J. Cronin

Boston College
Mobile Commerce

Jaime J. Dávila

Hampshire College
Digital Divide

Chris Dede

Harvard University
Distance Learning (Virtual Learning)

Victoria S. Dennis

Minnesota State Bar Association
Law Firms

Lynn A. DeNoia

Rensselaer Polytechnic Institute
Wide Area and Metropolitan Area Networks

Nikhilesh Dholakia

University of Rhode Island
Gender and Internet Usage
Global Diffusion of the Internet

Ruby Roy Dholakia

University of Rhode Island
Gender and Internet Usage
Global Diffusion of the Internet

Vesna Dolnicar

University of Ljubljana, Slovenia
Benchmarking Internet

Rich Dorfman

WebFeats! and Waukesha County Technical
College
Extensible Markup Language (XML)

Magda El Zarki

University of California—Irvine
Wireless Internet

Larry P. English

Information Impact International, Inc.
Information Quality in Internet and E-business
Environments

Roman Erenshteyn

Goldey-Beacom College
ActiveX

Ray Everett-Church

ePrivacy Group, Inc.
Privacy Law
Trademark Law

Patrick J. Fahy

Athabasca University
Web-Based Training

Gerald R. Ferrera

Bentley College
Copyright Law

Daniel R. Fesenmaier

University of Illinois at Urbana–Champaign
Travel and Tourism

C. Patrick Fleenor

Seattle University
Feasibility of Global E-business Projects

Marcia H. Flicker

Fordham University
Securities Trading on the Internet

Immanuel Freedman

Dr. Immanuel Freedman, Inc.
Video Compression

Borko Furht

Florida Atlantic University
Interactive Multimedia on the Web

Jayne Gackebach

Athabasca University, Canada
Health Issues

Alan Gaitenby

University of Massachusetts, Amherst
Online Dispute Resolution

Bruce Garrison

University of Miami
Online News Services (Online Journalism)

G. David Garson

North Carolina State University
E-government

Roger Gate

IBM United Kingdom Ltd., United Kingdom
Electronic Funds Transfer

Mario Giannini

Code Fighter, Inc., and Columbia
University
C/C++

Julia Alpert Gladstone

Bryant College
International Cyberlaw

Mary C. Gilly

University of California, Irvine
Consumer Behavior

Robert H. Goffman

Concordia University
Electronic Procurement

James E. Goldman

Purdue University
Firewalls

Sven Graupner

Hewlett-Packard Laboratories
Web Services

Robert H. Greenfield

Computer Consulting
Circuit, Message, and Packet Switching

Ulrike Gretzel

University of Illinois at Urbana–Champaign
Travel and Tourism

Paul Gronke

Reed College
Politics

Jim Grubbs

University of Illinois at Springfield
E-mail and Instant Messaging

Mohsen Guizani

Western Michigan University
Wireless Communications Applications

Jon Gunderson

University of Illinois at Urbana–Champaign
Universally Accessible Web Resources: Designing
for People with Disabilities

Babita Gupta

California State University, Monterey Bay
Global Issues

Louisa Ha

Bowling Green State University
Webcasting

Kirk Hallahan

Colorado State University
Online Public Relations

Diane M. Hamilton

Rowan University
Business-to-Consumer (B2C) Internet Business Models

Robert W. Heath Jr.

The University of Texas at Austin
Digital Communication

Geert Heijenck

University of Twente, The Netherlands
Wireless Internet

Jesse M. Heines

University of Massachusetts Lowell
Extensible Stylesheet Language (XSL)

Rodney J. Heisterberg

Notre Dame de Namur University and
Rod Heisterberg Associates
Collaborative Commerce

Steven J. Henry

Wolf, Greenfield & Sacks, P.C.
Open Source Development and Licensing

Julie Hersberger

University of North Carolina at Greensboro
Internet Censorship

Kenneth Einar Himma

University of Washington
Legal, Social, and Ethical Issues

Matthias Holweg

Massachusetts Institute of Technology
Managing the Flow of Materials Across the Supply Chain

Russ Housley

Vigil Security, LLC
Public Key Infrastructure (PKI)

Yeong-Hyeon Hwang

University of Illinois at Urbana-Champaign
Travel and Tourism

Robert E. Irie

SPAWAR Systems Center San Diego
Web Site Design

Linda C. Isenhour

University of Central Florida
Human Resources Management

H.-Arno Jacobsen

University of Toronto, Canada
Application Service Providers (ASPs)

Charles W. Jaeger

Southern Oregon University
Cyberterrorism

Dwight Jaffee

University of California, Berkeley
Real Estate

Sushil Jajodia

George Mason University
Intrusion Detection Techniques

Mark Jeffery

Northwestern University
Return on Investment Analysis for E-business Projects

Andrew Johnson

University of Illinois at Chicago
*Virtual Reality on the Internet: Collaborative
Virtual Reality*

Ari Juels

RSA Laboratories
Encryption

Bhushan Kapoor

California State University, Fullerton
ActiveX Data Objects (ADO)

Joseph M. Kayany

Western Michigan University
Internet Etiquette (Netiquette)

Doug Kaye

RDS Strategies LLC
Web Hosting

Chuck Kelley

Excellence In Data, Inc.
Data Warehousing and Data Marts

Diane Ketelhut

Harvard University
Distance Learning (Virtual Learning)

Chang-Su Kim

Seoul National University, Korea
Data Compression

Wooyoung Kim

University of Illinois at Urbana-Champaign
Web Services

Jerry Kindall

Epok Inc.
Digital Identity

Brad Kleindl

Missouri Southern State University-Joplin
Value Chain Analysis

Graham Knight

University College London, United Kingdom
Internet Architecture

Craig D. Knuckles

Lake Forest College
*DHTML (Dynamic HyperText Markup
Language)*

Jim Krause

Indiana University
Enhanced TV

Peter Kroon

Agere Systems
Speech and Audio Compression

Gary J. Krug

Eastern Washington University
Convergence of Data, Sound, and Video

Nir Kshetri

University of North Carolina
*Gender and Internet Usage
Global Diffusion of the Internet*

C.-C. Jay Kuo

University of Southern California
Data Compression

Stan Kurkovsky

Columbus State University
Common Gateway Interface (CGI) Scripts

Pamela M. H. Kwok

Hong Kong Polytechnic University, China
Wireless Marketing

Jennifer Lagier

Hartnell College
File Types

Thomas D. Lairson

Rollins College
Supply Chain Management and the Internet

Gary LaPoint

Syracuse University
International Supply Chain Management

Haniph A. Latchman

University of Florida
Managing a Network Environment

John LeBaron

University of Massachusetts Lowell
Internet2

Kenneth S. Lee

University of Pennsylvania
Wireless Internet

Jason Leigh

University of Illinois at Chicago
*Virtual Reality on the Internet: Collaborative
Virtual Reality*

Margarita Maria Lenk

Colorado State University
Guidelines for a Comprehensive Security System

Nanette S. Levinson

American University
Developing Nations

Edwin E. Lewis Jr.

Johns Hopkins University
E-business ROI Simulations

David J. Loundy

DePaul University
Online Stalking

Robert H. Lawson

University of East Anglia, United Kingdom
*E-systems for the Support of Manufacturing
Operations
Supply Networks: Developing and Maintaining
Relationships and Strategies*

David Lukoff

Saybrook Graduate School and Research Center
Health Issues

Kuber Maharjan

Purdue University
Downloading from the Internet

Julie R. Mariga

Purdue University
*Mobile Devices and Protocols
Mobile Operating Systems and Applications*

Oge Marques

Florida Atlantic University
Interactive Multimedia on the Web

Prabhaker Mateti

Wright State University
TCP/IP Suite

Bruce R. Maxim

University of Michigan–Dearborn
Game Design: Games for the World Wide Web

Blayne E. Mayfield

Oklahoma State University
Visual C++ (Microsoft)

Cavan McCarthy

Louisiana State University
Digital Libraries

Patrick McDaniel

AT&T Labs
Authentication

David E. McDysan

WorldCom
*Virtual Private Networks: Internet Protocol (IP)
Based*

Daniel J. McFarland

Rowan University
Client/Server Computing

Matthew K. McGowan

Bradley University
Electronic Data Interchange (EDI)

Nenad Medvidovic

University of Southern California
JavaBeans and Software Architecture

Nikunj R. Mehta

University of Southern California
JavaBeans and Software Architecture

John A. Mendonca

Purdue University
Organizational Impact

Weiyi Meng

State University of New York at Binghamton
Web Search Technology

Mark S. Merkow

E-commerce Guide
Secure Electronic Transactions (SET)

Mark Michael

King's College
*HTML/XHTML (HyperText Markup Language/
Extensible HyperText Markup Language)
Physical Security*

Brent A. Miller

IBM Corporation
Bluetooth™—A Wireless Personal Area Network

Robert K. Moniot

Fordham University
Software Piracy

Joseph Morabito

Stevens Institute of Technology
Online Analytical Processing (OLAP)

Roy Morris

Capitol College
Voice over Internet Protocol (IP)

Alec Nacamuli

IBM United Kingdom Ltd., United Kingdom
Electronic Funds Transfer

Annette Nellen

San José State University
*Public Accounting Firms
Taxation Issues*

Dale Nesbary

Oakland University
Nonprofit Organizations

Dat-Dao Nguyen

California State University, Northridge
*Business-to-Business (B2B) Internet Business
Models*

Peng Ning

North Carolina State University
Intrusion Detection Techniques

Mark E. Nissen

Naval Postgraduate School
Intelligent Agents

Won Gyun No

University of Waterloo, Canada
*XBRL (Extensible Business Reporting Language):
Business Reporting with XML*

Eric H. Nyberg

Carnegie Mellon University
Prototyping

Jeff Offutt

George Mason University
*Software Design and Implementation in the
Web Environment*

Donal O'Mahony

University of Dublin, Ireland
Electronic Payment

Robert Oshana

Southern Methodist University
Capacity Planning for Web Services

Dennis O. Owen

Purdue University
Visual Basic

Raymond R. Panko

University of Hawaii at Manoa
*Computer Security Incident Response Teams (CSIRTs)
Digital Signatures and Electronic Signatures
Internet Security Standards*

Anand Paul

University of Florida
Inventory Management

Thomas L. Pigg

Jackson State Community College
Conducted Communications Media

Paul S. Piper

Western Washington University
Research on the Internet

Benjamin R. Pobanz

Purdue University
Mobile Devices and Protocols

Richard E. Potter

University of Illinois at Chicago
Groupware

Dennis M. Powers

Southern Oregon University
*Cyberlaw: The Major Areas, Development,
and Provisions*

Paul R. Prabhaker

Illinois Institute of Technology
E-marketplaces

Etienne E. Pracht

University of South Florida
Health Insurance and Managed Care

Frederick Pratter

Eastern Oregon University
JavaServer Pages (JSP)

Robert W. Proctor

Purdue University
Human Factors and Ergonomics

Jian Qin

Syracuse University
Web Content Management

Zinovy Radovitsky

California State University, Hayward
Enterprise Resource Planning (ERP)

Jeremy Rasmussen

Sypris Electronics, LLC
Passwords

Peter Raven

Seattle University
Feasibility of Global E-business Projects

Amy W. Ray

Bentley College
Business Plans for E-commerce Projects

Julian J. Ray

Western New England College
Business-to-Business (B2B) Electronic Commerce

Pratap Reddy

Raritan Valley Community College
Internet Navigation (Basics, Services, and Portals)

Drummond Reed

OneName Corporation
Digital Identity

Vladimir V. Riabov

Rivier College
Storage Area Networks (SANs)

Nick Rich

Cardiff Business School, United Kingdom
*Managing the Flow of Materials Across the
Supply Chain*

Malu Roldan

San Jose State University
Marketing Plans for an E-commerce Project

Constantine Roussos

Lynchburg College
JavaScript

Akhil Sahai

Hewlett-Packard Laboratories
Web Services

Eduardo Salas

University of Central Florida
Human Resources Management

Atul A. Salvekar

Intel Corp.
Digital Communication

Pierangela Samarati

Università di Milano, Italy
Disaster Recovery Planning

J. Christopher Sandvig

Western Washington University
Active Server Pages

Robert J. Schalkoff

Clemson University
Rule-Based and Expert Systems

Shannon Schelin

North Carolina State University
E-government

William T. Schiano

Bentley College
Intranets

Roy C. Schmidt

Bradley University
*Risk Management in Internet-Based Software
Projects*

E. Eugene Schultz

University of California–Berkley Lab
Denial of Service Attacks
Windows 2000 Security

Steven D. Schwaizberg

Tufts-New England Medical Center
Medical Care Delivery

Kathy Schwalbe

Augsburg College
Project Management Techniques

Mark Shacklette

The University of Chicago
Unix Operating System

P. M. Shankar

Drexel University
Propagation Characteristics of Wireless Channels

John Sherry

Purdue University
History of the Internet

Carolyn J. Siccama

University of Massachusetts Lowell
Internet2

Judith C. Simon

The University of Memphis
Java
Law Enforcement
Law Firms

Robert Simon

George Mason University
Middleware

Nirvikar Singh

University of California, Santa Cruz
Digital Economy

Clara L. Sitter

University of Denver
Library Management

Robert Slade

Consultant
Computer Viruses and Worms

Erick D. Slazinski

Purdue University
Structured Query Language (SQL)

Mark Smith

Purdue University
Supply Chain Management Technologies

Lee Sproull

New York University
Online Communities

Charles Steinfield

Michigan State University
Click-and-Brick Electronic Commerce
Electronic Commerce and Electronic Business

Edward A. Stohr

Stevens Institute of Technology
Online Analytical Processing (OLAP)

Dianna L. Stone

University of Central Florida
Human Resources Management

David Stotts

University of North Carolina at Chapel Hill
Perl

Judy Strauss

University of Nevada, Reno
Marketing Communication Strategies

Wayne C. Summers

Columbus State University
Local Area Networks

Jamie S. Switzer

Colorado State University
Virtual Teams

Dale R. Thompson

University of Arkansas
Public Networks

John S. Thompson

University of Colorado at Boulder
*Integrated Services Digital Network (ISDN):
 Narrowband and Broadband Services and Applications*

Stephen W. Thorpe

Neumann College
Extranets

Ronald R. Tidd

Central Washington University
Knowledge Management

Herbert Tuttle

The University of Kansas
Video Streaming

Okechukwu C. Ugweje

The University of Akron
Radio Frequency and Wireless Communications

Asoo J. Vakharia

University of Florida
Supply Chain Management

Robert Vaughn

University of Memphis
Law Enforcement

Vasja Vehovar

University of Ljubljana, Slovenia
Benchmarking Internet

Kim-Phuong L. Vu

Purdue University
Human Factors and Ergonomics

Jordan Walters

BCN Associates, Inc.
Managing a Network Environment

Siaw-Peng Wan

Elmhurst College
Online Banking and Beyond: Internet-Related Offerings from U.S. Banks

Youcheng Wang

University of Illinois at Urbana–Champaign
Travel and Tourism

James. L. Wayman

San Jose State University
Biometric Authentication

Scott Webster

Syracuse University
International Supply Chain Management

Jianbin Wei

Wayne State University
Load Balancing on the Internet

Ralph D. Westfall

California State Polytechnic University, Pomona
Telecommuting and Telework

Pamela Whitehouse

Harvard University
Distance Learning (Virtual Learning)

Dave Whitmore

Champlain College
Multiplexing

Russell S. Winer

New York University
Customer Relationship Management on the Web

Raymond Wisman

Indiana University Southeast
Web Search Fundamentals

Paul L. Witt

University of Texas at Arlington
Internet Relay Chat (IRC)

Mary Finley Wolfinbarger

California State University Long Beach
Consumer Behavior

Peter R. Wurman

North Carolina State University
Online Auction Site Management

Cheng-Zhong Xu

Wayne State University
Load Balancing on the Internet

Qiang Yang

Hong Kong University of Science and
Technology, China
*Machine Learning and Data Mining on
the Web*

A. Neil Yerkey

University at Buffalo
Databases on the Web

Clement Yu

University of Illinois at Chicago
Web Search Technology

Daniel Dajun Zeng

University of Arizona
Intelligent Agents

Yan-Qing Zhang

Georgia State University
Fuzzy Logic

Xiaobo Zhou

University of Colorado at Colorado Springs
Load Balancing on the Internet

Donald E. Zimmerman

Colorado State University
*Usability Testing: An Evaluation Process for
Internet Communications*

Preface

The Internet Encyclopedia is the first comprehensive examination of the core topics in the Internet field. *The Internet Encyclopedia*, a three-volume reference work with 205 chapters and more than 2,600 pages, provides comprehensive coverage of the Internet as a business tool, IT platform, and communications and commerce medium. The audience includes the libraries of two-year and four-year colleges and universities with MIS, IT, IS, data processing, computer science, and business departments; public and private libraries; and corporate libraries throughout the world. It is the only comprehensive source for reference material for educators and practitioners in the Internet field.

Education, libraries, health, medical, biotechnology, military, law enforcement, accounting, law, justice, manufacturing, financial services, insurance, communications, transportation, aerospace, energy, and utilities are among the fields and industries expected to become increasingly dependent upon the Internet and Web technologies. Companies in these areas are actively researching the many issues surrounding the design, utilization, and implementation of these technologies.

This definitive three-volume encyclopedia offers coverage of both established and cutting-edge theories and developments of the Internet as a technical tool and business/communications medium. The encyclopedia contains chapters from global experts in academia and industry. It offers the following unique features:

- 1) Each chapter follows a format which includes title and author, chapter outline, introduction, body, conclusion, glossary, cross references, and references. This unique format enables the readers to pick and choose among various sections of a chapter. It also creates consistency throughout the entire series.
- 2) The encyclopedia has been written by more than 240 experts and reviewed by more than 840 academics and practitioners chosen from around the world. This diverse collection of expertise has created the most definitive coverage of established and cutting edge theories and applications in this fast-growing field.
- 3) Each chapter has been rigorously peer reviewed. This review process assures the accuracy and completeness of each topic.
- 4) Each chapter provides extensive online and offline references for additional readings. This will enable readers to further enrich their understanding of a given topic.
- 5) More than 1,000 illustrations and tables throughout the series highlight complex topics and assist further understanding.
- 6) Each chapter provides extensive cross references. This helps the readers identify other chapters within

the encyclopedia related to a particular topic, which provides a one-stop knowledge base for a given topic.

- 7) More than 2,500 glossary items define new terms and buzzwords throughout the series, which assists readers in understanding concepts and applications.
- 8) The encyclopedia includes a complete table of contents and index sections for easy access to various parts of the series.
- 9) The series emphasizes both technical and managerial issues. This approach provides researchers, educators, students, and practitioners with a balanced understanding of the topics and the necessary background to deal with problems related to Internet-based systems design, implementation, utilization, and management.
- 10) The series has been designed based on the current core course materials in several leading universities around the world and current practices in leading computer- and Internet-related corporations. This format should appeal to a diverse group of educators, practitioners, and researchers in the Internet field.

We chose to concentrate on fields and supporting technologies that have widespread applications in the academic and business worlds. To develop this encyclopedia, we carefully reviewed current academic research in the Internet field at leading universities and research institutions around the world. Management information systems, decision support systems (DSS), supply chain management, electronic commerce, network design and management, and computer information systems (CIS) curricula recommended by the Association of Information Technology Professionals (AITP) and the Association for Computing Management (ACM) were carefully investigated. We also researched the current practices in the Internet field used by leading IT corporations. Our work enabled us to define the boundaries and contents of this project.

TOPIC CATEGORIES

Based on our research we identified 11 major topic areas for the encyclopedia:

- Foundation;
- Infrastructure;
- Legal, social, organizational, international, and taxation issues;
- Security issues and measures;
- Web design and programming;
- Design, implementation, and management;
- Electronic commerce;
- Marketing and advertising on the Web;

- Supply chain management;
- Wireless Internet and e-commerce; and
- Applications.

Although these 11 categories of topics are interrelated, each addresses one major dimension of the Internet-related fields. The chapters in each category are also interrelated and complementary, enabling readers to compare, contrast, and draw conclusions that might not otherwise be possible.

Although the entries have been arranged alphabetically, the light they shed knows no bounds. The encyclopedia provides unmatched coverage of fundamental topics and issues for successful design, implementation, and utilization of Internet-based systems. Its chapters can serve as material for a wide spectrum of courses, such as the following:

- Web technology fundamentals;
- E-commerce;
- Security issues and measures for computers, networks, and online transactions;
- Legal, social, organizational, and taxation issues raised by the Internet and Web technology;
- Wireless Internet and e-commerce;
- Supply chain management;
- Web design and programming;
- Marketing and advertising on the Web; and
- The Internet and electronic commerce applications.

Successful design, implementation, and utilization of Internet-based systems require a thorough knowledge of several technologies, theories, and supporting disciplines. Internet and Web technologies researchers and practitioners have had to consult many resources to find answers. Some of these sources concentrate on technologies and infrastructures, some on social and legal issues, and some on applications of Internet-based systems. This encyclopedia provides all of this relevant information in a comprehensive three-volume set with a lively format.

Each volume incorporates core Internet topics, practical applications, and coverage of the emerging issues in the Internet and Web technologies field. Written by scholars and practitioners from around the world, the chapters fall into the 11 major subject areas mentioned previously.

Foundation

Chapters in this group examine a broad range of topics. Theories and concepts that have a direct or indirect effect on the understanding, role, and the impact of the Internet in public and private organizations are presented. They also highlight some of the current issues in the Internet field. These articles explore historical issues and basic concepts as well as economic and value chain concepts. They address fundamentals of Web-based systems as well as Web search issues and technologies. As a group they provide a solid foundation for the study of the Internet and Web-based systems.

Infrastructure

Chapters in this group explore the hardware, software, operating systems, standards, protocols, network systems, and technologies used for design and implementation of the Internet and Web-based systems. Thorough discussions of TCP/IP, compression technologies, and various types of networks systems including LANs, MANs, and WANs are presented.

Legal, Social, Organizational, International, and Taxation Issues

These chapters look at important issues (positive and negative) in the Internet field. The coverage includes copyright, patent and trademark laws, privacy and ethical issues, and various types of cyberthreats from hackers and computer criminals. They also investigate international and taxation issues, organizational issues, and social issues of the Internet and Web-based systems.

Security Issues and Measures

Chapters in this group provide a comprehensive discussion of security issues, threats, and measures for computers, network systems, and online transactions. These chapters collectively identify major vulnerabilities and then provide suggestions and solutions that could significantly enhance the security of computer networks and online transactions.

Web Design and Programming

The chapters in this group review major programming languages, concepts, and techniques used for designing programs, Web sites, and virtual storefronts in the e-commerce environment. They also discuss tools and techniques for Web content management.

Design, Implementation, and Management

The chapters in this group address a host of issues, concepts, theories and techniques that are used for design, implementation, and management of the Internet and Web-based systems. These chapters address conceptual issues, fundamentals, and cost benefits and returns on investment for Internet and e-business projects. They also present project management and control tools and techniques for the management of Internet and Web-based systems.

Electronic Commerce

These chapters present a thorough discussion of electronic commerce fundamentals, taxonomies, and applications. They also discuss supporting technologies and applications of e-commerce including intranets, extranets, online auctions, and Web services. These chapters clearly demonstrate the successful applications of the Internet and Web technologies in private and public sectors.

Marketing and Advertising on the Web

The chapters in this group explore concepts, theories, and technologies used for effective marketing and advertising

on the Web. These chapters examine both qualitative and quantitative techniques. They also investigate the emerging technologies for mass personalization and customization in the Web environment.

Supply Chain Management

The chapters in this group discuss the fundamentals concepts and theories of value chain and supply chain management. The chapters examine the major role that the Internet and Web technologies play in an efficient and effective supply chain management program.

Wireless Internet and E-commerce

These chapters look at the fundamental concepts and technologies of wireless networks and wireless computing as they relate to the Internet and e-commerce operations. They also discuss mobile commerce and wireless marketing as two of the growing fields within the e-commerce environment.

Applications

The Internet and Web-based systems are everywhere. In most cases they have improved the efficiency and effectiveness of managers and decision makers. Chapters in this group highlight applications of the Internet in several fields, such as accounting, manufacturing, education, and human resources management, and their unique applications in a broad section of the service industries including law, law enforcement, medical delivery, health insurance and managed care, library management, nonprofit organizations, banking, online communities, dispute resolution, news services, public relations, publishing, religion, politics, and real estate. Although these disciplines are different in scope, they all utilize the Internet to improve productivity and in many cases to increase customer service in a dynamic business environment.

Specialists have written the collection for experienced and not-so-experienced readers. It is to these contributors that I am especially grateful. This remarkable collection of scholars and practitioners has distilled their knowledge

into a fascinating and enlightening one-stop knowledge base in Internet-based systems that “talk” to readers. This has been a massive effort but one of the most rewarding experiences I have ever undertaken. So many people have played a role that it is difficult to know where to begin.

I should like to thank the members of the editorial board for participating in the project and for their expert advice on the selection of topics, recommendations for authors, and review of the materials. Many thanks to the more than 840 reviewers who devoted their times by proving advice to me and the authors on improving the coverage, accuracy, and comprehensiveness of these materials.

I thank my senior editor at John Wiley & Sons, Matthew Holt, who initiated the idea of the encyclopedia back in spring of 2001. Through a dozen drafts and many reviews, the project got off the ground and then was managed flawlessly by Matthew and his professional team. Matthew and his team made many recommendations for keeping the project focused and maintaining its lively coverage. Tamara Hummel, our superb editorial coordinator, exchanged several hundred e-mail messages with me and many of our authors to keep the project on schedule. I am grateful to all her support. When it came to the production phase, the superb Wiley production team took over. Particularly I want to thank Deborah DeBlasi, our senior production editor at John Wiley & Sons, and Nancy J. Hulan, our project manager at TechBooks. I am grateful to all their hard work.

Last, but not least, I want to thank my wonderful wife Nooshin and my two lovely children Mohsen and Morvareed for being so patient during this venture. They provided a pleasant environment that expedited the completion of this project. Nooshin was also a great help in designing and maintaining the author and reviewer databases. Her efforts are greatly appreciated. Also, my two sisters Azam and Akram provided moral support throughout my life. To this family, any expression of thanks is insufficient.

Hossein Bidgoli
California State University, Bakersfield

Guide to the Internet Encyclopedia

The Internet Encyclopedia is a comprehensive summary of the relatively new and very important field of the Internet. This reference work consists of three separate volumes and 205 chapters on various aspects of this field. Each chapter in the encyclopedia provides a comprehensive overview of the selected topic intended to inform a broad spectrum of readers ranging from computer professionals and academicians to students to the general business community.

In order that you, the reader, will derive the greatest possible benefit from *The Internet Encyclopedia*, we have provided this Guide. It explains how the information within the encyclopedia can be located.

ORGANIZATION

The Internet Encyclopedia is organized to provide maximum ease of use for its readers. All of the chapters are arranged in alphabetical sequence by title. Chapters titles that begin with the letters A to F are in Volume 1, chapter titles from G to O are in Volume 2, and chapter titles from P to Z are in Volume 3. So that they can be easily located, chapter titles generally begin with the key word or phrase indicating the topic, with any descriptive terms following. For example, "Virtual Reality on the Internet: Collaborative Virtual Reality" is the chapter title rather than "Collaborative Virtual Reality."

Table of Contents

A complete table of contents for the entire encyclopedia appears in the front of each volume. This list of titles represents topics that have been carefully selected by the editor-in-chief, Dr. Hossein Bidgoli, and his colleagues on the Editorial Board.

Following this list of chapters by title is a second complete list, in which the chapters are grouped according to subject area. The encyclopedia provides coverage of 11 specific subject areas, such as E-commerce and Supply Chain Management. Please see the Preface for a more detailed description of these subject areas.

Index

The Subject Index is located at the end of Volume 3. This index is the most convenient way to locate a desired topic within the encyclopedia. The subjects in the index are listed alphabetically and indicate the volume and page number where information on this topic can be found.

Chapters

Each chapter in *The Internet Encyclopedia* begins on a new page, so that the reader may quickly locate it. The author's name and affiliation are displayed at the beginning of the article.

All chapters in the encyclopedia are organized according to a standard format, as follows:

- Title and author,
- Outline,
- Introduction,
- Body,
- Conclusion,
- Glossary,
- Cross References, and
- References.

Outline

Each chapter begins with an outline indicating the content to come. This outline provides a brief overview of the chapter so that the reader can get a sense of the information contained there without having to leaf through the pages. It also serves to highlight important subtopics that will be discussed within the chapter. For example, the chapter "Computer Literacy" includes sections entitled Defining a Computer, Categories of Computers According to Their Power, and Classes of Data Processing Systems. The outline is intended as an overview and thus lists only the major headings of the chapter. In addition, lower-level headings will be found within the chapter.

Introduction

The text of each chapter begins with an introductory section that defines the topic under discussion and summarizes the content. By reading this section the readers get a general idea about the content of a specific chapter.

Body

The body of each chapter discusses the items that were listed in the outline section.

Conclusion

The conclusion section provides a summary of the materials discussed in each chapter. This section imparts to the readers the most important issues and concepts discussed within each chapter.

Glossary

The glossary contains terms that are important to an understanding of the chapter and that may be unfamiliar to the reader. Each term is defined in the context of the particular chapter in which it is used. Thus the same term may be defined in two or more chapters with the detail of the definition varying slightly from one to another. The encyclopedia includes approximately 2,500 glossary terms.

For example, the article “Computer Literacy” includes the following glossary entries:

Computer A machine that accepts data as input, processes the data without human interference using a set of stored instructions, and outputs information. Instructions are step-by-step directions given to a computer for performing specific tasks.

Computer generations Different classes of computer technology identified by a distinct architecture and technology; the first generation was vacuum tubes, the second transistors, the third integrated circuits, the fourth very-large-scale integration, and the fifth gallium arsenide and parallel processing.

Cross References

All the chapters in the encyclopedia have cross references to other chapters. These appear at the end of the chapter, following the text and preceding the references. The cross references indicate related chapters which can be

consulted for further information on the same topic. The encyclopedia contains more than 2,000 cross references in all. For example, the chapter “Java” has the following cross references:

JavaBeans and Software Architecture; Software Design and Implementation in the Web Environment.

References

The reference section appears as the last element in a chapter. It lists recent secondary sources to aid the reader in locating more detailed or technical information. Review articles and research papers that are important to an understanding of the topic are also listed. The references in this encyclopedia are for the benefit of the reader, to provide direction for further research on the given topic. Thus they typically consist of one to two dozen entries. They are not intended to represent a complete listing of all materials consulted by the author in preparing the chapter. In addition, some chapters contain a Further Reading section, which includes additional sources readers may wish to consult.

