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Strategic Relations Manager
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** Software Spectrum was recently awarded Microsoft's Exchange Visionary Award at Comdex this year. The Visionary Award recognizes Software Spectrum as a leader in Exchange consulting engagements who "built the Exchange Business" by participating in the deployment of over 800,000 seats of Exchange for companies around the globe. The award was personally presented by Steve Ballmer (Vice President, Microsoft) to Software Spectrum.

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Contents at a Glance

I | Introduction to Microsoft Exchange

- 1 Overview of Microsoft Exchange
- 2 Understanding Exchange's Organization and Sites
- 3 Exchange's Integrated Server Components
- 4 Integrating with Microsoft Windows NT Server

II | Installing and Migrating to Exchange

- 5 Designing Exchange Topology
- 6 Installing Exchange Server
- 7 Planning Connections to Microsoft Mail Systems
- 8 Migrating from Microsoft Mail Systems
- 9 Migrating from Lotus cc:Mail
- 10 NetWare Considerations/Migrating from Groupwise
- 11 Migrating from External Systems

III | Exchange Administration and Configuration

- 12 Using the Administrator Program
- 13 Directory and System Attendant Configuration
- 14 Message Transfer Configuration
- 15 Information Store Configuration
- 16 Creating and Configuring Recipients
- 17 Setting Up the Site Connector and Dynamic RAS Connector
- 18 Using Directory Replication and Synchronization
- 19 Using the Microsoft Mail Connector for PC Networks
- 20 Using the Microsoft Mail Connector for AppleTalk Networks
- 21 Configuring X.400 Connections
- 22 Configuring the IMS
- 23 Setting Up NNTP
- 24 Exchange Performance Tuning and Capacity Planning
- 25 Maintaining Exchange
- 26 Monitoring Your Organization
- 27 Exchange Security
- 28 Troubleshooting Exchange with Diagnostic Tools

IV | The Exchange Client

- 29 Installing and Configuring Outlook
- 30 Using Outlook
- 31 Using Advanced Outlook Features

V | Third-Party Integration and Application Development

- 32 Leveraging Your Investment in the Exchange Platform
- 33 Developing Exchange Forms
- 34 Taking Exchange to the Web

Index 827

Table of Contents

Introduction 1

- What Are the Key Features of Exchange? 2
- Who Should Use This Book? 9
- How to Use This Book 9
- Conventions Used in This Book 11

I Introduction to Microsoft Exchange

1 Overview of Microsoft Exchange 15

- The History of Messaging 16
 - Understanding Shared-File Messaging 16
 - Understanding Client/Server Messaging 17
- Overview of Exchange's Key Features 18
 - Using Key Definitions 18
 - Understanding the Universal Inbox for Information and Applications 19
 - Controlling Folder Types 19
 - Organizing Views 20
 - Setting Rules and Auto-Assistants 21
 - Using Find 21
 - Using Calendar 21
 - Using Application Development Tools 22
 - Enabling Group Information Sharing 23
 - Understanding Internet Support 23
 - Enabling Support for Remote Users 24
 - Performing Administration 24
 - Considering Reliability 25
 - Messaging Security 26

- Understanding Connectivity and Gateway Support 27
- Understanding Migration 28
- Understanding Electronic Data Interchange 28
- Understanding Fax Routing 29
- Using Voice Mail 29

- What's New in Exchange 5.5 30
 - Ubiquitous Outlook 30
 - Using Lotus cc:Mail Connector 32
 - Using PROFS/SNADS Connectors 33
 - Using the Lotus Notes Connector 33
 - Understanding Messaging Security 34
 - Understanding IMAP4 34
 - Understanding LDAPv3 35
 - Using Active Server Components (HTTP) 36
 - Additional Internet Security 37
 - Exchange Server Information Store 37

- Understanding Message Flow 38
 - Using MAPI 38
 - Message Flow Within One Server 39
 - Message Flow Between Servers 39

- Comparing Exchange to Lotus Notes 41
 - Understanding Notes Limitations 42
 - Notes Advantages 42

- Microsoft's Use of Exchange 43

- Exchange's Momentum 43

2 Understanding Exchange's Organization and Sites 45

- Understanding Exchange Organizations and Sites 46
 - Defining Site Boundaries 47
 - Linking Sites 48

- Exchange Site Resources 50
 - Servers 50
 - Recipients 50

- Exchange System Naming Conventions 51

- Exchange Message Routing 51
 - Understanding Routing 52

Directory Names and X.400 Originator/
Recipient Addresses 52

Understanding Routing 52
 Routing Tables 53
 Routing Attachments with Mes-
sages 53

Using Distribution Lists 54

Redundant Site Links, Routing Cost, and
Load Balancing 54

Address List and Directory Manage-
ment 55

 Directory Replication 56
 Knowledge Consistency Checker 59
 Directory Synchronization 59
 Microsoft Exchange as the DirSync Re-
questor 61
 Exchange as the DirSync Server 61

Understanding the X.500 Directory Ser-
vice 62

Expanded Address Book Features 62

3 Exchange's Integrated Server Components 65

Exchange's Four Core Components 66
 Introduction to System Attendant 66
 Introduction to Message Transfer
Agent 67
 Introduction to the Information
Store 68
 Introduction to Directory Service 68

Understanding the Administrator Pro-
gram 70

Integrating Connectors in the Exchange
Server 70

Understanding the Microsoft Mail Connec-
tor 72

 LAN Connection to Post Offices 73
 Asynchronous Connection to Post Of-
fices 74
 Multiple MS-Mail Connector MTAs 74

Understanding the X.400 Standard 76
 X.400 Connector Architecture 76
 X.400 Addressing in Exchange 77
 Adding Foreign X.400 Addresses into
Exchange 78
 Application and Examples of the X.400
Connector 78

Understanding the Internet Mail Ser-
vice 79

Connecting to Lotus cc:Mail 81

Understanding Gateways 83

Using Microsoft Mail Gateways 83

Connector for Lotus Notes 84

4 Integrating with Microsoft Windows NT Server 87

Core Functionality of Windows NT 88
 Supporting Multiple Protocols 88
 Using C2 Level Security 89
 Using Integrated Administrator
Tools 90

Understanding the Windows NT Domain
Architecture 91

 Trust Relationships Among Multiple Do-
mains 92
 Single Domain Model 92
 Master Domain Model 93
 Multiple Master Domain Model 94
 Complete Trust Domain Model 95

Understanding Exchange and Windows NT
Operating System Integration 96
 Comparing Windows NT and Exchange
Terminology 96
 Utilizing Integrated Features 97

Exchange Windows NT Dependencies 98
 System Service Account 98
 Security Models 99

II Configuring and Optimizing Windows 95

5 Designing Exchange Topology 103

Step 1 Understanding Your Users 104
 Exchange as a Component of a Knowledge Management Solution 105
 Implementing an Effective Knowledge Management System 108
 Mapping Exchange Functionality to Knowledge Management 109

Step 2 Knowing Your Network 111
 Network Types and Links 111
 Selecting Sites Based on Network Type 113
 Network Size 114
 Network Bandwidth 115
 Network Protocols 115

Step 3 Determining a Windows NT Domain Model 116
 Local and Global Groups 116
 Trust Relationships 116
 Server Roles 117
 Domain Models 117

Step 4 Selecting Your Sites 120

Step 5 Selecting a Site Mapping Strategy 122

Step 6 Selecting a Naming Strategy 127
 Organization Name 127
 Site Names 127
 Server Names 127
 Mailbox Names 128
 Email Addresses 129

Step 7 Linking Your Sites 131
 Site Connector 131
 RAS Connector 132
 X.400 Connector 133
 Internet Mail Service 133
 Microsoft Mail Connector 134
 Lotus cc:Mail Connector 134
 Lotus Notes Connector 135

Step 8 Planning Your Public Folder Infrastructure 135

Introduction to Public Folders 136
 Selecting Tools for Information Sharing Solutions 137
 Building a Public Folder Infrastructure 138

Step 9 Other Considerations 142
 Estimating Hardware Requirements 142
 Remote Users 143

Step 10 Reviewing Your Plan 144

6 Installing Exchange Server 145

Preparing for Server and Site Setups 147

Gathering Information Used During the Installation 147

Setting Up a Single Server 148
 Creating the Service Account 148
 Creating the Exchange Administrators Group 149
 Installing the Exchange Server Software 150
 Granting the Administrators Group Permissions for the Site 154

Setting Up Additional Servers at the Same Location 155

7 Planning Connections to Microsoft Mail Systems 157

Understanding Microsoft Mail Connector Components 158

Using Microsoft Mail Connector Interchange 158
 Using Microsoft Mail Connector Post Office 159
 Using Microsoft Mail Connector (PC) MTA (Message Transfer Agent) 160

Configuring Connections to Existing Post Offices 162

Configuring LAN Connections to Existing Post Offices 162

- Asynchronous and X.25 Connections for Remote Post Offices 163
- Direct and Indirect Message Routes 163

- Optimizing the Exchange and Microsoft Mail Integration 164

- Using Multiple Microsoft Mail Connector (PC) MTAs 164

- Using Multiple Microsoft Mail Connectors 165

- Using Exchange Server as a Backbone to Microsoft Mail (PC) 165

- Using Existing Microsoft Mail (PC) Gateways 166

- Using Exchange Connectors as Gateways 168

- Directory Replication and Synchronization 169

8 Migrating from Microsoft Mail Systems 171

- Planning the Migration Strategy 172

- Determining the Migration Strategy 172

- Using Single-Phase Migration 173

- Using Multi-Phase Migration 174

- Resolving Migration Issues 176

- Personal Address Books for Users Who Haven't Migrated 176

- Using Exchange Clients with the Microsoft Mail Post Office 176

- Groups and Distribution Lists 177

- Shared and Group Folders to Public Folders 178

- Schedule+ Messages and Calendars 178

- Reviewing a Sample Migration 178

- Phase One: Migrating Headquarters to Exchange 178

- Phase Two: Coexistence 180

- Phase Three: Completing the Migration 181

- Understanding Migration Package Elements 181

- Source Extractor 181

- Microsoft Mail Connector 182

- Directory Exchange Agent 182

- Schedule+ Free and Busy Gateway 182

- Pass-Through Connectivity 183

- Using the Migration Wizard 183

- Migrating Preparations 183

- Creating the User List 184

- Modifying the User List 185

- Migrating from the Post Office to Your Site 186

- Migrating MMFs 190

9 Migrating from Lotus cc:Mail 191

- Understanding the Architecture 192

- Connecting Exchange to Lotus cc:Mail 192

- Understanding How the Connector Works 193

- Using Multiple Connectors to cc:Mail 194

- Using the Migration Wizard 195

- Determining Your Migration Strategy 196

- Migration Levels from Full Migration to Coexistence 196

- Single-Phase Migration 198

- Multi-Phase Migration 199

- Following a Sample Migration with Three Phases 199

- Implementing Exchange Client -202

- Using the Exchange Migration Wizard 203

- Changing Message Storage from cc:Mail to Exchange 203

- Migration Package Elements 205

- After Using the Migration Tool 205

10 NetWare Considerations/Migrating from GroupWise 207

- Understanding the History of Microsoft and Novell 208

Exchange Installation—Server Considerations	209	Following a Sample Migration	225
Choosing a Network Protocol	209	Phase One—Migrating to Microsoft Exchange Clients	226
Migrating User Accounts to NT Servers	210	Phase Two—Sending Microsoft Exchange Messages Through a Microsoft Mail-Based Gateway	227
Moving Existing Data	210	Phase Three—Migrating the Branches to Microsoft Exchange Servers	227
NT Server Expertise	211	Understanding the Role of the Microsoft Mail	228
Exchange Installation—Client Considerations	211	Message Flow from Microsoft Exchange Users to IBM	
Exchange Migration Considerations	212	PROFS Users	229
Using the Exchange Migration Tool	213	Using Client Providers for IBM	
Coexistence of NetWare and Windows NT Server	213	PROFS	229
Migrating from NetWare to Windows NT Server	214	Having Users Drive Migration	229
Understanding the Role of Systems Integrators and Consultants	215	Using the Source Extractor	230
Power Users	215	Preparing to Migrate Data	230
Newsgroups and Web Pages	215	Installing the IBM PROFS Source Extractor	231
Microsoft Solution Providers	216	Creating Addresses in Your Host System	232
Microsoft Consulting Services	216	Creating Mailboxes	234
Organizational Considerations	216	Importing Migration Files	238
Breaking the NetWare Culture	217	Migrating from SMTP (Internet) Mail Systems	238
Committing to an All-Microsoft Strategy	217	System Migration	239
Migrating from Novell GroupWise	218	Migrating Users from POP Mail to Exchange	239
Planning the Migration	218	Building a Parallel SMTP System	239
Using the Migration Wizard	220	Migrating from Foreign X.400 Messaging Systems	240
11 Migrating from External Systems	221	User Migration from Foreign X.400 Systems	240
Migrating from a Host-Based System to Microsoft Exchange Server	222	System Migration	241
Migration Planning Considerations	223	III Exchange Administration and Configuration	
Introducing Migration Steps	223	12 Using the Administrator Program	245
The Migration Elements	223	Starting the Administrator Program and Connecting to an Exchange Server	246
The Migration Tool	223	Using the Administrator Interface	247
Connectors	224		
Gateways	224		
Passthrough Connectivity	225		
Using the Migration Wizard	225		

Navigating the Hierarchy Tree	247
Exchange Administrator Program Menu Overview	254
File Menu	255
Edit Menu	257
View Menu	258
Tools Menu	260
Window Menu	264
Help Menu	264

13 Directory and System Attendant Configuration 267

Configuring Directory Services	268
Setting a Tombstone Lifetime	268
Setting a Garbage Collection Interval	269
Creating an Offline Address Book	269
Defining Custom Attributes	269
Restricting Access to Site Directory Attributes	269
Configuring DS Site Property Pages	269
The General Page	270
The Permissions Page	271
The Offline Address Book Schedule Page	271
The Offline Address Book Page	272
The Custom Attributes Page	273
The Attributes Page	274
Configuring Site Addressing	275
The General Page	276
The Site Addressing Page	276
The Routing Calculation Schedule Page	277
The Routing Page	277
Configuring Server Property Pages	279
The General Page	280
The Permissions Page	281
The Services Page	281
The Locales Page	281
The Database Paths Page	282
The IS Maintenance Page	283
The Advanced Page	284
The Diagnostics Logging Page	285

Configuring Directory Service	286
The General Page	287
The E-Mail Addresses Page	287
The Diagnostics Logging Page	288

Configuring Directory Synchronization Service	289
---	-----

The General Page	290
The E-Mail Addresses Page	290
The Delivery Restrictions Page	290
The Incoming Templates Page	291
The Outgoing Templates Page	292
The Diagnostics Logging Page	292

Configuring System Attendant	292
Accessing the System Attendant Property Pages	293
Setting E-Mail Addresses for the System Attendant	294

Configuring Address Book Views	295
The General Page	296
The Group By Page	296
The Permissions Page	297
The Advanced Property Page	298

14 Message Transfer Configuration 301

Understanding the Transfer Agent Components	302
---	-----

Performing MTA Site Configuration	303
The General Tab	304
The Permissions Tab	304
The Messaging Defaults Tab	305

Configuring Local MTA Properties	308
The General Tab	309
The Queues Tab	311
The Diagnostics Logging Tab	312

15 Information Store Configuration 315

Understanding Important Information Store Concepts	316
--	-----

Information Store Site Configuration	316
The General Page	317
The Permissions Page	318
The Top-Level Folder Creation Page	318
The Storage Warnings Page	319
The Public Folder Affinity Page	321
Configuring Private Information Store	322
The General Page	322
The Logons Page	325
The Mailbox Resources Page	328
The Diagnostic Logging Page	330
Public Information Store/Public Folder Replication	330
The General Page	332
The Instances Page	333
The Replication Schedule Page	334
The Age Limits Page	335
The E-Mail Addresses Page	337
The Logons Page	338
The Public Folder Resources Page	341
The Server Replication Status Page	343
The Folder Replication Status Page	345
The Advanced Page	347
The Diagnostics Logging Page	348
16 Creating and Configuring Recipients	349
Creating Mailboxes	350
Creating a Mailbox with User Manager	351
Creating Mailboxes in the Exchange Administrator	352
Configuring Mailbox Property Pages	353
The General Page	353
The Organization Page	356
The Phone/Notes Page	357
The Distribution Lists Page	357
The Delivery Restrictions Page	358
The Delivery Options Page	359
The Custom Attributes Page	360
The Advanced Page	361
The Limits Page	363
Creating Custom Recipients	364
Configuring Properties for a Custom Recipient	367
The General Page	367
The Organization Page	368
The Phone Number and Notes Page	369
The Distribution Lists Page	369
The Email Addresses Page	369
The Delivery Restrictions Page	369
The Custom Attributes Page	369
The Advanced Page	369
The Protocols Page	370
Creating Distribution Lists	370
The General Page	371
The Distribution Lists Page	372
The Email Addresses Page	373
The Delivery Restrictions Page	374
The Custom Attributes Page	374
The Advanced Page	374
Creating and Configuring Public Folders	375
The General Page	376
The Replicas Page	380
17 Setting Up the Site Connector and Dynamic RAS Connector	383
Understanding Site Connectors	384
Installing a New Site Connector	384
Configuring Site Connector Properties	386
Deleting a Site Connector	391
Using the Dynamic Remote Access (RAS) Connector	391
Installing the RAS MTA Transport Stack	392
Configuring MTA Transport Stack Property Pages	393
Creating a New Dynamic RAS Connector	394
Installing a New Dynamic RAS Connector	394
Configuring a New Dynamic RAS Connector	395

18 Using Directory Replication and Synchronization 403

- Directory Replication Within a Site 404
- Directory Replication Between Sites 404
 - Using the Directory Replication Connector 405
 - Using Directory Replication Between Sites on the Same Network 405
 - Setting Up Directory Replication Between Sites on Different Networks 409
- Viewing a Site's Directory Data 411
- Understanding Directory Synchronization 412
 - Setting Up the Directory Synchronization Requestor 413
 - Using Exchange as a Directory-synchronization Server 419
 - Creating and Configuring a Directory Exchange Server 420
- Defining Remote Directory Synchronization Requestors 422
 - Creating a Remote Directory Synchronization Requestor 422
 - Configuring a Remote Directory Synchronization Requestor 422
 - Configuring Remote Requestors 425
 - Requestor Configuration 426
 - Starting and Stopping the Requestor 428
- Microsoft Mail AppleTalk Requestor 428
- Exporting Directory Information to Exchange Server 429
- Microsoft Mail AppleTalk or Exchange Server Addresses 430
- Removing Exchange Recipients from the Microsoft Mail AppleTalk Local Address List 430
- Re-synchronizing Address Information 431
- Configuring Foreign Directory Exchange Requestors 431

- Configuring Microsoft Directory Exchange Agent (DXA) Settings 432
 - Choosing a Server to Carry Out the DXA Functions 432
 - Modifying DXA Addresses 432
 - Setting Delivery Restrictions 433
 - Mapping Templates to Exchange Server Attributes 434
 - Mapping Exchange Server Attributes to a Microsoft Mail Template 434
- Starting Directory Synchronization 436
- Stopping Synchronization Services 437

19 Using the Microsoft Mail Connector for PC Networks 439

- Understanding the Microsoft Mail Connector 440
- Configuring the Microsoft Mail Connector 444
- Configuring the Microsoft Mail Connector (continued) 446
 - Defining Post Office Connections 447
 - Configuring the Message Transfer Agent 454
- Microsoft Mail Connector Address Space 458
 - Configuring the Address Space 459
 - Configuring the Local Exchange Post Office 460
- Microsoft Mail Connector Post Offices and Gateways in PC Mail 461
 - Managing the NT Service for the Microsoft Mail Connector 462
 - Testing the Connection Between Exchange and MS Mail 462
- Adjusting the Auditing Levels for the Microsoft Mail Connector 464
- Configuring Directory Synchronization 465

20 Using the Microsoft Mail Connector for AppleTalk Networks 469

Introduction to the Microsoft Mail Connector 470

Installing Services for Macintosh 471
 Creating a Macintosh-Accessible Volume 472
 Configuring Macintosh-Accessible Volume Permissions 473
 Testing Connection to the Macintosh-Accessible Volume 474

Configuring the Microsoft Mail Connector for Use 475

Configuring Exchange Microsoft Mail Connector Properties 476

 The Interchange Page 476
 The Mail Connector AppleTalk MTA Dialog Box 477
 The Local Postoffice Page 478
 The Connections Page 479

Configuring Macintosh Microsoft Mail (AppleTalk) 480

 Installing the Microsoft Exchange Connection Gateway 481
 Configuring the Exchange Connection 482
 Scheduling Gateway Connections 483
 Installing an Access Gateway 483

21 Configuring X.400 Connections 485

X.400 Supported Transport Protocols 486

X.400 Connector Installation and Configuration 486

 Installing an MTA Transport Stack 487
 Configuring MTA Transport Stack Property Pages 488
 Setting Up a New X.25 Transport Stack 489
 Setting Up a New TP4 Transport Stack 491

Installing and Configuring an X.400 Connector 492

 Creating a New X.400 Connector 492
 Configuring an X.400 Connector 493
 Manually Modifying Indirectly Connected Sites 499

Configuring a Foreign X.400 System 503

Verifying Connections 504

22 Configuring the IMS 505

Learning the Internet Mail Service Wizard 506

Learning the Internet Mail Service (IMS) 506

 Internet Standards on the Internet Mail IMS 507
 Understanding IMS Uses 508

Understanding the Internet Mail IMS Components 511

Setting Up IMS Components 512

Setting Up the Internet Mail Service 514
 Defining an Administrative Message Account 515

 Configuring the Address Space Served by the IMS 516
 Specifying the Site Address 518
 Configuring Connection Options 518
 Defining Message Content Options 523

 Setting Advanced Options 525
 Defining IMS Message Restrictions 526

 Setting Security Options 529
 Supporting Other Protocols 529
 Accessing the Directory Through LDAP 530

 Managing SMTP Messages 531
 Defining an Additional IMS Within a Site 534

Testing the IMS 534

23 Setting Up NNTP 537

- Historical Overview 538
 - Understanding Newsgroups 539
 - Understanding UseNet's Flow 539
 - Understanding Newsfeeds 540
- Planning for the Internet News Service (INS) 542
- Establishing NNTP Connectivity Phases 542
 - Installing an NNTP Newsfeed 543
 - Configuring an NNTP Connection 551
- Understanding Newsgroup Hierarchies 558
- Understanding NNTP Protocol Properties 558
 - Using Properties for Permissions 560
 - Using Properties for Newsfeeds 560
 - Using Authentication 560
 - Converting Message Format 562
 - Control Message Properties 563
 - Enabling Anonymous Access 564
 - Setting Idle Time-Out 565
 - Setting Diagnostics Logging 565
 - Configuring the Client 566
 - Configuring Internet Newsgroup Public Folders 567

24 Exchange Performance Tuning and Capacity Planning 569

- The Art of Performance Tuning 570
 - Defining Users 570
- Defining Servers 570
 - Defining Load 571
 - Direct versus Background Requests 571
- How Many Users Can Exchange Support? 572
- Using Exchange's Performance Tuning Tools 572
 - Using the Performance Optimizer 573
 - Using the Performance Monitor 574

Detecting Disk Subsystem Bottlenecks 575

Addressing Disk Subsystem Bottlenecks 576

- Separating All Transaction Logs 576
- Installing Additional Hard Disks 576
- Installing Faster Hard Disks and Drive Controllers 576
- Using RAID Disk Striping to Increase Performance 576
- Minding Memory Requirements in Exchange 577

Detecting Memory Bottlenecks 577

Addressing Memory Bottlenecks 577

- Adding Memory 577
- Using Multiple Paging Files 577
- Removing Unnecessary Services 578

Detecting Network Bottlenecks 578

- Detecting Client Side Bottlenecks 578
- Detecting Server Side Bottlenecks 579

Addressing Network Bottlenecks 579

- Applying Faster Hardware on Heavy Traffic Links 579
- Segmenting Your Network 579
- Matching the Network Card to the System Bus 580
- Increasing Your Bandwidth 580

Detecting Processor Bottlenecks 580

Addressing Processor Bottlenecks 580

- Upgrading Your Processor 580
- Using Off-Peak Scheduling for the Processor 581

Detecting System Bus Bottlenecks 581

Addressing System Bus Bottlenecks 581

- Using Larger CPU Caches 581
- Using Off-Peak Scheduling for the Processor 581

Exchange-Specific Counters 582

- Trend Counters 582
- Service Time Counters 583

- Optimizing Dedicated Exchange Servers 583
 - Optimizing Messaging Servers 583
 - Optimizing Connector Servers 584
 - Optimizing Public Folder Servers 584
 - Optimizing Servers with Shared Roles 585
- Real World Answers to "How Many Users Can Exchange Support?" 585
 - Calculating Acceptable Server Response Times 585
 - Capacity Planning with LoadSim 587

25 Maintaining Exchange 589

- Relocating Server Recipients 590
- Replicating Public Folders 591
 - Public Folder Replicas 592
 - Moving a Public Folder with the Exchange or Outlook Client Software 593
- Creating Mailbox Templates 593
- Performing Information Store Maintenance 594
 - Private Information Store Properties 595
 - Public Information Store Properties 598
- Defragmenting and Compacting Information Stores Offline 601
- Maintaining Message Transfer Agents 603
 - MTA Message Queues 604
 - MTA Diagnostic Logging 605
- Maintaining Microsoft Mail Connector 605
- Maintaining Directories 607
 - Understanding Knowledge Consistency 608
 - Resynchronizing Replicated Directory Information 608
- Defragmenting and Compacting Directory Information 609

- Working with Directory Event Logs 610
- Backing Up Your Exchange Server 610

26 Monitoring Your Organization 613

- Creating a Link Monitor 614
 - The General Page 616
 - The Notification Page 616
 - The Servers Page 619
 - The Recipients Page 620
 - The Bounce Page 621
- Creating a Server Monitor 622
 - The Services Page 622
 - The General Page 623
 - The Notification Page 624
 - The Servers Page 625
 - The Actions Page 627
 - The Clock Page 629
- Starting and Using a Monitor 629
 - Automatically Starting a Server Monitor 630
 - Manually Starting a Server Monitor 630
- Using Monitor Status Windows 631
 - Reading the Link Monitor Window 631
 - Reading the Server Monitor Window 632
- Stopping a Monitor for Maintenance 632
- Using SNMP to Monitor and Troubleshoot 633
 - Using the Batch File 635
 - Using Perf2mib.exe and Mibcc.exe 635
 - MIB Viewing 635

27 Exchange Security 637

- Understanding Windows NT Authentication 638
- Defining Windows NT Domain Architecture 638

Understanding the Types of Windows NT Accounts 639

- User Accounts 639
- Service Accounts 639

Understanding Windows NT Access Control 640

- Mailbox Permissions 640
- Public Folder Permissions 640
- Applying Directory Permissions 641
- Applying Windows NT Groups and Permissions 641

Using Windows NT Auditing Capabilities 642

Introduction to Data Encryption 642

Using Exchange's Advanced Security 643

- Understanding Keys 644
- Understanding Certificates 644
- Understanding Tokens 645
- Understanding Key Management Server 646
- Understanding Digital Signatures 646

Understanding Key Management Server 647

- Selecting the Server to Manage the Key Management Database 647
- Installing the Key Management Component Software 648
- Starting the Key Management Server Service 648
- Changing Your Advanced Security Administrative Password 649
- Enabling Advanced Security Features for Individual Users 649
- Using Person-to-Person Key Exchange 649
- Configuring Remote Sites to Use Advanced Security 650
- Verifying that the Key Management Component Is Functioning Correctly 651
- Viewing Security Logs for Errors or Attempted Breaches 651
- Backing Up and Maintaining the Key Management Database 651

S/MIME 651

28 Troubleshooting Exchange with Diagnostic Tools 653

- Tracking Exchange Messages 654
 - Enabling Message Tracking 654
 - Using Exchange Administrator Tracking Tools 655
 - Using the Message Tracking Center 657
 - Tracking a Message 662

Additional Exchange Core Component Troubleshooting Tools 662

- Using MTACHECK 662
- Using ISINTEG 664

Using Diagnostic Logging 665

- Subcomponents and Categories 665
- Logging Levels 666

Using Windows NT Event Viewer 667

III The Exchange Client

29 Installing and Configuring Outlook 671

Preparing to Install Outlook 672

- Installing through an Installation Share 672
- Outlook System Requirements 673
- Saving Your Personalized Information 673

Installing Outlook 673

Configuring Outlook 676

- Knowing Your Messaging Services 676
- Creating Your Outlook Profile 676

Configuring Offline Folders 681

30 Using Outlook 683

Configuring Outlook Views 684

Using the Office Assistant 686

Configuring Folder Permissions Through Exchange 686

- Using the Inbox 687
 - Creating Messages 688
 - Reading Messages 690
- Using the Calendar 691
 - Adding an Appointment to Your Calendar 691
 - Adding a Detailed Appointment to Your Calendar 692
 - Organizing a Meeting 693
 - Editing Appointments and Meetings 694
 - Adding Events 695
 - Time Zone Issues 695
- Managing Your Contacts 696
 - Adding Contacts 696
 - Viewing Contacts 699
 - Importing Contacts from Personal Address Book 700
- Deleted Item Recovery 700

31 Using Advanced Outlook Features 705

- Utilizing Auto Assistants 706
- Using Remote Mail 706
- Managing Projects with Tasks 707
 - Creating a New Task 707
 - Editing 708
 - Assigning Tasks to Others 708
 - Recurring Tasks 709
 - Dragging a Task to Your Calendar 709
- Using the Journal 710
 - Creating a Journal Entry 710
 - Using the Timer 711
 - Setting Journal Options 711
- Using Notes 713
- Profiles and Information Services 713
 - Introduction to Profiles 714
 - Understanding Information Services 714
- Working with Delegates 714
- Working with Public Folders Offline 715

- Web Outlook View 716
 - Messaging with Outlook Web Access 716
 - Public Folders 719
 - Find Names 722
 - Options 723
 - Calendaring in Outlook Web Access 724
 - Selecting to Log Off 726

IV Third-Party Integration and Application Development

32 Leveraging Your Investment in the Exchange Platform 729

- Using Workflow Technologies to Extend Exchange 730
- Document Imaging and Management with Exchange 733
- Information Sharing 735
- Understanding Information Providers 737
- Communications Gateways and Connectors for Exchange 738
 - Communication Support for Exchange 738
 - Gateway Support for Exchange 741
- Content Indexing, Searching, and Retrieval 746
- Virus Protection Products 747
- Various ISV Solutions 748
- Consulting Solutions 749

33 Developing Exchange Forms 753

- Installation of the Exchange Forms Designer 755
- Using Forms in Your Organization 755
 - Discussing Applications 756
 - Referencing Repositories 756

- Explaining the Forms Environment 756
 - Forms Libraries 757
 - Views 757
 - Rules 758
 - Permissions 758
 - Items 759
- Explaining the Form's Components 759
- Setting Properties of Form Components 760
- Installing Forms 760
- Planning Your Exchange Form 761
- Creating the Web Site Button Form 762
 - Defining the Purpose 762
 - Defining the Fields 763
 - Creating a Folder for Your Application 764
 - Creating the Form 764
 - Setting the Properties of All Objects 769
 - Installing the Form 774
 - Testing the Form 776
 - Designing the Views 776
 - Copying or Moving the Form to a Public Folder 778
 - Setting the Folder Properties 779
 - Setting Folder Permissions 780
 - Setting Folder Rules 781
- Using Your Form 783
- Extending Forms with Visual Basic 784
 - Potential Uses of Visual Basic with Exchange Forms 785
 - Modifying Applications 785
- Creating the Personnel Profile Information Application 787
- Creating the Personnel Profile Information Folder 788
 - Restricting Folder Access 789
 - Making the Folder Address Available 789
- Creating the Personnel Profile Information Request Form 790
 - Designing the Compose Window 790
 - Setting the Window Properties for the Compose Window 791
- Designing the Read Window 791
 - Setting the Initial Value for the Subject Field 791
 - Copying User Instructions Label Field to the Compose Window 793
 - Resizing the Read Window 793
 - Setting the Window Properties for the Read Window 793
 - Setting the Form Properties for the Read Window 794
 - Selecting Events for the Request Form 794
 - Creating a Custom Response 795
 - Saving and Installing the Form 796
- Creating the Personnel Profile Information Form 796
 - Adding Fields to the Compose Window of the Response Form 797
 - Setting the Initial Value of the Teams Field 800
 - Pre-addressing the Response Form 801
 - Setting the Window Properties for the Response Compose Window 801
 - Copying Fields in the Compose Window to the Read Window 802
 - Setting Window Properties for the Response Read Window 802
 - Setting Form Properties for the Response Read Window 802
 - Saving and Installing the Response Form 803
 - Creating the By Team View 803
 - Setting Permissions 803
 - Testing the Application 804
 - Adding a Button to the Form with Visual Basic 805
 - Cleaning up the Form Window 805
 - Increasing the Canvas Size 806
 - Adding Code to the Command Button 806
 - Copying Command Button and Code Contents to the READ.FRM 807
 - Making an .EXE File 807
- Reinstalling the Personnel Information Request Form 807

Outlook Forms Development	808
Outlook Forms Designer	808
Outlook Form Categories	808
Modifying Built-in Forms	809
Creating a Custom Form	809
Publishing the Form	810
Exporting Your Forms and Outlook Applications	810
Form Views	810

34 Taking Exchange to the Web 811

Understanding the Active Server Platform	812
--	-----

Laying the Foundation	813
-----------------------	-----

Preparing IIS for Active Server Page Application	814
--	-----

Introduction to Active Server Pages Using VBScript	817
--	-----

Working with VBScript	817
-----------------------	-----

Using Active Server Page Applications	818
---------------------------------------	-----

Understanding Active Messaging	820
--------------------------------	-----

Working with Active Messaging	820
-------------------------------	-----

Following an Active Server Page Example	821
---	-----

Working with Remote Data Services	824
-----------------------------------	-----

Finding a Starting Point	826
--------------------------	-----

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Microsoft Exchange Server is one of the most scalable and feature-rich products from Microsoft. In a small office, it's a robust messaging and group scheduling system with Internet mail capability, so that Exchange users can reach just about anyone on the Internet. In a large corporation, it's positioned to be the messaging backbone and a versatile groupware product. Using the Forms Designer, you can build custom workflow applications, such as a personnel profiles database. (See Chapter 33, "Developing Exchange Forms" for a personnel profile form application created from scratch.) Because larger companies usually have existing mail systems, Exchange provides several connectors, gateways, and migration/extraction tools so that your current mail system can coexist with or migrate to Exchange. With the newly enhanced Lightweight Directory Access Protocol (LDAPv3) features in Exchange 5.5 and the new hooks for the forthcoming Windows NT 5.0 Active Directory Services, Exchange may also become the integrated center of a unified corporate directory service.

Plus, for any size environment, a single, intuitive Administration program manages your entire messaging environment. Exchange, in essence, becomes the heart of your messaging system.

What Are the Key Features of Exchange?

Exchange is the new reality of messaging technology to which other vendors are striving. Exchange provides revolutionary functionality and performance at a low end-user cost. Now that you have an understanding of what Exchange is and how it's positioned for different types of companies, look at some its features.

Outlook

Outlook is a feature-rich Exchange client. Positioned as an upgrade to the Microsoft Exchange Client and Schedule+ that appeared in the original Exchange 4.0, it was designed as Microsoft's premier email client for 32-bit Windows-based systems. In the latest release Exchange 5.5, versions of Outlook are now available in a 16-bit version for Windows 3.x, Macintosh, POP3/IMAP4, and for Web Browser access via Active Server Components and HTML. Outlook in all its versions is available with Exchange Server, as a stand-alone product (32-bit version), and as a component of Office97. Outlook operates as a client with Microsoft Mail and Schedule+ 7.0, Microsoft Exchange Server, POP3 / IMAP4, and other messaging systems, such as cc:Mail and Lotus Notes. The flexibility enables administrators to deploy their choice of client within a company. No matter what a company's decision, Microsoft provides a unified client architecture and logical upgrade paths from most any client currently used. Combining the features of the Exchange Client (Inbox) and Schedule+, users can still manage email, calendars, contacts, tasks, and to-do lists. Outlook, however, enhances all these previous features and adds enhanced views, journalizing capabilities, document management, and *postable* notes.

As a feature of the Internet Mail Service of Exchange when integrated with the Microsoft Internet Information Server (IIS), email functionality is also available by using a standard Web browser. Outlook Web Access (OWA) enables remote users, who either do not have access to Outlook or have limited hardware resources (RAM, hard drive space), to easily review

messages and access public folders on an Exchange Server using Internet Explorer. With Exchange 5.5, the Outlook Web Access Client can also schedule calendar events and manage server-based rules. Note that you must have Microsoft's Internet Information Server (IIS) installed to provide email access to Outlook Web Access users.

Built-in Internet Standards

Exchange supports several protocols, including SMTP (Simple Mail Transfer Protocol), POP3 (Post Office Protocol), and now IMAP4 (Internet Mail Access Protocol) for email, NNTP (Network News Transfer Protocol) for Internet newsgroups retrieval, LDAPv3 (Lightweight Directory Access Protocol) for Exchange directory access (reads and writes), HTTP and HTML for Web access, and SSL for secure Internet transmission. S/MIME is added for secure encryption of MIME attachments over SMTP mail and MHTML to allow encapsulation of HTML content in MIME format. ETRN support is added to enable the Exchange server to act as both SMTP server and client for easier access to held Internet mail via dial-up.

You can use any email client that supports POP3 or IMAP4 to retrieve messages from a Microsoft Exchange Server, including the Microsoft Outlook Express Client (replacing the older Internet Explorer Mail Client). Microsoft Exchange Internet Mail Service (IMS) provides a standard SMTP server for any POP3 Client or IMAP4 Client to submit its messages.

NNTP enables a full newsgroup of Internet newsgroups into your company's public folders. Employees can post responses right into the public folder, and the response is posted back to the appropriate newsgroup on the Internet.

LDAP is an Internet protocol that enables users to access Exchange's directory information. With the proper rights, clients can read, search, and browse Exchange's directory from the Internet or corporate intranet. Even though the IETF has not completely ratified the latest LDAPv3 standard, many of the proposed functions are already included in Exchange 5.5. With LDAPv3, all 16 proposed commands—including searches, reads, and now writes—can enable updates to and from external directory services. You can grant end users the ability to update their LDAP and, thus, Exchange directory information. Referrals support has also been added to automatically forward an LDAP search to another LDAP service provider for resolution.

All of these LDAP-centric functions enable easy integration with the forthcoming NT 5.0 Active Directory Services Interface (ADSI) to dynamically update the Exchange 5.5 directory with data from ADS and vice versa.

With HTTP and HTML, along with Internet Information server (IIS) and Active Server Components, users can access their private mailboxes, calendars, and public folders using a standard Web browser, such as Internet Explorer.

SSL is a supported Internet-security protocol that protects data traveling on the Internet. Simple Authentication and Security Layer (SASL), pending ratification by the IETF, is also a supported option to force SSL authentication before the server can accept SMTP messages. This feature enables secure SMTP-based connections between Exchange servers over the Internet.

cc:Mail Connector

Exchange 5.0 offered a cc:Mail connector that provided complete email connectivity to existing cc:Mail installations. Exchange 5.5 extends these connectivity options to support additional older versions of cc:Mail. Email with attachments may be sent between both messaging platforms. Directory synchronization between Exchange and cc:Mail is also possible. By offering coexistence, the built-in connector enables you to rollout Exchange in phases instead of all at once.

Lotus Notes Connector

With the recent acquisition of the Canadian message-switching-technology company, Linkage Software, Microsoft has integrated the best of the Linkage technology into the release of Exchange 5.5, including connectivity and directory replication between Exchange and Lotus Notes. Microsoft has enhanced the acquired Linkage elements to directly use the Exchange Directory engine and to remove the previous Linkage requirement for a separate SQL server for Directory Synchronization.

PROFS and SNADS Connectors

Many of the Fortune 1000 have invested large amounts of resources in maintaining IBM's PROFS OfficeVision and SNADS messaging technologies on various flavors of big iron and mid-range systems. Microsoft Exchange 5.5 now offers Linkage technology as an integrated component to link Exchange to these legacy systems. The technology enables migration and coexistence as clients switch over to the Exchange system and clients, which cost less and have richer features.

Linkage technology also makes possible Directory Synchronization between the legacy systems. Combining all the new connectivity options makes Exchange a premier messaging switch, and many industry pundits have ironically observed that Microsoft now owns the best solution for connecting Lotus Notes to HOST-based messaging systems!

User-Definable Server or Client-based Message Rules

Exchange provides support for *server-based* rules, where users can configure rules to execute on their Exchange home servers, such as forwarding messages to particular individuals, replying with an *out of office* note to all incoming messages, and routing messages to specific folders to manage messaging flow. Because the process runs on the Exchange Server, the user doesn't need to be logged in.

The server rules can apply to applications that are using Exchange. Outside information stores, for example, have a server agent configured from the client. The next time the user logs into the system, the server agent runs to retrieve information for the user.

With several of the flavors of Outlook Client, users have the option of setting up *client-based* rules to assist in managing messages in their local folders. A useful example is to set up a client-based rule to delay sending messages from the Outbox for 15 minutes, which enables you to rethink that message you just sent to the CEO!

ty.

Furthermore, the Exchange client is designed to sense line-connection speed and transfer less data over dial-up connections. This increases the efficiency of the connection. When using Remote Mail options, you can set the client software to download only mail message headers on a remote connection. You can then download full message bodies as needed, based on subject, size, and sender.

Exchange builds upon the scalability of Windows NT Enterprise Edition to enable support for both server clustering and 8-way Symmetric Multi-Processor support (SMP).

Exchange Server Information Store

One of the major perceived limitations of Exchange 4.0/5.0 was the 16 GB limit of each of the Exchange Information Store databases (Private, Public, and Directory). Microsoft has shattered the 16GB limit with new JET database technology that raises the limit to 16,000GB (16 terabytes) in each database. By combining this dramatic enhancement with the fully relational database structure and SQL-like transaction logging functions of Exchange, Microsoft opens Exchange to nearly limitless possibilities for managing very complex messaging-based applications.

Exchange makes great use of *single-instance message storage* by saving one copy of a message in its databases, and then enabling multiple users to access the message. In this way, if a 5MB message and attachment were mailed to all 1000 users on an Exchange server, the server actually would use only 5MB to store the message. When the last user deletes the message from his or her mailbox, the message is removed from the database.

Breaking the 16GB limit enables Exchange servers to support exponentially more users. With the 16GB limit of earlier versions, if the Exchange Administrator decided to limit each user to 50MB of storage space on the Exchange server, the theoretical limit on users per server was 320. With the new 16TB limit, this number can easily rise to 320000 users! (Taking into account the single-instance message storage, this number of users can rise much higher.)

One of the most exciting, and most requested, new features of Exchange 5.5 is the capability to recover deleted messages and folders. Essentially, a tombstone/recycle bin concept has been applied to the message store, so that when you delete objects, they are not removed from the database until a specified number of days pass or a backup of the server executes.

Of course, Message Tracking has been available in Exchange from the first release to enable administrators to trace the path a message takes through the systems' various connectors, gateways, and MTAs.

Public Folders and Replication

Public folders are central repositories of common information. Exchange users can post messages, files, applications, forms, and so on. By making use of the messaging infrastructure of Exchange, you can replicate public folders throughout the Exchange enterprise. Rather than sending a mail message to many users, you can use public folders like an electronic bulletin board. A user can then post a reply into a folder and, create a thread of responses.

You can also replicate public folders down to the client PC to facilitate offline creating and reading via the process of synchronization. You also can set permissions to restrict access to certain folder contents. The public folder replication function is designed to minimize the amount of replicated data. Public folder contents are also indexed and these indexes are available across the enterprise.

To facilitate development of advanced public folder applications, Exchange 5.5 adds the Exchange Scripting Agent as a Windows NT service for managing server-executed scripts. These scripts can be time- or event-driven Visual Basic or JavaScript components that interact with messages and with the various functions of Exchange. This powerful feature enables developers to more easily build complex workflow functions and routings.

Collaboration Functions

Exchange 5.5 introduces several enhancements to enable easier online interaction and collaboration, which improves productivity. A new Exchange Chat Service has been added to enable Exchange clients to easily initiate chat sessions for virtual meetings. To further facilitate collaboration in real-time on document creation, whiteboard sessions, and so on, the Internet Locator Service (ILS) also ships with Exchange 5.5. The ILS tracks who is online and available for such interactive sessions via Microsoft NetMeeting. Users can pick meeting participants from the Exchange Global Address List. Having this single source for lookups of users reduces the need for multiple address books to track them.

Exchange's Advanced Security

With the Key Management Server (KMS), Exchange adds additional security over the C2 level security provided by Windows NT Server. Exchange offers you the ability to sign a message with a digital signature, which is used to verify that the user sending the message is really the true sender. Exchange also offers levels of message encryption to ensure that only the sender and recipient can read a message's contents. Person to Person Key Exchange (PPKE) enables users to exchange digitally signed and encrypted messages over the Internet. Previously, this was possible only between users within an Exchange Organization.

Dramatic enhancements to the KMS in Exchange 5.5 enable the bulk creation and distribution of user keys, which makes it easier to set up an entire location or corporation to use these security options. The integration of KMS setup into the Exchange Administrator program makes overall management of the KMS much easier as well. Key recovery options are also added, which enable an Exchange administrator to recover and re-issue a user's key if the user forgets the password, or if the user leaves the company without disclosing the password. Through this same mechanism, you can also revoke a user's key.

To better control an Exchange administrator's ability to affect key security, options are available to implement so-called missile silo passwords in which two different administrative passwords are required to change or disable certain security features.

Keeping in line with proposed Internet security standards, you can anticipate future support for X.509v3 (enhancing the current X.509 support in Exchange) and S/MIME certificates, such as VeriSign.

Outlook Forms Designer

Exchange's Outlook Forms Designer tool is simple enough for end users to create basic forms, and powerful enough for experienced developers to create form-based applications. The forms automate common requests, such as time-off requests or office-supply orders. Using public folders, you can multiply the effectiveness of forms by replicating the forms and their information throughout your enterprise.

Coupled with Microsoft's Visual InterDev tool, a developer can more easily convert Outlook forms into HTML forms via the new Forms Conversion Wizard. After you convert the forms, you can make them available to Outlook Web Access clients via Active Server Pages.

Developer Tools

Exchange 5.0 added the ability to present Exchange data to the Web via Active Server Pages and components called Active Messaging. The name has been changed to reflect the unified Microsoft development strategy and is now known as Collaboration Data Objects (CDO). The included CDO library offers developers a set of pre-built objects on which they can create more powerful and complex web-based applications.

Microsoft is also bundling a single-user version of Microsoft Visual InterDev for use in creating and managing HTML forms and other Java, ActiveX, and CDO elements.

Multiple Language Support

Exchange supports more than 20 languages and provides many features for companies whose sites are spread throughout the world.

Single-seat View for Administration

The Exchange Administrator tool is the central console managing all Exchange activity within an organization. This includes all servers, users, mailboxes, connectors, gateways, public folders, and sites. As noted previously, the Administrator tool now offers you the ability to recover the deleted message objects and folders.

An enhancement for system administrators is support for Simple Network Management Protocol (SNMP) via the industry standard MIB. You can now monitor Exchange from such tools as HP OpenView and other enterprise-monitoring solutions.

Many large corporations are composed of multiple corporate entities that are essentially separate and distinct but that want to share a common messaging backbone and directory. Exchange 5.5 introduces *multiple organization hosting* to enable you to break the Exchange Directory down into many virtual containers associated with each line of business unit. You can still apply all the normal Exchange security permissions, so the various users and administrators of each virtual organization can see and control only their respective components.

Online System Backup

Believe it or not, email can grow in use to become a company's most mission-critical application. Especially in international firms, Exchange must be up 24 hours a day and seven days a week for 365 days a year. Exchange enables you to perform backups of open messaging stores via appropriate Exchange-aware backup solutions without shutting down the server or having users log out.

With the new Information Store limits pushing to 16TB, backup and recovery support in Exchange have been enhanced to enable more efficient databases locks and reads, pushing backup performance to a possible 25GB per hour.

Support for 1984 and 1988 X.400 Standards

Exchange simultaneously offers Message Transfer Agent support for both 1984 and 1988 X.400 standards, which means Exchange offers you flexibility when you design an Exchange enterprise architecture. Microsoft is committed to maintaining X.400 compatibility as 199X standards are published.

Message Routing

Message routing provides multiple routes to transfer mail between sites. If one link for remote sites goes down, Exchange automatically reroutes mail using a secondary route. Exchange can also calculate the least costly route when all links are functional. Microsoft has made several to boost the capabilities of the *dynamic re-routing* feature and to force Exchange to evaluate a route based only on the cost assigned.

Migration Tools for non-Exchange Mail Systems

Microsoft realizes that many other systems are in use today. Therefore, Microsoft provides connectors, gateways, and migration/extraction tools to provide either complete coexistence with Exchange or a smooth migration path onto an Exchange platform.

Who Should Use This Book?

This book is aimed at network and system administrators as well as messaging specialists who are responsible for installing, configuring, and maintaining an Exchange system. Most of the examples in this book are geared to a large, international enterprise to draw out all Exchange's features. MIS managers can use the information in this book to make key decisions about adopting and deploying Exchange. Finally, this book touches on application-forms development. Although Exchange's Outlook Forms Designer targets novice developers who may not have a strong Visual Basic (VB) background, VB programmers can leverage their knowledge to make additional custom extensions and web-enable their forms.

How to Use This Book

This book is divided into five sections. The first two sections are for a general audience, and the last three sections depend on an understanding of the previous sections.

Part I Introduction to Microsoft Exchange

Part I welcomes you into the world of Microsoft Exchange. As described briefly in the preceding sections, Exchange is a completely revolutionary client/server messaging system. Part I presents a complete overview about how Exchange integrates into your environment.

Chapter 1, "Overview of Microsoft Exchange," introduces the concepts of working with client/server messaging, groupware, document management, and the universal Inbox. This chapter also discusses many new features available with Microsoft Exchange 5.5.

In Chapter 2, "Understanding Exchange's Organization and Sites," you learn about the different tiers in Exchange's messaging hierarchy.

Chapter 3, "Exchange's Integrated Server Components," provides a more in-depth look at Exchange's core components and how they cooperate with each other.

Chapter 4, "Integrating with Microsoft Windows NT Server," identifies the integration of Exchange into Windows NT and Exchange NT dependencies.

Part II Installing and Migrating to Exchange

Part II is the core of the book. These seven chapters spells out all the planning essentials for migrating to or deploying a new Exchange architecture.

Chapter 5, "Designing Exchange Topology," introduces you to the planning process you need in order to design an Exchange architecture. In the chapter, you analyze your company's messaging needs and infrastructure, and then you design an Exchange architecture.

Chapter 6, "Installing Exchange Server," outlines the system requirements for Exchange, provides step-by-step installation instructions, and discusses adding additional Exchange servers into an existing Exchange Organization.

Chapters 7 through 11 provide information needed when you are working with non-Exchange mail systems. You are guided through connecting to or migrating from Microsoft Mail, migrating from Lotus cc:Mail, migration from PROFS/SNADS, installing Exchange in a NetWare environment, and migrating from external systems.

Part III Exchange Administration and Configuration

In Part III, you learn how to configure all the Exchange services—connectors, message transfer agents, links to external systems, public folders, and address routing. This part also focuses on the administration of Exchange.

Chapters 12 through 15 discuss how to use the Exchange Administrator program, and how to use the core components in Exchange server.

Chapter 16, "Creating and Configuring Recipients," exemplifies how to create a mailbox and Windows NT domain account for an Exchange user, which also includes distribution lists and foreign-mail system custom recipients.

Chapter 17, "Setting Up the Site Connector and Dynamic RAS Connector," discusses how to install and set up a site and RAS connector.

In Chapter 18, "Using Directory Replication and Synchronization," you learn what directory replication is and how to configure Exchange's Directory Synchronization services.

Chapters 19 and 20 walk you through using the Microsoft Mail Connector for PC and AppleTalk networks. Exchange includes several custom features to support this integration.

Chapter 21 similarly discusses configuring X.400 connections.

Chapter 22 focuses on the many features of the Internet Mail Service including SMTP mail connectivity, POP/IMAP client access, LDAP functions, and HTTP web interfacing.

In Chapter 23, "Setting Up NNTP," you learn what Network News Transfer Protocol (NNTP) is, and how to install, configure, and administer it.

The information in Chapter 24, "Exchange Performance Tuning and Capacity Planning" applies to all Exchange implementations. You learn how to use several performance-tuning tools, and to detect and tune the most common Exchange bottlenecks. You also learn the techniques that answer the burning question: How many users can one Exchange server support?

Chapters 25 through 28 discuss managing and monitoring Exchange's daily operations as well as troubleshooting Exchange when problems occur. You also learn about Exchange's advanced security features in Chapter 27.

Part IV The Exchange Client

This part discusses the Exchange client—Outlook. This includes several of Outlook's features, such as enhancing email, effective scheduling, managing tasks, journalizing your activities, organizing your contacts, and using notes to jot down important thoughts.

Chapter 29, "Installing and Configuring Outlook," describes the spectrum of setup methods and Outlook's system requirements.

Chapters 30 and 31 teach you how to use the common and advanced features of Outlook, including printing, profiles and information services, and the Outlook Web Access view.

Part V Third-Party Integration and Application Development

Part V presents some other uses for the Exchange architecture.

Chapter 32, "Leveraging Your Investment in the Exchange Platform," highlights several add-ons and enhancements from independent software vendors who are developing solutions for Exchange. The chapter also describes consulting firms that are expert in developing, piloting, and deploying Exchange.

Chapter 33, "Developing Exchange Forms," teaches you to design custom forms using Exchange's Form Designer. This chapter discusses many of the programming issues associated with developing custom forms.

Chapter 34, "Taking Exchange to the Web," covers the functions of interfacing the Active Server Pages of Microsoft's Internet Information Server with the Collaborative Data Objects (CDO) provided in Exchange to create Web-based applications and solutions.

Conventions Used in This Book

Que has over a decade of experience writing and developing the most successful computer books available. With this experience, we learned which special features help readers the most. Look for these special features throughout the book to enhance your learning experience.

Several type and font conventions are used in this book to help make your reading easier.

- *Italic type* is used to emphasize the author's points or to introduce new terms.
- Screen messages, code listings, and command samples appear in `monospace` typeface.
- Code and other information that the user is asked to type appears in **bold monospace** type.

TIP

Tips present brief advice on a quick or often-overlooked procedure. These tips include shortcuts that will save you time.

NOTE Notes present interesting or useful information that isn't necessarily essential to the discussion. A note is used to provide additional information that may help you avoid problems, or to offer advice that relates to the particular topic.

CAUTION

Cautions look like this and serve to warn about potential problems that a procedure may cause, unexpected results, and mistakes to avoid.

Introduction to Microsoft Exchange

- 1** Overview of Microsoft Exchange 15
- 2** Understanding Exchange's Organization and Sites 45
- 3** Exchange's Integrated Server Components 65
- 4** Integrating with Microsoft Windows NT Server 87

In

“Build the world’s fastest, most scalable, most reliable, easiest to administer messaging and groupware enterprise platform that can connect to the world.”

Brian Valentine, Microsoft General Manager, Exchange Group 1993

This has been Microsoft’s compelling vision for Exchange since its conception in 1993.

But what exactly is Exchange? Microsoft Exchange Server is a messaging product for businesses, integrating e-mail, group scheduling, electronic forms, and common groupware applications in one product that can be easily managed via a single administrator program. Exchange facilitates collaboration within companies so teams can share the latest information obtained, internally via intranets and externally from the Internet and newsgroups. This messaging product also enables managers to schedule meetings with several people and manage resources through a common interface. Departments can set up information repositories (solution databases) for reference and discussion. Companies can create virtual knowledge bases with their business partners using an extranet. In short, Microsoft Exchange Server 5.5 is designed to help you communicate and collaborate with anyone, anywhere, anytime—easily.

This chapter provides an overview of Exchange 5.5, its new features on both the client and server side, and its positioning as an enterprise-wide messaging system.

The History of Messaging

Electronic mail has been in existence for many years. The original electronic mail systems—including PROFS, SYSM, and Memo—resided on UNIX-based host computers or IBM mainframes. The single host, whether it was a mainframe or a minicomputer, was a centralized solution. These electronic mail systems, many of which are still running today, are text-based and provide enterprise-wide messaging.

Understanding Shared-File Messaging

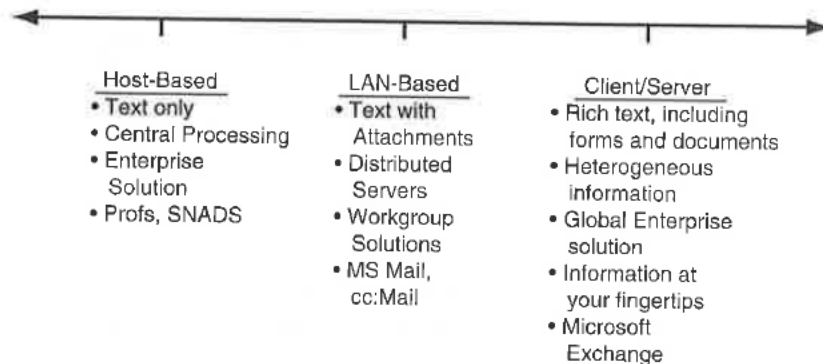
PCs began to grow in capability and popularity, however. As their acceptance became widespread, their cost began to drop, prompting more purchases, especially in corporate America. More and more computing was taking place at the desktop instead of within a centralized machine. The PCs began communicating with each other via small workgroups and *Local Area Networks (LANs)*, extending their reach. It wasn’t long before LAN-based messaging took root and grew within the same company walls that housed the mainframe messaging solution.

LAN-based or shared-file messaging occurs when the client desktop initiates and controls all messaging activity. When a user composes and sends a message, the client software sends the message to the server or post office into a specific directory or file (or mailbox). A recipient retrieves his messages by accessing his specific mailbox on the server. The server is passive and primarily stores messages (see Figure 1.1).

FIG. 1.1

Message flow using
shared-file messaging.

Electronic Mail Timeline



At the time, there were advantages to this architecture:

- Reduced cost—server doesn't need to be high performance
- Simple design—relatively easy setup and administration
- Increased performance in some areas—application runs locally

But there were weaknesses as well:

- Inadequate security—each user needs full control (read/write) on the entire file system, including other users's mailboxes.
- Increased network traffic—each client must constantly poll the server for new messages. In a small LAN or workgroup, the traffic can be manageable, but in a large enterprise, any traffic will grind things to a halt.
- Limited scalability—no matter how much hardware one adds to the server, there is a hard limit to the number of clients and number of messages that reasonably can be handled by the system, especially because bandwidth is the limiting factor.

Understanding Client/Server Messaging

To address these weaknesses, client/server messaging was designed to distribute messaging processing between the client and server, enabling each system to focus on tasks best suited for its role. When a user composes and sends a message, for example, the server places the message in the appropriate directory or forwards it to another server. The recipient receives the message without constantly polling the server. Microsoft Exchange was developed using client/server messaging architecture (see Figure 1.2).

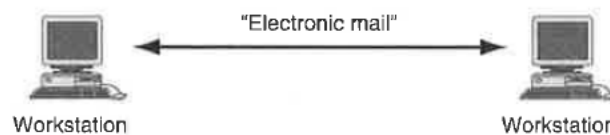
Client/server messaging improves upon shared-file messaging in the following areas:

- *Better security*—Except for their own “directories” (Inboxes), users have read-only rights for other selected Exchange objects and components.
- *Decreased network traffic*—Using *Remote Procedure Calls (RPCs)*, clients connect and make messaging requests. The server processes the requests and returns only the requested information.

FIG. 1.2

Message flow
using client/server
messaging.

One-to-One Communication



- **Extensibility**—Exchange runs on Windows NT, which easily scales when more memory or an additional processor is added. Also, there are several connectors, gateways, and migration wizards to extend your messaging reach. Exchange has evolved into a full-featured platform on which business solutions can be built, such as forms, work-flow charts, and document databases.

The Exchange client component on the recipient's PC receives information that the creator or source "pushes" to it. Exchange goes beyond the push model by providing a shared repository—*Public Folders*—for storing information that is on call for the user. This repository enables users to "pull" information down to their workstations when they need that information. Because it provides both push and pull technology, Exchange does not constrain corporations with the distribution mechanism. Exchange provides a complete solution.

Overview of Exchange's Key Features

Now that you have a historical perspective of messaging, it's time to examine Exchange's key features and how they can meet your messaging needs.

Using Key Definitions

You should become familiar with some key concepts and definitions that are used throughout this chapter:

- **Address Book**—A list of names, addresses, or other information. Names can include users, distribution lists, and public folders.
- **Custom Recipient**—A recipient outside your enterprise. For example, you would use a person's Internet SMTP address as the custom recipient when sending mail over the Internet.
- **Directory**—A hierarchical structure of objects that represent each component of the organization, such as the organization itself, containers, recipients, and more.
- **Enterprise**—A corporate environment with a large electronic messaging infrastructure. A typical enterprise will have several thousand to tens of thousands of users on the mail system.
- **Information Store**—The back-end database that contains all messages and data located on the Microsoft Windows NT server that houses the Exchange server.
- **Microsoft Exchange Client/Viewer**—The program that a client uses to read, write, and manipulate the mailbox and folders.

- **MTA**—The Message Transfer Agent, which transfers and routes mail messages and attachments between servers.
- **Recipient**—The receiver of a message or form. A recipient can be a user, distribution list, or public folder.
- **Routing Table**—A table created by Exchange and used by the MTA to move messages between servers.
- **Security Descriptor**—Permissions information attached to every object under the Windows NT server. Security descriptors tell the operating system who has access to a certain resource, whether that resource is a file, a service, or an application.

Understanding the Universal Inbox for Information and Applications

The concept of the universal inbox has been around for years, but the capability to deliver such a product is revolutionary. Microsoft learned from its research that users want an integrated desktop environment to improve their organization and control of daily activities. A *universal inbox* interface makes it easy to organize personal, public (shared), or online information all in one place. A user now can view information in a variety of ways, and easily find information anywhere on the desktop. Future BackOffice products and especially Windows 98 will seek to leverage this model.

The key to the Exchange inbox is the fact that Microsoft provides the gateway to all your company information. Third-party software developers are pursuing business opportunities on this foundation by building their applications on top of this technology; these applications appear as folders. The vision is to provide one standard location and interface for accessing information, regardless of the information's format. Solutions are available for integrating voice-mail systems into Exchange, for example. If you have a multimedia PC with an integrated sound system, you can access your e-mail as well as voice mail, or dial in from a telephone to "hear" your e-mail along with your voice mail.

The Exchange Outlook client interface embodies the concept of the universal inbox by providing a consistent look and feel across all the supported platforms and released versions. Exchange 5.5 now presents a "flavor" of the Outlook client for each operating system that connects to Exchange (Windows 95 and Windows NT, Windows 3.x, Macintosh, DOS, and via the Internet).

The client also enables you to place filing, printing, viewing, deleting, and other functions on convenient button bars. These button bars keep the desktop uncluttered and yet enable the desktop to contain many pieces of information.

Controlling Folder Types

When you use the Exchange Outlook client, you have control of several folders that are displayed from the Microsoft Exchange root folder tree. These folders are very similar in layout to Windows Explorer, which ships with Windows 95 and Windows NT 4.0, and to the File Manager in Windows 3.1 and Windows NT 3.x.

The three main folder types are described here:

- **Mailbox**—The Mailbox folder serves as the traditional inbox that most e-mail packages have. The main difference in Exchange, however, is that this folder holds much more than e-mail; it also can contain all the data types from several sources (for example, Dow Jones information, Word or Excel documents, JPG files, and so on). After reading the data, the user can move the data into any of several other folders or have it automatically moved to other folders based on certain rules.

- **Personal folders**—These folders enable the user great flexibility in organizing their message objects. Some people like to organize documents by author, for example; others like to organize by subject. Users also can store the information on their local hard disks for use offline. All mail in the mailbox is kept on the server until it is saved on the user's hard disk.

Suppose that you're going on a trip. Before you leave, you log on to the Exchange server and get all your documents from the server (via replication/synchronization). You then save the documents to a private folder for reviewing offline. There you can compose your replies, and when you connect to the Exchange server the next time, those outgoing messages are sent on their way. In addition, the folder views are synchronized next time you log on to your Exchange server.

- **Public folders**—Public folders facilitate the sharing of information. Each client who has access rights can read information stored in public folders. The administrator can assign users read, write, and delete access to information contained in a public folder. Public folders also can be published to the Internet/intranet as HTML via the Active Server Pages components of Exchange and Microsoft's *Internet Information Server (IIS)*.

In addition, the creator of the information may create a custom view to standardize the look and feel of the information. For example, in many firms there exists a document on all the bulletin boards containing what job openings exist at the company. With Exchange, you could create an Access database that would hold standard information and simply create a form that resided in a public folder. People could then browse the information in a standard way and all data would be updated whenever the database is updated.

Organizing Views

As mentioned earlier in this chapter, Exchange enables users to organize information according to their taste. Exchange provides some features to make this process much easier. Those features are described in the following paragraphs.

A *view* is simply a way to order information. Information can be sorted by author, keyword, date, or subject.

Two kinds of views are available: folder views and common views. *Folder views* order information in individual folders. If you have a private folder called Peter that contains all mail from Peter, you can define a view that sorts all the objects in the folder by date. Then you could change the view for the folder to include a secondary sort criterion, such as subject. The data

then would conform to the view only in that folder. *Common views* are views that can be applied to any folder. You can define a view called Date and apply it to many folders at the same time.

In addition to providing many predefined views, Exchange is also flexible enough to enable you to create views, including custom fields from forms and even Microsoft Office documents like Word or Excel. If a public folder has a database element that contains a Boolean logical (Y or N) field, for example, you can create a view that sorts all the Yes records before all the No records.

Setting Rules and Auto-Assistants

Rules are a set of conditions that when met, organize incoming messages. For example, you can establish a rule dictating that if Sender = My Manager, to file the message in a folder called Urgent, and play a sound.

Auto-Assistants enable you to have rules in effect even when you aren't logged on. If you go away on vacation, for instance, you can have a generic message auto-replying to all messages saying you'll return in one week. If the message contains a certain keyword in the subject, you could have your mail forwarded to someone else to take care of it or to another e-mail account where you can review it.

Using Find

The *Find* feature is a powerful search engine that enables you to specify criteria for finding items in any or all of your folders. This feature is extremely useful when you remember a subject or a keyword but can't remember who sent the message or what the actual content was. You can have the Find feature look for the message in all your folders.

The Find feature runs in the background and is treated like any other running program, enabling you to continue working while the search is under way.

When you are presented with the objects that meet the specified criteria, any action you take on those objects takes effect in the actual folders the objects reside in. For example, you can use the Find feature to retrieve all messages 30 or more days old. As messages appear in the Find window, you can select all of them, and click the Delete button. They will all be removed from their respective folders.

Adding a third-party search index tool to your Outlook client can make searching even more powerful and much quicker. Options are available for search indexing on the Exchange server as well.

Using Calendar

With the proper permissions, you can view someone else's calendar or schedule to find the best time to schedule a meeting. The Calendar function, once a separate function using a Schedule+ client, is now completely integrated into one client called Outlook. Read on for more information.

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Exchange document ow becomes a platform atabases and groupwar uct upon built. Th ich business messagi utlook Forms Design solutions l is targeted

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By providing a simple graphical user interface, the Outlook Forms Designer enables users to create forms without the need for complex programming.

It may be difficult to believe, but the Outlook Forms Designer is a front end to Visual Basic. Simply drawing the fields in the form sends the proper commands to Visual Basic to create the executable form. You do not have to be a Visual Basic guru to create forms and to extend the functionality of Exchange beyond the transfer of messages.

Savvy Visual Basic and C++ developers can integrate their own custom codes to extend Outlook forms to do amazing things as noted in the following sections.

CAUTION

With Outlook and Exchange 5.5, the Macintosh Outlook Client can only support the electronic forms that have been specially customized for use by the Macintosh client of Exchange because the forms are based on Visual Basic components. Forms that are not usable by the Macintosh client will display a special symbol indicating this lack of compatibility.

Custom Application Programming with MAPI Exchange Client applications aren't limited to those that ship with Exchange. Because Exchange is based on the *Messaging Application Programming Interface (MAPI)*, you can design applications that take advantage of Exchange's underlying folder architecture by accessing data via MAPI.

Custom applications can use MAPI to perform such tasks as opening a public folder and dropping in data, searching data, deleting items, and examining the contents of folders. All actions are subject to the permission that the application has for any given object. If the program is running with the permissions of a user who doesn't have the ability to delete data, the application cannot delete any data.

MAPI also can be used to add functionality to a form created with the Outlook Forms Designer. You can write a program that takes data from a custom form, imports that data into Excel, performs some calculations, sends the compiled results to the user in an e-mail message, and then faxes a copy to another recipient.

Enabling Group Information Sharing

Exchange enables the user to post information on an electronic bulletin board (public folder). For example, marketing representatives can track customer accounts from a shared contact-management database and access product information from a reference library. With Outlook, creating the folder applications can be very simple.

Understanding Internet Support

The *Internet Mail Connector (IMC)* that was first introduced in Exchange 4.0 has continued to grow in functions and protocol support. Exchange 5.0 saw the renaming of the IMC to reflect what it had evolved into—a group of “services” now called the *Internet Mail Service (IMS)*. Included here are the SMTP mail gateway between Exchange and the Internet for sending and

receiving, as well as POP3 support for standard POP-based mail clients such as Eudora or the new Outlook Express client. IMAP4 support has been added in Exchange 5.5 as a dramatically enhanced upgrade to the POP standard. Web Browser support for access to a user's mailbox, calendar, and public folders is available when the HTTP protocol is configured with Active Server Pages and IIS. Any browser that supports frames can be used to log on and view dynamic HTML representations of a mailbox's content. When accessing in this method, the browser is using the Outlook Web Access components installed on the Exchange server.

To facilitate easy directory access for these POP/IMAP4 and browser clients, *Lightweight Directory Access Protocol (LDAP)* is available. Exchange 5.5 is supporting the soon-to-be-published LDAPv3 standard by offering a full set of 16 commands for LDAP usage, including reads, writes, and referrals to other LDAP servers. NNTP newsfeeds and function are supported and enhanced in 5.5, allowing for more options to configure NNTP replication to and from Internet NNTP newsfeeds.

Finally, a rich environment for interfacing Microsoft's Internet Information Server with Exchange to enable publishing and interaction with public folders within Exchange has been added, collectively called *Active Server Components*. By using *Collaboration Data Objects* (formerly called *Active Messaging*), you can easily publish Exchange public folder data and custom forms to the Web. All of these help integrate a company's messaging enterprise into a much larger messaging system—the Internet. These are described in more detail later in the chapter.

Enabling Support for Remote Users

Exchange with Outlook clients enables users to work offline. Users can use the Exchange Outlook 32- and 16-bit clients from their PCs via remote network access (dial-up connections) or while they are disconnected from the network. Exchange is designed to use RPC calls, which, when coupled with dial-up connections, are designed to sense the line speed and optimize performance.

Exchange can be used over asynchronous connections, including ISDN, PPP, PPTP, SLIP, X.25, and regular modem connections. This form of Exchange connectivity holds true for client-to-server connections as well as server-to-server connections. Additionally, security can be implemented when using NT's Remote Access Services for dial-back and challenged dial-in via NT C2 security.

Performing Administration

Microsoft Exchange Server administration is performed from a single tool capable of connecting to every site and server in your Exchange organization—Exchange Administrator. This program gives the server administrator a graphical representation of all directory objects in any site for which he or she has permission.

Exchange Administrator is used to define the hierarchical structure of the organization's messaging infrastructure. You can define and set properties for elements such as connections to other mail systems, recipients, servers, and addressing templates.

The advantage of centralized administration is that it enables you to see the entire object tree or hierarchy of information and make any addition, move, or change in an easy, straightforward manner, regardless of the location of the server. If your company merges with another company that has a Microsoft Mail messaging infrastructure in place, for example, the Exchange Administrator can add the Microsoft Mail connector, and connectivity would be available to all specified users on all specified servers. The convenience of adding functionality from a central console is apparent, in this case, in size of enterprise.

If decentralized administration is desired, you can open multiple administrative sessions and set permissions to the various objects and components of Exchange to allow different administrators to modify and control these different features. In an extremely large Exchange organization, setting specific permissions and spreading out Exchange administration responsibilities can be very advantageous.

Considering Reliability

Many companies don't consider a messaging system to be a mission-critical application. However, the reality is that e-mail is one of the few applications on everyone's desktop and that most everyone relies on. To keep your users happy, Exchange offers a number of tools and features to prevent Exchange from becoming "unavailable" (see Table 1.1).

Table 1.1 Troubleshooting Tools and Features

Tool/Feature	Function
Link Monitor	Link Monitor watches for successful message connections between two points in an Exchange organization. They also can be configured to test connections to foreign messaging systems. Use this tool to determine if an Exchange server or network link is experiencing problems. Naturally, alerts are given if the link is unresponsive.
Server Manager	Server Manager tells you whether any of a server's services has stopped and enables you to restart those services remotely, even across a wide-area network (WAN) or active telephone link. As with the Link Monitor, alerts are available to notify administrators of server problems.
Performance Monitor	NT's <i>Performance Monitor (PerfMon)</i> enables you to monitor statistics for most software and hardware components (processor utilization, available memory). Installing Exchange adds several specific counters for detailed Exchange diagnostic work. PerfMon can be set up to page you if certain thresholds are exceeded, such as a message queue that has exceeded 1,000 messages or disk space that has dropped below a preset threshold.

continues

Table 1.1 Continued

Tool/Feature	Function
	and application events (including
SNMP	
Intelligent Rerouting	
Fault-Tolerant Store	
Backup	
Auditing	

Exchange provides for RSA digital key encryption, which is used to authenticate the user who is sending the message. When a user "signs" a message, the signature guarantees that the name associated with the message is the actual name of the author.

In addition to the digital signature, you can enable digital encryption of messages. Exchange uses an algorithm called *CAST* developed by Northern Telecom. Security is discussed further in Chapter 27, "Exchange Security."

Understanding Connectivity and Gateway Support

Exchange offers a wide variety of connectivity features. Through its connectors and third-party gateways, Exchange enables users to exchange mail with external e-mail systems that use different messaging protocols, such as host-based mail systems using SNA, Internet mail systems using SMTP, and foreign host systems using X.400. Mail can also be exchanged between Exchange sites using TCP/IP, IPX, or NetBEUI. Exchange offers the following connectors:

- Microsoft Mail for PC Networks
- Microsoft Mail for AppleTalk Networks
- X.400
- SMTP
- cc:Mail
- Dynamic RAS (dial-up connector)
- Site Connector
- Lotus Notes
- PROFS/SNADS

In addition to the aforementioned connectors, third-party gateways for Exchange extend your reach. Exchange supports its own gateways and Microsoft Mail (PC) gateways as well. The following are just a few gateways that are available for Exchange from third parties:

- DEC All-in-One
- Fax
- CompuServe
- MHS

Regardless of the origin of a message, all message objects in a user's mailbox look exactly the same. Additionally, any installed connectors or gateways are transparent to the user. That fact is a key advantage of Exchange. A user's data is collected and consistently formatted in a universal inbox.

Like incoming mail, outgoing mail is routed through connectors and gateways that are transparent to the user. The administrator creates custom recipients that reside in address books alongside conventional Exchange recipients.