

Contents at a Glance

<i>Introduction</i>	1
<i>Part I: Deciding on vSphere</i>	7
Chapter 1: Getting the Most Out of VMware vSphere.....	9
Chapter 2: Introducing Virtualization	15
Chapter 3: Exploring the Capabilities of VMware vSphere	29
Chapter 4: Comparing Virtual Infrastructure 3.5 with vSphere 4.x.....	39
<i>Part II: Getting Ready for vSphere</i>	51
Chapter 5: Planning for a vSphere Rollout	53
Chapter 6: Preparing Network and Storage for vSphere	65
<i>Part III: Installing vSphere</i>	73
Chapter 7: Installing VMware ESX 4 for the First Time.....	75
Chapter 8: Building the vCenter Server	89
Chapter 9: Getting Started with the vSphere Client.....	103
<i>Part IV: Configuring and Connecting vSphere</i>	111
Chapter 10: Configuring a New vCenter Server	113
Chapter 11: Wiring Up vSphere to the Network, Virtually	129
Chapter 12: Connecting vSphere to Shared Storage	149
Chapter 13: Assembling an ESX Cluster.....	171
<i>Part V: Administering and Maintaining vSphere</i>	181
Chapter 14: Creating, Cloning, and Converting VMs.....	183
Chapter 15: Organizing vSphere Resources	205
Chapter 16: Events, Alarms, and Monitoring	219
Chapter 17: A Quick Tour of Your Virtual Infrastructure.....	231
Chapter 18: One of These Hosts Is Not Like the Other — Host Profiles	241
<i>Part VI: Tuning and Troubleshooting vSphere</i>	259
Chapter 19: Making VMs Play Fair with Resource Pools	261
Chapter 20: Using vSphere Availability Features	271
Chapter 21: Troubleshooting vSphere	287

<i>Part VII: The Part of Tens</i>	301
Chapter 22: Ten Tools to Make vSphere Management Easier.....	303
Chapter 23: Ten Places to Improve Your vSphere Know-How.....	313
Chapter 24: Ten Pro Tips for a Successful vSphere Deployment	317
<i>Index</i>	323

<http://www.pbookshop.com>

Table of Contents

<i>Introduction</i>	1
About This Book	1
How to Use This Book	2
What You're Not to Read	2
Foolish Assumptions	3
How This Book Is Organized	3
Part I: Deciding on vSphere	3
Part II: Getting Ready for vSphere	3
Part III: Installing vSphere	3
Part IV: Configuring and Connecting vSphere	4
Part V: Administering and Maintaining vSphere	4
Part VI: Tuning and Troubleshooting vSphere	4
Part VII: The Part of Tens	4
Icons Used in This Book	5
Where to Go from Here	5
<i>Part I: Deciding on vSphere</i>	7
Chapter 1: Getting the Most Out of VMware vSphere	9
vSphere and Your Environment	9
Rolling out vSphere	10
Mapping out an unfamiliar terrain	10
You'll need one of those	11
Thinking about Networks and Storage	11
Taking Care of vSphere	12
The vCenter of Your Universe	12
Chapter 2: Introducing Virtualization	15
Thinking Virtual	15
Virtual machines aren't so different	16
Real virtual hardware	17
Arriving at Virtualization — Again	17
Virtualization is so 1960s	17
Supervisor turns hypervisor	18
Virtualization Simplified	19
Picturing virtualization	21
This is your machine	22
This is your machine on virtualization	24

Ups and Downs of Virtualization	25
Positively virtual	25
Some side effects of virtualization	27
When Virtual Is Improbable	28
Chapter 3: Exploring the Capabilities of VMware vSphere	29
Exploring the Unique Features of vSphere	29
Taking a Peek at Standard vSphere Features	30
Memory overcommit	30
Virtual machine cloning	31
Thin provisioning	32
High availability	32
vMotion live migration of VMs	33
Getting a Look at Advanced vSphere Features	33
Distributed Resource Scheduler	34
Hot-add of CPU and memory to running virtual machines	34
Delving into vSphere Enterprise Features	35
Storage vMotion live migration	35
vSphere fault tolerance	35
vShield Zones	36
vNetwork Distributed Switch	36
Host Profiles	37
Chapter 4: Comparing Virtual Infrastructure 3.5 with vSphere 4.x ..	39
Quickly Comparing VI3 with vSphere 4	39
Bigger, better virtual machines	40
vCenter Server (formerly VirtualCenter)	41
ESX — a host of improvements	42
Pushing up the uptime	42
Finding Out What's New in vSphere 4	43
Additions to availability	43
Net new networking	44
Storage starters	45
Security sentiments	45
Virtual management medley	46
Discovering the Differences in vSphere 4.1	47
vCenter Server	47
ESX 4.1	48
Part II: Getting Ready for vSphere	51
Chapter 5: Planning for a vSphere Rollout.	53
Right-Sizing the Environment	53
Enough is not always enough	54
Measure twice, deploy once	55

Department of redundancy department 57
 Selling the same disk space twice (or more)..... 58
 Keeping Scalability in Mind 58
 Storage considerations 58
 Adding hosts versus adding clusters 59
 Comparing vSphere Small Business Editions 60
 Essentials for Retail 60
 Essentials Plus for Retail..... 60
 Looking at Mid-Size and Enterprise Business vSphere Versions 61
 Standard Edition 61
 Advanced Edition..... 62
 Enterprise Edition 63
 Enterprise Plus Edition 63
 Exploring Support and Subscription (SnS) Requirements 64

Chapter 6: Preparing Network and Storage for vSphere 65

vSphere, the Network Switch..... 65
 Understanding virtual and physical network switches 66
 Asking for the right connections 67
 Teaming Network Interface Cards 68
 VLANs and Other Switching Concepts 68
 vSphere, the Keeper of Storage 69
 Getting the skinny on thin provisioning 70
 Painting yourself into a corner through overallocation 70
 Sharing storage is more than just sharing space..... 70
 Access Control and Datastores 71
 Advanced Storage Configurations 71

Part III: Installing vSphere 73

Chapter 7: Installing VMware ESX 4 for the First Time 75

Gearing Up for Install 75
 Preparing the install media 75
 Confirming the connections 76
 IP addresses, routes, and VLANs, oh my!..... 77
 Booting Up ESX 4 Installation Media..... 77
 Confirming ESX Installation..... 86
 Connecting via a Web browser 86
 Connecting with vSphere Client..... 87

Chapter 8: Building the vCenter Server 89

Placing vCenter Server in a Stable Home 89
 Going virtual is the new physical..... 90
 Right-sizing resources for vCenter 90
 Going global and Multiple vCenter instances 92

Meeting the Prerequisites	93
Operating system (OS).....	93
Hardware.....	94
Microsoft Active Directory	95
Database.....	95
Networking.....	97
User account permissions	98
Running the vCenter Server Installer.....	98

Chapter 9: Getting Started with the vSphere Client 103

Installing the vSphere Client	103
Reviewing the prerequisites.....	103
Running the installer	104
vSphere Client's Less Famous Sister: vSphere Web Access	108
Enabling vSphere Web Access	108
Connecting to vSphere Web Access.....	110

Part IV: Configuring and Connecting vSphere 111

Chapter 10: Configuring a New vCenter Server 113

Laying the Foundation	113
Adding licenses	114
Creating a new vCenter datacenter	117
Adding ESX Hosts	118
Adding vSphere licensing	118
Telling vCenter Server about a new ESX host.....	122
Setting up time synchronization on ESX hosts	124

Chapter 11: Wiring Up vSphere to the Network, Virtually 129

Creating a vSwitch.....	129
Associating physical NICs to the vSwitch.....	132
Configuring NIC teaming and failover	133
Confirming the connection	136
Creating Port Groups on a vSwitch	136
Associating port groups with VLANs	137
Using a port group without VLAN tagging.....	137
Adding a Management Network Port	138
Adding a VMkernel Port.....	139
Enabling vMotion.....	140
Adding a vNetwork Distributed Virtual Switch.....	141
Attaching hosts to the vDS	142
Configuring VLANs.....	145
Configuring Network I/O Control	145
Troubleshooting vSphere Networking.....	147

Chapter 12: Connecting vSphere to Shared Storage 149

- Getting Familiar with vSphere Storage 149
 - VMware Virtual Machine File System..... 150
 - Network File System 152
- Deciding on Disk 152
- Sizing Up vSphere Storage Options..... 153
- Configuring Fibre Channel SAN Storage 155
 - Attaching the Logical Unit Numbers to vSphere hosts..... 155
 - Setting the path selection policy 156
 - Optimizing FC SAN performance 159
 - Avoiding common configuration errors..... 160
- Configuring Internet SCSI SAN Storage 160
 - Comparing hardware versus software iSCSI initiators 161
 - Enabling the iSCSI initiator on a vSphere host..... 161
 - Configuring Dynamic Discovery of an iSCSI server 162
 - Avoiding common configuration errors..... 164
- Preparing LUN-Based SAN Storage for First Use 164
 - Creating a new VMFS volume 164
 - Enabling Storage Input/Output Control 167
- Configuring Network-Attached Storage 168
 - Mounting NFS exports in vSphere 169
 - Avoiding common configuration errors..... 170

Chapter 13: Assembling an ESX Cluster 171

- Keeping Consistent Configurations 171
 - Network naming 172
 - Same data store, same name 172
 - Same access, different hosts 173
- Inviting ESX Hosts to the Cluster Club..... 173
 - Creating a cluster..... 174
 - Adding an ESX host to a cluster..... 176
- Sharing the Load with Distributed Resource Scheduler (DRS) 177
 - Keeping VMs separated 177
 - ESX hosts and VMs, hand-in-hand 178
 - Enabling DRS on a cluster 178

Part V: Administering and Maintaining vSphere 181

Chapter 14: Creating, Cloning, and Converting VMs 183

- The Makings of a Virtual Machine 183
 - Configuration..... 183
 - Virtual disks..... 184
 - Virtual hardware..... 185

Filling Up the Virtual Container	188
Building a VM from scratch	188
What's a worker without VMware Tools?	191
A Computer in a File	194
Importing an existing virtual machine disk	194
Thinning out an existing virtual disk	195
Bring in the Clones	195
Making a clone of a VM	195
Deploying from a template	198
Automatically Customizing Clones	199
Cloning with customization	199
Customization specifications	201
Things That Don't Clone Very Well	203
Applications with identities	203
Licensing tied to hardware	203
Chapter 15: Organizing vSphere Resources	205
The Client Perspective: Four Views, One vSphere	205
Focusing on the vSphere hosts: The Hosts and Clusters view	206
Virtual machines on the brain: the VMs and Templates view	207
Thinking capacity — a storage perspective:	
The Datastores view	208
Networking, and whatever it connects: Networking view	209
Using Logic to Place a New Virtual Machine	210
Considering storage growth	210
Creating a common sense folder structure	211
Assigning ownership through Custom Attributes	212
Giving permissions to the new owner	214
All Together Now: vSphere vApps	215
Defining a vApp in vSphere vCenter	216
Bringing order to virtual machines	217
Chapter 16: Events, Alarms, and Monitoring	219
Using Events to Track Activity	219
Spotting the events that matter	220
Finding an event related to a failure	220
Setting Up Alarms in vSphere	221
Exploring the default alarms	222
Calming vSphere alarm paranoia	224
Tweaking alarms to understand “normal”	225
Putting Alarms to Work	226
Setting up notifications	226
Sending alerts over e-mail	227
Connecting vSphere to other monitoring systems	229
Going overboard with alerting	230

Chapter 17: A Quick Tour of Your Virtual Infrastructure 231

Diving into Datastores 231
 Peering into Permissions 232
 Perusing the Environment with Maps 234
 Checking the Stats with Performance 235
 Writing a vCenter To-Do List with Scheduled Tasks 237

Chapter 18: One of These Hosts Is Not Like the Other — Host Profiles 241

Preparing the Perfect Host 241
 Network considerations 242
 Datastores all around 243
 Connect me with Active Directory 243
 Do you know the time? 244
 Capturing a Host Configuration 244
 Attaching a Host Profile 246
 Applying a Host Profile 247
 Changing the Admin Password 251
 Keeping the Host Profile Up to Date 255

Part VI: Tuning and Troubleshooting vSphere 259

Chapter 19: Making VMs Play Fair with Resource Pools 261

Creating a Resource Pool 261
 Putting Resources in Perspective 262
 Setting Limits and Reservations for Clusters, Hosts, and Virtual Machines 264
 Do you have a reservation? 265
 Enforcing hard limits 266
 Giving preference to certain VMs 266
 Delegating Resources to Other VMs 267
 Allocating resources to a group 267
 Favoring critical machines 268
 Combining Resource Pools 268
 The nesting instinct: Dividing resources with nests 269
 Importing VMs with their own resource settings 270
 Merging resource pools when adding a host to a cluster 270

Chapter 20: Using vSphere Availability Features 271

Deciding How Much Downtime Is Too Much 271
 Defining zero downtime 272
 Clustering at the OS level 272
 Comparing high availability and fault tolerance 273

Using VMware High Availability	274
Prerequisites for VMware High Availability	275
Bringing order to your VMs	275
Providing Your VMs High Availability	276
Responding to failure	276
Enabling High Availability on a cluster	277
Exploring VMware Fault Tolerance — Beyond HA	278
Prerequisites for VMware Fault Tolerance	279
Calculating the cost of VMware Fault Tolerance	280
Enabling VMware Fault Tolerance	280
Protecting multi-VM applications	282
Making the Rules (and Breaking Them)	283
Managing acceptable failure settings	283
Configuring behaviors for critical situations	284
Saving space for visitors during maintenance	285

Chapter 21: Troubleshooting vSphere 287

Conducting General Troubleshooting	287
ESXi: Easier or harder to troubleshoot?	288
Super-secret Tech Support Mode	288
PSOD	289
Taking Advantage of Log Files	290
Troubleshooting a SAN	292
Refresh and rescan	292
SCSI locks	292
Solving High Availability Errors	293
Reconfigure for VMware HA over and over	293
Admittance errors	293
My whole blade chassis failed, and HA did nothing!	294
Isolation island	294
Troubleshooting Oversubscribed Hosts	295
Disabling unneeded devices	295
Install/update VMware Tools	295
Tools updated on every reboot	295
Don't overuse reservations	296
CPU ready and why it matters	296
Handling vCenter Troubles	297
Cannot convert template to a VM	297
Guest customization errors	297
vCenter Server stopped and won't start	298
Dealing with VM Crashes	298
Low VMFS space	299
Missing or ghost hardware	299
Incorrect HAL in Windows	299
Handling Networking Issues	300

Part VII: The Part of Tens.....	301
Chapter 22: Ten Tools to Make vSphere Management Easier.	303
VMware PowerCLI	303
VMware Project Onyx	304
DynamicOps Cloud Automation Center	305
vSphere Mini Monitor	306
Veeam FastSCP.....	306
Ultimate Deployment Appliance (UDA).....	308
Virtual Guest Console	309
xtravirt vSphere Client RDP Plug-In	310
Openfiler	311
Stratusphere UX.....	311
Chapter 23: Ten Places to Improve Your vSphere Know-How.	313
DABCC.com	313
Mike Laverick's RTFM Education	314
NTPRO.NL.....	314
Petri IT Knowledgebase	314
virtualization.info	314
VMware Knowledgebase.....	315
VMware Communities.....	315
vSphere Land	315
xtravirt	315
Yellow Bricks.....	316
Chapter 24: Ten Pro Tips for a Successful vSphere Deployment . . .	317
Plan to Make the Most of vSphere Memory Optimization	317
Monitor Utilization on Datastores with Thin-Provisioned VMs	318
VM Snapshots Are Quiet Space Consumers.....	318
Clean Templates Make for Happy VMs.....	318
Automate the Startup/Shutdown of VMs.....	319
Not Everyone Needs vCenter Access.....	319
vSphere Clusters of a Feather	320
Don't Get vMotion Sickness	320
Working through Hostname Resolution	321
Putting VM Tools — Everywhere	321
Index.....	323

<http://www.pbookshop.com>