

Cloud Computing: A Practical Approach

Anthony T. Velte
Toby J. Velte, Ph.D.
Robert Elsenpeter



New York Chicago San Francisco
Lisbon London Madrid Mexico City
Milan New Delhi San Juan
Seoul Singapore Sydney Toronto

Contents

Acknowledgments	xiii
Introduction	xiv

Part I Getting Started

1 Cloud Computing Basics	3
Cloud Computing Overview	3
Disambiguation—Just What Is Cloud Computing?	3
Cloud Components	6
Infrastructure	8
Services	11
Applications	16
Storage	16
Database Services	17
Intranets and the Cloud	19
Components	20
Hypervisor Applications	20
First Movers in the Cloud	21
Amazon	21
Google	22
Microsoft	22
2 Your Organization and Cloud Computing	23
When You Can Use Cloud Computing	23
Scenarios	23
When You Shouldn't Use Cloud Computing	25
Benefits	29
Scalability	30
Simplicity	30
Knowledgeable Vendors	30
More Internal Resources	31
Security	31
Limitations	31
Your Sensitive Information	31
Applications Not Ready	33
Developing Your Own Applications	34

Security Concerns	35
Privacy Concerns with a Third Party	35
Are They Doing Enough to Secure It?	36
Security Benefits	37
Regulatory Issues	39
No Existing Regulation	39
Government to the Rescue?	39
3 Cloud Computing with the Titans	41
Google	41
Google App Engine	42
Google Web Toolkit	43
EMC	45
Technologies	45
VMware Acquisition	46
NetApp	46
Offerings	46
Cisco Partnership	47
Microsoft	48
Azure Services Platform	48
Windows Live	49
Exchange Online	51
SharePoint Services	52
Microsoft Dynamics CRM	53
Amazon	54
Amazon Elastic Compute Cloud (Amazon EC2)	54
Amazon SimpleDB	55
Amazon Simple Storage Service (Amazon S3)	55
Amazon CloudFront	55
Amazon Simple Queue Service (Amazon SQS)	55
Elastic Block Store	56
Salesforce.com	57
Force.com	58
Salesforce.com CRM	59
AppExchange	59
IBM	61
Services	61
Movement to the Cloud	62
Security	63
Partnerships	63
Yahoo! Research	63
SAP and IBM	64
HP, Intel, and Yahoo!	65
IBM and Amazon	67

4	The Business Case for Going to the Cloud	69
	Cloud Computing Services	69
	Infrastructure as a Service	69
	Platform as a Service	72
	Software as a Service	74
	Software plus Services	77
	How Those Applications Help Your Business	77
	Operational Benefits	77
	Economic Benefits	78
	Tips for Evaluating SaaS	79
	Staffing Benefits	80
	Deleting Your Datacenter	81
	What You Can Delete	82
	What You Should Keep	82
	Steps	82
	AppZero	82
	Salesforce.com	83
	Why It's Good for Business	84
	Best Business Practices	84
	Thomson Reuters	85
	Their Cloud Use	85
	Using the Cloud	86
	Cloud Computing and Web 2.0	86
	Applications and the Cloud	86
	Getting Started	87
	Be Realistic	87

Part II Cloud Computing Technology

5	Hardware and Infrastructure	91
	Clients	91
	Mobile	92
	Thin	92
	Thick	93
	Security	93
	Data Leakage	94
	Offloading Work	94
	Logging	95
	Forensics	95
	Development	95
	Auditing	95
	Network	100
	Basic Public Internet	101
	The Accelerated Internet	102

Optimized Internet Overlay	102
Site-to-Site VPN	103
Cloud Providers	103
Cloud Consumers	104
Pipe Size	104
Redundancy	106
Services	107
Identity	107
Integration	108
Mapping	109
Payments	110
Search	110
6 Accessing the Cloud	111
Platforms	111
Web Application Framework	111
Web Hosting Service	114
Proprietary Methods	115
Web Applications	118
Your Choices	118
Sample Applications	119
Web APIs	120
What Are APIs?	120
How APIs Work	121
API Creators	122
Web Browsers	126
Internet Explorer	127
Firefox	127
Safari	130
Chrome	130
7 Cloud Storage	135
Overview	135
The Basics	135
Storage as a Service	136
Providers	137
Security	138
Reliability	139
Advantages	139
Cautions	140
Outages	141
Theft	141
Is Cloud Storage for Me?	142
Cloud Storage Providers	142
Amazon Simple Storage Service (S3)	142
Nirvanix	145

	Google Bigtable Datastore	146
	MobileMe	148
	Live Mesh	149
8	Standards	153
	Application	153
	Communication	153
	Security	156
	Client	158
	HTML	158
	Dynamic HTML	159
	JavaScript	160
	Infrastructure	161
	Virtualization	162
	OVF	163
	Service	164
	Data	165
	Web Services	167

Part III Cloud Computing at Work

9	Software as a Service	173
	Overview	173
	Advantages	174
	Software Considerations	175
	Vendor Advantages	175
	Limitations	175
	Driving Forces	176
	Popularity	176
	Virtualization Benefits	177
	SaaS and SOA	177
	Economic Impact	177
	Company Offerings	178
	Intuit	178
	Google	179
	Microsoft	180
	IBM	183
	Industries	184
	Healthcare	184
	Collaboration—WebEx	188
	Construction—CMiC	188
	Retail—Epicor	189
	Banking—OpenChannel	190

10	Software plus Services	193
	Overview	194
	Pros	194
	Cons	195
	Vendors	195
	Mobile Device Integration	197
	Google Android	198
	Providers	202
	Adobe AIR	202
	Apple iPhone SDK	203
	Microsoft Online	205
	Hybrid Model	206
	Partnership	208
	Active Directory	210
11	Developing Applications	213
	Google	213
	Payment	214
	Force.com and Google	215
	Google Gears	216
	Microsoft	218
	Live Services	220
	Microsoft SQL Services	221
	Microsoft .NET Services	221
	Microsoft SharePoint Services and Dynamics CRM Services	221
	Design	221
	Intuit QuickBase	222
	Cast Iron Cloud	224
	Bungee Connect	226
	Development	228
	Google App Engine	228
	Salesforce.com	232
	Microsoft Windows Azure	243
	Troubleshooting	249
	Application Management	250
12	Local Clouds and Thin Clients	253
	Virtualization in Your Organization	254
	Why Virtualize?	254
	How to Virtualize	256
	Concerns	258
	Security	258
	Server Solutions	258
	Microsoft Hyper-V	259
	VMware	263
	VMware Infrastructure	264

Thin Clients	268
Sun	268
Hewlett Packard	269
Dell	271
Case Study: McNeilus Steel	273
Benefits	273
Making the Sell	274
Equipment	274
Making the Move	275
Doing New Things	275
13 Migrating to the Cloud	277
Cloud Services for Individuals	277
Available Services	277
Skytap Solution	281
Cloud Services Aimed at the Mid-Market	284
Force.com	284
Enterprise-Class Cloud Offerings	288
MS Exchange	288
VMotion	290
VMware vCenter Converter	291
Hyper-V Live Migration	292
Migration	293
Which Applications Do You Need?	293
Sending Your Existing Data to the Cloud	294
Use the Wave Approach	295
14 Best Practices and the Future of Cloud Computing	297
Analyze Your Service	297
Establishing a Baseline and Metrics	297
Tools	298
Best Practices	306
Finding the Right Vendor	307
Phased-in vs. Flash-cut Approaches	308
Be Creative in Your Approach	309
How Cloud Computing Might Evolve	309
Researcher Predictions	309
Responding to Change	313
Get Ready	314
A Glossary, Vendors, and Resources	315
Glossary	315
Cloud Vendors	319
Resources	324
Index	327