

SECOND EDITION

Cloud Computing

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BRIEF CONTENTS

Preface	xiii
1 Introducing Cloud Computing	1
2 Software as a Service (SaaS)	23
3 Platform as a Service (PaaS)	39
4 Infrastructure as a Service (IaaS)	53
5 Identification as a Service (IDaaS)	67
6 Data Storage in the Cloud	79
7 Collaboration in the Cloud	99
8 Virtualization	119
9 Securing the Cloud	139
10 Disaster Recovery and Business Continuity and the Cloud	157
11 Service-Oriented Architecture	181
12 Managing the Cloud	193
13 Migrating to the Cloud	215
14 Mobile Cloud Computing	233
15 Governing the Cloud	245
16 Evaluating the Cloud's Business Impact and Economics	259
17 Designing Cloud-Based Solutions	277

BRIEF CONTENTS

18 Coding Cloud-Based Applications 291

19 Application Scalability 301

20 The Future of the Cloud 315

Appendix: Answer Key to Cloud+ Certification Review 327

Glossary of Key Terms 331

Index. 337

CONTENTS

Preface	xiii
1 Introducing Cloud Computing	1
Web 2.0 and the Cloud	3
Distinguishing Cloud Types	6
Cloud Deployment Models	6
Cloud Service Models	7
Exploring Uses of the Cloud	10
Introducing Scalability	11
Introducing Virtualization	11
Collecting Processing Power Through Grid Computing	14
Understanding Other as-a-Service Solutions	17
Chapter Summary	17
Key Terms	18
Review Questions	18
Cloud+ Certification Review	19
2 Software as a Service (SaaS)	23
Getting Started with SaaS	24
Understanding the Multitenant Nature of SaaS Solutions	24
Understanding OpenSaaS Solutions	26
Understanding Mashups	29
Understanding Service-Oriented Architecture (SOA)	29
Chapter Summary	34
Key Terms	35
Chapter Review	35
Cloud+ Certification Review	36
3 Platform as a Service (PaaS)	39
Information Technology Evolution Leading to the Cloud	42
Benefits of PaaS Solutions	45
Disadvantages of PaaS Solutions	46
Chapter Summary	48
Key Terms	49
Chapter Review	49
Cloud+ Certification Review	49
4 Infrastructure as a Service (IaaS)	53
Understanding IaaS	54
Improving Performance Through Load Balancing	56
Taking a Closer Look at Load Balancing	57
System and Storage Redundancy	59

Utilizing Cloud-Based NAS Devices	60
Advantages of IaaS Solutions	61
Server Types Within an IaaS Solution	62
Chapter Summary	63
Key Terms	64
Review Questions	64
Cloud+ Certification Review	64
5 Identification as a Service (IDaaS)	67
Understanding Single Sign-On (SSO)	68
Understanding How SSO Works	68
Understanding Federated Identity Management	69
Understanding Account Provisioning	70
Multifactor Authentication (MFA)	70
Understanding OpenID	72
Mobile-Identity Management	73
Chapter Summary	74
Key Terms	75
Review Questions	75
Cloud+ Certification Review	75
6 Data Storage in the Cloud	79
Examining the Evolution of Network Storage	80
Understanding Cloud-Based Data Storage	81
Advantages and Disadvantages of Cloud-Based Data Storage	82
Getting Past the Fear of Cloud-Based Data	86
Cloud-Based Backup Systems	86
Understanding File Systems	87
Industry-Specific Cloud-Based Data Storage	89
Cloud-Based Database Solutions	89
Cloud-Based Block Storage	92
Understanding Hot Versus Cold Storage	92
Utilizing Content Delivery Networks (CDNs)	92
Cloud Data Management Interface (CDMI)	92
Chapter Summary	93
Key Terms	95
Review Questions	95
Cloud+ Certification Review	95
7 Collaboration in the Cloud	99
Collaborating in the Clouds	100
Questions to Ask with Respect to Collaborative Tools	100
Web-Based Collaboration Began with Web Mail	101
Instant Messaging Isn't What It Used to Be	102
Cloud-Based Phone and Fax Systems	103
Revisiting File Sharing	105
The Wiki	105
Editing Shared Files Within the Cloud	106
Collaborating via Web-Logs (Blogs)	109
Collaborative Meetings in the Cloud	111
Virtual Presentations and Lectures	112
Using Social Media for Collaboration	113
Using Cloud-Based Calendar Management	113

Using Streaming-Video Content to Collaborate 114
 Cloud-Based TV Content 114
 Chapter Summary 115
 Key Terms 116
 Review Questions 116
 Cloud+ Certification Review 117

8 Virtualization 119

Understanding Virtualization 120
 The History of Virtualization 120
 Leveraging Blade Servers 120
 Server Virtualization 123
 Hypervisor Types 125
 Desktop Virtualization 125
 Desktop Solutions on Demand 126
 Virtual Networks 129
 Data Storage Virtualization 132
 Not All Applications Are Well Suited for Virtualization 133
 Why Virtualize? 133
 Chapter Summary 134
 Key Terms 135
 Review Questions 135
 Cloud+ Certification Review 136

9 Securing the Cloud 139

General Security Advantages of Cloud-Based Solutions 140
 Understanding Hardening 142
 Introducing Business Continuity and Disaster Recovery 142
 Understanding Data-Storage Wiping 142
 Understanding Distributed Denial of Service (DDoS) Attacks 143
 Packet Sniffing 144
 Man-in-the-Middle Attack 145
 Monitoring Device Screens 145
 Malicious Employees 145
 Hypervisor Attack 146
 Guest-Hopping Attacks 146
 SQL-Injection Attacks 148
 Physical Security 149
 Chapter Summary 151
 Key Terms 152
 Review Questions 152
 Cloud+ Certification Review 153

10 Disaster Recovery and Business Continuity and the Cloud 157

Understanding the Threats 158
 Threat: Disk Failure 158
 Threat: Power Failure or Disruption 160
 Threat: Computer Viruses 163
 Threat: Fire 163
 Threat: Floods 164
 Threat: Disgruntled Employees 165
 Threat: Lost Equipment 165
 Threat: Desktop Failure 166

Threat: Server Failure	166
Threat: Network Failure	167
Threat: Database System Failure	168
Threat: Phone System Failure	169
Understanding Service-Level Agreements	169
Measuring Business Impact: The Essence of Risk Mitigation	170
Disaster Recovery Plan Template	170
Chapter Summary	175
Key Terms	176
Chapter Review	176
Cloud+ Certification Review	176
11 Service-Oriented Architecture	181
Understanding Service-Oriented Architecture	182
Web Services Are Not Web Pages	182
Many Companies Provide Web Services	183
Understanding Web-Service Performance	183
Web Services and Reuse	185
Scaling Web Services	185
Web Services and Loose Coupling	185
Treating a Web Service as a Black Box	186
Web Service Interoperability	186
Understanding RESTful Services	188
Governing Web Services	189
Chapter Summary	189
Key Terms	190
Chapter Review	190
Cloud+ Certification Review	190
12 Managing the Cloud	193
Know Your Service-Level Agreement (SLA)	194
Making the Argument for the Cloud	195
Leveraging Managed Service (as-a-Service) Solutions	195
Know Your System's Dataflow	197
Understanding Shared Responsibility	197
Understanding Cloud Provisioning	198
Beware of Vendor Lock-In	199
Protecting Your Business with Source-Code Escrow	199
Ensure System Backups	200
Ensure System Logs and Audit Capabilities	202
Determine the Technical Support and Help-Desk Procedures	202
Determining Training Procedures	202
Know the Cloud Provider's Security Policies and Procedures	203
Defining the Data Privacy Requirements	203
Know Specifics About the Economics of the Cloud and Return on Investment	205
Monitor Capacity Planning and Scaling Capabilities	206
Solution Testing and Validation	207
Using a Framework Such as ITIL (Information Technology Infrastructure Library)	208
Chapter Summary	208
Key Terms	209
Chapter Review	209
Cloud+ Certification Review	209

13	Migrating to the Cloud	215
	Revisit Your Business Drivers for Cloud Migration	216
	Common Components of a Cloud Migration	216
	Define the System Goals and Requirements	217
	Working with Vendors	219
	Formalizing Your Success Criteria	219
	Protect Your Existing Data	219
	Use an Experienced Cloud Consultant	220
	Know Your Application's Current Characteristics	221
	Keep Vendor Lock-In in Mind	221
	Define Your Training Requirements	223
	Establish a Realistic Deployment Schedule	223
	Review the Budget Factors	224
	Leveraging Reserved Instances	224
	Identify IT Governance Issues	225
	Understanding Cloud Bursting	225
	Change Management Considerations	226
	Chapter Review	226
	Key Terms	226
	Review Questions	227
	Cloud+ Certification Review	227
14	Mobile Cloud Computing	233
	The Evolution of Mobile Computing	234
	Understanding the G in 4G and 5G	234
	The Mobile-Cloud Ecosystem	235
	Responsive Web Applications Versus Apps	235
	Mobile Solutions and Cloud	236
	Mobile Collaboration	237
	Mobile Document Storage and Access	238
	Multifactor Authentication	238
	Geolocation Solutions	238
	Mobile and BYOD	239
	Streaming Media Content	240
	Mobile Software Development Considerations	240
	Chapter Summary	242
	Key Terms	242
	Chapter Review	242
	Cloud+ Certification Review	243
15	Governing the Cloud	245
	Understanding Corporate Governance	246
	Understanding Business Strategy	246
	Measure What Is Important	247
	Inspect What You Expect	249
	Understanding Internal Controls	249
	Extending Governance to IT	253
	Cloud-Computing Governance	254
	Chapter Summary	255
	Key Terms	256
	Review Questions	256
	Cloud+ Certification Review	256

16	Evaluating the Cloud’s Business Impact and Economics	259
	Business Economics 101	260
	Total Cost of Ownership (TCO)	260
	Economies of Scale	262
	Capital Expenditures	263
	Operational Expenses	263
	Return on Investment	264
	Profit Margins	266
	Understanding Chargebacks	267
	Moore’s Law and the Cloud	267
	Understanding Right Sizing	267
	Defining a Large Data Center	268
	Other Economic Key Performance Indicators	268
	Marketing the Cloud	270
	Chapter Summary	271
	Key Terms	271
	Review Questions	272
	Cloud+ Certification Review	272
17	Designing Cloud-Based Solutions	277
	Identifying the Team	278
	Revisit the System Requirements	278
	When to Select a Development Environment	278
	Design Is a Give-and-Take Process	279
	Designing for Accessibility	279
	Designing for Audit	279
	Designing for High Availability	280
	Designing for Backup	280
	Designing for Existing and Future Capacity	280
	Designing for Configuration Management	281
	Designing for Deployment	281
	Designing for Disaster Recovery	281
	Designing for the Environment (Green Computing)	282
	Designing for Interoperability	282
	Designing for Maintainability	282
	Designing for Performance	283
	Designing for Price	283
	Designing for Privacy	283
	Designing for Portability	284
	Designing for Recovery	284
	Designing for Reliability	284
	Designing for Response Time	284
	Designing for Robustness	285
	Designing for Security	285
	Designing for Testability	285
	Designing for Usability	286
	Chapter Summary	286
	Key Terms	288
	Chapter Review	288
	Cloud+ Certification Review	288
18	Coding Cloud-Based Applications	291
	Placing an Application in the Cloud	292
	Understanding Cloud-Native Solutions	293
	Leveraging Open-Source Solutions	293

Understanding Load Testing	293
Understanding Continuous Deployment	293
Creating a Simple Cloud Solution	294
Getting Your Own Domain Name	294
Creating and Hosting a Cloud Solution	295
Looking at a Simple Solution	295
Choosing a PaaS Provider	296
Understanding Serverless Computing	297
Chapter Summary	298
Key Terms	299
Chapter Review	299
Cloud+ Certification Review	299
19 Application Scalability	301
Reviewing the Load-Balancing Process	302
Designing for Scalability	303
Scaling Up, Scaling Out, or Both	303
Minimize Objects on Key Pages	303
Selecting Measurement Points	305
Analyze Your Database Operations	306
Evaluate Your System's Data Logging Requirements	307
Revisit Your Service-Level Agreement (SLA)	308
Capacity Planning Versus Scalability	308
Scalability and Diminishing Returns	308
Performance Tuning	309
Complication Is the Enemy of Scalability	309
Chapter Summary	310
Key Terms	311
Review Questions	311
Cloud+ Certification Review	311
20 The Future of the Cloud	315
The Internet of Things (IoT)	316
How the Cloud Will Change Operating Systems	318
Location-Aware Applications	319
Intelligent Fabrics, Paints, and More	319
Continued Expansion of Social Media	321
The Future of Cloud TV	321
Video Games and Augmented Reality	322
Future of Cloud-Based Smart Devices	323
Cloud and Mobile	323
Blockchain and Cloud	323
Faster Time to Market for Software Applications	324
Chapter Summary	324
Key Terms	325
Chapter Review	325
Cloud+ Certification Review	325
Appendix: Answer Key to Cloud+ Certification Review	327
Glossary of Key Terms	331
Index	337

PREFACE

For years, software developers and network administrators have used a picture of a cloud to represent the myriad communication details that take place as messages flow across the Internet from one computer network to another. The abstraction that is the “cloud” has exploded to now include processors, both physical and virtual, data storage, software-as-a-service solutions, and mobile applications. Cloud-based applications and new capabilities emerge daily, bringing with them lower cost of entry, pay-for-use processor and data-storage models, greater scalability, improved performance, ease of redundancy, and improved business continuity. With those many advantages come increased security challenges and IT-governance concerns. This book looks at each of these issues in detail. As you will learn, the dynamic nature of the cloud will certainly continue, and we’ve only just begun to scratch the surface of what can be done with the cloud.

Chapter 1 Introducing Cloud Computing introduces the abstract nature of cloud computing and the factors that led to the evolution of the cloud. The chapter examines software as a service (SaaS), platform as a service (PaaS), and infrastructure as a service (IaaS) with real-world examples of each. The chapter examines the key advantages of cloud computing, which include scalability, redundancy, low cost of entry, and virtualization.

Chapter 2 Software as a Service (SaaS) examines browser-based SaaS solutions and the advantages they provide. The chapter features real-world solutions such as Salesforce.com for customer relationship management, Taleo for human resource solutions, ADP for SaaS-based payroll processing, and many others.

Chapter 3 Platform as a Service (PaaS) introduces cloud-based hardware and software platforms that allow companies, large and small, to quickly and cost effectively move their applications to the cloud. The chapter examines such PaaS providers as Amazon, Google, and Microsoft.

Chapter 4 Infrastructure as a Service (IaaS) introduces the concept of a cloud-based data center that reduces or eliminates a company’s need for a large in-house data center. Because of the IaaS provider’s economies of scale, it can significantly reduce a company’s cost of IT operations.

Chapter 5 Identification as a Service (IDaaS) examines the use of cloud-based identity-management solutions to simplify user provisioning and resource access. With more solutions distributed across the cloud, IDaaS provides a way to facilitate the user’s sign-on process across solution providers.

Chapter 6 Data Storage in the Cloud examines the integration of cloud-based data storage and the evolution of network-based storage that led to its creation. The chapter examines several cloud-based data storage solutions that users can enable today at little or no cost. The chapter also examines several turnkey, low-cost, cloud-based backup solutions.

Chapter 7 Collaboration in the Cloud looks at cloud-based technologies that allow two or more users to work together to accomplish a task. The chapter shows the evolution of collaboration technologies from instant messaging to virtual meetings to shared documents that support simultaneous editing by multiple users.

Chapter 8 Virtualization introduces the use of hardware and software to create the perception that one or more entities exist, when they many not actually be physically present. The chapter examines solutions for virtual servers, virtual desktops, and virtual networks.

Chapter 9 Securing the Cloud examines the real-world issues where people (including sophisticated IT users) do not yet feel comfortable with placing their own data, or their company's data, in the cloud. The chapter examines specific security threats and measures one should take to minimize the occurrence of those threats.

Chapter 10 Disaster Recovery and Business Continuity and the Cloud examines ways that the use of the cloud and its redundant resources improve a company's ability to recover from and to continue operations after a disaster or serious event. The chapter examines common threats to business operations and ways the use of the cloud can mitigate them.

Chapter 11 Service-Oriented Architecture looks at how the availability of web-based services is changing the way developers create programs and the speed at which they can deploy solutions. The chapter examines a variety of real-world web services available to programmers for integration into programs.

Chapter 12 Managing the Cloud examines the tasks a manager must perform after a company migrates its applications to the cloud, such as auditing logs, monitoring system performance, and identifying bottlenecks within the data flow.

Chapter 13 Migrating to the Cloud discusses considerations a manager should evaluate before migrating a solution to the cloud, such as avoiding vendor lock-in, identifying remote data backup operations and security considerations, preparing a budget, and integrating developer and user training.

Chapter 14 Mobile Cloud Computing evaluates whether mobile computing is driving the growth of cloud computing or vice versa. The chapter examines the "ecosystem" that is mobile computing as well as common cloud-based mobile apps.

Chapter 15 Governing the Cloud discusses the role of IT governance and its extensions for cloud-based computing. The chapter examines the need for and ways to implement cloud-based internal controls.

Chapter 16 Evaluating the Cloud's Business Impact and Economics examines how the cloud's economies of scale and pay-for-use model will accelerate the ability for companies, large and small, to release cloud-based solutions. The chapter also evaluates the cloud's impact on operational and capital expenses.

Chapter 17 Designing Cloud-Based Solutions discusses the fact that developers will simply pick up and move many existing applications to the cloud. In the future, however, developers should design cloud-based solutions to better utilize scalability and redundancy. The chapter examines many common design considerations and ways the cloud will affect them.

Chapter 18 Coding Cloud-Based Applications examines how users and developers can place content in the cloud. The chapter walks you through the steps a developer performs to place a solution in the cloud.

Chapter 19 Application Scalability examines the two ways developers can scale applications: vertically, by using faster processors or more powerful servers, and horizontally, by supporting the ability to better distribute processing. The chapter looks at considerations designers should take when designing their applications to better achieve scalability.

Chapter 20 The Future of the Cloud examines ways the cloud will extend its reach into our cars, televisions, appliances, and even the clothes that we wear. By the end of the chapter, readers will realize that we have just scratched the surface of the cloud.

New to This Edition

This *Second Edition* prepares readers for the CompTIA Cloud+ Certification, which examines not only cloud specifics, such as SaaS, PaaS, IaaS, and other as-a-service solutions, but also key operations and functionality. The exam uses real-world scenarios to examine cloud deployment, optimization, scaling, security, and much more. At the end of each chapter, you will find a series of questions that target such key concepts to prepare you for the certification exam. Employers consider the Cloud+ Certification as a validation of your technical skills and knowledge. As you complete each chapter, take time to review the questions, and when you complete the book, you should take the exam.

Cloud Labs

This text is accompanied by cloud labs. These hands-on virtual labs provide immersive mock IT infrastructures where students can learn and practice foundational cybersecurity skills as an extension of the lessons in this text. For more information or to purchase the labs, visit go.jblearning.com/cloudcomputing2e

Author Bio



Dr. Kris Jamsa wrote his first computer program in Algol, using punched cards, while attending the U.S. Air Force Academy. Since then, he has spent his career wrangling data and the programs that use it. Jamsa has a PhD in computer science, a second PhD in education, and master's degrees in computer science, information security, project management, education, and business. He is the author of 115 books on all aspects of programming and computing.

Kris lives with his wife, Debbie, on their ranch in Prescott, Arizona. When he is not in front of a computer screen, you can find him spending time with their horses, dogs, and cats.