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AWS Certified Solutions Architect – Associate

(SAA-C03)

MARK WILKINS

AWS Certified Solutions Architect – Associate (SAA-C03) Cert Guide

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AWS Certified Solutions Architect – Associate (SAA-C03) Cert Guide

Mark Wilkins

Pearson

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About the Author

Mark Wilkins is an electronics engineering technologist with a wealth of experience in designing, deploying, and supporting software and hardware technology in the corporate and small business world. Since 2013, Mark has focused on supporting and designing cloud service solutions with Amazon Web Services, Microsoft Azure, and the IBM Cloud. He is certified as an AWS Certified Solutions Architect – Associate. Mark is also a Microsoft Certified Trainer (MCT) and holds certifications in MCTS, MCSA, Server Virtualization with Windows Server Hyper-V, and Azure Cloud Services.

Mark worked as a technical evangelist for IBM SoftLayer from 2013 through 2016 and taught both SoftLayer fundamentals and SoftLayer design classes to many Fortune 500 companies in Canada, the United States, Europe, and Australia. As former course director for Global Knowledge, Mark developed and taught many technical seminars, including Configuring Active Directory Services, Configuring Group Policy, and Cloud and Virtualization Essentials. Mark currently develops AWS curriculum on AWS cloud services and certification for O'Reilly Media and LinkedIn Learning. To learn more about what Mark finds interesting about the cloud, visit The Cloud Thingy, at https://thecloudthingy.substack.com/. To learn more about the AWS cloud and AWS certification, check out Mark's YouTube channel at http://www.youtube.com/@SAA-C03.

Mark's published books include *Windows 2003 Registry for Dummies*, *Administering SMS 3.0*, *Administering Active Directory*, and *Learning Amazon Web Services (AWS): A Hands-On Guide to the Fundamentals of AWS Cloud*.

Dedication

I would like to dedicate this book to my grandson, Silas, a future nerd. And to Bruce, one of our cats, for making me take breaks when he wanted.

Acknowledgments

This manuscript was made truly great by the incredible project management of Tonya Simpson, who went above and beyond! Thanks so much.

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Finally, thanks so much to Nancy Davis, my tireless acquisitions editor. Nancy very patiently made this book a reality.

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Ralph Parisi is a certified Champion Authorized Amazon instructor and has been teaching AWS courses for 6 years. Ralph has been an instructor for more than 20 years and has taught technical classes for Microsoft Exchange Server, Microsoft Windows Server, Active Directory, Group Policy, Citrix XenDeskop, and XenApp. Ralph has worked as a consultant to large corporations architecting Exchange Server and Active Directory solutions and migrations. Ralph has also worked with various companies as a technical writer. Ralph lives in North Carolina with his wife and Saluki, Dillon.

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As the reader of this book, *you* are our most important critic and commentator. We value your opinion and want to know what we're doing right, what we could do better, what areas you'd like to see us publish in, and any other words of wisdom you're willing to pass our way.

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Please note that we cannot help you with technical problems related to the topic of this book.

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Introduction

There are many reasons to get certified in AWS technology. First of all, AWS certifications validate your AWS cloud knowledge. To fully understand the AWS cloud, preparing for the AWS Certified Solutions Architect – Associate (SAA-C03) exam is a great place to start. There are other AWS certifications that may be a better fit, depending on your technical level, your current knowledge of cloud concepts, and your current and future jobs with AWS technologies and services. Certifications are broken down into Foundational, Associate, Professional, and Specialty certifications. Full details can be found at https://aws.amazon.com/certification/. AWS frequently adds new certification tracks, but the following are the certifications that are currently available:

- **Foundational:** There is one Foundational certification: AWS Certified Cloud Practitioner. The recommendation is to have at least 6 months of fundamental AWS cloud knowledge before attempting this certification exam. You might be closer to this certification than you think, depending on your current level of technical skills. One advantage of taking the AWS Certified Cloud Practitioner exam first is that it helps you to get used to answering multiple-choice test questions and to learn about the foundational AWS cloud services.
- **Associate:** There are several Associate certifications:
  - **AWS Certified Solutions Architect – Associate:** For individuals working as solutions architects, designing AWS solutions using AWS services
  - **AWS Certified SysOps Administrator – Associate:** For individuals working as systems administrators, managing and operating AWS services
  - **AWS Certified Developer – Associate:** For individuals working as developers, deploying and debugging cloud-based applications hosted at AWS

    Each certification exam expects that you know how the AWS service that you are being tested on works. Each Associate certification has a specific focus:
  - **Architect:** The best design possible, based on the question and scenario
  - **SysOps:** The administration steps required to carry out a particular task
  - **Developer:** How to best use the service for the hosted application you are writing

For example, the three Associate exams would test different aspects of CloudWatch logs:

- **Architect:** The main focus of this exam is on how CloudWatch logs work and the main design features to consider based on specific needs—that is, design knowledge related to using CloudWatch logs for a variety of solutions.
- **SysOps:** The main focus of this exam is on how to configure CloudWatch logs based on specific needs—that is, configuration and deployment of CloudWatch logs using operational knowledge.
- **Developer:** The main focus of this exam is on what CloudWatch logs are useful for when developing applications for tracking performance of an application hosted on an EC2 instance—that is, knowledge of how a particular AWS service can help in the development and testing process with applications.

  Before you attempt one of the Associate certifications, AWS recommends that you have at least 1 year of experience solving problems and implementing solutions using AWS services. AWS really wants to ensure that you have hands-on experience solving problems.

- **Professional:** These certifications include the AWS Certified Solutions Architect Professional and the AWS Certified DevOps Engineer Professional. Professional certifications are not where you normally start your certification journey. AWS recommends that you have at least 2 years of hands-on experience before taking a Professional exam.
- **Specialty:** The Specialty certifications for Advanced Networking, Security, Machine Learning, Data Analytics, SAP on AWS, and Database require advanced knowledge of the subject matter. AWS recommends that you have an Associate certification before you attempt one of these certifications.

NOTE The AWS Certified Solutions Architect – Associate (SAA-C03) certification is globally recognized and does an excellent job of demonstrating that the holder has knowledge and skills across a broad range of AWS topics.

The Goals of the AWS Certified Solutions Architect – Associate Certification

The AWS Certified Solutions Architect – Associate certification is intended for individuals who perform in a solutions architect role. This exam validates a candidate's ability to effectively demonstrate knowledge of how to architect and deploy secure and robust applications on AWS technologies. It validates a candidate's ability to

- Have knowledge and skills in the following AWS services: compute, networking, storage, and database and deployment and management services

- Have knowledge and skills in deploying, managing, and operating AWS workloads and implementing security controls and compliance requirements
- Identify which AWS service meets technical requirements
- Define technical requirements for AWS-based applications
- Identify which AWS services meet a given technical requirement

Recommended Prerequisite Skills

While this book provides you with the information required to pass the Certified Solutions Architect – Associate (SAA-C03) exam, Amazon considers ideal candidates to be those who possess the following:

- Experience in AWS technology
- Strong on-premises IT experience
- Understanding of mapping on-premises technology to the cloud
- Experience with other cloud services

The Exam Domains

The AWS Certified Solutions Architect – Associate (SAA-C03) exam is broken down into four major domains. This book covers each of the domains and the task statements.

- **Domain 1: Design Secure Architectures 30%**
  - Task Statement 1: Design secure access to AWS resources
  - Task Statement 2: Design secure workloads and applications
  - Task Statement 3: Determine appropriate data security controls
- **Domain 2: Design Resilient Architectures 26%**
  - Task Statement 1: Design scalable and loosely coupled architectures
  - Task Statement 2: Design highly available and/or fault-tolerant architectures
- **Domain 3: Design High-Performing Architectures 24%**
  - Task Statement 1: Determine high-performing and/or scalable storage solutions
  - Task Statement 2: Design high-performing and elastic compute solutions
  - Task Statement 3: Determine high-performing database solutions

- Task Statement 4: Determine high-performing and/or scalable network architectures
- Task Statement 5: Determine high-performing data ingestion and transformation solutions

- **Domain 4: Design Cost-Optimized Architectures 20%**
  - Task Statement 1: Design cost-optimized storage solutions
  - Task Statement 2: Design cost-optimized compute solutions
  - Task Statement 3: Design cost-optimized database solutions
  - Task Statement 4: Design cost-optimized network architectures

Steps to Becoming an AWS Certified Solutions Architect – Associate

To become an AWS Certified Solutions Architect – Associate, an exam candidate must meet certain prerequisites and follow specific procedures. Exam candidates must ensure that they have the necessary background and technical experience for the exam and then sign up for the exam.

Signing Up for the Exam

The steps required to sign up for the AWS Certified Solutions Architect – Associate exam are as follows:

Step 1. Create an AWS Certification account at https://www.aws.training/Certification and schedule your exam from the home page by clicking Schedule New Exam.

Step 2. Select a testing provider, either Pearson VUE or PSI, and select whether you want to take the exam at a local testing center or online from your home or office. If you choose to take an online exam, you will have to agree to the online testing policies.

Step 3. Complete the examination signup by selecting the preferred language and the date of your exam.

Step 4. Submit the examination fee.

TIP Refer to the AWS Certification site at https://aws.amazon.com/certification/ for more information regarding this and other AWS certifications.

How to Use This Book

This book maps directly to the domains of the AWS Certified Solutions Architect – Associate (SAA-C03) exam and includes a number of features that help you understand the topics and prepare for the exam.

Objectives and Methods

This book uses several key methodologies to help you discover the exam topics on which you need more review, to help you fully understand and remember those details, and to help you ensure that you have retained your knowledge of those topics. This book does not try to help you pass the exam only by memorization; it seeks to help you truly learn and understand the topics. This book is designed to help you pass the AWS Certified Solutions Architect – Associate (SAA-C03) exam by using the following methods:

- Helping you discover which exam topics you have not mastered
- Providing explanations and information to fill in your knowledge gaps
- Supplying exercises that enhance your ability to recall and deduce the answers to test questions
- Providing practice exercises on the topics and the testing process via test questions on the companion website

Book Features

To help you customize your study time using this book, the core chapters have several features that help you make the best use of your time:

- **Foundation Topics:** The sections under "Foundation Topics" describe the core topics of each chapter.
- **Exam Preparation Tasks:** The "Exam Preparation Tasks" section lists a series of study activities that you should do at the end of each chapter:
  - **Review All Key Topics:** The Key Topic icon appears next to the most important items in the "Foundation Topics" section of the chapter. The "Review All Key Topics" activity lists the key topics from the chapter, along with the number of the page where you can find more information about each one. Although the contents of the entire chapter could be tested on the exam, you should definitely know the information listed in each key topic, so you should review these.
  - **Define Key Terms:** Although the AWS Certified Solutions Architect – Associate (SAA-C03) exam may be unlikely to word a question "Define

this term," the exam does require that you learn and know a lot of terminology. This section lists the most important terms from the chapter and asks you to write a short definition and compare your answer to the glossary at the end of the book.

- **Q&A:** Confirm that you understand the content that you just covered by answering these questions and reading the answer explanations.

- **Web-based practice exam:** The companion website includes the Pearson Test Prep practice test engine, which enables you to take practice exam questions. Use it to prepare with a sample exam and to pinpoint topics where you need more study.

How This Book Is Organized

This book contains 14 core chapters—Chapters 2 through 15. Chapter 1 introduces the foundations of AWS, and Chapter 16 provides preparation tips and suggestions for how to approach the exam. Each core chapter covers a specific task statement or multiple task statements of the domains for the AWS Certified Solutions Architect – Associate (SAA-C03) exam.

Companion Website

Register this book to get access to the Pearson Test Prep practice test software and other study materials plus additional bonus content. Check this site regularly for new and updated postings written by the author that provide further insight into the more troublesome topics on the exam. Be sure to check the box indicating that you would like to hear from us to receive updates and exclusive discounts on future editions of this product or related products.

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Step 2. Enter the ISBN 9780137941582.

Step 3. Answer the challenge question as proof of purchase.

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If you are unable to locate the files for this title by following these steps, please visit https://www.pearsonITcertification.com/contact and select the Site Problems/ Comments option from the Select a Topic drop-down list. Our customer service representatives will assist you.

Pearson Test Prep Practice Test Software

As noted earlier, the Pearson Test Prep practice test software comes with two full practice exams. These practice exams are available to you either online or as an offline Windows application. To access the practice exams that were developed with this book, see the instructions in the card inserted in the sleeve at the back of the book. This card includes a unique access code that enables you to activate your exams in the Pearson Test Prep practice test software. For more information about the practice exams and more tools for exam preparation, see Chapter 16.

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Figures 1.1, 1.3 through 1.6, 1.10, 1.12 through 1.4, 2.1 through 2.4, 2.6 through 2.8, 2.13, 2.14, 3.1 through 3.4, 3.7 through 3.9, 3.11 through 3.24, 3.27 through 3.37, 3.39 through 3.48, 4.3, 4.4, 4.6 through 4.8, 4.11 through 4.14, 4.22 through 4.34, 5.2, 5.6 through 5.11, 5.14 through 5.16, 5.18, 6.7, 6.11 through 6.15, 6.17 through 6.20, 6.22, 6.23, 6.26 through 6.30, 7.5, 7.11 through 7.14, 7.33, 7.34, 8.1 through 8.13, 8.15, 8.17 through 8.23, 9.2 through 9.5, 9.7, 9.9, 9.10, 9.12, 9.13 through 9.29, 10.1, 10.4, 10.10 through 10.12, 10.17, 10.18, 11.3 through 11.7, 11.10 through 11.21, 11.23, 11.24, 11.27 through 11.31, 11.33, 11.34, 12.1 through 12.10, 12.12 through 12.17, 13.3 through 13.12, 14.1, 14.3 through 14.6, 14.13, 15.4, 16.1, 16.2: Amazon Web Services, Inc

Figure 2.11: Adam Wiggins

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This chapter covers the following topics:

- Essential Characteristics of AWS Cloud Computing
- AWS Cloud Computing and NIST
- Moving to AWS
- Operational Benefits of AWS
- Cloud Provider Responsibilities
- Security at AWS
- Migrating Applications
- The AWS Well-Architected Framework
- AWS Services Cheat Sheet

Understanding the Foundations of AWS Architecture

The AWS Certified Solutions Architect – Associate (SAA-C03) exam that we are discussing in this book measures your technical competence in architecting workloads to run successfully in the Amazon Web Services (AWS) cloud. For any of their associate certification exams, AWS does not expect you to be an expert in every single cloud service, as that is an impossible task. However, AWS does expect you to be able to display a high level of competence about how to architect (design, deploy, monitor, and manage) workloads running on AWS cloud architecture based on the exam domains of knowledge. You can find the SAA-C03 exam guide here: https://d1.awsstatic.com/training-and-certification/docs-sa-assoc/AWS-Certified-Solutions-Architect-Associate_Exam-Guide_C03.pdf. The SAA-C03 exam guide lists the AWS services that could be tested on the exam, and what AWS services are not covered.

The goal of writing this book is to include enough technical details for all readers to absorb and pass the AWS Certified Solutions Architect – Associate (SAA-C03) exam. The following list should help you to gauge whether you should read this entire chapter or skim through the topics:

- If you are coming from a technical background but don't know anything about the AWS cloud, start with this first chapter and read it carefully.
- If you have a background working in the AWS cloud but this is your first certification attempt, you might not need to read the entire chapter, but you should review the first chapter's content, and study the final section, "AWS Services Cheat Sheet."
- If you already are certified as an AWS Certified Solutions Architect – Associate and it's time to re-certify, you might not need to read this chapter, but you should study the final section, "AWS Services Cheat Sheet," to ensure that you're up to speed on the latest AWS services covered on the exam.

And let's be clear, the goal of this book is to help you pass the AWS Certified Solutions Architect – Associate exam. If you ace the exam, great! However, passing the exam should be your overall goal. You need to get roughly 72% of the exam questions right to pass the exam; Amazon is not clear as to the exact percentage for passing the exam but it's in this range. The AWS SAA-C03 exam is 65 multiple choice questions. However, it's very important to understand that 15 of the 65 exam questions are beta questions that don't count! Therefore, there are 50 questions you must answer successfully. Answering approximately 37 questions correctly out of the 50 questions that count will achieve your goal of becoming an AWS Certified Solutions Architect – Associate.

The SAA-C03 exam is marked using what is defined as *scaled scoring*. The questions that you are presented on your exam most likely will not be the same as those presented to other exam candidates; the difficulty of each exam question is weighted to ensure the total knowledge level of each exam as a whole is maintained. Additional details on how to prepare to take the exam are fully covered in the last chapter of this book, Chapter 16, "Final Preparation."

The following list of tasks will also help you greatly in the goal of becoming certified:

- **Read the FAQs:** Each AWS cloud service has a frequently asked questions (FAQs) summary that summarizes the service and its highlights. When learning about an AWS service, always start with the FAQ—you won't be disappointed. And be sure to take notes as you learn.
- **Read the AWS Well-Architected Framework PDFs:** The exam is based on the AWS Well-Architected Framework. Reading the PDF of each pillar is a great study aid for understanding the mindset of the exam questions, and will also prepare you to be a great AWS consultant/cloud architect. Make sure to review the Security Pillar, Reliability Pillar, Performance Efficiency Pillar, and the Cost Optimization Pillar. See https://aws.amazon.com/architecture/well-architected/.
- **Sign up for a free AWS cloud account:** This is the best method to practice hands-on tasks for the exam. Create multiple AWS accounts; you are not limited to one free AWS account, but a different e-mail address must be used as the root login for each AWS account that is created.
- **Complete AWS Well-Architected Labs:** Complete as many of the labs as possible that relate to the AWS Certified Solutions Architect – Associate exam topics. The labs are foundational (100), intermediate (200), and advanced (300), as partially shown in Figure 1-1 for the Security category. See https://wellarchitectedlabs.com/.

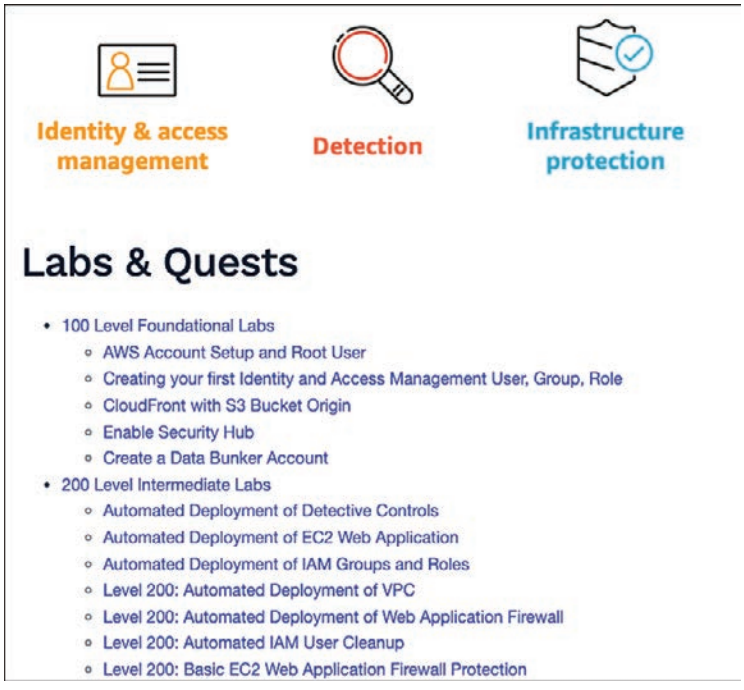

Figure 1-1 AWS Well-Architected Framework Hands-on Labs

- **Use the AWS Well-Architected Tool:** The AWS Well-Architected Tool is a self-paced utility that consists of Well-Architected Framework questions from each pillar to make you consider which best practices and procedures should be considered when hosting your workloads at AWS. This is a great study aid for the exam, available at https://www.wellarchitectedlabs.com/well-architectedtool/.
- **Complete the AWS security workshops:** AWS offers a variety of security workshops that will help you understand AWS security best practices; see https://awssecworkshops.com/.
- **Answer as many sample exam questions as you can:** Included in this book is a test engine with hundreds of test questions. The hardest part of preparing to take the exam is getting used to answering multiple-choice test questions. The more practice you have, the better you will be prepared. AWS also has some sample questions for the SAA-C03 exam here:

  https://d1.awsstatic.com/training-and-certification/docs-sa-assoc/AWS-Certified-Solutions-Architect-Associate_Sample-Questions.pdf

and here:

https://explore.skillbuilder.aws/learn/course/external/view/elearning/13266/aws-certified-solutions-architect-associate-official-practice-question-set-saa-c03-english?saa=sec&sec=prep

- **Browse the AWS Architecture Center:** The AWS Architecture Center (https://aws.amazon.com/architecture/) has many examples of how to deploy reference architecture for analytics, compute and HPC deployments, and databases, to name just a few. Walking through the step-by-step notes provides a great overview of the associated AWS services and can be helpful in visualizing how AWS architecture is designed and deployed.

Essential Characteristics of AWS Cloud Computing

In 2021, CEO Andy Jassy estimated that the cloud was currently less than 5% of global IT spending, which suggests that moving workloads to the cloud for many companies is really just beginning. The public cloud providers AWS and Microsoft Azure have been established for well over a decade and have strong infrastructure as a service (IaaS) and platform as a service (PaaS) offerings available around the world. Google Cloud Platform (GCP), Oracle Cloud, and IBM Cloud are also viable alternatives. Figure 1-2 shows the Gartner Magic Quadrant for Cloud Infrastructure and Platform Services (see https://www.gartner.com/en/research/methodologies/magic-quadrants-research), which indicates the current favorite cloud technology providers companies can choose to align with. In the Leaders quadrant, Amazon Web Services leads, followed closely by Microsoft and then Google. Alibaba Cloud aligns with the Visionaries quadrant, and Oracle, Tencent Cloud, and IBM currently occupy the Niche Players quadrant.

When I started my career as a computer technician in the 1990s, most corporations that I supported used several computer-based services running on mainframes that were not located on premises. Accounting services were accessed through a fast (at the time) 1200-baud modem that was connected using one of those green-screened digital terminals. The serial cable, threaded through the drop ceiling to connect the terminal, was strong enough to pull a car.

Today we rely more and more on one or more public cloud providers for hosting many types of workloads on an ever-increasing collection of very specialized data centers and cloud services. There is no hardware ownership, the cloud provider owns the services, and customers rent cloud services as required.

Source: Gartner (July 2021)

Figure 1-2 Gartner's Magic Quadrant of Top Public Cloud Providers (https://www.gartner.com/en/research/methodologies/magic-quadrants-research)[1]

You might think that the public cloud only offers virtual resources, but the AWS cloud and others *can* provide bare-metal servers if requested. AWS will happily host

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your applications and databases on bare-metal servers hosted at AWS, or in your own data centers. Of course, more commonly, AWS offers you a wide variety of virtual servers in many different sizes and designs. AWS is also quite happy if you continue to operate your on-premises data centers and coexist with cloud resources and services operating at AWS. AWS also offers AWS Outposts, which enables customers to run an ever-increasing number of AWS cloud services on premises. Microsoft Azure will offer to sell you a copy of its complete Azure cloud operating system, called Azure Stack, installed on servers in your data centers. It's getting harder to define the public cloud these days.

Applications that are hosted in the public cloud leverage virtual server, network, and storage resources combined with cloud services that provide monitoring, backup services, and more. Hardware devices, such as routers, switches, and storage arrays, have been replaced by AWS-managed cloud services built from the same virtual computers, storage, and networking components used by AWS themselves that are offered to each customer. This doesn't mean that companies aren't still using hardware devices on premises. However, it is possible to run hundreds or thousands of virtual machines in parallel, outperforming the functionality of a single hardware switch or router device. Most AWS cloud services are hosted on virtual machines called Amazon Elastic Cloud Compute (EC2) instances running in massive server farms powering the storage arrays, networking services, load-balancing, and auto-scaling services provided by AWS are part of Amazon Web Services (AWS). For example, AWS Config helps you manage compliance, and the AWS Backup service backs up AWS storage services.

AWS Cloud Computing and NIST

If you haven't heard of the National Institute of Standards and Technology (NIST), a branch of the U.S. government, you're not alone. Around 2010, NIST began documenting the emerging public cloud. After consulting the major cloud vendors, it released an initial report in June 2011, Special Publication 800-145, "The NIST Definition of Cloud Computing," defining the cloud services that were common across all public cloud vendors. The report's genius is that it defined in 2011 what the emerging public cloud actually became. NIST's cloud definitions have moved from mere definitions, to accepted standards that are followed by all of the public clouds we use today.

The five key NIST definitions of the public cloud have morphed into a definitive standard methodology of how cloud providers and thousands of customers operate in the public cloud. The report can be found here: https://nvlpubs.nist.gov/nistpubs/legacy/sp/nistspecialpublication800-145.pdf. The five essential characteristics of the cloud model defined by NIST are

- On-demand Self-Service
- Broad Network Access
- Resource Pooling
- Rapid Elasticity
- Measured Service

The sections that follow describe these essential NIST characteristics.

On-Demand Self-Service

These days companies don't just *expect* cloud service to be delivered quickly; they *demand* it.

Every cloud provider, including AWS, offers a self-service management portal (see Figure 1-3). Request any cloud service, and in seconds, or minutes, it's available in your AWS account, ready to be configured or used. Gone are the days of requesting a virtual server via email and waiting several days until it's available. At AWS, a virtual server can be ordered and operational in under 5 minutes. Creating and using an Amazon Simple Storage Service (Amazon S3) bucket is possible within seconds. It is also possible to procure a software-defined network (called an Amazon Virtual Private Cloud) and have it operational in seconds. Using the AWS management console enables customers to order and configure many cloud services across many AWS regions. Any cloud service ordered is quickly delivered using automated procedures running in the background.

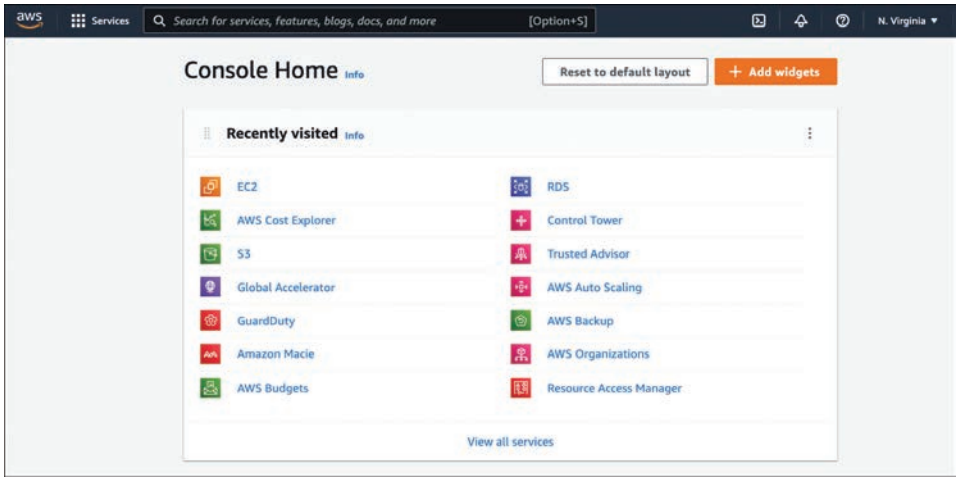

Figure 1-3 The AWS Management Console