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AWS Certified Cloud Practitioner CLF-C02 Cert Guide

Anthony Sequeira, CCIE No. 15626

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Dedication

This book is dedicated to my dear friend Pierre Smith, who has provided many decades of advice, banter, and, of course, laughs. Pierre will most likely never certify in AWS, but he certainly could if he wanted to—in record time.

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Introduction

The AWS Certified Cloud Practitioner exam tests candidates' overall understanding of the AWS Cloud and many of its critical services. This certification also serves to validate candidates' knowledge with an industry-recognized credential. This exam covers four domains:

- Cloud Concepts
- Security and Compliance
- Cloud Technology and Services
- Billing, Pricing, and Support

Obtaining the AWS Certified Cloud Practitioner certification is a recommended path to achieving further specialty certifications or can be a start toward associate certifications in various disciplines, such as solutions architect, SysOps administrator, and developer.

The Goals of the AWS Certified Cloud Practitioner Program

After a candidate studies this text carefully, they should be more than ready for their certification exam. The exam validates a candidate's ability to do the following:

- Explain the value of the AWS Cloud.
- Understand and explain the AWS shared responsibility model.
- Understand security best practices.
- Understand AWS Cloud costs, economics, and billing practices.
- Describe and position the core AWS services, including compute, network, database, and storage services.
- Identify AWS services for common use cases.

Ideal Candidates

While this text provides you with the information required to pass this exam, Amazon considers ideal candidates to be those who possess the following:

- Six months of exposure to AWS Cloud design, implementation, and/or operations
- AWS knowledge in the following areas:
 - AWS Cloud concepts
 - Security and compliance in the AWS Cloud

- Core AWS services
- Economics of the AWS Cloud

The Exam Objectives (Domains)

The AWS Certified Cloud Practitioner CLF-C02 exam is broken down into four major domains. The contents of this book cover each of the domains and the sub-topics included in them, as illustrated in the following descriptions.

The following table lists those domains and the percentage of the exam dedicated to each of them:

Domain	Percentage of Representation in Exam
1: Cloud Concepts	24%
2: Security and Compliance	30%
3: Cloud Technology and Services	34%
4: Billing, Pricing, and Support	12%
Total 100%	

Domain 1: Cloud Concepts

Chapters 1 through 6 of this book cover Domain 1: Cloud Concepts. This domain covers critical topics such as the services and categories of services provided by AWS. It also covers important information on how AWS can save your IT team large sums of money. It comprises 24% of the exam and includes the following topics:

- Task Statement 1.1: Define the benefits of the AWS Cloud.
- Task Statement 1.2: Identify design principles of the AWS Cloud.
- Task Statement 1.3: Understand the benefits of and strategies for migration to the AWS Cloud.
- Task Statement 1.4: Understand concepts of cloud economics.

Domain 2: Security and Compliance

Chapters 7 through 10 cover Domain 2: Security and Compliance. This domain covers security in general with AWS, and it also provides details on the implementation of

strong security with AWS services such as IAM and a wide variety of management tools. This domain makes up 30% of the exam and includes the following topics:

- Task Statement 2.1: Understand the AWS shared responsibility model.
- Task Statement 2.2: Understand AWS Cloud security, governance, and compliance concepts.
- Task Statement 2.3: Identify AWS access management capabilities.
- Task Statement 2.4: Identify components and resources for security.

Domain 3: Cloud Technology and Services

Chapters 11 through 18 cover Domain 3: Cloud Technology and Services. This domain digs into the “nuts and bolts” of AWS, such as the global infrastructure and core services of AWS. It encompasses 34% of the exam and includes the following topics:

- Task Statement 3.1: Define methods of deploying and operating in the AWS Cloud.
- Task Statement 3.2: Define the AWS global infrastructure.
- Task Statement 3.3: Identify AWS compute services.
- Task Statement 3.4: Identify AWS database services.
- Task Statement 3.5: Identify AWS network services.
- Task Statement 3.6: Identify AWS storage services.
- Task Statement 3.7: Identify AWS artificial intelligence and machine learning (AI/ML) services and analytics services.
- Task Statement 3.8: Identify services from other in-scope AWS service categories.

Domain 4: Billing, Pricing, and Support

Chapters 19 through 21 cover Domain 4: Billing, Pricing, and Support. In these chapters, you’ll learn about the tools and techniques for controlling costs inside AWS as well as the resources that are available to assist you. This domain accounts for 12% of the exam and includes the following topics:

- Task Statement 4.1: Compare AWS pricing models.
- Task Statement 4.2: Understand resources for billing, budget, and cost management.
- Task Statement 4.3: Identify AWS technical resources and AWS Support options.

Steps to Becoming an AWS Certified Cloud Practitioner

To become an AWS Certified Cloud Practitioner, a test candidate should meet certain prerequisites and follow specific procedures. Once they deem themselves ready, a test candidate can sign up for the exam.

Signing Up for the Exam

The steps required to sign up for the AWS Certified Cloud Practitioner exam are as follows:

- Step 1.** To schedule your exam, first create an AWS Certification account at <https://www.aws.training/certification>
- Step 2.** Complete the Examination Agreement, attesting to the truth of your assertions regarding professional experience and legally committing to adhering to the testing policies.
- Step 3.** Submit the examination fee.

Facts About the Exam

The exam is a computer-based test. The exam consists of multiple-choice questions only. You must bring a government-issued identification card. No other forms of ID will be accepted.

TIP Refer to the AWS Certification site at <https://aws.amazon.com/certification/> for more information regarding the AWS Certified Cloud Practitioner and other AWS certifications.

How to Use This Book

This book maps directly to the topic areas of the exam and uses a number of features to 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 prove to yourself that you have retained 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 Cloud Practitioner exam by using the following methods:

- Helping you discover which exam topics you have not yet become proficient in
- 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:** These are the core sections of each chapter. They explain the concepts for the topics in that chapter.
- **Exam Preparation Tasks:** After the “Foundation Topics” section of each chapter, the “Exam Preparation Tasks” section lists a series of study activities that you should do at the end of the 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 page number for each one. Although the contents of the entire chapter could be on the exam, you should definitely know the information listed in each key topic, so you should review these.
 - **Define Key Terms:** Although the Cloud Practitioner exam may be unlikely to ask a question such as “Define this term,” the exam does require that you learn and know a lot of AWS-related terminology. This section lists the most important terms from the chapter, asking you to write a short definition and compare your answer to the Glossary at the end of the book.
 - **Q&A Questions:** Confirm that you understand the content you just covered by answering these questions and reading the answer explanations.
- **Web-based practice exam:** The companion website includes the Pearson Cert Practice Test engine, which allows you to take practice exams. Use it to prepare with a sample exam and to pinpoint topics where you need more study.

How to Access the Companion Website

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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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Pearson Test Prep Practice Test Software

As noted previously, this book comes complete with the Pearson Test Prep practice test software, containing two full exams. These practice tests are available to you either online or as an offline Windows application. To access the practice exams that were developed with this book, please see the instructions below.

How to Access the Pearson Test Prep (PTP) App

You have two options for installing and using the Pearson Test Prep application: a web app and a desktop app. To use the Pearson Test Prep application, start by finding the registration code that comes with the book. You can find the code in these ways:

- You can get your access code by registering the print ISBN (9780138285999) on pearsonitcertification.com/register. Make sure to use the print book ISBN regardless of whether you purchased an eBook or the print book. After you register the book, your access code will be populated on your account page under the Registered Products tab. Instructions for how to redeem the code

are available on the book's companion website by clicking the Access Bonus Content link.

- If you purchase the Premium Edition eBook and Practice Test directly from the Pearson IT Certification website, the code will be populated on your account page after purchase. Just log in at pearsonitcertification.com, click Account to see details of your account, and click the Digital Purchases tab.

NOTE After you register your book, your code can always be found in your account on the Registered Products tab.

Once you have the access code, to find instructions about both the Pearson Test Prep web app and the desktop app, follow these steps:

- Step 1.** Open this book's companion website, as shown earlier in this Introduction, under the heading, "How to Access the Companion Website."
- Step 2.** Click the **Practice Test Software** button.
- Step 3.** Follow the instructions listed there for both installing the desktop app and using the web app.

Note that if you want to use the web app only at this point, just navigate to pearsonstestprep.com, log in using the same credentials used to register your book or purchase the Premium Edition, and register this book's practice tests using the registration code you just found. The process should take only a couple of minutes.

Customizing Your Exams

Once you are in the exam settings screen, you can choose to take exams in one of three modes:

- **Study mode:** Allows you to fully customize your exam and review answers as you are taking the exam. This is typically the mode you use first to assess your knowledge and identify information gaps.
- **Practice Exam mode:** Locks certain customization options, as it is presenting a realistic exam experience. Use this mode when you are preparing to test your exam readiness.
- **Flash Card mode:** Strips out the answers and presents you with only the question stem. This mode is great for late-stage preparation when you really want to challenge yourself to provide answers without the benefit of seeing multiple-choice options. This mode does not provide the detailed score reports that the other two modes do, so you should not use it if you are trying to identify knowledge gaps.

In addition to these three modes, you will be able to select the source of your questions. You can choose to take exams that cover all of the chapters, or you can narrow your selection to just a single chapter or the chapters that make up a specific part in the book. All chapters are selected by default. If you want to narrow your focus to individual chapters, simply deselect all the chapters and then select only those on which you wish to focus in the Objectives area.

You can also select the exam banks on which to focus. Each exam bank comes complete with a full exam of questions that cover topics in every chapter. The two exams printed in the book are available to you, as are two additional exams of unique questions. You can have the test engine serve up exams from all four banks or just from one individual bank by selecting the desired banks in the exam bank area.

There are several other customizations you can make to your exam from the exam settings screen, such as the time of the exam, the number of questions served up, whether to randomize questions and answers, whether to show the number of correct answers for multiple-answer questions, and whether to serve up only specific types of questions. You can also create custom test banks by selecting only questions that you have marked or questions for which you have added notes.

Updating Your Exams

If you are using the online version of the Pearson Test Prep software, you should always have access to the latest version of the software as well as the exam data. If you are using the Windows desktop version, every time you launch the software while connected to the Internet, it checks if there are any updates to your exam data and automatically downloads any changes that were made since the last time you used the software.

Sometimes, due to many factors, the exam data may not fully download when you activate your exam. If you find that figures or exhibits are missing, you may need to manually update your exams. To update a particular exam you have already activated and downloaded, simply click the **Tools** tab and click the **Update Products** button. Again, this is only an issue with the desktop Windows application.

If you wish to check for updates to the Pearson Test Prep exam engine software, Windows desktop version, simply click the **Tools** tab and click the **Update Application** button. This ensures that you are running the latest version of the software engine.

Credits

Figures 1.1-1.8, 2.1-2.5, 3.1, 4.1-4.4, 5.1, 6.1-6.7, 7.2, 8.2, 8.3, 9.1-9.5, 10.1-10.3, 11.1, 11.2, 12.1-12.3, 13.1-13.4, 14.1-14.3, 15.1, 15.2, 16.1-16.4, 17.1-17.3, 18.1-18.4, 19.1-19.3, 20.1-20.3, 21.1-21.5-Amazon Web Services, Inc

Figures 6.8 & 11.3-Microsoft Corporation

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AWS Artificial Intelligence and Data Analytics Services

In this chapter, we'll delve into the exciting realm of artificial intelligence (AI)/machine learning (ML) services in AWS. In addition, we will explore some amazing data analytics services offered by AWS. This is an important chapter as it addresses some of the most popular and hyped up topics in IT today.

AWS, as you would expect, does a fantastic job of making what might be very complex technologies quite simple to implement. This chapter covers the AWS services available in these areas.

“Do I Know This Already?” Quiz

The “Do I Know This Already?” quiz allows you to assess whether you should read the entire chapter. Table 17-1 lists the major headings in this chapter and the “Do I Know This Already?” quiz questions covering the material in those sections so you can assess your knowledge of these specific areas. The answers to the “Do I Know This Already?” quiz questions appear in Appendix A, “Answers to the ‘Do I Know This Already?’ Quizzes and Q&A Sections.”

Table 17-1 “Do I Know This Already?” Foundation Topics Section-to-Question Mapping

Foundation Topics Section	Questions
Artificial Intelligence/Machine Learning Services	1–3
Data Analytics Services	4–6

CAUTION The goal of self-assessment is to gauge your mastery of the topics in this chapter. If you do not know the answer to a question or are only partially sure of the answer, you should mark that question as wrong for purposes of the self-assessment. Giving yourself credit for an answer you correctly guess skews your self-assessment results and might provide you with a false sense of security.

1. You have been tasked with training a machine-learning model for a project in your organization. What AWS service can assist you with this?
 - a. Kendra
 - b. Athena
 - c. SageMaker
 - d. Lex
2. What AWS service helps you offer intelligent natural language searching in your solutions?
 - a. Lex
 - b. Kendra
 - c. SageMaker
 - d. QuickSight
3. You are interested in adding AI to your customer service chat. What AWS service should you investigate?
 - a. Kendra
 - b. SageMaker
 - c. Athena
 - d. Lex
4. What AWS service permits SQL queries against data stored in S3 buckets?
 - a. Athena
 - b. QuickSight
 - c. Kinesis
 - d. Glue
5. What is an option for ETL data services in AWS?
 - a. Glue
 - b. Athena
 - c. SageMaker
 - d. Neptune

- 6.** What service of AWS can assist you in creating powerful data visualizations such as charts and graphs?
- a.** Athena
 - b.** QuickSight
 - c.** Glue
 - d.** Kinesis

Foundation Topics

Artificial Intelligence/Machine Learning Services

I don't want to take anything for granted in this section, so let's begin by defining AI and ML. Artificial intelligence (AI) refers to computer systems or machines that are designed to perform tasks that typically require human intelligence, such as learning, reasoning, problem-solving, and decision-making. A subset of this exciting discipline is machine learning (ML), which involves the algorithms and models that enable computers to learn patterns from data and make predictions or decisions without explicit programming.

AI and ML are lofty disciplines that typically require the latest and greatest technologies and lots of available resources (like CPU, memory, and storage). AWS is perfectly positioned to help companies take advantage of these cutting-edge technologies.

SageMaker

AWS *SageMaker* is a smart assistant that you can use to build and train machine learning models without needing to be a coding expert. It provides easy-to-use tools to help you gather and prepare data, pick the right algorithm, and then train and deploy your model, all in one convenient place on the AWS Cloud platform. Figure 17-1 shows AWS SageMaker in the AWS Management Console.

Key Topic

AWS SageMaker offers several features that simplify the ML lifecycle. Here are just some of them:

- **Built-in algorithms:** SageMaker comes with a variety of prebuilt algorithms for common ML tasks—such as classification, regression, and clustering—which means you don't need to create models from scratch.
- **Notebook instances:** SageMaker provides Jupyter notebook instances, which allow you to create and share documents that contain live code, equations, visualizations, and narrative text.
- **Training jobs:** You can use SageMaker to easily train your ML models at scale, distributing the training process across multiple instances.
- **Model hosting:** Once your model is trained, SageMaker makes it simple to deploy, host, and integrate it with your applications.

- **Managed endpoints:** SageMaker provides managed endpoints for deploying models, making it easy to handle real-time predictions and batch processing.
- **Autopilot:** SageMaker enables you to automate the end-to-end process of building, training, and deploying ML models with minimal effort, making it suitable for users with limited ML expertise.

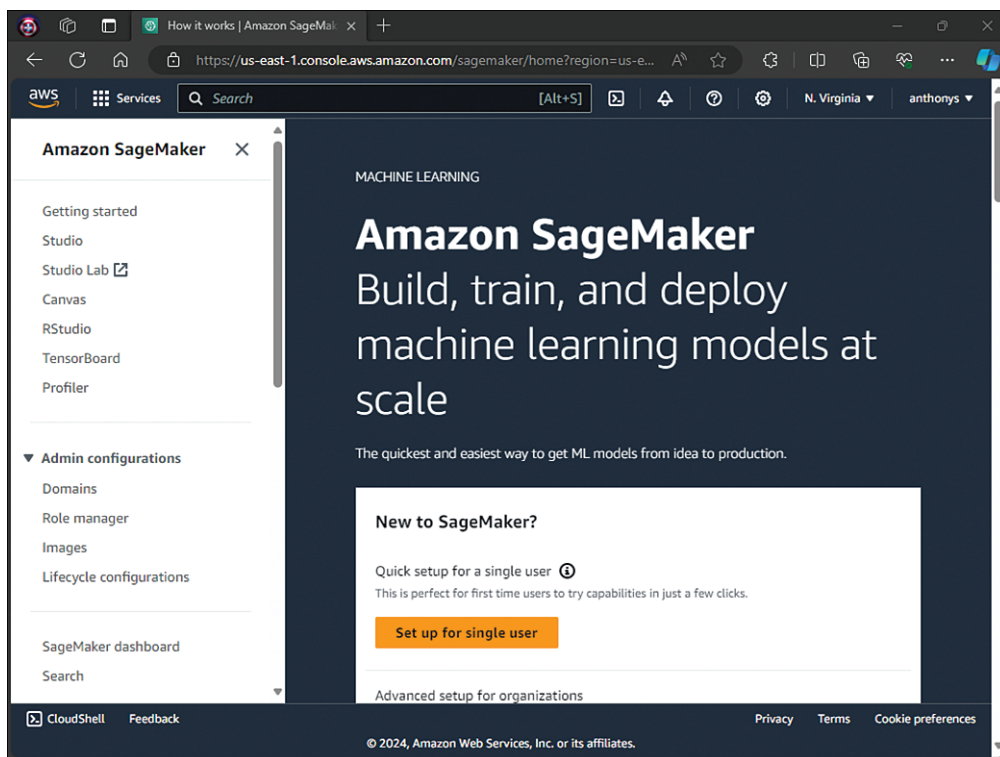


Figure 17-1 AWS SageMaker

Lex

Key Topic

AWS *Lex* makes it easy to create virtual assistants for your applications. It's a service that helps you build chatbots and conversational interfaces using natural language understanding. Think of it as the brain behind a chatbot. Lex understands user inputs, extracts key information, and can respond in a way that makes sense.

This service is handy for creating interactive experiences in your applications, whether for answering customer queries, handling reservations, or guiding users through processes. You can integrate Lex into various platforms, such as mobile apps or websites, to make it easier for users to interact with your applications using just

their words. Plus, Lex is powered by the same technology as Amazon Alexa, so it's got some serious language smarts under the hood.

Kendra

AWS **Kendra** is a super-smart search engine that is designed to help you find information effortlessly. It's a powerful search service that uses ML to understand the context and meaning behind your queries. Instead of just matching keywords, Kendra comprehends natural language, making it feel like you're having a conversation with your search engine. It's great for handling complex searches across vast amounts of data in documents, FAQs, or other sources. Figure 17-2 shows the Kendra service in the AWS Management Console.

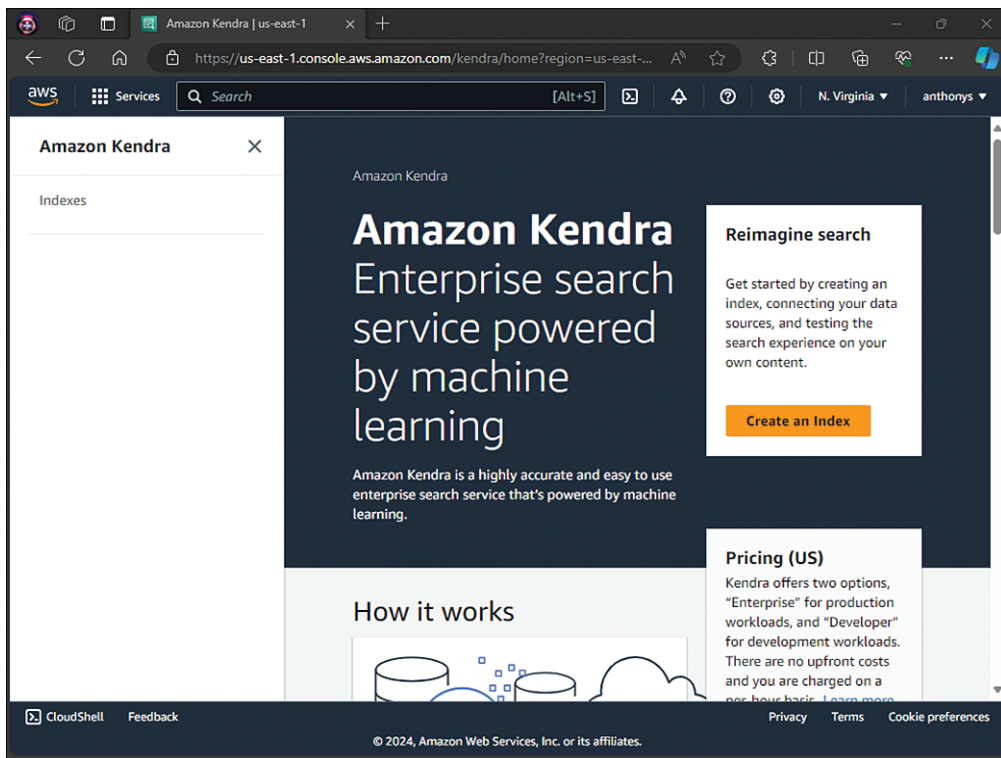


Figure 17-2 AWS Kendra

AWS Kendra includes the following features:

- **Semantic search:** Kendra uses machine learning algorithms to understand the semantics of the content and improve the accuracy of search results by recognizing nuances of and relationships between words.

- **Relevance tuning:** Kendra allows you to fine-tune search results to prioritize certain documents or sources based on your preferences. It enables you to ensure that the most important information is surfaced first.
- **Rich document support:** Kendra can handle a variety of document types, including PDFs, Word documents, HTML, and more, making it versatile for different types of content.
- **Query suggestions:** Kendra provides query suggestions to guide users and help them refine their search queries for better results.
- **Natural language query enhancement:** Kendra assists users in constructing more effective queries by suggesting natural language improvements, making the search process more intuitive.

Data Analytics Services

AWS offers a suite of data analytics services that can help a small startup or a large enterprise make informed decisions by extracting meaningful patterns from data. AWS provides scalable and flexible solutions to analyze data efficiently. With services like AWS Athena, and AWS Glue, you can turn raw data into actionable intelligence. The AWS Cloud makes data analytics accessible, allowing you to focus on uncovering valuable insights without the hassle of managing complex infrastructure.

Athena



When I first tried the AWS *Athena* service, I thought it was pure magic. Athena is a serverless, interactive query service that makes it possible to analyze data residing in AWS S3 buckets using standard SQL expressions. With Athena, you don't need complex data transformation or loading processes. You dump the data into S3, and you are ready to directly query the data in its raw, native format.

Athena uses Trino and Presto, which are open-source distributed SQL query engines that enable you to execute SQL queries across your data stored in S3. Athena supports various data formats, including Avro, Parquet, ORC, JSON, and CSV, ensuring compatibility with a wide range of data structures. In addition, Athena integrates with the AWS Glue Data Catalog (discussed next) to streamline the metadata management process and enhance query efficiency.

Glue

The AWS *Glue* service provides ETL (extract, transform, and load) services for your data analytics. An ETL system in data analytics is like an automated data organizer that collects information from different places, cleans it up, and arranges it neatly

so that your analysts can easily make sense of it. It's basically the behind-the-scenes work that ensures your data is ready and polished for analysis.

The Glue Data Catalog acts as a central repository for metadata about your data sources, transformations, and targets. AWS Glue crawlers automatically scan and catalog data in various formats across different storage systems, creating a searchable and organized metadata store.

The ETL process is handled by Glue Jobs, which allows you to define and execute Python or Scala code for data transformation. Glue provides a serverless execution environment and allows you to scale your ETL jobs based on demand without managing the underlying infrastructure.

Glue features tight integration with other AWS services and supports a variety of potential data sources and destinations, including S3, Redshift, and RDS.

QuickSight

AWS ***QuickSight*** is a business intelligence service that makes it easy to visualize and explore your data. It allows you to create interactive dashboards and reports, providing insights from various data sources with just a few clicks.

QuickSight is designed to be user friendly, enabling both technical and nontechnical users to derive meaningful insights from their data through intuitive and customizable visualizations.

AWS QuickSight offers several key features that make it a powerful and user-friendly business intelligence service:

- **Easy data integration:** QuickSight seamlessly connects to various data sources, including AWS services, databases, and third-party applications, making it convenient to analyze data from different platforms.
- **Intuitive visualizations:** QuickSight provides a wide range of customizable and interactive visualizations, such as charts, graphs, and maps, to allow users to represent data in ways that best communicate insights.
- **Insights:** QuickSight's Auto Insights feature uses machine learning to automatically discover hidden trends, patterns, and anomalies in data, saving users time in the analysis process.
- **Smart recommendations:** QuickSight offers intelligent recommendations for the most suitable visualizations based on the type of data and the analysis performed, enhancing the user experience and aiding in data exploration.
- **SPICE:** QuickSight uses the Super-fast, Parallel, In-memory Calculation Engine (SPICE), which provides high-performance data processing for quick and responsive analytics, even with large datasets.

- **Ad hoc analysis:** Users can perform ad hoc analysis by dragging and dropping fields to create new visualizations on the fly, enabling quick exploration and understanding of data.
- **Dashboard storytelling:** QuickSight supports the creation of interactive dashboards and stories that allow users to present and share insights in a narrative format and enhance the communication of data-driven stories.

Kinesis

Key Topic

AWS *Kinesis* is a fully managed platform designed for real-time processing of streaming data at scale. It enables an organization to ingest, process, and analyze large volumes of real-time data from diverse sources, such as Internet of Things (IoT) devices, applications, and logs. Figure 17-3 shows AWS Kinesis in the AWS Management Console.

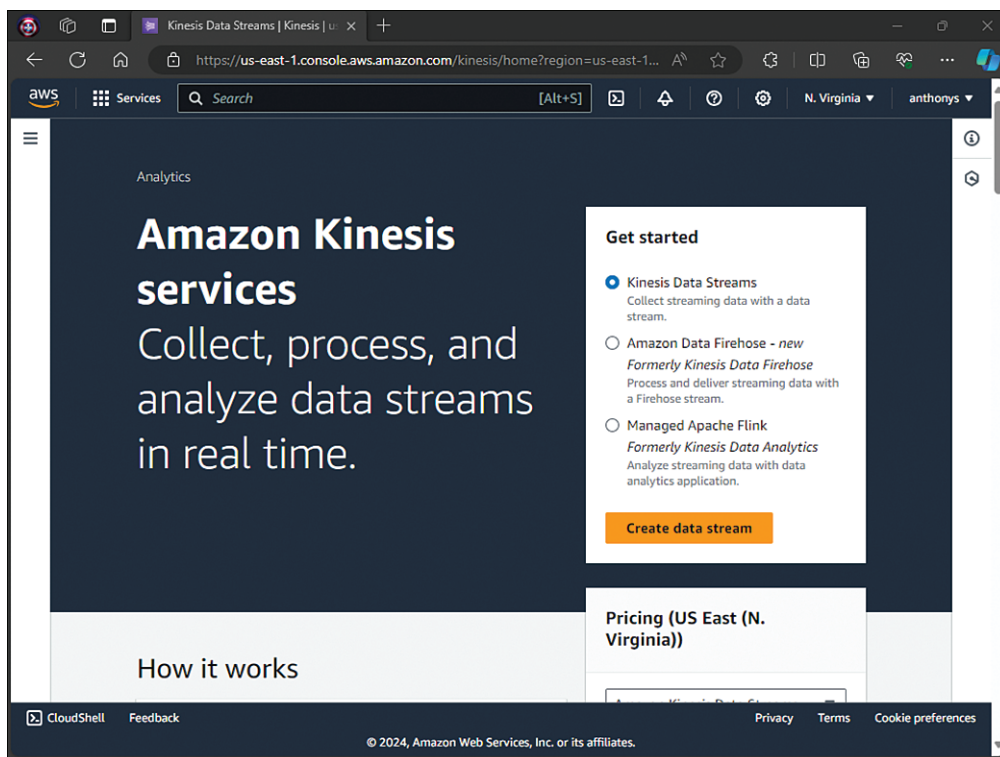


Figure 17-3 AWS Kinesis

Kinesis offers a suite of services that cater to specific aspects of streaming data workflows:

- **Kinesis Data Streams:** This service allows you to collect and process real-time data streams. It enables you to scale the number of streaming data shards based on the volume of data, ensuring efficient handling of varying workloads. With Data Streams, developers can build applications that rapidly respond to changing data and extract valuable insights in real time.
- **Kinesis Data Firehose:** This service simplifies the process of loading streaming data into other AWS services or external destinations and eliminates the need for manual intervention. It automates data delivery, transformation, and compression, streamlining the data pipeline and reducing management overhead.
- **Kinesis Data Analytics:** This service facilitates the real-time analysis of streaming data. It enables you to run SQL queries on streaming data, extract meaningful information, and derive insights on the fly. Kinesis Data Analytics enables an organization to gain actionable intelligence from its streaming data in order to make informed decisions and drive innovation.

As you can see, AWS Kinesis is a comprehensive and scalable solution for managing the entire lifecycle of your streaming data, from ingestion and processing to analysis and delivery.

Exam Preparation Tasks

As mentioned in the section “How to Use This Book” in the Introduction, you have a few choices for exam preparation: the exercises here, Chapter 22, “Final Preparation,” and the exam simulation questions in the Pearson Test Prep Software Online.

Review All Key Topics

Review the most important topics in this chapter, noted with the Key Topics icon in the outer margin of the page. Table 17-2 lists these key topics and the page number on which each is found.



Table 17-2 Key Topics for Chapter 17

Key Topic Element	Description	Page Number
List	SageMaker features	214
Overview	Lex	215
Overview	Athena	217
Overview	Kinesis	219

Define Key Terms

Define the following key terms from this chapter and check your answers in the Glossary:

SageMaker, Lex, Kendra, Athena, Glue, QuickSight, Kinesis

Q&A

The answers to these questions appear in Appendix A. For more practice with exam format questions, use the Pearson Test Prep Software Online.

1. Name and briefly describe the AWS AI/ML service that is powered by the same technology as Amazon Alexa.
2. Name and briefly describe the AWS technology that aims to manage your data streaming lifecycle from ingestion to analysis.



This chapter covers the following subjects:

- **Business Application Services:** This section of the chapter describes several services that provide key business needs, like email and customer service. It also covers AWS tools that foster integration between services.
- **Customer Engagement Services:** In this section of the chapter, you will learn about several different services that aim to improve the AWS customer experience.
- **Developer Services:** AWS has many tools and services designed to thrill your developers. In this section of the chapter, you will learn about many important developer services.
- **End-User Compute Services:** In this section of the chapter, you will learn about methods of making applications and even entire desktops available via remote access.
- **IoT Services:** IoT is a growing trend in modern compute. In this section of the chapter, you'll learn about two fundamental IoT services of AWS.

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