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Certified Database

Study Guide

Specialty (DBS-C01) Exam

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I dedicate this book to my two funny and witty daughters and my lovely husband, who were always supportive throughout the journey.
—Angie Nobre

I dedicate this book to my family and friends who supported and inspired me in this fantastic journey.
—Érika Kurauchi

I dedicate this book to my wife and son, who support me in all adventures.
—Hugo Rozestraten

To my family: Erika, Antonio, Clelia, and Leandro, your love and support made this book a reality.
—Leonardo Ciccone

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—Matheus Arrais

To my wife, my son, my daughters, and my parents. Specially to my dad who also wrote a database book but couldn't get it published.
—Rene Martinez

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Finally, thanks to our readers for trusting us to guide and prepare you for this incredible learning journey.

—The Authors

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Introduction

In 2022, 97 zettabytes of data were created, copied, captured, and consumed, and 181 zettabytes are projected by 2025. Databases play a crucial role in this data world. Over the last decade, database technologies matured: from tiime series to graph, from ledger to key-value, from relational to nonrelational. It's undeniable: the database field is flourishing. Understanding and applying the concepts covered in this book will improve your contributions and impact as a DBA, developer, architect, or analyst.

The purpose of this book is to help you pass the AWS Certified Database – Specialty exam. As of the writing of this book, the exam is composed of 65 questions, either multiple response or multiple choice, with a total length of 180 minutes.

Don't just study the questions and answers! The questions on the actual exam will be different from the practice questions included in this book. The exam is designed to test your knowledge of a concept or objective, so use this book to learn the objectives behind the questions.

Non-native English speakers can request a 30-minute exam extension when taking the exam in English. For more information, check `https://aws.amazon.com/certification/policies/before-testing`.

When reading exam questions, try to outline the key requirements, and work backwards from the responses. This will help you eliminate wrong responses from the start, saving time.

What Does This Book Cover?

This book covers the topics outlined in the AWS Certified Database – Specialty (DBS-C01) exam guide available here:

`https://d1.awsstatic.com/training-and-certification/docs-database-specialty/AWS-Certified-Database-Specialty_Exam-Guide.pdf`

Chapters follow a logical evolution of the workload-specific types of databases and their use cases, and they cover monitoring, troubleshooting and security features.

Chapter 1: Databases—From Your Server to AWS Cloud This chapter presents an evolution of databases and the differences of managing databases on premises and in the

AWS cloud. It presents important concepts and features of a self-managed database in AWS, configuring a database using Amazon EC2, and understanding the limitations. It also introduces database options in AWS.

Chapter 2: Basic AWS Concepts This chapter introduces the basics of AWS infrastructure, networking, security, storage, and operations, which are important to understand when designing database solutions in AWS. If you are very experienced with AWS components, you may want to skip this chapter; otherwise, take your time to learn more about AWS regions, availability zones, edge locations, VPC, VPN, direct connect, network connectivity, network security, security model, identity and access management, data encryption, block storage, file storage, object storage, monitoring, logging, and auditing.

Chapter 3: Purpose-Built Databases This chapter discusses workload-specific database design. It introduces how to evaluate application requirements and datastore characteristics, taking into consideration several important aspects: data access patterns, latency, scaling, transaction support, consistency, volume, durability, availability, security and compliance, business logic, and cost. It concludes by presenting a comprehensive way to compare the requirements with AWS managed services for databases.

Chapter 4: Relational Databases on AWS This chapter presents transactional databases in AWS with a focus on relational databases, which are mostly used to support transactional environments using concepts of ACID transactions. It presents options for managing and installing relational databases on Amazon EC2, storage requirements and options on AWS, and monitoring, updating, and scale options for this type of installation. A large part of this chapter is dedicated to Amazon RDS, including the engine options and a deep dive into Amazon Aurora, covering all the topics related to RDS: deployment, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 5: Low-Latency Response Time for Your Apps and APIs This chapter introduces the concepts of low-latency and NoSQL databases, presenting two low-latency database services on AWS: Amazon DynamoDB and Amazon Keyspaces (for Apache Cassandra). It details Amazon DynamoDB table design tenets as well as partition and sort key definitions, indexing options, queries, scans, transactions, caching, and global options. For Amazon Keyspaces (for Apache Cassandra) it presents partitions, clustering keys, and static columns concepts. It also covers all the topics related to DynamoDB and Keyspaces: capacity, deployment, scalability, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 6: Document Databases in the Cloud This chapter discusses document database concepts and options in AWS. It presents Amazon DocumentDB (with MongoDB compatibility) with its resilient storage layer and the key architecture components such as cluster, instance, and reader endpoints. The chapter covers details of the topics related to Amazon DocumentDB: capacity, deployment, scalability, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 7: Better Places Than Databases to Store Large Objects This chapter presents the concept of large objects and how they were handled before AWS and how they are handled with the availability of AWS options. It introduces Amazon S3, compares it to other AWS storage options, and goes into the details of S3 storage classes, data load and retrieval, life-cycle management, operations, monitoring, access control, and security.

Chapter 8: Deliver Valuable Information at the Speed Your Business Needs This chapter describes how to store and use analytics and time series and operational data, with purpose-built databases in AWS to extract value for business. It introduces the information latency concept, presents Amazon Redshift and Amazon Timestream in detail, and also mentions Amazon OpenSearch, a topic that is not covered on the exam. For Amazon Redshift, the chapter goes into the details of table design, loading data, cluster architecture, and cluster options. For Amazon Timestream, it also covers the architecture and loading data options. For Amazon Redshift and Amazon Timestream, it goes into detail on deployment, scalability, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 9: Discovering Relationships Using Graph Databases This chapter discusses the concepts of graph databases and their usage to handle relationships between data items. It presents the basic concepts of graph databases and then goes deep into Amazon Neptune data loading and query options, cluster architecture, scalability, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 10: Immutable Database and Traceable Transactions This chapter introduces the concept of immutable databases and the AWS service Amazon Quantum Ledger Database (QLDB). It goes into the details of Amazon QLDB and how it ensures no data can be modified or deleted after it is inserted, using an immutable transaction log. It discusses the Amazon QLDB components: ledger, table, document, journal, query engine, and cryptographic verification. It also presents how to load data to and query data from Amazon QLDB, as well as service scalability, management, operations, monitoring, troubleshooting, and database security.

Chapter 11: Caching Data with In-Memory Databases This chapter presents caching strategies and how AWS services can help to implement them. It introduces Amazon ElastiCache service for Redis and Memcached and also Amazon MemoryDB, discussing their features and how they can handle caching requirements and strategies. It also discusses in detail how to distribute data in each engine and how to address deployment, scalability, migration options, management, operations, monitoring, troubleshooting, and database security.

Chapter 12: Migrating Your Data to AWS This chapter presents the options to migrate data to AWS database services. It discusses network communication and specialized database migration services like AWS SCT and AWS DMS, which are native database tools that help in data migration for each engine, including AWS DataSync, AWS Snow Family, and AWS Storage Gateway. It also details database migration strategy and downtime minimization along with security and resilience options and requirements.

Chapter 13: Disaster Recovery This chapter discusses disaster recovery requirements and strategies for database applications in AWS. It presents the concepts of RTO and RPO and how they are affected by the deployment and replication strategies. It also explores how AWS managed services for databases handle data resilience and replication using Multi-AZ and global database options.

Chapter 14: Save Time and Reduce Errors Automating Your Infrastructure This chapter introduces the concept of infrastructure as code (IaC) and how this relates to database deployment and management. It presents AWS CloudFormation and goes into the details of how to simplify infrastructure management using templates, stacks, and change sets. It also discusses best practices related to database security and access management, using AWS System Manager Parameter and AWS Secrets Manager.

Interactive Online Learning Environment and Test Bank

Studying the material in the *AWS® Certified Database Study Guide: Specialty (DBS-C01) Exam* is an important part of preparing for the AWS Certified Database Specialty (DBS-C01) certification exam, but we provide additional tools to help you prepare. The online test bank helps you understand the types of questions that appear on the certification exam. The online test bank runs on multiple devices.

- **Sample tests:** The sample tests in the test bank include all the questions at the end of each chapter as well as the questions from the assessment test. In addition, there are two practice exams with 50 questions each. You can use these tests to evaluate your understanding and identify areas that may require additional study.
- **Flashcards:** The flashcards in the test bank will push the limits of what you should know for the certification exam. There are 100 questions that are provided in digital format. Each flashcard has one question and one correct answer.
- **Glossary:** The online glossary is a searchable list of key terms introduced in this exam guide that you should know for the AWS Certified Database Specialty (DBS-C01) certification exam.

Visit `www.wiley.com/go/sybextestprep` to register and gain access to this interactive online learning environment and test bank with study tools. To start using these tools to study for the AWS Certified Database Specialty (DBS-C01) exam, go to `www.wiley.com/go/sybextestprep`, register your book to receive your unique PIN, and once you have the