Core AWS Services (Cont.)

INTRODUCTION TO AWS DATABASE SOLUTIONS

Many types of databases are available today. The great news is that AWS supports these varieties. In fact, AWS permits several different approaches to their implementation.

Aurora

Amazon Aurora is a MySQL- and PostgreSQLcompatible relational database engine. It offers many benefits, including the following:

- High performance: Aurora can provide up to five times the throughput of standard MySQL or twice the throughput of standard PostgreSQL running on the same hardware.
- Highly secure: Aurora provides multiple levels of security for your database. These include network isolation using a VPC, encryption of data at rest using keys you create and control through Key Management Service (KMS), and encryption of data in transit using SSL.
- MySQL and PostgreSQL compatible: The Aurora database engine is fully compatible with MySQL 5.6 and MySQL 5.7 using the InnoDB storage engine.
- Highly scalable: You can scale your Aurora database from an instance with two vCPUs and 4 GiB of memory up to an instance with 32 vCPUs and 244 GiB of memory.
- High availability and durability: Aurora is designed to offer higher than 99.99 percent availability. It is also amazing when it comes to durability, ensuring six synchronous copies of your data running across three AZs. This becomes a huge advantage over standard RDS implementations

Relational Database Service

- Fast and easy to administer: You can use the AWS Management Console, the AWS RDS command-line interface, or simple API calls to access the capabilities of a production-ready relational database in minutes.
- Highly scalable: You can scale your database's compute and storage resources with only a few mouse clicks or an API call, often with no downtime.
- Available and durable: RDS runs on the same highly reliable infrastructure used by other Amazon Web Services. When you provision a Multi-AZ DB instance, RDS synchronously replicates the data to a standby instance in a different Availability Zone (AZ).
- Secure: RDS makes it easy to control network access to your database. RDS also lets you run your database instances in a VPC, which enables you to isolate your database instances and connect to your existing IT infrastructure through an industry

standard encrypted IPsec VPN. Many RDS engine types offer encryption at rest and encryption in transit. You can also take advantage of Direct Connect.
- Inexpensive: You pay low rates and only for the resources you consume.

DynamoDB

- Fast, consistent performance: DynamoDB delivers consistent, fast performance at any scale for all applications.
- Highly scalable: When you create a table, you specify how much request capacity you require. If your throughput requirements change, you update your table's request capacity using the AWS Management Console or the DynamoDB APIs. DynamoDB manages all the scaling behind the scenes, and you are still able to achieve your previous throughput levels while scaling is underway. Instant scaling and auto-scaling capabilities now exist that even assist you if you are unsure of the initial capacity you require.
- Fully managed: DynamoDB is a fully managed cloud NoSQL database service. You create a database table, optionally set your throughput or allow auto- scaling, and let the service handle the rest.
- Event-driven programming: DynamoDB integrates with Lambda to provide triggers that enable you to architect applications that automatically react to data changes.
- Fine-grained access control: DynamoDB integrates with IAM for fine-grained access control.
- Flexible: DynamoDB supports both document and key-value data structures, giving you the flexibility to design the best data architecture that is optimal for your application.

ElastiCache

ElastiCache is a web service that makes it easy to deploy, operate, and scale an in-memory cache in the cloud. The service improves the performance of web applications by allowing you to retrieve information from fast, managed, in-memory caches, instead of relying entirely on slower disk-based databases. ElastiCache supports two open-source in-memory caching engines:

- Redis: A fast, open-source in-memory data store and cache. ElastiCache for Redis is a Rediscompatible in-memory service that delivers the ease of use and power of Redis along with the availability, reliability, and performance suitable for the most demanding applications.
- Memcached: A widely adopted memory object caching system. ElastiCache is protocol-compliant with Memcached, so tools that you use today with existing Memcached environments work seamlessly with the service

Redshift

Redshift is a fast, fully managed, petabyte-scale data warehouse that makes it simple and cost-effective to analyze all your data using your existing business intelligence tools. Features include the following:

- High query performance on data sets ranging in size from a hundred gigabytes to a petabyte or more.
- Using columnar storage, data compression, and zone maps to reduce the amount of I/O needed to perform queries.
- Redshift has massively parallel processing (MPP) data warehouse architecture, parallelizing and distributing SQL operations to take advantage of all available resources. The underlying hardware is designed for high-performance data processing, using locally attached storage to maximize throughput between the CPUs and drives, and a 10GigE mesh network to maximize throughput between nodes.

Database Migration Service

AWS Database Migration Service helps you migrate databases to or from AWS easily and securely. Features include the following

- The source database remains fully operational during the migration, minimizing downtime to applications that rely on the database.
- It migrates your data to and from most widely used commercial and open-source databases. The service supports homogeneous migrations such as Oracle to Oracle, as well as various migrations between different database platforms, such as Oracle to Amazon Aurora or Microsoft SQL Server to MySQL.
- It also allows you to stream data to Redshift from any of the supported sources, including Aurora, PostgreSQL, MySQL, MariaDB, Oracle, SAP ASE, Teradata, and SQL Server, enabling consolidation and straightforward analysis of data in the petabyte scale data warehouse. • You can use AWS Database Migration Service for continuous data replication with high availability.