Lecture 18

Cloud Database
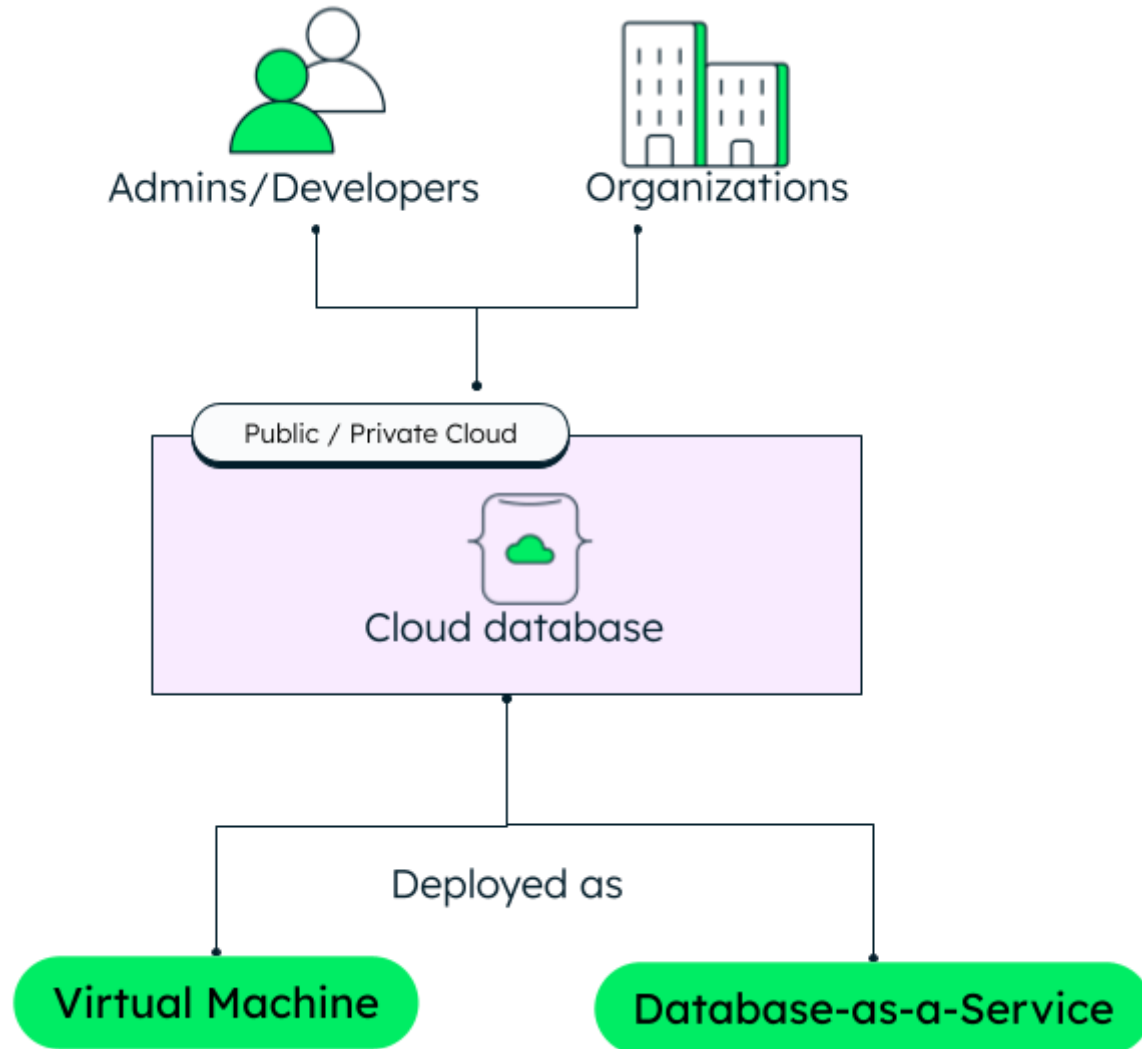
Parallel Query execution with NoSQL Database

Cloud database

Cloud Database

A cloud database is a database service built and accessed through a cloud platform. It serves many of the same functions as a traditional database with the added flexibility of cloud computing. Users install software on a cloud infrastructure to implement the database.

Cloud Database

Admins/Developers
Organizations
Public / Private Cloud
Cloud database
Deployed as
Virtual Machine
Database-as-a-Service

A cloud database is a database that is deployed in a cloud environment as opposed to an on-premise environment. The database itself can be offered as a SaaS (Software-as-a-Service) application or simply be hosted in a cloud-based virtual machine. Applications can then access all the data stored in a cloud database over a network from any device.

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Key features of Cloud Database

- A database service built and accessed through a cloud platform.
- Enables enterprise users to host databases without buying dedicated hardware.
- Can be managed by the user or offered as a service and managed by a provider.
- Can support relational databases (including MySQL and PostgreSQL) and NoSQL databases (including MongoDB and Apache CouchDB).
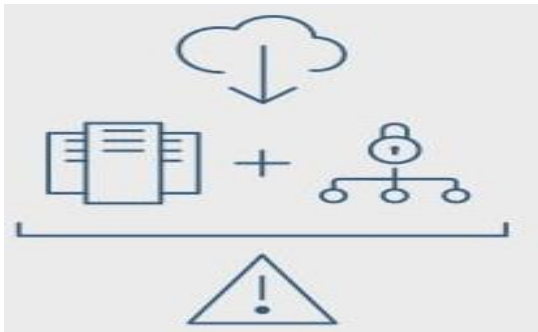- Accessed through a web interface or vendor-provided API

Why Cloud Database???
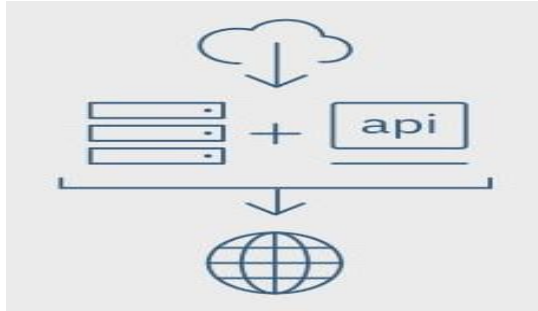
- **Ease of access:** Users can access cloud databases from virtually anywhere, using a vendor's API or web interface.

- **Scalability:** Cloud databases can expand their storage capacities on run-time to accommodate changing needs. Organizations only pay for what they use.

- **Disaster recovery:** In the event of a natural disaster, equipment failure or power outage, data is kept secure through backups on remote servers.

Cloud Database

- **Easy monitoring:** Monitor performance metrics and information on API calls, data latency, and error rates from the API Gateway dashboard, which allows you to visually monitor calls to your services using [Amazon CloudWatch](#).
- **Flexible security controls:** Authorize access to your APIs with AWS Identity and Access Management (IAM) and Amazon Cognito. To support custom authorization requirements, you can execute a Lambda authorizer from [AWS Lambda](#).
- **RESTful API options:** Create RESTful APIs using HTTP APIs or REST APIs. HTTP APIs are the best way to build APIs for a majority of use cases—they're up to 71% cheaper than REST APIs. If your use case requires API proxy functionality and management features in a single solution, you can use REST APIs.

When to use Cloud Database???

Cloud databases work in most cases that traditional databases do. They are particularly valuable when building software products that:
- require a large volume of data.
- are cloud-native.
- need to handle high scale traffic.
- are distributed geographically.

Fully-managed databases are now increasingly used for real-time transaction processing, legacy database migration, mobile application development, Internet of Things, caching, and analytics.

Considerations for selecting Cloud Database???

Cloud database provider

Database technology

Management system

Cost

Security

Performance

Types of Cloud Database

Relational

NoSQL

Multimodal

Distributed SQL

Cloud data warehouses

Parallel Query execution with NoSQL Database

Types of Database in AWS

- <u>Amazon Neptune</u> (Graph database service)
- Amazon RDS (Managed relational database)
- <u>Amazon DynamoDB</u> (NoSQL Database Service)
- <u>Amazon Redshift</u> (Data Warehouse)
- <u>AWS Database Migration Service</u> (Database Migration)
- And many more

NoSQL Database

- Amazon DynamoDB is a fully managed, serverless, key-value NoSQL database designed to run high-performance applications at any scale.
- DynamoDB offers built-in security, continuous backups, automated multi-Region replication, in-memory caching, and data import and export tools.

NoSQL Database

- You can use Amazon DynamoDB to create a database table that can store and retrieve any amount of data, and serve any level of request traffic.

- Amazon DynamoDB automatically spreads the data and traffic for the table over a sufficient number of servers to handle the request capacity specified by the customer and the amount of data stored, while maintaining consistent and fast performance.

DynamoDB

- Free 25 GB of storage and up to 200 million read/write requests per month with the AWS Free Tier

DynamoDB

Developers can use DynamoDB to build modern, serverless applications that can start small and scale globally to support petabytes of data and tens of millions of read and write requests per second. DynamoDB is designed to run high-performance, internet-scale applications that would overburden traditional relational databases.

DynamoDB

- Import data from Amazon S3 directly into a new DynamoDB table without writing any code or managing additional infrastructure.
- AWS Glue Elastic Views supports DynamoDB as a source to combine and replicate data continuously across multiple databases in near real-time.
- Use PartiQL, a SQL-compatible query language, to query, insert, update, and delete table data in DynamoDB.
- Use Amazon Kinesis Data Streams to capture item-level changes in your DynamoDB tables.
- Restore DynamoDB tables even faster.
- AWS Pricing Calculator now supports DynamoDB.
- Export data from DynamoDB to Amazon Simple Storage Service (Amazon S3) and use other AWS services such as Amazon Athena to analyze your data and extract actionable insights.

Key features of DynamoDB

Performance at any scale

Serverless

Enterprise ready

Thank You