Fundamentals of DATABASE

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What is a DATA ?

Organized collection of information

Data refers to raw facts, figures, and statistics that are collected or represented for various purposes.

It can take many forms, including numbers, text, images, sounds, and more.

Data is typically unprocessed and lacks context on its own; it becomes meaningful when it is processed, organized, and interpreted.

In today's digital age, the amount of data generated daily is staggering.

we are producing approximately 2.5 quintillion bytes of data each day.

This data comes from various sources, including social media, IoT devices, online transactions, and more. With the continued growth of the internet and technology, this number is likely to have increased significantly.

1 quintillion is a billion times larger than a billion

1 quintillion = 1,000,000,000,000,000,000

DATABASE

A database is a structured collection of data that is organized and stored in a way that allows for efficient retrieval, management, and manipulation.

Databases are designed to store information in a systematic manner, making it easy to search for and access specific data when needed.

WHY ?

Data Storage: Databases provide a reliable and structured way to store vast amounts of data, ensuring data integrity and durability.

Data Retrieval: They allow for quick and efficient retrieval of specific information, reducing the time and effort required to access data.

Data Security: Databases implement security measures to protect sensitive information, including user authentication and authorization.

WHY ?

Data Integrity: They enforce data consistency and integrity through constraints and validation rules.

Data Analysis: Databases are used for data analysis and reporting, helping businesses make informed decisions.

Scalability: Databases can scale to accommodate growing data volumes, making them suitable for businesses of all sizes

PROCESS

Data Collection:

This is the initial step where data is gathered from various sources.

Data can come from user inputs, sensors, external files, or other systems.

It may be in the form of text, numbers, images, or any other data type.

Data Processing:

Before data is inserted into a database, it may need to be processed or cleaned.

This can involve removing duplicates, handling missing values, formatting data, and performing any necessary transformations to make the data consistent and meaningful.

PROCESS

Database Design:

In this step, you need to design the structure of your database.

This involves defining tables, specifying the columns (attributes) for each table, and establishing relationships between tables if you're working with a relational database management system (RDBMS). Database design ensures that data is organized efficiently

PROCESS

Table Creation:

Once you have a database design, you create tables in the database that correspond to the entities or data types you want to store.

Each table represents a specific type of data, and each column in the table corresponds to an attribute of that data.

PROCESS

Data Insertion:

After the tables are created, you can insert the processed data into these tables.

This is typically done using SQL (Structured Query Language) for relational databases.

The data is inserted row by row, with each row corresponding to a record or entry.

PROCESS

Data Retrieval:

With data in the database, you can use SQL queries to retrieve specific information from the tables.

Queries allow you to filter, sort, and extract data based on various conditions and criteria.

PROCESS

Data Maintenance: Databases require ongoing maintenance. This includes updating data when it changes, deleting data that is no longer needed, and ensuring data integrity through constraints and validations.

Backup and Security: It's crucial to regularly backup your database to prevent data loss. Additionally, you must implement security measures to protect sensitive data from unauthorized access and breaches.

USES OF DB

Business: Databases are crucial for managing customer information, inventory, sales, and financial data.

Healthcare: Electronic Health Records (EHRs) are stored in databases to manage patient data securely.

E-commerce: Online stores rely on databases for product listings, customer profiles, and order processing.

Education: Educational institutions use databases for student records, grades, and course information.

TYPES OF DATABASES

Relational Databases

Database management system (DBMS) that organize and store data in structured tables with rows and columns.

They are based on the principles of the relational model, which uses keys to establish relationships between tables.

TYPES OF DATABASES

SQL Databases

Subset of relational databases.

They use the SQL language for data definition, manipulation, and querying.

SQL databases follow the relational model and store data in structured tables.

TYPES OF DATABASES

NoSQL Databases

Category of databases designed to store and manage unstructured or semi-structured data.

They do not follow the traditional relational model and offer flexibility in data storage.

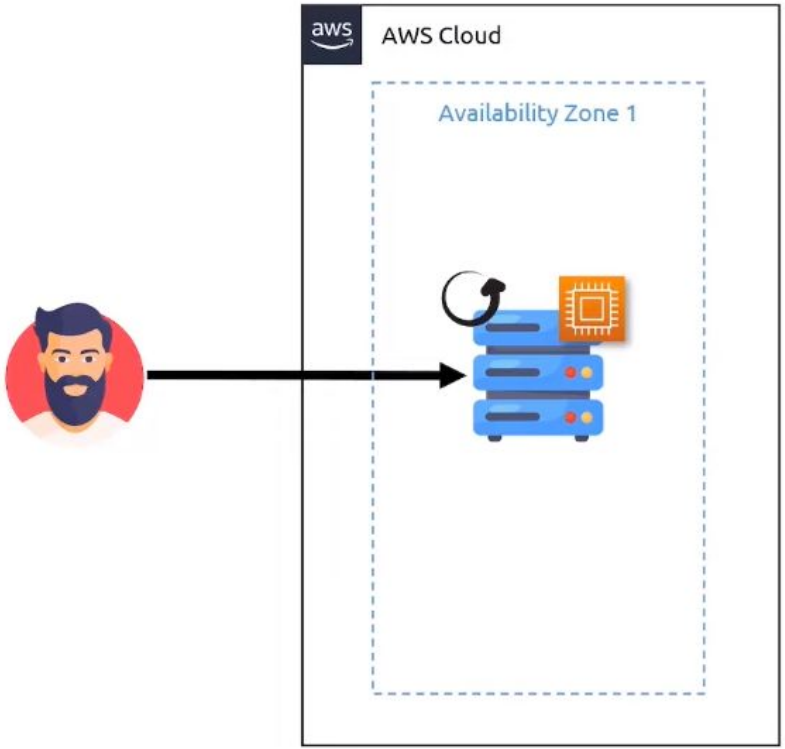
TYPES OF DATABASES

Cloud Databases

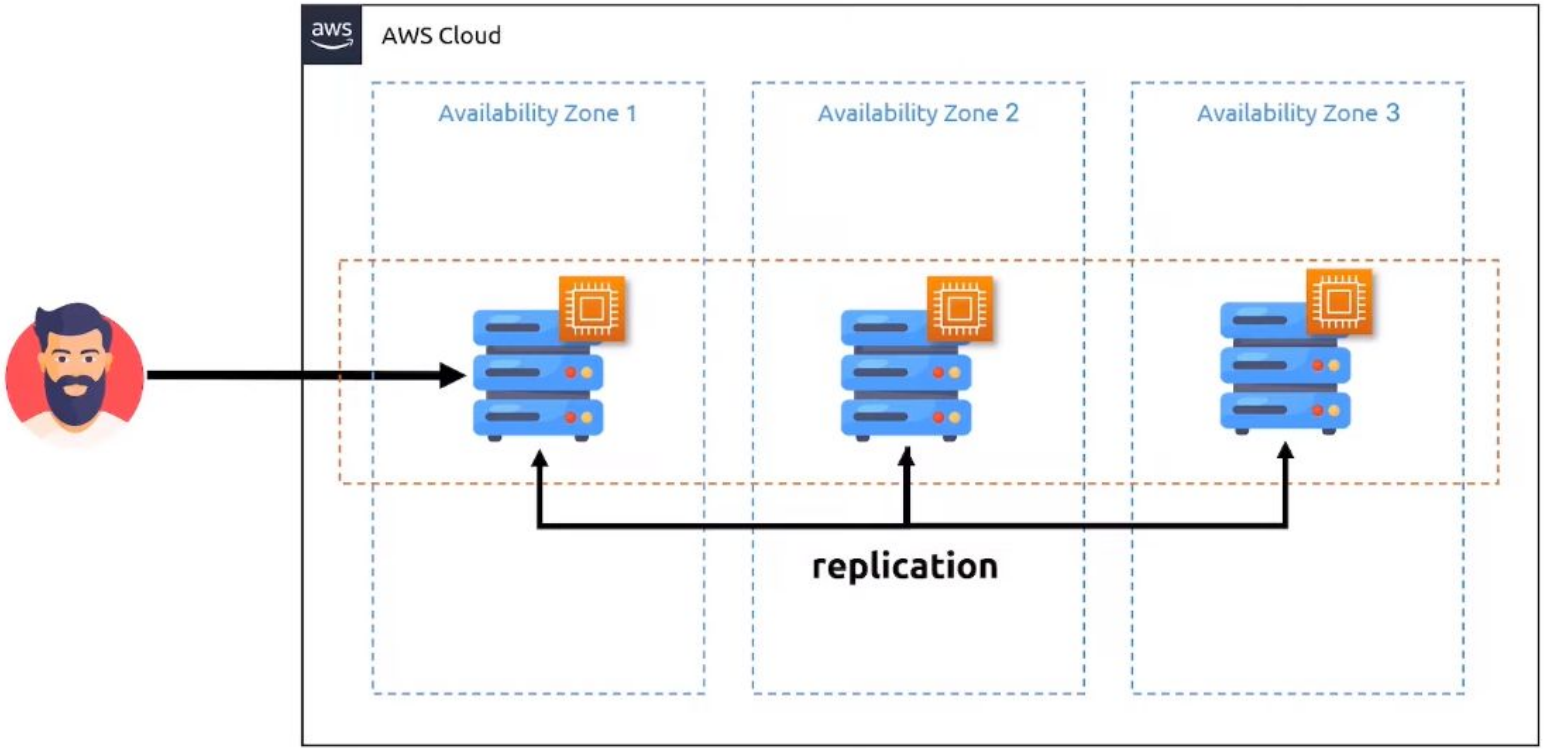
Database services provided by cloud service providers (e.g., AWS, Azure, GCP).

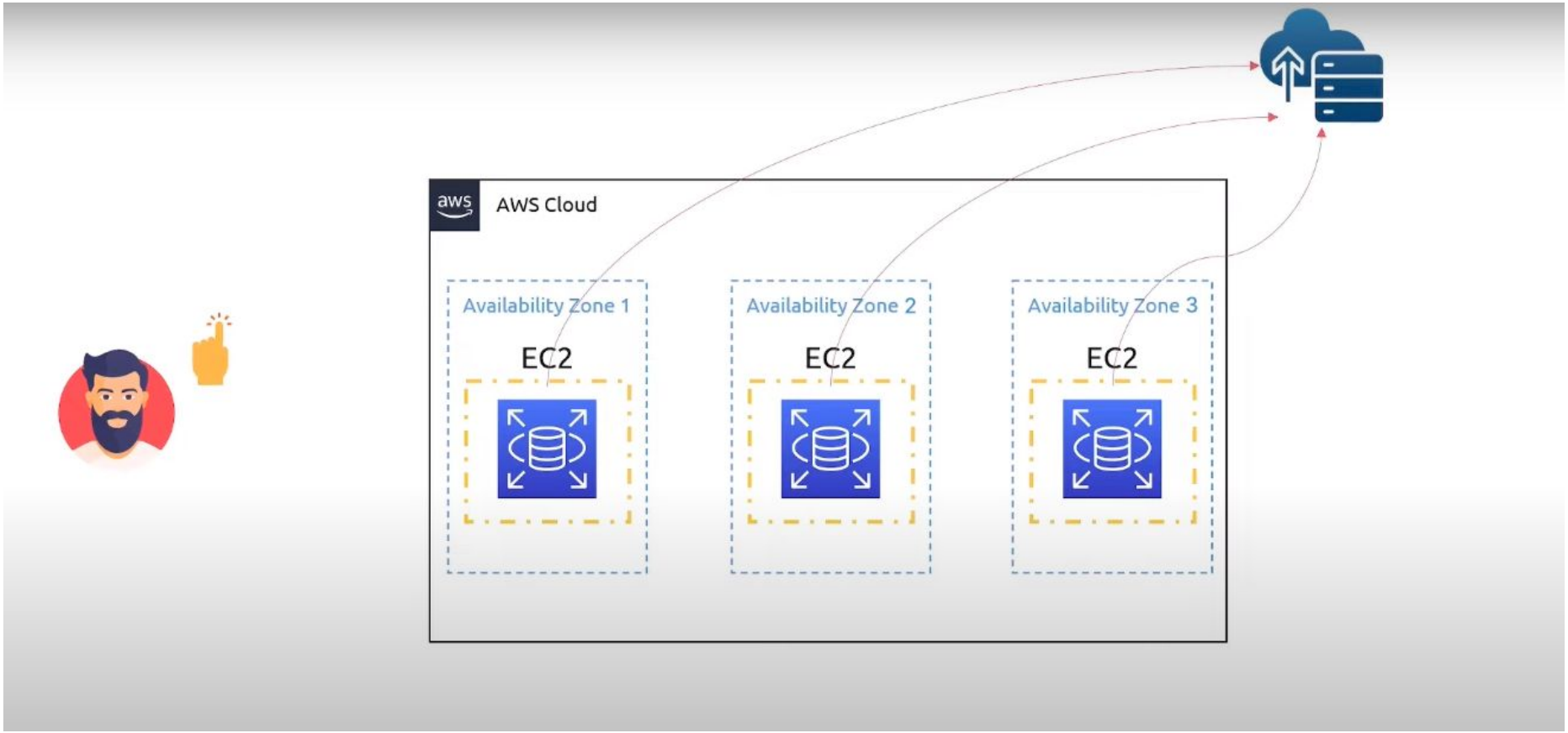
These databases are hosted in the cloud and can be accessed and managed remotely.

Relational Database Service



- Install Dependencies
- Install Database(Postgres, MySQL)
- Database Authentication/Permissions
- Configure Firewall
- Routine updates/patches


aws
AWS Cloud
Availability Zone 1
Availability Zone 2
Availability Zone 3
replication


aws
AWS Cloud
Availability Zone 1
EC2
Availability Zone 2
EC2
Availability Zone 3
EC2

Feature	Amazon EC2 management	Amazon RDS management
Application optimization	Customer	Customer
Scaling	Customer	AWS
High availability	Customer	AWS
Database backups	Customer	AWS
Database software patching	Customer	AWS
Database software install	Customer	AWS
OS patching	Customer	AWS
OS installation	Customer	AWS
Server maintenance	AWS	AWS
Hardware lifecycle	AWS	AWS
Power, network, and cooling	AWS	AWS

SALES

purchase_number	date_of_purchase	customer_id	item_code
1	03/09/2016	1	A_1
2	02/12/2016	2	C_1
3	15/04/2017	3	D_1
4	24/05/2017	1	B_2
5	25/05/2017	4	B_2
6	06/06/2017	2	B_1
7	10/06/2017	4	A_2
8	13/06/2017	3	C_1
9	20/07/2017	1	A_1
10	11/08/2017	2	B_1

Customers

customer_id	first_name	last_name	email_address	number_of_complaints
1	John	McKinley	john.mackinley@365careers.com	0
2	Elizabeth	McFarlane	e.mcfarlane@365careers.com	2
3	Kevin	Lawrence	kevin.lawrence@365careers.com	1
4	Catherine	Winnfield	c.winnfield@365careers.com	0

Terms

Record:

A record is a collection of related data that represents a single entity or item. It is typically organized as a row in a database table or spreadsheet.

Field:

A field is an individual piece of data within a record. It corresponds to a specific attribute or characteristic of the entity represented by the record.

SQL (Structured Query Language)

Specialized programming language used for managing and manipulating relational databases.

SQL allows you to interact with databases to perform various tasks, including querying, inserting, updating, and deleting data.

Data Querying, Data Modification, Schema Definition, Data Manipulation

procedural (imperative)

how

declarative (nonprocedural)

WHAT

1. Please, open the door.
2. Go outside.
3. Take the bucket I forgot there.
4. Bring it back to me

1. Fetch the bucket, please.

Lets Hands On!!