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# System Design — 4 Top Cloud Disaster Recovery Strategies



Mahesh Saini · Follow

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Cloud allows disaster recovery to be a very quick process, reducing the downtime that is suffered. It also provides the flexibility of multiple strategies that can be deployed to fit the user or customer's requirements for cost and tolerable downtime.

**Any DR strategy starts with finalizing:**

## 1. RTO (Recovery Time Objective):

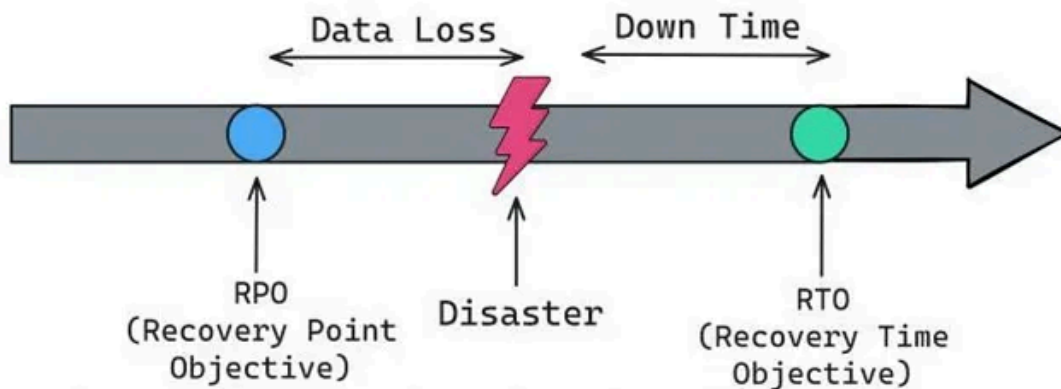
*How much downtime one can accept ?*

## 2. RPO (Recovery Point Objective):

*How much data loss one can accept ?*

# Cloud Disaster Recovery Strategies

Basics First: What is RTO and RPO ?

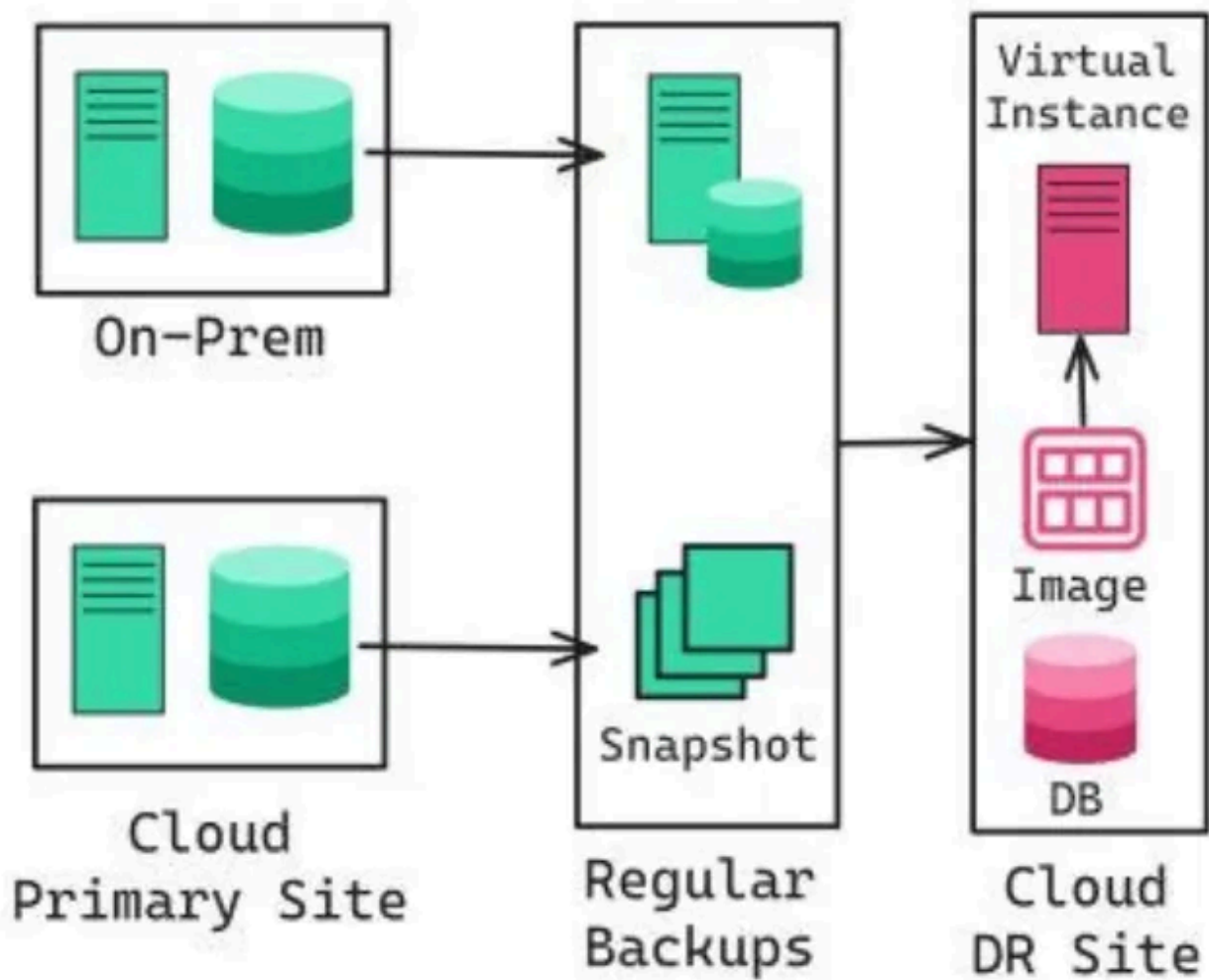


In this article, we will look at 4 common disaster recovery strategies that can be utilized with the cloud, depending on the RPO and RTO of the business.

## 1. Backup and Restore

- Backup and Restore is the simplest approach that can be deployed. In this approach, data and systems are backed up and able to be redeployed if needed to recover. You can employ this method using tools like CloudFormation, Terraform, or AWS CDK (Code Development Kit).

# 1. Backup and Restore



- You would be taking regular snapshots or backups of your data, and storing them in durable locations like Amazon S3. However, it is the slowest and most basic restoration method, making it the cheapest.

*Typical,*

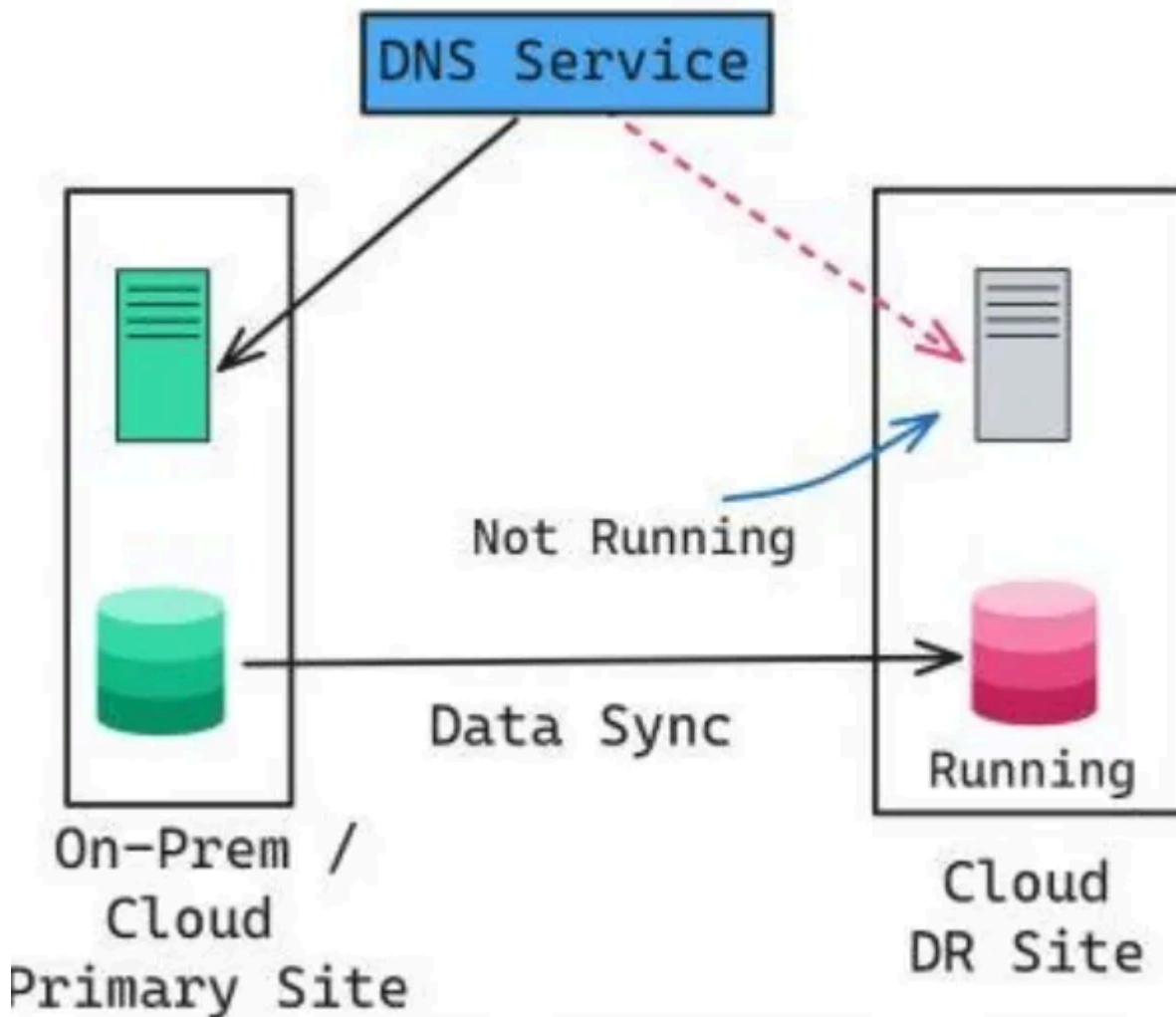
*RTO: Several hours to days*

*RPO: Can vary from several hours to the last successful backup*

## 2. Pilot Light

- Pilot light provides a better balance of cost-effectiveness and reliability. Using this approach, you will have your most crucial systems running in the cloud concurrently with your actual production environment.

## 2. Pilot Light



- For example, if you had an RDS master instance in production, you would also have an RDS slave instance running in the cloud, which replicates data from the master. This means that you will always have a replica ready to go should the main one fail.
- This method provides a faster recovery time than Backup and Restore, but requires a slightly higher cost and more setup time.

*Typical,*

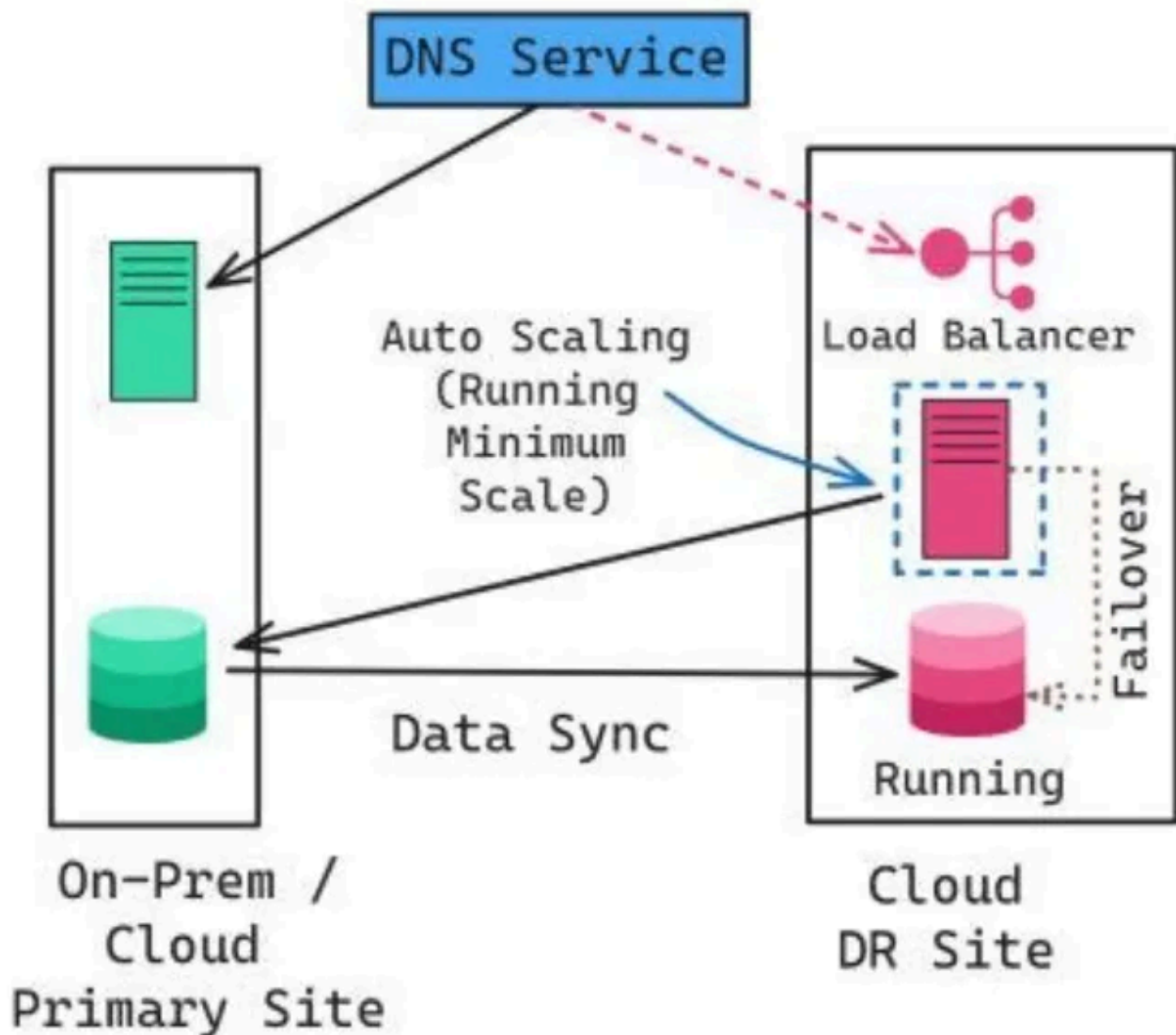
*RTO: Mins to a few hours*

*RPO: How frequently data is synchronized*

### 3. Warm Standby

- Preparing a partially operational environment with up-to-date data to minimize downtime during recovery

### 3. Warm Standby



- Warm Standby provides a much more reliable approach than Pilot Light, but also more costly. With Warm Standby, you have a duplicate environment, exactly the same as your production, on standby and running all the time, albeit at minimum load.
- For example, if your main environment utilized EC2 instances accessing a DynamoDB database, you would have another copy of this environment running in another region at the same time. This backup would be at the very minimum. For example, if production had 5 EC2 instances, the backup environment would have 1. However, the backup environment should be capable of scaling up immediately if the production environment fails.

- Warm Standby is a great option for business-critical solutions that require rapid RTO but still want to save money.

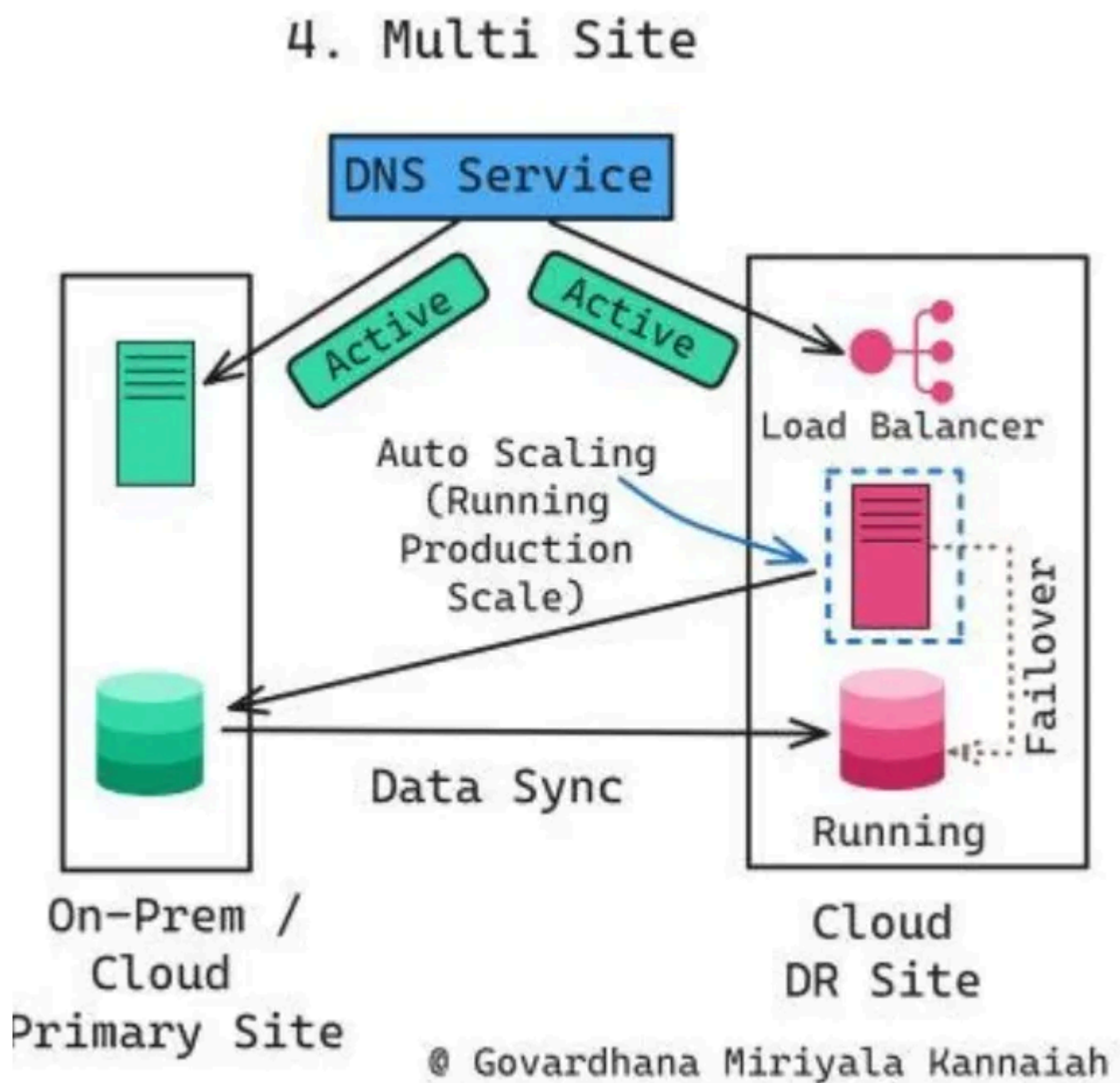
*Typical,*

*RTO: Mins to a few hours*

*RPO: Within the last few minutes or hours*

#### 4. Hot Site / Multi Site:

- Running a fully redundant, active production environment in parallel with the primary system, ensuring continuous business operations



- This approach creates an exact one-for-one replication of your environment. Unlike Warm Standby, the backup environment is running at exactly the same capacity as your production, making this approach incredibly expensive.
- However, this would ensure that there is near zero interruption should your production go down, as there is no delay due to spin-up time for auto-scaling. This approach should only be used for the most critical systems that cannot go down even for a second or so.

*Typical,*

*RTO: Near-zero or a few minutes*

*RPO: Very minimal, often within the last few seconds*

*And, if you are looking for summarized articles, you can also check my previous articles like [Foundational Concepts of Kafka and Its Key Principles](#), [Why Redis is Miraculously Optimized](#), [What does API gateway do in Microservices Architecture](#)*

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**Written by Mahesh Saini**



Enjoys coding, cycling, and swimming. Connect on LinkedIn: <https://www.linkedin.com/in/mahesh-s-28529349/>

The diagram illustrates the Compute Layer architecture, centered around a **Kafka Cluster**. The cluster consists of seven **Broker** nodes arranged in a ring topology. The architecture is divided into several functional areas:

- Compute Layer (Top):** Contains a **TABLE** icon and a **Kafka Streams API** section. Below this are the **Kafka Consumer API** and **Kafka Producer API**.
- Import Data as Event Streams with Connectors (Left):** Shows data flowing from a **CLOUD SERVICE, DB, OR OTHER SYSTEM** into the **Kafka Connect & Producer API**, which then feeds into the **Kafka Cluster**.
- Export Data as Event Streams with Connectors (Right):** Shows data flowing from the **Kafka Cluster** through the **Kafka Connect & Consumer API** to a **CLOUD SERVICE, DB, OR OTHER SYSTEM**.
- Create Event Streams with Kafka Producer APIs (Bottom Left):** An **APP** icon is shown next to the text, indicating an application that produces data into the **Kafka Cluster**.
- Read and Process Event Streams with Kafka Consumer APIs (Bottom Right):** An **APP** icon is shown next to the text, indicating an application that consumes data from the **Kafka Cluster**.

Arrows indicate the direction of data flow between these components and the central Kafka Cluster.



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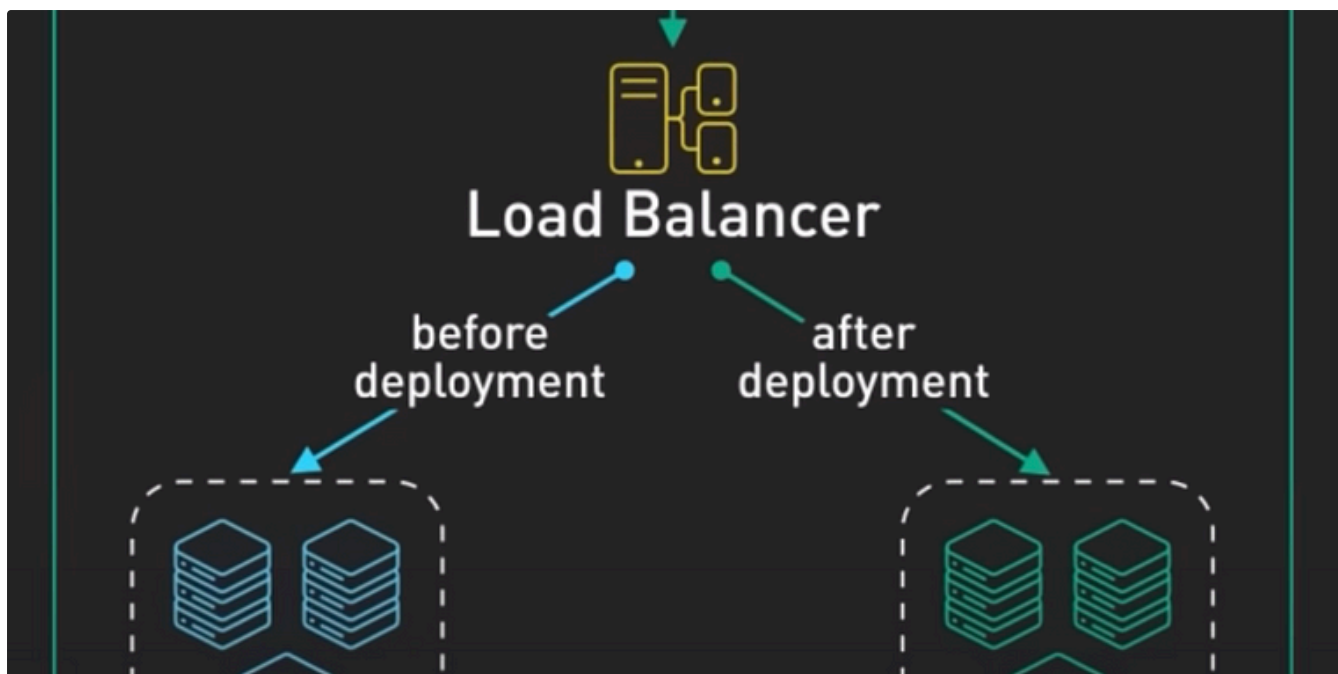
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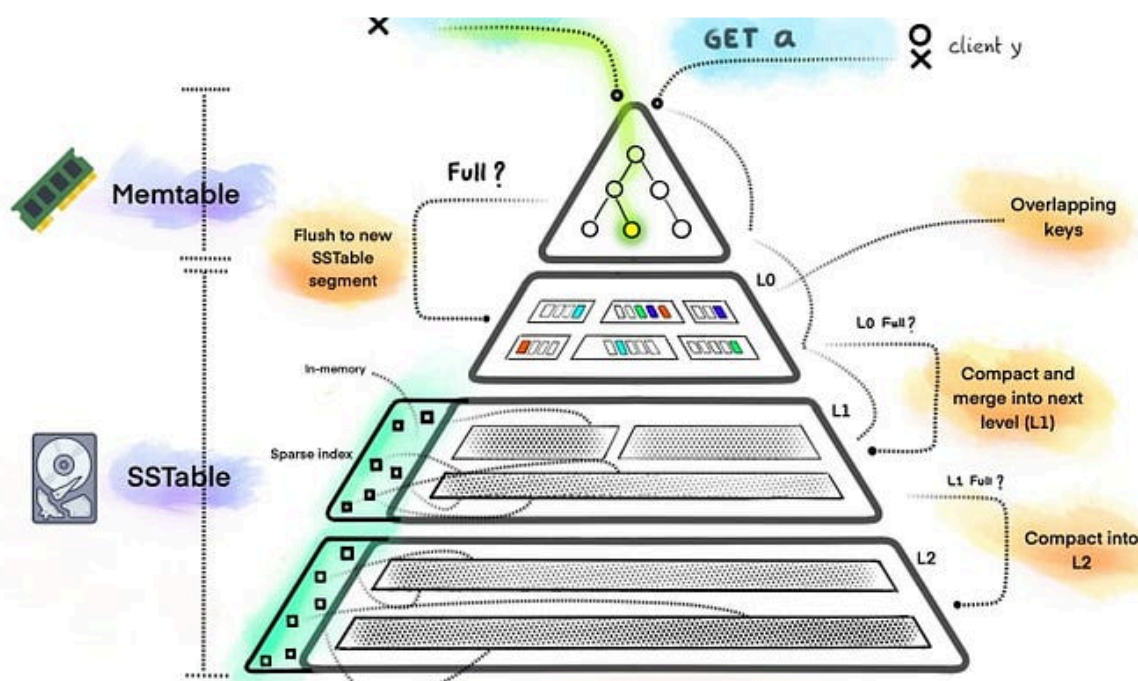
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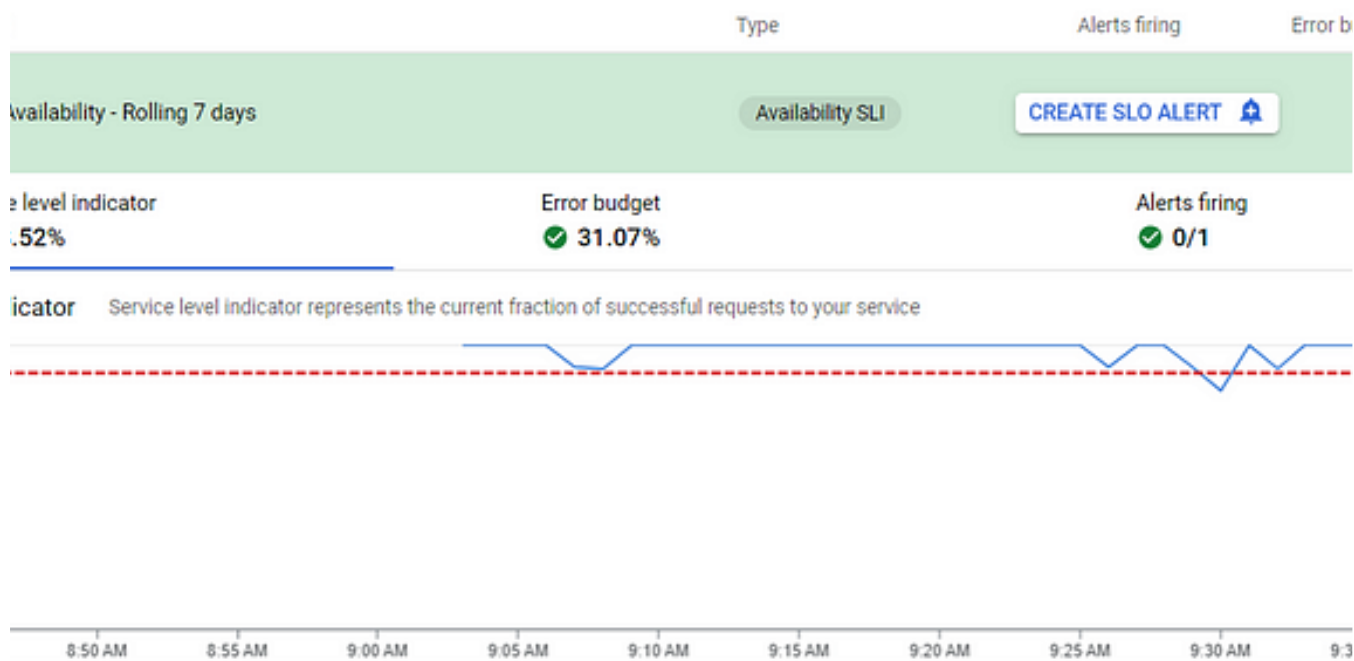
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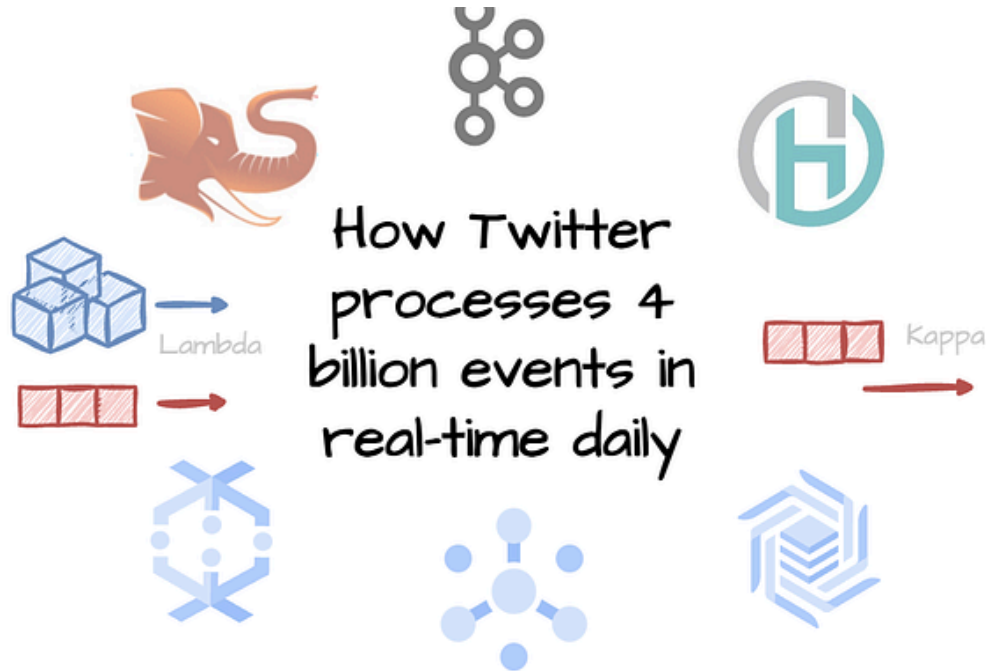


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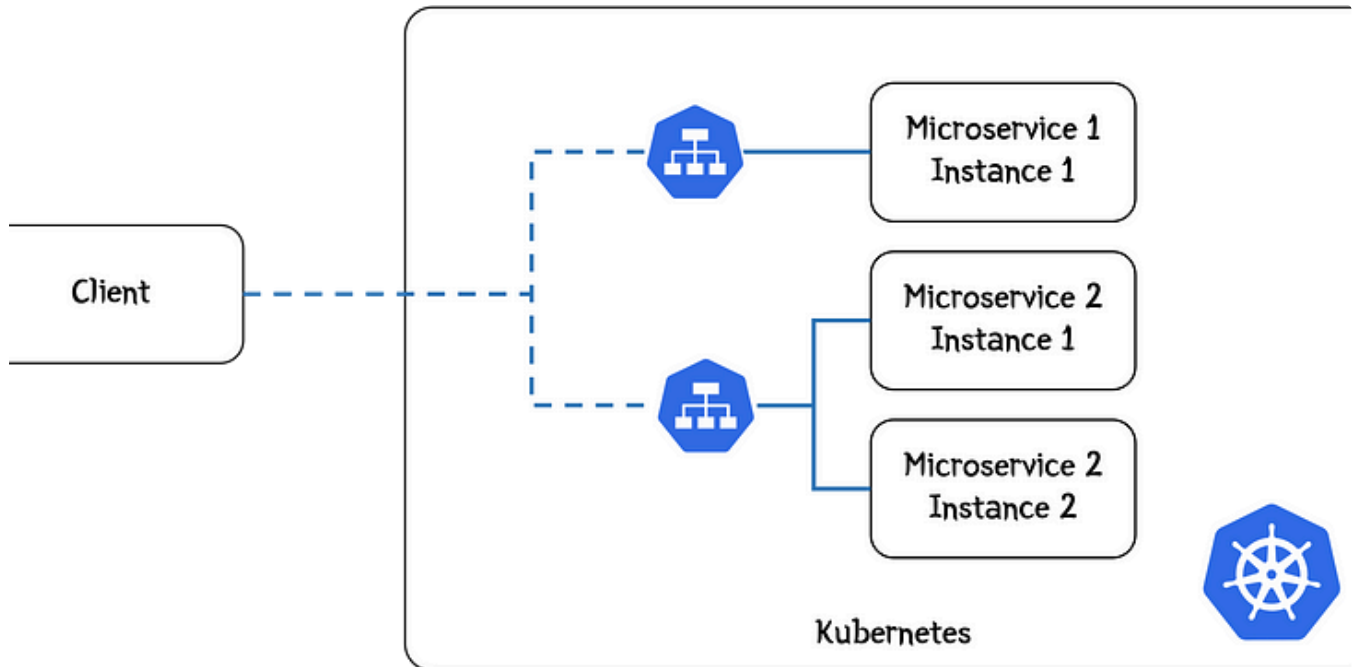
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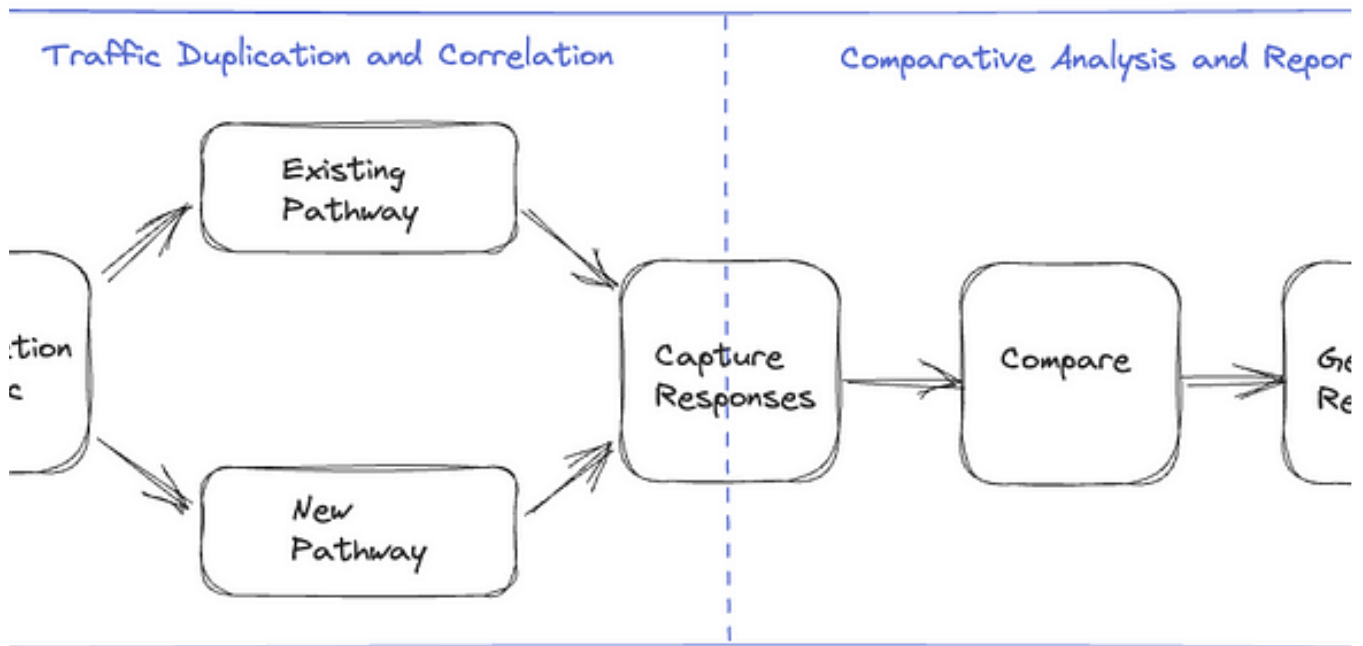
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