

Optimizing Disaster Recovery Strategies with AWS: Efficient Business Continuity and Resilience

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Abstract: *In the era of increasing reliance on cloud-based infrastructure, ensuring continuous availability and swift recovery from disasters is paramount for modern enterprises. This project focuses on the implementation of an automated disaster recovery mechanism using Amazon Web Services (AWS), leveraging its cloud-native tools and services to achieve resilience, reliability, and business continuity. The core challenge addressed in this project is the downtime and data unavailability caused by failures in primary cloud regions due to system faults, human errors, or natural disasters.*

The objective of this project is to design and implement a fault-tolerant solution that ensures minimal Recovery Time Objective (RTO) and Recovery Point Objective (RPO) for cloud-hosted services. To achieve this, we developed an automation pipeline using AWS Lambda, Amazon RDS with cross-region read replicas, EBS snapshot management, and EC2 provisioning mechanisms. The system is configured to continuously monitor, replicate, and recover critical data and compute resources in a secondary region in the event of a disruption in the primary region.

The automation script identifies the most recent backups or snapshots using AWS Backup and EBS snapshot APIs and dynamically provisions EC2 instances based on the latest snapshots or AMIs. It also ensures that associated configurations like security groups, subnets, and key pairs are appropriately mapped and verified for compatibility across different VPCs and regions. The Lambda function is triggered either on schedule or via manual invocation, ensuring recovery can be initiated without human error and in a time-efficient manner. During testing, multiple failure scenarios were simulated, including instance crashes and regional outages. The system successfully launched replacement EC2 instances and restored RDS replicas with minimal manual intervention, thereby validating the robustness of the solution. The results demonstrate a practical and cost-effective approach to disaster recovery by automating recovery tasks and reducing manual configuration efforts.

This project highlights the critical importance of cloud-native disaster recovery strategies and showcases how AWS services can be orchestrated to build a scalable and efficient recovery system. The automated approach reduces human dependency, accelerates recovery timelines, and ensures that mission-critical applications remain resilient even in adverse conditions.

Keywords: Disaster Recovery, AWS Lambda, EC2, EBS Snapshots, Cross-Region Replication, RTO, RPO, Automation

