Enabling Multiregion Solutions

with Amazon DynamoDB

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Agenda

- Why enable multiregion solutions?
  - Drivers for multiregion architectures
- DynamoDB within an AWS Region
  - What do I get from DynamoDB within a single Region?
- Multiregion solutions with DynamoDB
  - Global tables
  - Disaster recovery and performance solutions
- Customer use case: Chick-fil-A
- Takeaways

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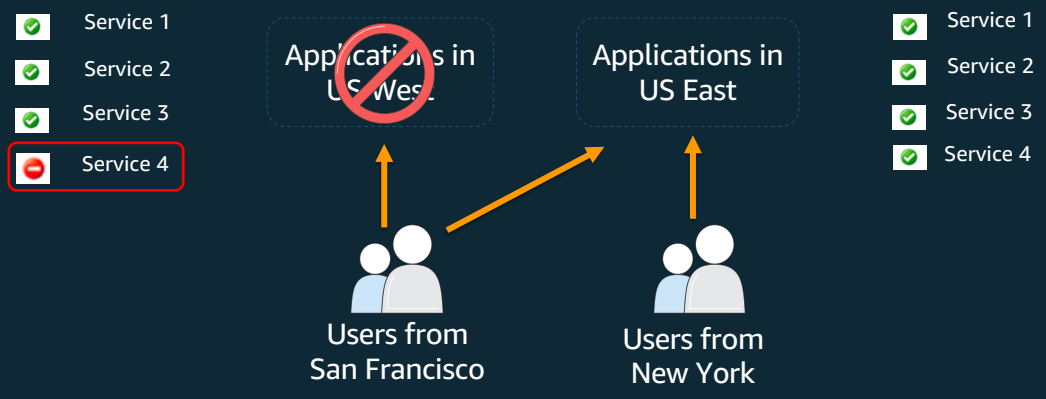
Why enable multiregion solutions?

1. Business continuity/disaster recovery



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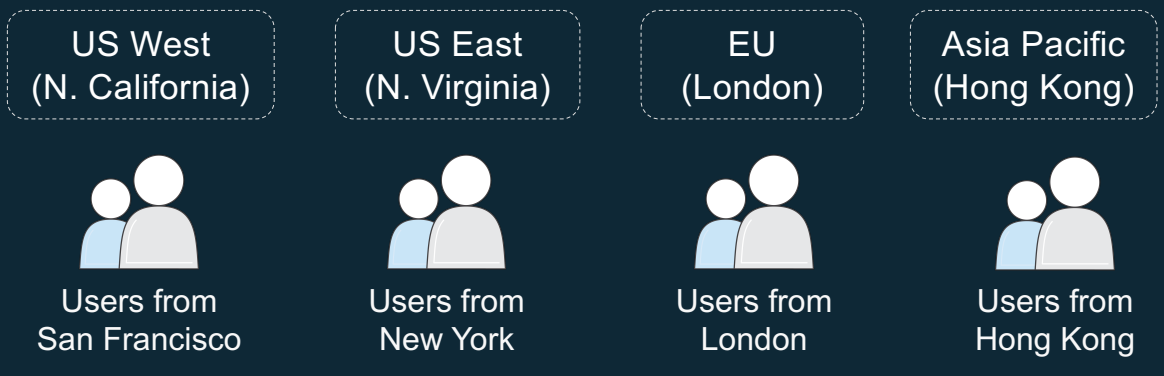
Why enable multiregion solutions?

1. Business continuity/disaster recovery
2. Geographically distributed customer base



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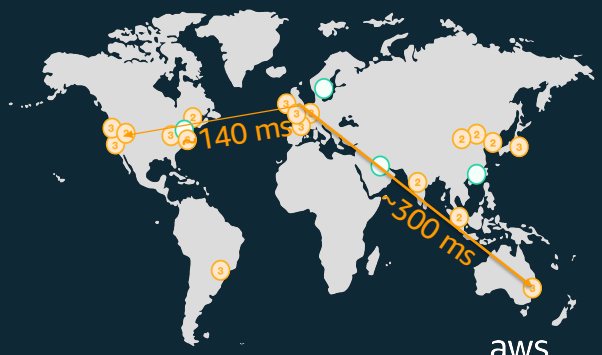
Why enable multiregion solutions?

1. Business continuity/disaster recovery
2. Geographically distributed customer base
   a. Improve latency for end users



* Latency numbers are examples

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Why enable multiregion solutions?

1. Business continuity/disaster recovery
2. Geographically distributed customer base
   a. Improve latency for end users
   b. Meet legal and data regulatory compliance

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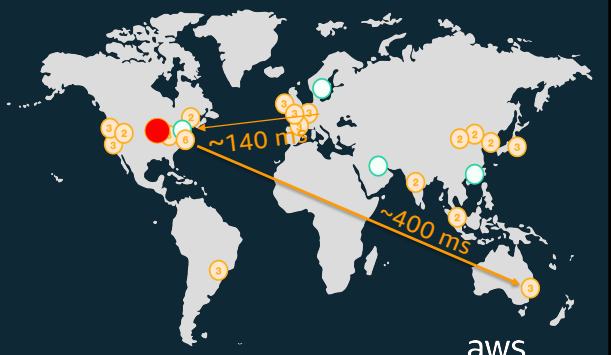
What DynamoDB provides within a single Region

1. Business continuity/disaster recovery
   a. Backup and restore
   b. Redundancy by way of three Availability Zones
   c. Availability SLA of 99.99% (“four nines”)

A single AWS Region cannot provide:

- Consistent low latency globally
- 99.999% availability (“five nines”)



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DynamoDB backup and restore

On-demand backups for long-term data archival and compliance

Point-in-time restore for short-term retention and data corruption protection

Hundreds of TB backed up instantly with no performance impact

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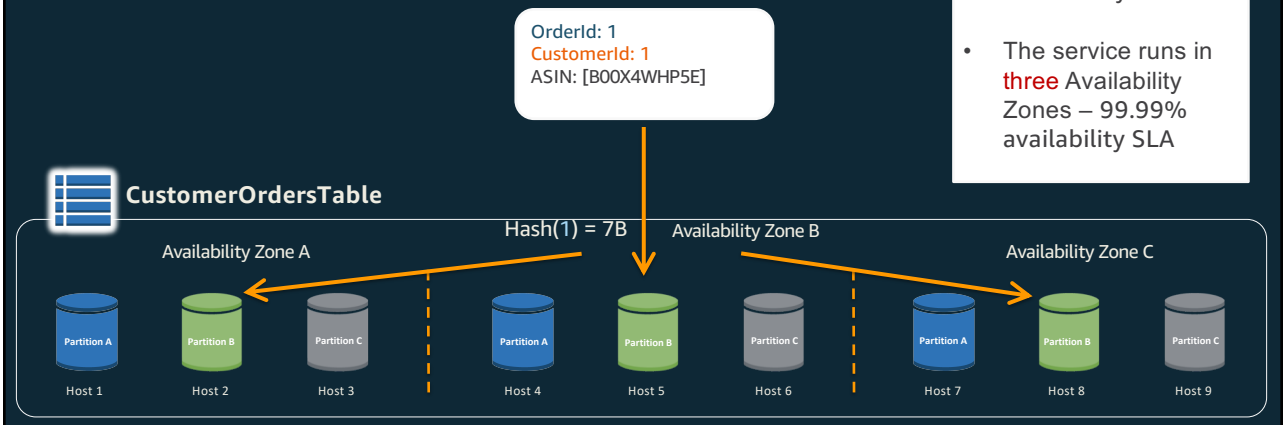
DynamoDB redundancy within an AWS Region

Three-way replication

- Data is always replicated to three Availability Zones
- The service runs in three Availability Zones – 99.99% availability SLA



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DynamoDB global tables

Fully managed, multimaster, multiregion data replication

Build high-performance, globally distributed applications

Low-latency reads and writes to locally available tables

Disaster-proof with multiregion redundancy; availability SLA of 99.999%

Easy to set up and no application rewrites required

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Demo: Creating a global table

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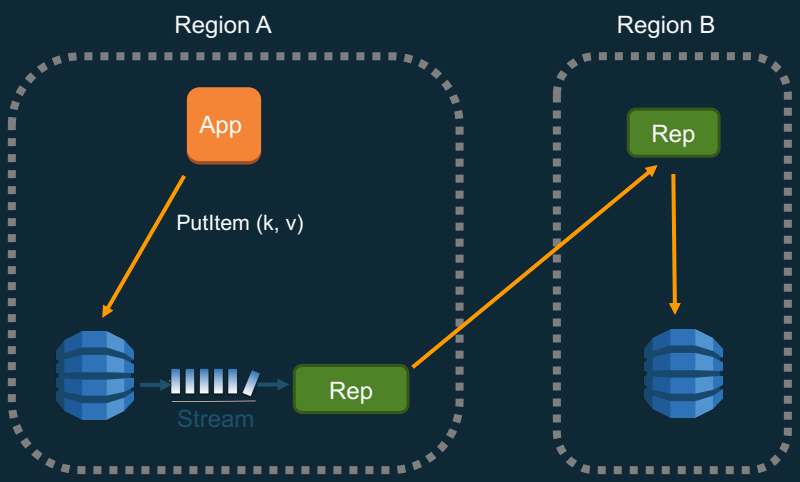
How replication works

Or: All the things you would have to do…



- Size replication capacity
- Scale elastically
- Implement redundancy for reliability
- Implement conflict resolution
- Operate replication service
  - Handle failures, etc.

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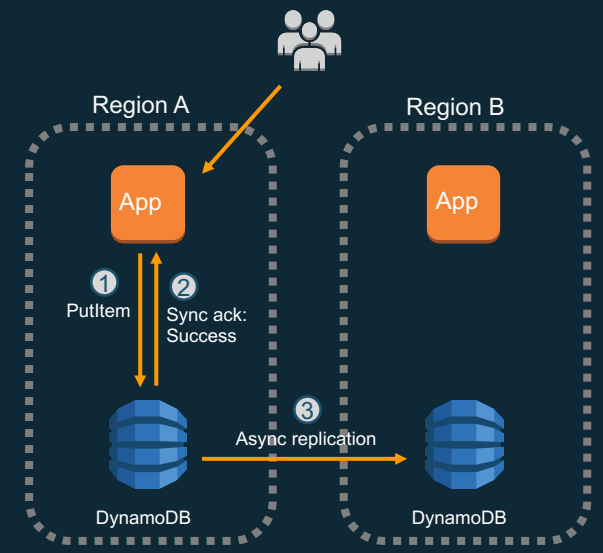
How replication works: PutItem



Application writes are always:
- Local (regional)
- Synchronous

Cross-region (replication) writes are always asynchronous

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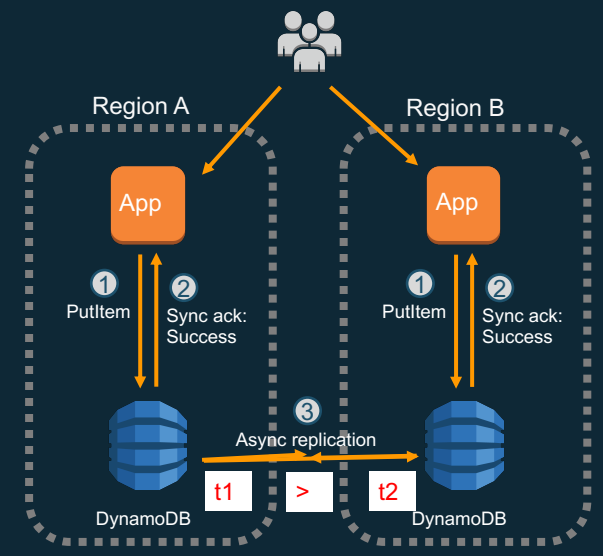
How replication works: conflict resolution



Application writes are always:
- Local (regional)
- Synchronous

Cross-region (replication) writes are always asynchronous

Conflict resolution:
- Last writer wins
- Ensures convergence to consistent state

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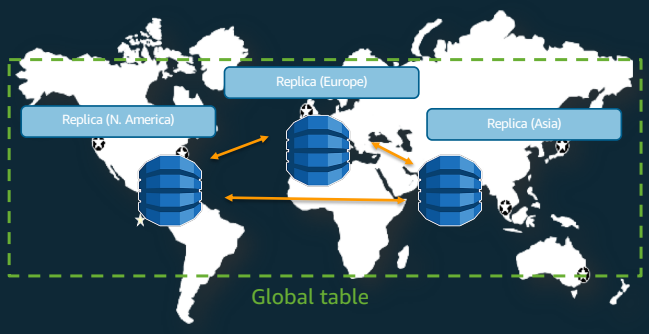
Global tables: key details



Reliable multimaster data replication between Regions

Asynchronous:

- No performance impact to application writes
- No interregion dependency

Replication latency under 2 s between any two Regions – enables RPO of under 2 s

Last writer wins conflict resolution

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Disaster recovery

How much data can you afford to recreate or lose?

How quickly must you recover? What is the cost of downtime?

It's not about the data—it's about the mission.

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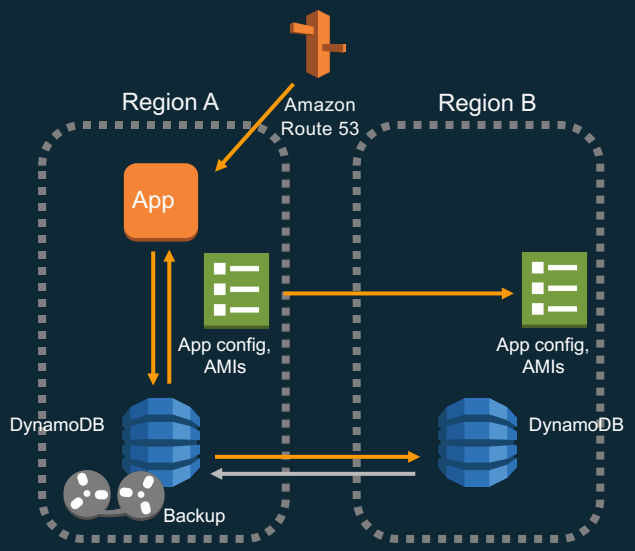
DR strategy: pilot light (active-passive)



Critical data replicated using global tables

App configuration replicated, application stack not running in the passive Region

Failover not fully automated

Continuous backup enabled for data protection

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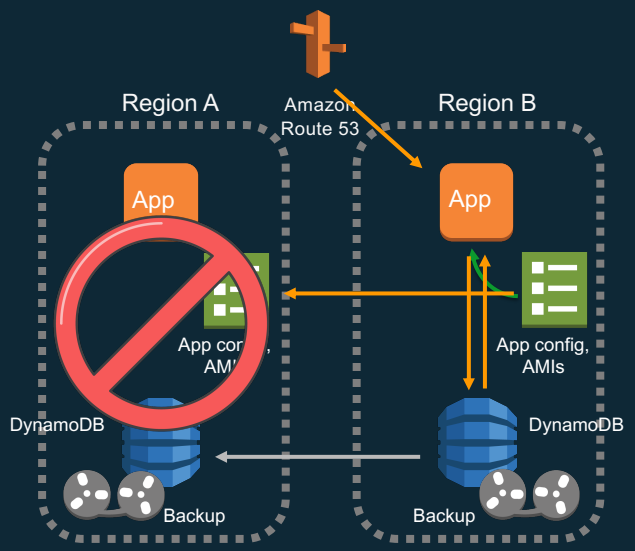
DR strategy: pilot light (active-passive)



In the failover Region:

Continuous backup enabled for data protection

Application stack deployed from configuration

DNS updated to route traffic to failover Region

Redundancy should be restored as soon as possible

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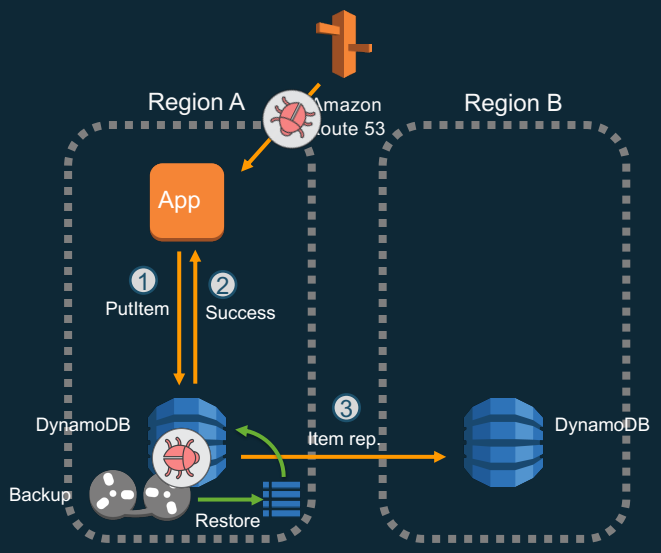
Data protection with continuous backup



Continuous backup enabled for data protection

In case of data corruption:

1. Identify keys of corrupt data
2. Restore to last known good point in time
3. Selectively read correct data from the restore table and write to prod. table

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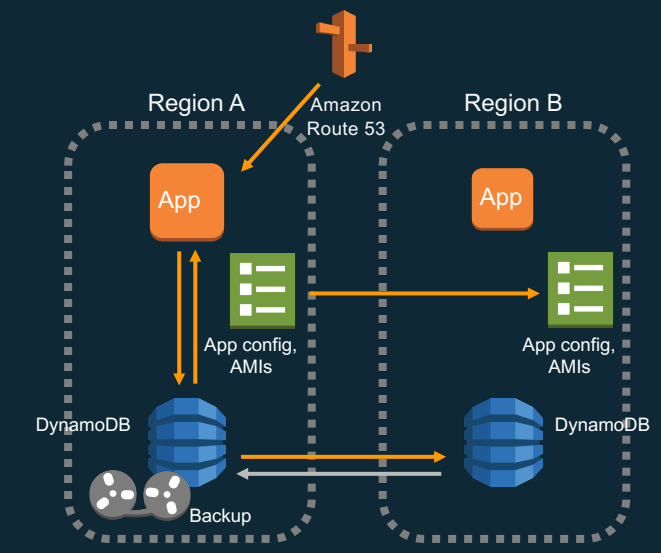
DR strategy: warm standby (active-passive)



Data replicated using global tables

App configuration replicated, scaled down application stack running in the passive region

Failover not fully automated

Continuous backup enabled for data protection

Less downtime than pilot light

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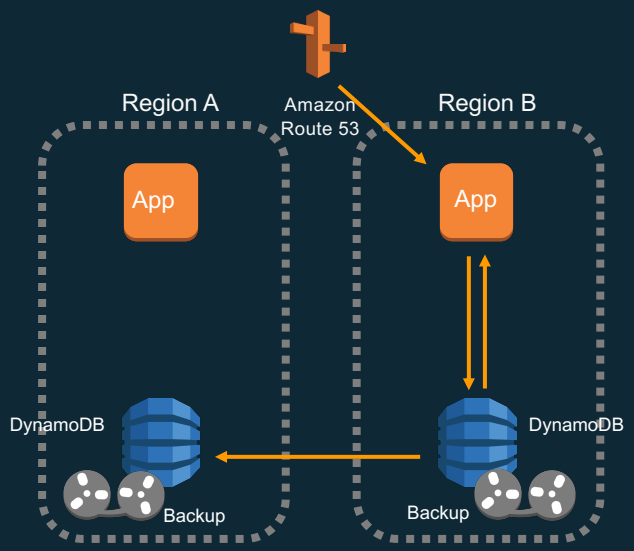
Getting to five nines of availability for your app



Active-passive: passive Region is a hot standby

Active-active: both Regions are fully active and provisioned for full load

Automated deployments, failure detection, and failover

Health checks used to automate failover

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Use case: active-active

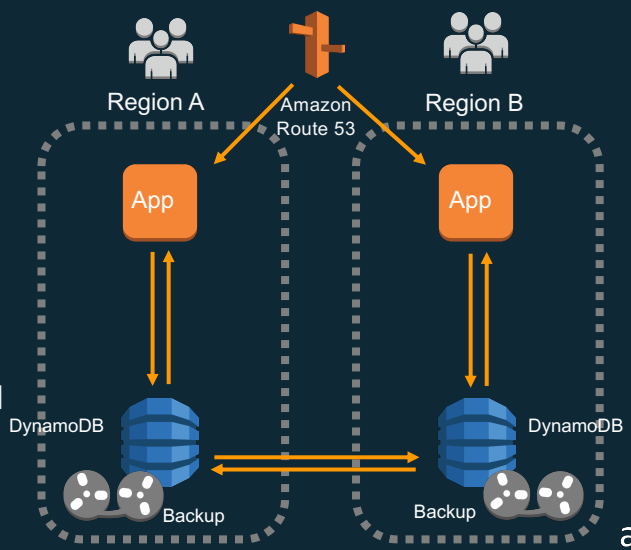
Used for both disaster recovery and performance objectives

Independent regional stacks

Latency or geo-based routing

Stacks sized for full capacity in case of failure

Health check–based automated failover



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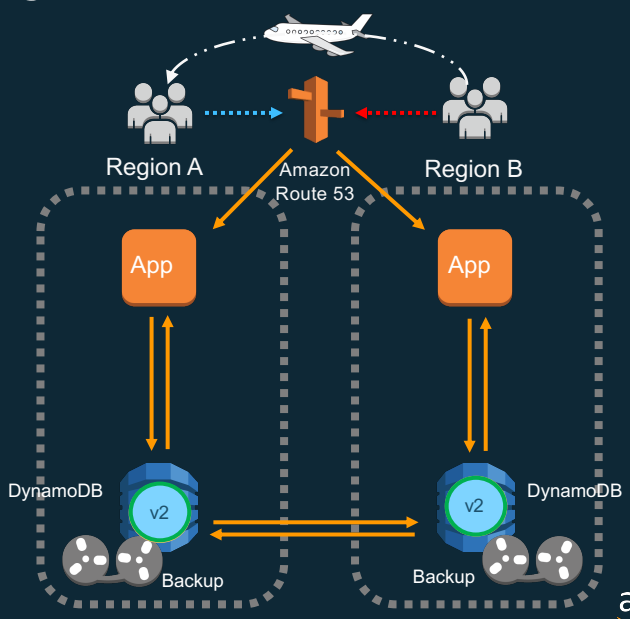
Use case: active-active
Conflict resolution

Best strategy for conflict resolution: conflict avoidance

Maintain geo affinity: use latency or geo-based routing

Avoid random or round-robin routing



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Customer use case: Chick-fil-A

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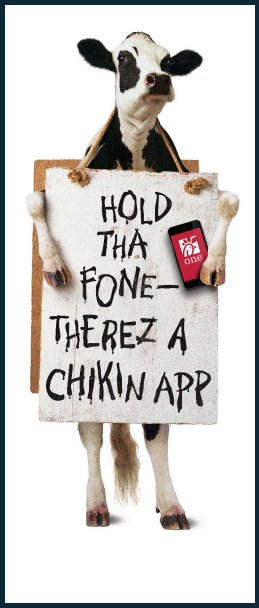
About Chick-fil-A

Chick-fil-A is a privately owned, quick-service restaurant (QSR) company based in Atlanta, GA

2,200+ restaurants in US

Highest per-restaurant sales in QSR industry

More than 10 percent of revenue flowing through digital channels



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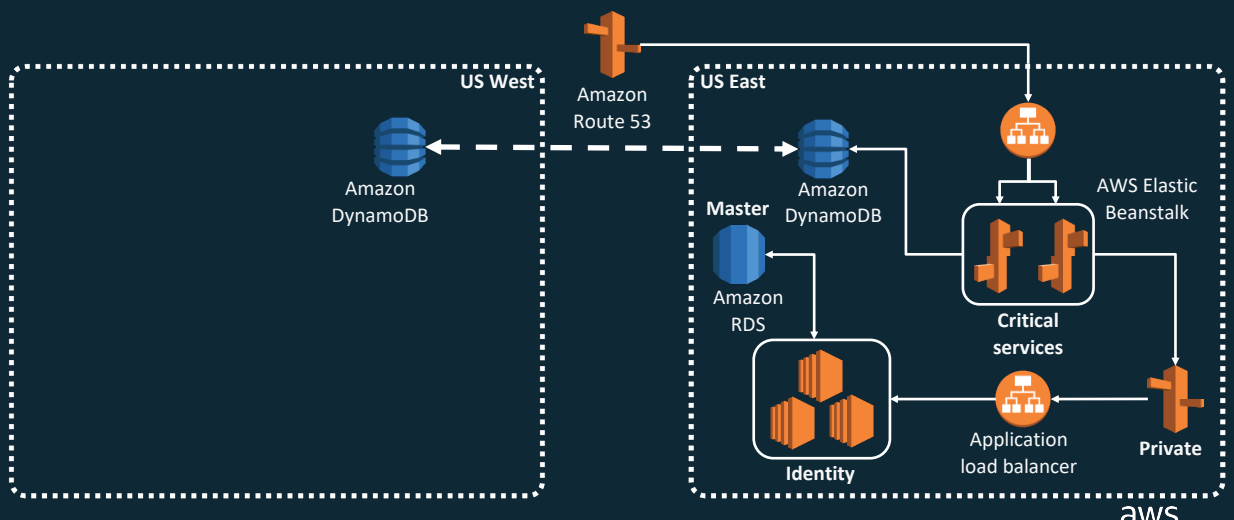
Chick-fil-A's multiregion journey



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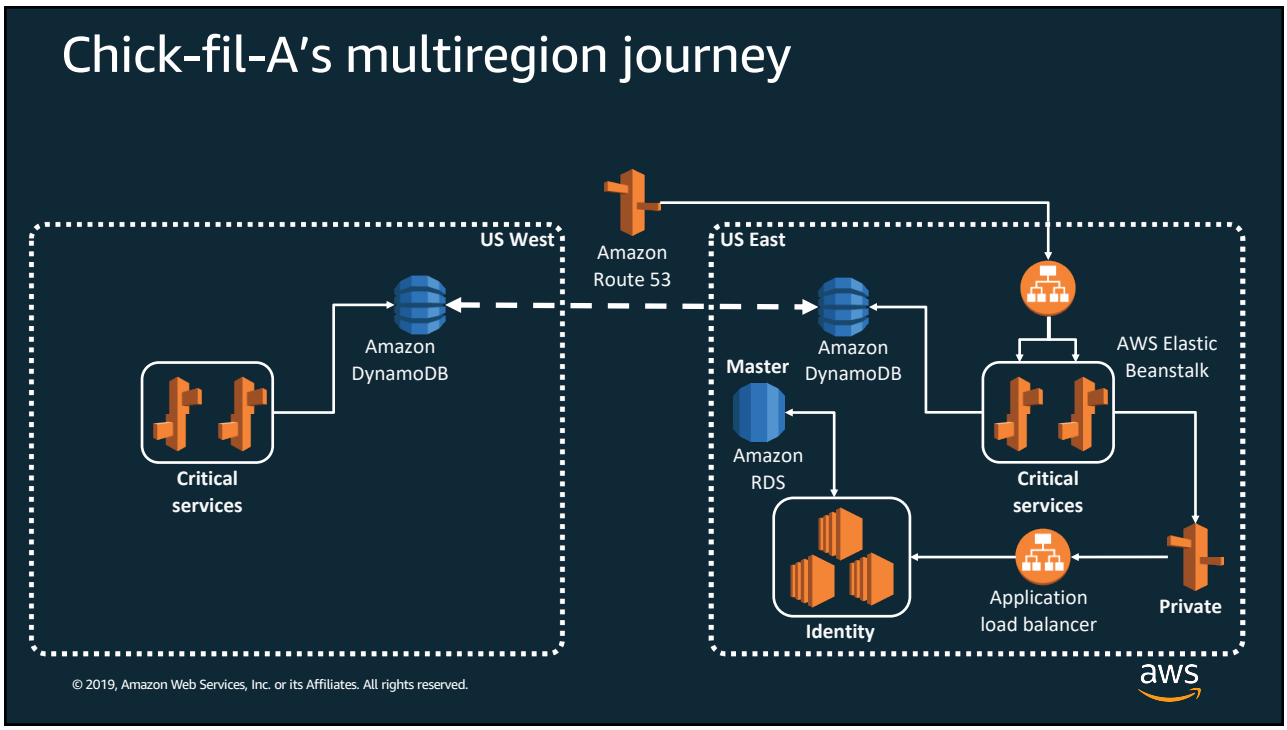
Chick-fil-A's multiregion journey
US West
Amazon Route 53
US East
Amazon DynamoDB
Amazon DynamoDB
Master
AWS Elastic Beanstalk
Amazon RDS
Critical services
Critical services
Identity
Application load balancer
Private
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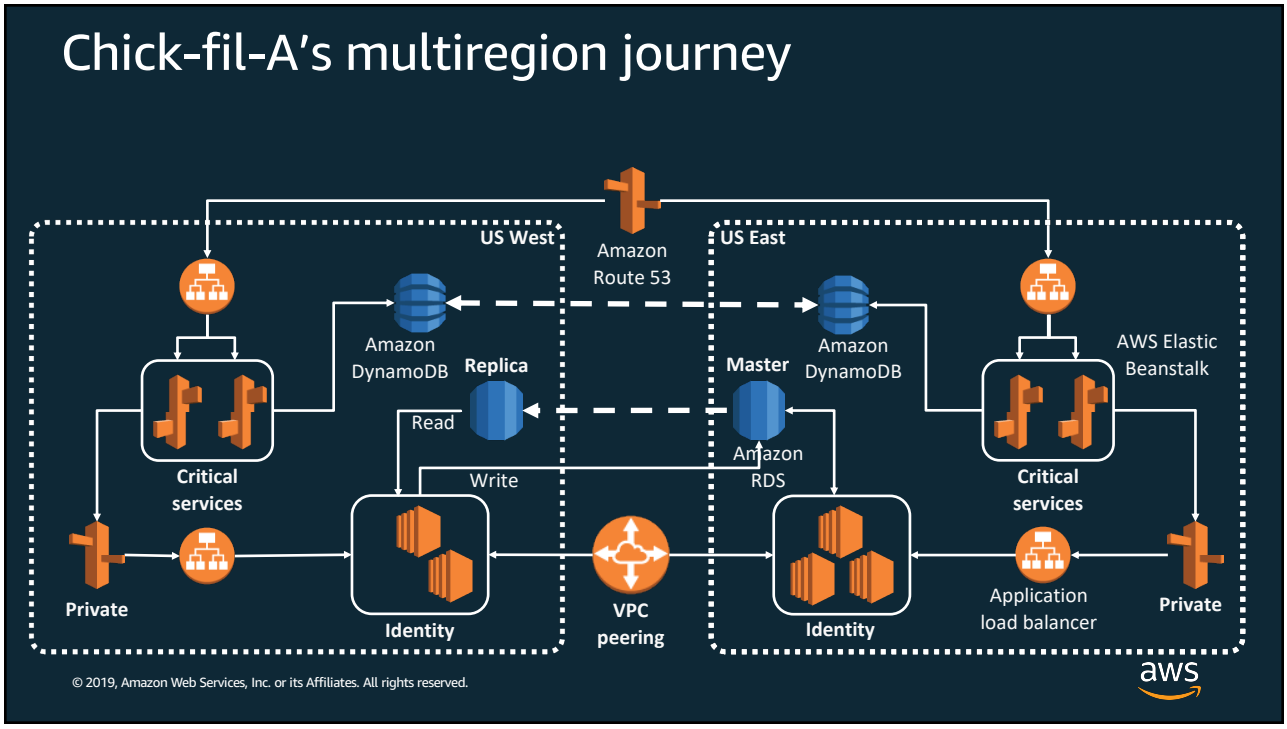
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Read
Write
Amazon RDS
Critical services
Critical services
Private
Identity
VPC peering
Identity
Application load balancer
Private
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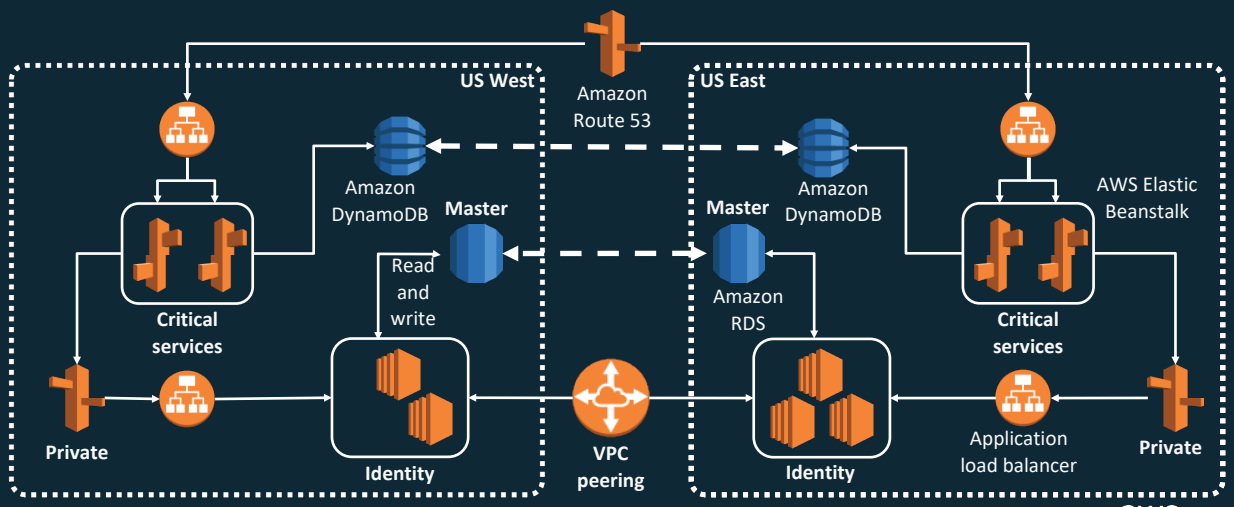
Chick-fil-A's multiregion journey



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Takeaways

- Understand your disaster recovery, performance, and compliance requirements
  - RPO and RTO
  - What is mission critical vs. what is not
  - What has to stay within a specific AWS Region
- DynamoDB is highly available and durable in a single Region
  - 99.99% availability SLA
- DynamoDB global tables is a turn-key solution for multiregion replication
  - 99.999% availability SLA
- Getting your application to "five nines" requires automation
  - It's a journey from single Region to active-passive to active-active to fully automated active-active

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Thank you!

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