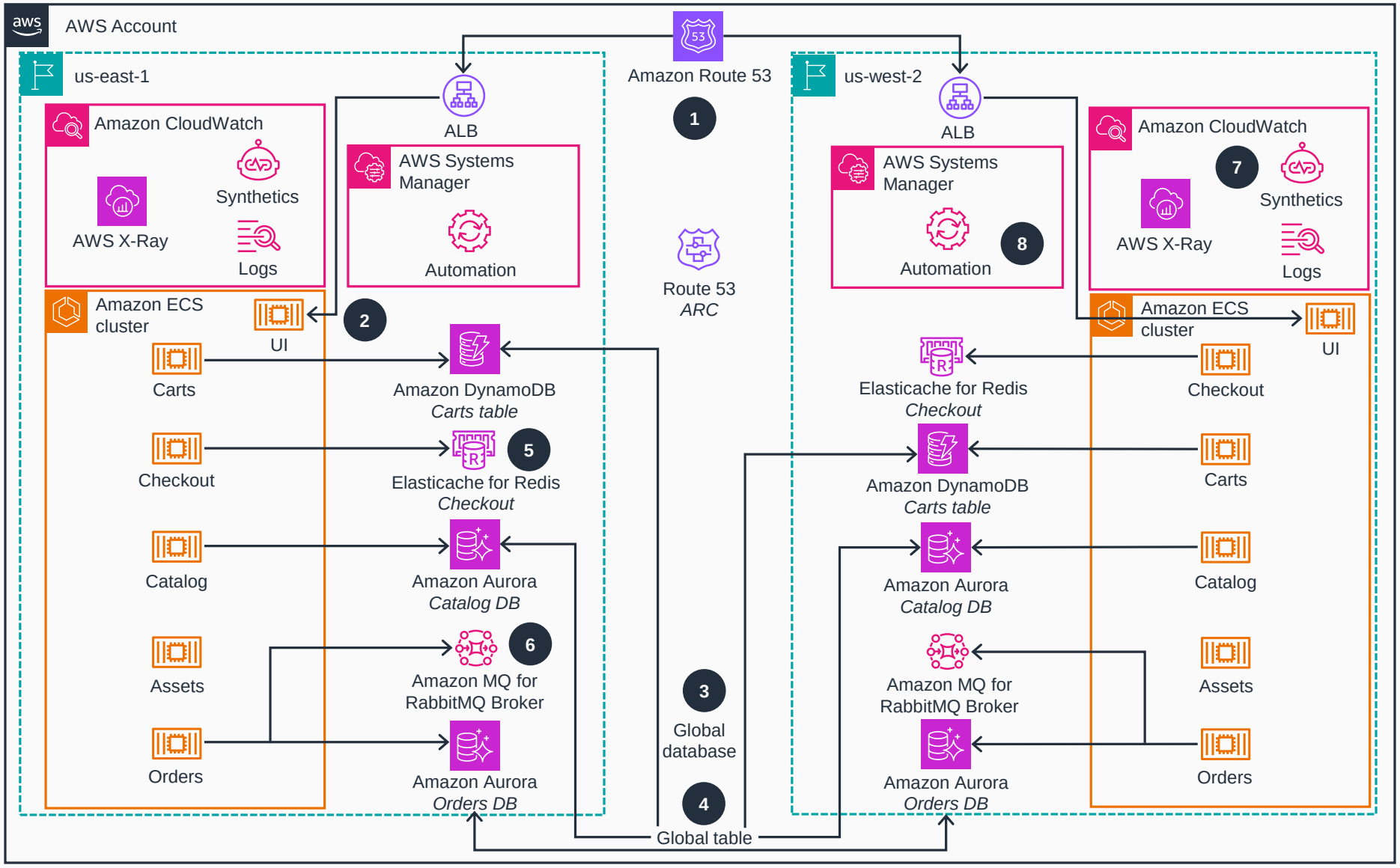
Guidance for Multi-Region Resilient Microservice on AWS

This architecture diagram shows the active/active state across two AWS Regions.



1. **Amazon Route 53** failover records use **Amazon Application Recovery Controller** managed health checks to route requests to the active Regions.
2. Application Load Balancers (ALBs) send requests to the user interface (UI) tasks on **Amazon Elastic Container Service (Amazon ECS)**. Depending on the page being accessed, the UI will make a service call to the appropriate service through **Amazon ECS** Service Connect.
3. As records are written to the writer instances of the Catalog and Orders **Amazon Aurora** global databases, they are replicated to the standby clusters.
4. As records are written to the Carts **Amazon DynamoDB** global table in one Region, they are replicated to the table in the other Region.
5. The Checkout service uses **Amazon ElastiCache for Redis** for temporarily caching the contents of the cart until the order is placed.
6. The Orders service leverages **Amazon MQ for RabbitMQ** broker to publish order creation events for any downstream consumption purposes.
7. **Amazon CloudWatch** Synthetics from each Region sends requests from the application in each Region (using the ALB's address) to the DNS name resolved through **Route 53** and pushes the metrics, logs, and traces to **CloudWatch**.
8. **AWS Systems Manager** automation runbooks automate the enabling and disabling of the **Amazon Application Recovery Controller** routing controls and the failing-over of the **Aurora** global databases.

Reviewed for technical accuracy June 25, 2024

AWS Reference Architecture

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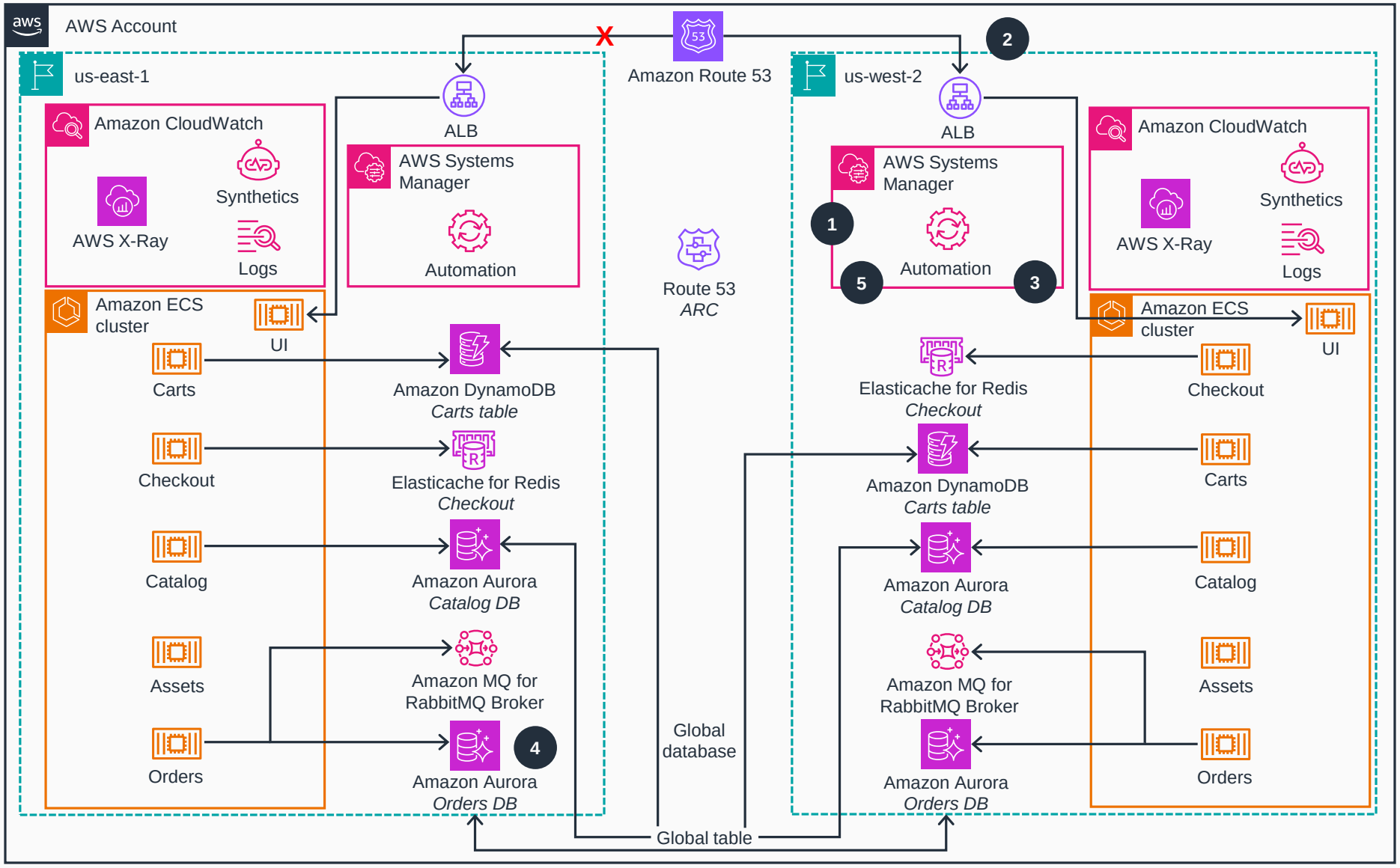
This architecture diagram shows the failover sequence when the workload fails over to us-west-2 from us-east-1 AWS Region.



1. **Systems Manager** runbook (invoked by an operator manually) toggles the **Amazon Application Recovery Controller** routing control "off," which causes the managed health check for the Region to enter a "failed" state.
2. **Route 53** returns only the remaining healthy Region as a client to resolve the application's fully-qualified domain name.
3. **Systems Manager** runbook executes **Aurora** global database managed failover, which promotes the standby Region to the primary for writes.
4. The former primary Region is rebuilt as a secondary Region by **Aurora**.
5. **Systems Manager** runbook recovers a copy of the old primary database from a snapshot and compares the data in the new primary database to the old, and then creates a missing transaction report.

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AWS Reference Architecture