Implementing Resilient and Cost Effective Human Task Orchestration Service at Scale on AWS

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Public

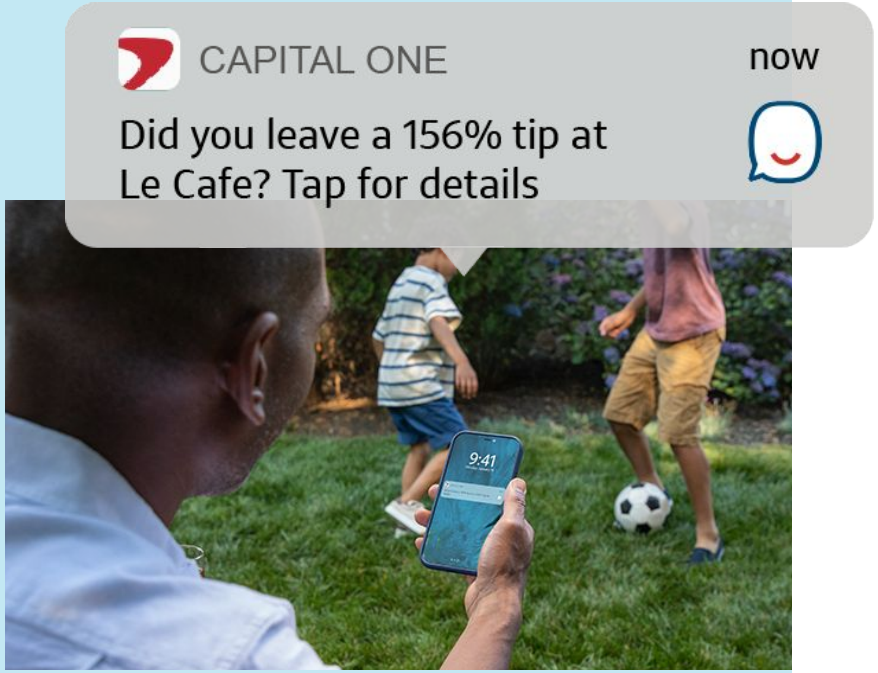
We Are

A BANK BUILT LIKE A TECH COMPANY

- Tech is central to everything we do at Capital One: for nearly a decade, we have invested and invented like the very best technology companies
- Our world-class, in-house technology team now numbers 12,000+ people, most of which are engineers
- We're all in on the cloud like no other bank out there, which enables us to create exceptional, innovative experiences for our customers
- Advanced, automated DevOps and CI/CD approaches mean engineers spend more time at the top of the tech stack building new and unique digital banking experiences

Cloud Computing
WE'RE ALL-IN

In 2020, we left our data centers to create exceptional banking experiences for our customers, becoming the first bank to go all-in on the public cloud



- Going all in on the cloud—and embracing cloud-native services like serverless computing—has enabled instant provisioning of infrastructure and rapid innovation

- Today, we're using real-time, streaming data at scale, machine learning, and the power of the cloud to solve unique, challenging technology problems and deliver intelligent, personalized solutions that benefit millions of customers

- Capital One Shopping, built in the cloud with microservices architecture and streaming data, helps customers save money shopping online by automatically finding lower prices, coupons and online credits

Capital One

Open Source Software
COMMITMENT TO COMMUNITY

Capital One made an “open source first” declaration in 2014 and that’s when we made our first contributions to the open source community.

- We sponsor FINOS, Python, Continuous Delivery and the Cloud Native Computing Foundations to help keep open source sustainable
- Capital One’s contributions to the open source community have been significant and we've released more than 40 of our own software projects
- We’ve invested for years to build the culture and governance required to be open source-first in a highly regulated industry

Featured Open Source Projects: Data Profiler, Rubicon-ML and Hygieia

Capital One

Want to learn more?

- Want to learn more about our Tech? Check out Capital One Tech to find out more about enterprise software solutions, ideas and stories.
- At Capital One, we celebrate and honor the differences that makes us all unique- inside and outside of work. Help us create a more equitable future for all! Join us! Visit Capital One Careers to view our open roles.
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Agenda

- Key benefits of Camunda
- Our approach to building a platform for Human Task Orchestration needs
- Our Implementation of a highly resilient platform on AWS

There are two broad classifications based on the primary driver of the “work” to “flow” across the process

System Orchestration

A process that executes in sequence or parallel with no involvement from humans

Example: Data transformation jobs that run in a predefined sequence

Human Task Orchestration

A process that involves Humans in the decision making process and the decisions dictate the next set of steps in the flow

Example: Accountable Executive approving a policy exception

Key criterias to evaluate the right tool to manage the “Human Task Orchestration” needs

Must be Open Source

Must support BPMN and DMN

Must have active Open Source community participation

Must support multi-tenancy

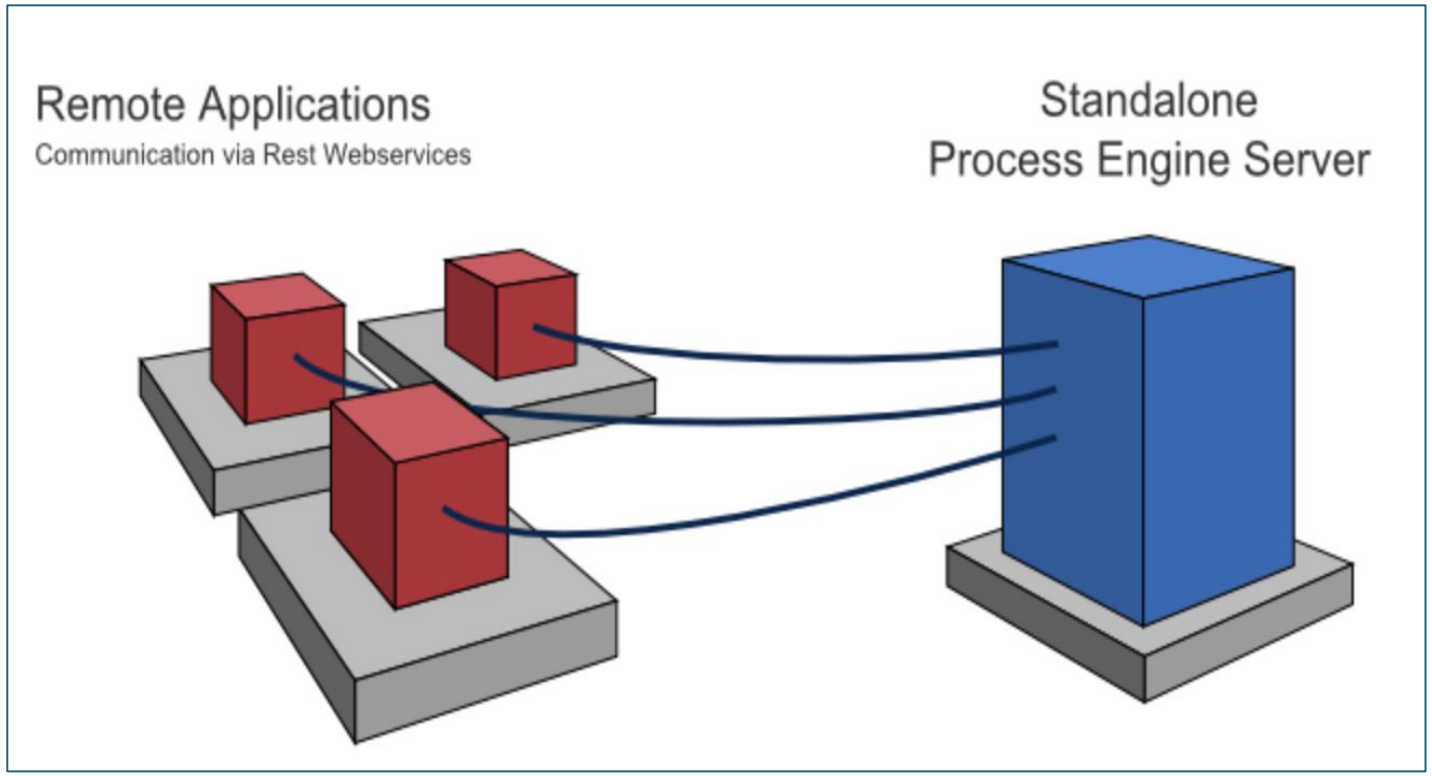
Must have a roadmap to / offer SaaS

In addition to the Key criteria, we considered additional industry capabilities to evaluate the offerings from Camunda

Analytics / Insights	Audit Tracking	Connectors	Decision Engine
Event driven notifications	Process Modeler	Task Management	Versioning

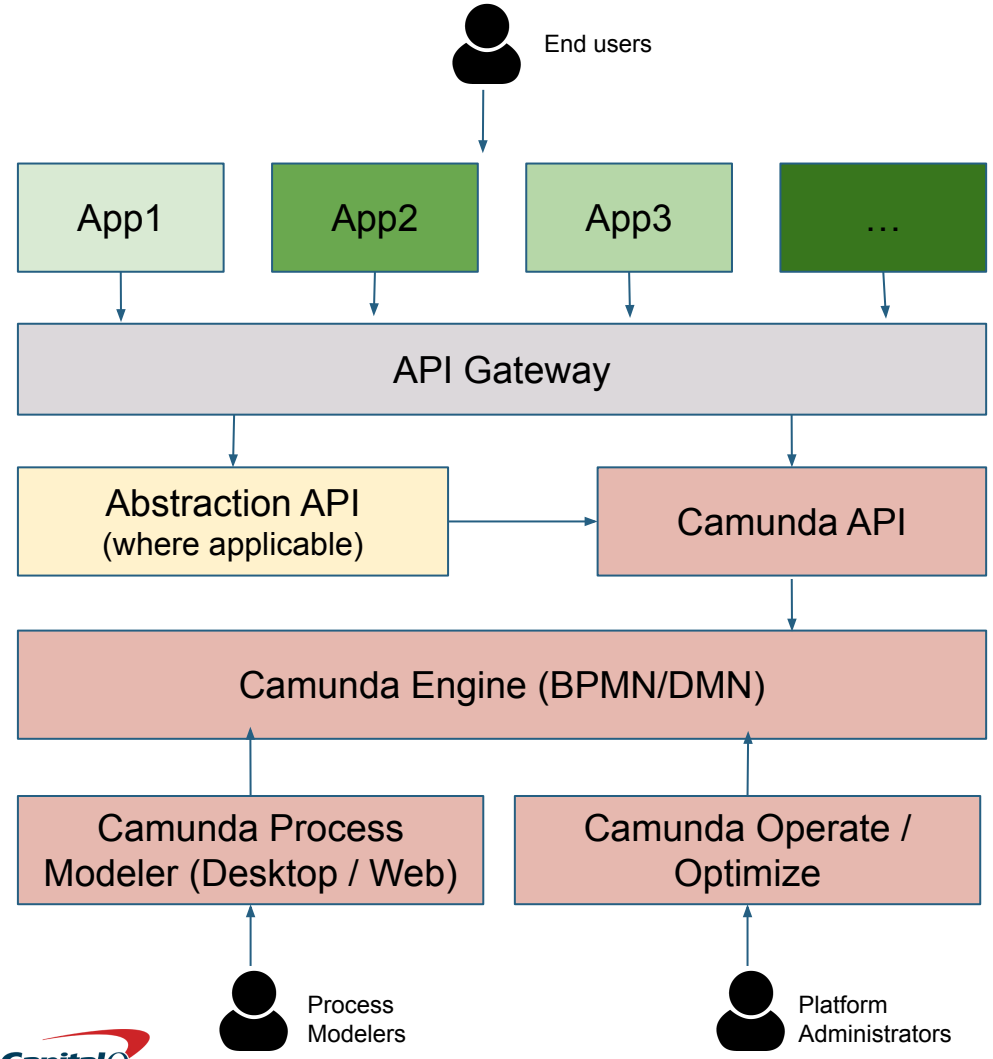
Camunda provided different deployment options - we chose to implement a “Remote Process Engine Server” model

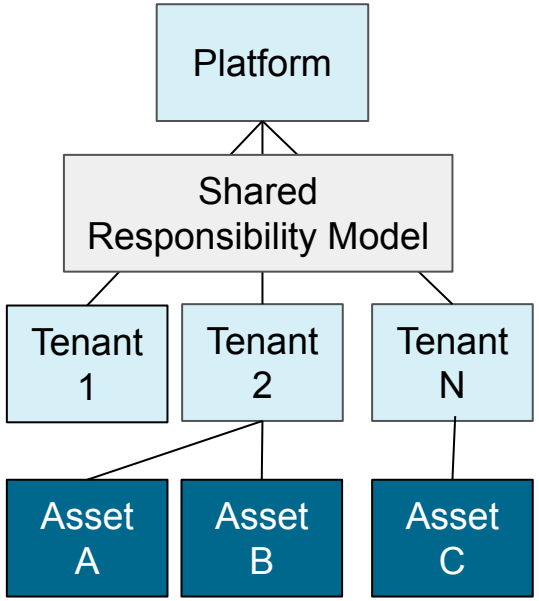
Standalone (Remote) Process Engine Server



Picture Credit: Camunda Architecture Overview

The Platform Architecture enables us to implement a remote process engine as a service and enable multi-tenancy



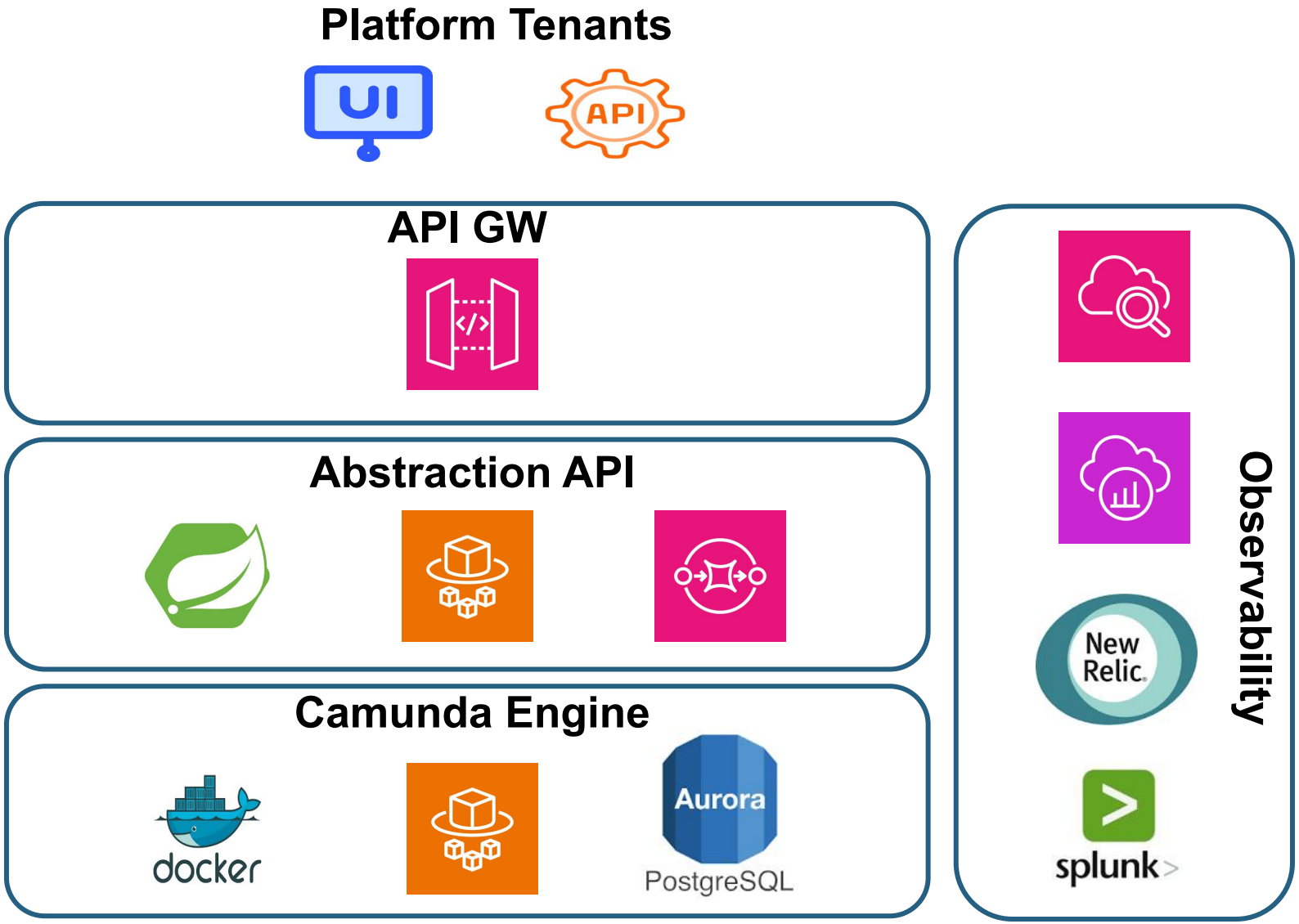


- AWS uses a Shared Responsibility Model for managing security and compliance with customers
- Tenant Applications represent functionality owned by tenants* that function as tenants of a multi-tenant platform / application
- The Shared Responsibility Model is critical in ensuring the expected responsibilities of the platform and its tenants are clear

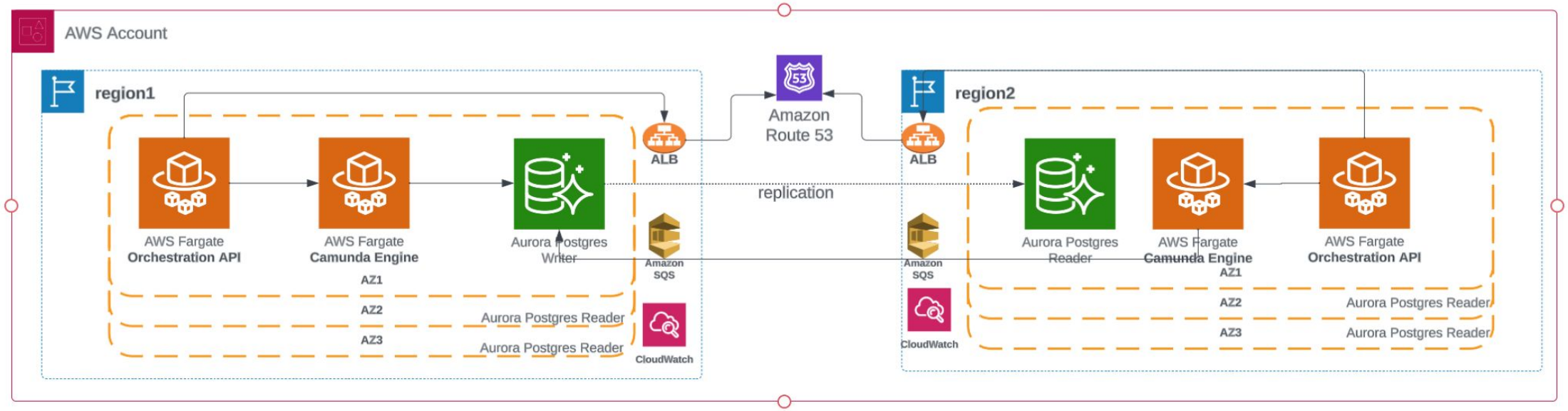
*A tenant is a unit of isolation that is enforced by the platform, where a unit is an organization entity (service consumer / service customer) that consumes a platform's services (process, application, system, etc.) and is differentiated from the service provider offering the platform.

IMPLEMENTATION

The Platform is built on AWS Cloud infrastructure with Modern technologies



The Platform follows a Scalable & High Resiliency Architecture



Serverless Technologies

Multi Availability Zone (AZ) deployment

Multi Region Active / Active mode

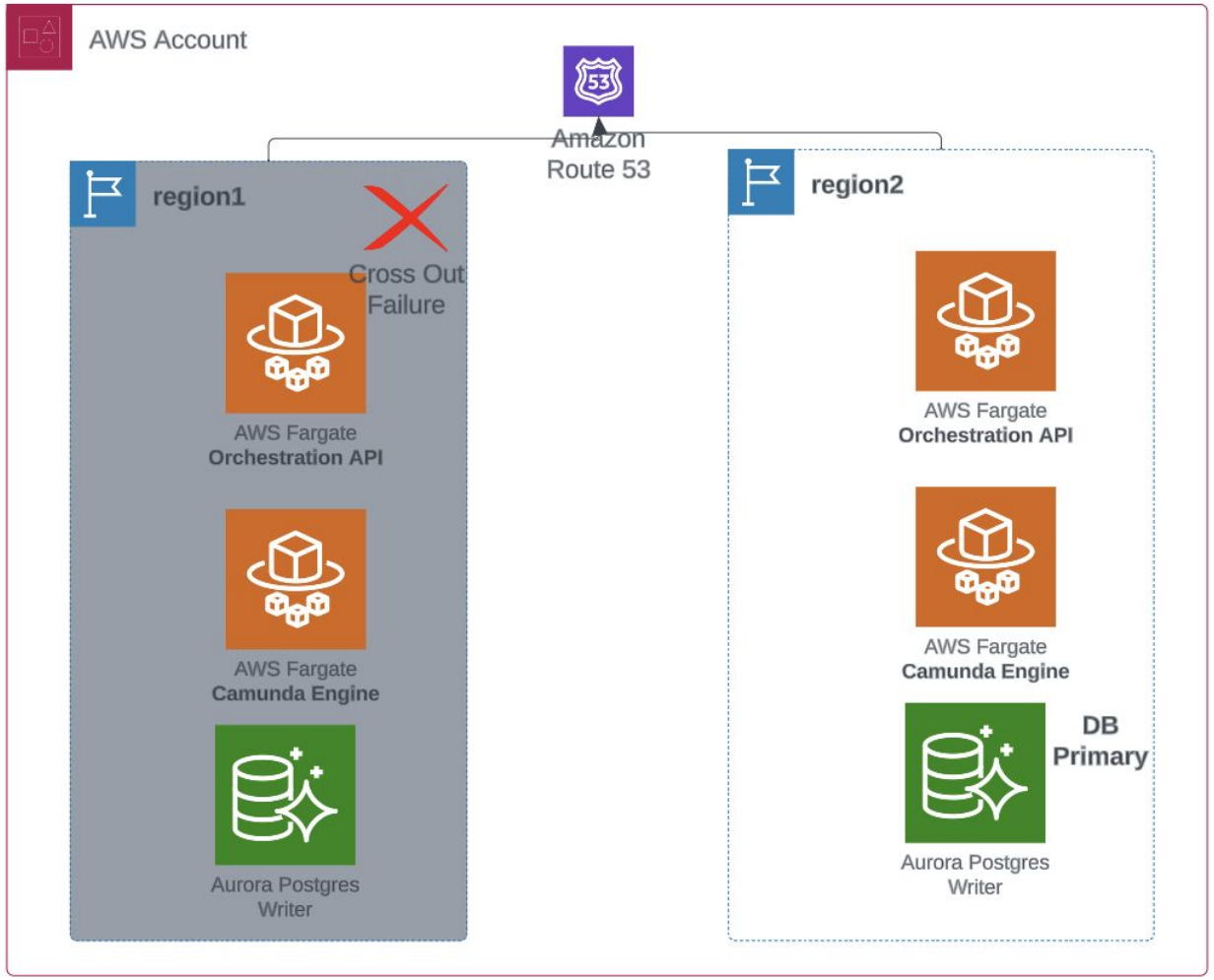
Enhanced Monitoring

The Platforms maintains high resiliency during Disaster Recovery (DR) exercises & Unplanned events

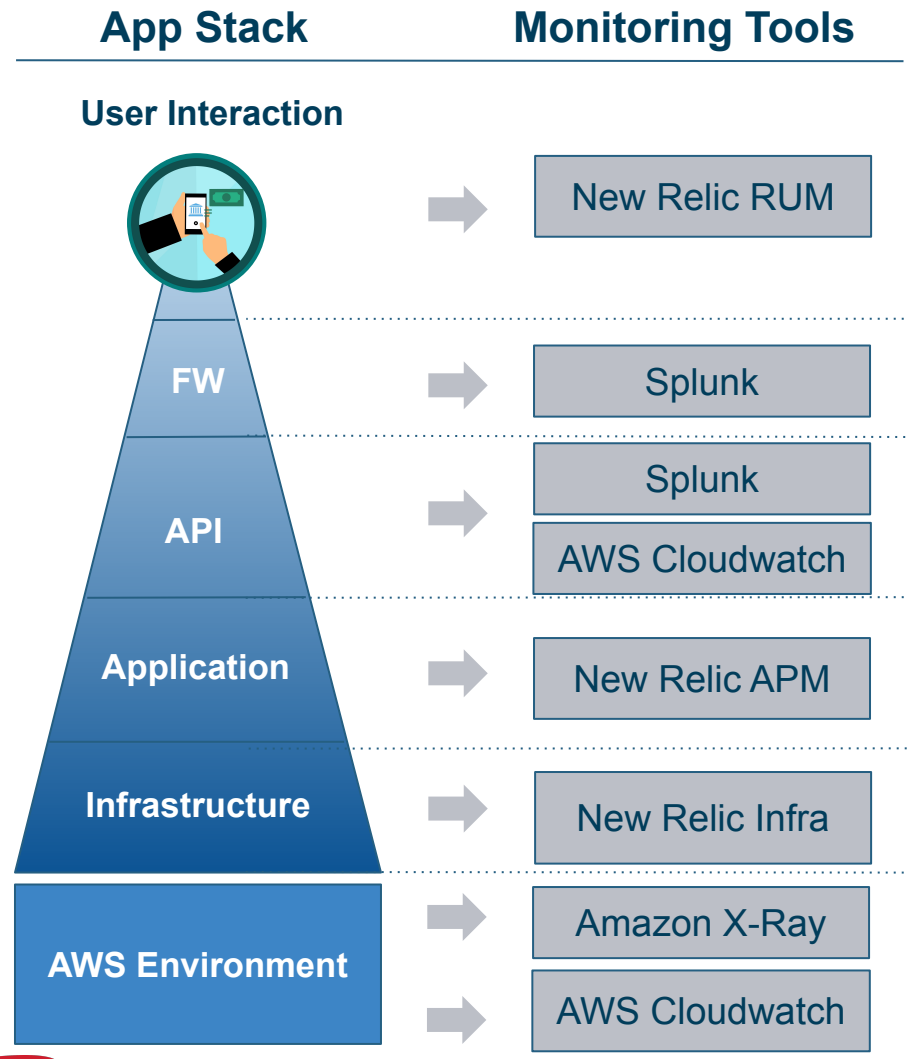
Active-Active

Automated Failover

Reduced
Recovery Point Objective (RPO)
& Recovery Time Objective (RTO)



The Platform incorporates Continuous Monitoring & Observability using AWS native offerings and other products



- By instrumenting monitors and measures in the correct planes, full observability of our systems are achieved
- Leverage AWS Native Monitoring using
  - AWS CloudWatch
  - X Ray Distributed Tracing
- APM Monitoring using NewRelic
- CloudWatch Application logs

Challenges and Lessons Learned

Self-Service / Onboarding tenants

Shared Responsibility Model

Platform configurations

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