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Modern Applications design patterns: Implementing microservice architectures with AWS

Chris Modica
Enterprise Solutions Architect,
Amazon Web Services

Agenda

Cloud-native modern application design patterns

- API Gateway pattern
- Strangler pattern
- Event Sourcing pattern

Modern application design patterns working with monolithic architectures

Combing multiple design patterns

References

What we're not covering

L300

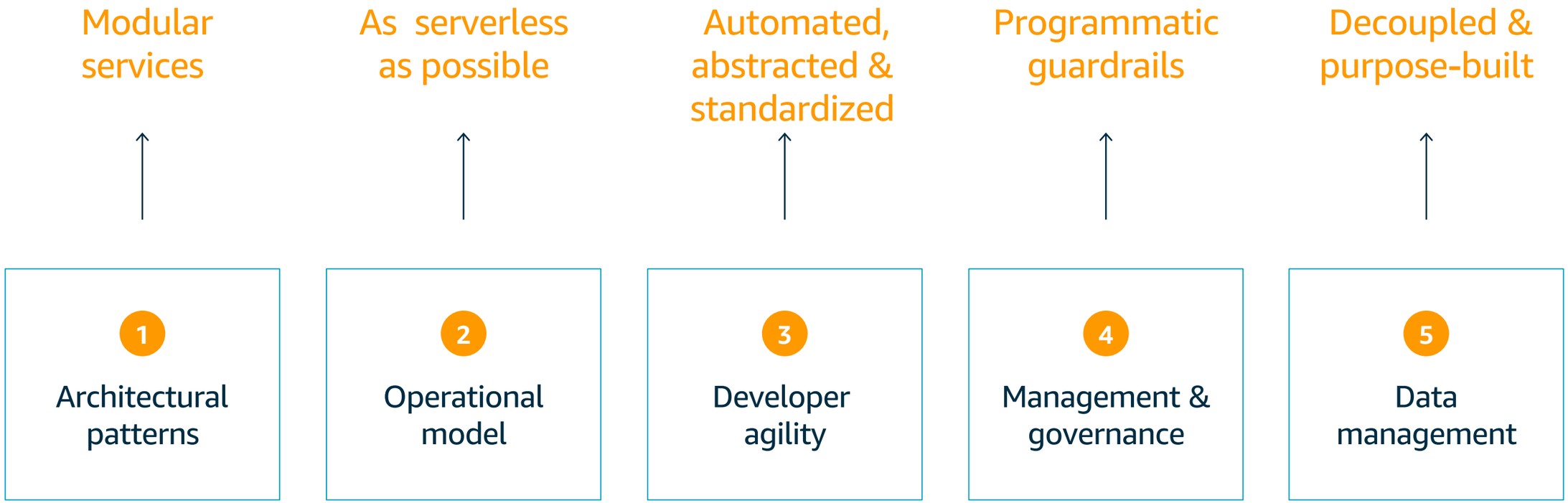
Introduction to AWS services

Best practices for serverless at scale

Multi-region design patterns

Polyglot persistence

What is the best way to build a modern application ?



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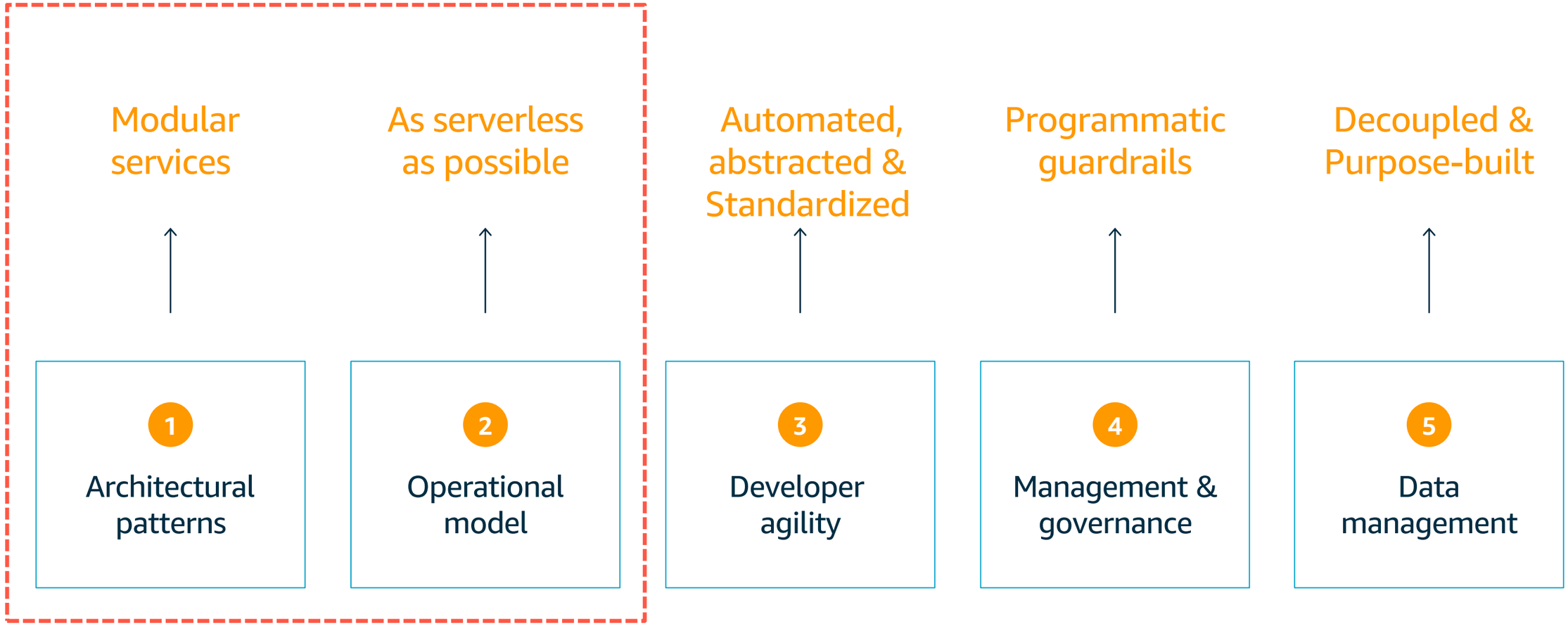
What is the best way to build a modern application ?



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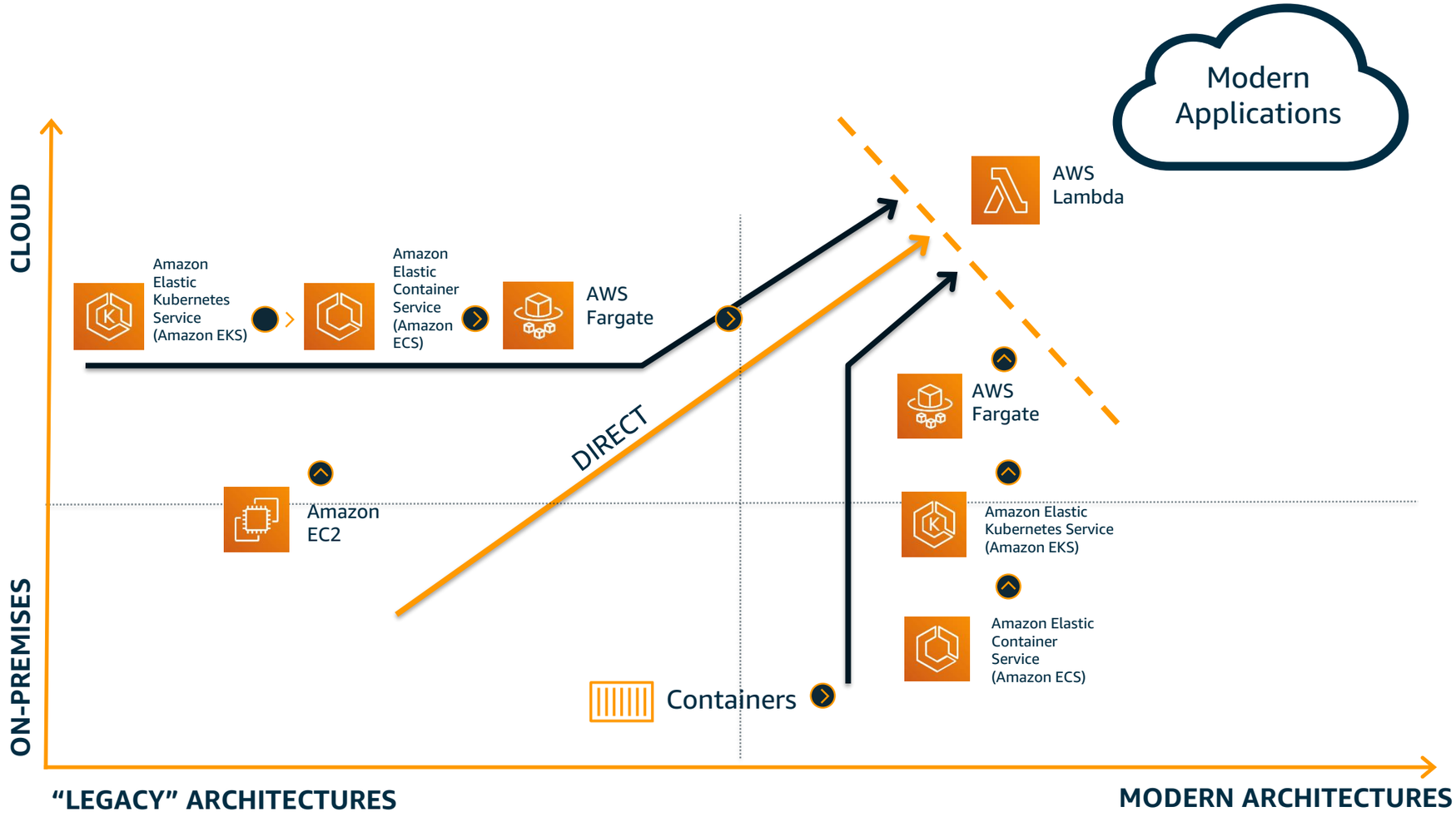
Many paths to modern applications



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Compute and operations

More concerns ← → Less concerns

	Amazon EC2 *Infrastructure-as-a-Service*	Amazon ECS)/Amazon EKS *Container-management as a service*	AWS Fargate *Serverless containers*	AWS Lambda *Serverless functions*
AWS MANAGES	• Physical hardware software, networking, and facilities	• Container orchestration control plane • Physical hardware software, networking, and facilities	• Container orchestration, provisioning • Cluster scaling • Physical hardware, host OS/kernel, networking, and facilities	• Data source integrations • Physical hardware, software, networking, and facilities • Provisioning
CUSTOMER MANAGES	• Application code • Data source integrations • Scaling • Security configurations and updates, network config, management tasks • Provisioning, managing scaling and patching of servers	• Application code • Data source integrations • Work clusters • Security config and updates, network config, firewall, management tasks	• Application code • Data source integrations • Security config and updates, network config, management tasks	• Application code

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Architectural patterns

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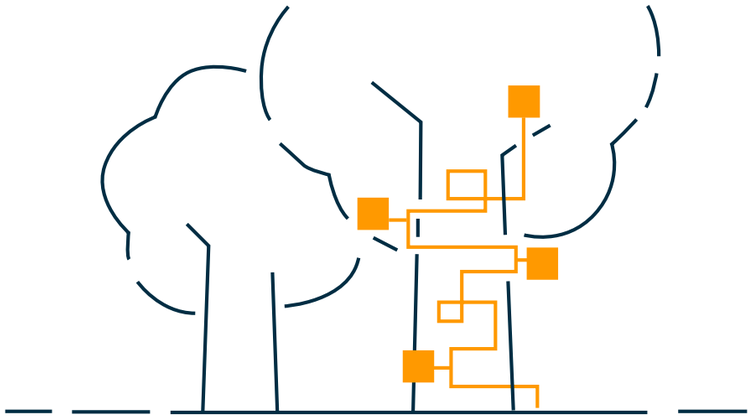
Typically starts with breaking down the monolith

Moving **monolithic** applications to **microservices** by gradually creating events and **APIs** for various components on of the legacy application



THE STRANGLER PATTERN

https://martinfowler.com/bliki/StranglerFigApplication.html

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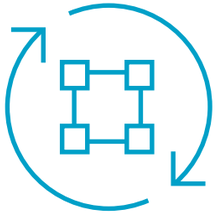
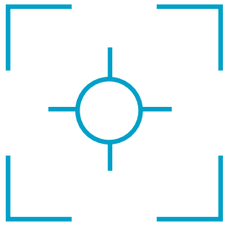
Monolith to microservices

PRINCIPLES

Reduce the size of deliverables



Transform continuously

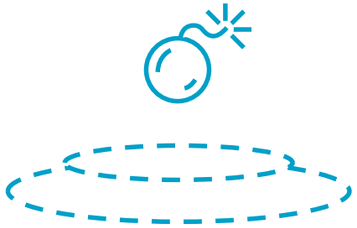


Maximize work not done

Monolith to microservices

BENEFITS

Frequent
value delivery



Smaller blast
radius of risk

Staged
investments

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Breaking up a monolithic applications

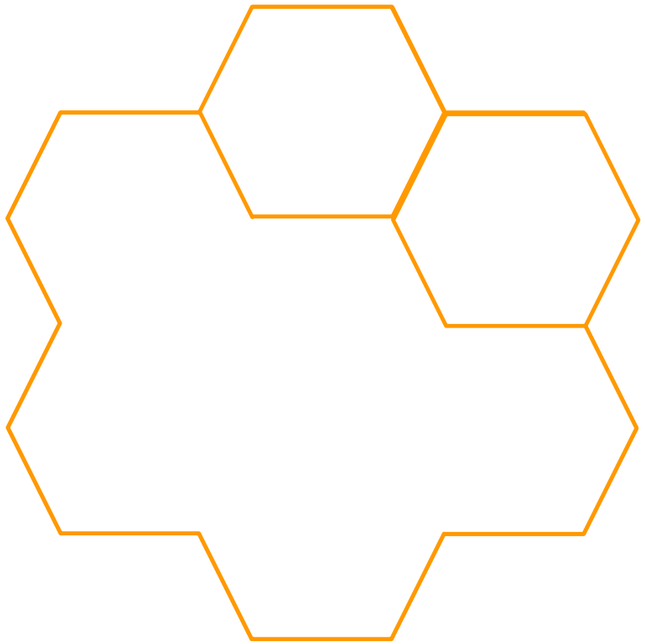
Use AWS cloud native services with legacy applications

Decouple functionality for quicker/safer development

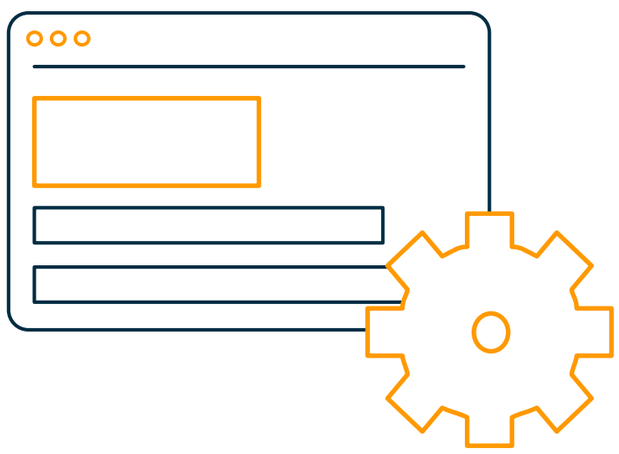
Gradually carve out one task/component at a time to refactor

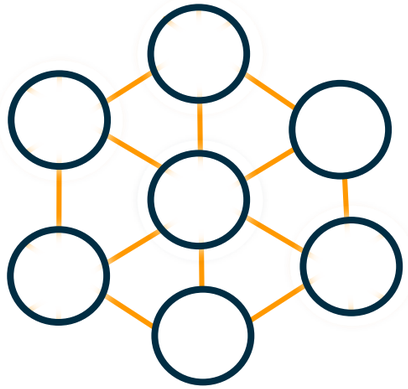
Design patterns works with cloud or hybrid applications

New functionality cloud native

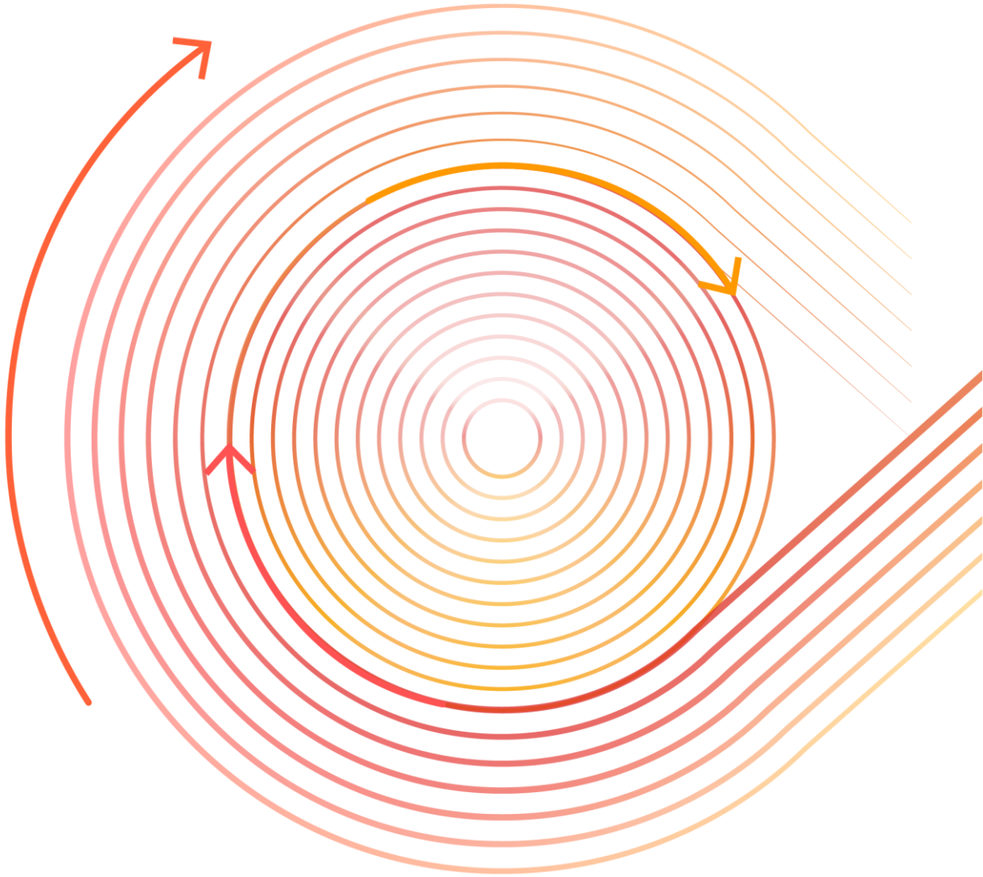


APIs are the front door of microservices





API Gateway pattern



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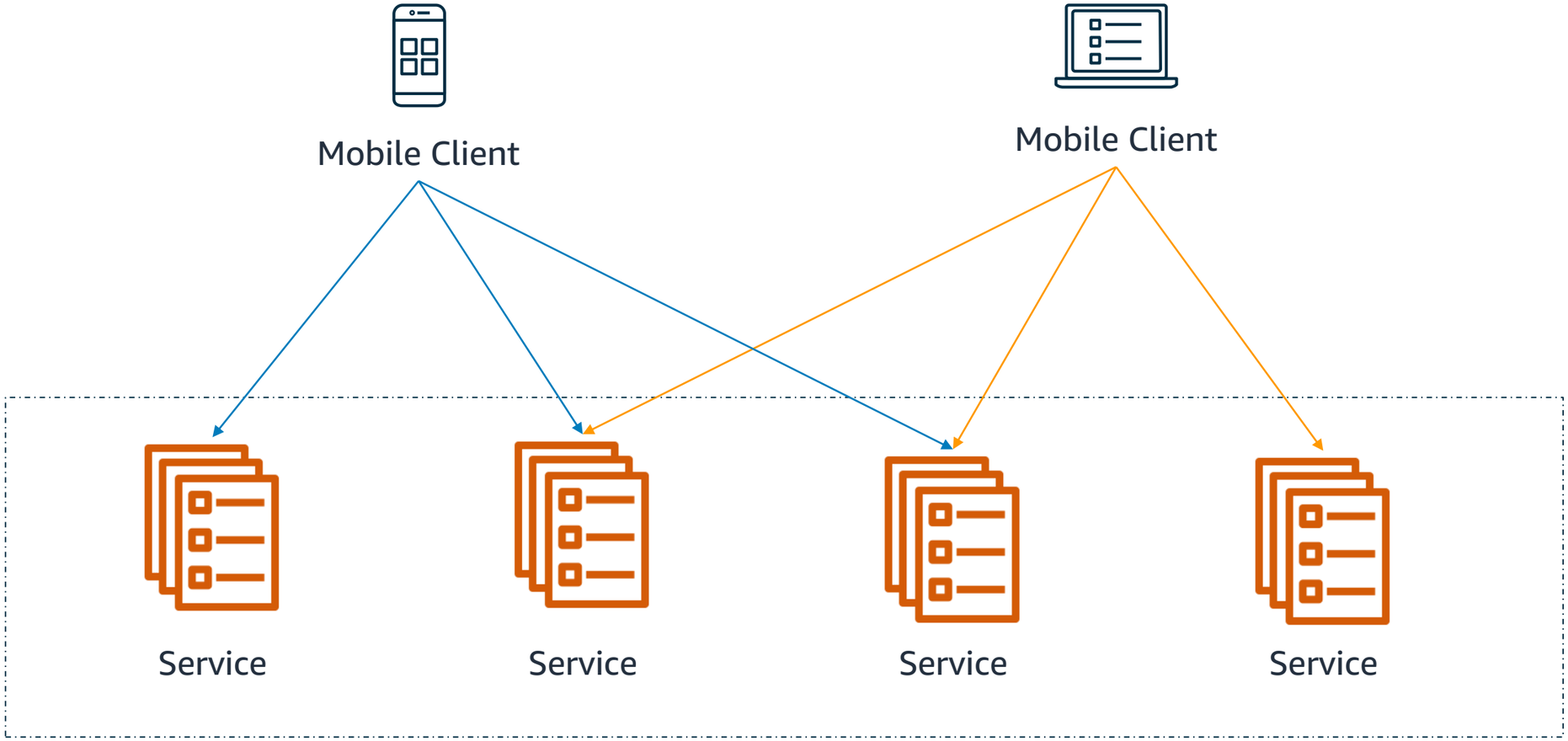
Example: Communication between devices and services (without an API Gateway)



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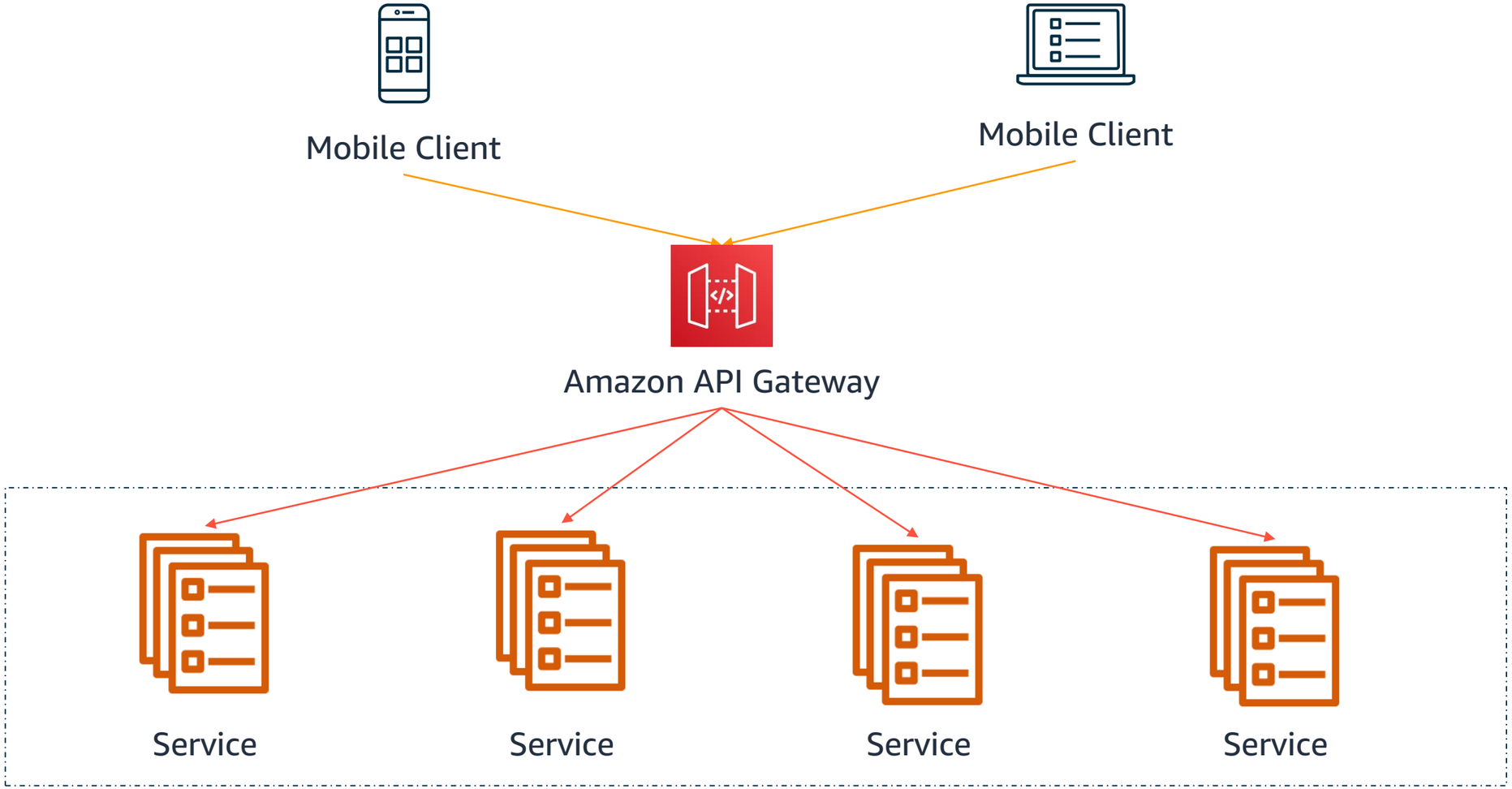
Example: Communication between devices and services (with an API Gateway)



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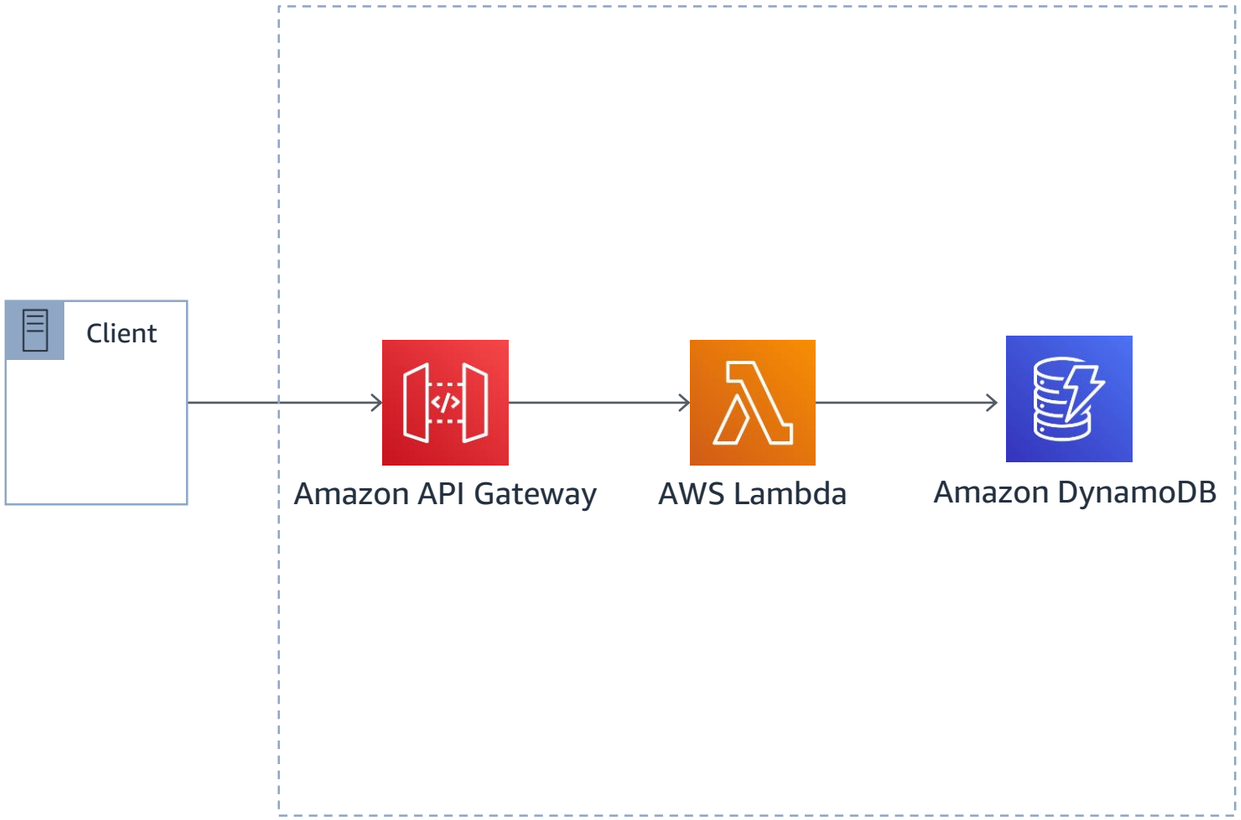
API Gateway pattern *(RESTful)*



OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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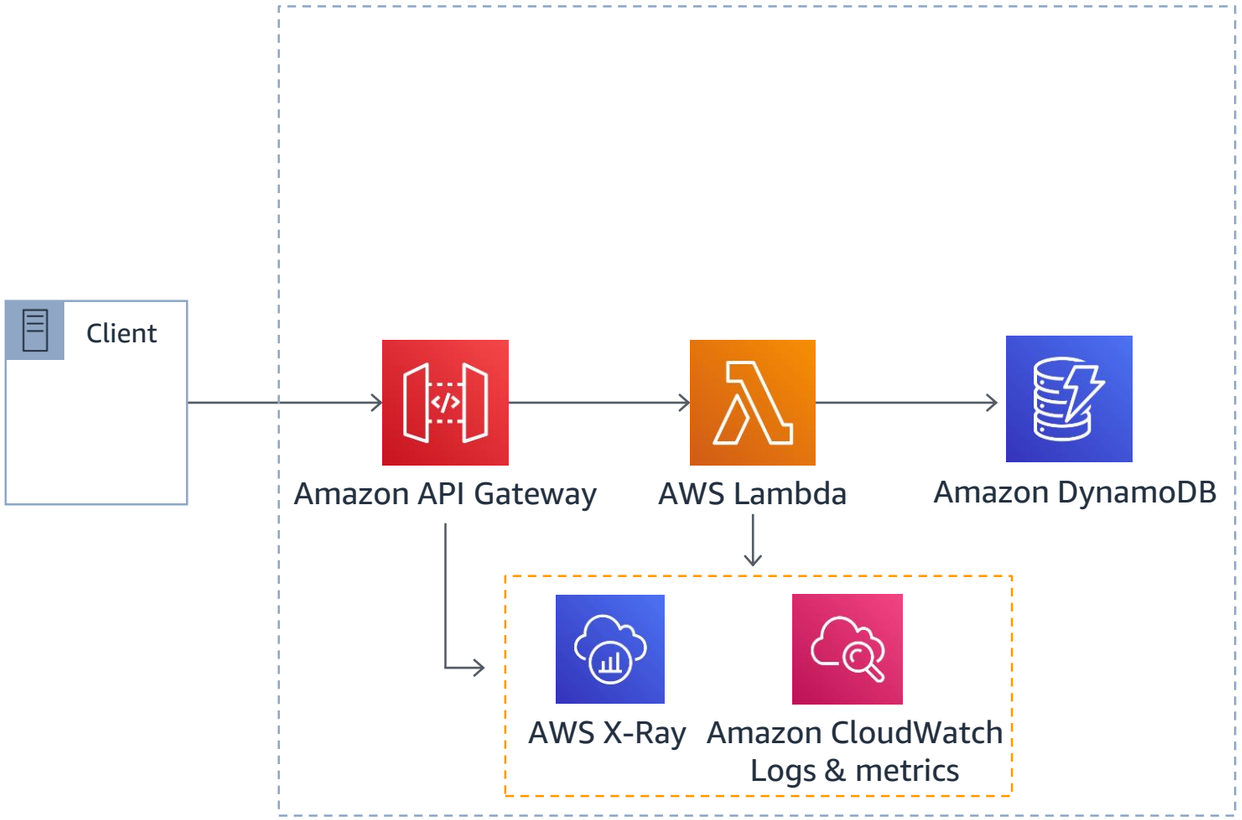

Best practices

- Enable access logs, structure logs and instrument your code
- Create metrics async with CloudWatch Embedded Metric Format

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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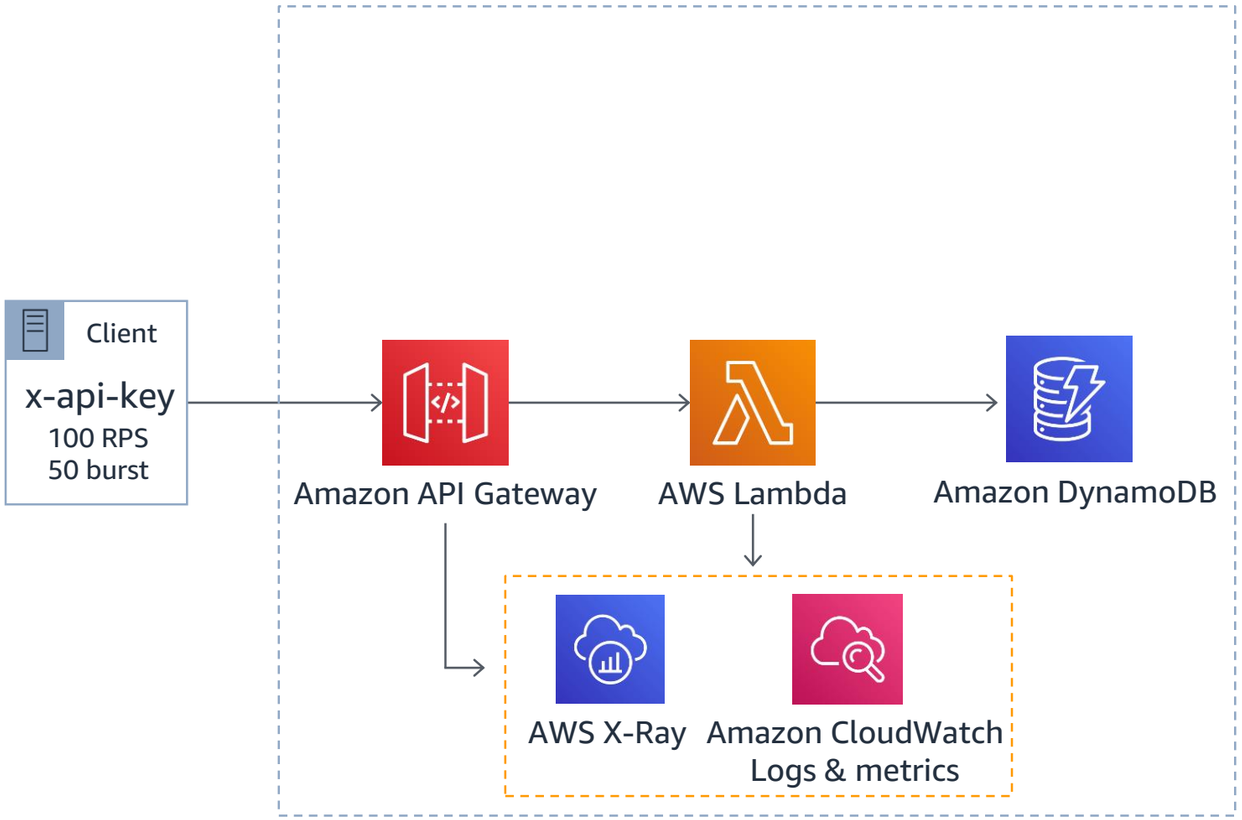

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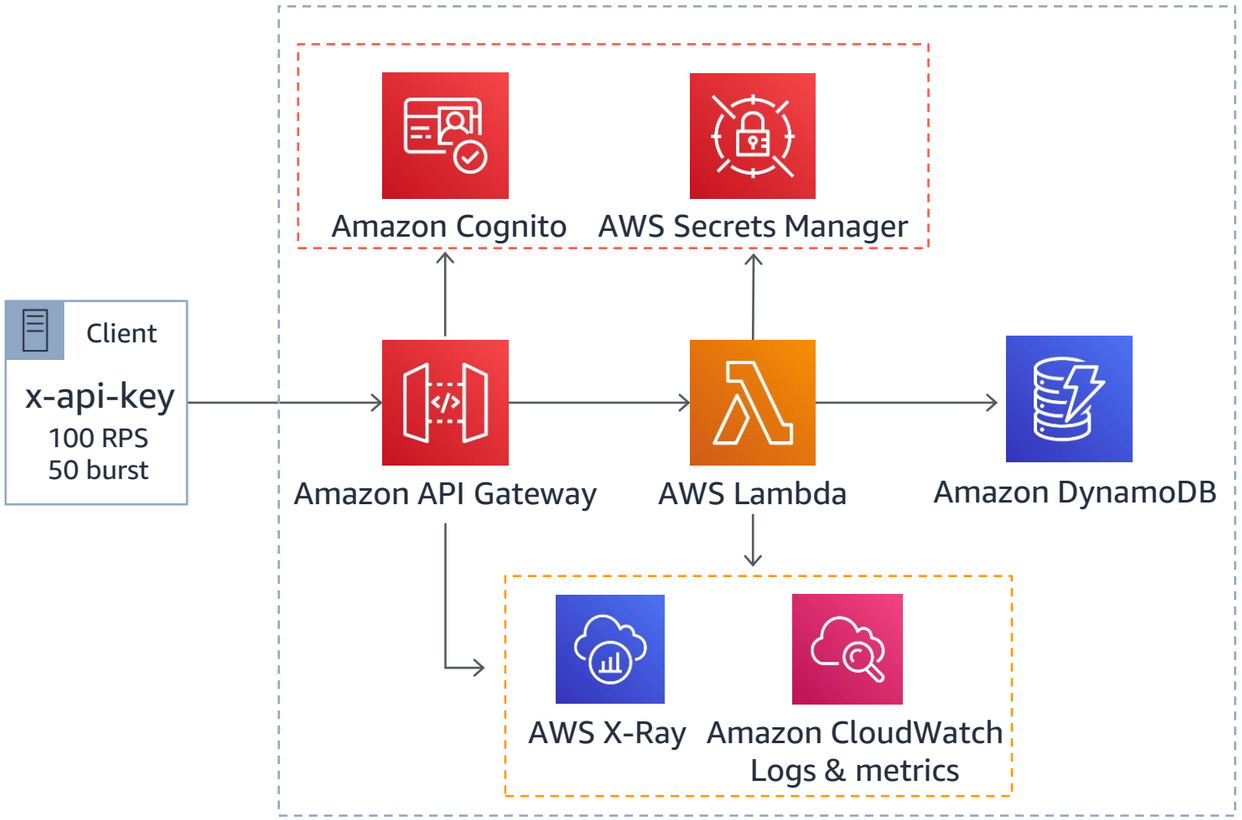

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- Regulate inbound access rates
- Authorize consumers. Manage secrets with AWS Secrets Manager

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- Regional endpoints HTTP2

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- On-demand tables support up to 40K read/write request units
- Regional endpoints HTTP2
- Use AWS Lambda Power Tuning for perf/cost tuning

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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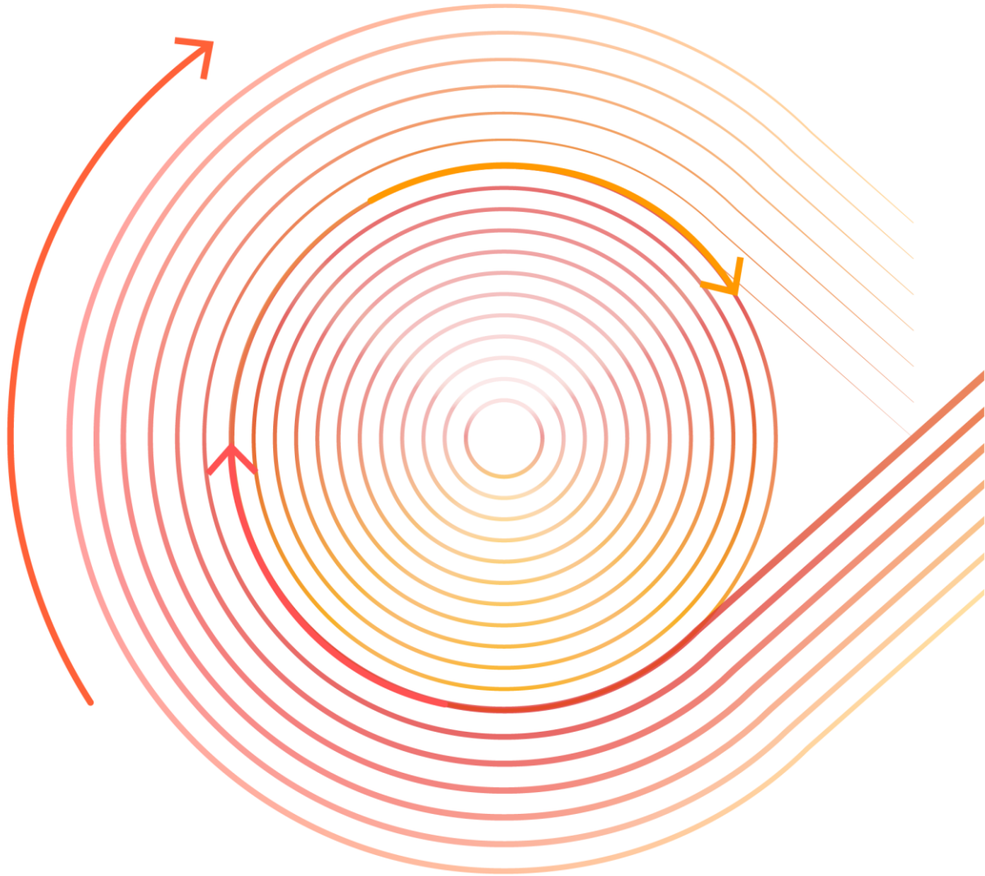
Strangler pattern



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> An alternative route is to gradually create a system around the edges of the old, letting it grow slowly over several years until the old system is strangled

Martin Fowler

Chief Scientist, ThoughtWorks

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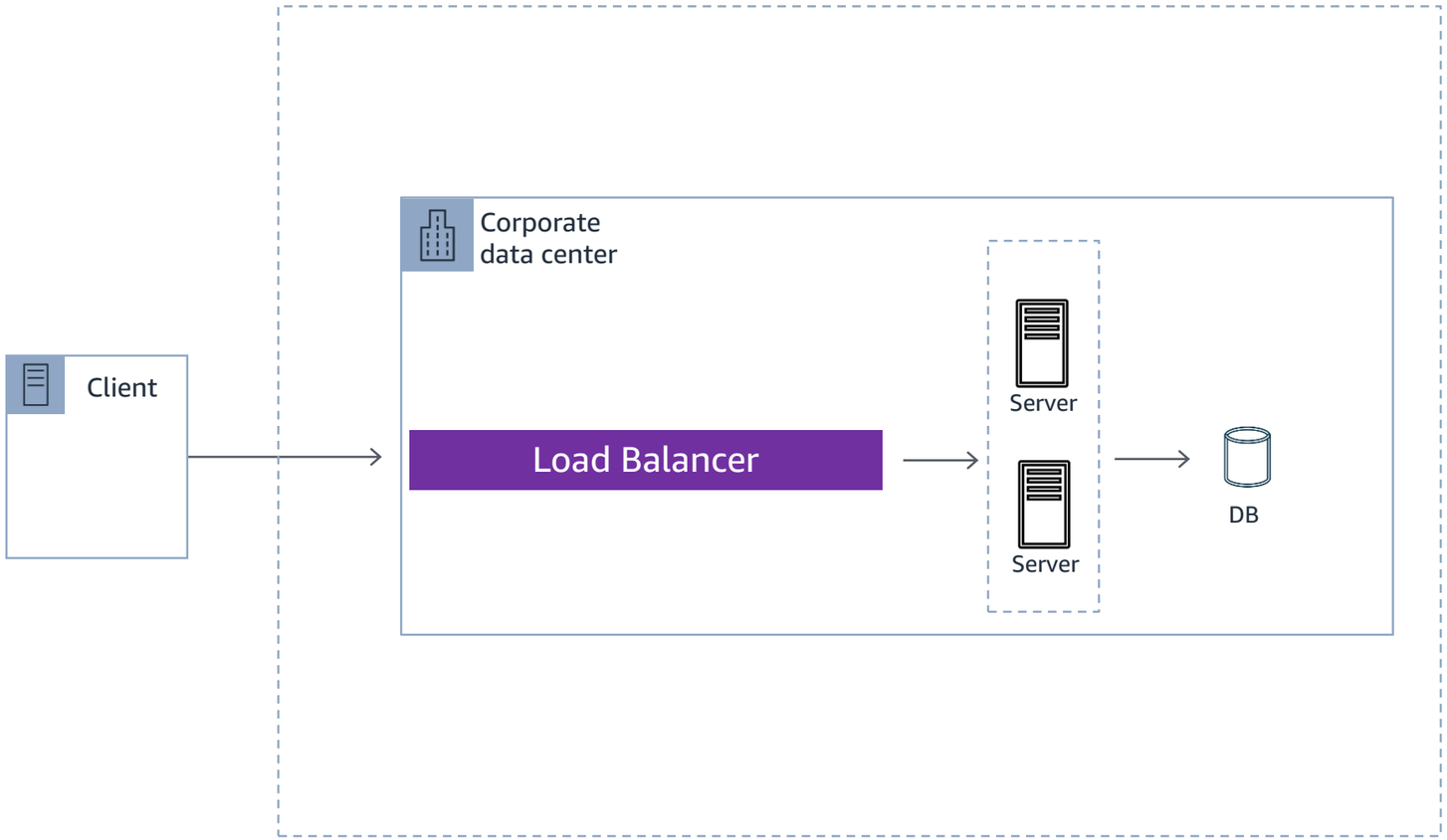
Strangler pattern



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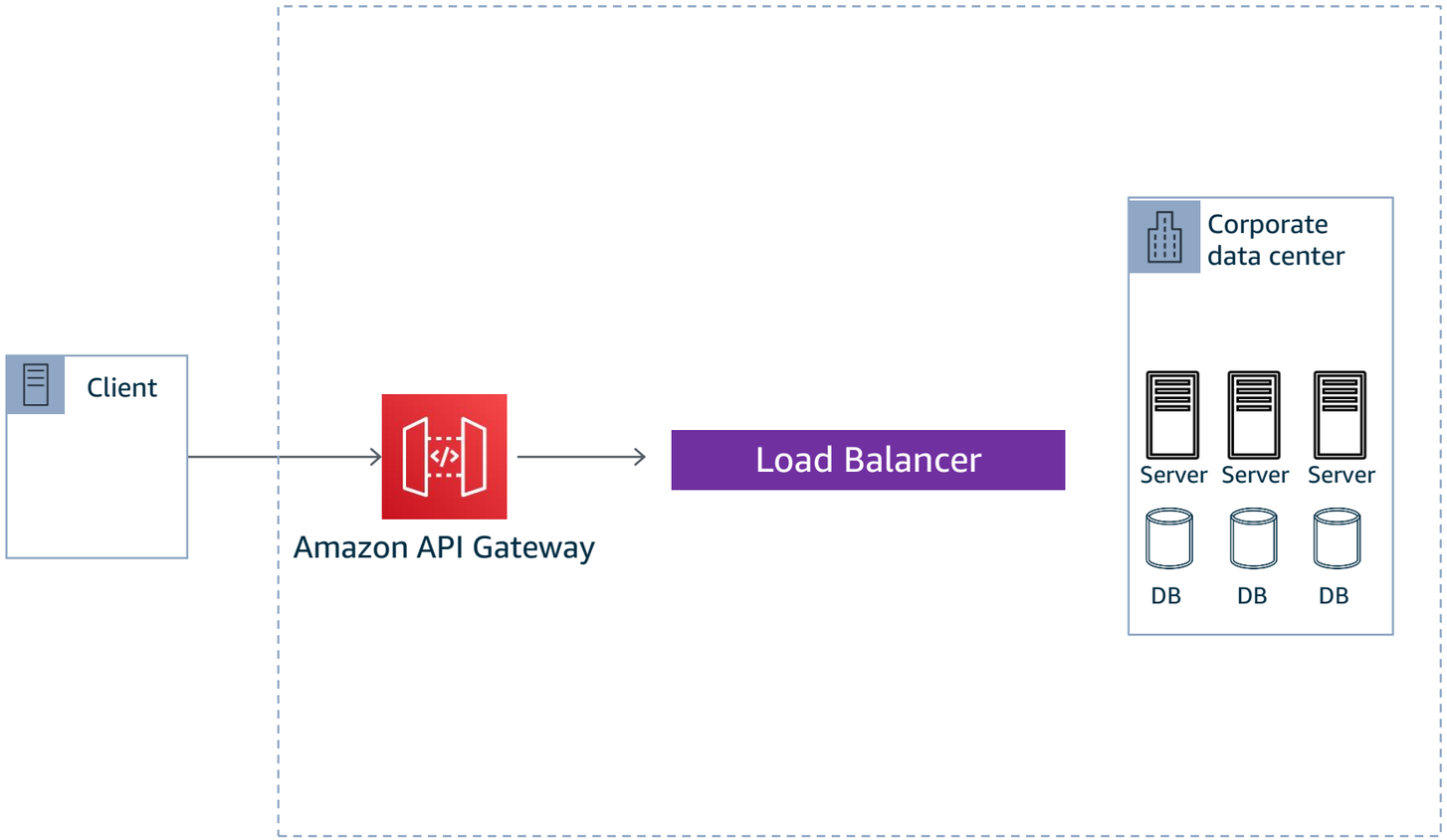

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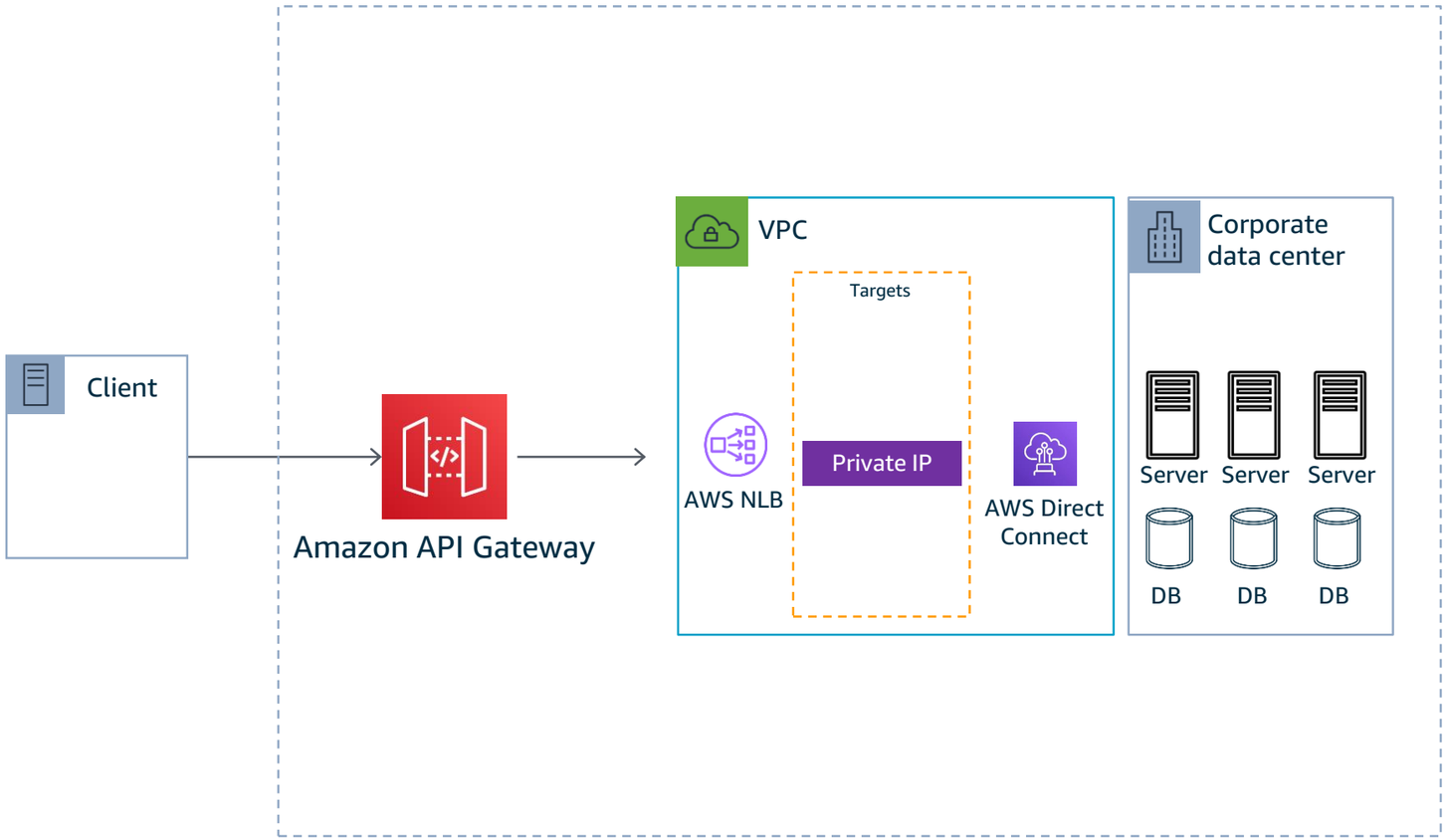

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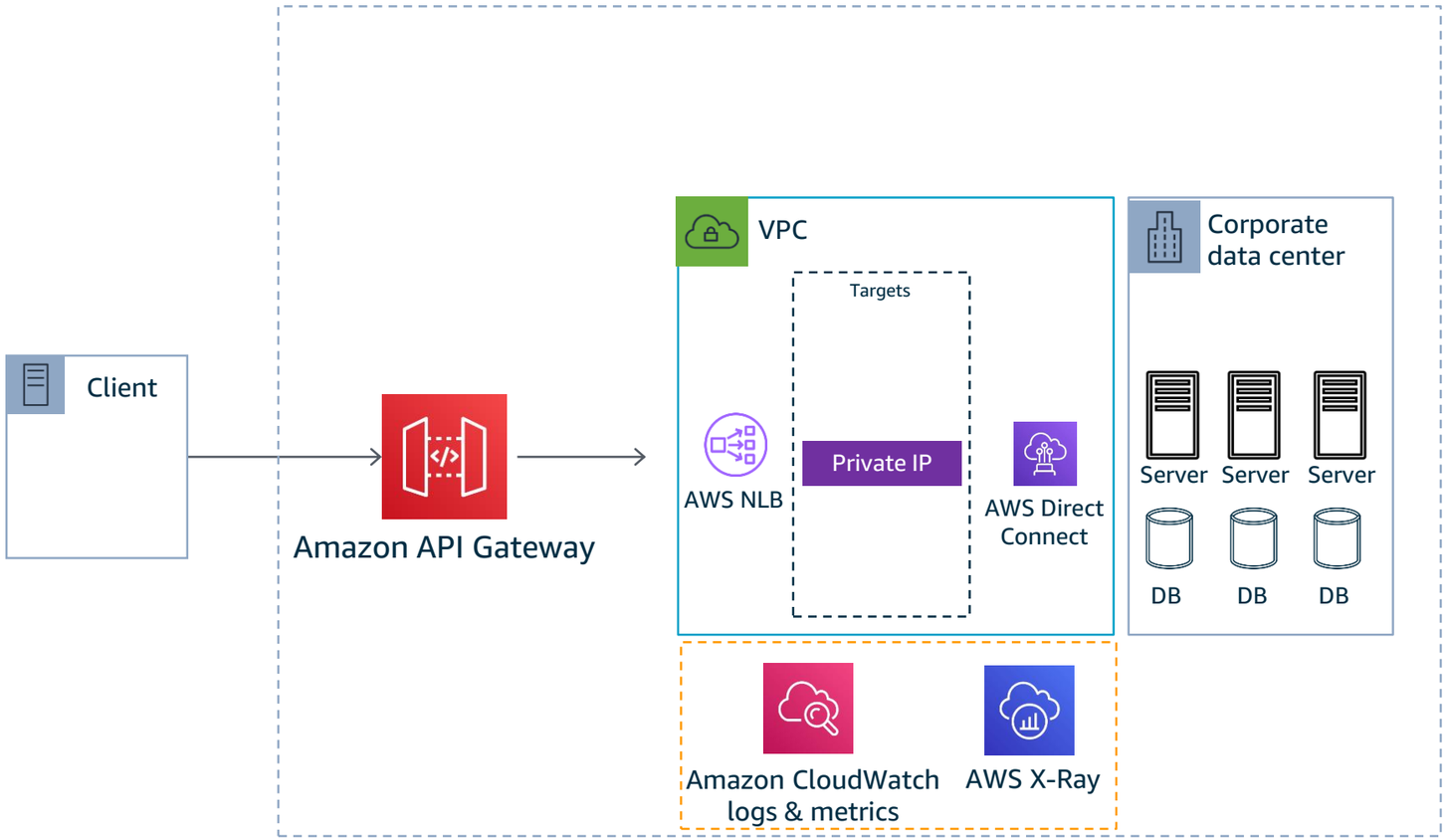

Best practices

- Centralize logs, metrics, and distributing tracing

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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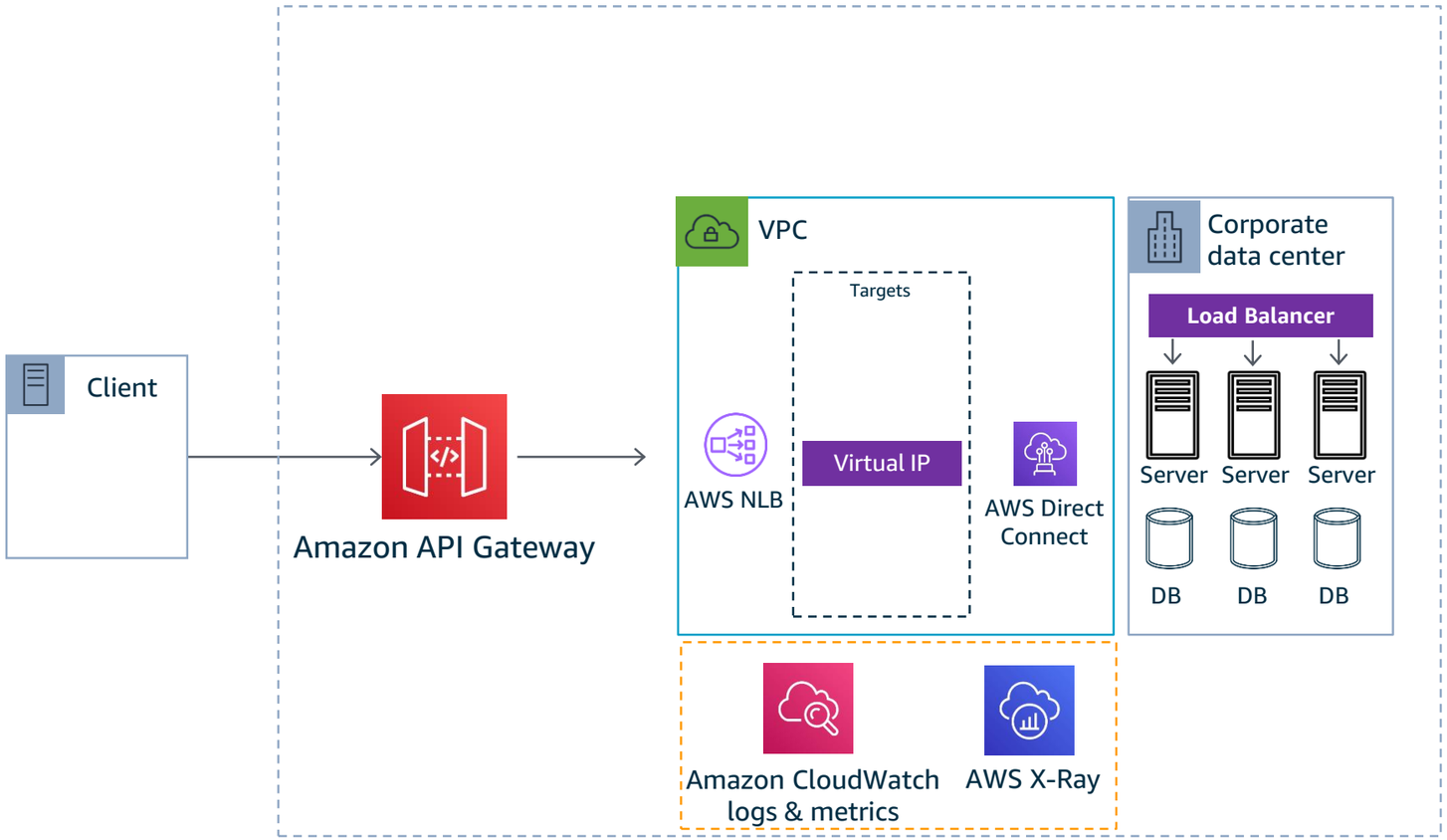

Best practices

- Centralize logs, metrics, and distributing tracing
- Use a corporate Load balancer virtual IP to send traffic to

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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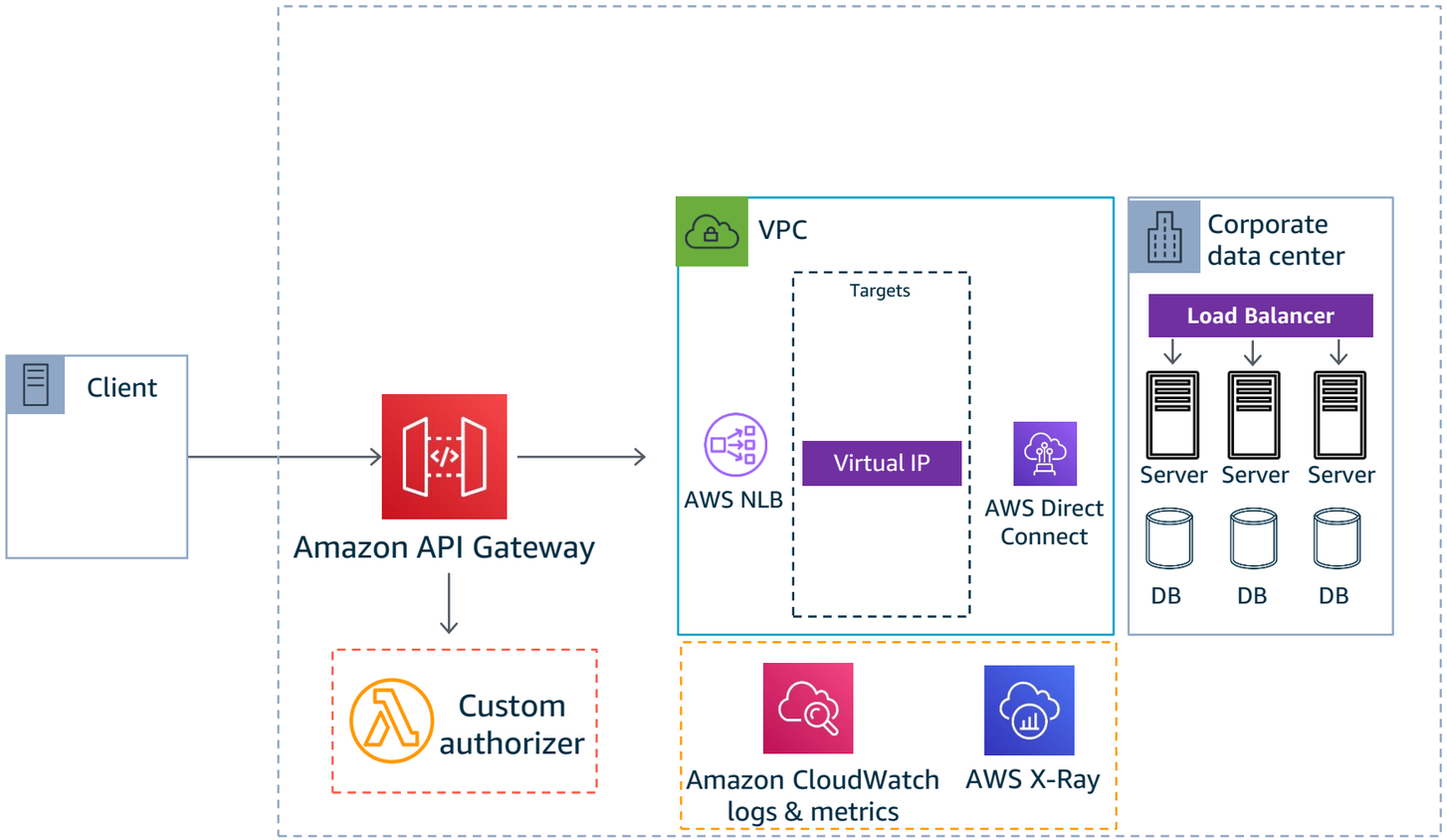
Strangler pattern



Best practices

- Centralize logs, metrics, and distributing tracing
- Use a corporate Load balancer virtual IP to send traffic to
- Enforce authorization

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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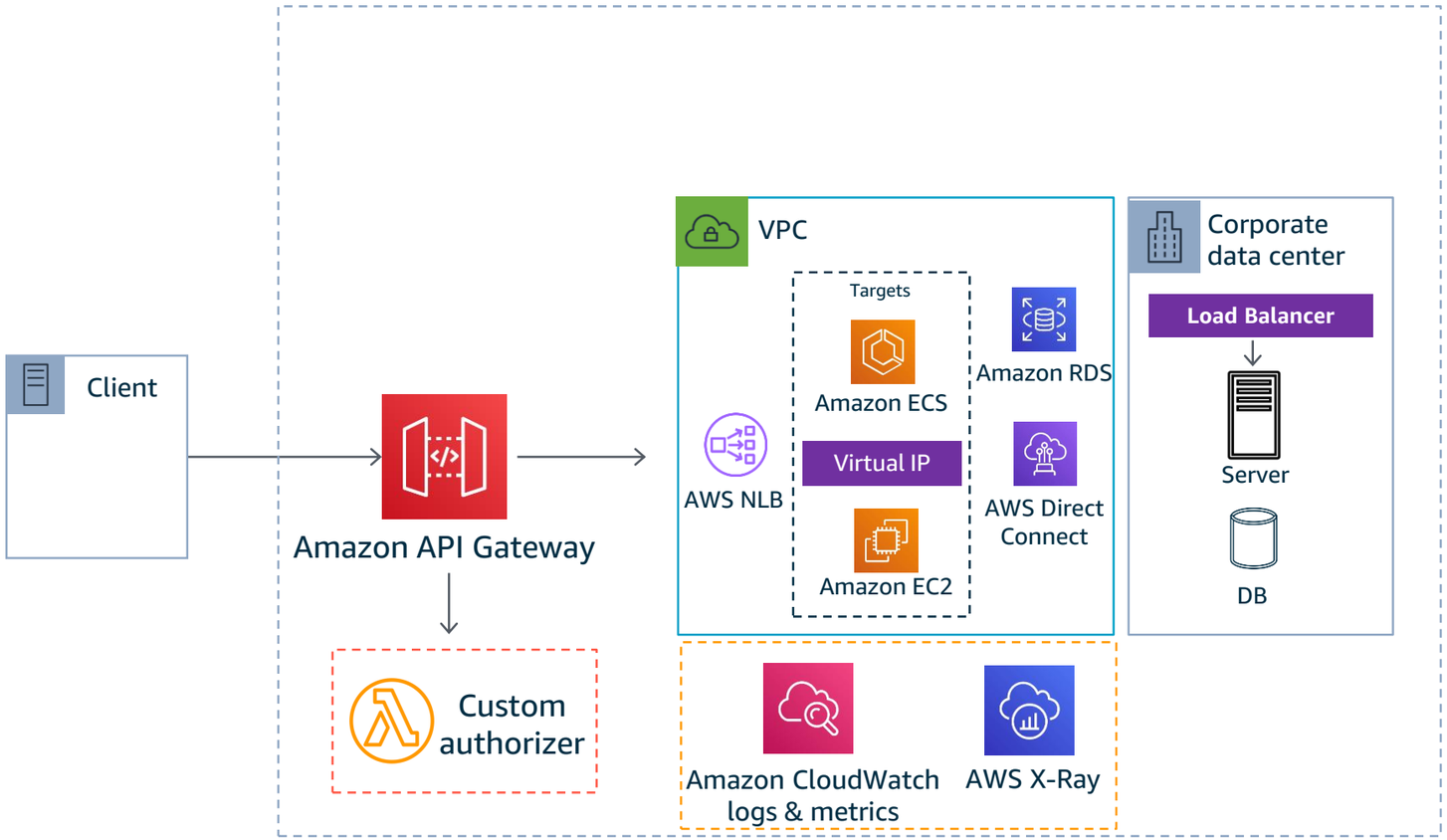
Strangler pattern



Best practices

- Centralize logs, metrics, and distributing tracing
- Use a corporate Load balancer virtual IP to send traffic to
- Enforce authorization
- Gradually shift functionalities to newer compute/database platforms

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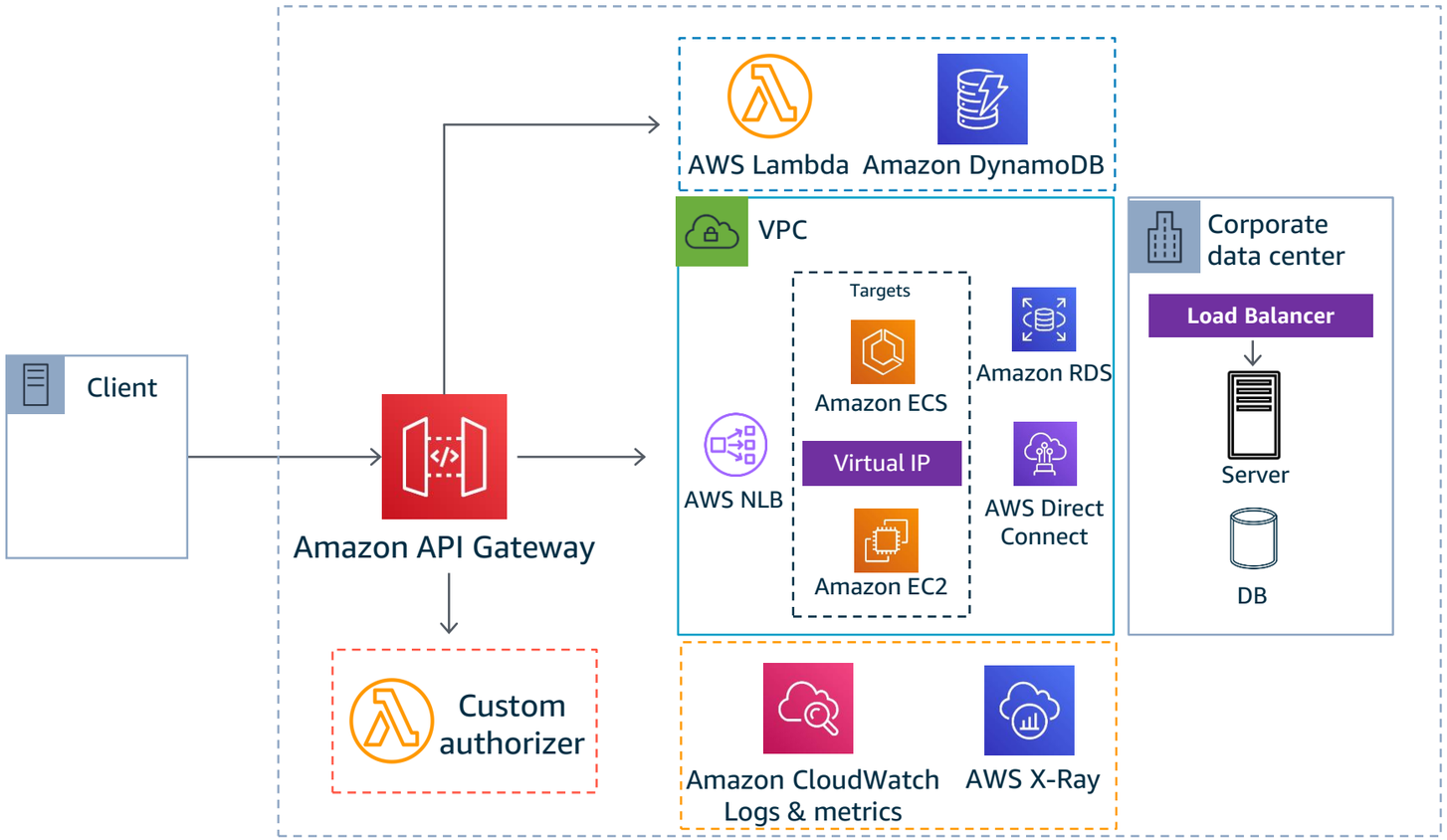

Best practices

- Centralize logs, metrics, and distributing tracing
- Use a corporate Load balancer virtual IP to send traffic to
- Enforce authorization
- Gradually shift functionalities to newer compute/database platforms
- Use serverless for new functionalities

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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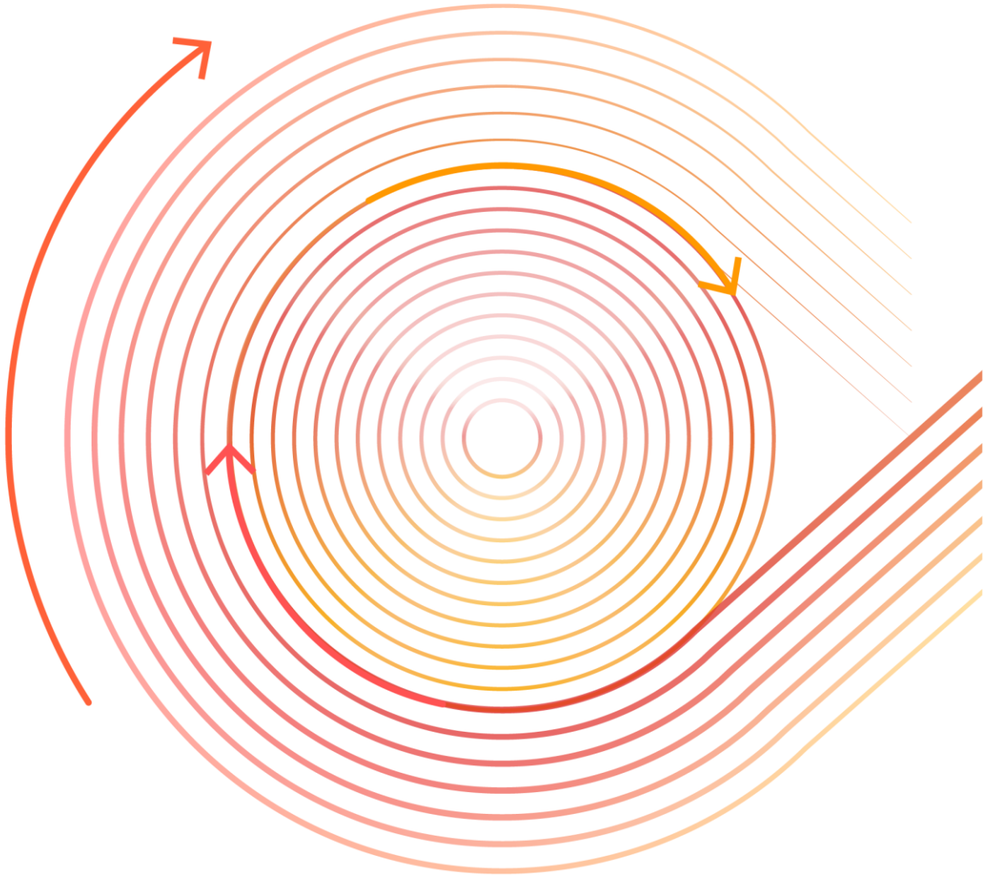
Event Sourcing pattern

(Streaming)



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Event Sourcing (streaming) pattern

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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Event Sourcing (streaming) pattern

Best practices

- Enable source stream record backup

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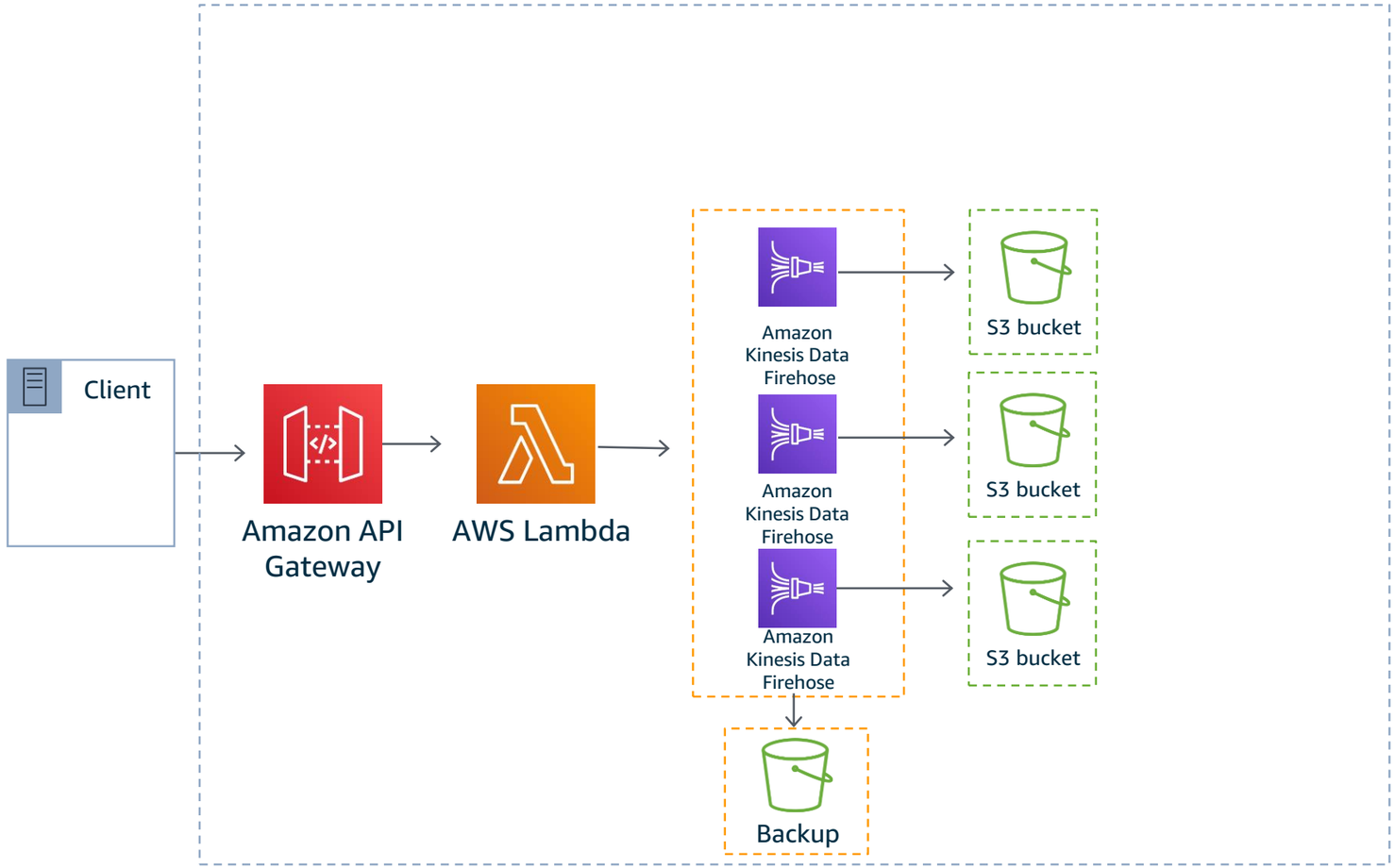

Best practices

- Enable source stream record backup
- Favor dedicated Data Firehose per context/domain

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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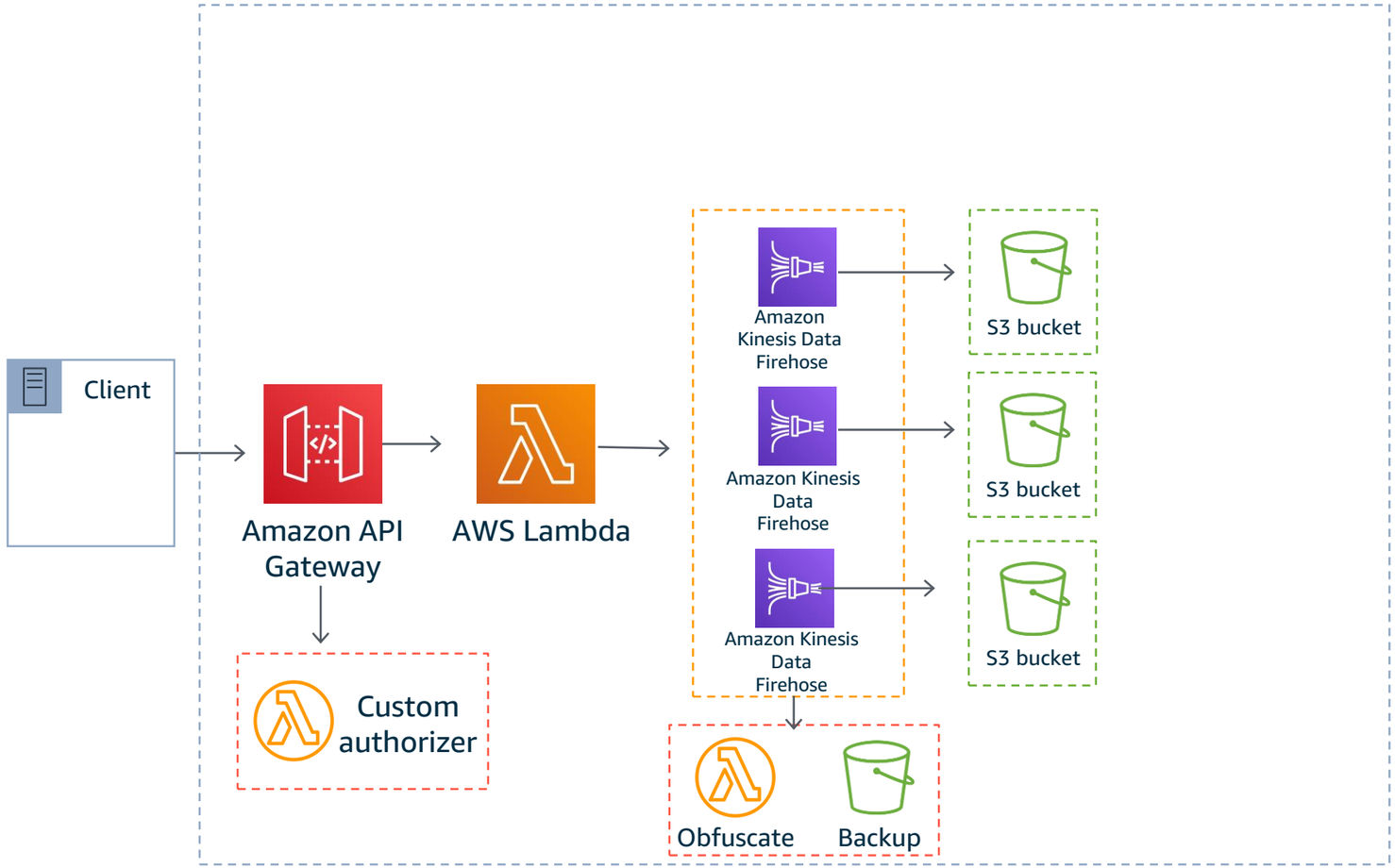

Best practices

- Enable source stream record backup
- Favor dedicated Data Firehose per context/domain
- Enforce authorization
- Obfuscate/remove sensitive stream data

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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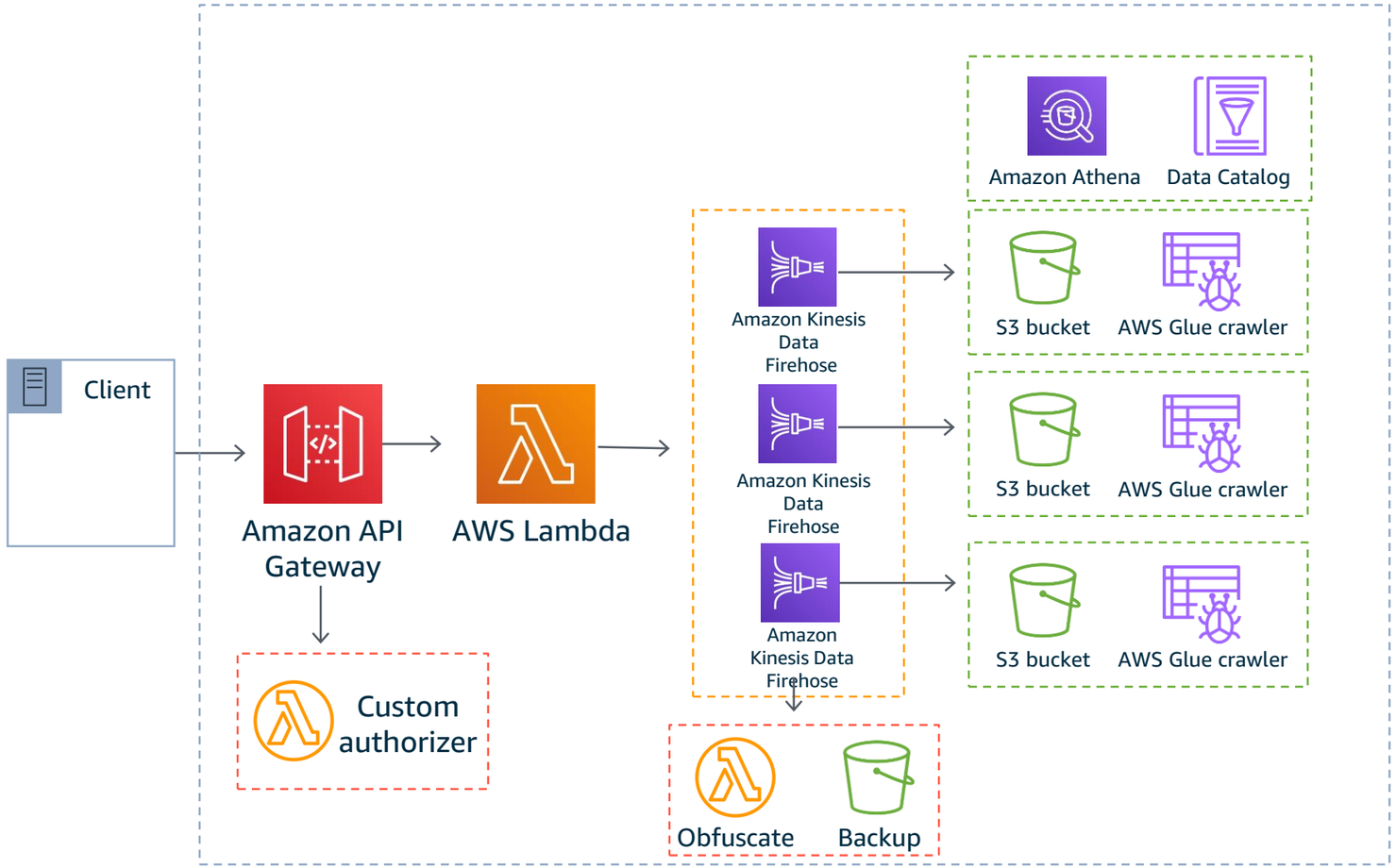

Best practices

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- Favor dedicated Data Firehose per context/domain
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- Obfuscate/remove sensitive stream data
- Enable Parquet transformation. Use Glue to discover data schema and Amazon Athena to query

OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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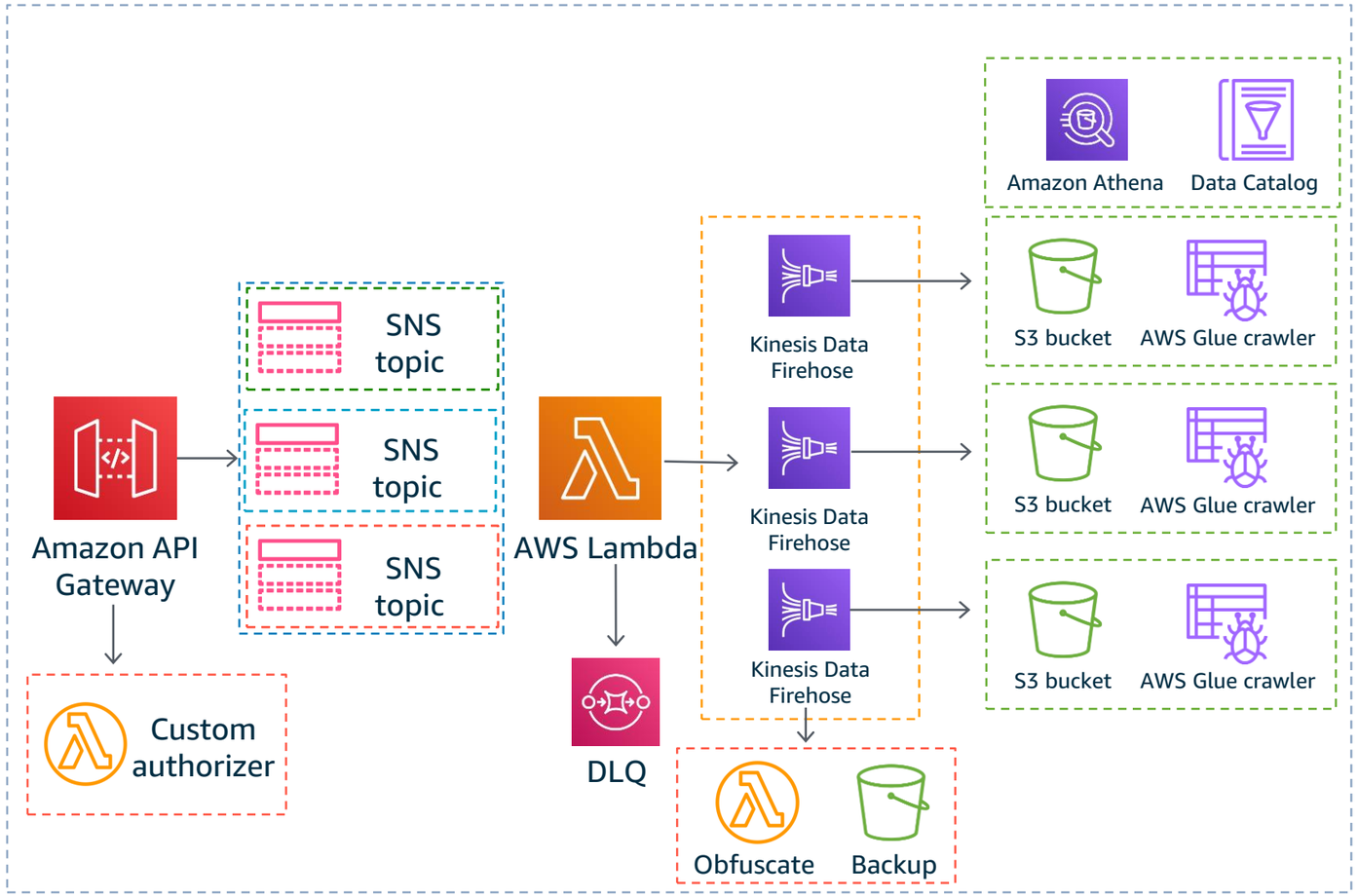
Event Sourcing (streaming) pattern



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OPERATIONS | RELIABLILITY | SECURITY | PERFORMANCE | COST

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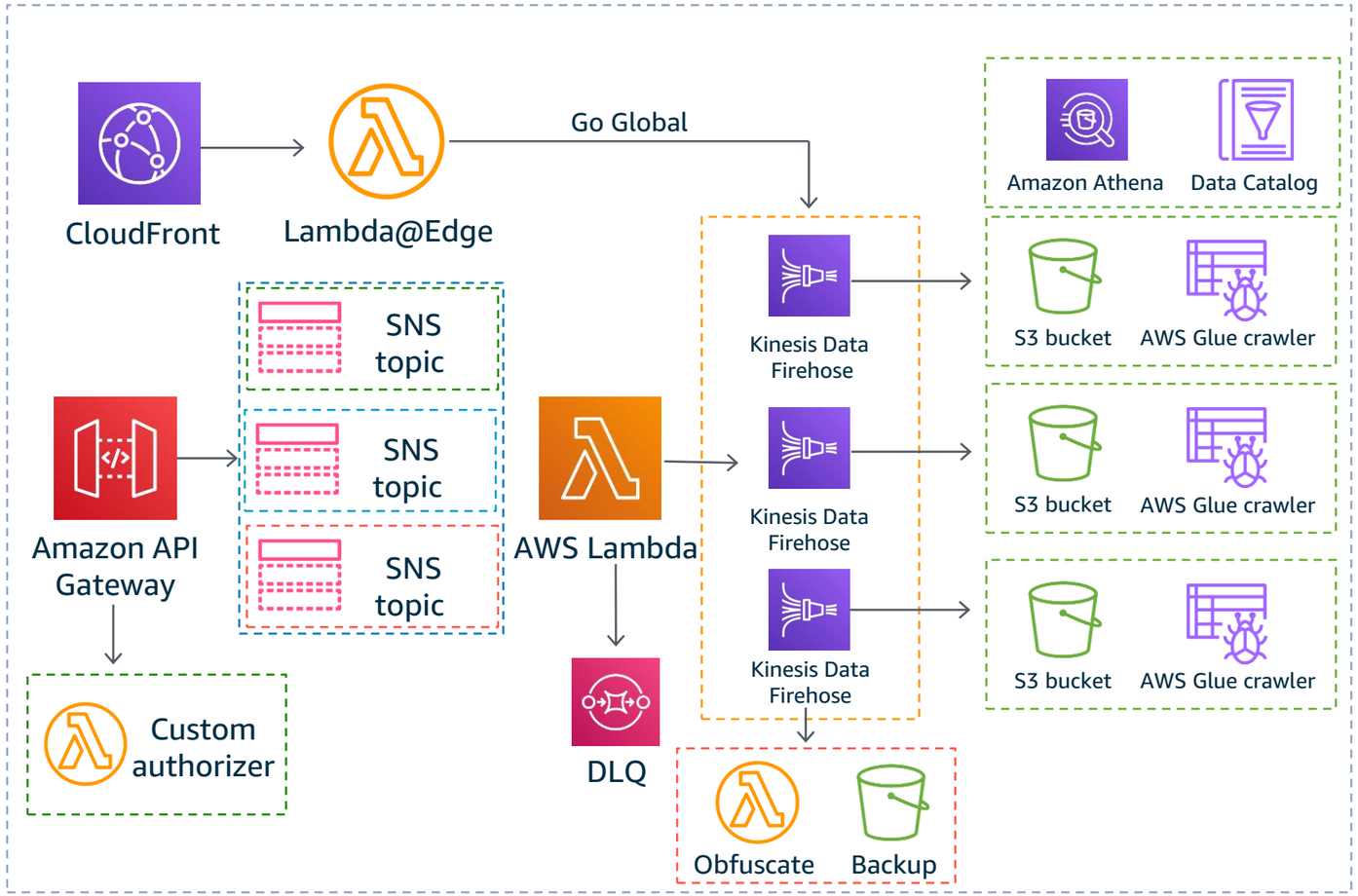

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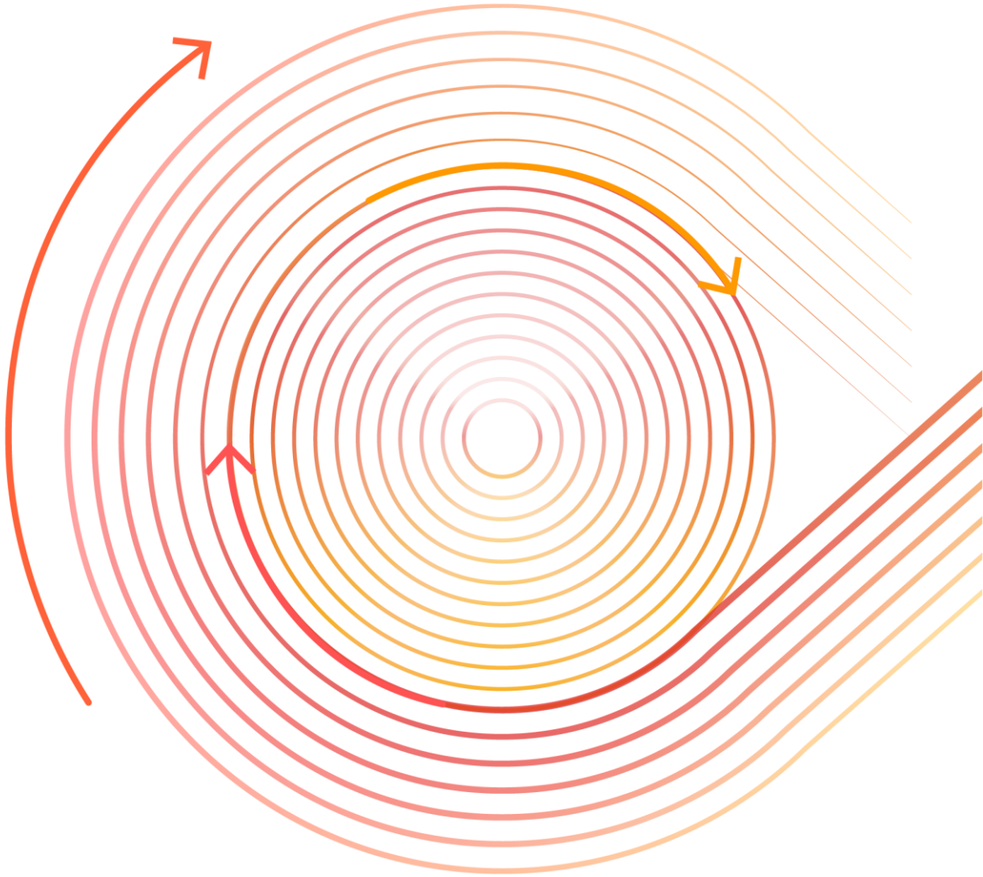
Design pattern aggregation



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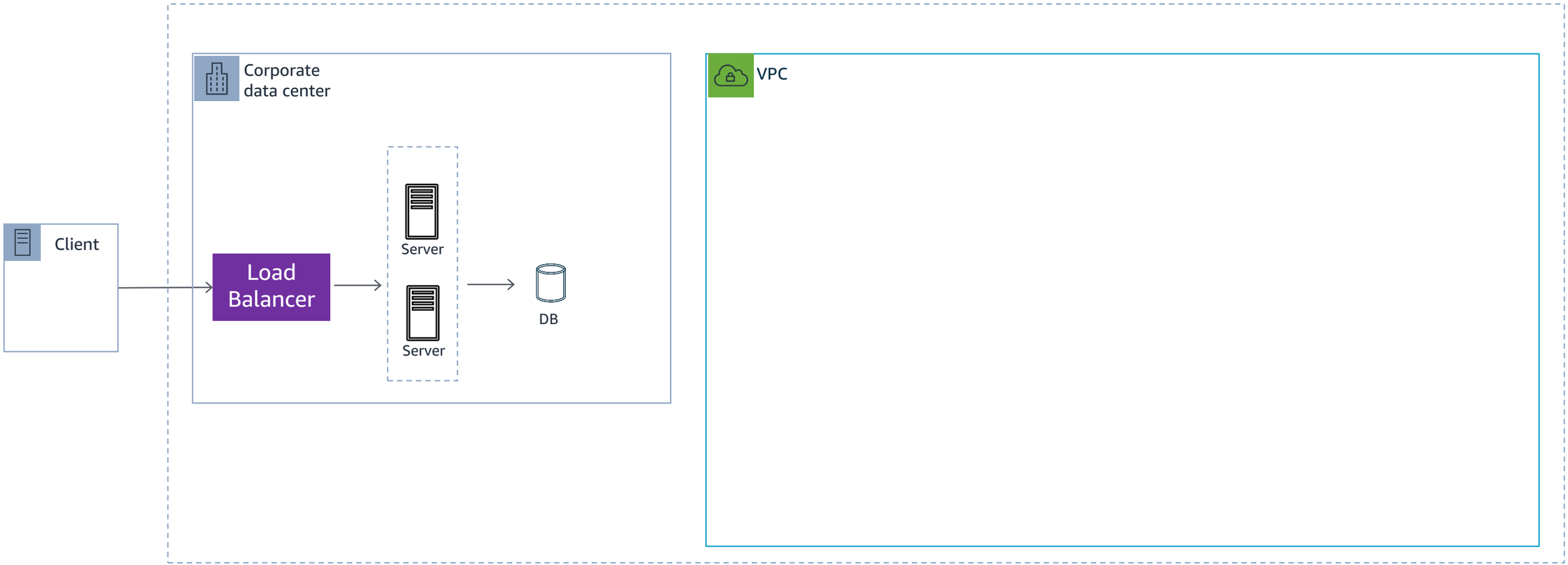
Data migration



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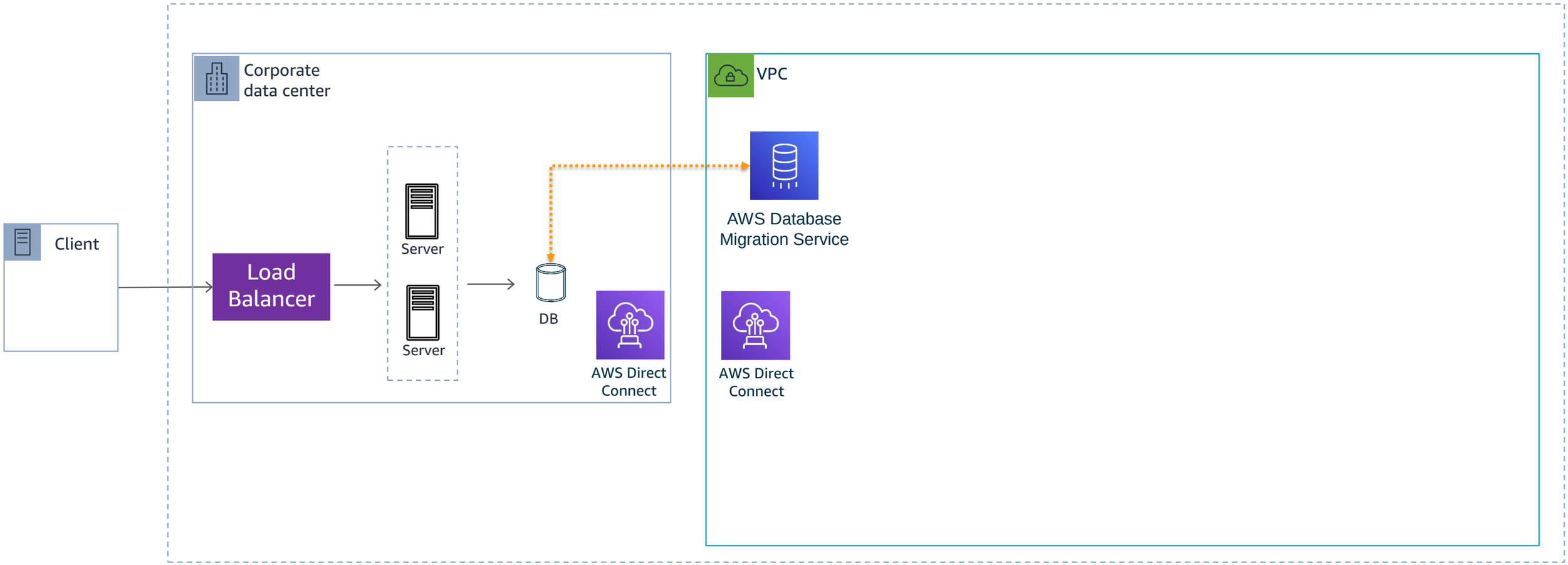
Data migration



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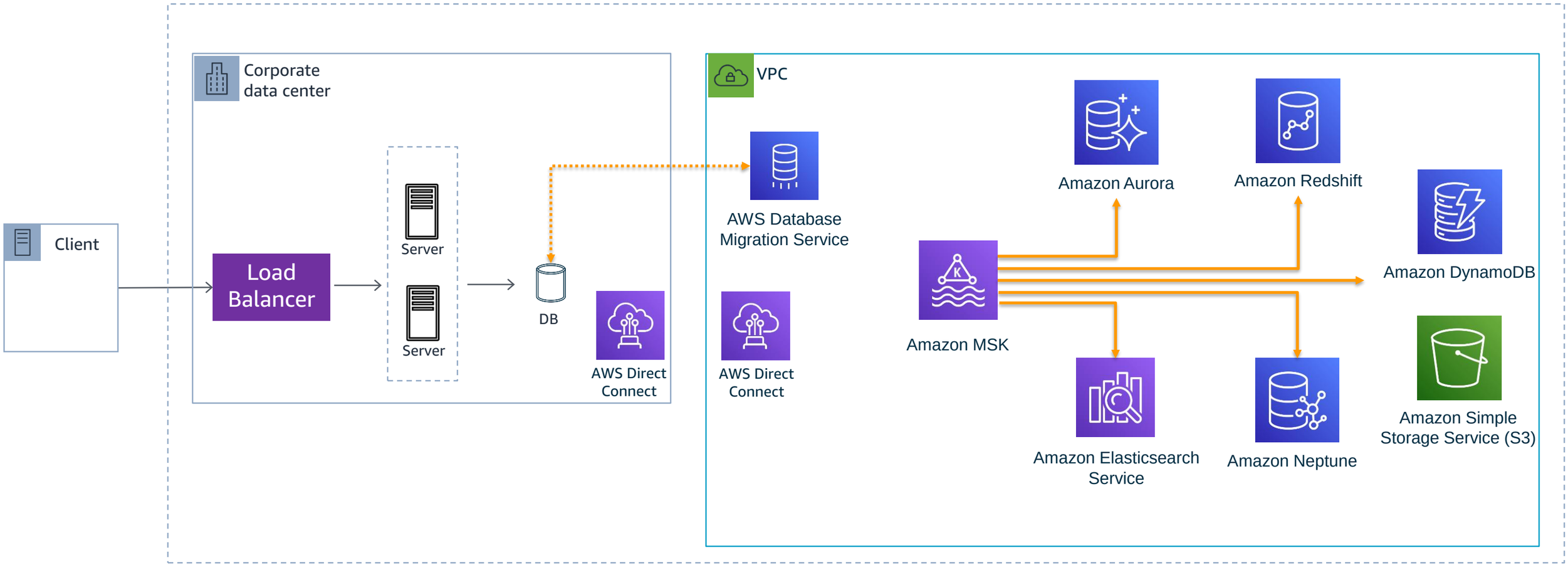
Data migration and modern application transformation

Event Sourcing with Fan-Out pattern



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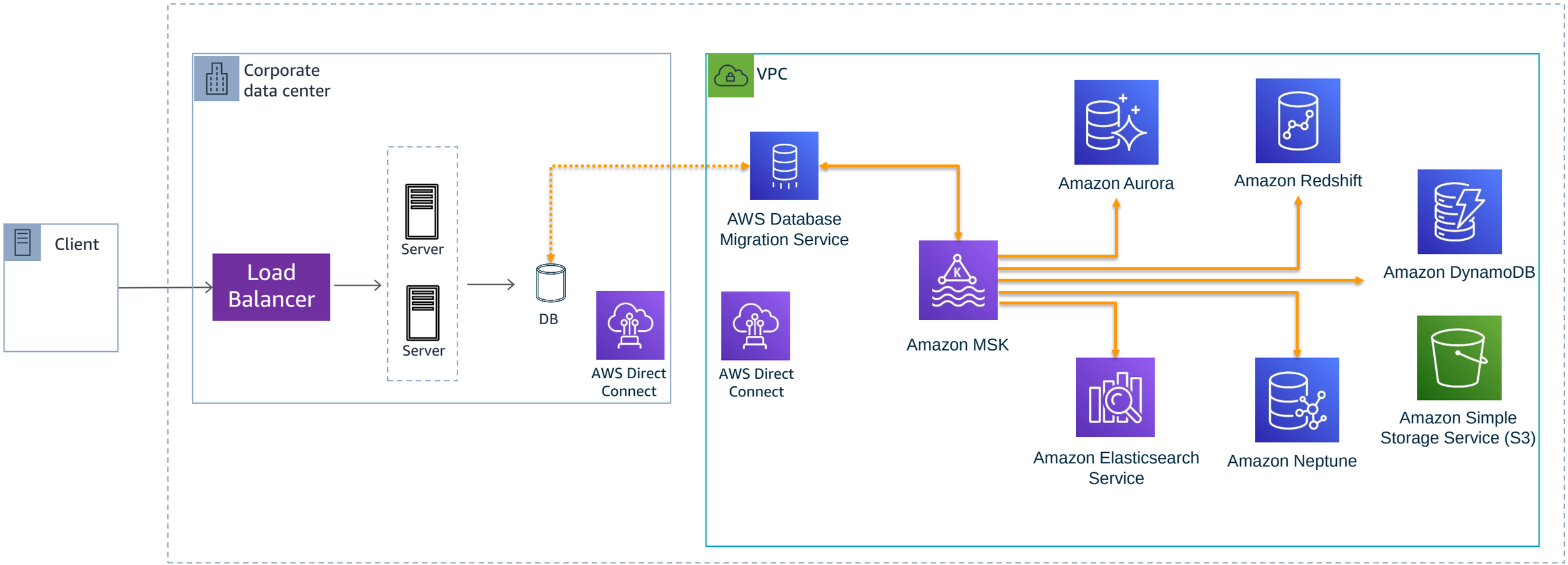
Data migration and modern application transformation

Event Sourcing with Fan-Out pattern + Strangler pattern



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Summary

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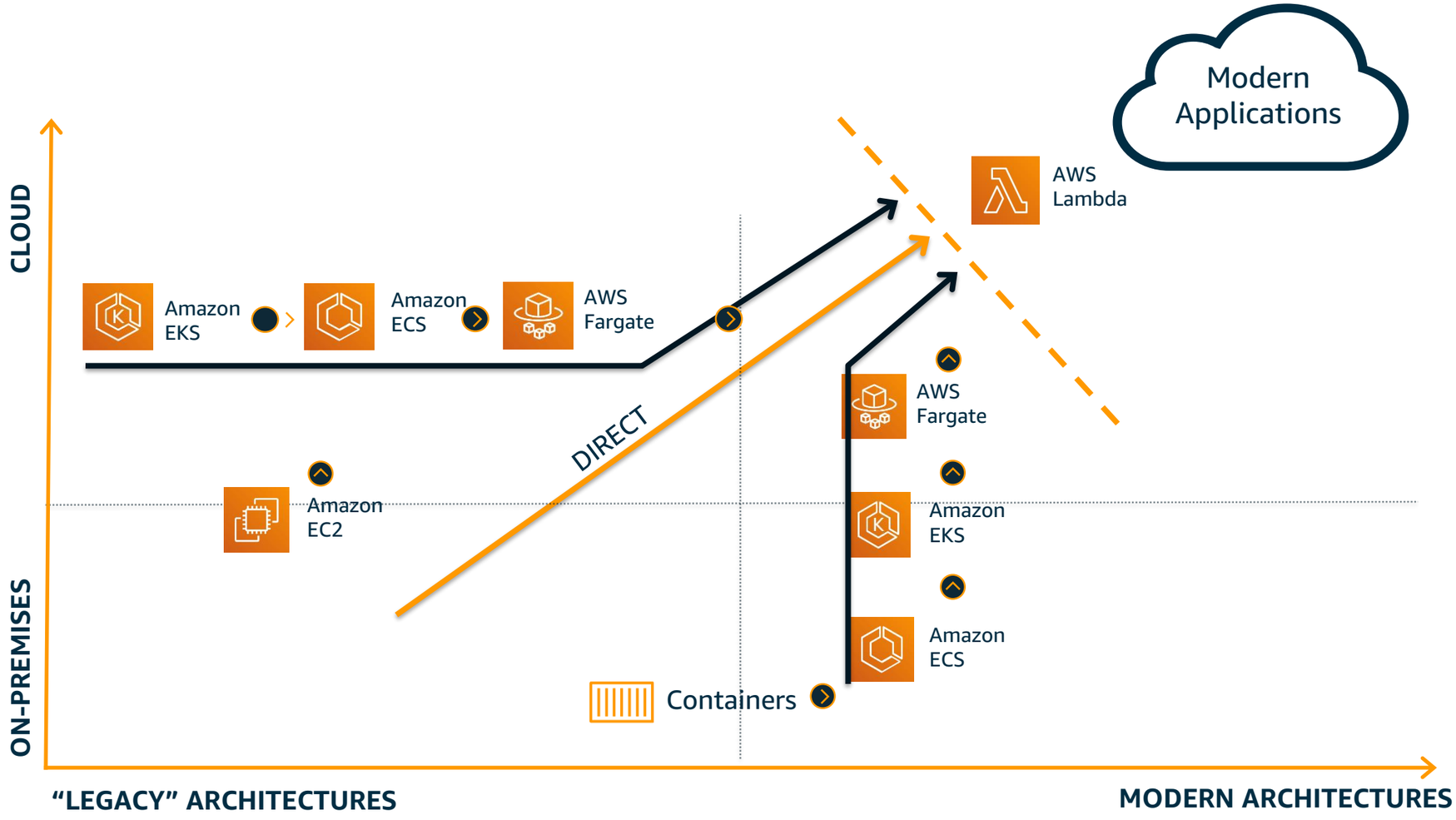
Many paths to modern applications



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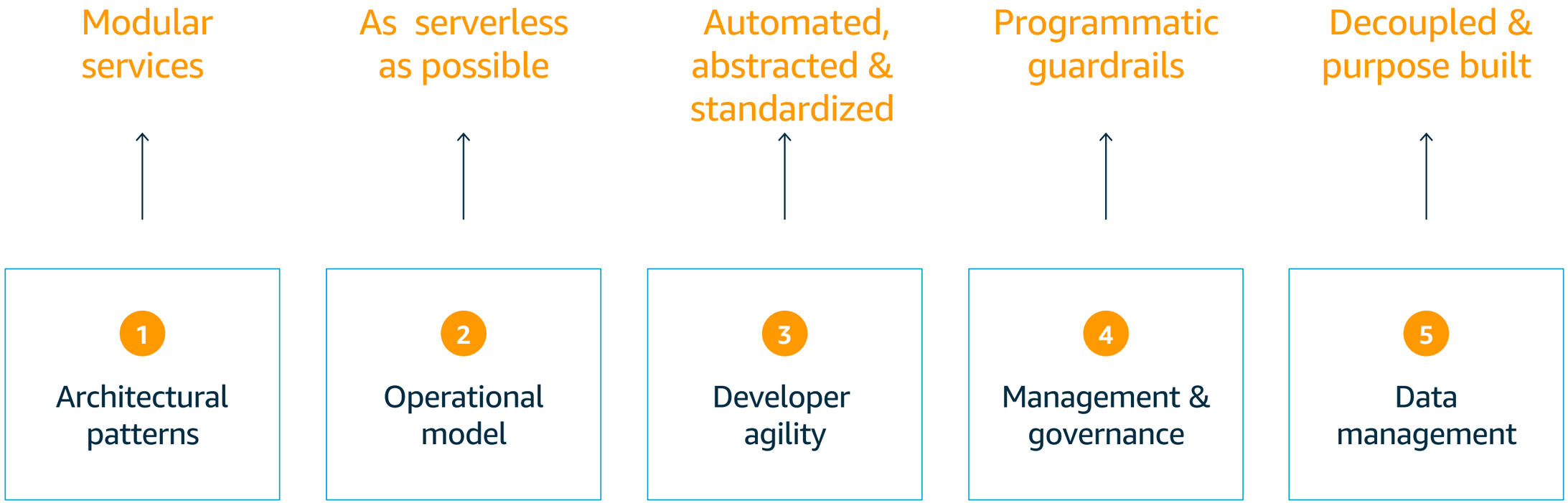
What is the best way to build a modern application ?



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Whitepaper

Whitepaper: Modern Application Development on AWS : Cloud-native Modern Development and Design Patterns on AWS

https://d1.awsstatic.com/whitepapers/modern-application-development-on-aws.pdf

Event driven architectures

https://rebrand.ly/mospvqd

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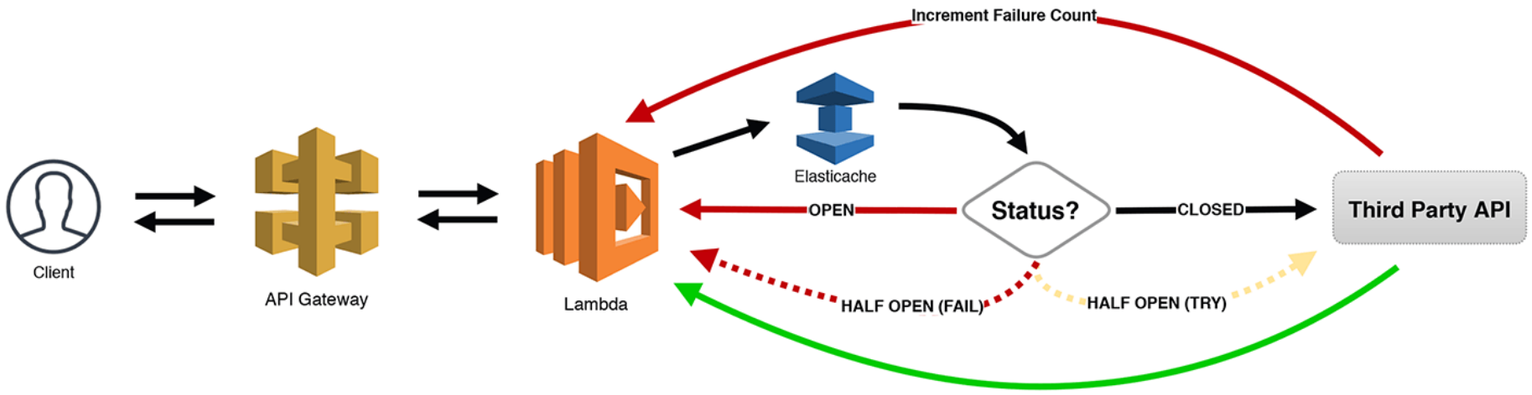
Circuit Breaker and many more by Jeremy Daly



Circuit Breaker and many more by Jeremy Daly

https://www.jeremydaly.com/serverless-microservice-patterns-for-aws/

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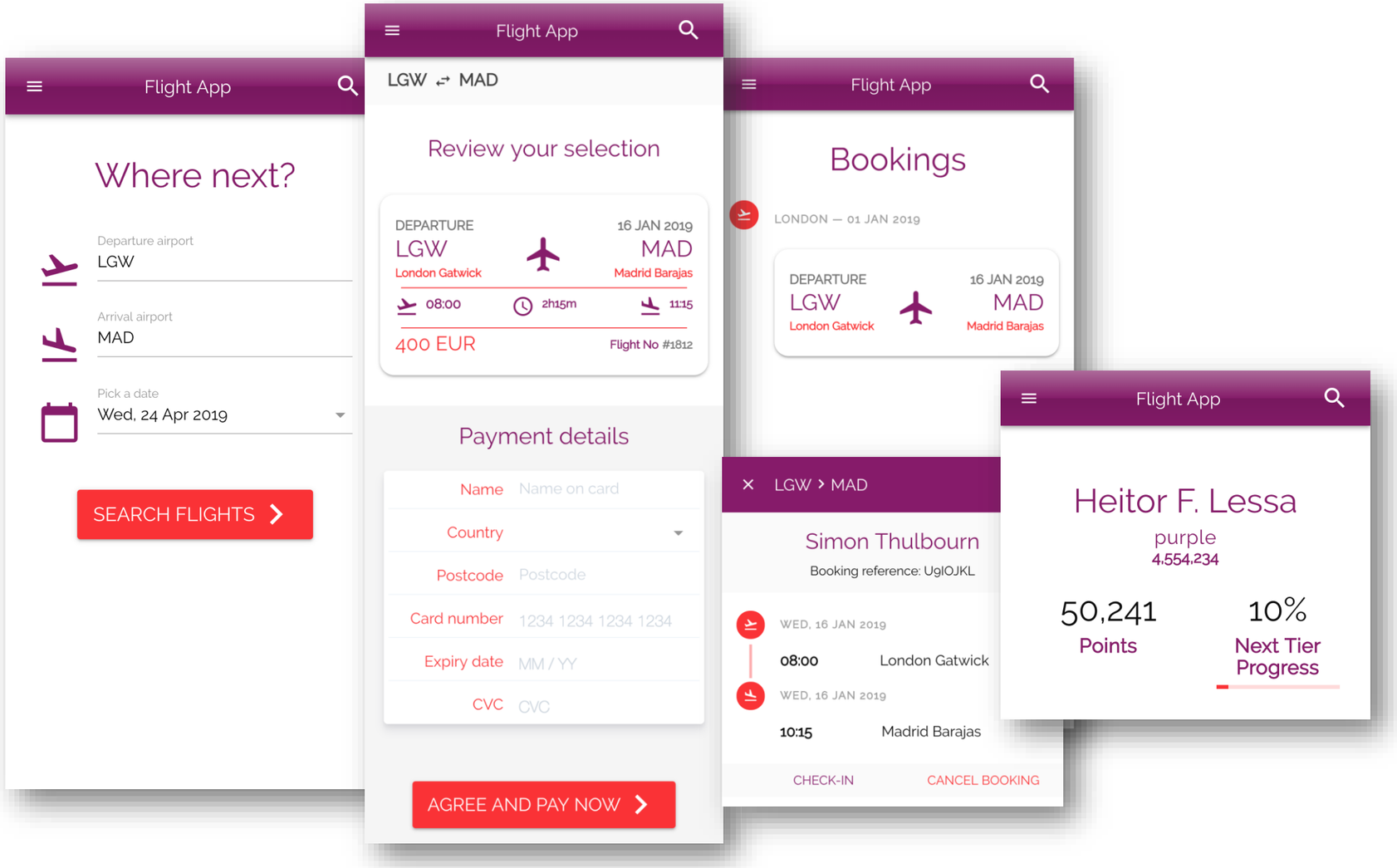
Serverless airline – Multiple patterns/practices



https://github.com/aws-samples/aws-serverless-airline-booking

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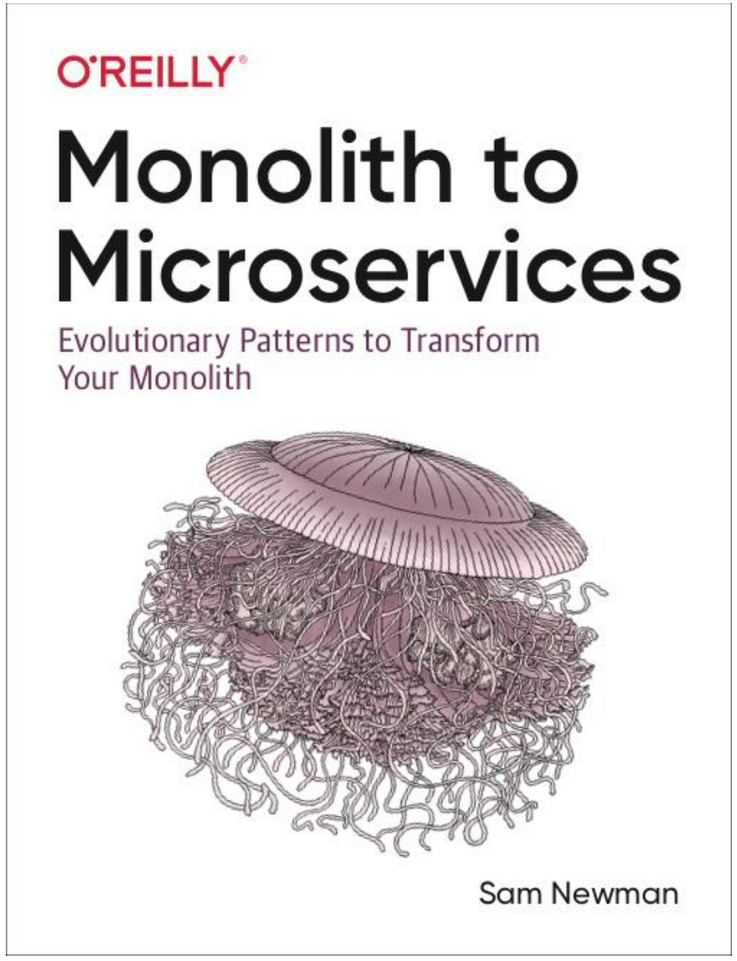
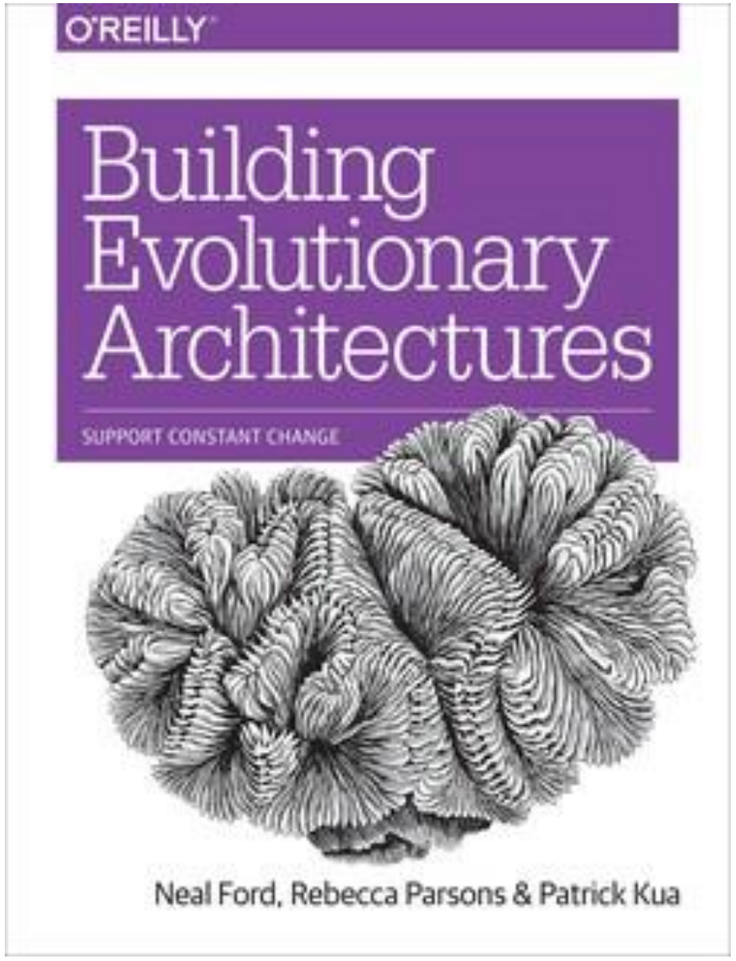
Reference books



https://samnewman.io/books/monolith-to-microservices/



https://www.thoughtworks.com/books/building-evolutionary-architectures

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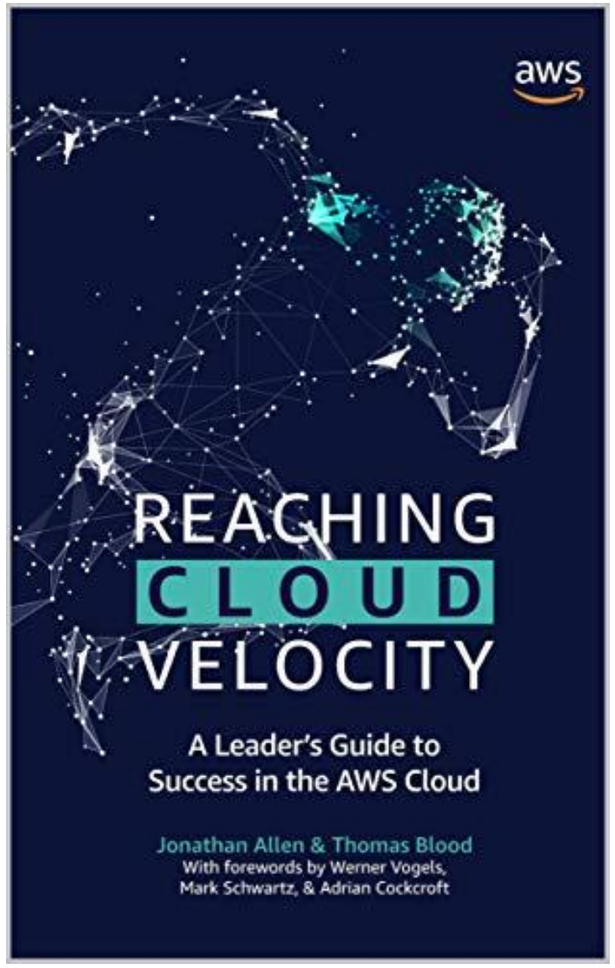
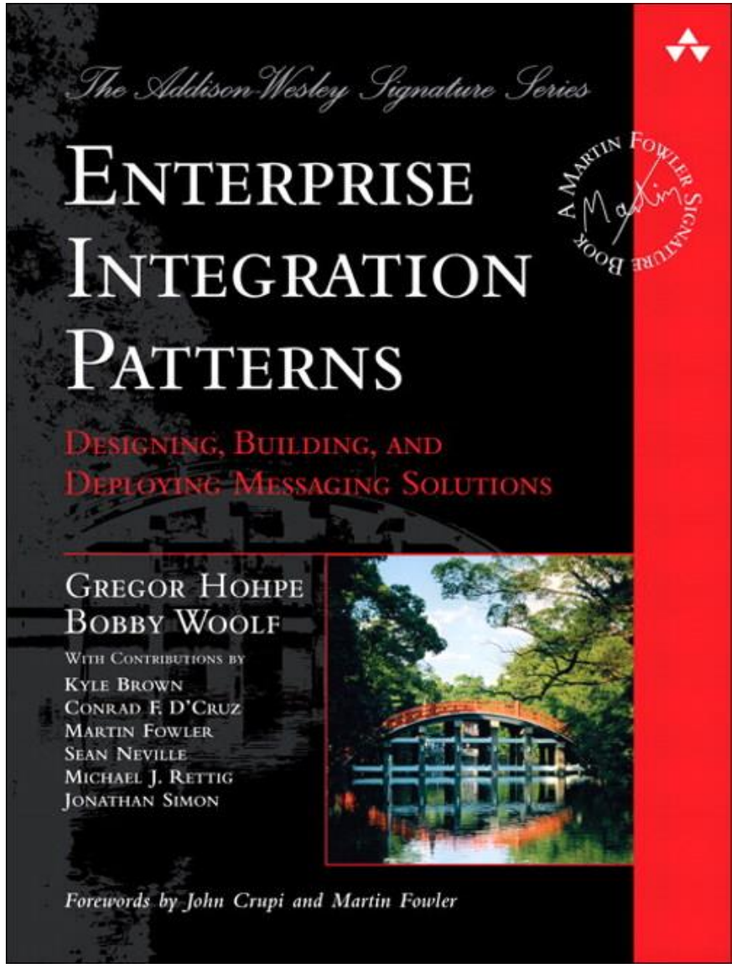
Reference books



https://www.amazon.com/dp/B086VDRTC2



https://www.martinfowler.com/books/eip.html

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[1] 451 Research, *Demystifying Cloud Transformation: Where Enterprises Should Start,* September 2019.

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