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Cloud Native Architecture

Reshmi Krishna

Cloud Native Architecture

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Cloud Native Architecture

- Cloud Computing
- New Demands
- Being Reactive
- Speed & Safety

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Cloud Native Architecture

- Cloud Computing
- New Demands
- Being Reactive
- Speed & Safety

- Reactive Design
- 12 Factor Apps
- Microservices
- Design Patterns

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- Reactive Design
- 12 Factor Apps
- Microservices
- Design Patterns

- Tools
- Platform
- Process and Culture

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Cloud Native Architecture

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Cloud Defined

- Cloud Computing
- Cloud Native Applications
- Cloud Native Application Architecture

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Cloud-Era Demands

- Competitive landscape
- Consumer expectations
- Device Diversity & Ubiquity
- Scale

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Being Reactive

- React to Events
- React to Load
- React to Failure
- React to Users

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Speed & Safety

- Design for quick recovery
- Quick recovery increases risk tolerance
- Risk tolerance enables innovation

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Cloud Native Architecture

- Reactive Design
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- Design Patterns

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Reactive Design

- React to Events → Event-Driven
- React to Load → Scalable
- React to Failure → Resilient
- React to Users → Responsive

http://www.reactivemanifesto.org

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The Twelve Factor App

I. Codebase
One codebase tracked in revision control, many deploys

II. Dependencies
Explicitly declare and isolate dependencies

III. Config
Store config in the environment

IV. Backing Services
Treat backing services as attached resources

V. Build, release, run
Strictly separate build and run stages

VI. Processes
Execute the app as one or more stateless processes

VII. Port binding
Export services via port binding

VIII. Concurrency
Scale out via the process model

IX. Disposability
Maximize robustness with fast startup and graceful shutdown

X. Dev/prod parity
Keep development, staging, and production as similar as possible

XI. Logs
Treat logs as event streams

XII. Admin processes
Run admin/management tasks as one-off processes

http://12factor.net

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Microservices

If services have to be updated together, they're not loosely coupled!

Loosely coupled service oriented architecture with bounded contexts

- Adrian Cockcroft

If you have to know about surrounding services, you don't have a bounded context

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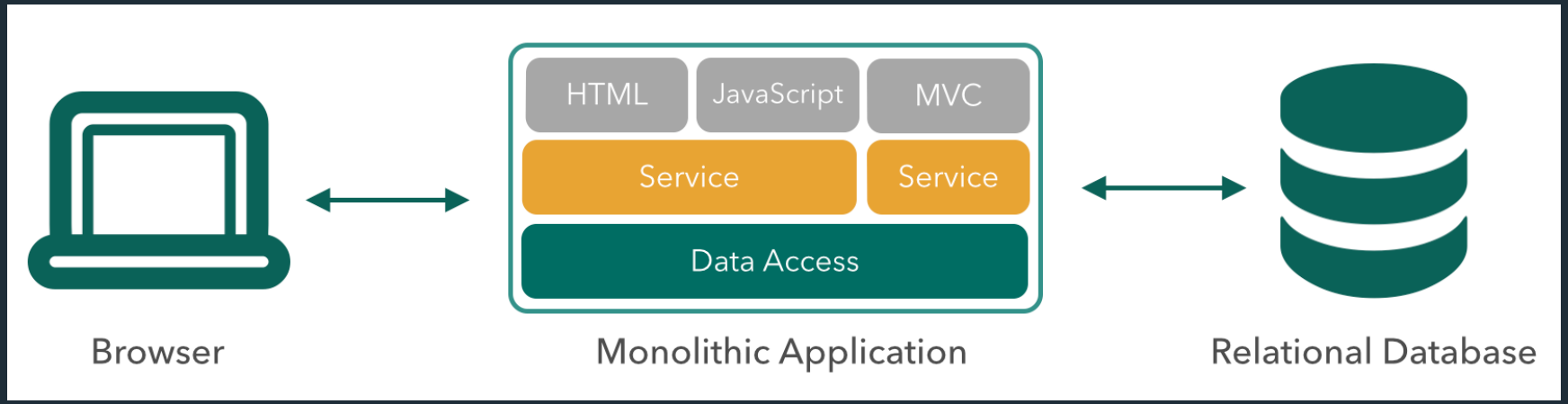
Not Monoliths



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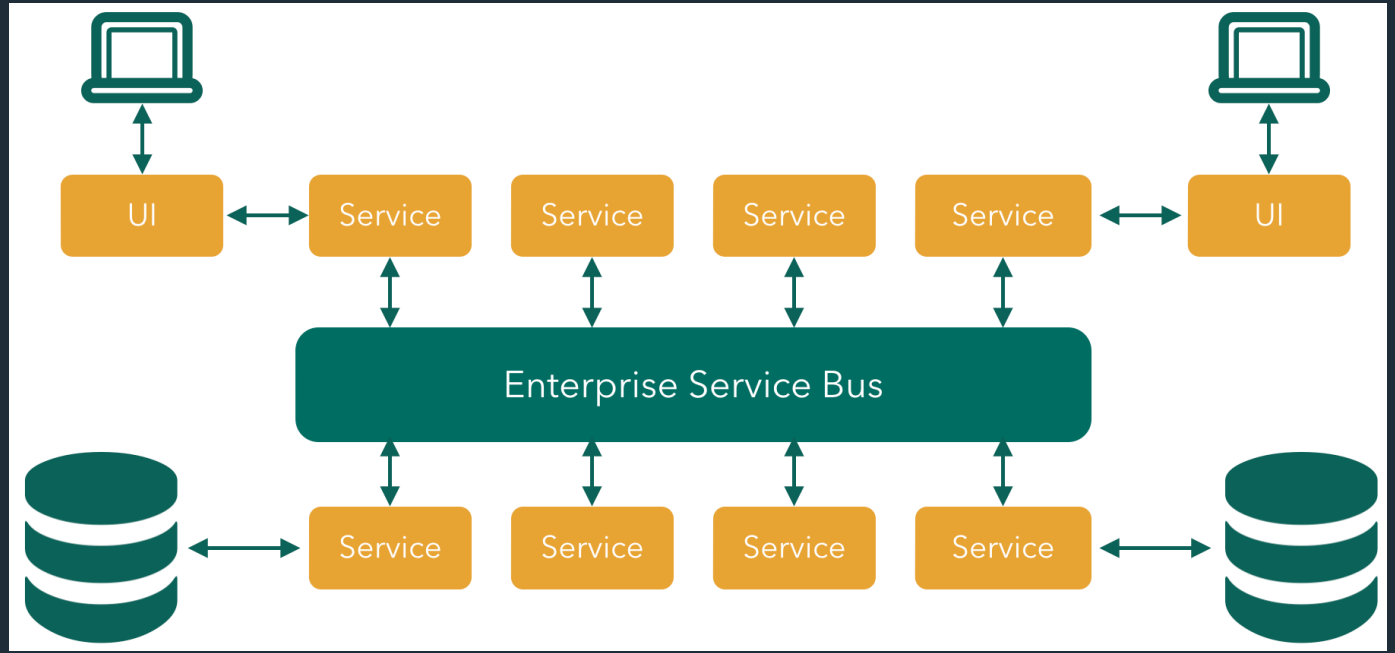
Not ESB-Centric SOA



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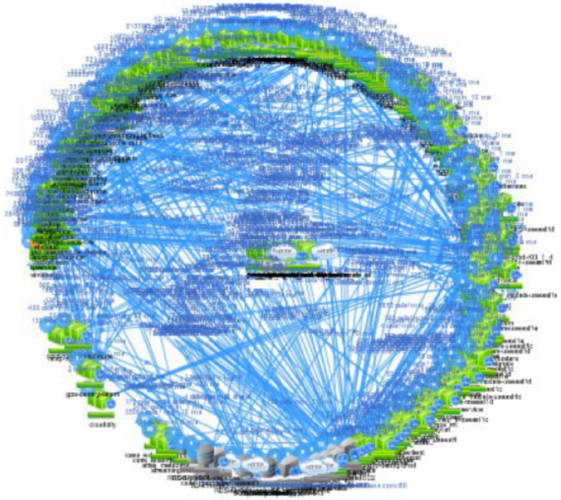
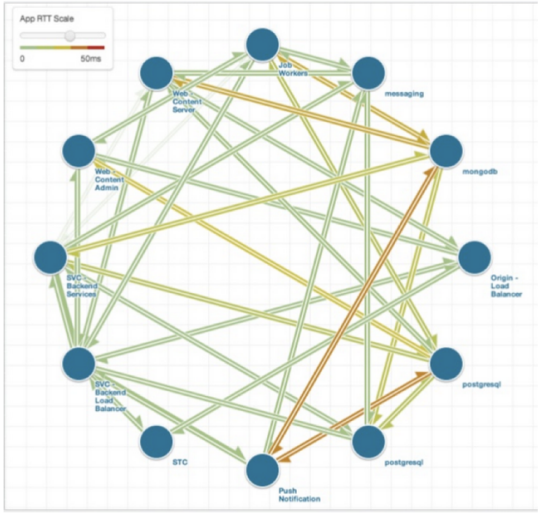
Microservice Pioneers



Netflix



Gilt Groupe (12 of 450)

Twitter

Who Moved My Complexity?

- Microservices are individually simple
- Complexity is transferred to the ecosystem

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Challenges in a Distributed System

- Configuration management
- Registration and discovery
- Routing and load balancing
- Fault tolerance and isolation
- Aggregation and transformation
- Monitoring and distributed tracing
- Process management

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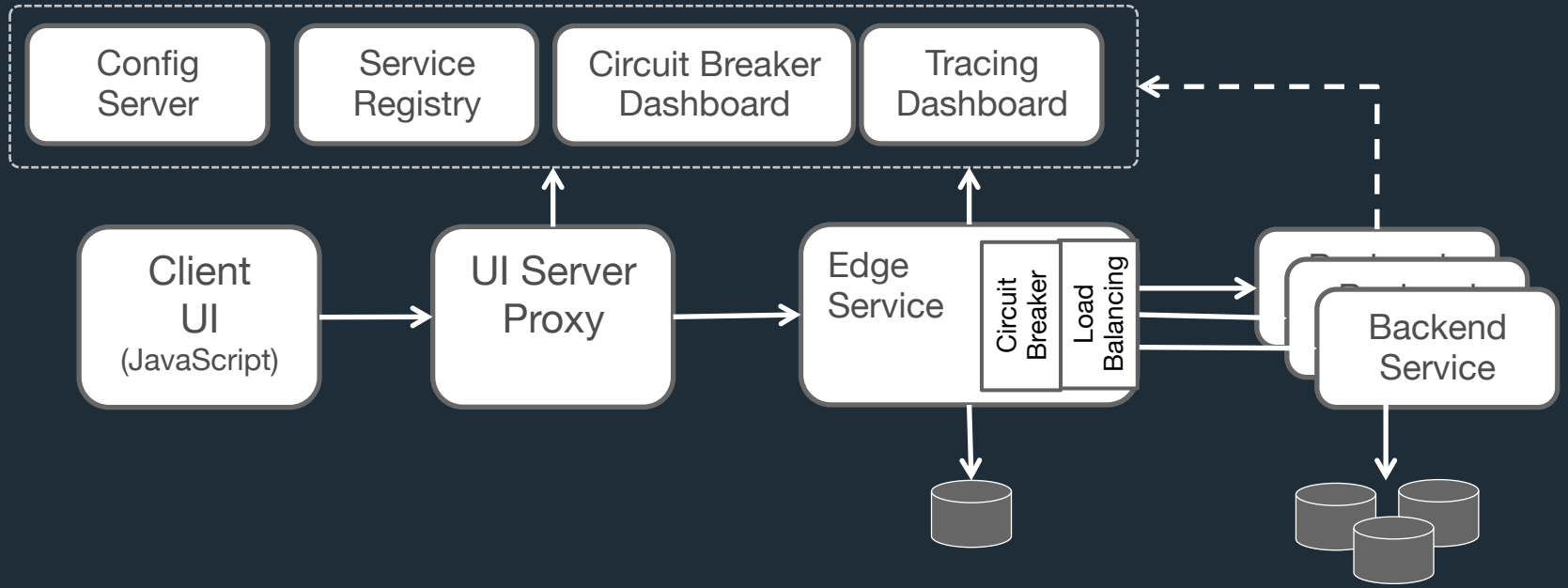
Design Patterns & Automation to the Rescue!



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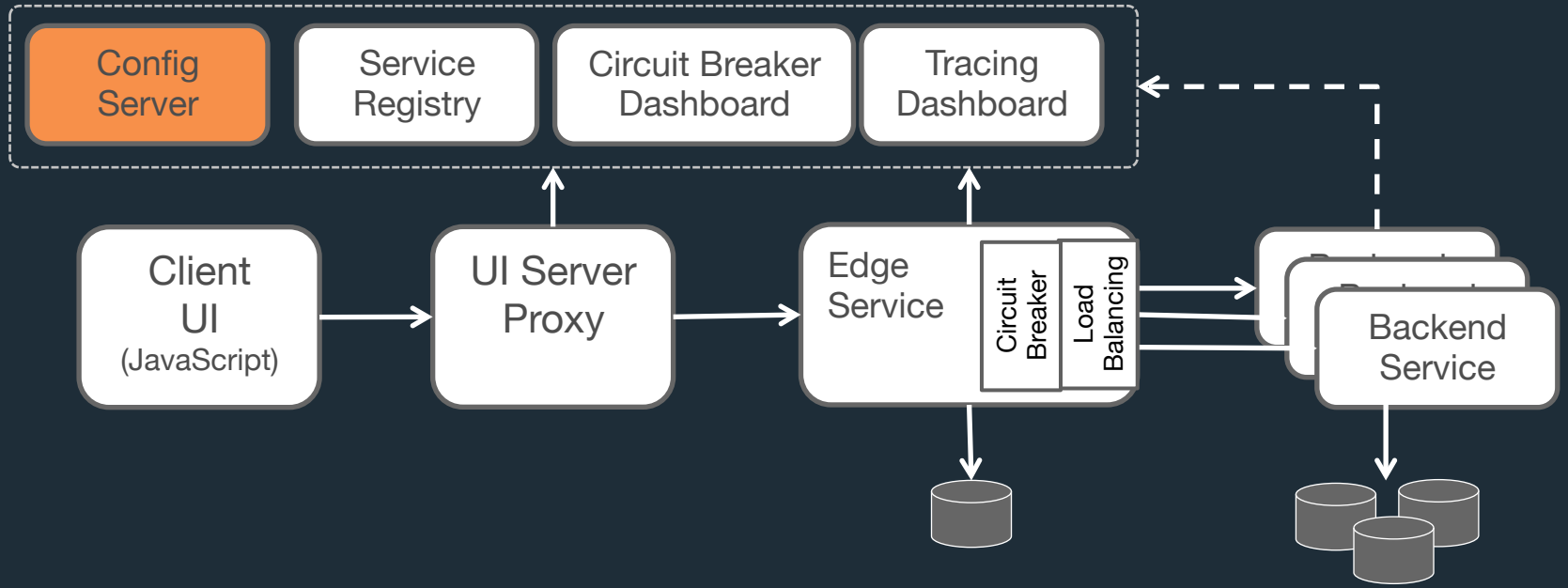
Configuration Management



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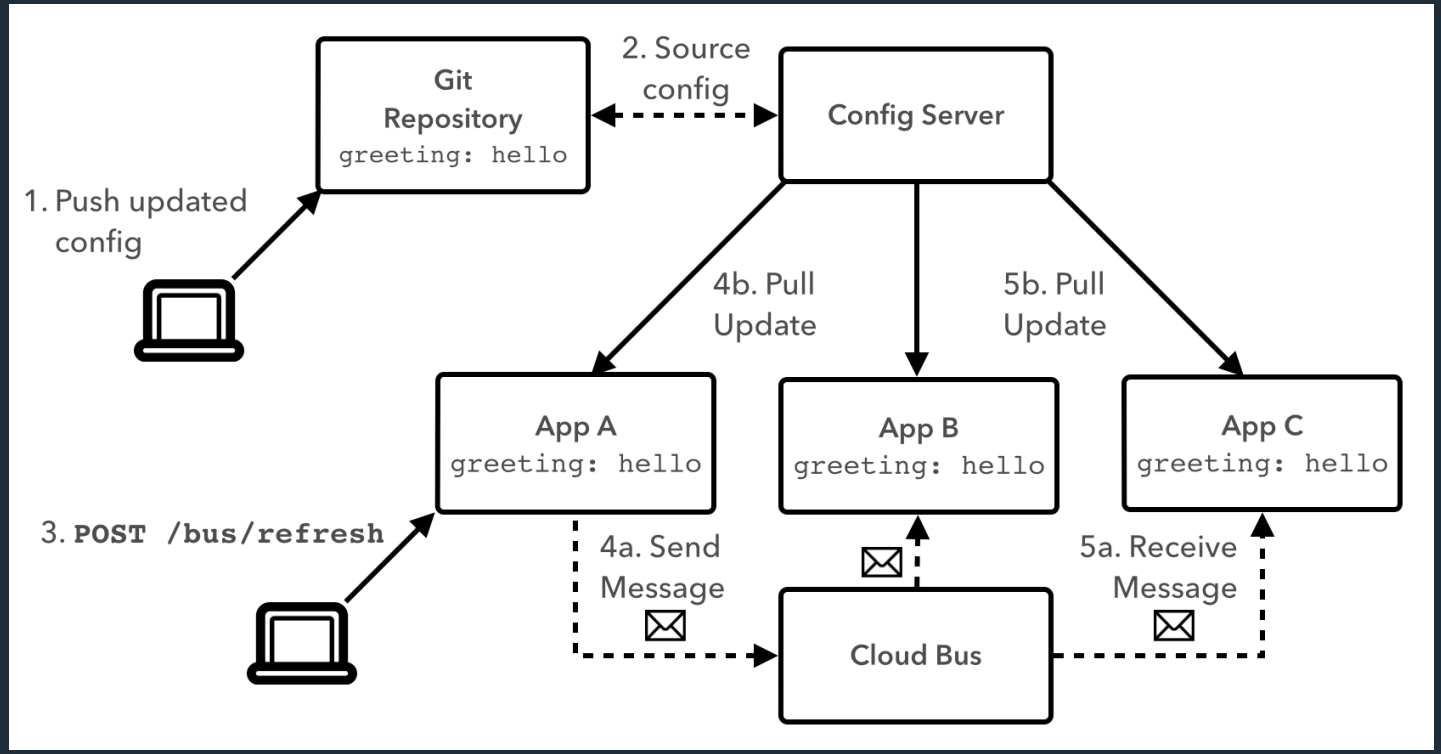
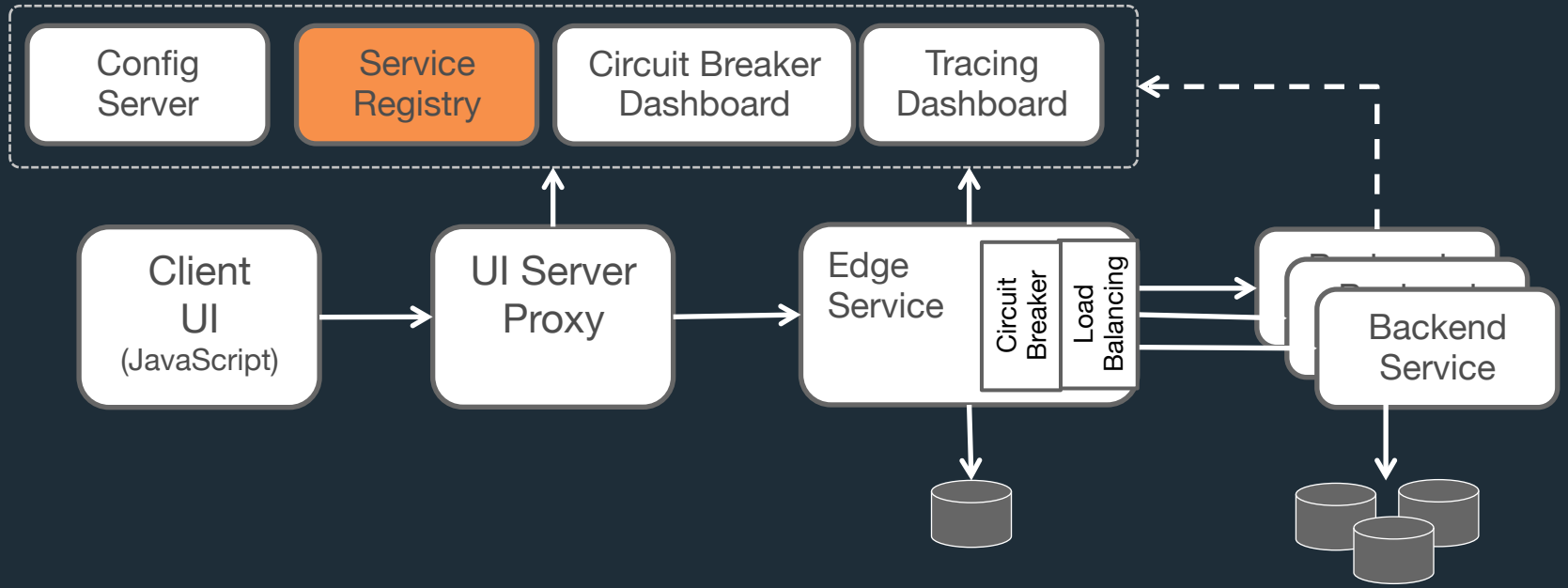
Configuration Server



Registration and Discovery



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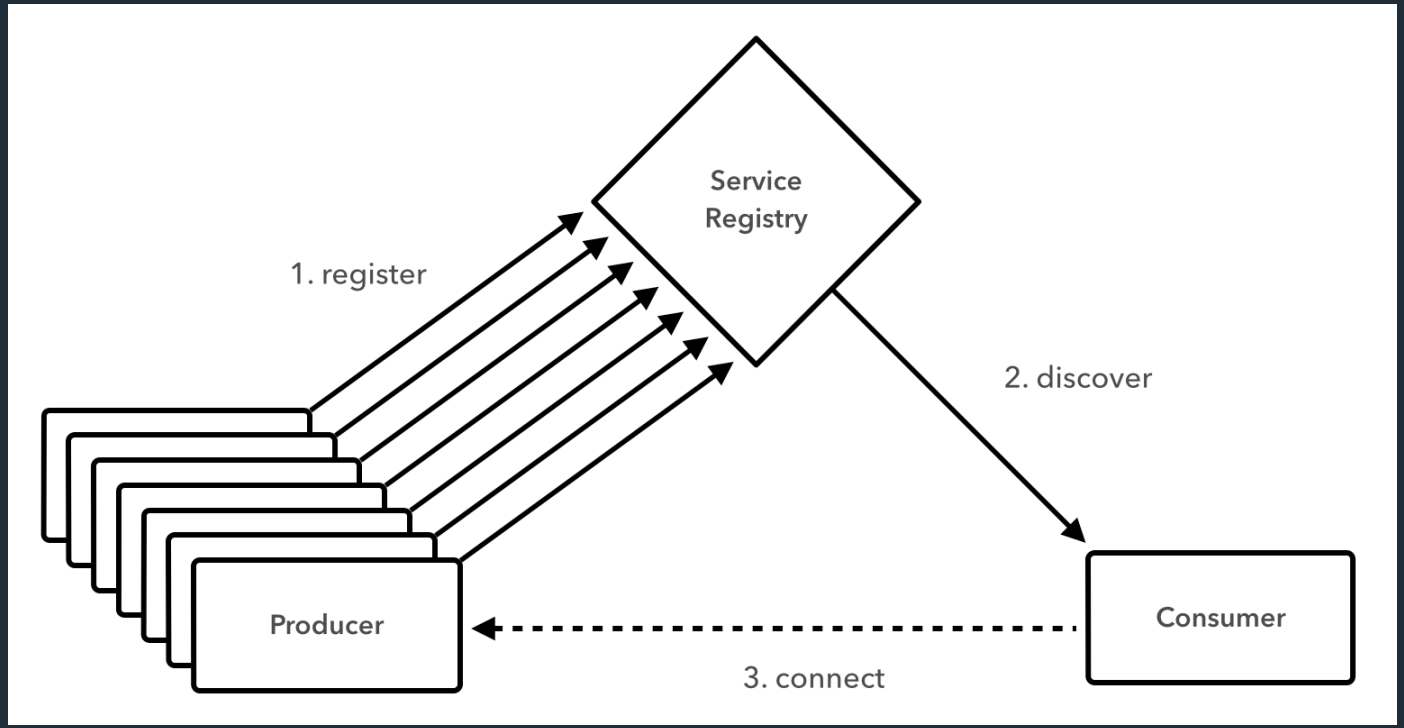
Registration and Discovery Server



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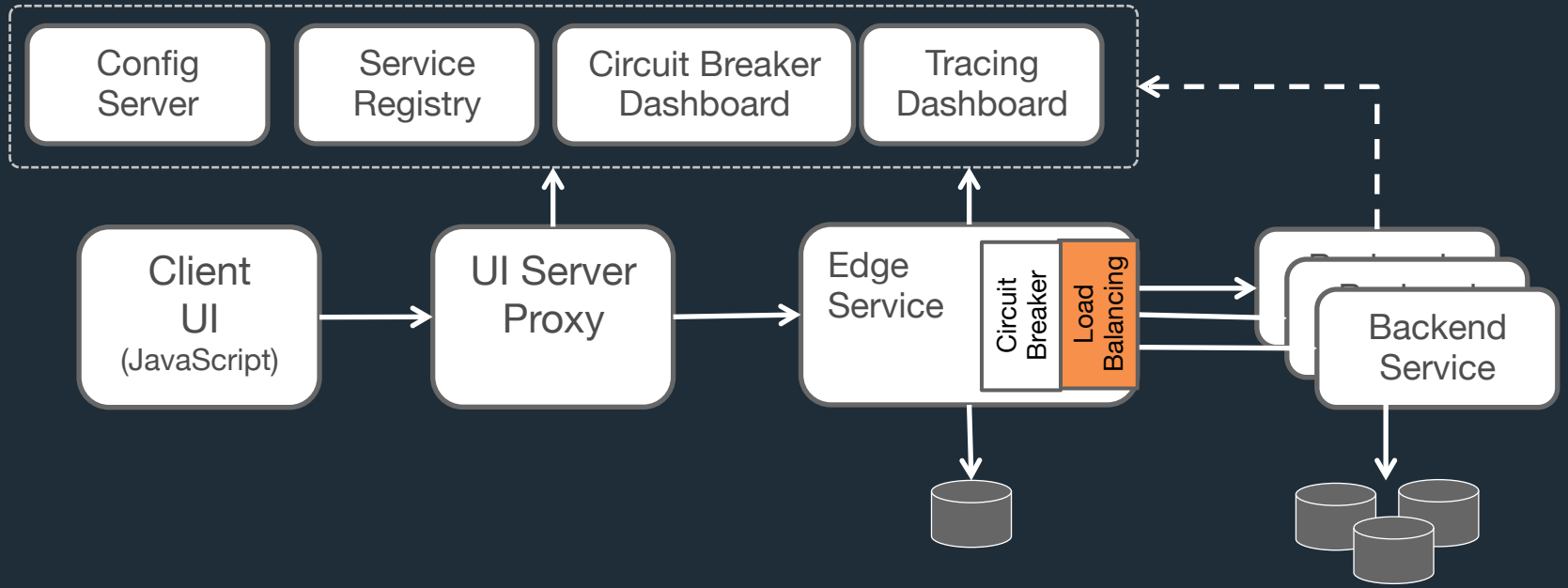
Routing and Load Balancing



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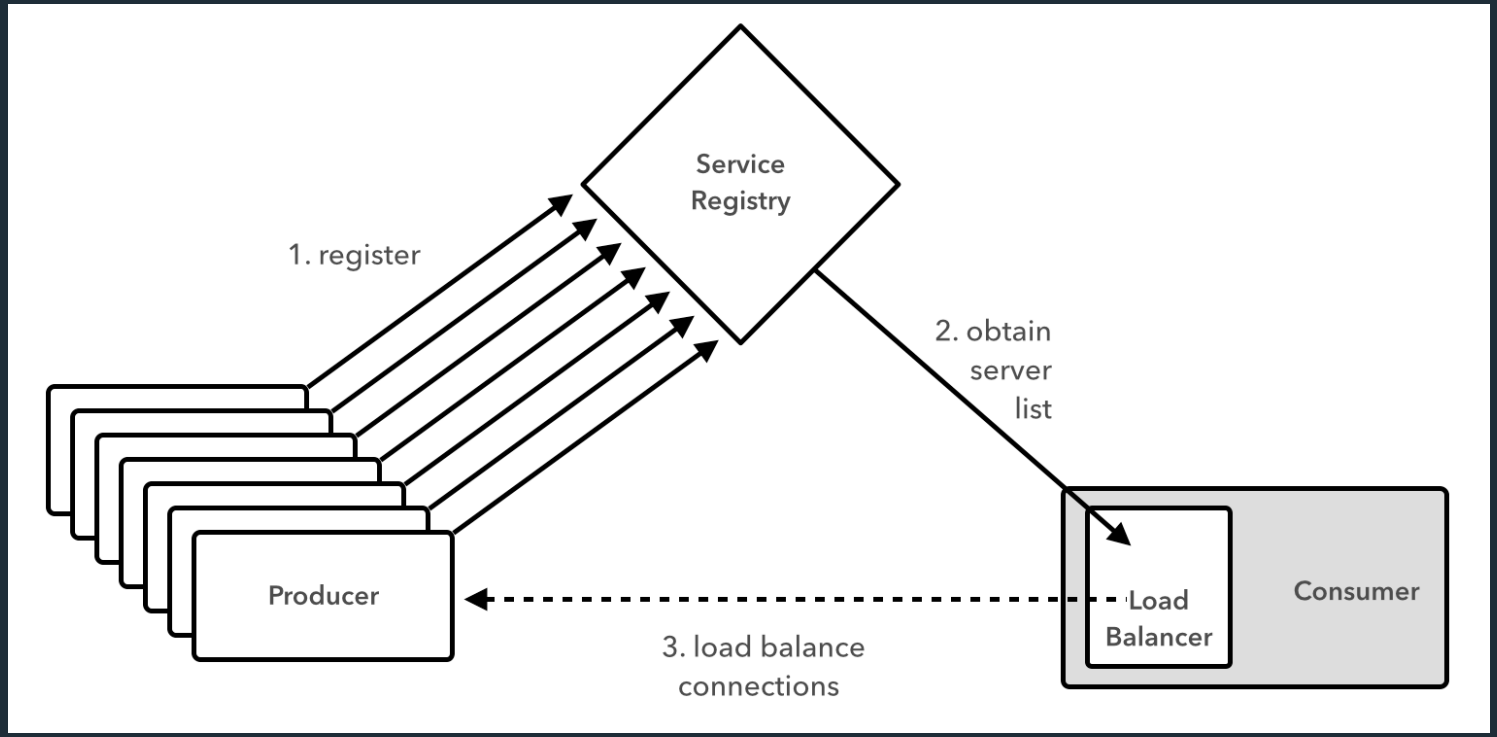
Client-Side Load Balancing



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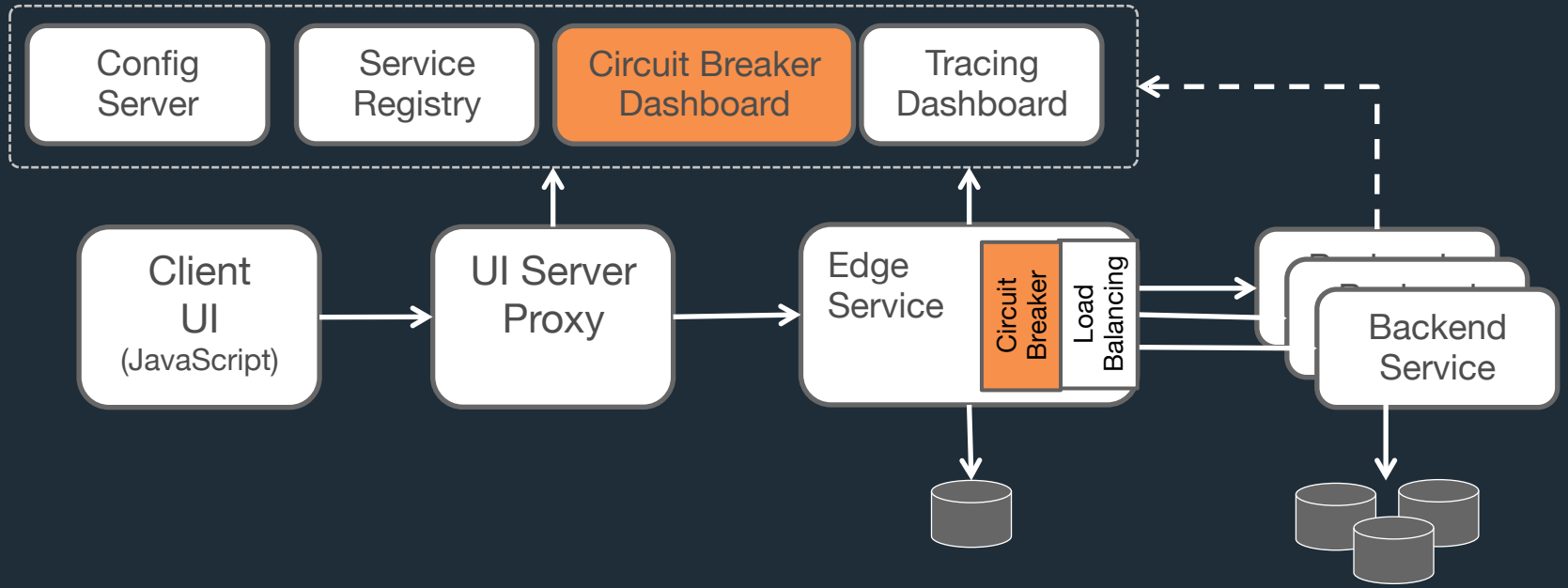
Fault Tolerance and Isolation



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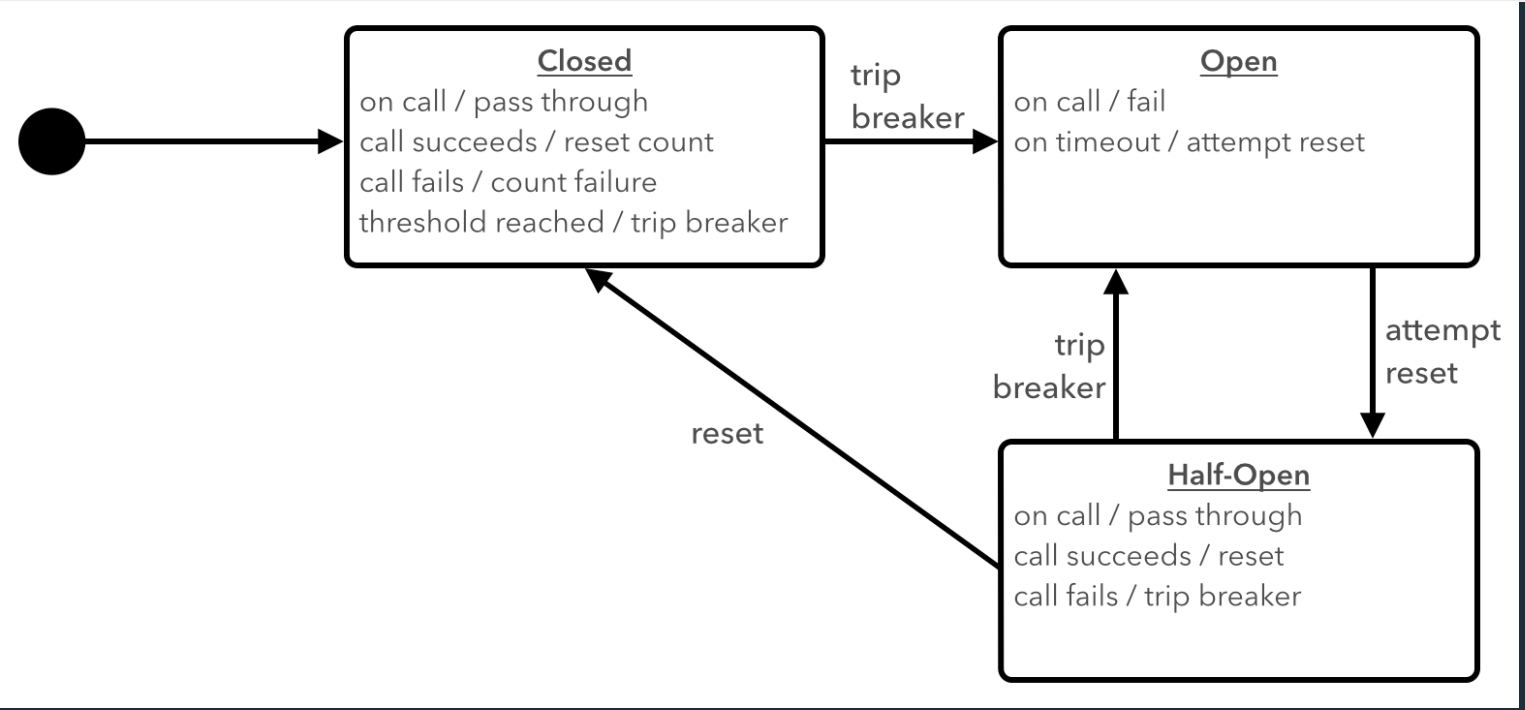
Circuit Breaker



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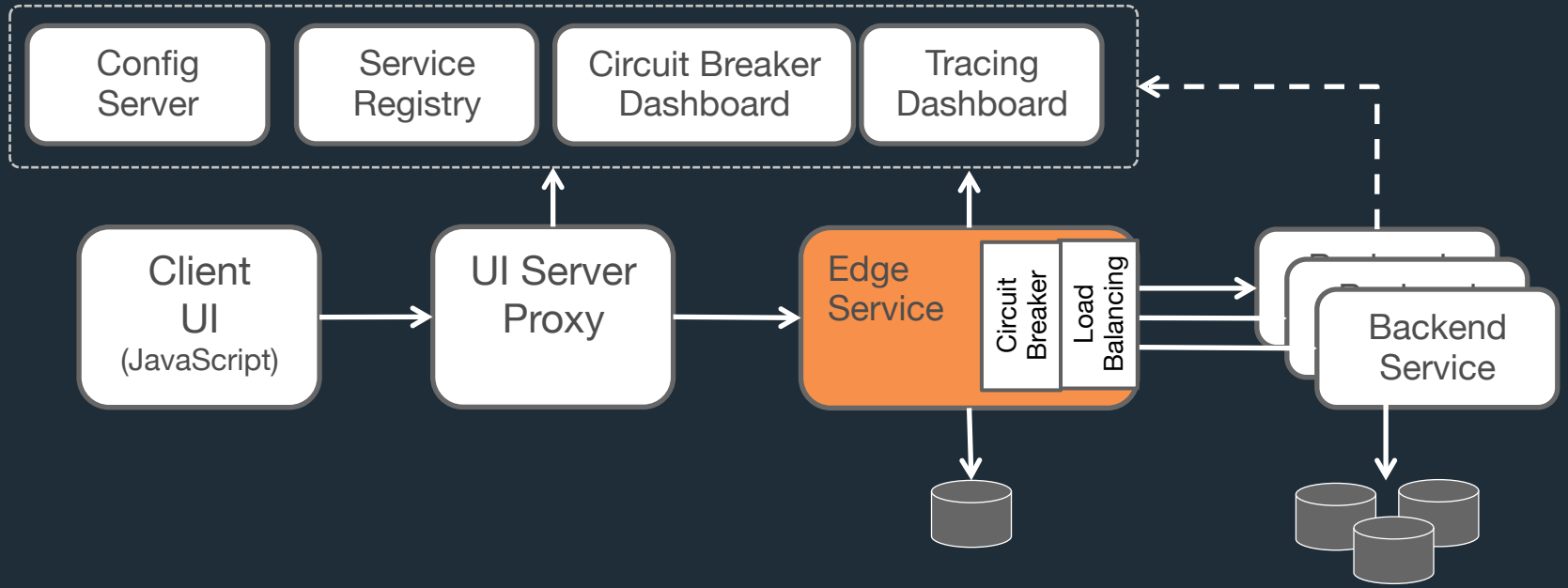
Aggregation and Transformation



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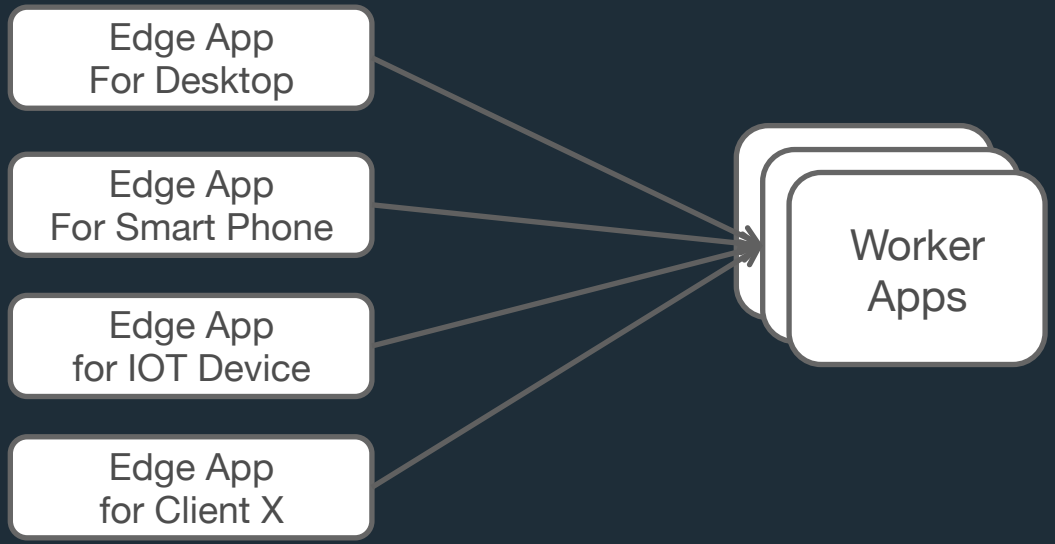
API Gateway



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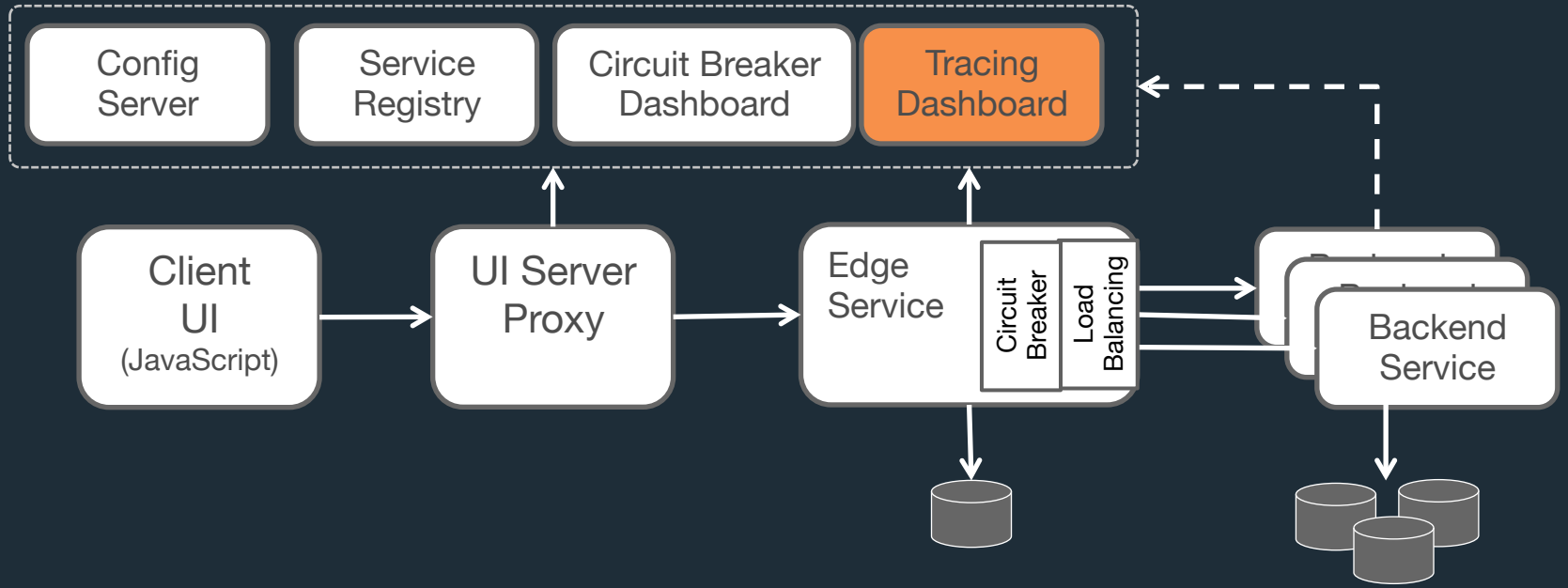
Monitoring and Distributed Tracing



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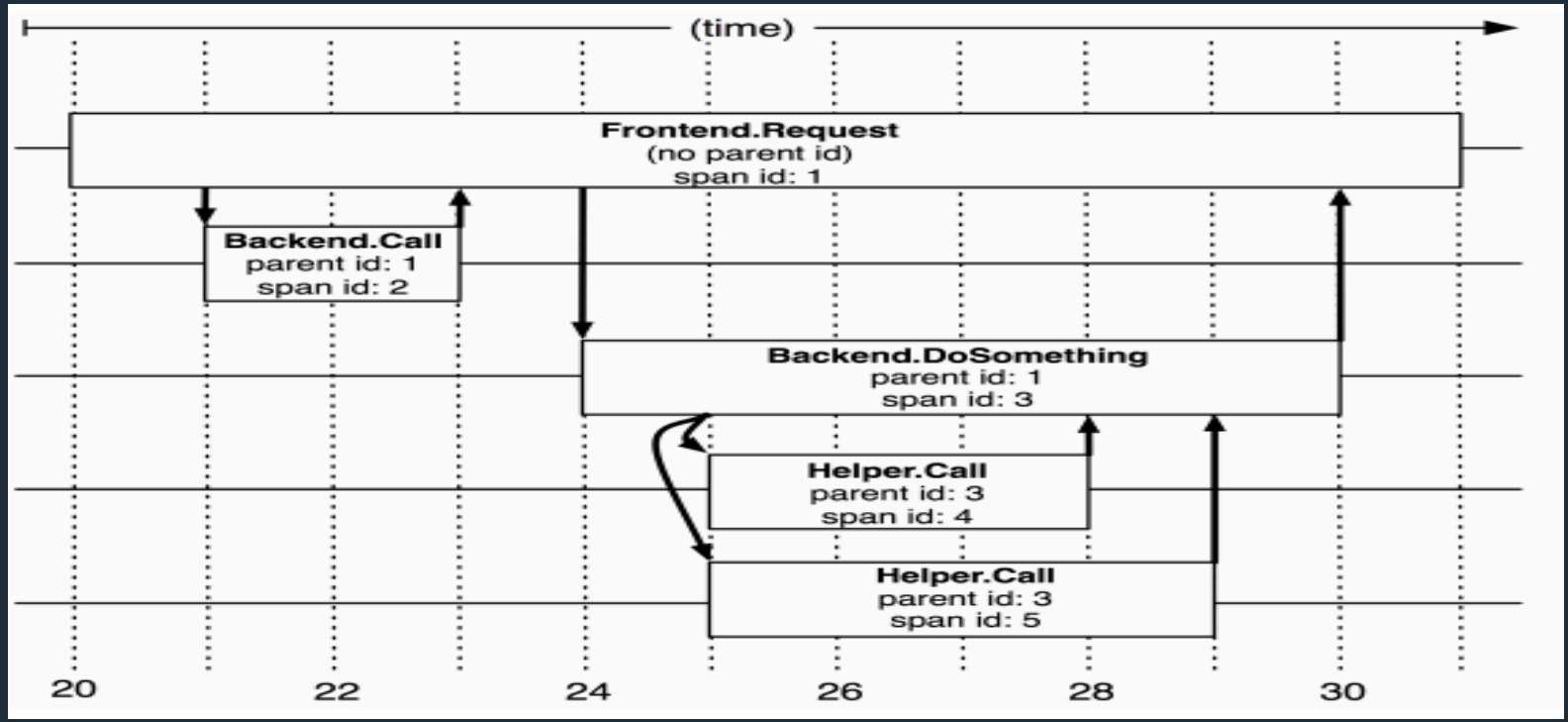
Distributed Tracing



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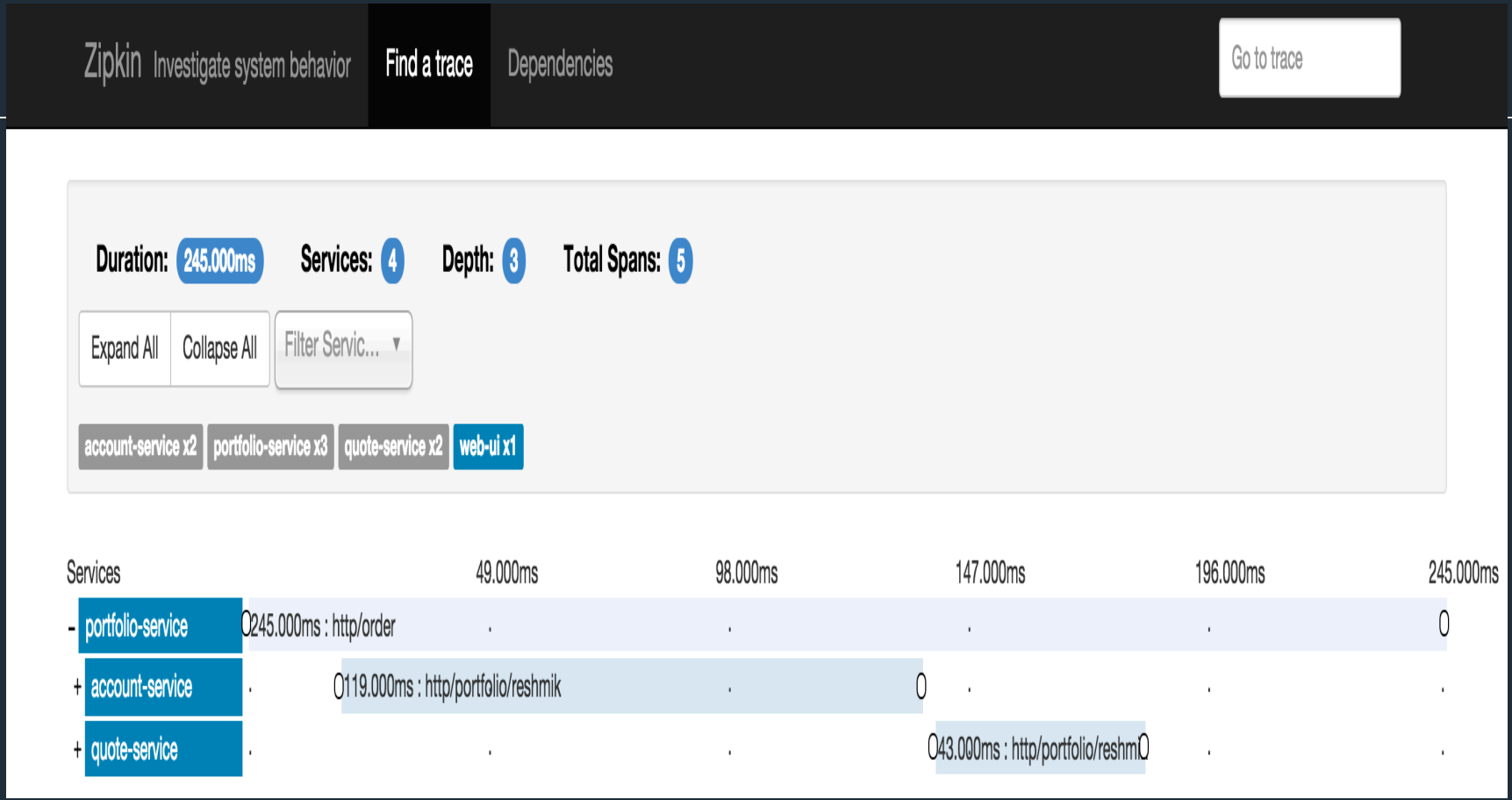

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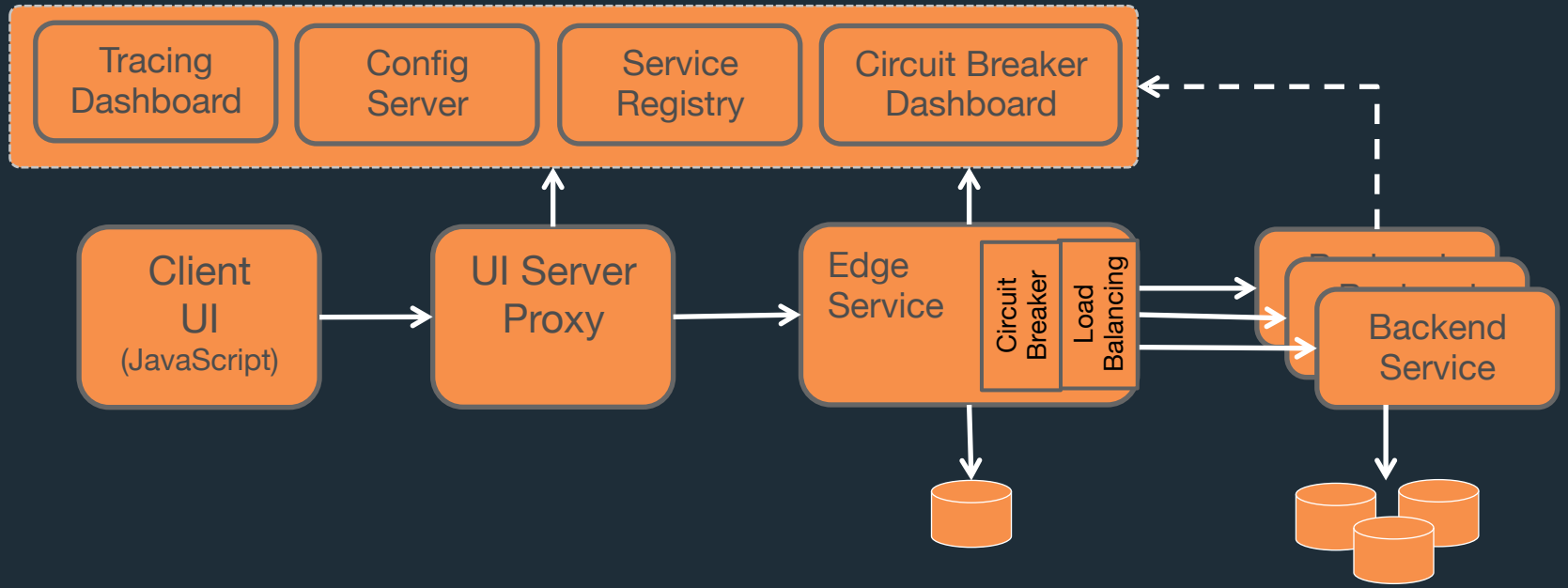
Process Management



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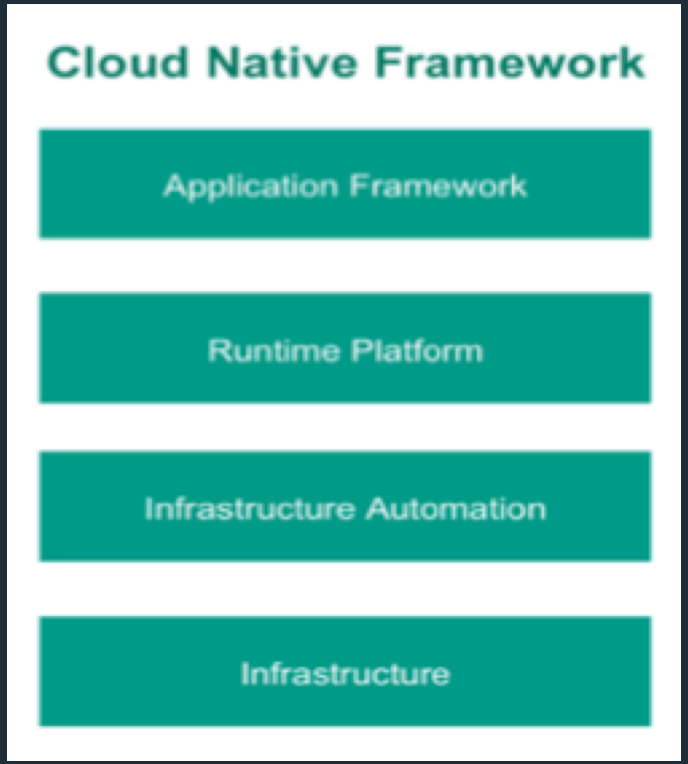
Structured Automation

- Groundwork for devops
- Self-service
- Rapid, automated provisioning
- Predictability and consistency
  - not ad-hoc!
- Visibility (monitoring & metrics)
- Continuous delivery on Day 2, too!



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Cloud Native Architecture

- Tools
- Platform
- Process and Culture

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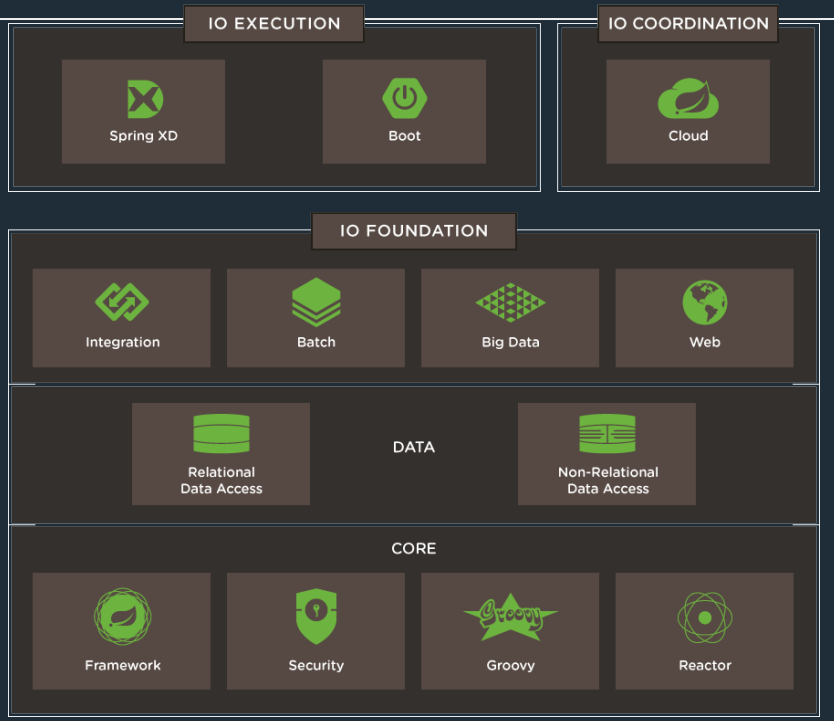
Spring I/O

- Spring Boot
  - How you build an app
- Spring Cloud
  - Pieces for Cloud Native
- Spring Core



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Spring Boot

- “Microframework”
- Opinionated
- Convention over configuration
- Production ready
- Ops Friendly
  - Self contained
  - Health and metrics
  - Externally configurable

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Spring Cloud

- Distributed/versioned configuration
- Service registry and discovery
- Routing
- Service-to-service calls
- Load balancing
- Circuit Breakers
- More…

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Spring Cloud Netflix Components

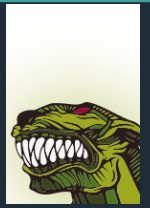
Ribbon

Archaius

Hystrix

Feign

Zuul



Client

Eureka

Turbine

Server

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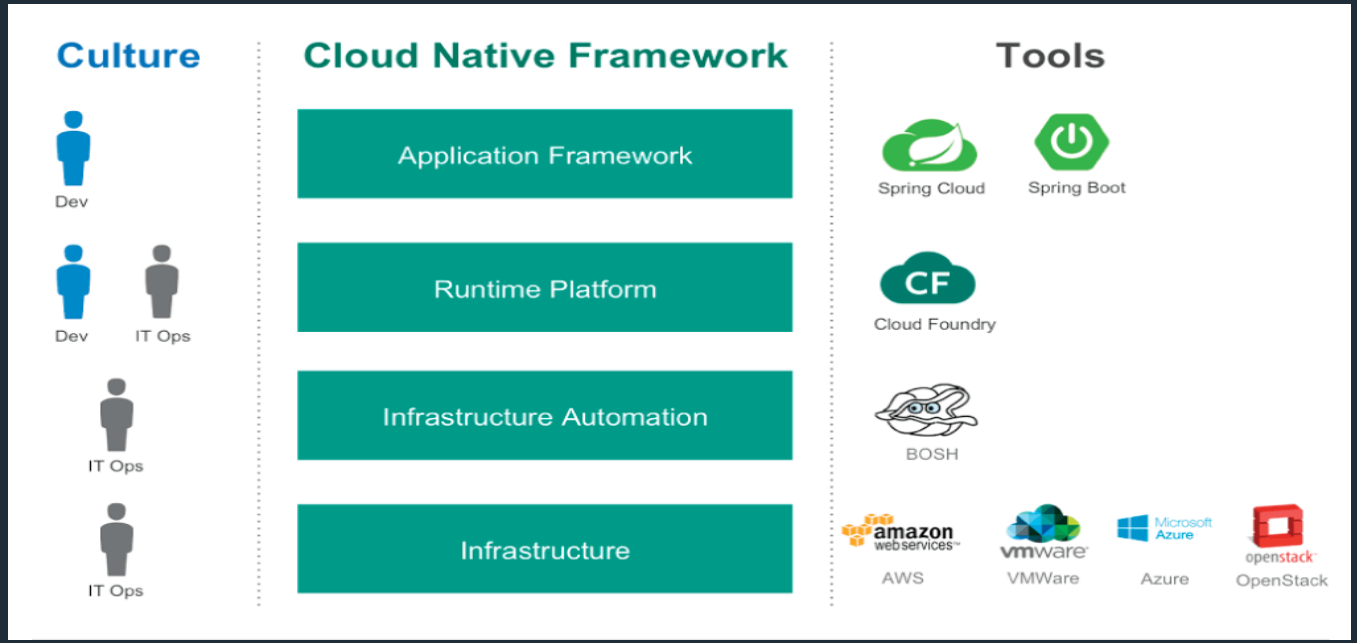
Pivotal Cloud Foundry



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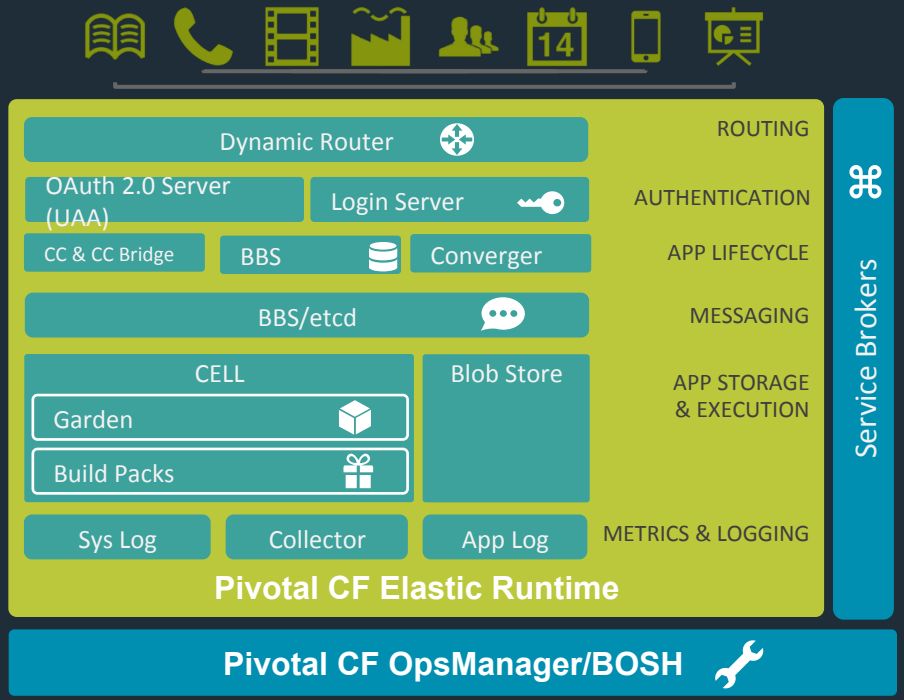
Pivotal Cloud Foundry



- Turnkey, fully automated Platform-as-a-Service
- Scalable runtime environment, extensible to most modern frameworks and languages running on Linux
- Instant expansion or upgrade with no downtime
- Deploy, scale and manage applications with bindable services using simplified semantics and APIs

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The Journey: Technology

- Provide the right tools
  - Platform, design pattern foundations, continuous delivery…
- Start small
  - Right-size for your needs
  - For migrations, don’t boil the ocean
- Target applications that:
  - Have high business/competitive impact
  - Need to scale or change frequently

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The Journey: Culture & Organization

- Small, cross-functional teams
- Products, not projects
- Test-driven development
- Short iterations
- Transparency and visibility

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Thank You

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Open.
Agile.
Cloud-Ready.