Canary In a Pipeline

OSCON 2018

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KENZAN
An Amdocs Company

Presentation Outline

What Canary Is

Canary Deployment Phases

Canary In Microservices

Other Considerations

Demo

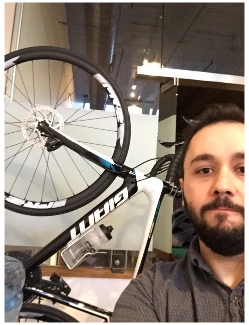
About Kenzan

Full Service Consulting Firm
Architecture, front and back end development, business analysis and DevTest.

Cloud Virtualization Experts And Enablers
AWS, Netflix stack, Kubernetes, Istio, enterprise architecture and beyond.

DevOps Leadership
Platform builds, continuous delivery and scalable resourcing.

About Me



Technical Architect at Kenzan working out of Rhode Island

Worked at Kenzan for 7ish years

Assisted clients with building microservice platforms using Netflix OSS on AWS Cloud

Transitioned clients into containerization using Docker, ECS, and Kubernetes

First time conference presenter!

The problem with current deployment pipelines

We want to deliver value to the users

Delivering value requires deploying to production

Deploying to production is scary

No value is delivered if something goes wrong

Break the Deployment Fear

Fear leads to fewer and larger deployments

Larger deployments introduce more problems

Introduce Canary to your pipeline

Deploy to production with confidence

Deploy more frequently

Deliver user value at a higher velocity

Origination of the Term “Canary”

Refers to “canary in a coal mine”

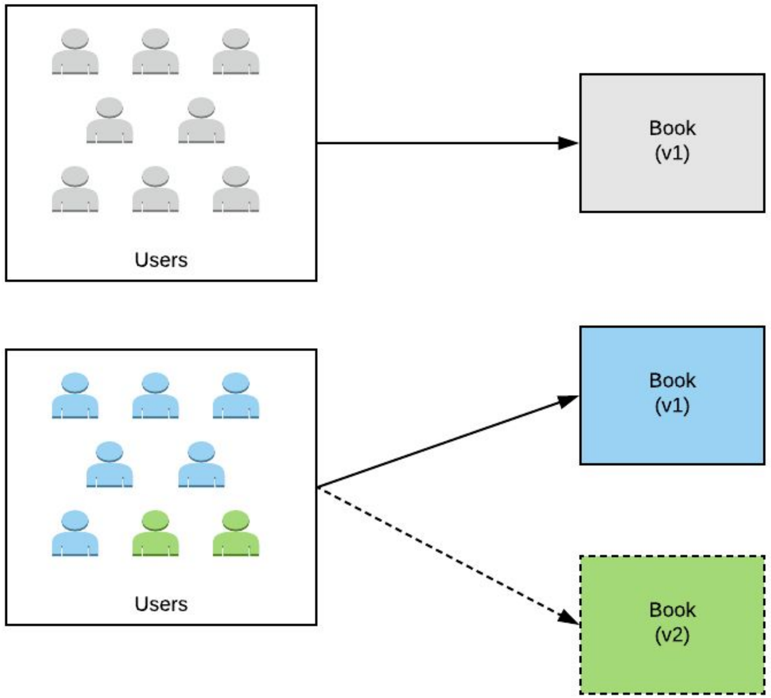
Used as an early warning sign of mine contamination

Canary in Software Development

Process of deploying a limited feature release to production

Controls exposure of a feature to a small subset of users

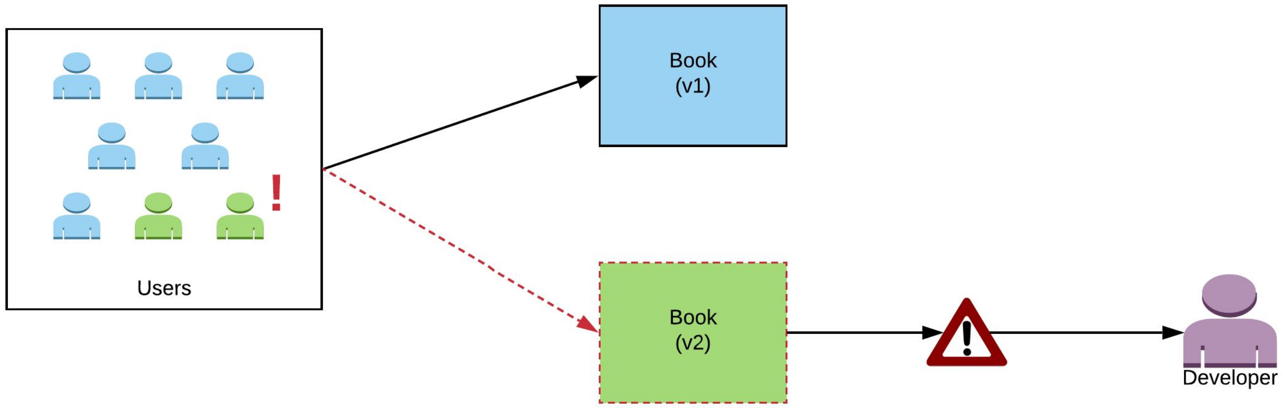
New feature receives a sample of real user traffic



Early Detection of Failures

Monitoring systems flag any issues with the feature deployment

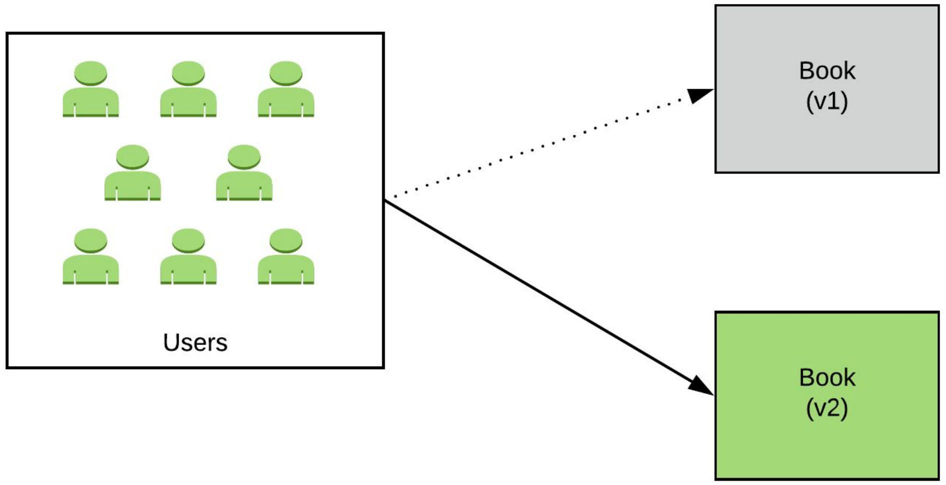
Teams react to issues and either proceed or rollback the deployment



Promote to New Version

Traffic is promoted to the new version after assessing the deployment

Old version is disposed



Phases of Canary

Blue/Green Deployment

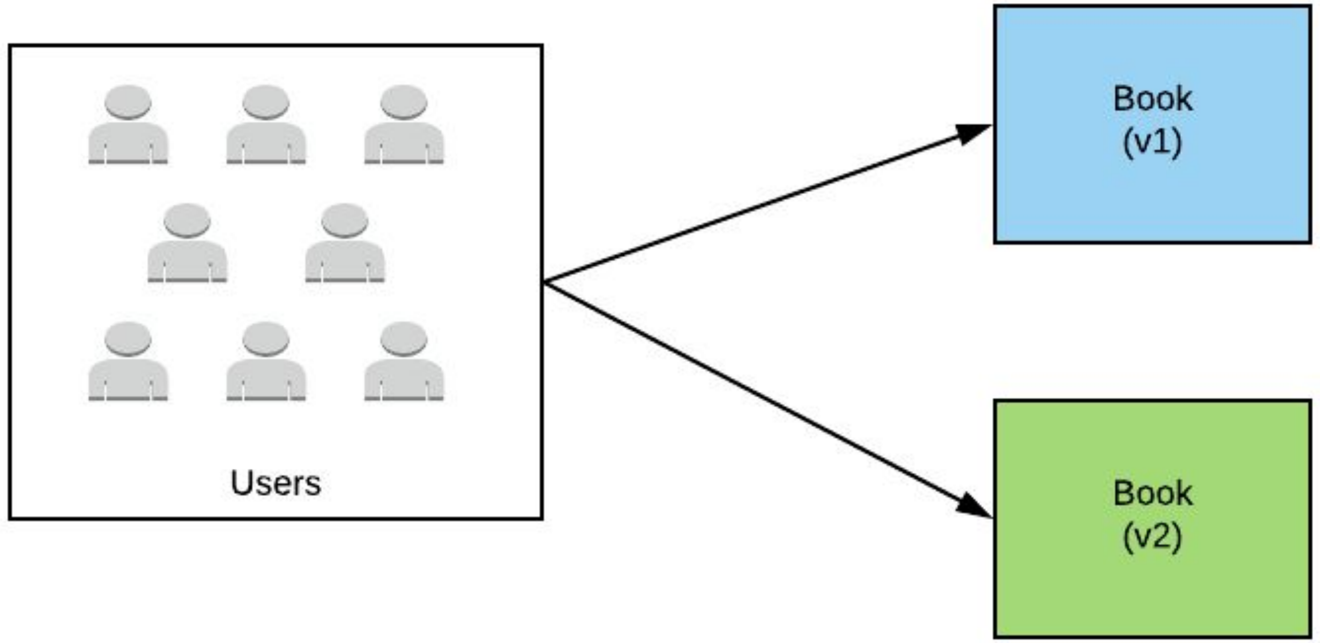
Traffic Shifting

Observation

Judgement

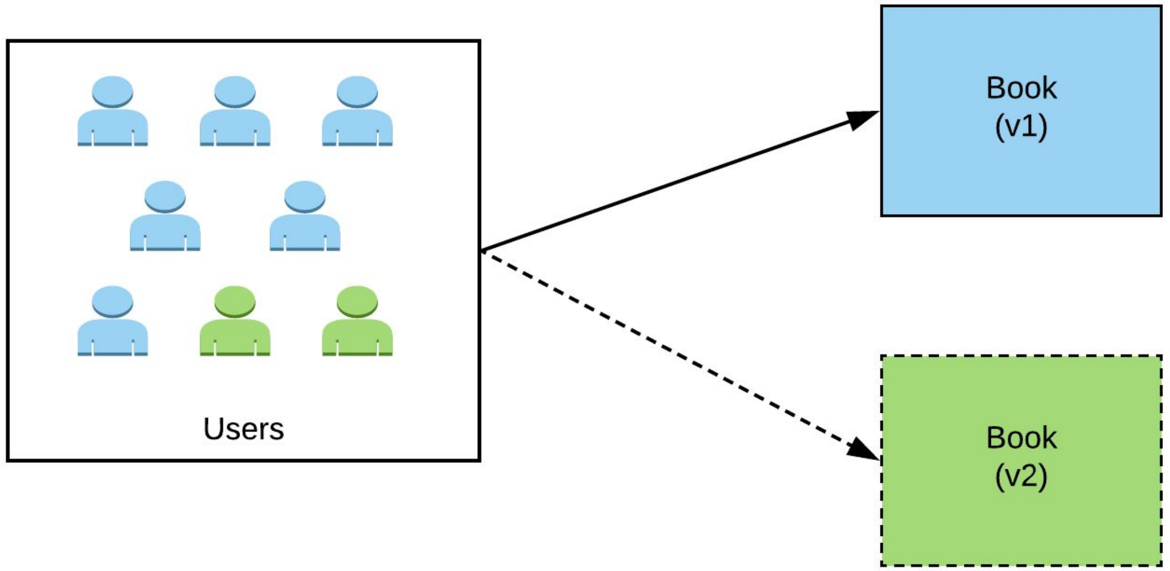
Blue/Green Deployment

Deploy new version of the same service



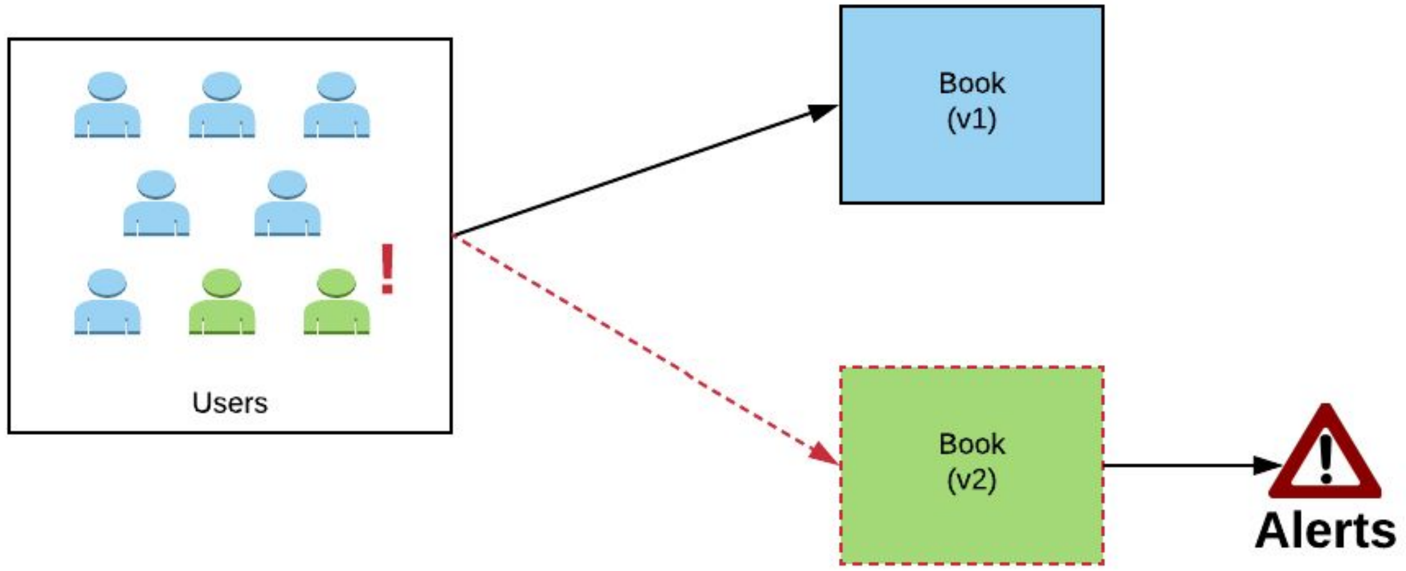
Traffic Shifting

Control and transition traffic between two versions



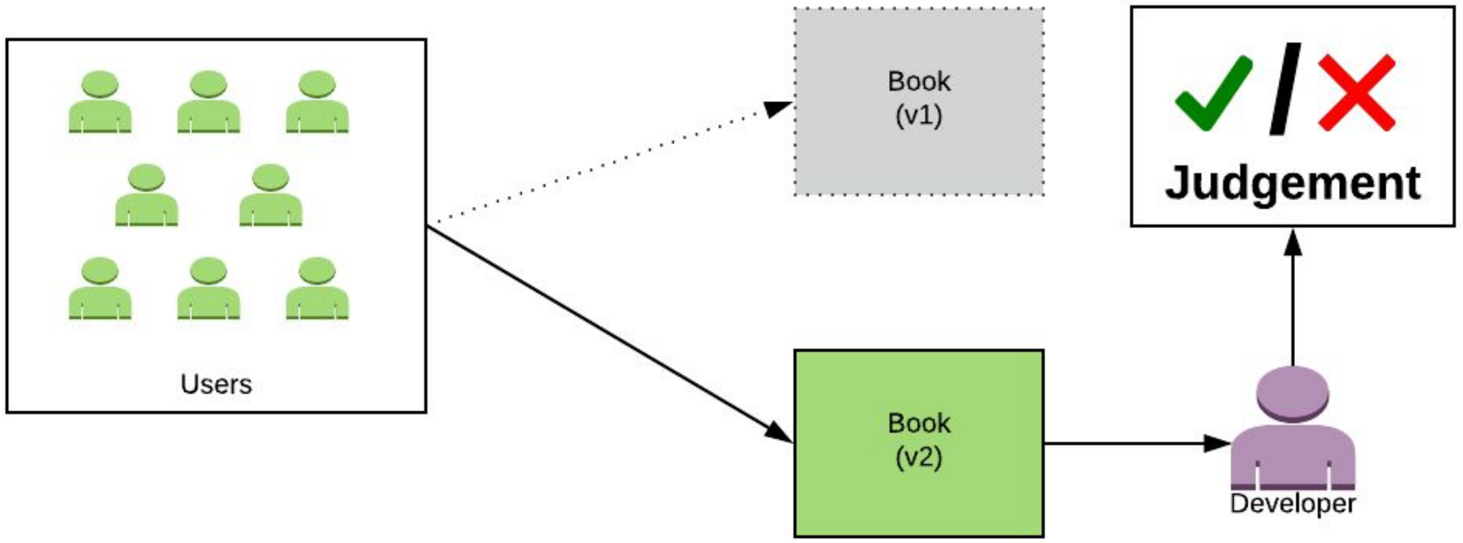
Observation

Observe health of two versions



Judgement

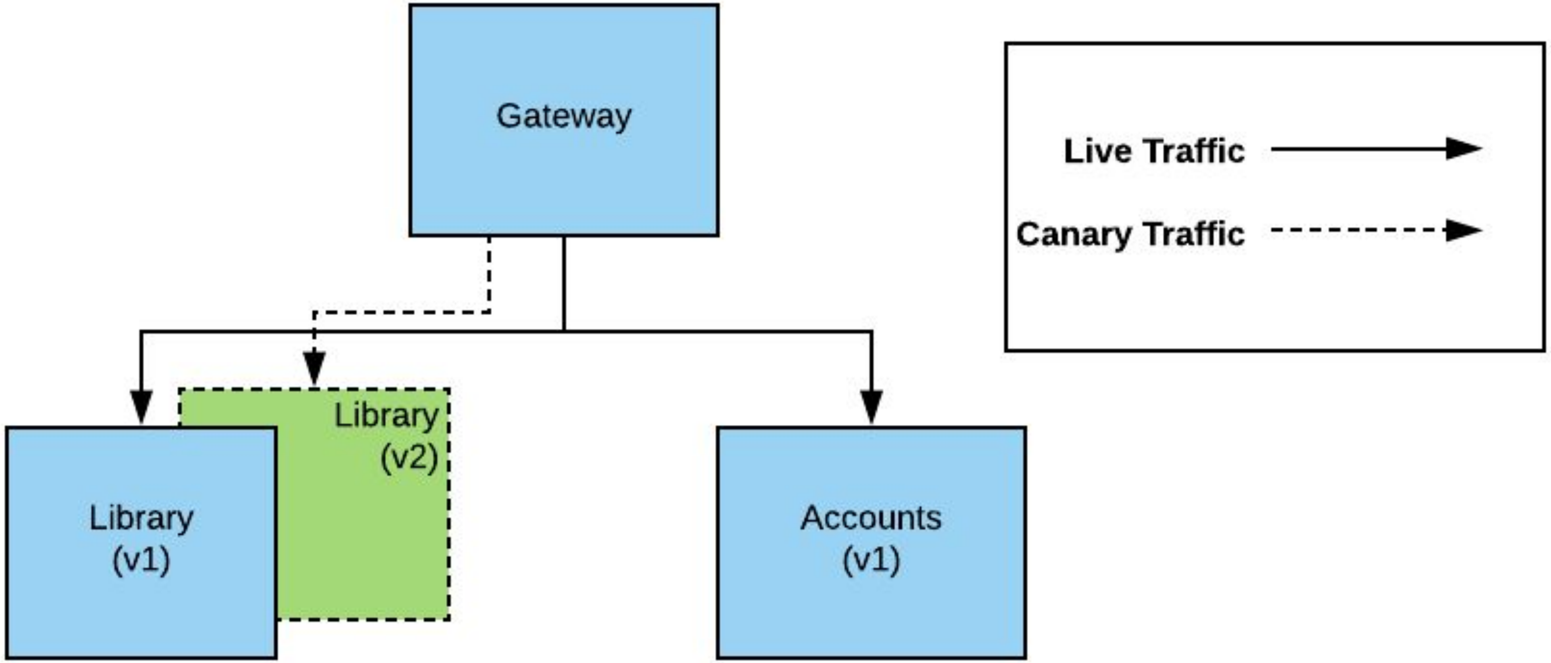
Judge the status of a deployment and promote/reject



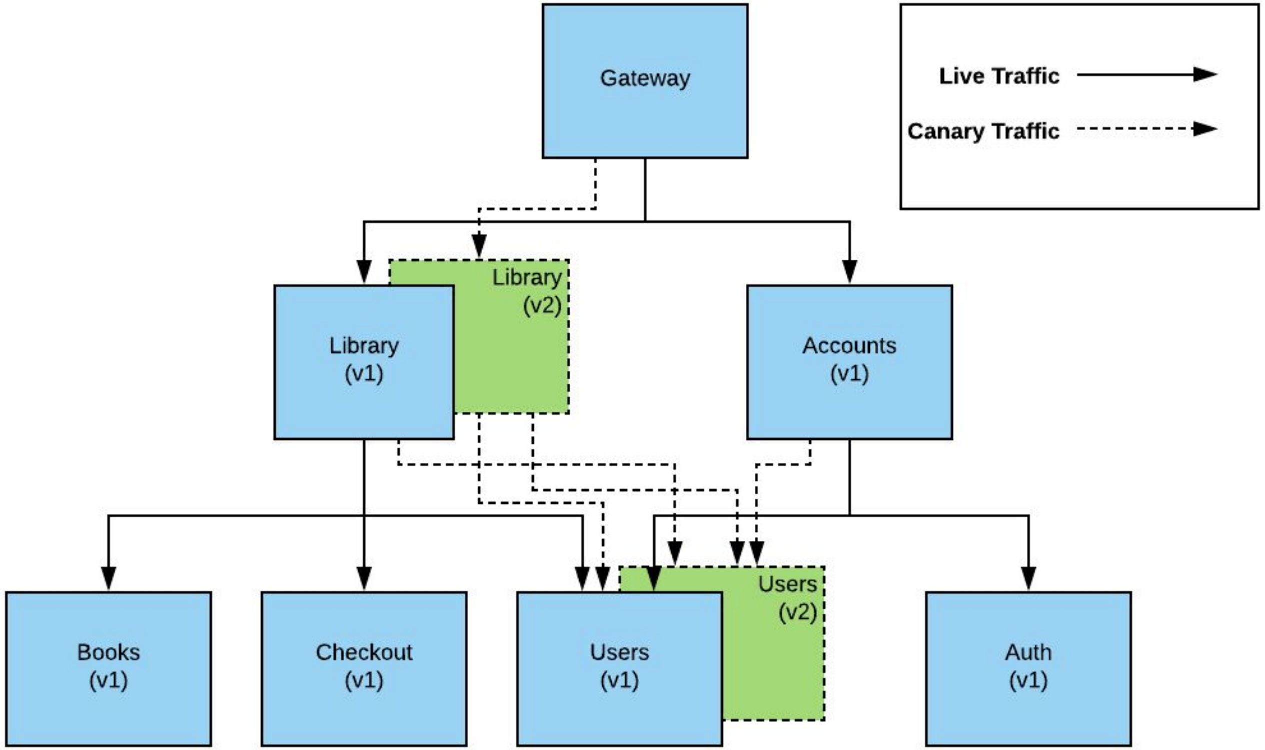
Canary Chaos in Microservices

Microservice architectures add additional complexity to Canary

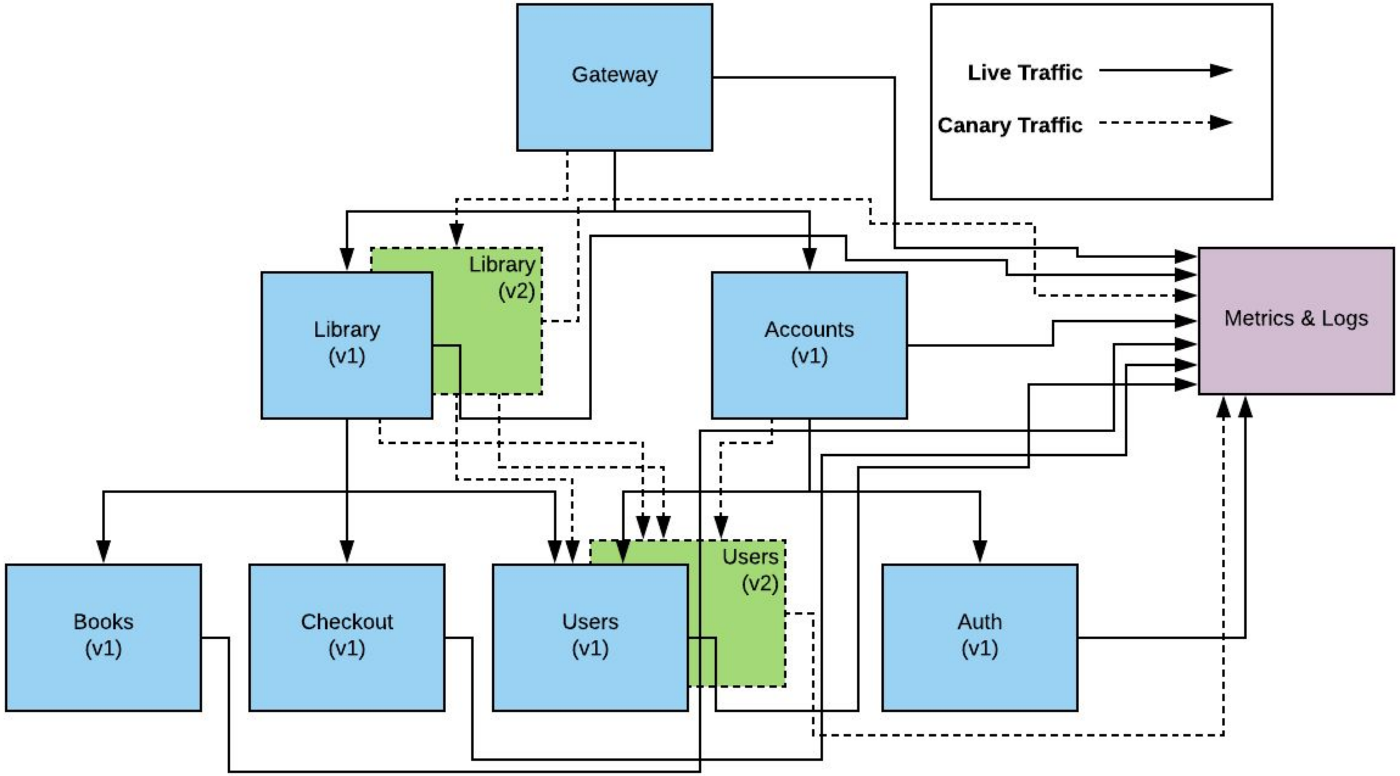
Gateways route traffic to **N** number of Microservices



Microservices talk to **N** number of other Microservices



Microservice produce **N** number of metrics and logs to sort through



How to Solve Canary Chaos?

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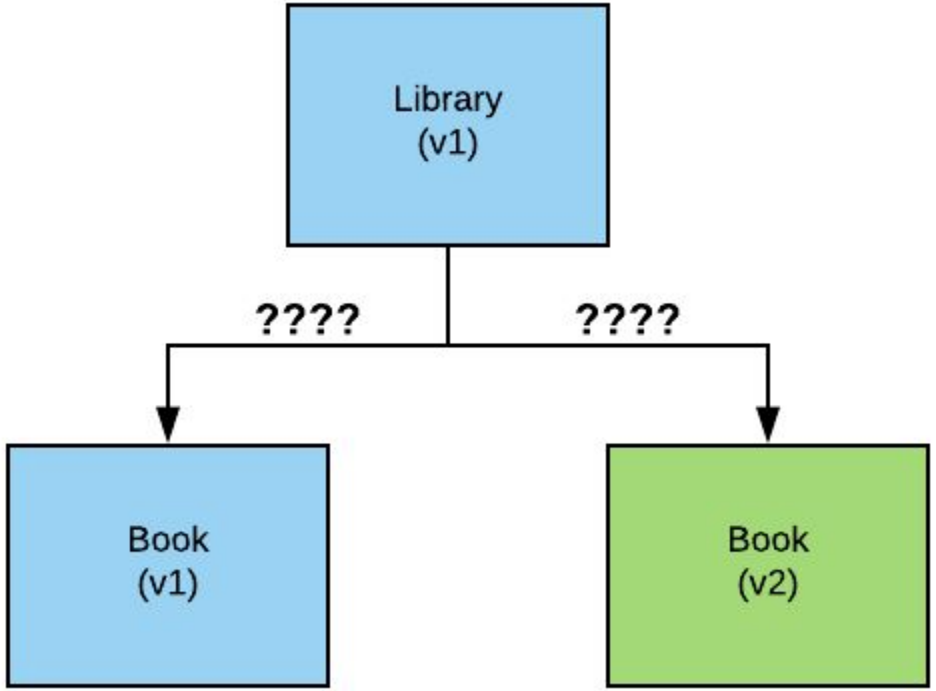
Answer:
Canary Awareness

At any point in time, any deployable component can be part of a canary deployment.

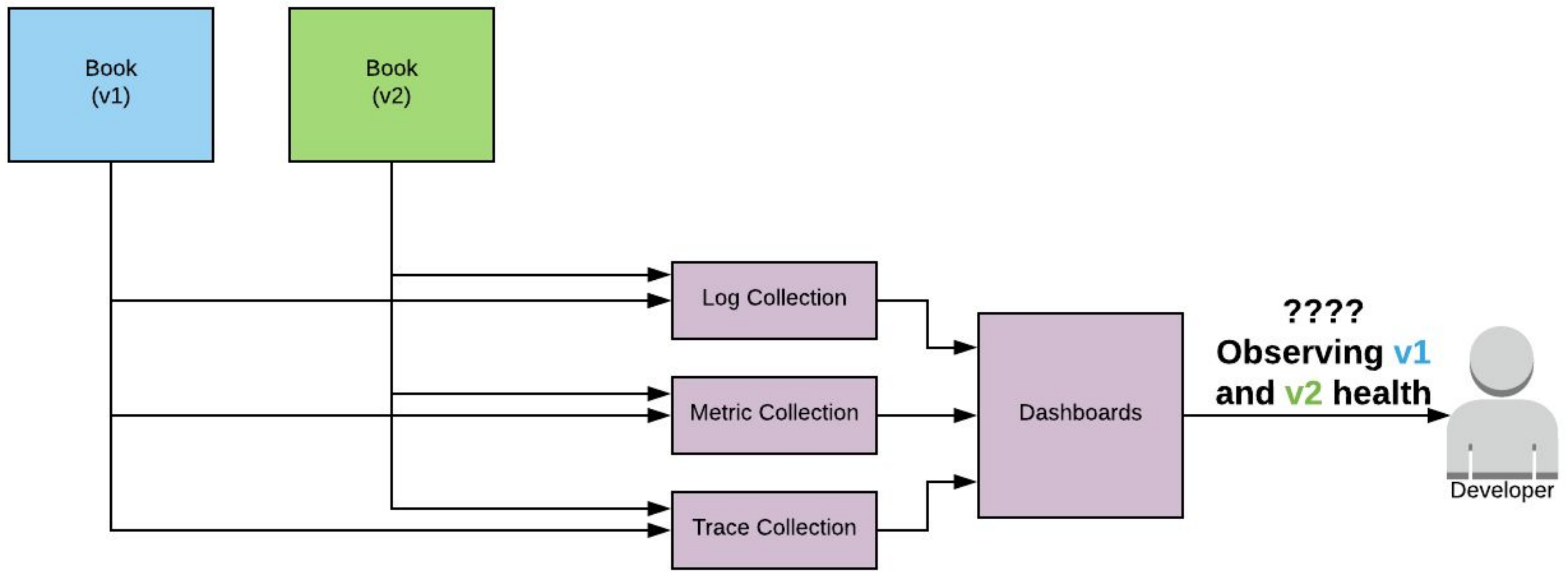
Deployable components need to be aware of their own version

Depending components need to be aware of deployable component versions

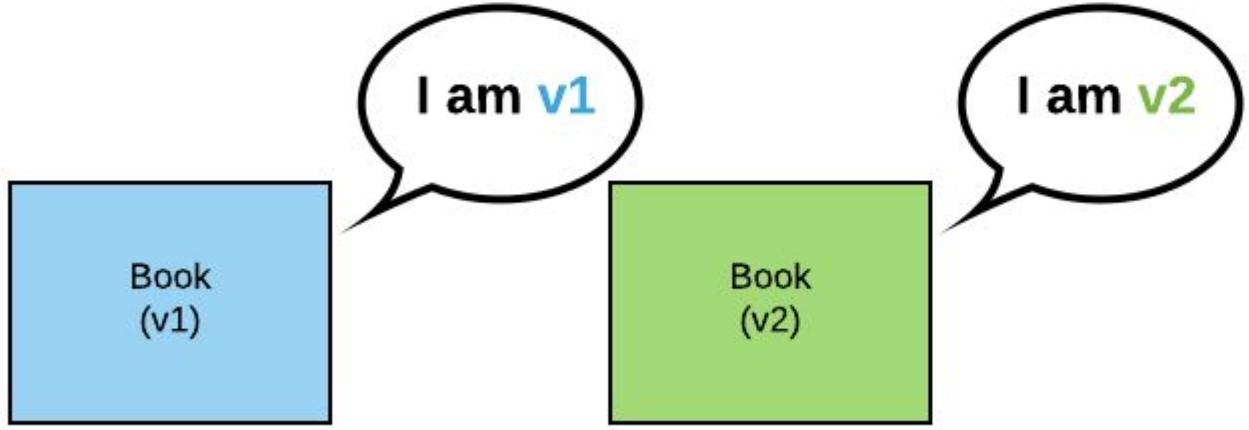
Without Canary Awareness:
Library does not know that Book has two versions



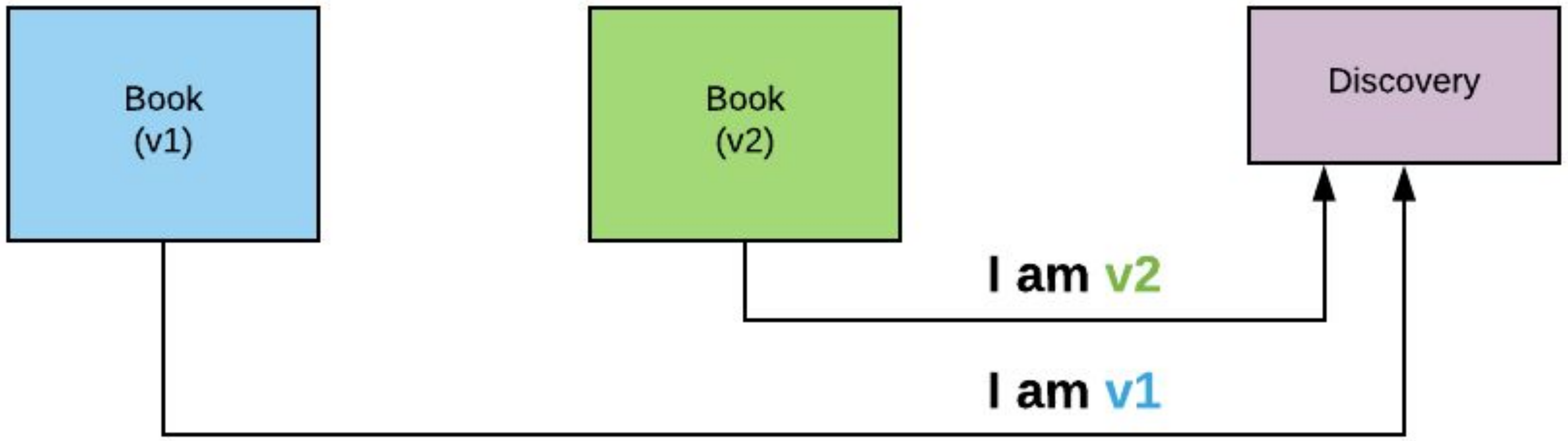
Without Canary Awareness:
Metrics/Logs/Traces from both versions of Book are mixed together



Deployable components need to be aware of their own version



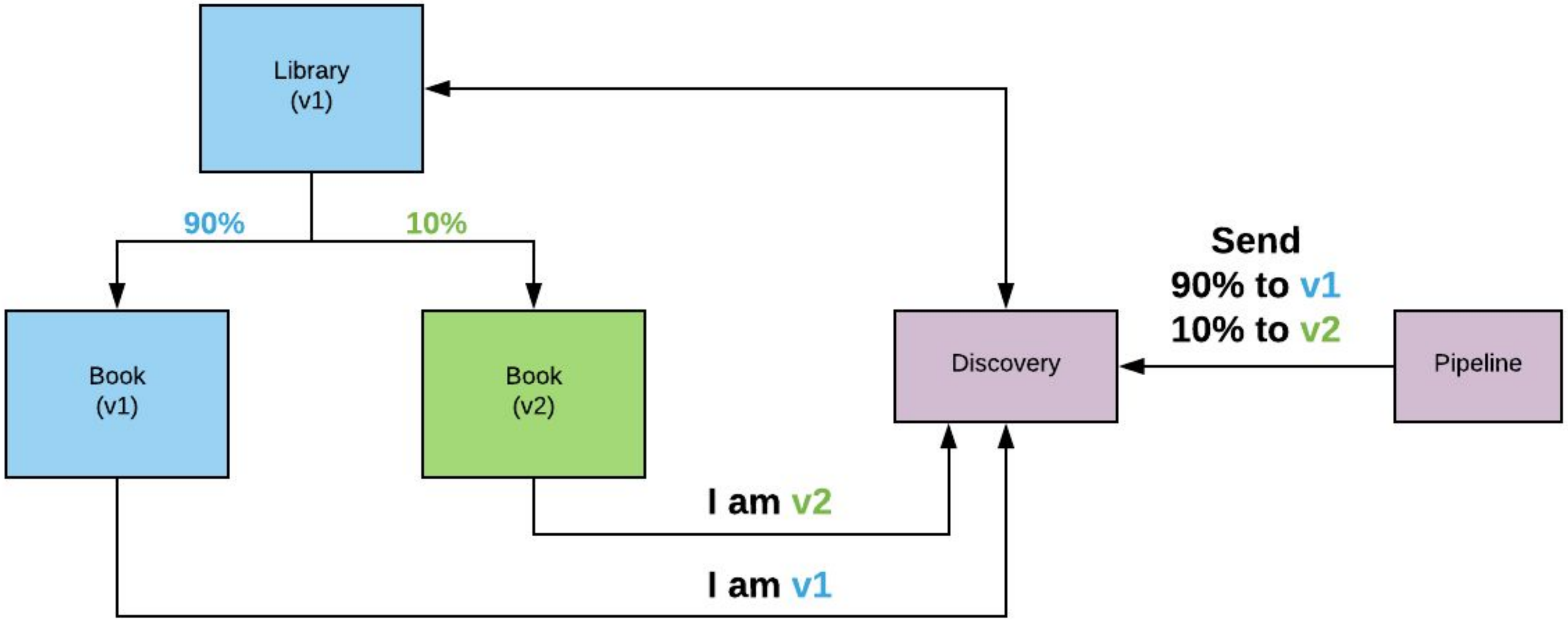
Register version metadata into a central discovery system so that others are aware



Services subscribe to discovery systems with version metadata

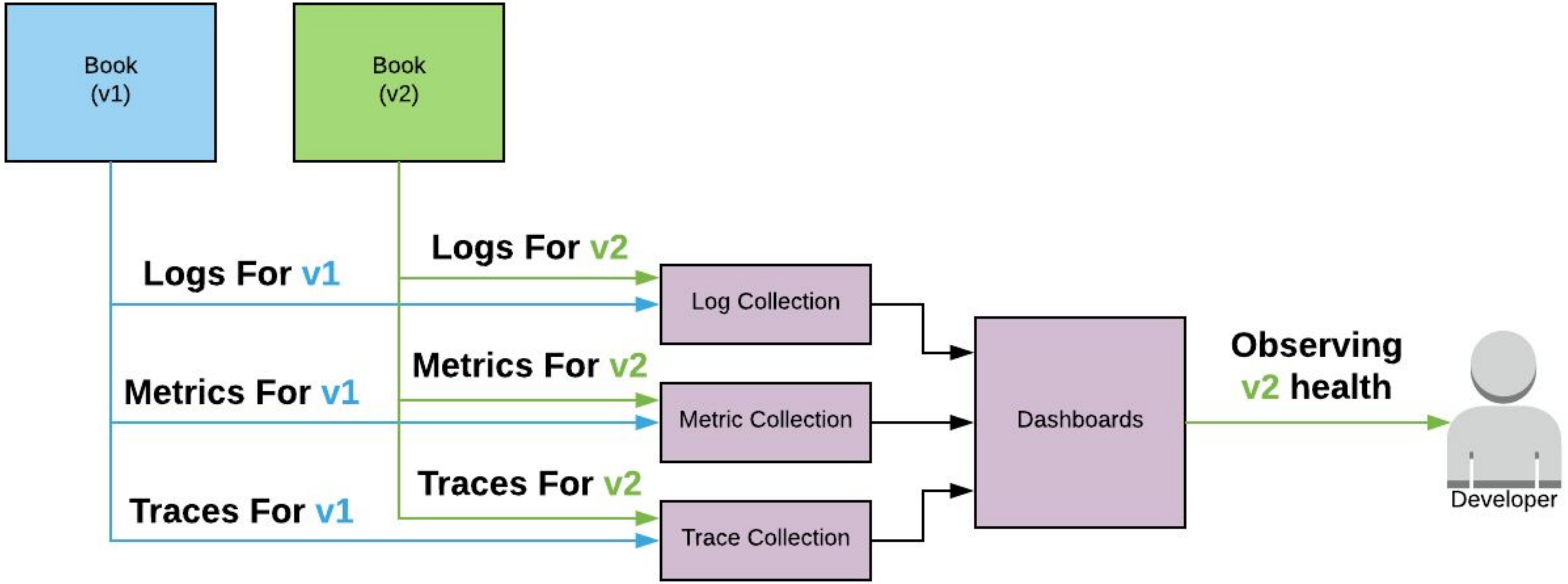
Pipeline updates traffic percentages in discovery system

Discovery subscribers receive traffic % and route accordingly

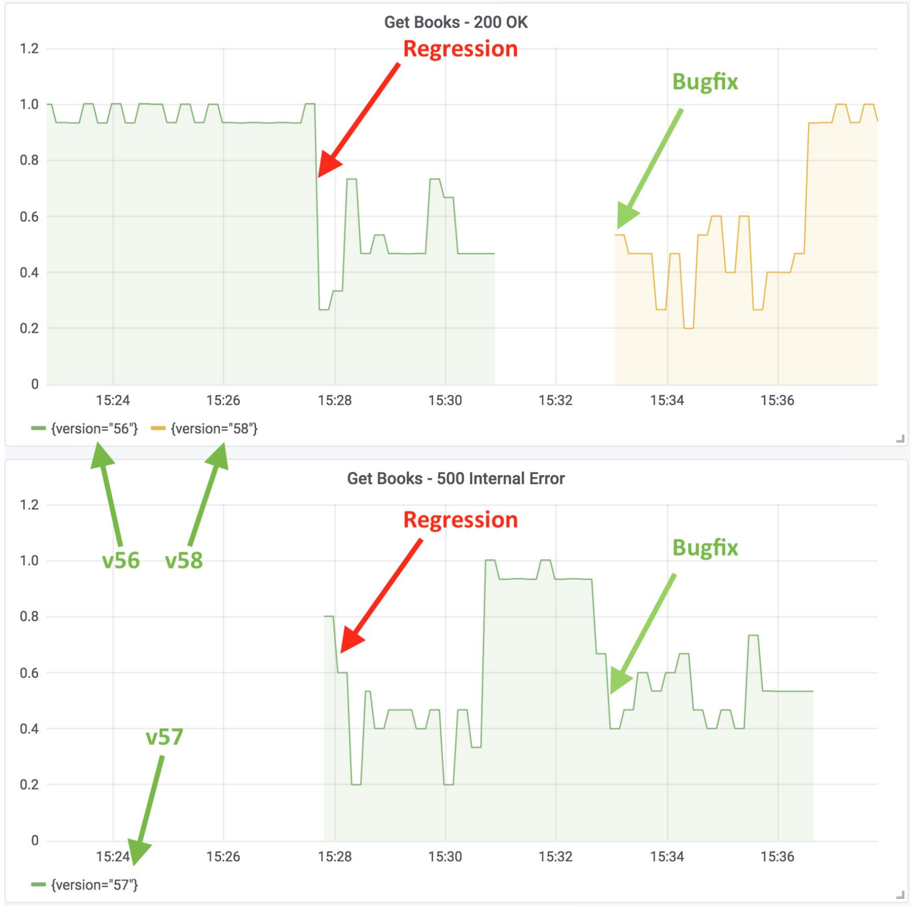


Use Canary Awareness concept to tag metrics/logs/traces with version

Enables developer filtering capabilities to observe health of the new version



Able to see an increase in errors (500s) from version 56 to version 57



Service stabilizes with deployment of version 58

Yes, that is Grafana in "light mode"

Other Considerations

Scale Based Canary

Using replication scale to randomize canary traffic

Canary State Management

Producing a consistent user experience

Automated Canary Analysis

Automate canary judgement based on metrics

Service Mesh

Magically connecting services together

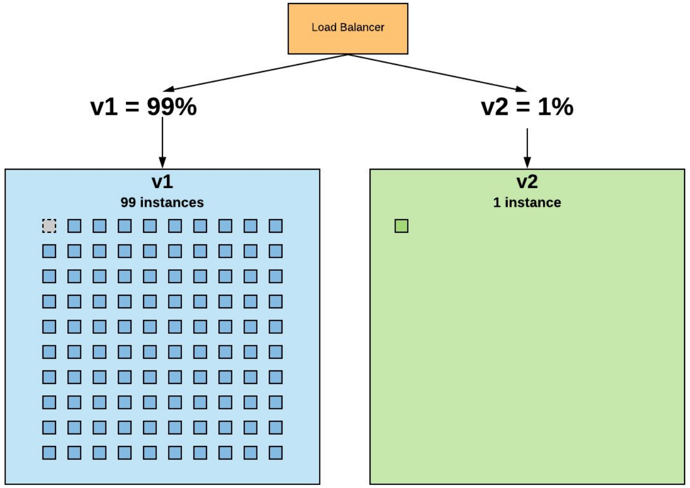
Scale Based Canary

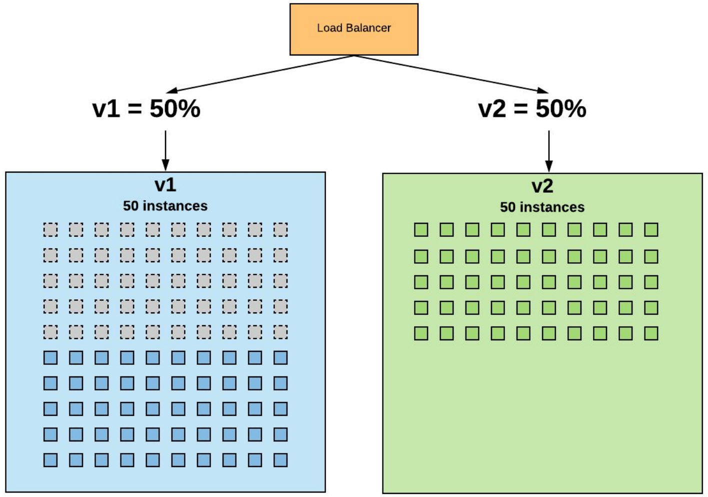
Use replica scale as a way to saturate new version traffic with old version traffic

Do some math…

(**1** instance of **v2**) / (**99** instances of **v1**) = **1%** traffic to **v2**

(**50** instance of **v2**) / (**50** instances of **v1**) = **50%** traffic to **v2**





Scale Based Canary

PROS

Ability to use commodity load balancers without custom routing

Easy to implement

Works well for service per load balancer setup

CONS

Scale requirements to saturate traffic can be expensive

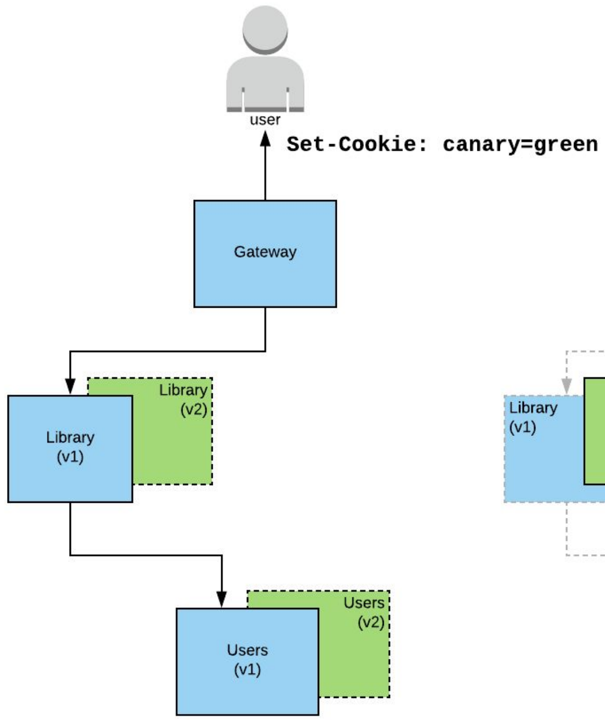
Difficult to slice pertangages for < 10 instances

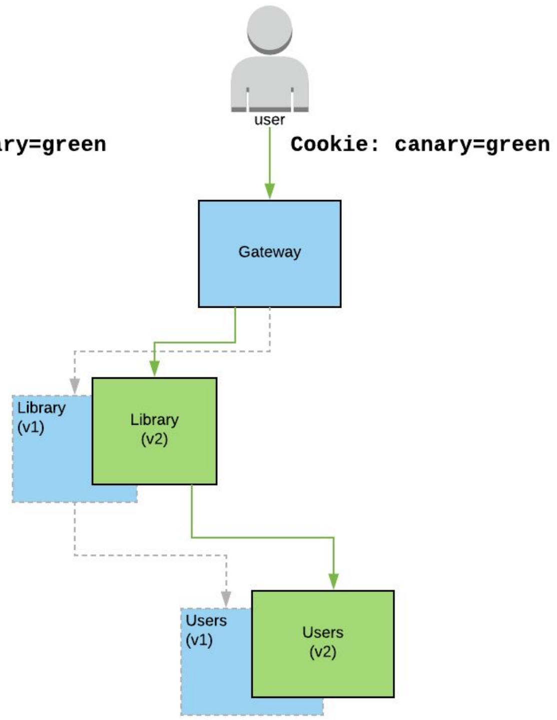
Use of cloud based LB's like AWS ELB require one LB per service group

Canary State Management

Ability to keep a user chosen for canary testing on the same version

User does not get an inconsistent experience from mixed versions





Automated Canary Analysis

Establishing a baseline of healthy metrics

Using the baseline to evaluate a new deployment

Fail deployment if new deployment metrics do not meet healthy thresholds

Spinnaker is a Continuous Delivery tool with contributors such as Netflix, Google, and Kenzan

Spinnaker introduced automated canary analysis in a component called Kayenta
https://github.com/spinnaker/kayenta

Compares a baseline metric against the new version and judges the deployment

Currently supports Stackdriver, Prometheus, and DataDog metric providers

Service Mesh

Connects services together over the network

Manages load balancing between apps

Uses discovery to route traffic

Istio offers Traffic Shifting capabilities to enable canary traffic management

Creates sidecar proxies using Envoy that manage mesh traffic

Works on Kubernetes to discover services and route traffic

Bundled with telemetry tools such as Prometheus, Grafana, and Jaeger

Istio

Demo Setup

Platform: Kubernetes

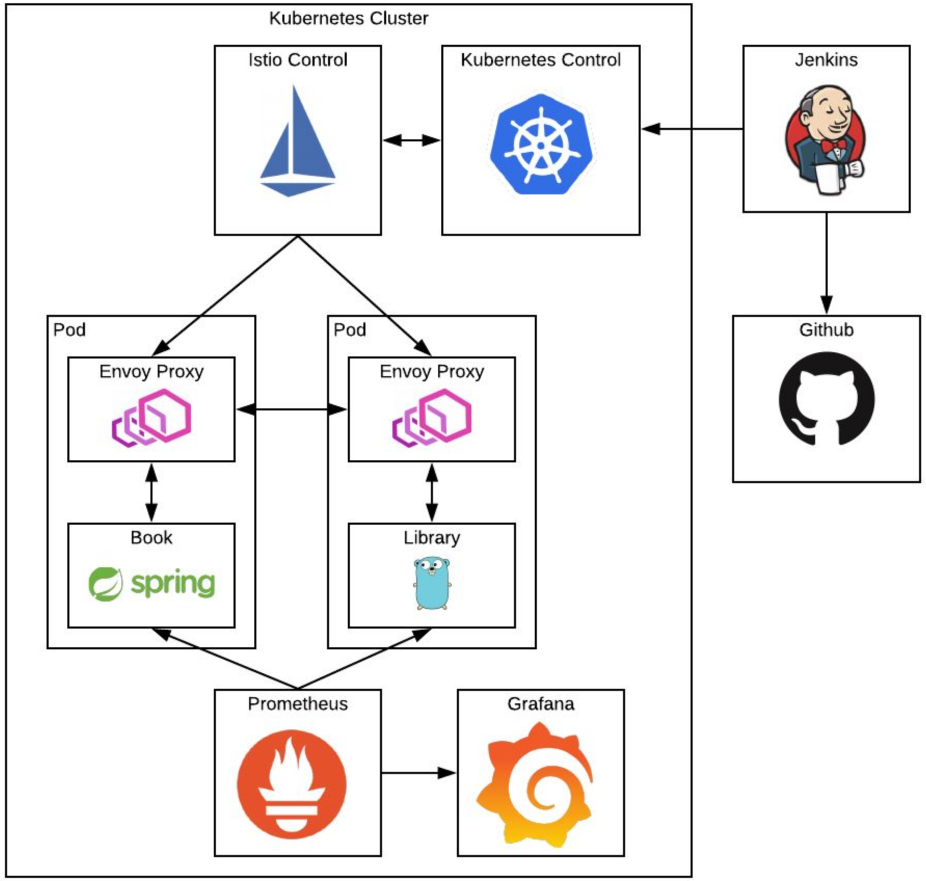
Traffic Management: Istio/Envoy

CI/CD: Jenkins

Source Control: Github

Microservices:
Library built in Go
Book built with Spring Boot

Monitoring: Prometheus/Grafana



Conclusion

Advantages

Limits the user impact of a bad deployment

Increases feature deployment velocity

More Open Source Canary tools becoming available

Disadvantages

Requires **real** user traffic

Introduces new complexities

Organizational resistance to adapt a new deployment process

Questions?

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