Being a Cloud Native Architect

Burr Sutter (burrsutter.com)

@burrsutter - bit.ly/jnation2019

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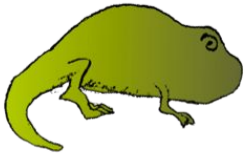
OPENSHIFT

QUARKUS

Developer Evolution :-)

70s	80s	90s	00s	10s	
					
COBOL JCL WFL	C/C++ 4GLs CASE Netware RDBMS SQL Unix	HTTP/HTML CGI GET/POST Cookies Java Servlet EJB Windows NT Solaris/AIX OOP	MVC - Struts DI - Spring ORM - Hibernate XML, WS-* JSF AJAX J2EE -> Java EE Agile Automated Testing CI SVN Linux	Angular/React/Vue iOS/Android, IoT Maven/Gradle Git REST, gRPC, Websockets MongoDB, Redis Hadoop/Spark Docker/Kubernetes Reactive or Functional CI/CD, DevOps Blue/Green, Canary Microservices	Mythical Beast

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Elements/Ingredients

1. DevOps & Agile
2. Skill Portability
3. On-Demand - Never Wait & Always Automate
4. Pipeline Throughput, Deployment Interval, Optimize for Learning
5. Deployment Techniques
6. Application Architecture vs Application Infrastructure
7. Linux Containers
8. Kubernetes/OpenShift & Hybrid Cloud
9. Service Mesh: Observability, Security, Traffic Control (Istio)
10. Serverless Serving (Knative)
11. Build In Cluster (Tekton)
12. Beyond HTTP (AMQP, Kafka, Knative Eventing, Camel-K)

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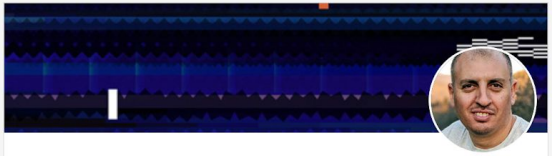
O'REILLY®

July 16, 2019
Introduction to encryption
Presented by **Michael Pound**

99 SPOTS REMAINING — LEARN MORE



July 16, 2019
Advanced React.js
Presented by **Samer Buna**

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July 16, 2019
AWS for Mobile App Developers
Presented by **Bear Cahill**

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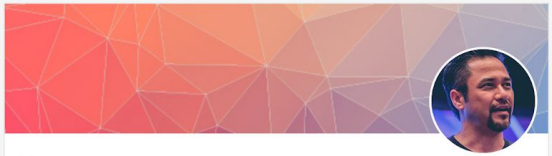

July 16, 2019
9 Steps to Awesome with Kubernetes
Presented by **Burr Sutter**

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July 16, 2019
Scalable Data Science with Apache Hadoop and Spark
Presented by **Douglas Eadline**

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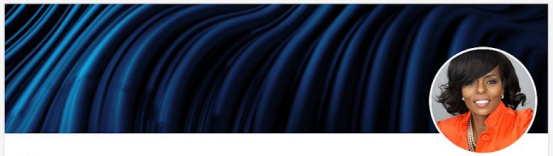

July 16, 2019
Why smart leaders fail
Presented by **Pamela Rucker**

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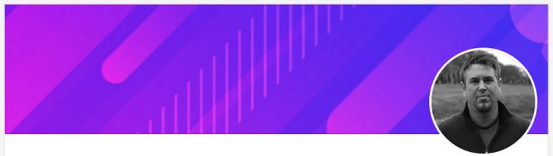
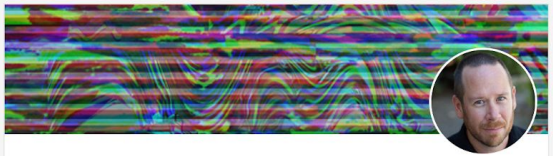


July 16, 2019
Getting Started with Cloud Computing
Presented by **Michael Shannon**

186 SPOTS REMAINING — LEARN MORE

July 17 & 18, 2019
Getting started with Python 3
Presented by **Matt Harrison**

136 SPOTS REMAINING — LEARN MORE



July 17 & 18, 2019
AWS Certified SysOps Administrator (Associate) Crash Course
Presented by **Chad Smith**

187 SPOTS REMAINING — LEARN MORE

Adapt what is useful, reject what is useless, and add what is specifically your own.

— *Bruce Lee*

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1999

1999

Cost of a Java-based Web App circa 1999

	$18,000	Sun Sparc App Server Box (4 CPUs, 2GB of RAM)
+	$60,000	BEA Weblogic
+	$92,000	Sun Spark DB Server Box (8 CPUs)
+	$243,000	Oracle RDBMS
+	$50,000	Symantec Visual Café for 10 developers

$463,000 (capex) + ~$**80,000** annual maint (opex)

m5ad.4xlarge	16	N/A	64 GiB	2 x 300 NVMe SSD	$0.824 per Hour
m5ad.12xlarge	48	N/A	192 GiB	2 x 900 NVMe SSD	$2.472 per Hour
m5ad.24xlarge	96	N/A	384 GiB	4 x 900 NVMe SSD	$4.944 per Hour
m5d.large	2	8	8 GiB	1 x 75 NVMe SSD	$0.113 per Hour
m5d.xlarge	4	16	16 GiB	1 x 150 NVMe SSD	$0.226 per Hour
m5d.2xlarge	8	31	32 GiB	1 x 300 NVMe SSD	$0.452 per Hour

MEMORY	VCPUS	SSD DISK	TRANSFER	PRICE
1 GB	1 vCPU	25 GB	1 TB	$5/mo $0.007/hr
2 GB	1 vCPU	50 GB	2 TB	$10/mo $0.015/hr
3 GB	1 vCPU	60 GB	3 TB	$15/mo $0.022/hr
2 GB	2 vCPUs	60 GB	3 TB	$15/mo $0.022/hr
1 GB	3 vCPUs	60 GB	3 TB	$15/mo $0.022/hr
4 GB	2 vCPUs	80 GB	4 TB	$20/mo $0.030/hr
8 GB	4 vCPUs	160 GB	5 TB	$40/mo $0.060/hr
16 GB	6 vCPUs	320 GB	6 TB	$80/mo $0.119/hr

INSTANCE	VCPU	RAM	TEMPORARY STORAGE	PAY AS YOU GO
D2 v3	2	8 GiB	50 GiB	$0.096/hour
D4 v3	4	16 GiB	100 GiB	$0.192/hour
D8 v3	8	32 GiB	200 GiB	$0.384/hour

Cost of a Web App circa 2019

OpenShift

Message Processor (Worker)

AMQ

OpenShift

Message Processor (Worker)

AMQ

OpenShift

Message Processor (Worker)

AMQ

OpenShift

Message Processor (Worker)

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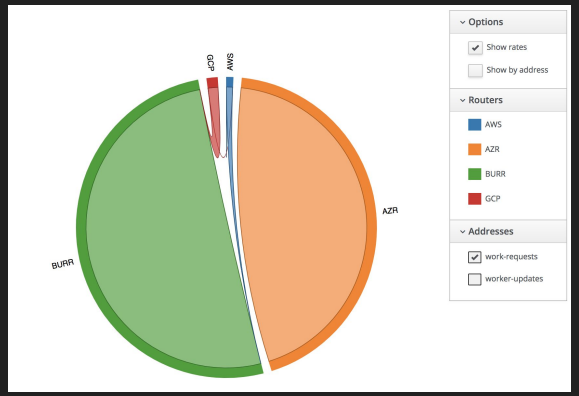

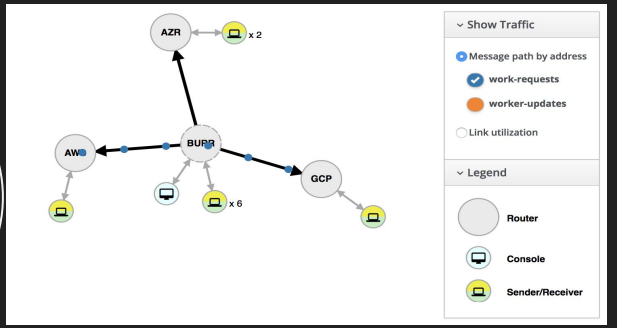

Showing off is the fool's idea of glory.

— *Bruce Lee*

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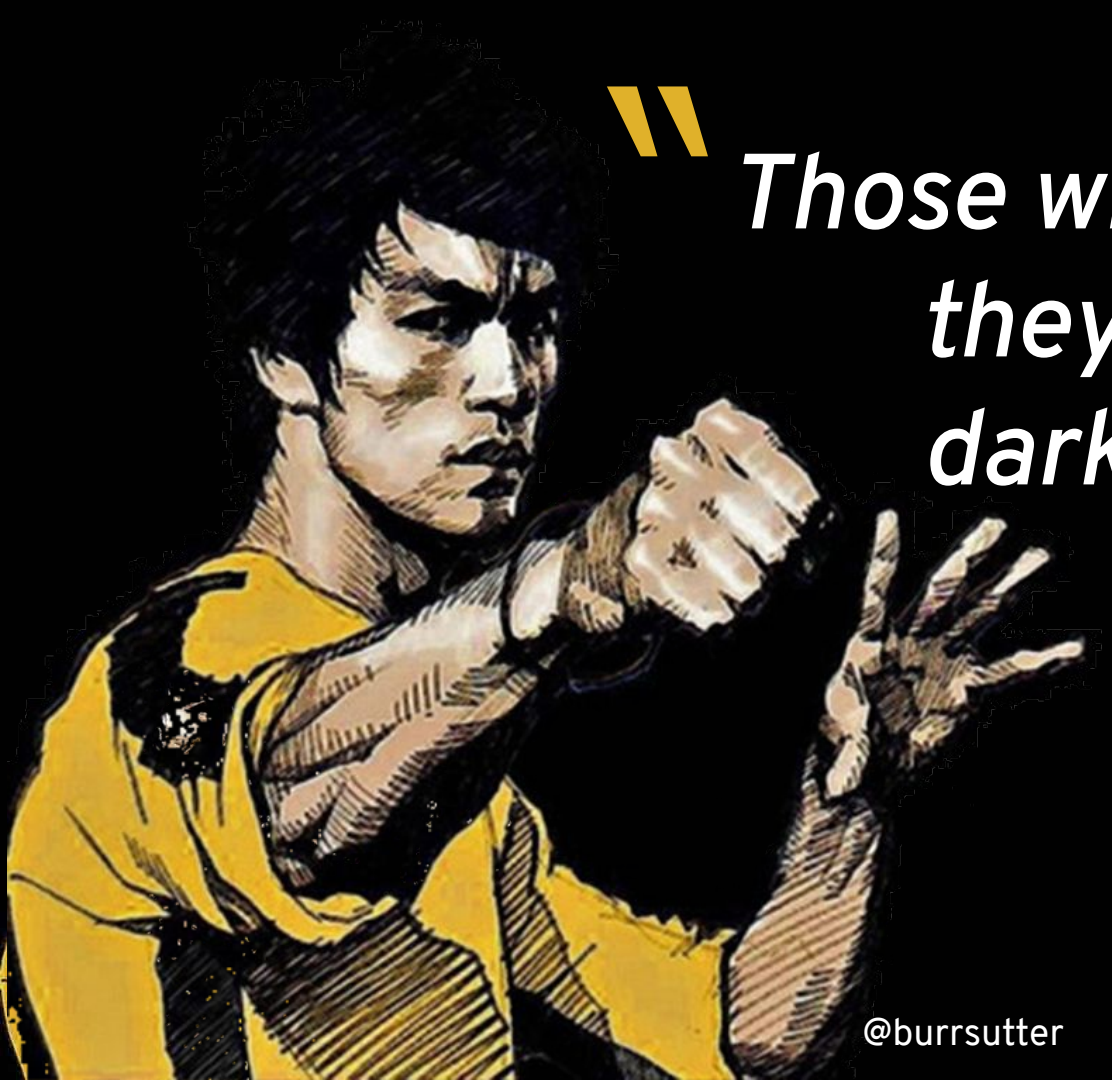

"Those who are unaware they are walking in darkness will never seek the light.

— Bruce Lee

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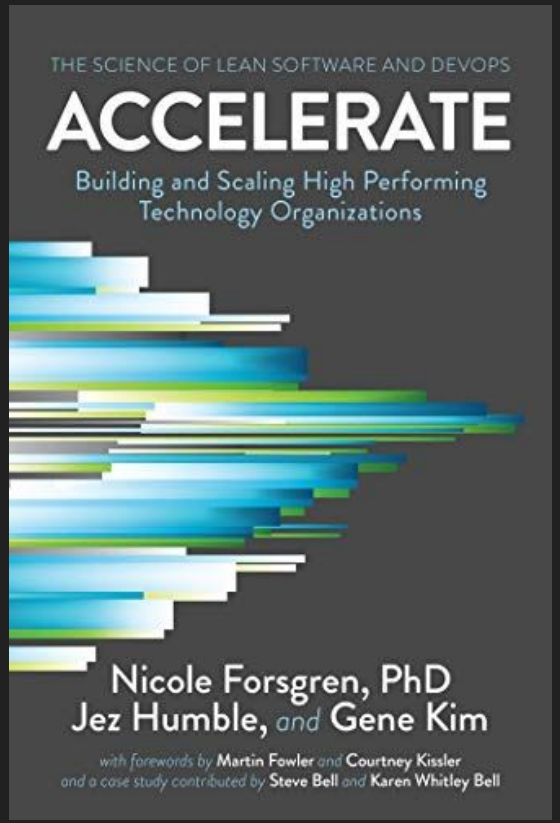
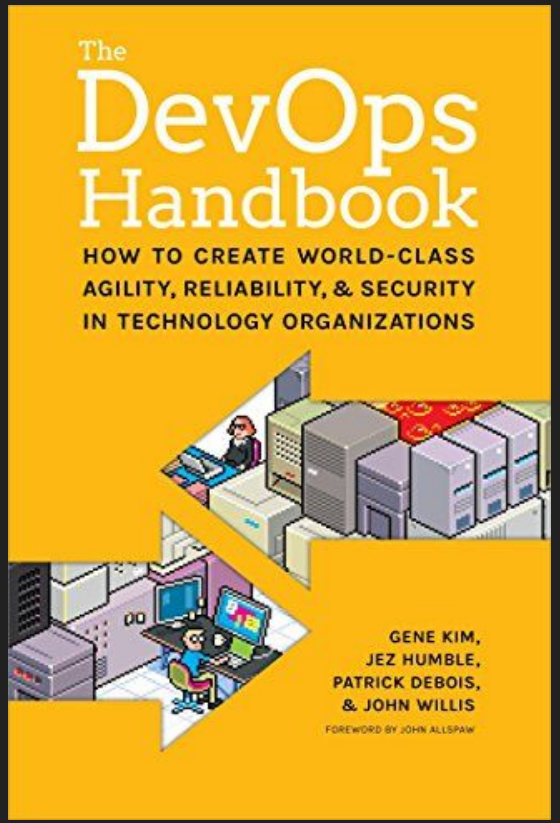
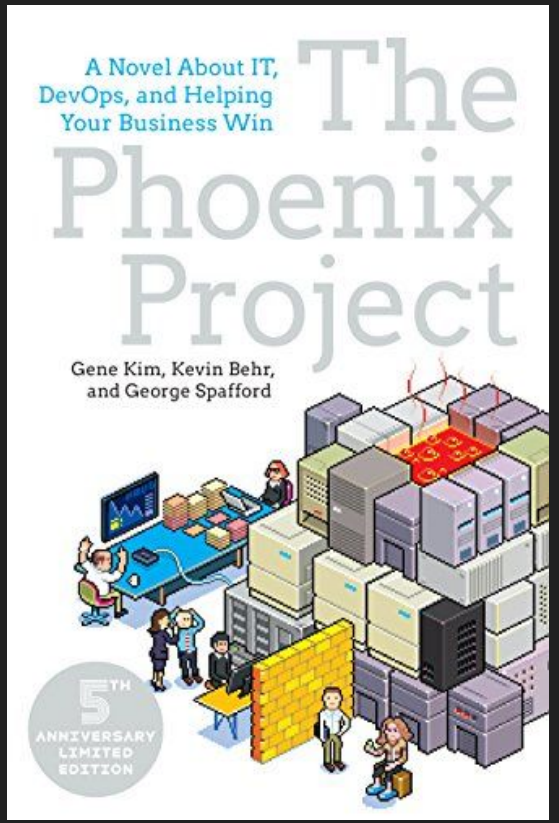
Must Read
State of DevOps Report

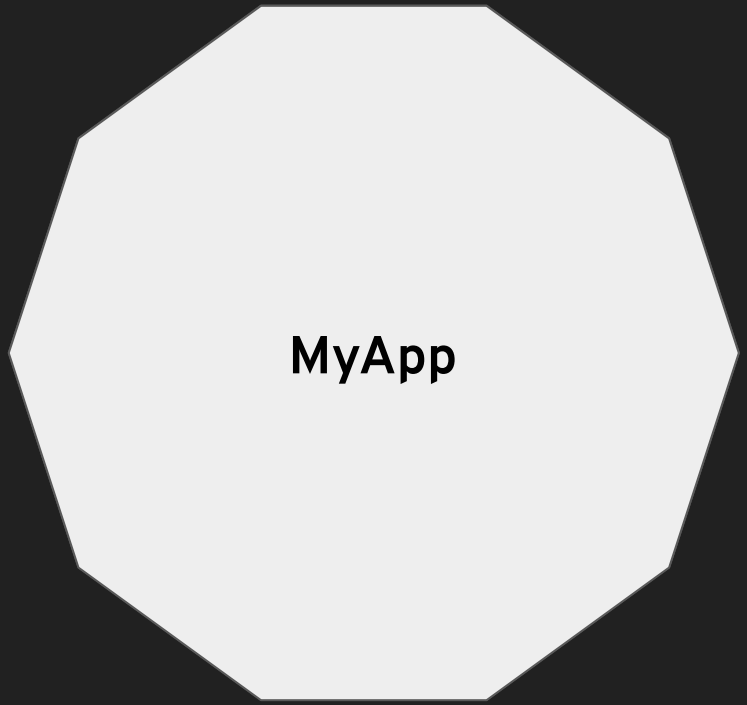
https://devops-research.com/



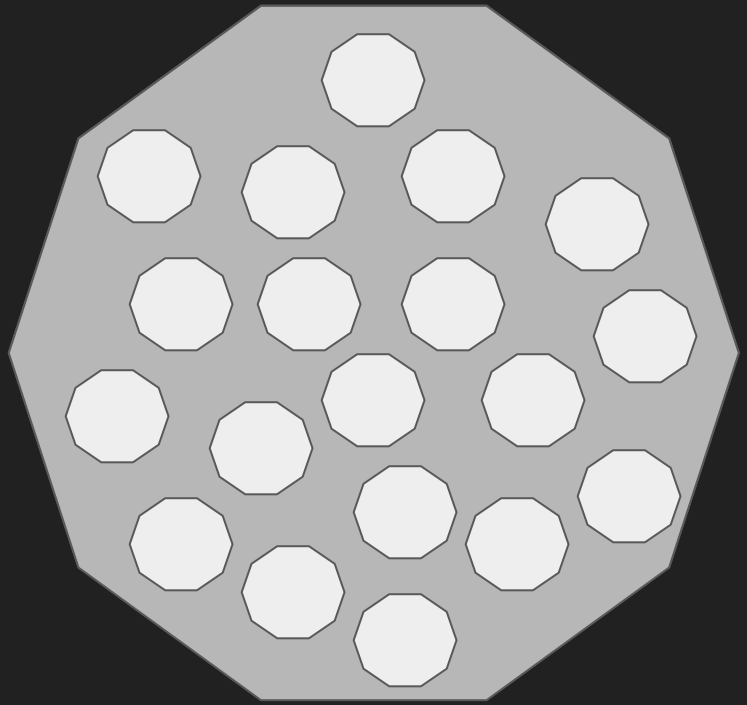




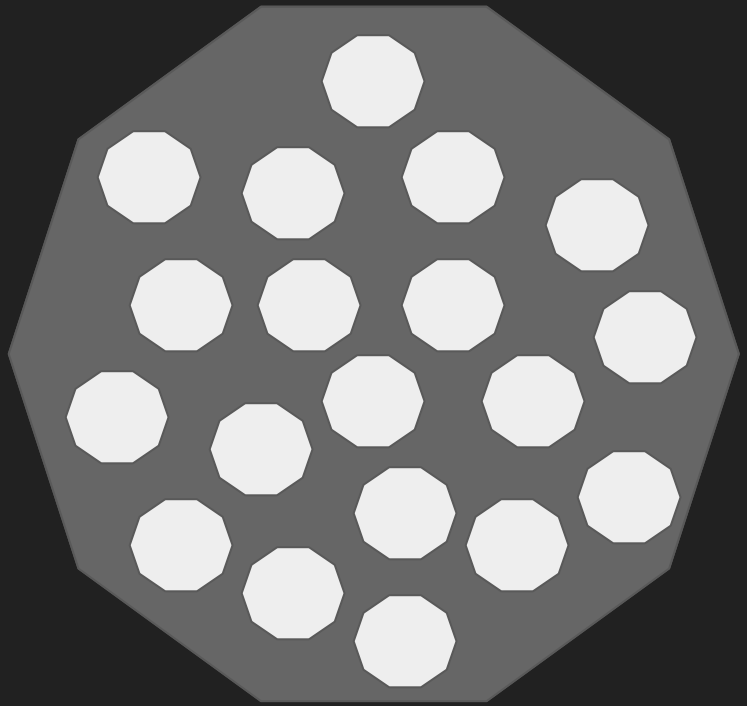
Monolith



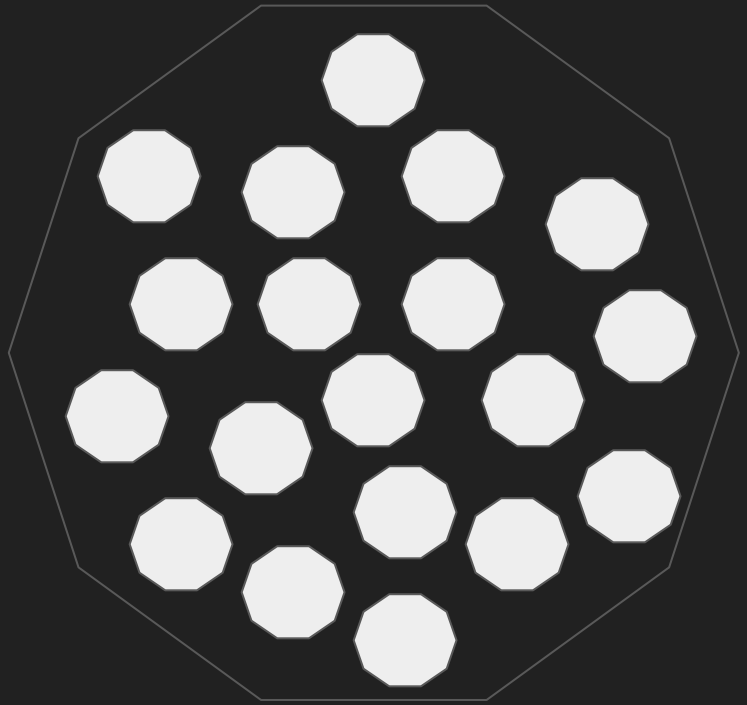
The Application



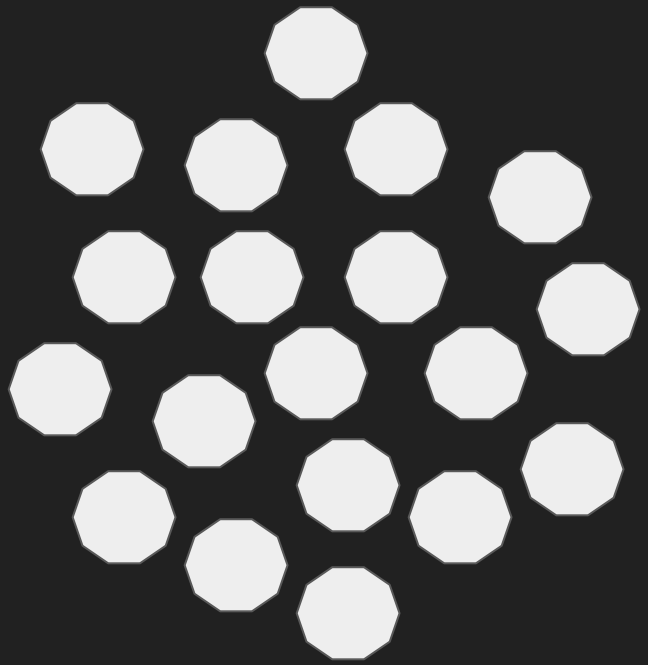
Modules



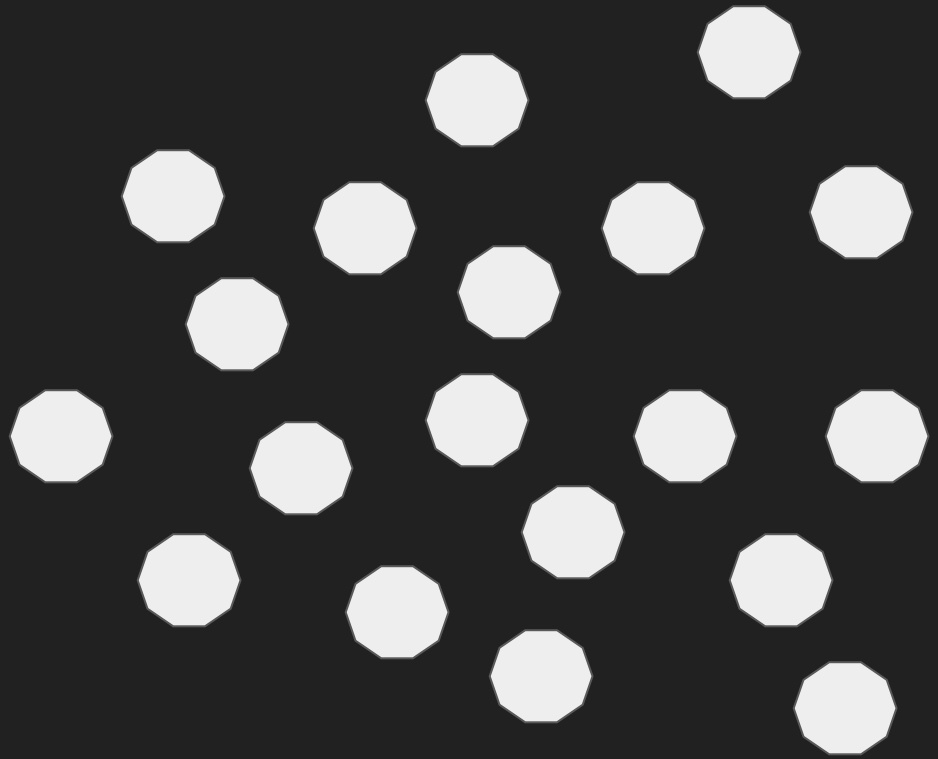
Microservices



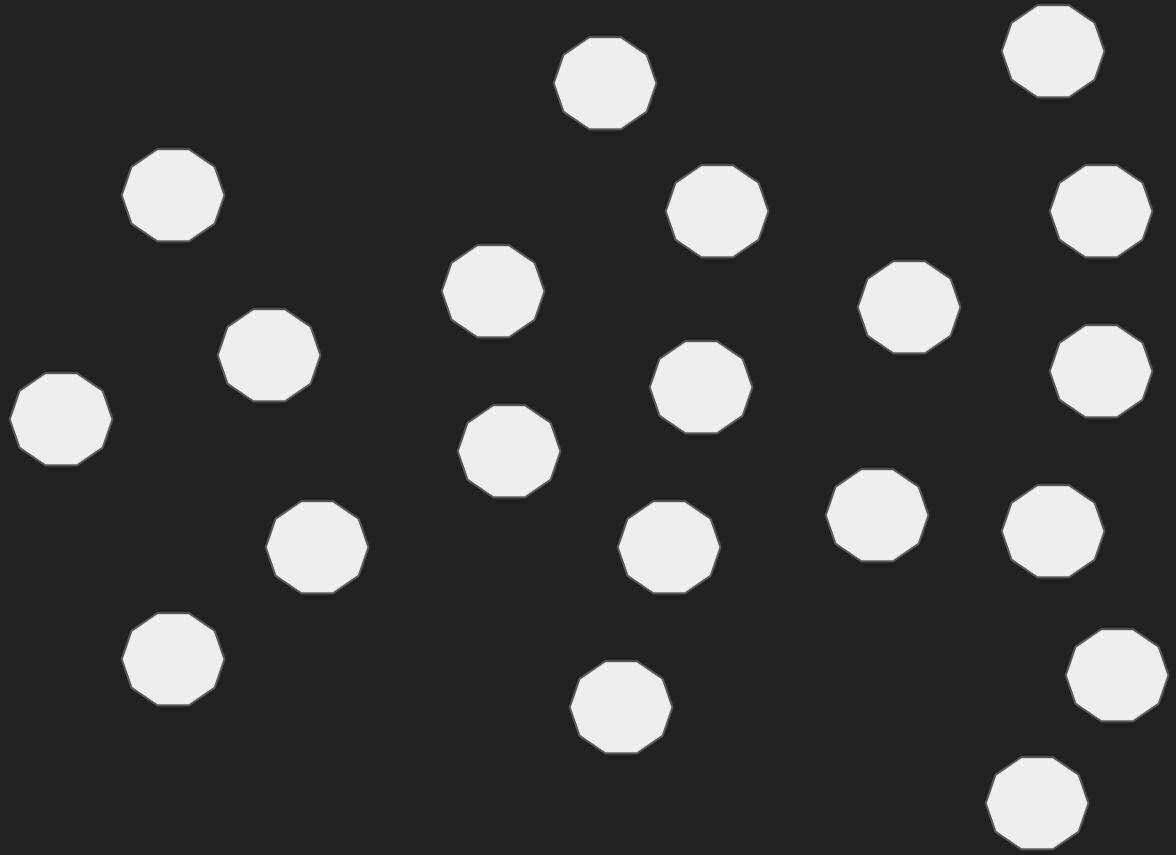
Microservices



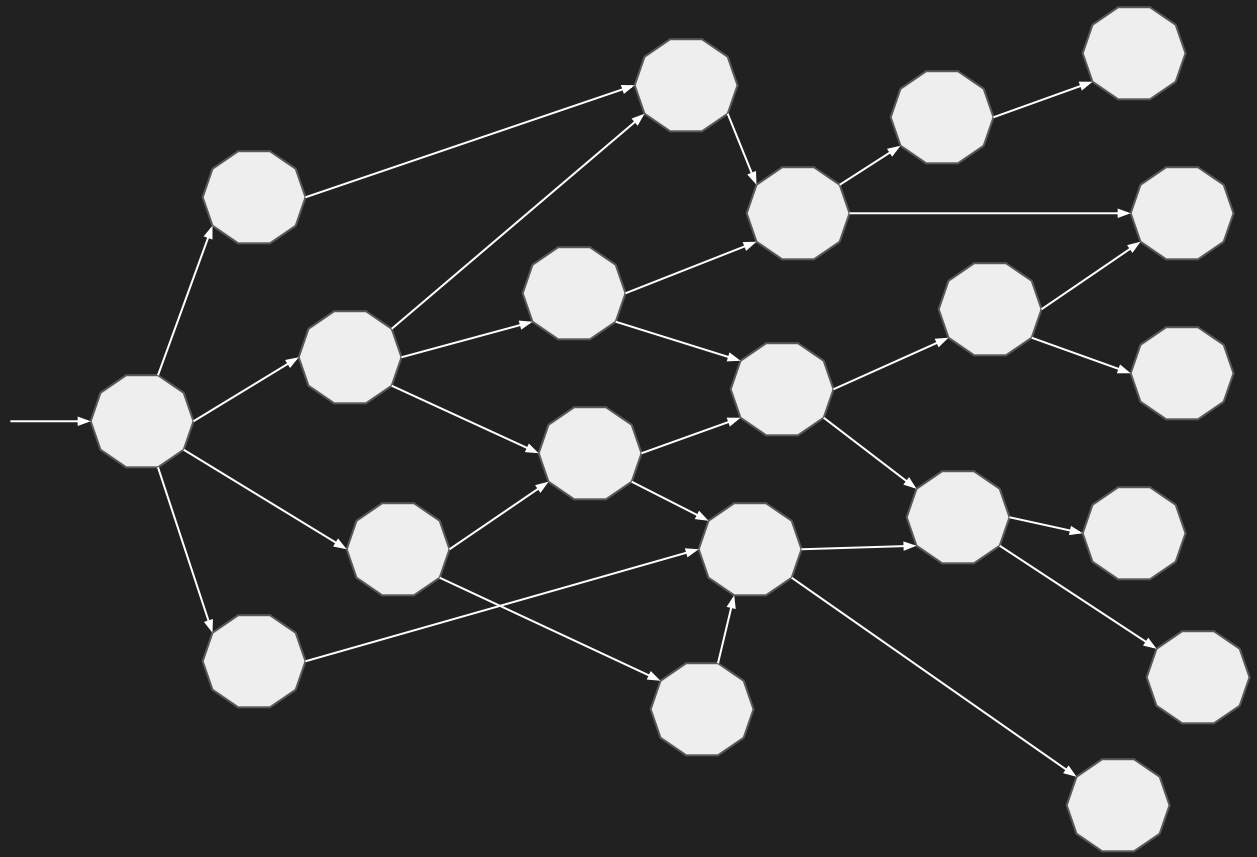
Microservices



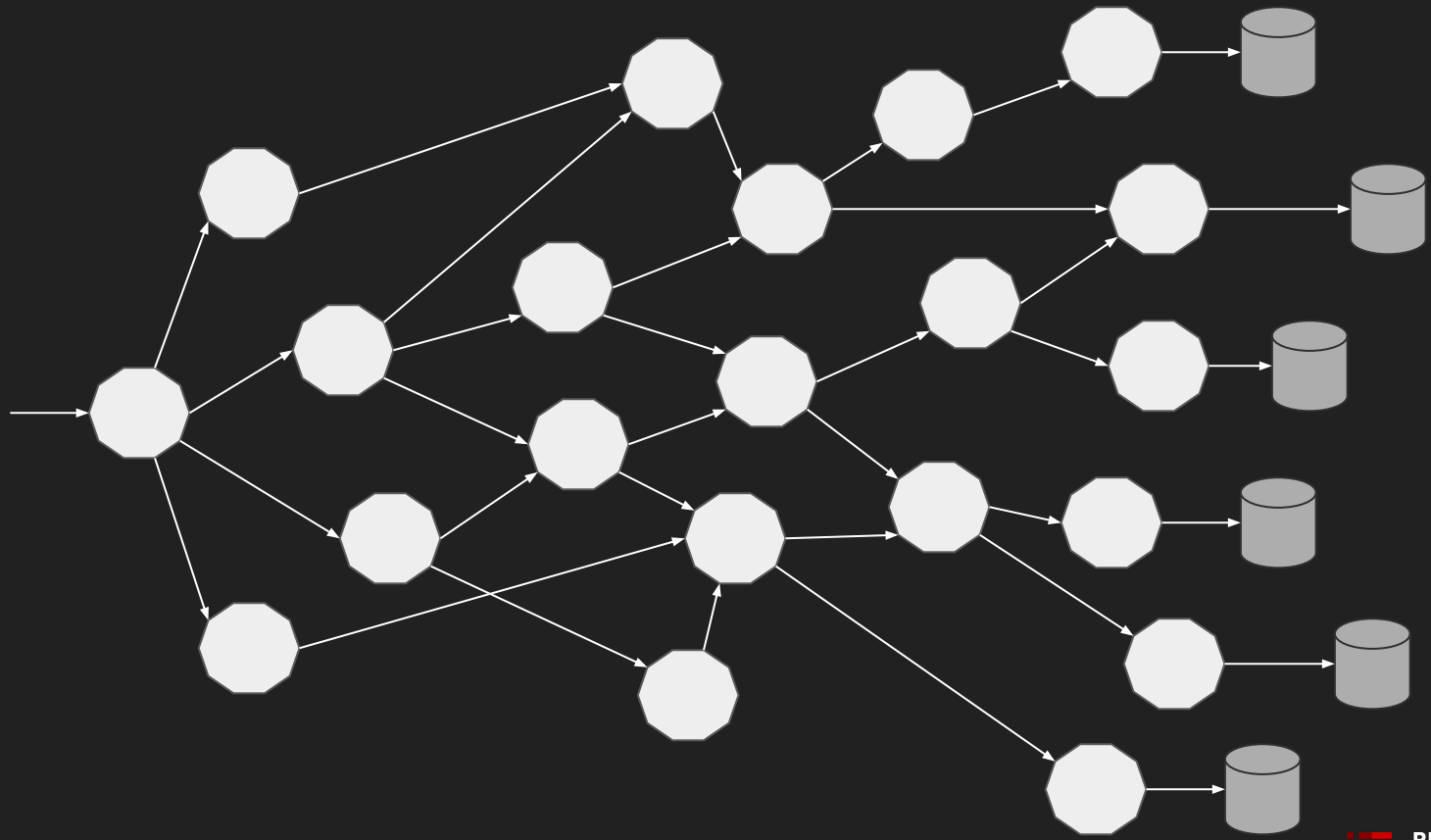
Microservices



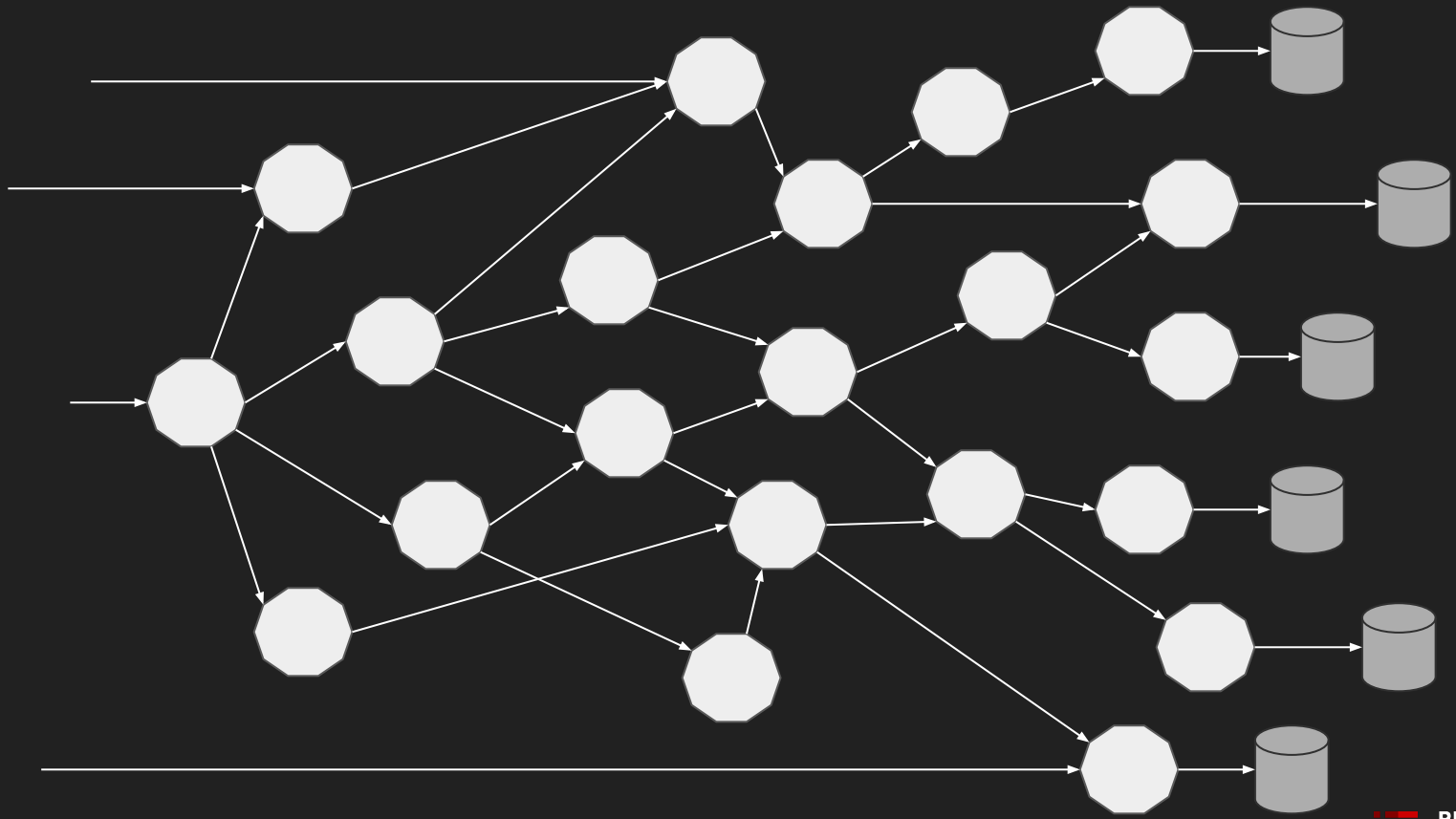
Network of Services



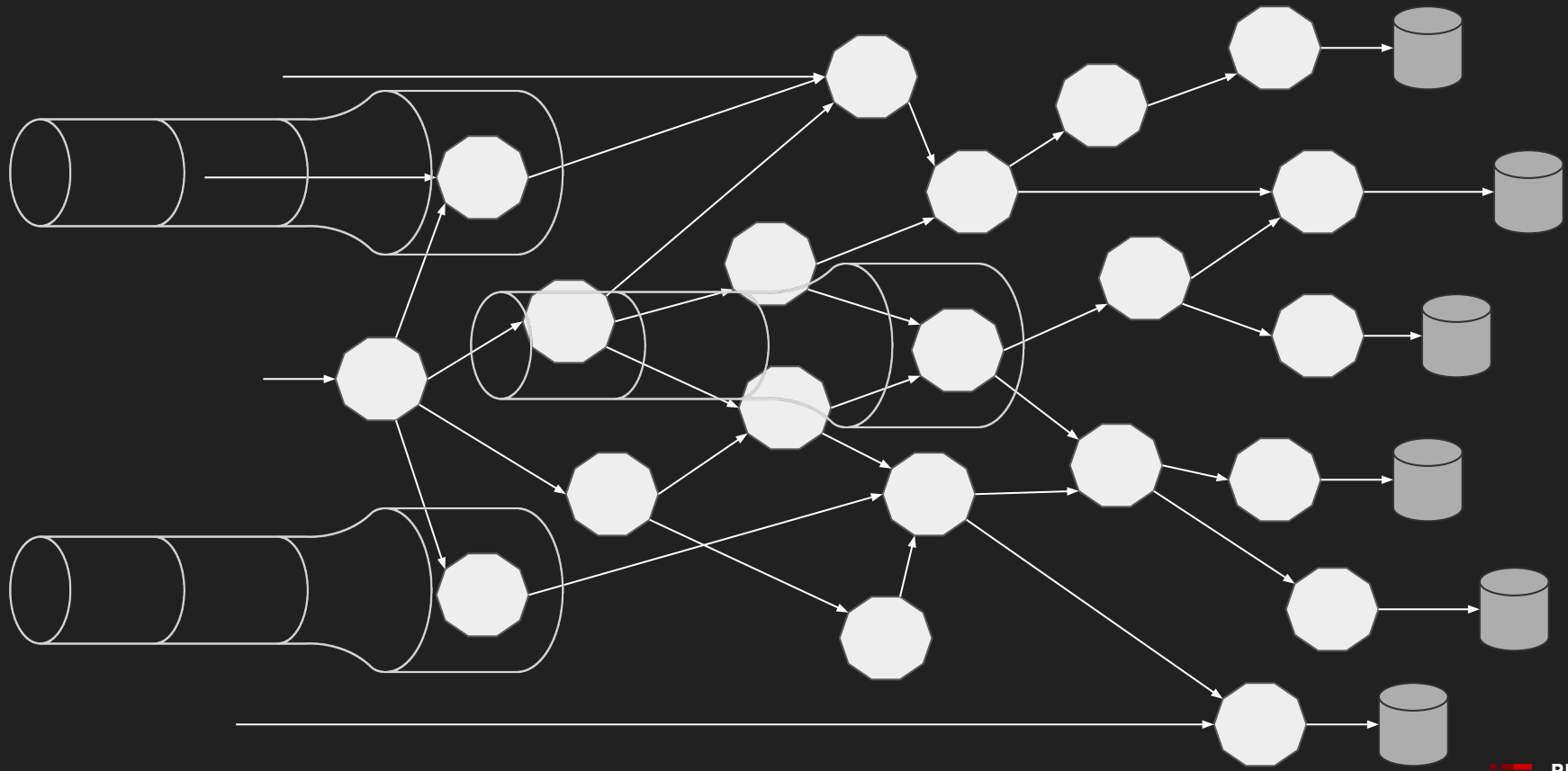
Microservices own their Data



Multiple Points of Entry

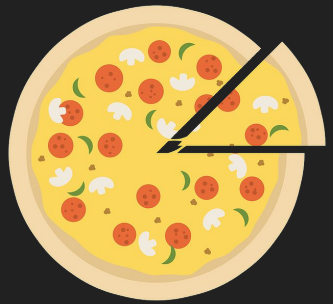


Multiple Teams, Multiple Pipelines



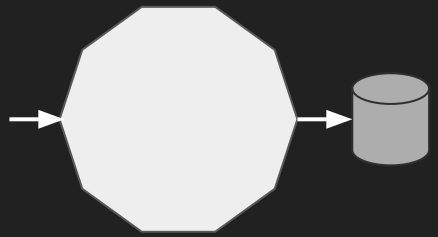
Microservices Principles

1. Deployment **Independence** - updates to an individual microservice have no negative impact to any other component of the system. Optimized for **Replacement**
2. Organized around **business** capabilities
3. **Products** not Projects
4. **API** Focused
5. **Smart** endpoints and dumb pipes
6. Decentralized Governance
7. Decentralized Data Management
8. Infrastructure Automation (infrastructure as code)
9. Design for failure
10. Evolutionary Design



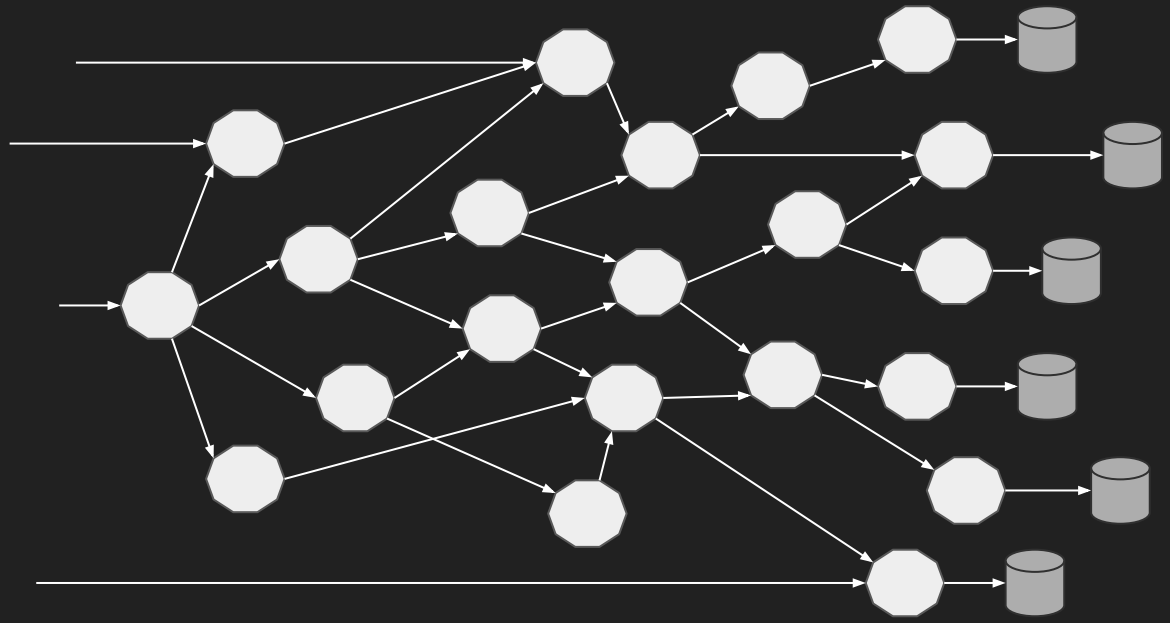
2 Pizza Team

Old School

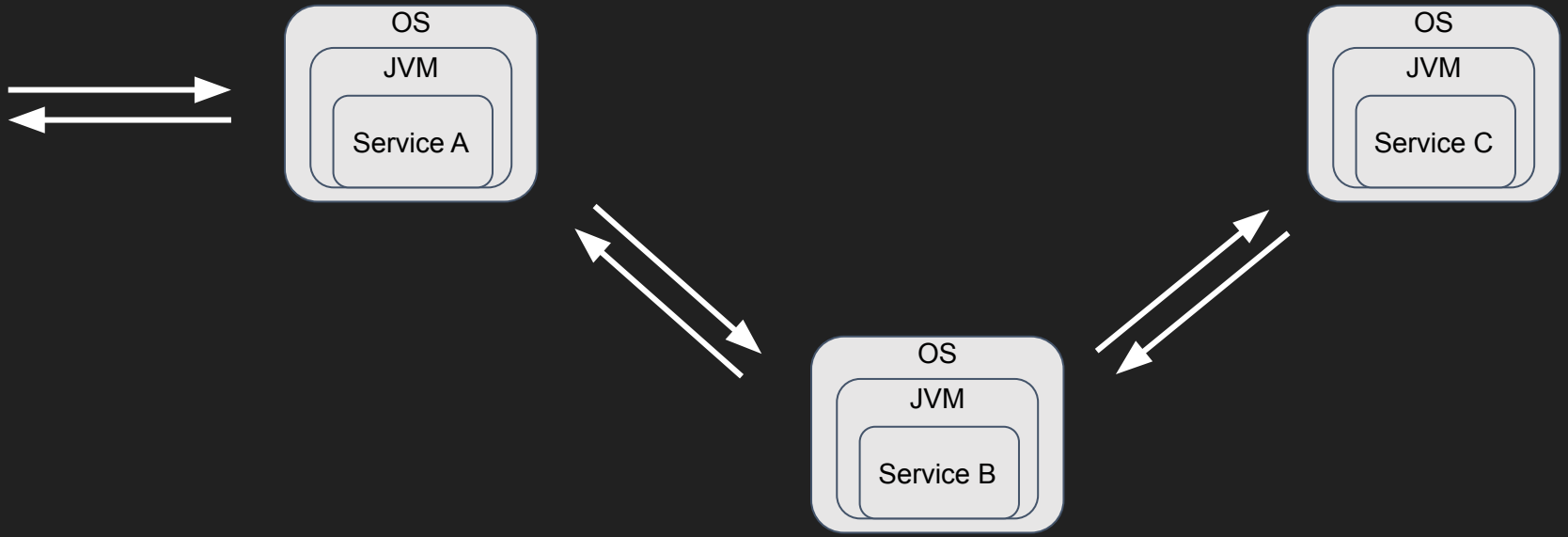


Love Thy Mono

New School



Microservices == Distributed Computing

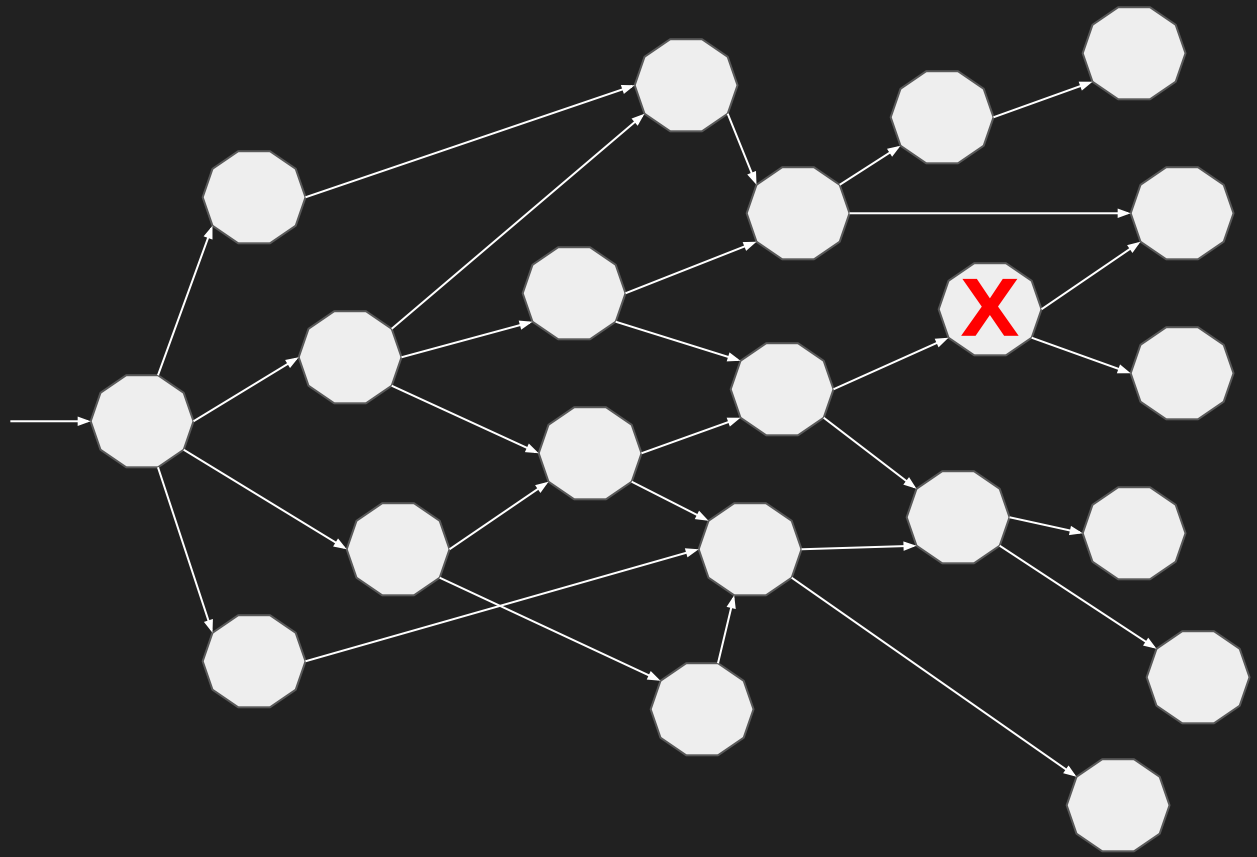


Fallacies of Distributed Computing

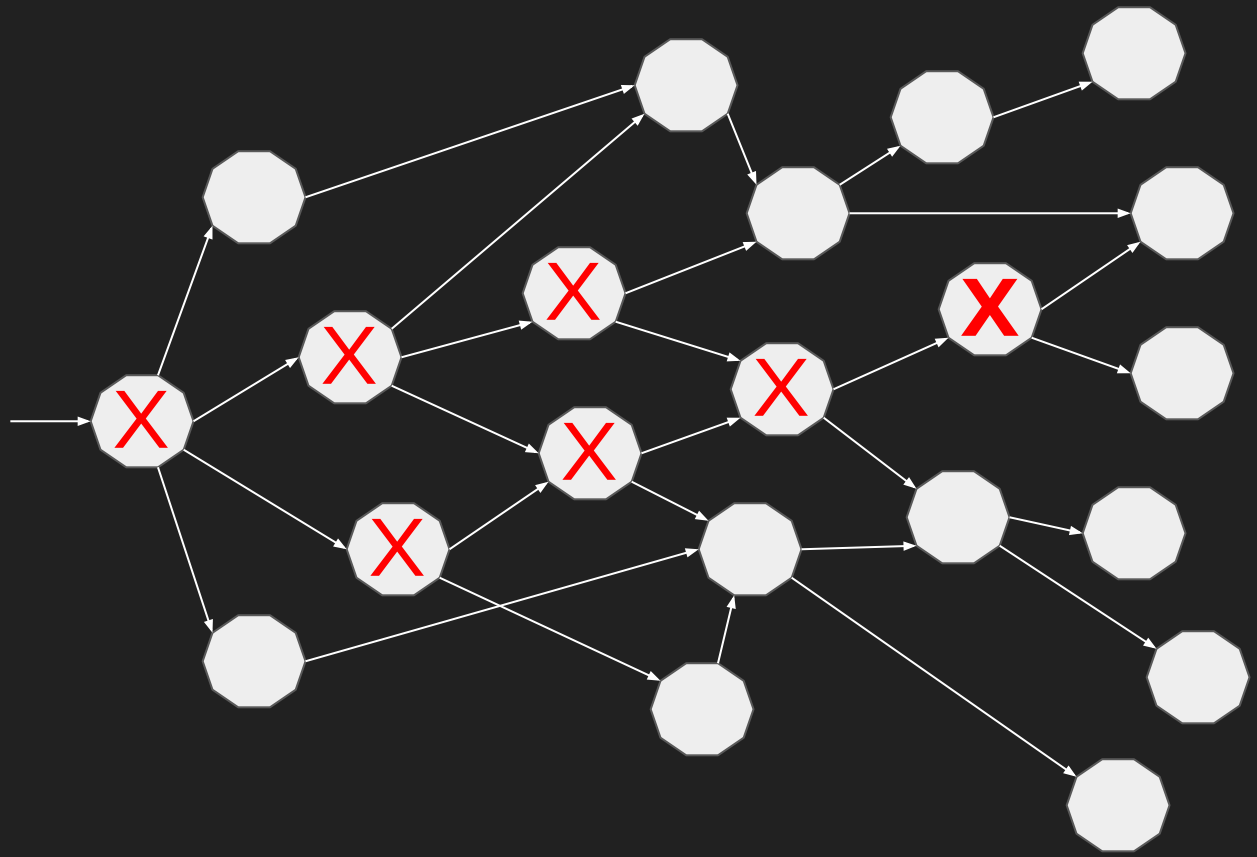
- The Network is Reliable
- Latency is zero
- Bandwidth is infinite
- Topology does not change
- There is one administrator
- Transport cost is zero
- The network is homogeneous

https://en.wikipedia.org/wiki/Fallacies_of_distributed_computing

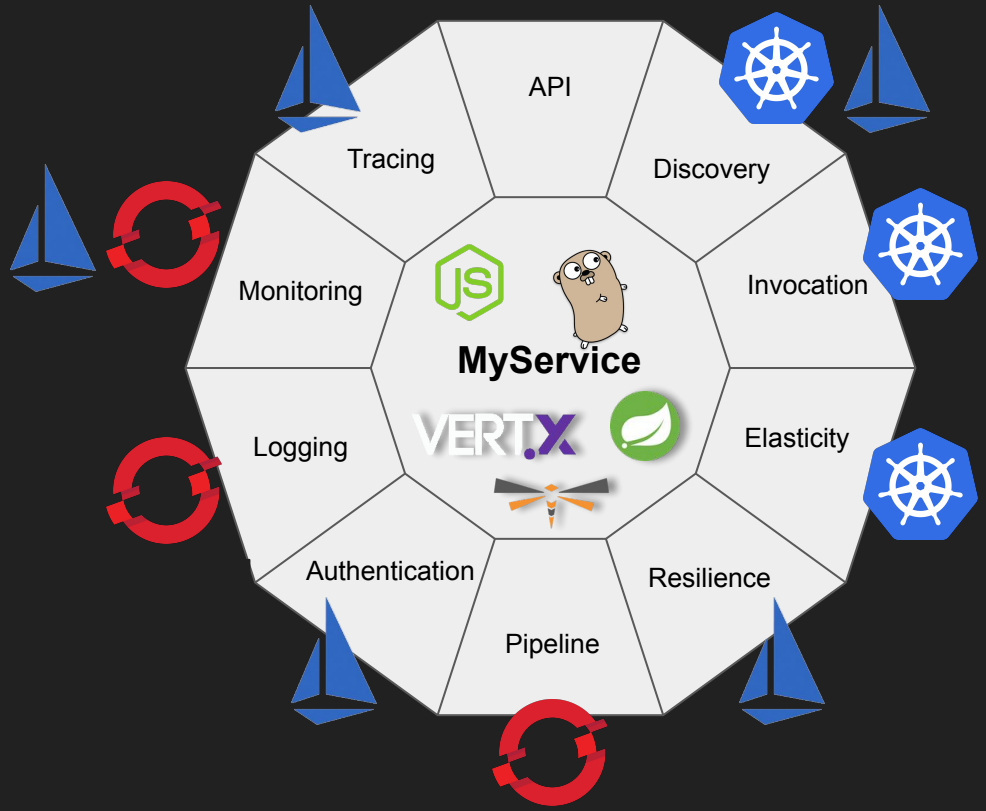
Failure of a Service



Cascading Failure



Microservices'ilities + Istio



Istio

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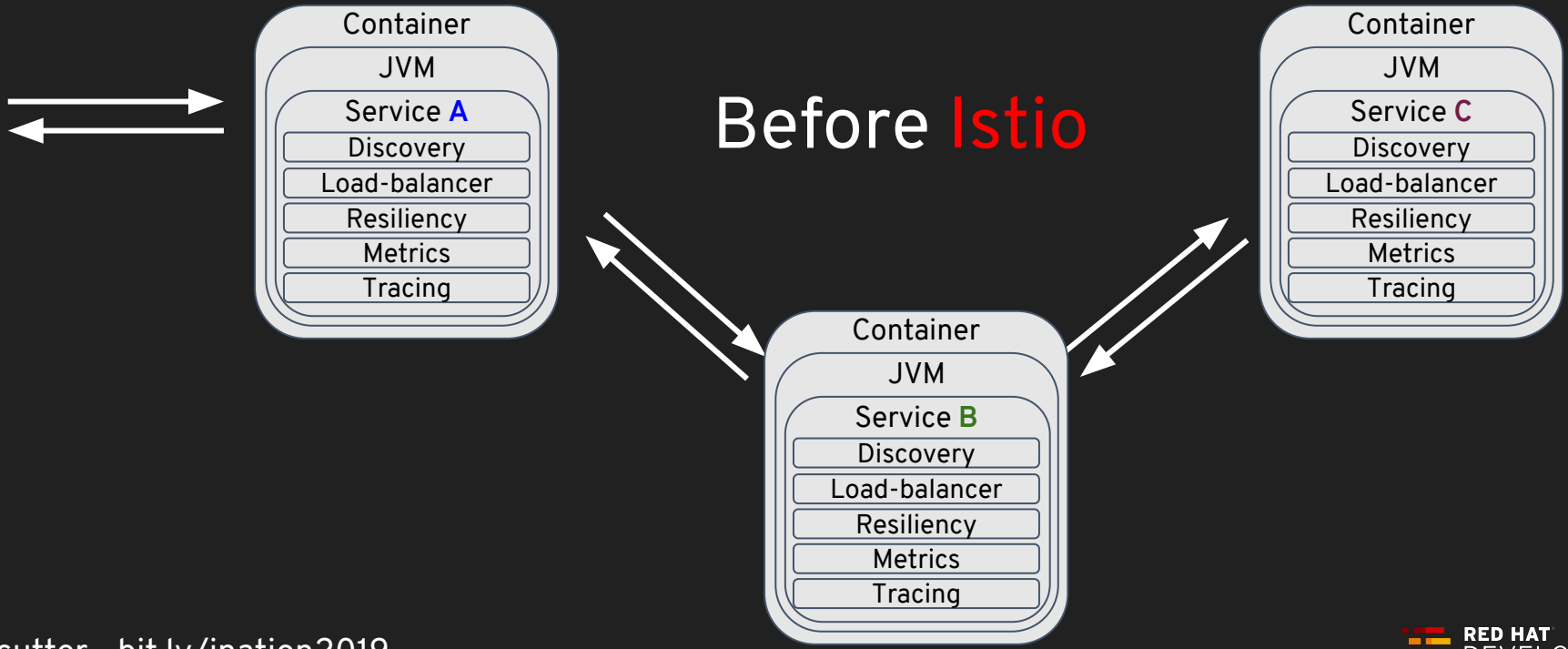
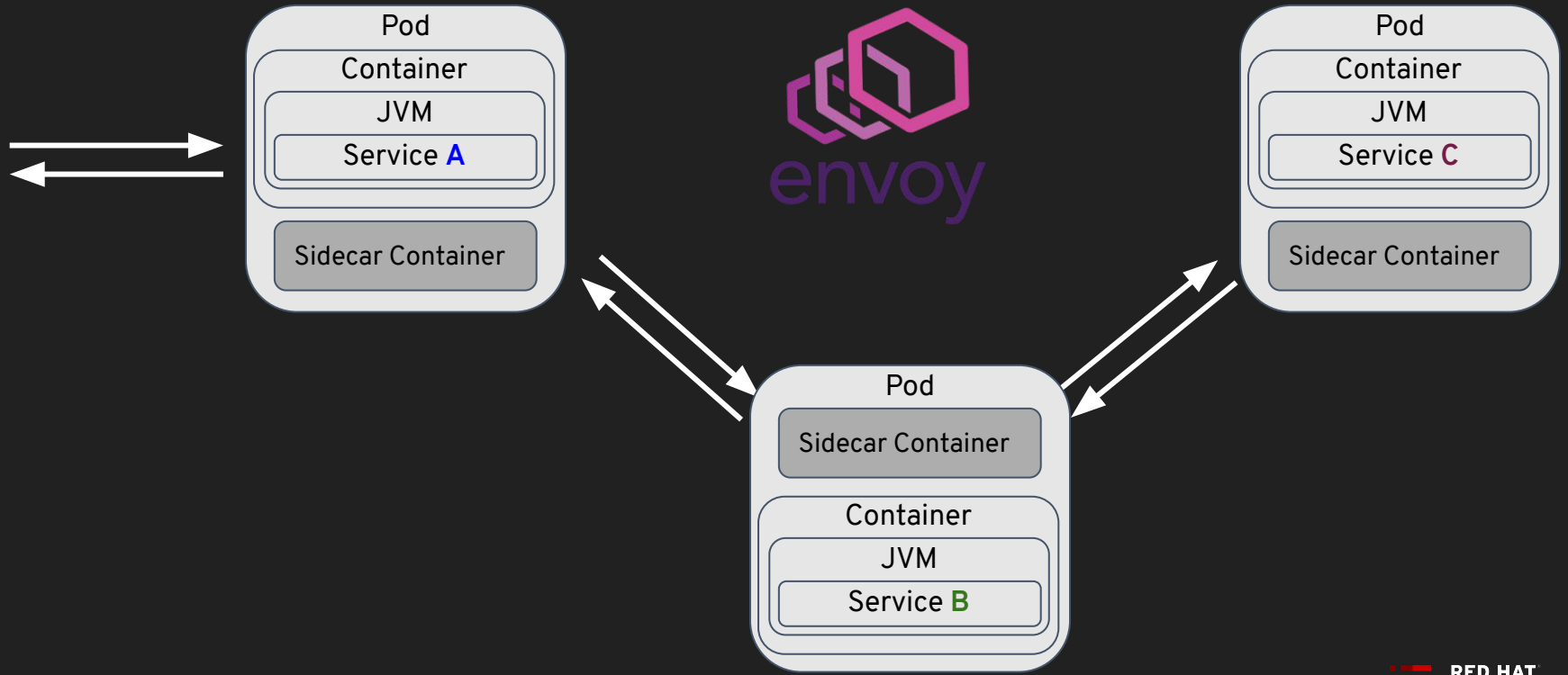
Microservices embedding Capabilities



Envoy is the current sidecar



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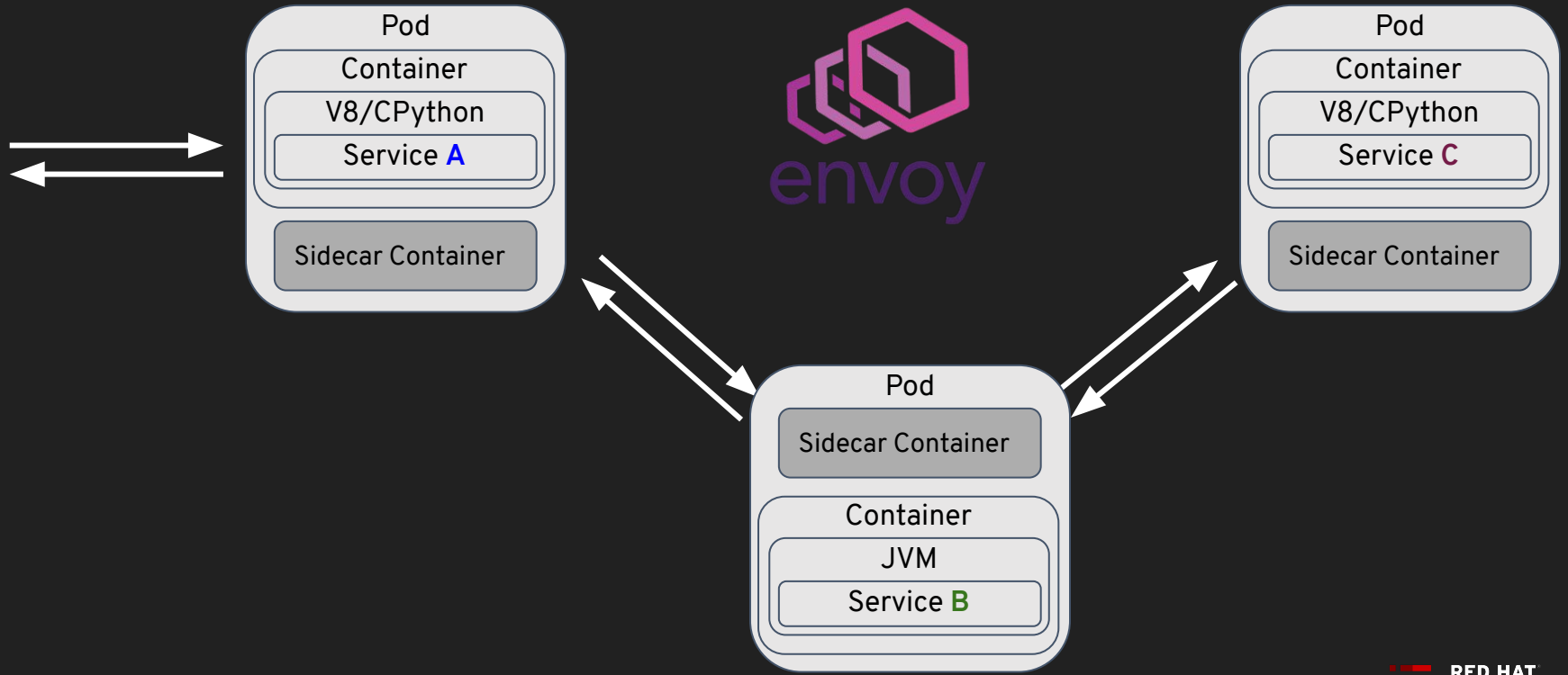
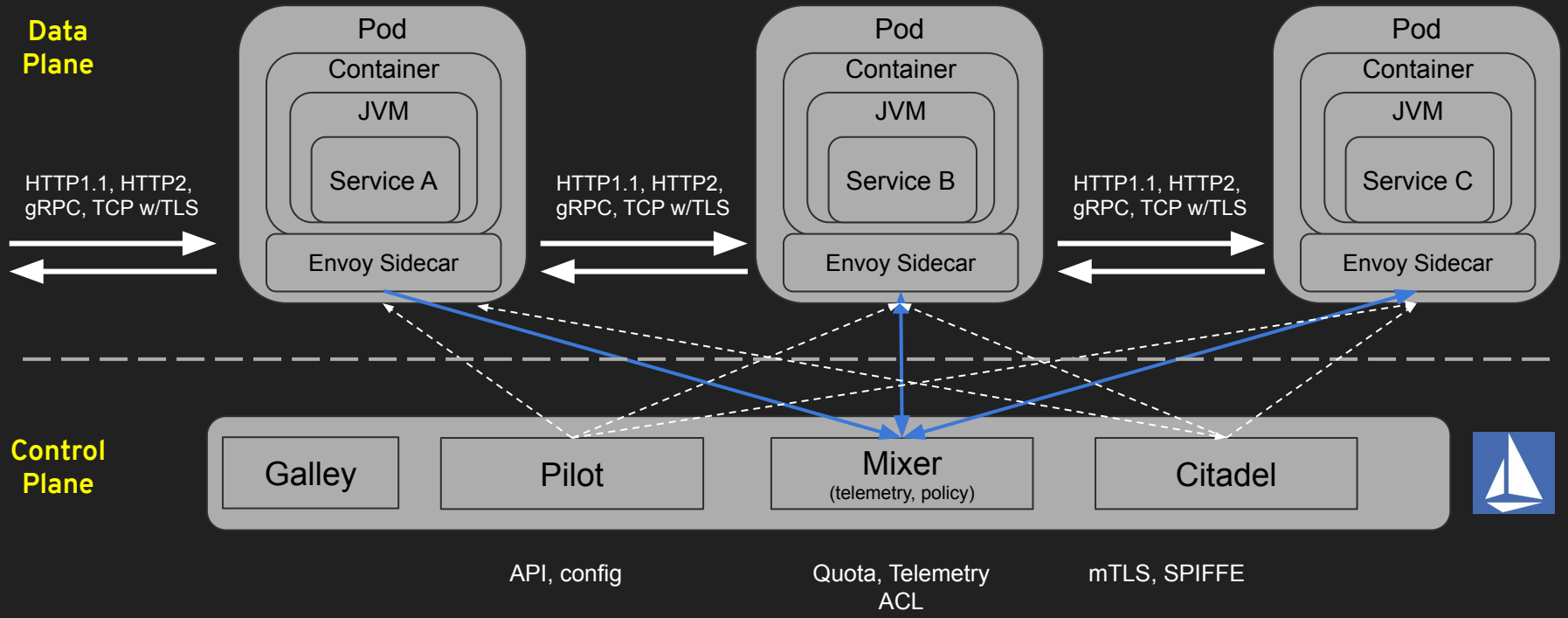
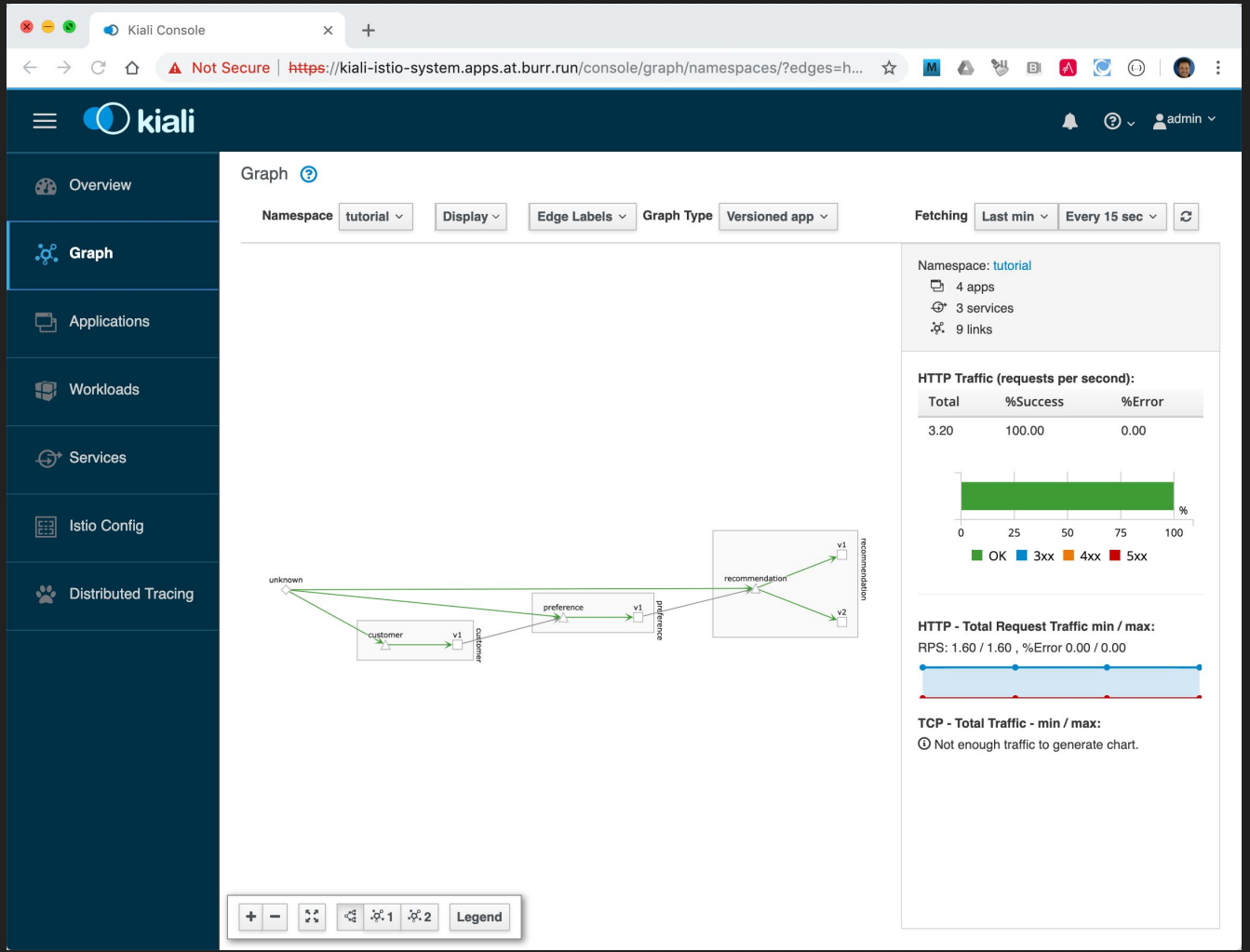


Istio Data Plane vs Control Plane





"Be happy, but never satisfied.

— Bruce Lee

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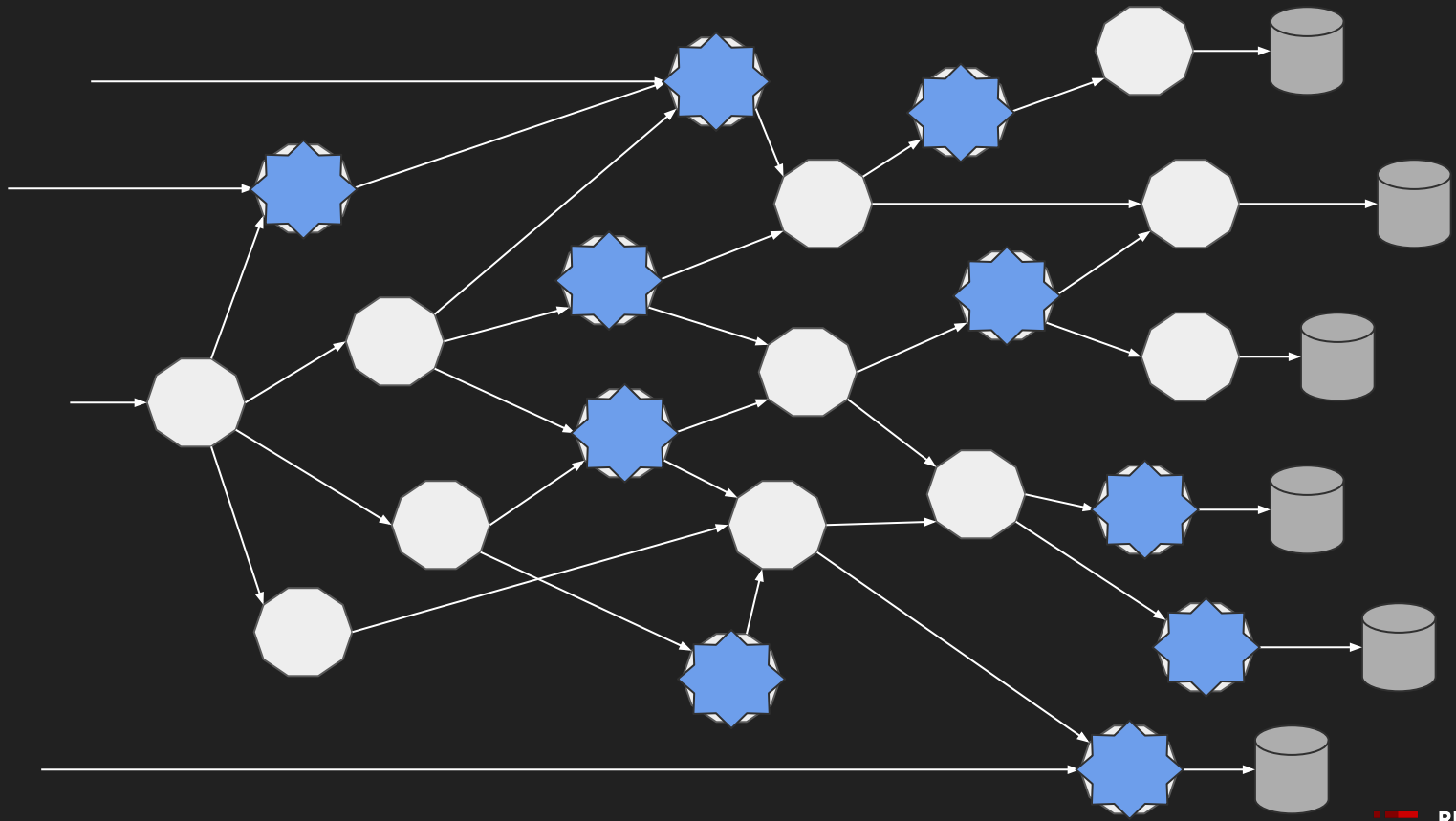
Let there be Functions?

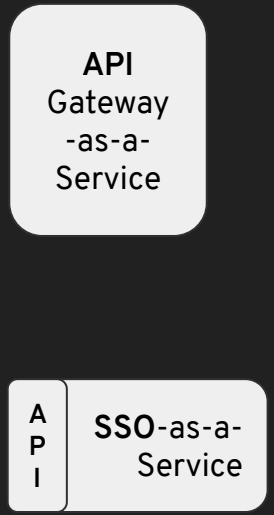


It is Serverless
because of BaaS/SaaS
(managed by another party services).

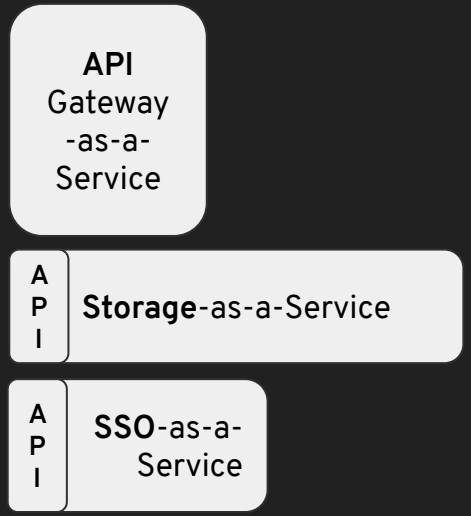
It is all about the Services

HTTP Input/Output Service

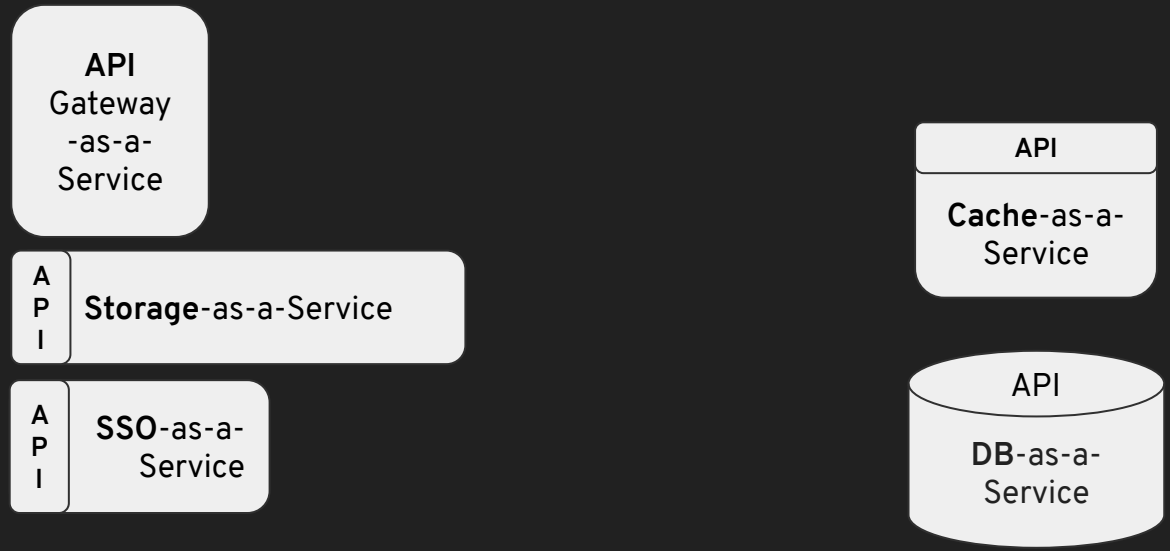
Authentication Service



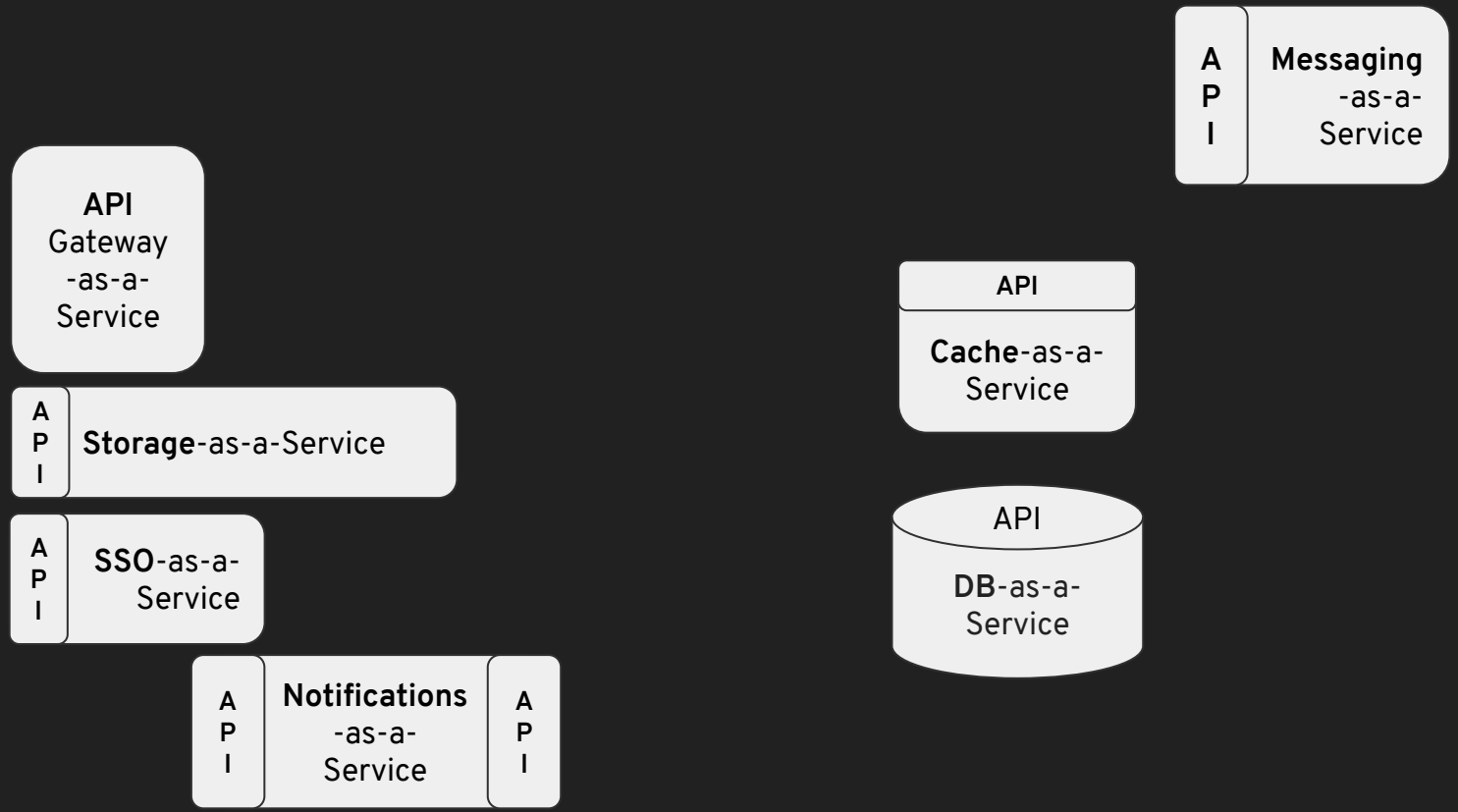
File Storage Service



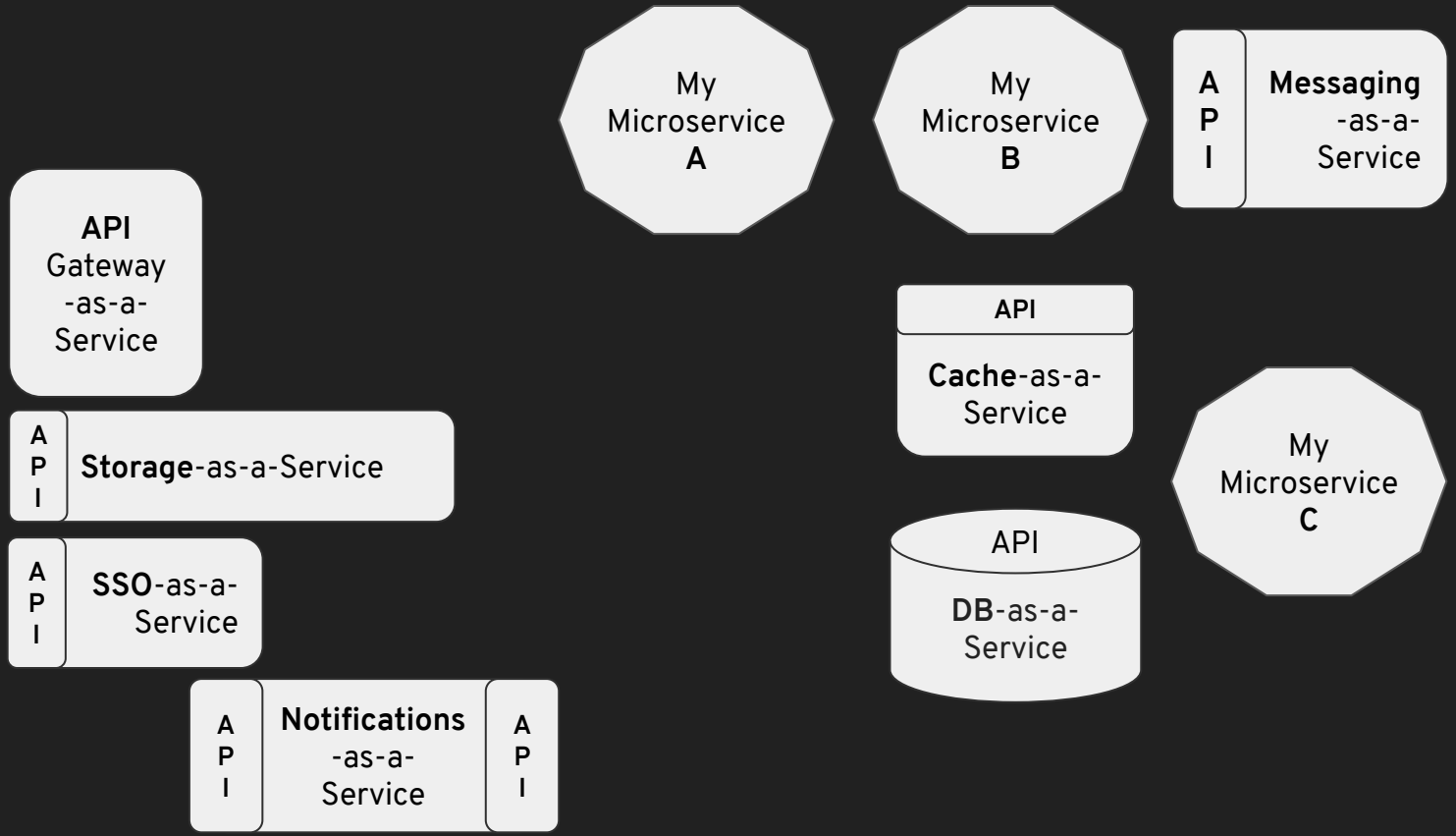
Data Services



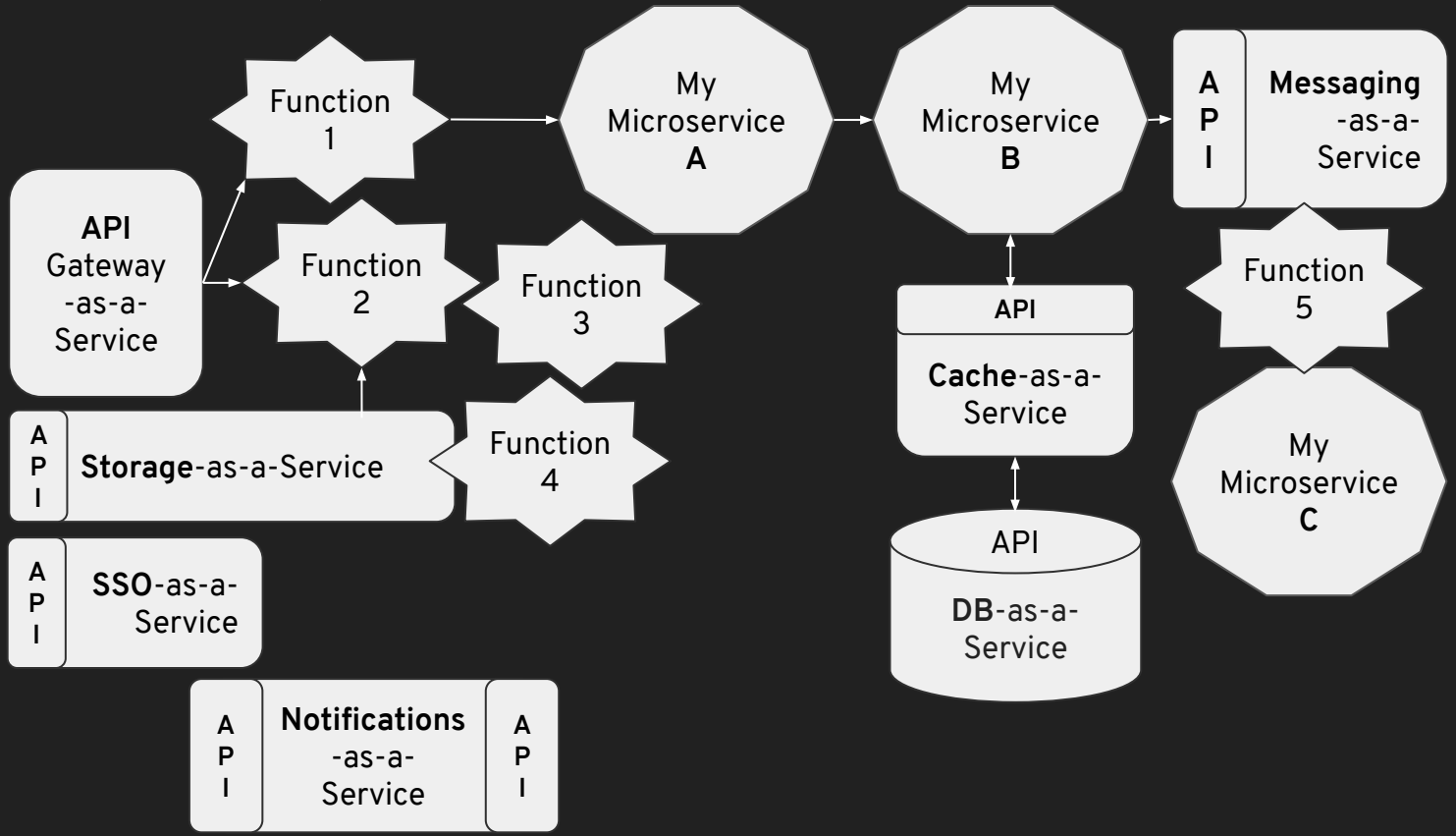
Connectivity Services



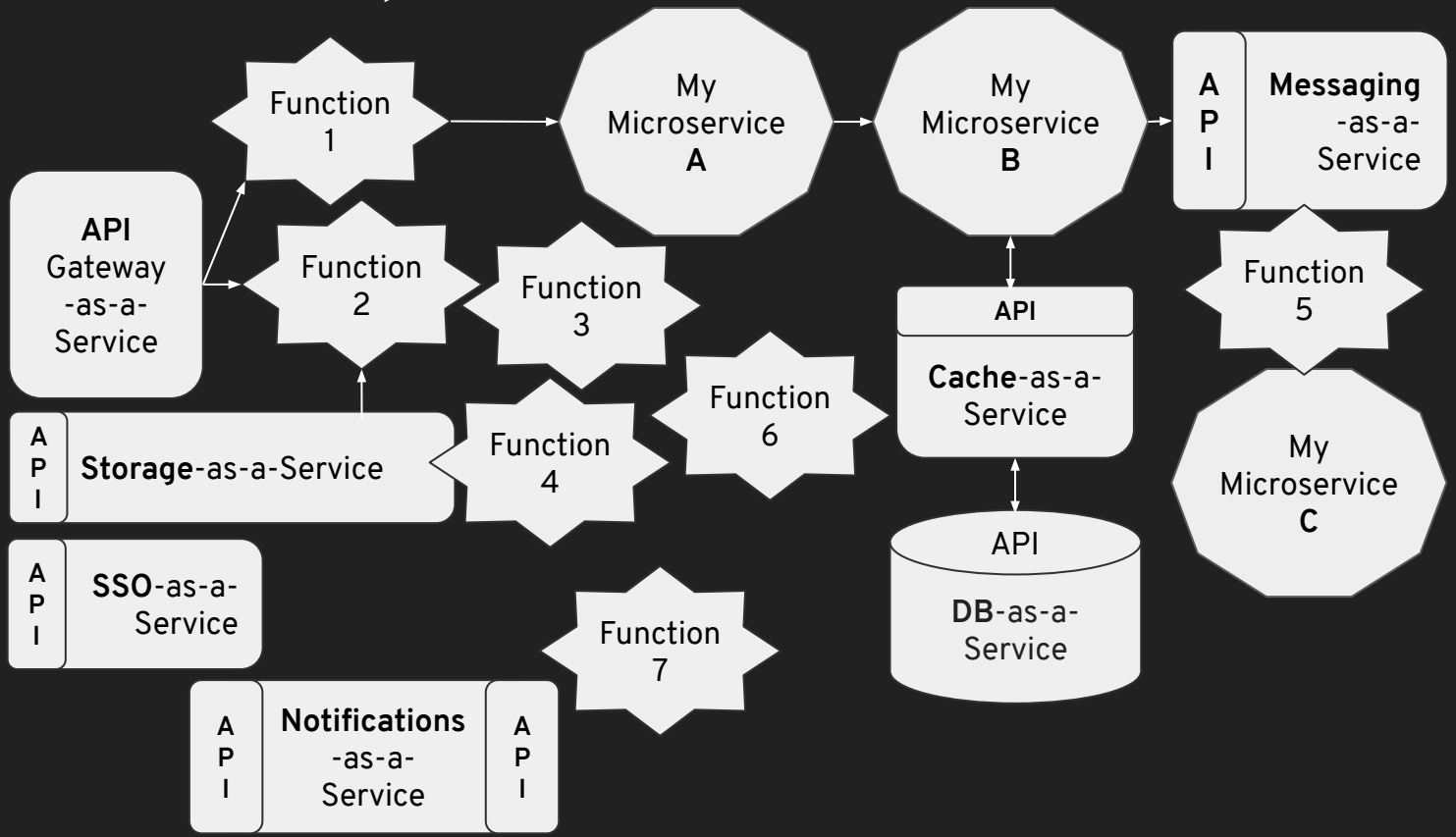
Your Containerized Services



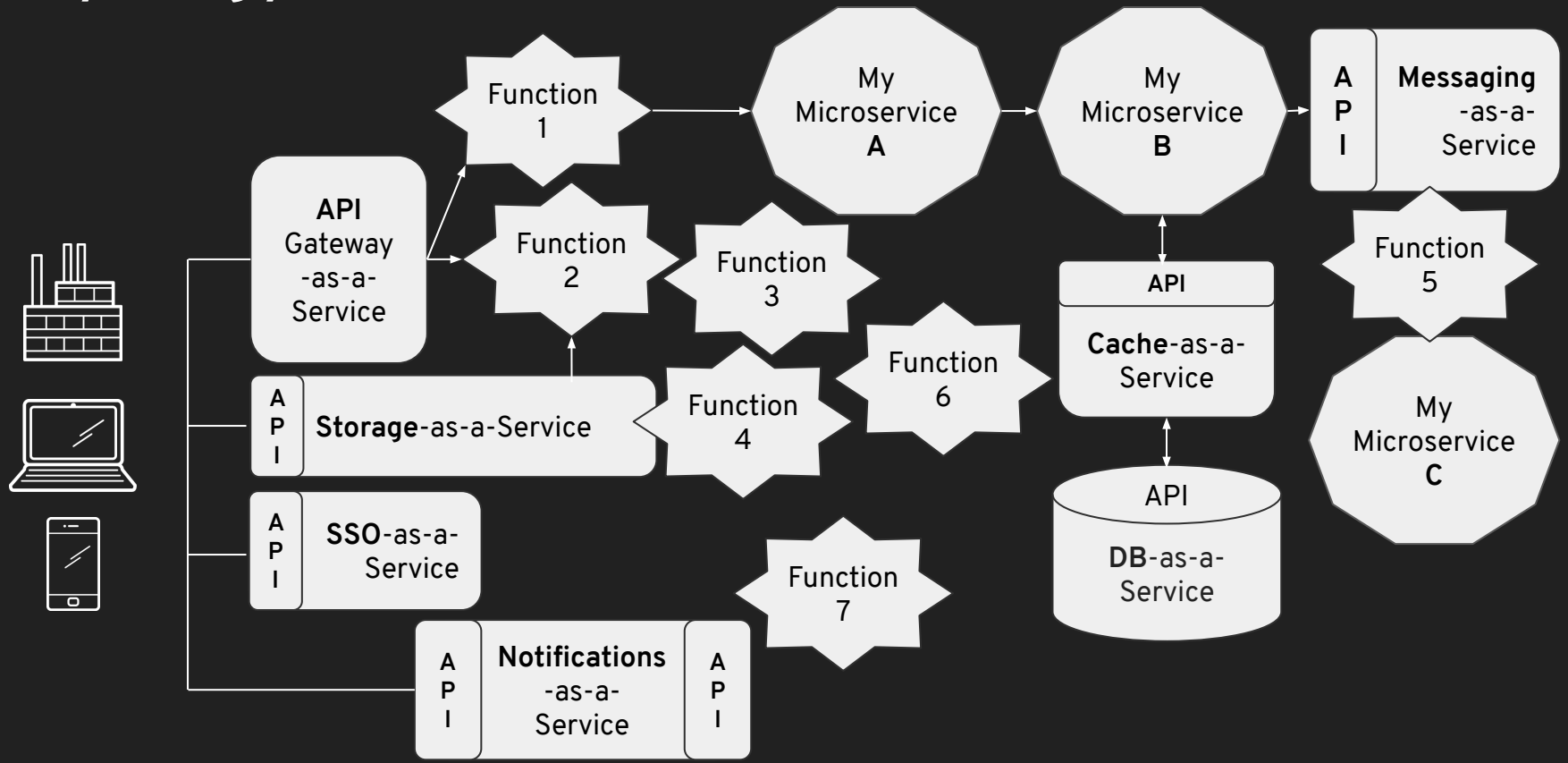
Event-Driven Input



Event-Driven Output

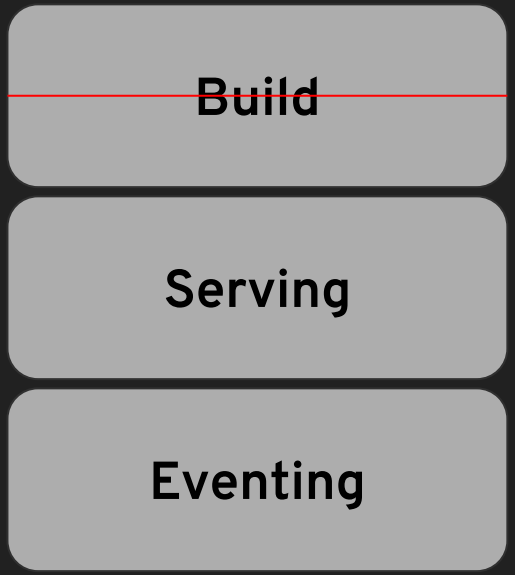


Synergy



Knative

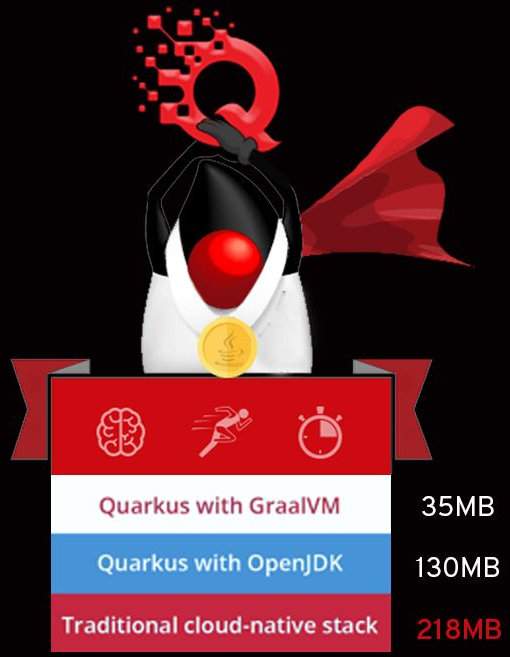
Knative's Primary Components



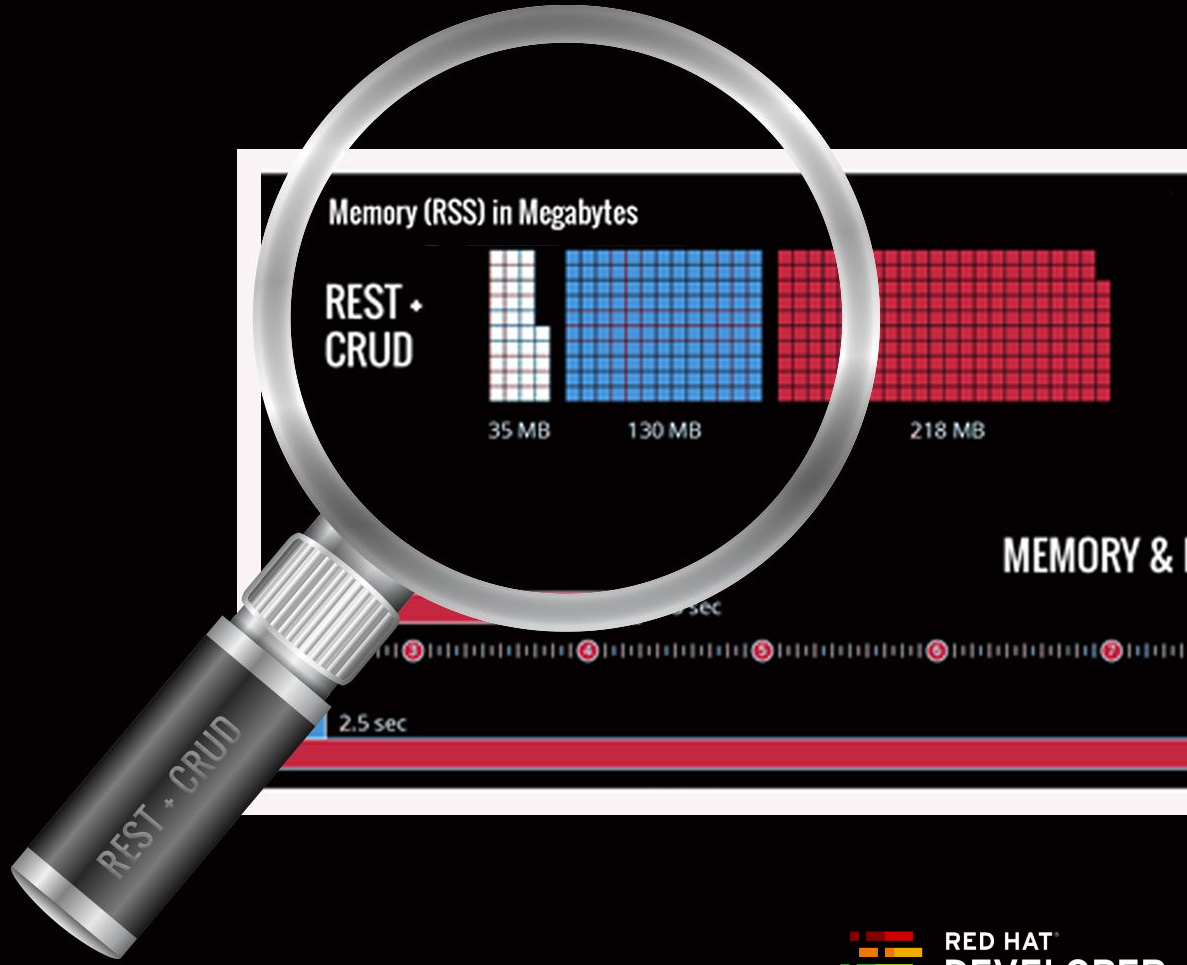
TEKTON

Quarkus: Supersonic, Subatomic Java

Kubernetes Native



Memory (RSS) in Megabytes



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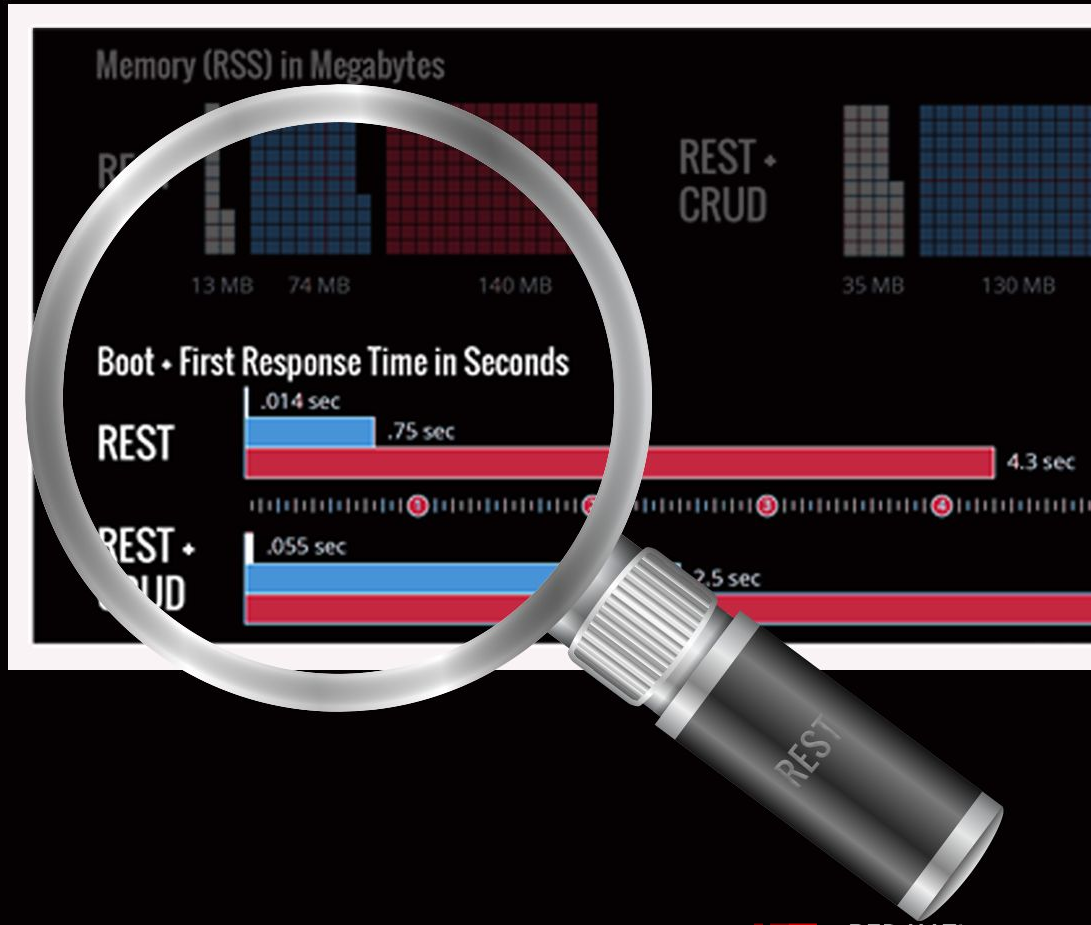

Boot + First Response Time in Seconds

★★★★★

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Resources

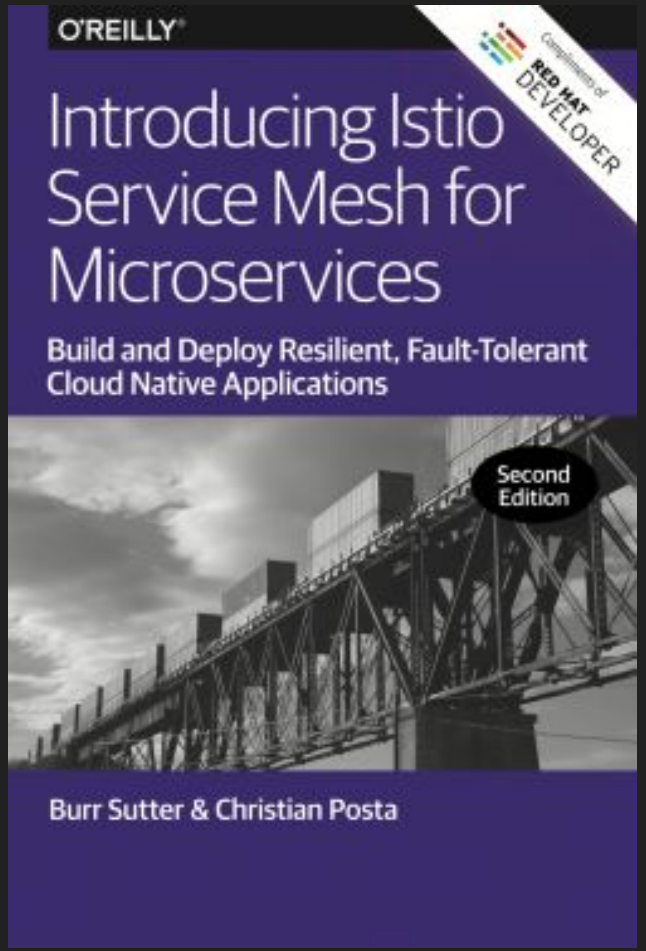
https://learning.oreilly.com/live-training/ (search for "burr")

bit.ly/9stepsawesome - Introduction to Kubernetes (recording)

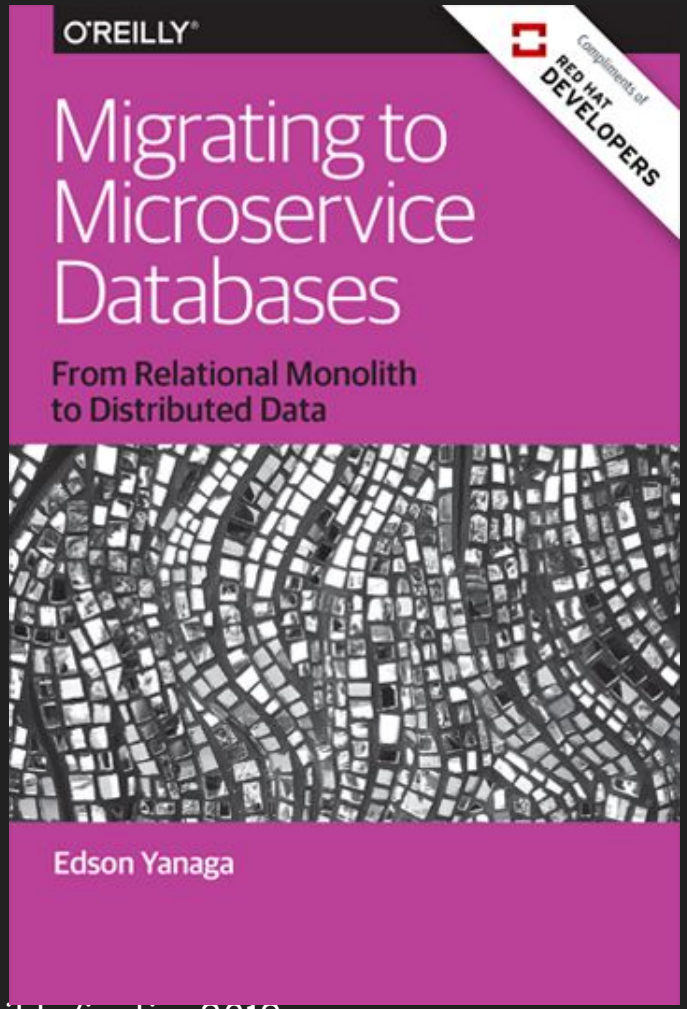
bit.ly/istio-tutorial - Istio: Enter the Service Mesh (bit.ly/istio-intro)

bit.ly/knative-tutorial

bit.ly/quarkus-tutorial

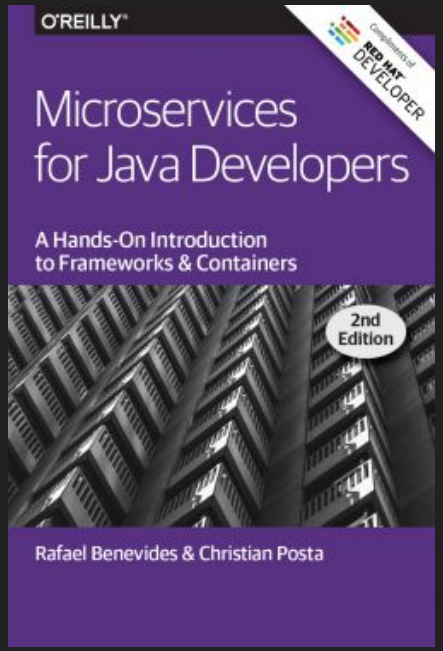


bit.ly/istiobook



bit.ly/mono2microdb

bit.ly/javamicroservicesbook



Free eBooks from developers.redhat.com

Microservices Introductory Materials

Demo: bit.ly/msa-instructions
Slides: bit.ly/microservicesdeepdive
Video Training: bit.ly/microservicesvideo
Kubernetes for Java Developers
9 Steps to Awesome with Kubernetes

Advanced Materials

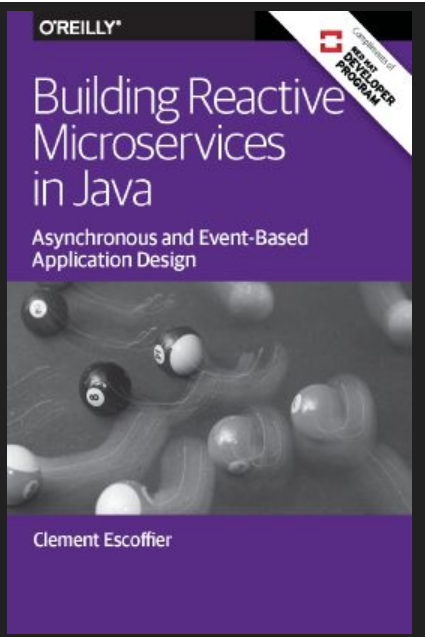
bit.ly/istio-tutorial

learn.openshift.com/servicemesh

bit.ly/knative-tutorial

bit.ly/istio-intro
bit.ly/serverlesskube

bit.ly/reactivemicroservicesbook



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"Don't fear failure.
Not failure, but low aim,
is the crime.
In great
attempts it is
glorious even to fail

— Bruce Lee

@burrsutter

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