



redhat.



Microsoft Azure

# MONOLITHS TO MICROSERVICES: APP TRANSFORMATION

Hands-on Technical Workshop

# PART 5: RESILIENT DISTRIBUTED APPS

# DISTRIBUTED SERVICES ARCHITECTURES

Benefits (when implemented correctly):

- Performance
- Reliability
- Resiliency
- Extensibility
- Availability
- Robustness

# DISTRIBUTED SERVICES ARCHITECTURES

## Fallacies of Distributed Computing

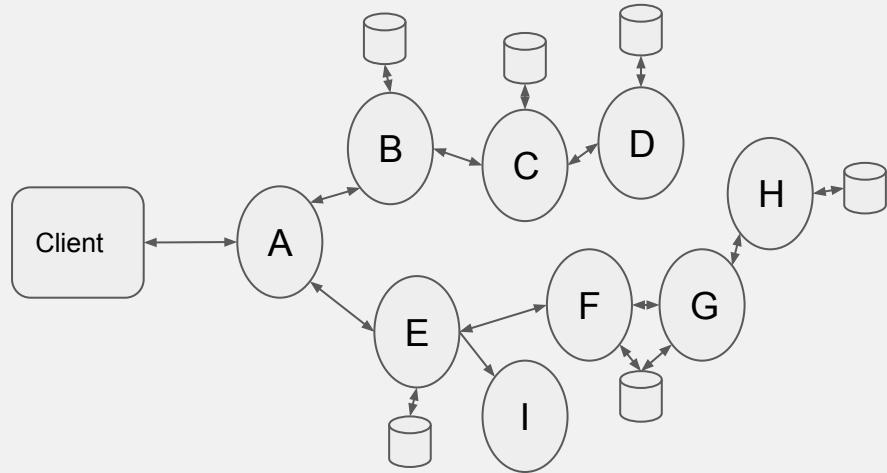
- The network is reliable.
- Latency is zero.
- Bandwidth is infinite.
- The network is secure.
- Topology doesn't change.
- There is one administrator.
- Transport cost is zero.
- The network is homogeneous.

[wikipedia.org/wiki/Fallacies\\_of\\_distributed\\_computing](https://en.wikipedia.org/wiki/Fallacies_of_distributed_computing)

# DISTRIBUTED SERVICES ARCHITECTURES

Applications must deal with

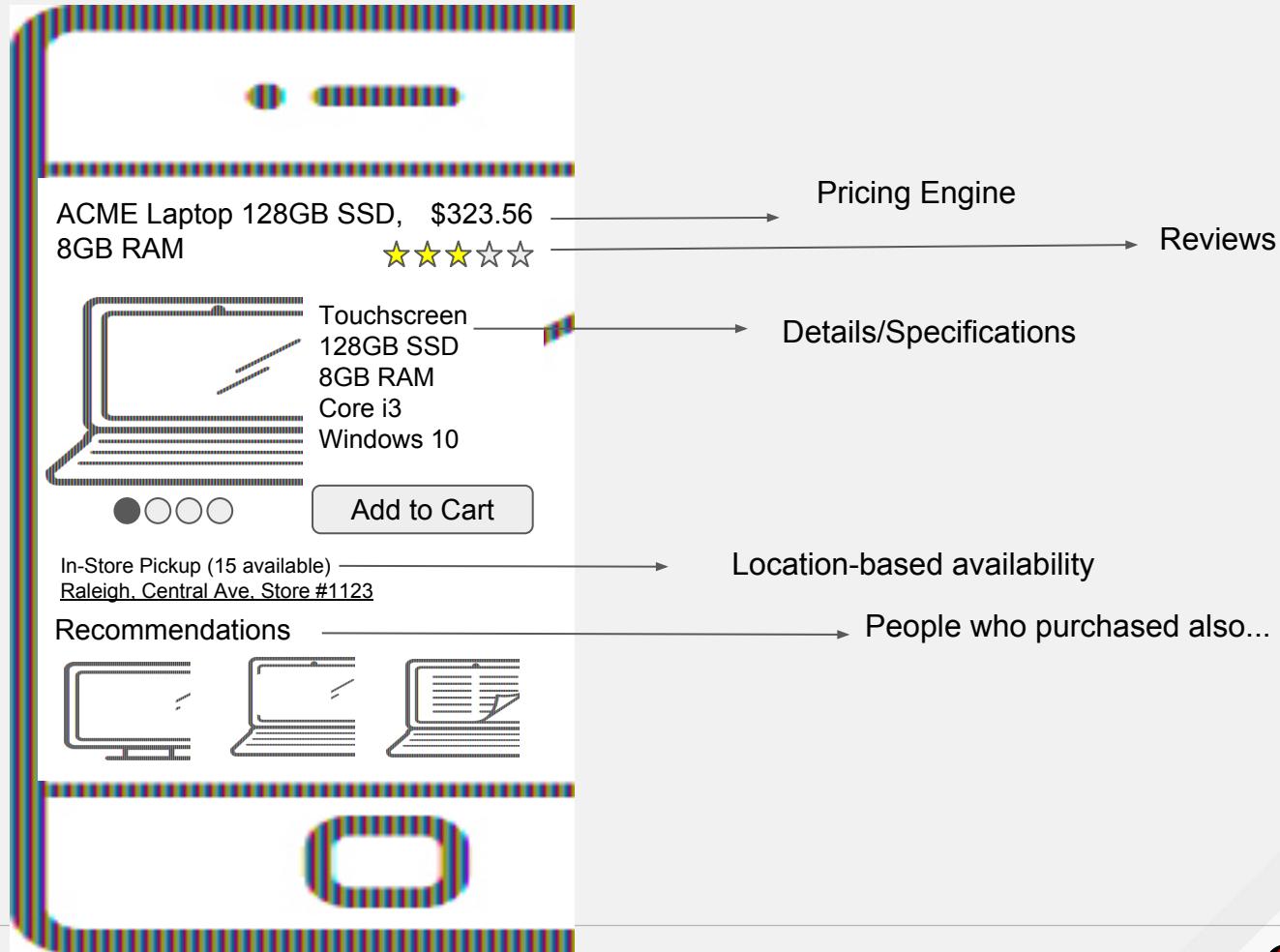
- Unpredictable failure modes
- End-to-end application correctness
- System degradation
- Topology changes
- Elastic/ephemeral/transient resources



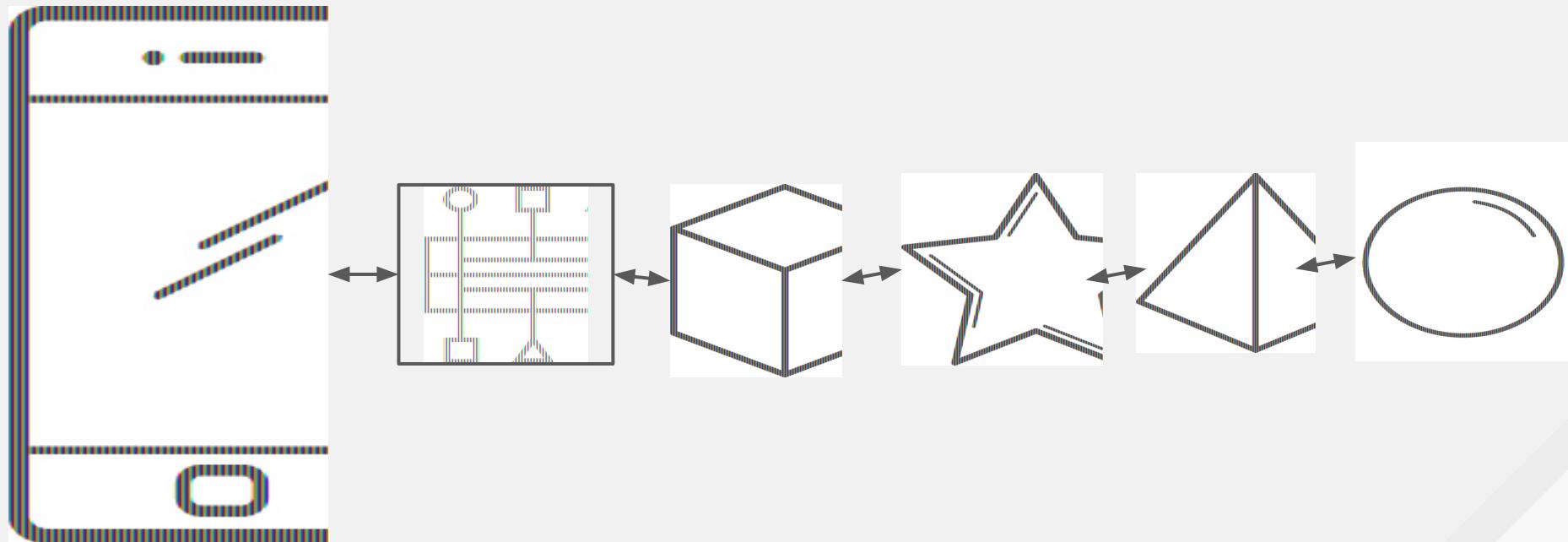


# MICROSERVICES == DISTRIBUTED COMPUTING

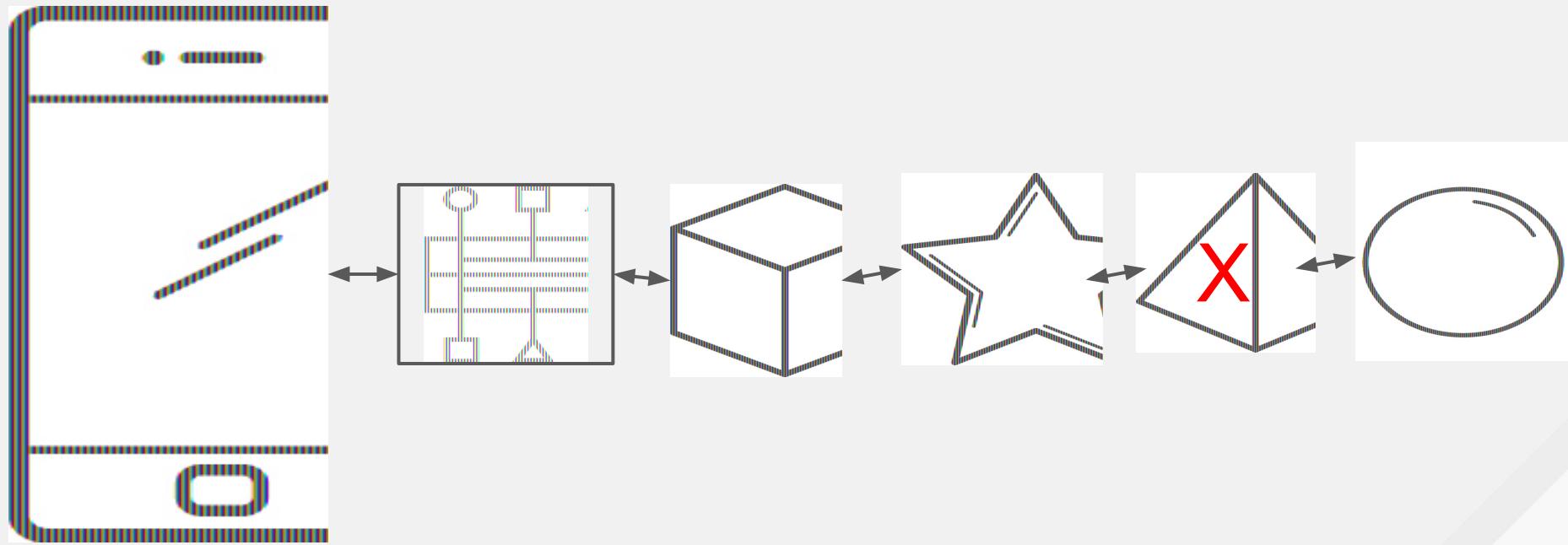
# Example



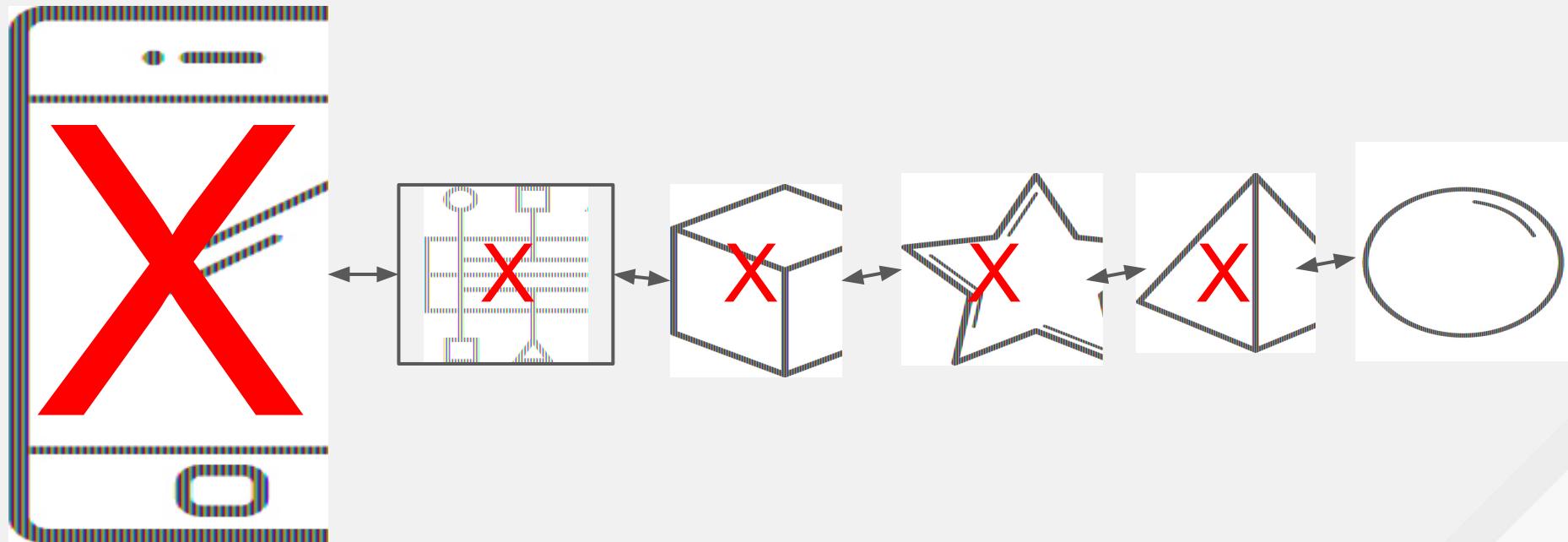
# Chaining



# Chaining (Fail)



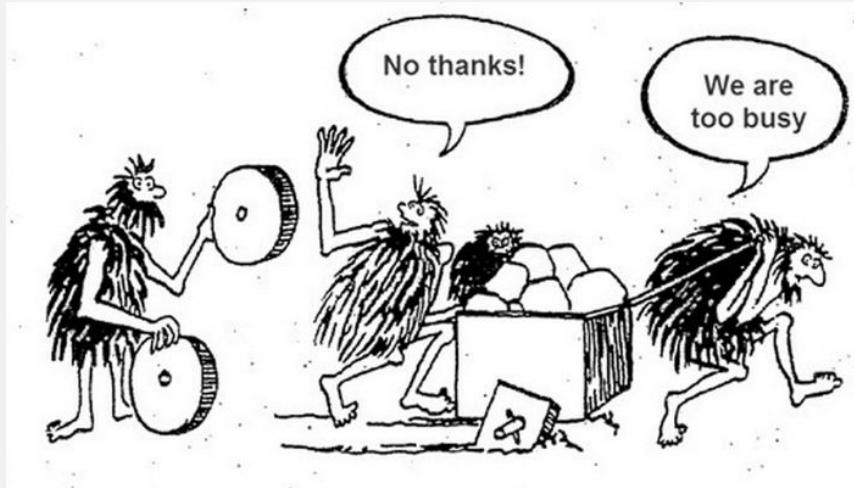
# Chaining (Cascading Fail)



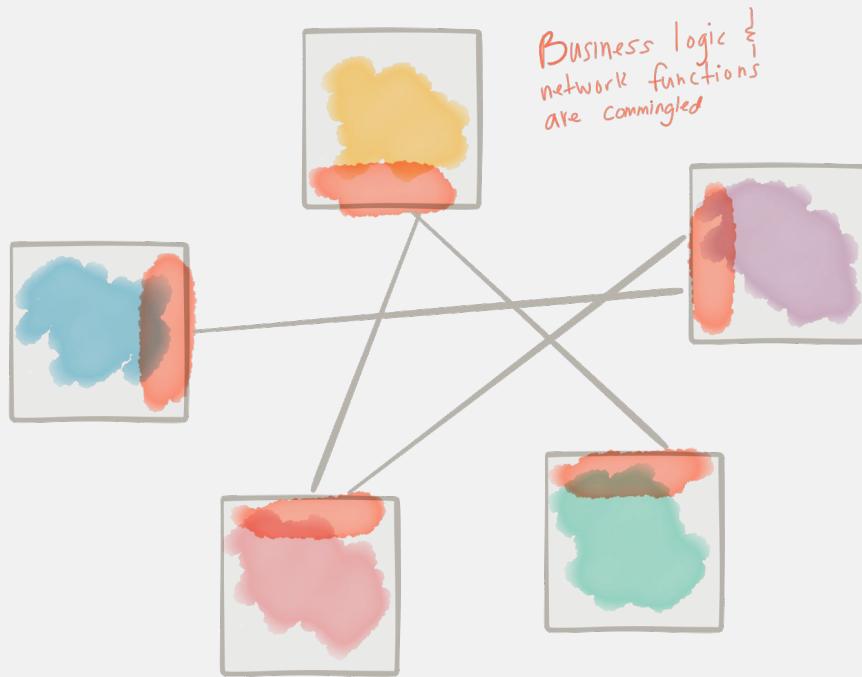
# POSSIBLE SOLUTIONS

Today, Developers do this:

- Circuit Breaking
- Bulkheading
- Timeouts/Retries
- Service Discovery
- Client-side Load Balancing



# TOO MUCH INFRASTRUCTURE IN BUSINESS LOGIC



# BUT I'M USING...

# spring

```
spring-cloud-netflix-hystrix  
spring-cloud-netflix-zuul  
spring-cloud-netflix-eureka-client  
spring-cloud-netflix-ribbon  
spring-cloud-netflix-atlas  
spring-cloud-netflix-spectator  
spring-cloud-netflix-hystrix-stream  
...  
@Enable....150MagicThings
```



```
org.wildfly.swarm.hystrix  
org.wildfly.swarm.ribbon  
org.wildfly.swarm.topology  
org.wildfly.swarm.camel-zookeeper  
org.wildfly.swarm.hystrix  
org.wildfly.swarm.hystrix  
...
```

# VERT.X

```
vertx-circuit-breaker  
vertx-service-discovery  
vertx-dropwizard-metrics  
Vertx-zipkin  
...
```

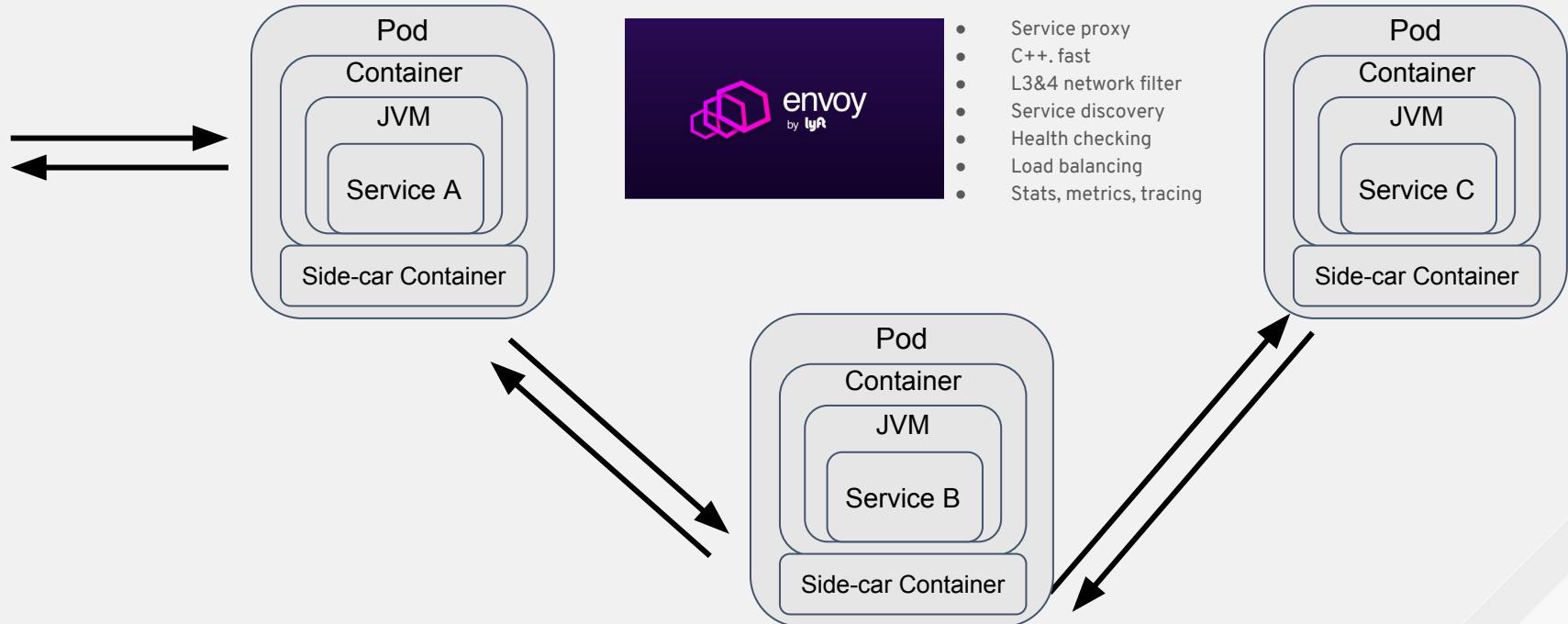
- + Node.js
- + Go
- + Python
- + Ruby
- + Perl
- + ....

# SIDECARS



INSERT DESIGNATOR, IF NEEDED

# PODS WITH TWO CONTAINERS





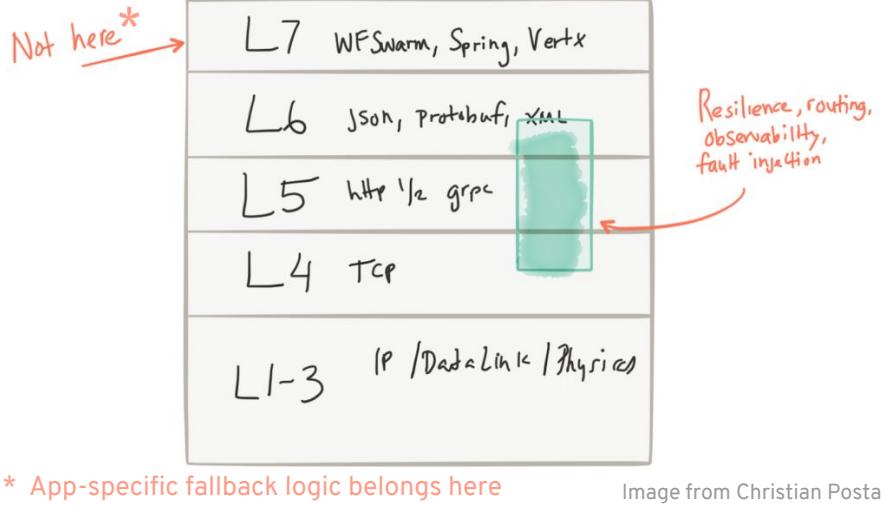
# Istio - Sail

(Kubernetes - Helmsman or ship's pilot)

# ISTIO - A ROBUST SERVICE MESH FOR MICROSERVICES

## Key Features

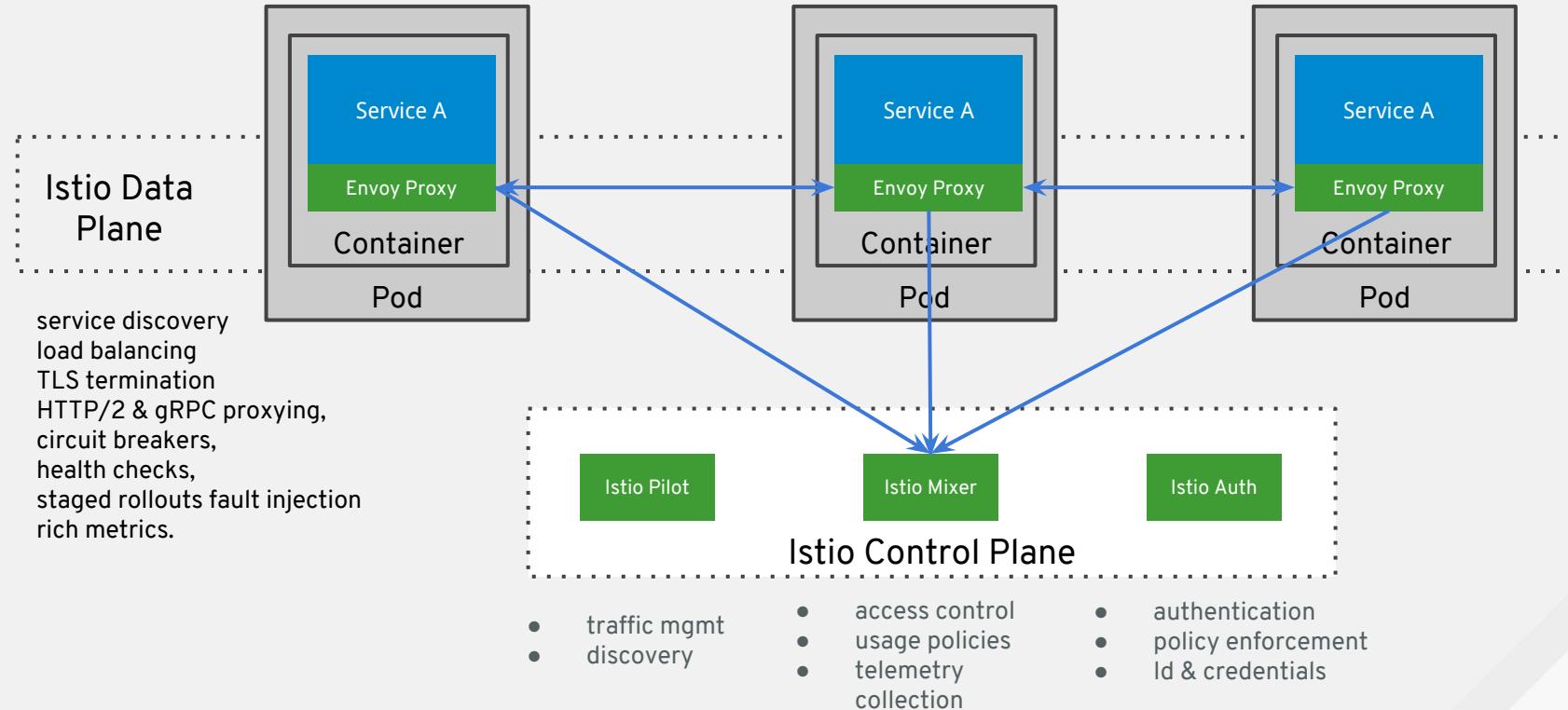
- Intelligent routing and load balancing
- Fleet-wide, in-depth observability
- Resiliency across languages and platforms
- Fault injection
- Developer productivity
- Policy driven ops
- Circuit breaking, outlier detection
- Timeouts/retries
- Rate limiting
- Secure by default
- Incremental, unobtrusive adoption



Further Reading :

<https://blog.openshift.com/red-hat-istio-launch/>  
<https://istio.io/blog/istio-service-mesh-for-microservices.html>  
<http://blog.christianposta.com/microservices/the-hardest-part-of-microservices-calling-your-services/>

# ISTIO - A ROBUST SERVICE MESH FOR MICROSERVICES



# MICROSERVICES 3.0 - SERVICE MESH

## Code Independent:

- Intelligent Routing and Load-Balancing
  - A/B Tests
  - Canary Releases
  - Dark Launches
- Distributed Tracing
- Circuit Breakers
- Fine grained Access Control
- Telemetry, metrics and Logs
- Fleet wide policy enforcement



# LAB: DETECTING AND PREVENTING ISSUES IN DISTRIBUTED APPS WITH ISTIO

# GOAL FOR LAB

In this lab you will learn:

- How to **install Istio** onto OpenShift Container Platform
- How to deploy apps with **sidecar proxies**
- How to generate and visualize **deep metrics** for apps
- How to **alter routing** dynamically
- How to **inject faults** for testing
- How to do **rate limiting**
- How Istio implements **circuit breaking** and **distributed tracing**

# SAMPLE APP: “BookInfo”

The screenshot shows a web browser window with multiple tabs open. The active tab is titled "BookInfo Sample" and displays the URL "192.168.99.101:31463/productpage". The page content is as follows:

**The Comedy of Errors**

**Wikipedia Summary:** The Comedy of Errors is one of **William Shakespeare's** early plays. It is his shortest and one of his most farcical comedies, with a major part of the humour coming from slapstick and mistaken identity, in addition to puns and word play.

**Book Details**

**Paperback:**  
200 pages  
**Publisher:**  
PublisherA  
**Language:**  
English  
**ISBN-10:**  
1234567890  
**ISBN-13:**  
123-1234567980

A red rectangular box highlights the "Book Details" section.

An extremely entertaining play by Shakespeare. The slapstick humour is refreshing!

Reviewer1 Affiliation1

★★★★★

Absolutely fun and entertaining. The play lacks thematic depth when compared to other plays by Shakespeare.

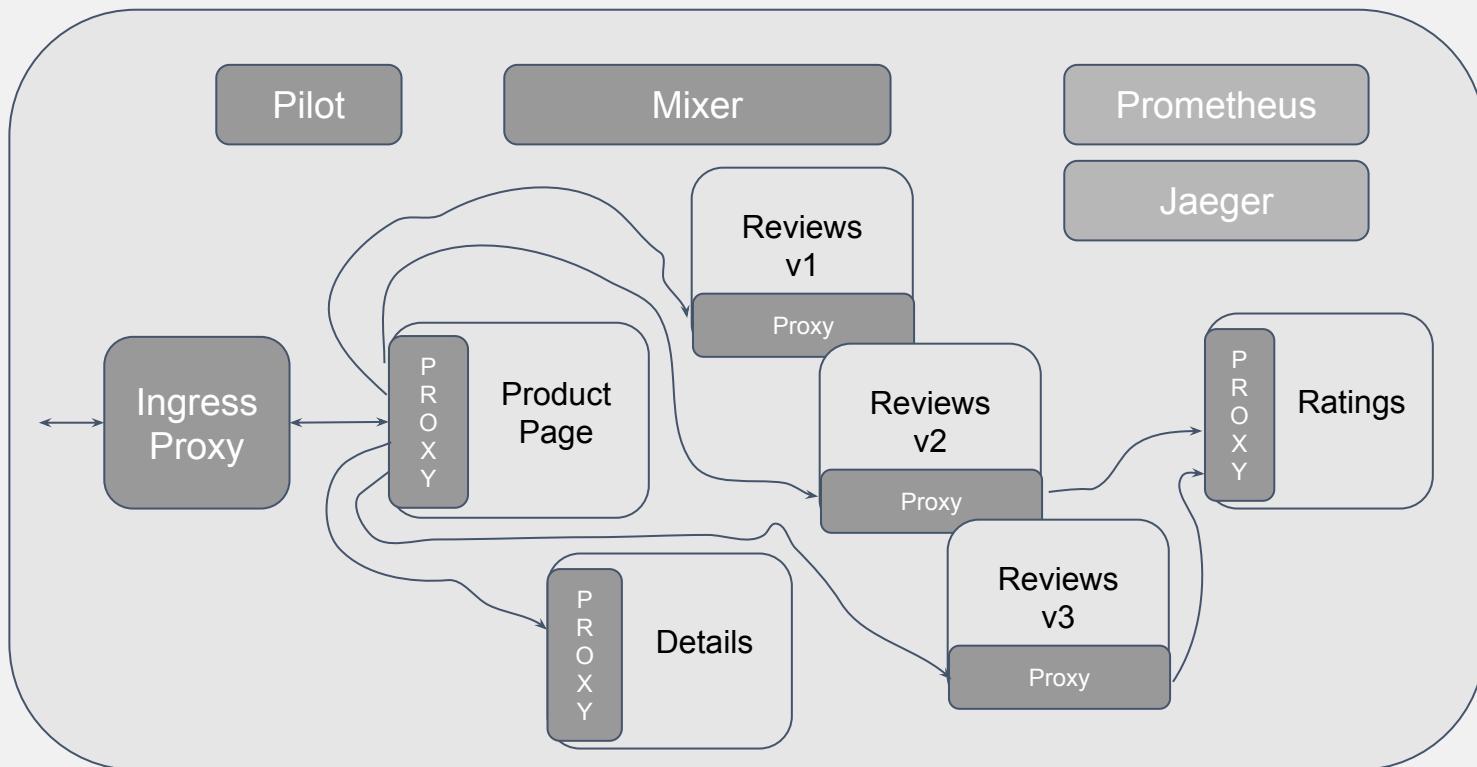
— Reviewer2 Affiliation2

★★★★★

precedence: 1  
route:  
- tags:  
 - version: v1  
 - weight: 100  
Go refresh the page

A small icon of a lightbulb is located at the bottom left of the page.

# SAMPLE APP: “BookInfo”



# LAB: DETECTING AND PREVENTING ISSUES IN DISTRIBUTED APPS WITH ISTIO

SCENARIO 7

PREVENT AND DETECT ISSUES IN A DISTRIBUTED SYSTEM

# WRAP-UP AND DISCUSSION

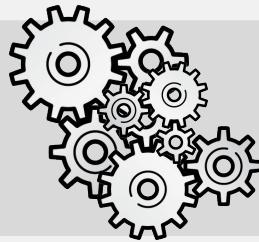
# RESULT OF LAB

In this lab you learned:

- How to install Istio onto OpenShift Container Platform
- How to deploy apps with sidecar proxies
- How to generate and visualize deep metrics for apps
- How to alter routing dynamically
- How to inject faults for testing
- How to do rate limiting
- How Istio implements circuit breaking and distributed tracing
- Use cases for service mesh

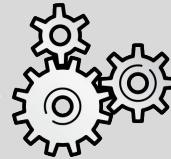
# MICROSERVICES 4.0?

Service



- > Autonomous
- > Loosely-coupled

Microservice



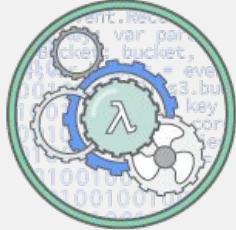
- > Single Purpose
- > Stateless
- > Independently Scalable
- > Automated

Function

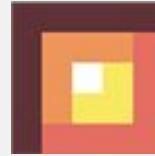


- > Single Action
- > Event-sourced
- > Ephemeral

# SERVERLESS PROJECTS / SERVICES



APEX



webtask

SERVERLESS INFRASTRUCTURE



serverless-docker



APACHE  
OpenWhisk™



Microsoft Azure



CLOUD FUNCTIONS BETA



<http://funcatron.org>

# THANK YOU



LinkedIn: [linkedin.com/company/red-hat](https://linkedin.com/company/red-hat)  
YouTube: [youtube.com/user/RedHatVideos](https://youtube.com/user/RedHatVideos)  
Facebook: [facebook.com/redhatinc](https://facebook.com/redhatinc)  
Twitter: [twitter.com/RedHatNews](https://twitter.com/RedHatNews)  
Google+: [plus.google.com/+RedHat](https://plus.google.com/+RedHat)



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Twitter: [twitter.com/azure](https://twitter.com/azure)  
Azure Friday: [channel9.msdn.com/Shows/Azure-Friday](https://channel9.msdn.com/Shows/Azure-Friday)  
Azure | Channel 9: [channel9.msdn.com/Blogs/Azure](https://channel9.msdn.com/Blogs/Azure)