



Several Clouds

Microservice and Docker

Prepared for
Faculty of Mathematics and Informatics (FMI)

Building Microservices

What are microservices?

Applications composed of **independent services** that communicate over **well-defined APIs**

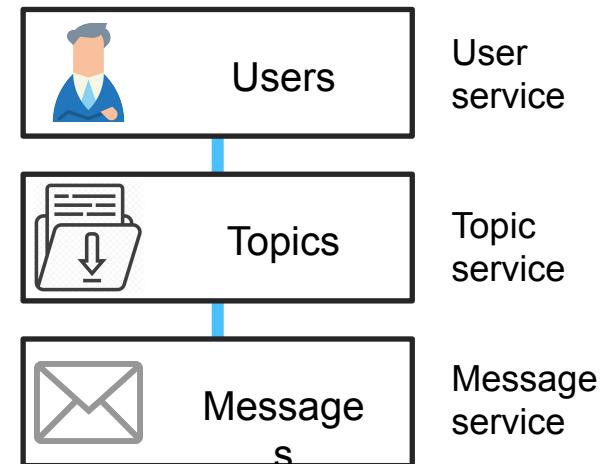
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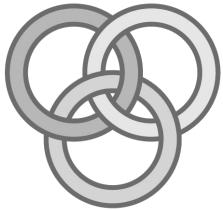
Monolithic forum application



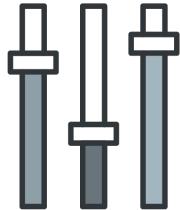
Microservice forum application



Why use microservices?



Your system can withstand
individual failures



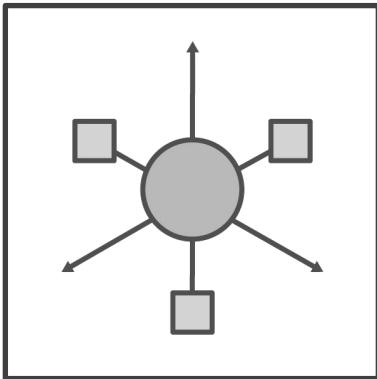
Allows parallel production
and faster iteration



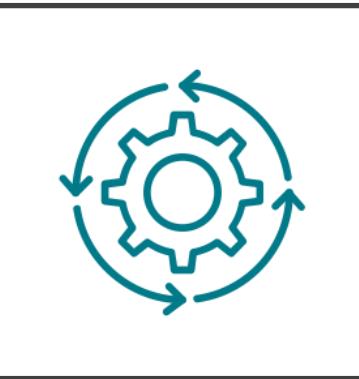
Spend on scaling only
where needed

Characteristics of a microservice

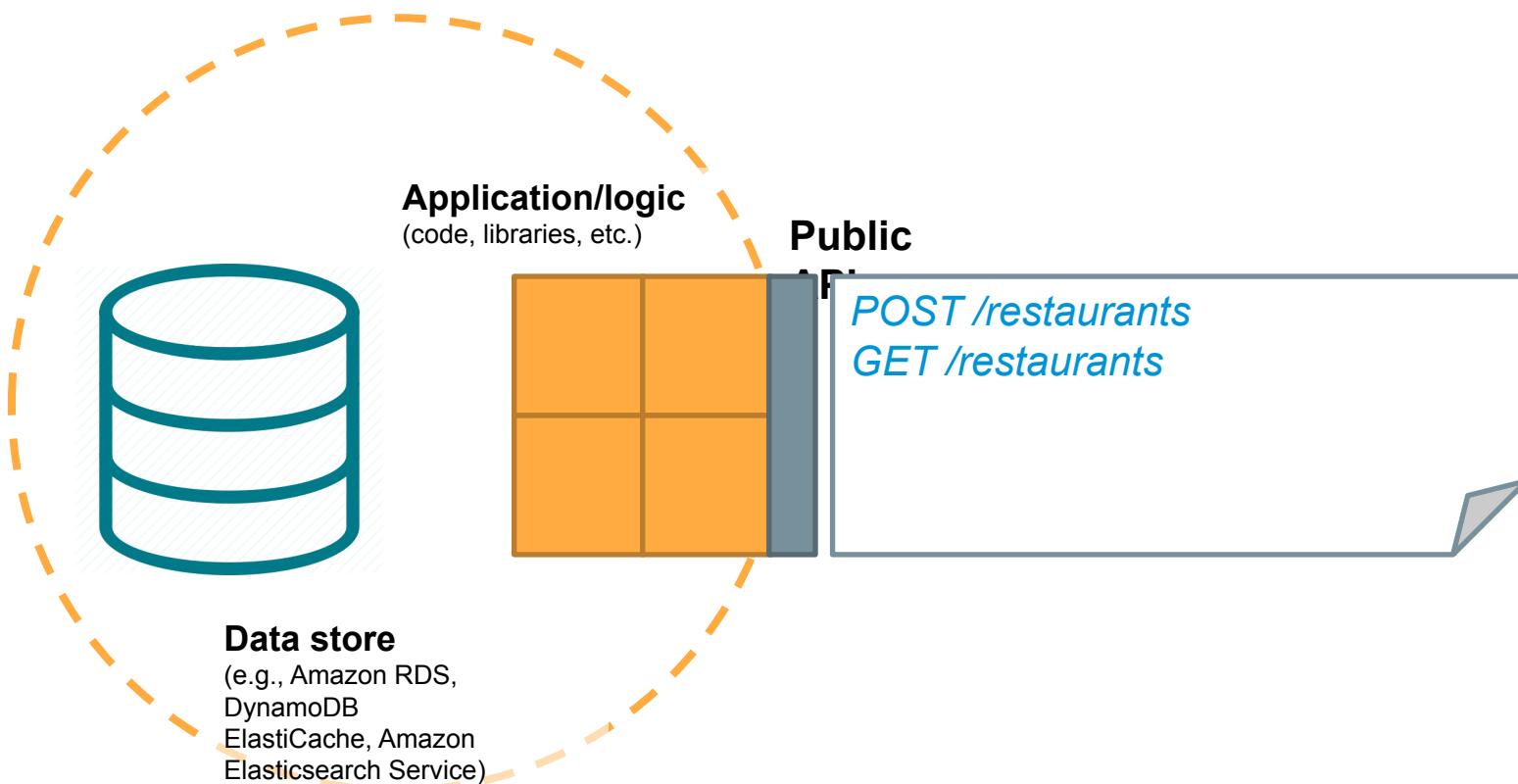
Autonomous



Specialized



Anatomy of a microservice



Microservices at Amazon

BEAUTIFUL THINGS ON AMAZON UPDATED DAILY EXPLORE

All - don't mess with texas mug

Hello, Jim Your Account Prime Lists

Departments Browsing History Jim's Amazon.com Today's Deals Gift Cards & Registry Sell Help

Kitchen & Dining Best Sellers Wedding Registry Small Appliances Kitchen Tools Cookware Bakeware Cutlery Dining & Entertaining Storage & Organization

Celebrate 4th of July

Don't Mess With Texas Coffee Mug
by Aquiles Creations
4.5★ 11 customer reviews

Price: \$7.99 ✓Prime
In Stock.
Want it tomorrow, June 24? Order within 14 hrs 24 mins and choose One-Day Shipping at checkout. Details
Sold by Got Allende and Fulfilled by Amazon. Gift-wrap available.

11 OZ Ceramic Mug, Both sides printing
Microwave and Dishwasher Safe
Printed on both sides with premium printing

7 new from \$7.99

Save \$10 on George Foreman when you spend \$50
Shop now

Find wrong product information here? Help us fix it.

Frequently Bought Together

Total price \$23.91
Add all three to Cart Add all three to List

This item: Don't Mess With Texas Coffee Mug \$7.99
Speak Texan in 30 Minutes or Less by Lou Hudson Paperback \$5.95

Cart Subtotal: \$4.99

1 recent change in Cart
Proceed to checkout
This order contains a gift

Turn on 1-Click ordering for this browser

Ship to: Jim Tran-BELLEVUE
Add to List Add to Wedding Registry

\$12.50 Add to Cart
+ Free Shipping Sold by: luRouse

\$12.50 Add to Cart
+ Free Shipping Sold by: Sun Coast Max

\$9.99 Add to Cart
+ \$5.49 shipping Sold by: Asole Wu Shop

7 new from \$7.99
Have one to sell? Sell on Amazon

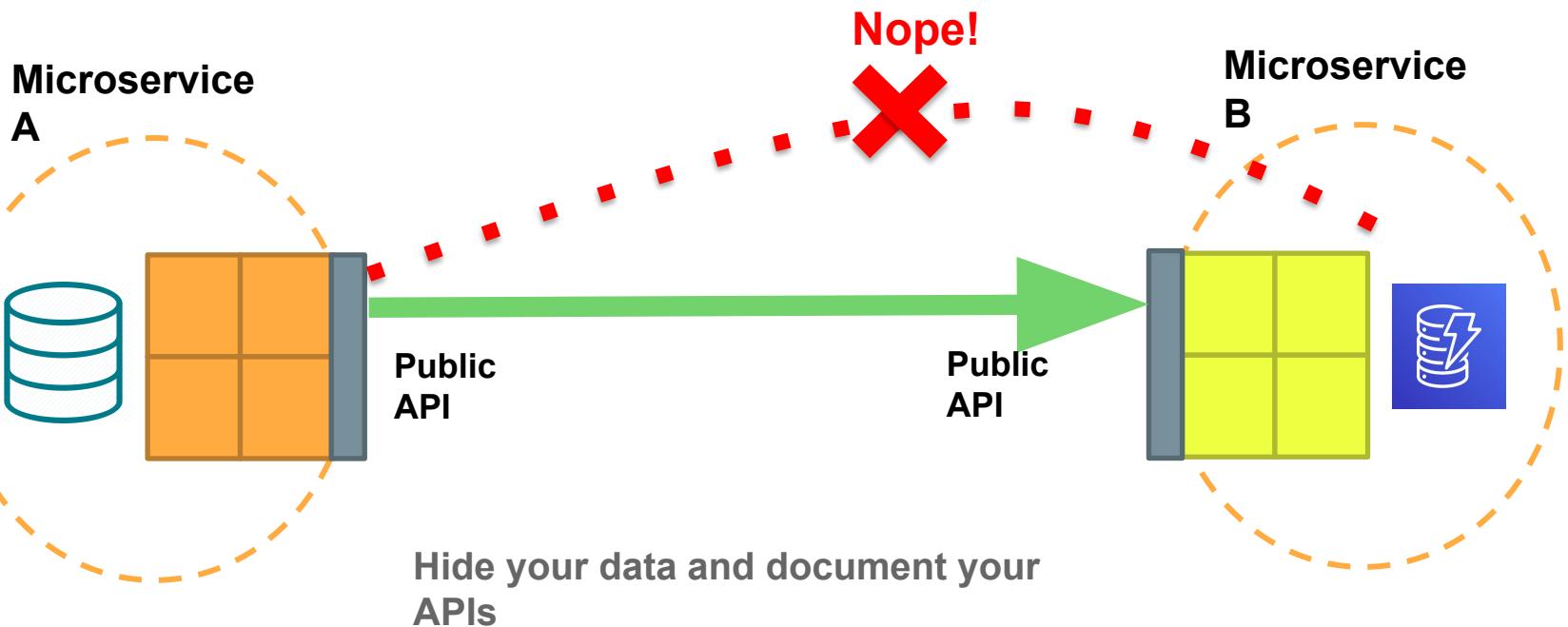
THERMIK

Six Principles of Microservices

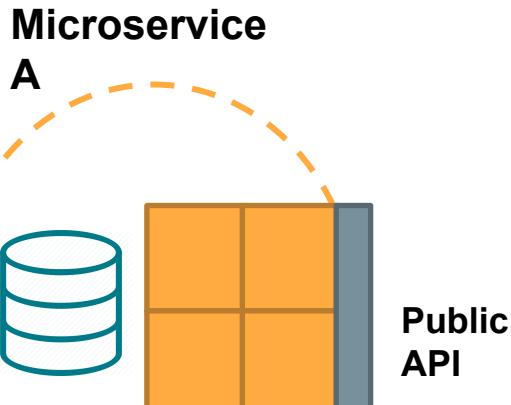
Six principles of microservices

- 1. Rely only on the public API.
- 2. Use the right tool for the job.
- 3. Secure your services.
- 4. Be a good citizen within the ecosystem.
- 5. It's more than just technology transformation.
- 6. Automate everything.

Principle #1: Rely only on the public API



Principle #1: Rely only on the public API



Define a versioning strategy

Version 1.0.0

storeRestaurant (id, name, cuisine)

Version 1.1.0

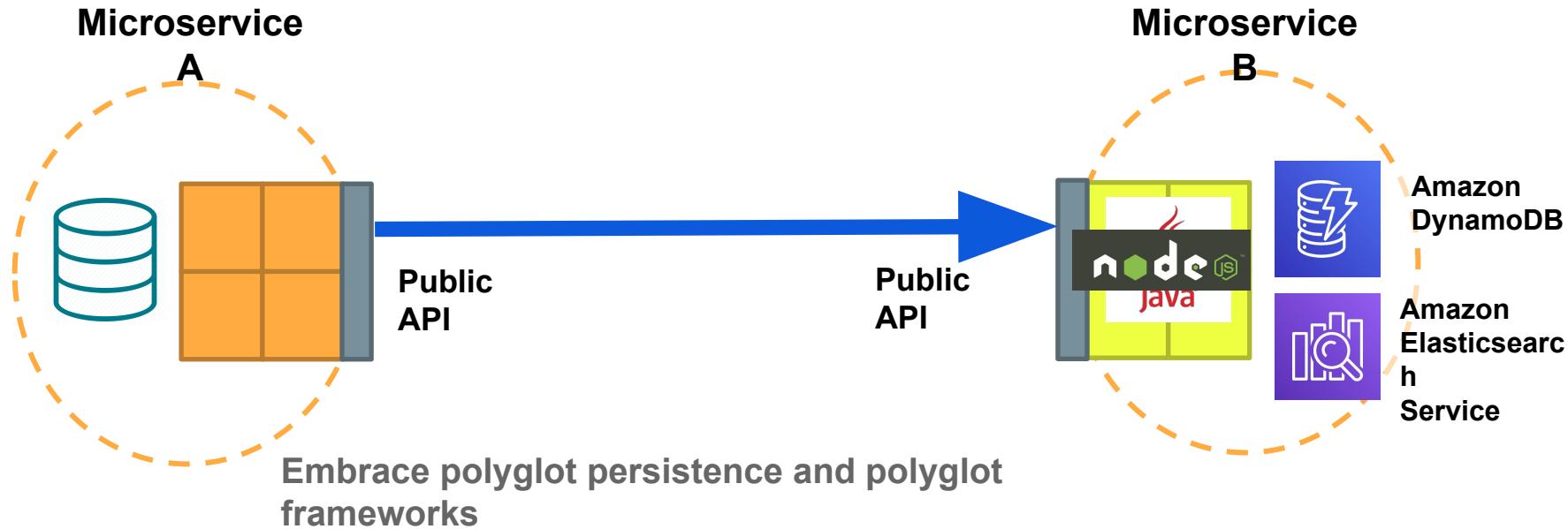
storeRestaurant (id, name, cuisine)
storeRestaurant (id, name, arbitrary_metadata)
addReview (restaurantId, rating, comments)

Version 2.0.0

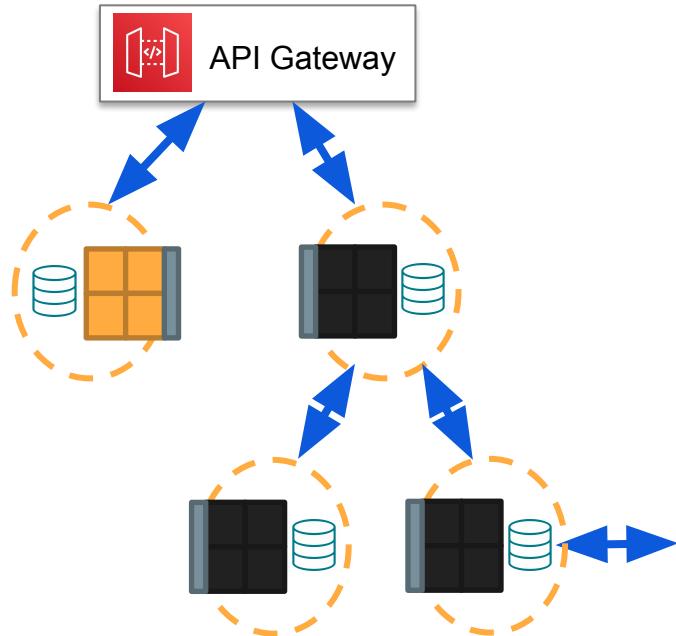
storeRestaurant (id, name, arbitrary_metadata)
addReview (restaurantId, rating, comments)

Principle #2:

Choose the right tool for the job

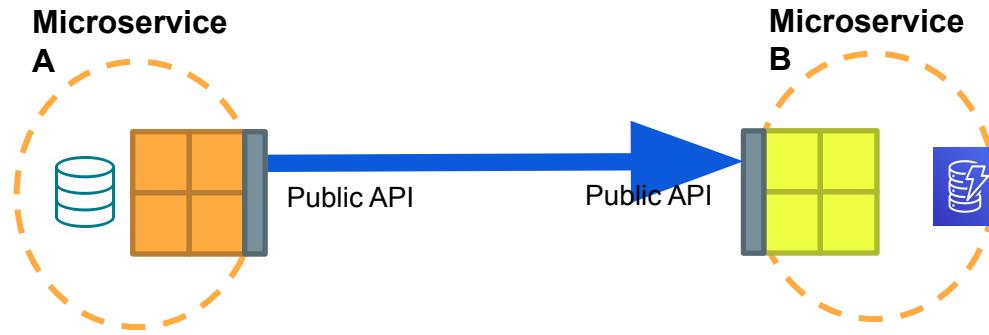


Principle #3: Secure your services



- Defense in depth
- Gateway (“front door”)
- API throttling
- Authentication and authorization
- Secrets management

Principle #4: Be a good citizen

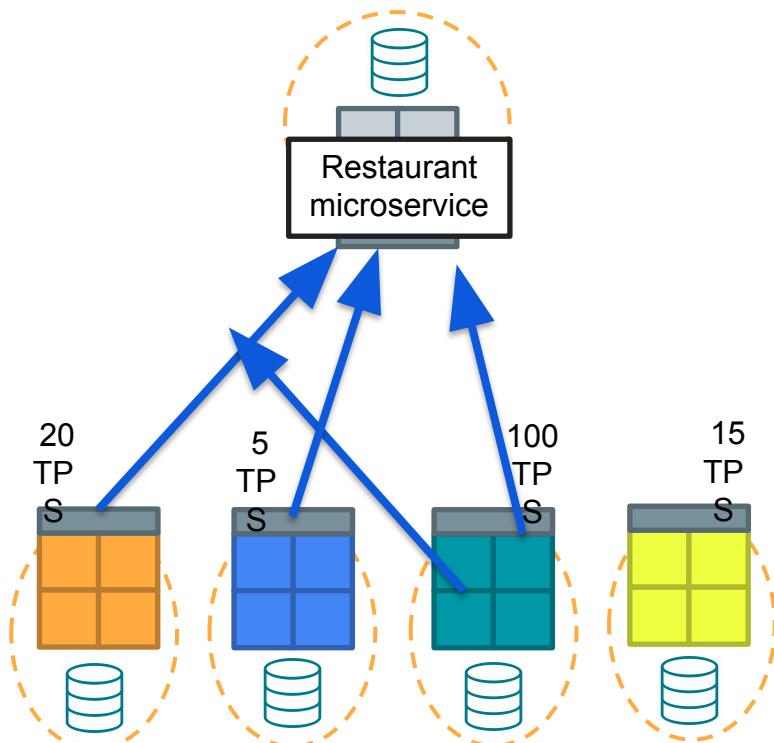


We need to call your microservice to fetch restaurant details.

Which APIs do you need to call?

Once I understand your use cases, I'll give you permission to register your service as a client on our service's directory entry.

Principle #4: Be a good citizen



Before we let you call our microservice, we need to understand your use case, expected load (TPS), and accepted latency.

Have clear SLAs

Principle #4: Be a good citizen

Distributed monitoring and tracing

- "Is the service meeting its SLA?"
- "Which services were involved in a request?"
- "How did downstream dependencies perform?"

Shared metrics

- For example, request time, time to first byte

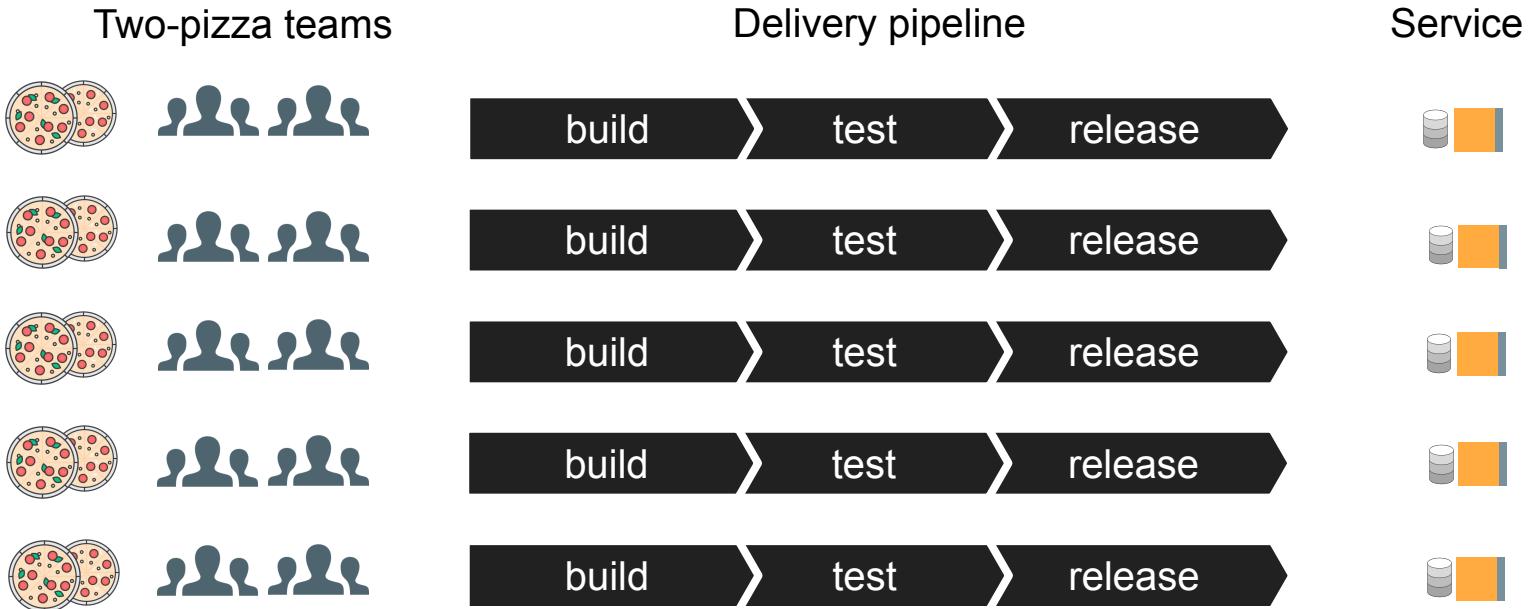
Distributed tracing

- For example, Zipkin, OpenTracing

User-experience metrics

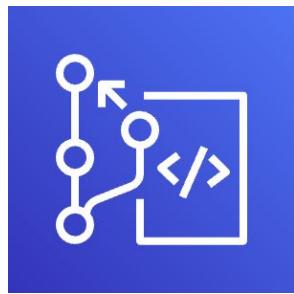


Principle #5:



Favor small, focused dev teams

Principle #6: Automate everything



AWS
CodeCommit



AWS
CodePipeline



AWS
CodeDeploy

Adopt
DevOps

Six principles of microservices

1. Rely only on the public API
 - Hide your data
 - Document your APIs
 - Define a versioning strategy
2. Use the right tool for the job
 - Polyglot persistence (data layer)
 - Polyglot frameworks (app layer)
3. Secure your services
 - Defense in depth
 - Authentication/authorization
4. Be a good citizen
 - Have SLAs
 - Distributed monitoring, logging, tracing
5. It's more than just technology transformation
 - Favor small, focused dev teams
6. Automate everything
 - Adopt DevOps

Using Container Services

What is a container?

Your container

Your application



Dependencies



Configurations



Hooks into OS

What problems can containers solve?

Getting software to **run reliably** in different environments



Developer's
workstation

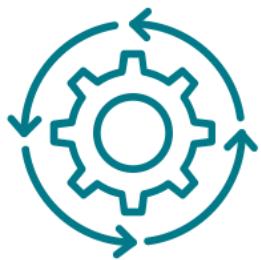


Production



Test
environment

Container benefits



Repeatable

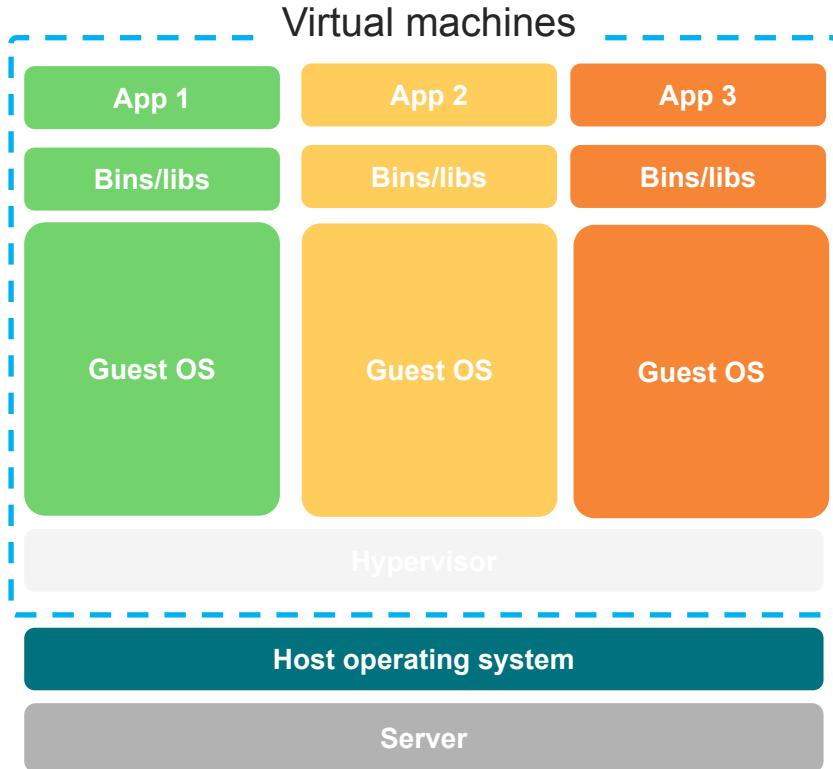


Self-contained running
environments

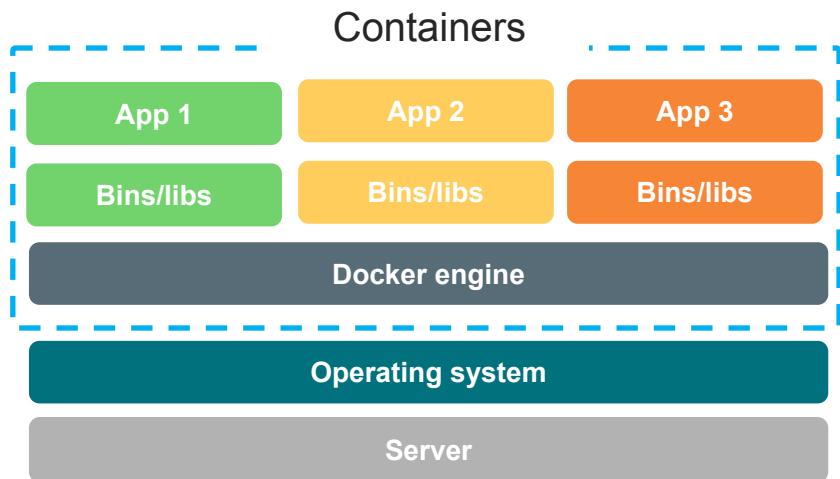


Faster to wind up and
down than VMs

Virtual machines vs. containers



In general: VMs abstract hardware, while containers abstract operating systems



Docker history



Docker get started

- <https://docs.docker.com/get-started/overview/>

- Lightweight
- Isolated
- Self-sufficient
- Layered filesystem
- Mount local files

Docker repository

- How to save the artifacts
- DockerHub
- <https://gallery.ecr.aws/>
- <https://ghcr.io>
-

Docker Getting Started

- <https://docs.docker.com/get-started/>

Foundations of Docker

Install Docker and jump into discovering what Docker is.

Get Docker

Choose the best installation path for your setup.

What is Docker?

Learn about the Docker platform.

Learn the foundational concepts and workflows of Docker.

Introduction

Get started with the basics and the benefits of containerizing your applications.

Docker concepts

Gain a better understanding of foundational Docker concepts.

Docker workshop

Get guided through a 45-minute workshop to learn about Docker.



Several Clouds

Thank you!

daniel@severalclouds.com

<https://www.linkedin.com/in/danielrankov/>