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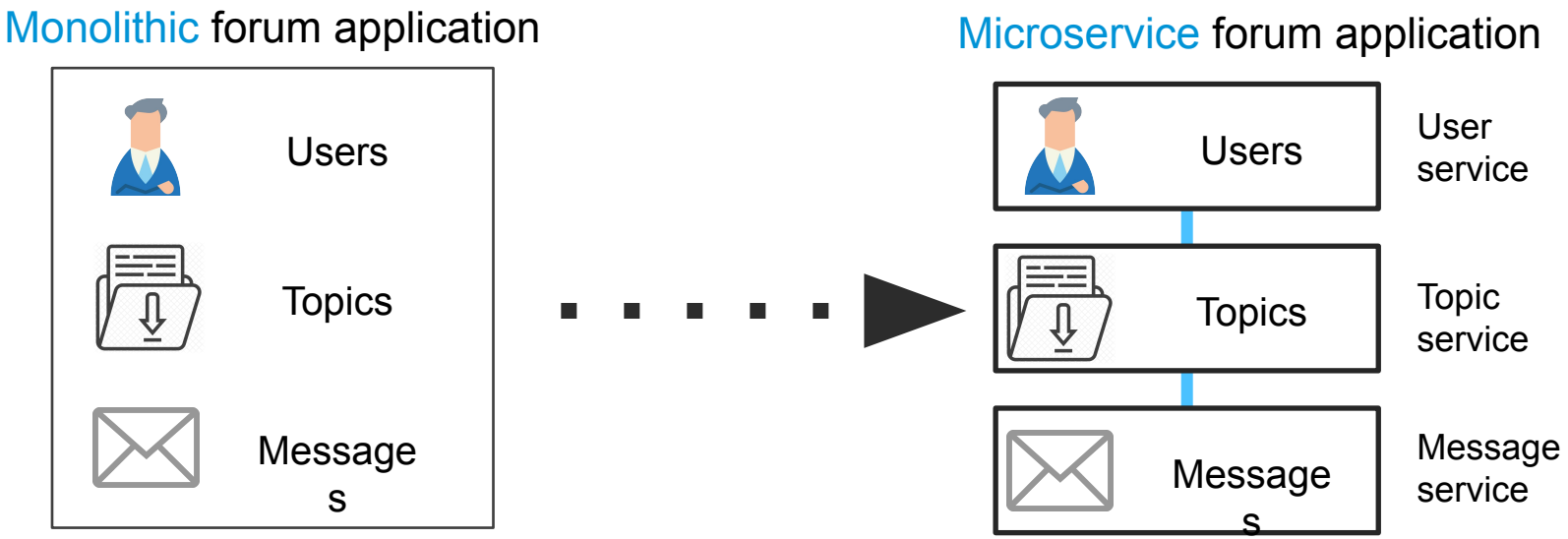
Applications composed of independent services that communicate over well-defined APIs



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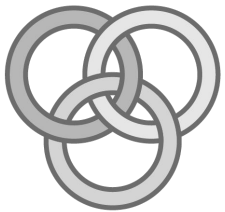
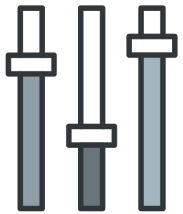
Why use microservices?



Your system can withstand individual failures



Allows parallel production and faster iteration

Spend on scaling only where needed

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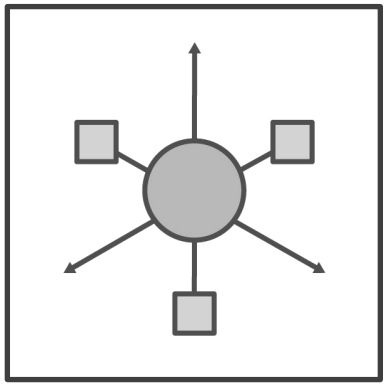
Characteristics of a microservice

Autonomous



Specialized

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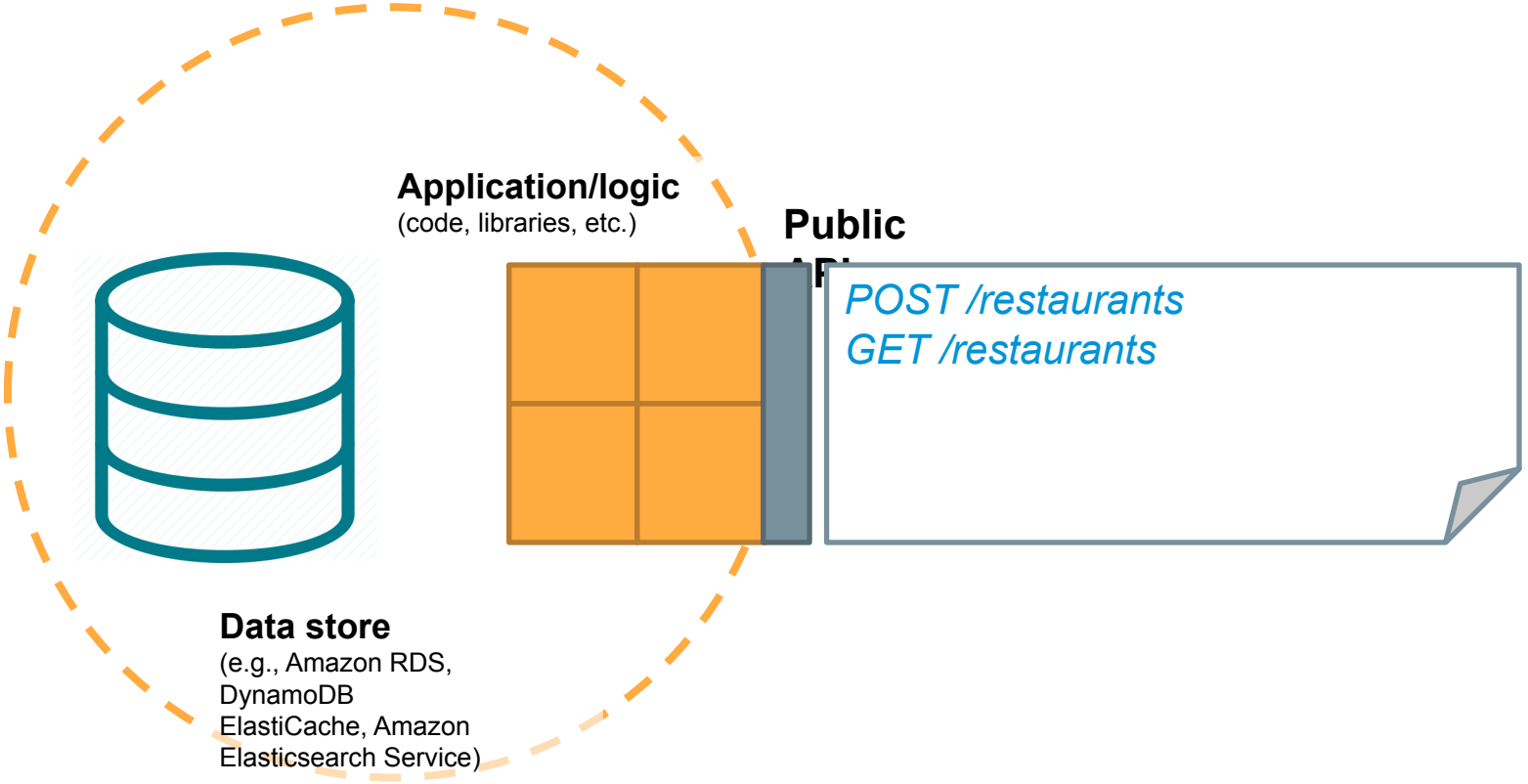
Anatomy of a microservice



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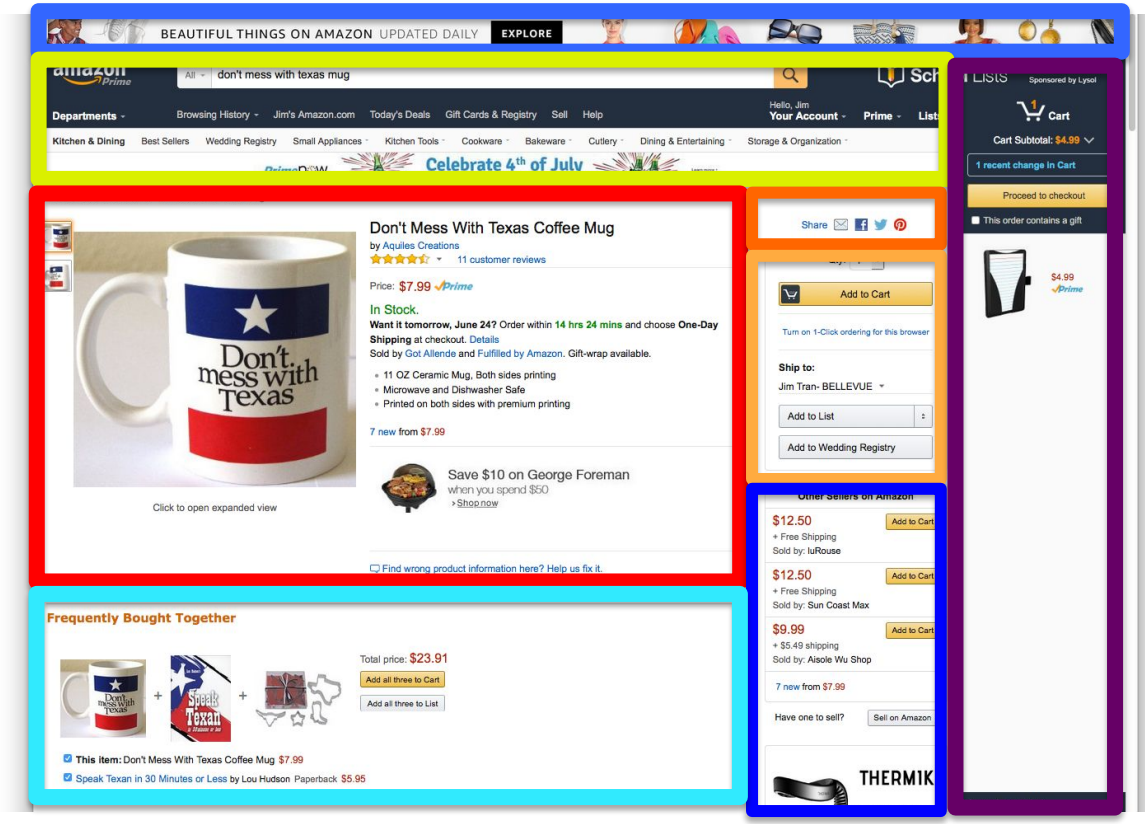
Microservices at Amazon



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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.

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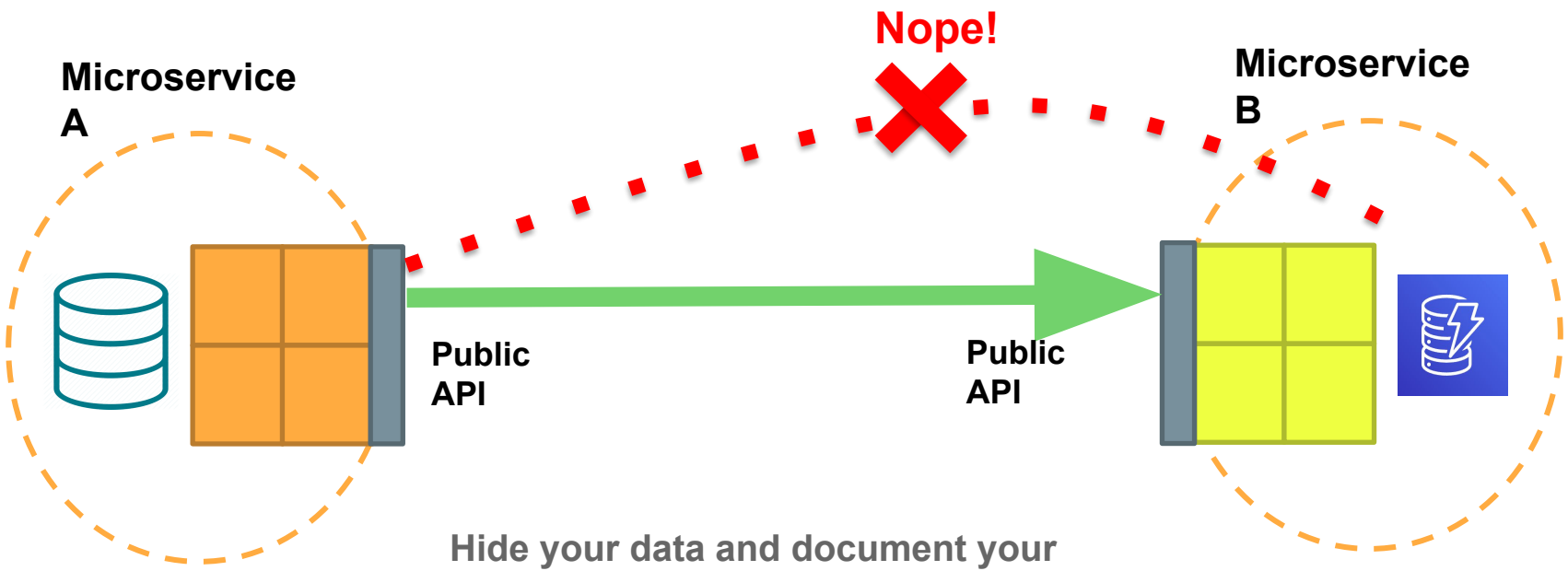
Principle #1: Rely only on the public API



Hide your data and document your APIs

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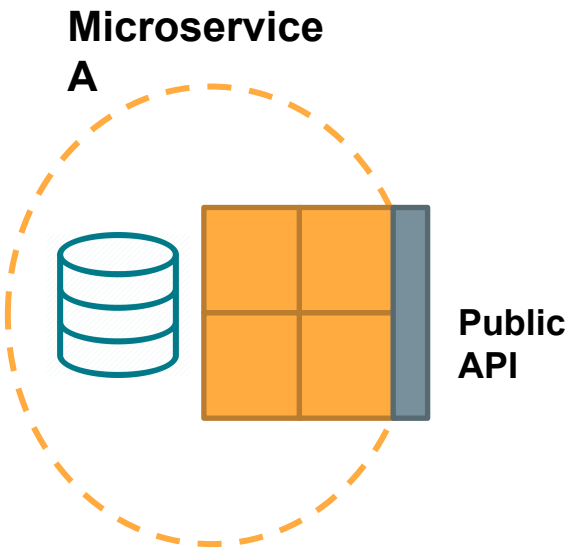
Principle #1: Rely only on the public API



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*)

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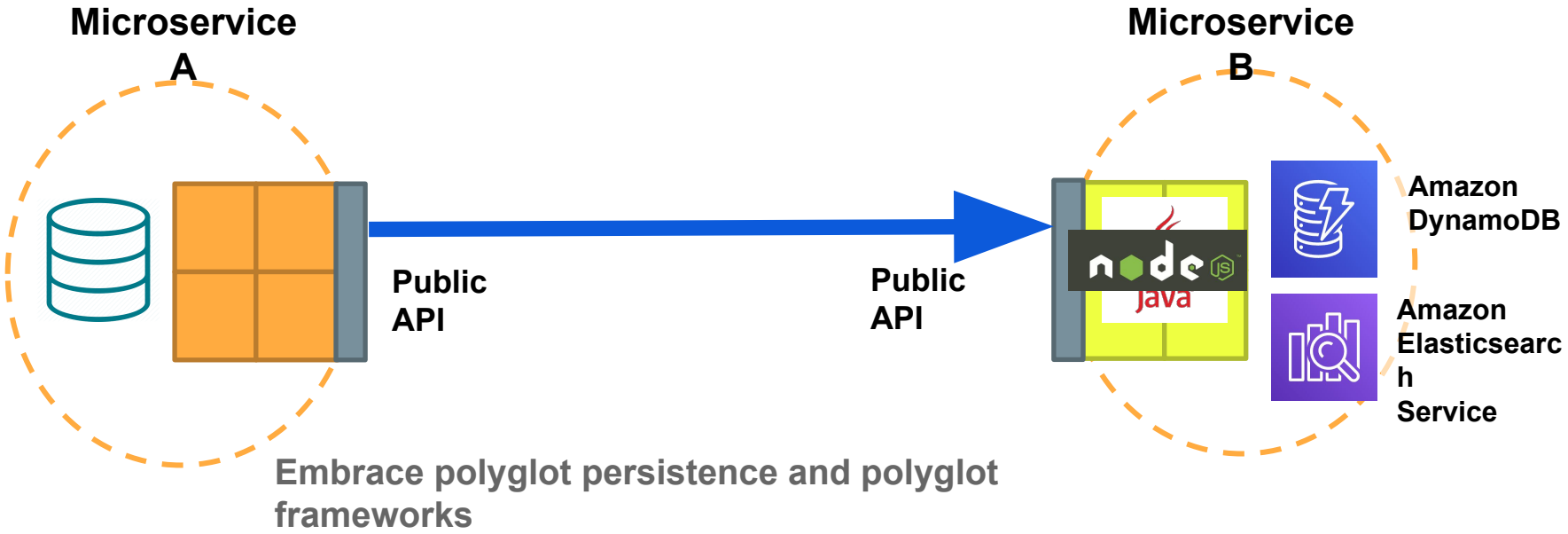
Principle #2:



Embrace polyglot persistence and polyglot frameworks

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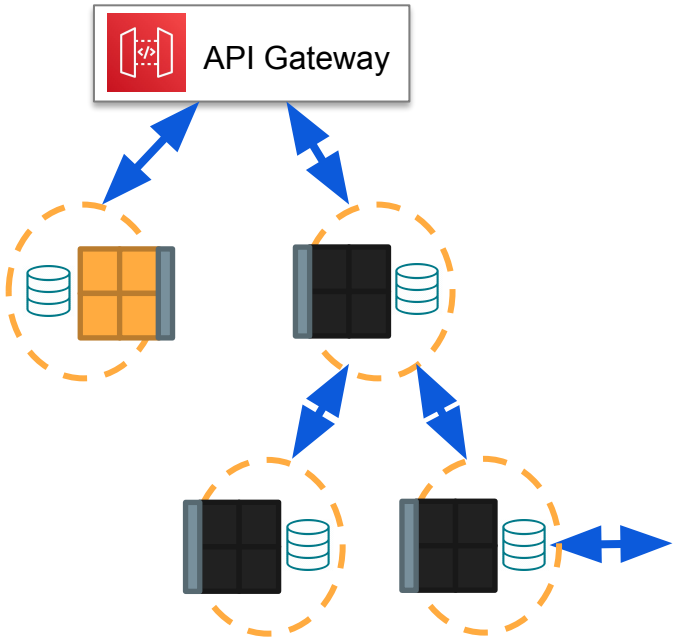
Principle #3: Secure your services



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

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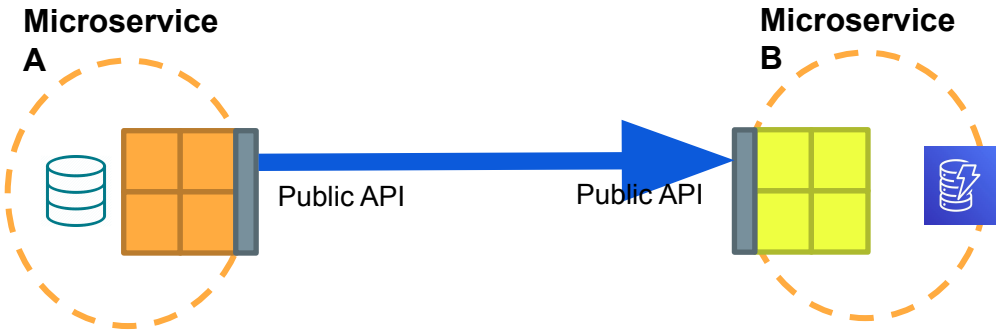
Principle #4: Be a good citizen



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.

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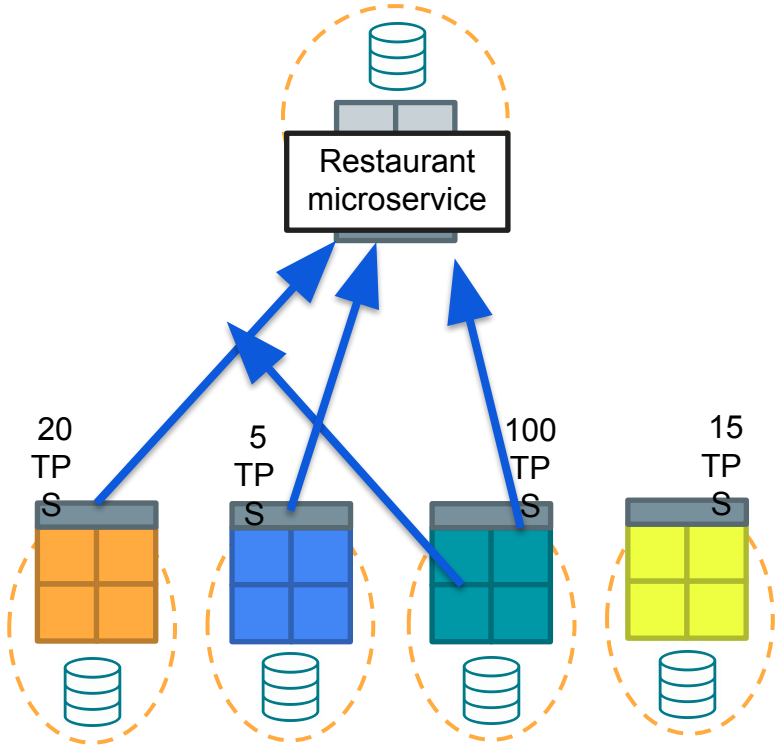
Principle #4: Be a good citizen



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

Have clear SLAs

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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?”

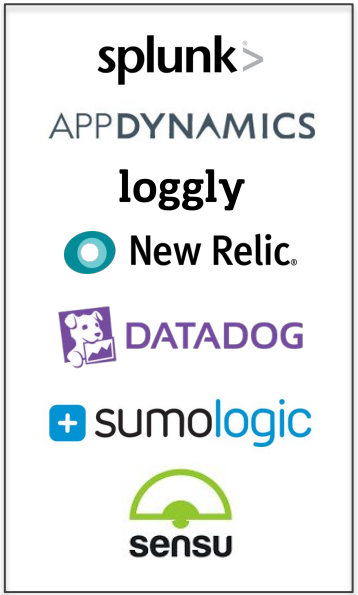
Shared metrics

- For example, request time, time to first byte

Distributed tracing

- For example, Zipkin, OpenTracing

User-experience metrics



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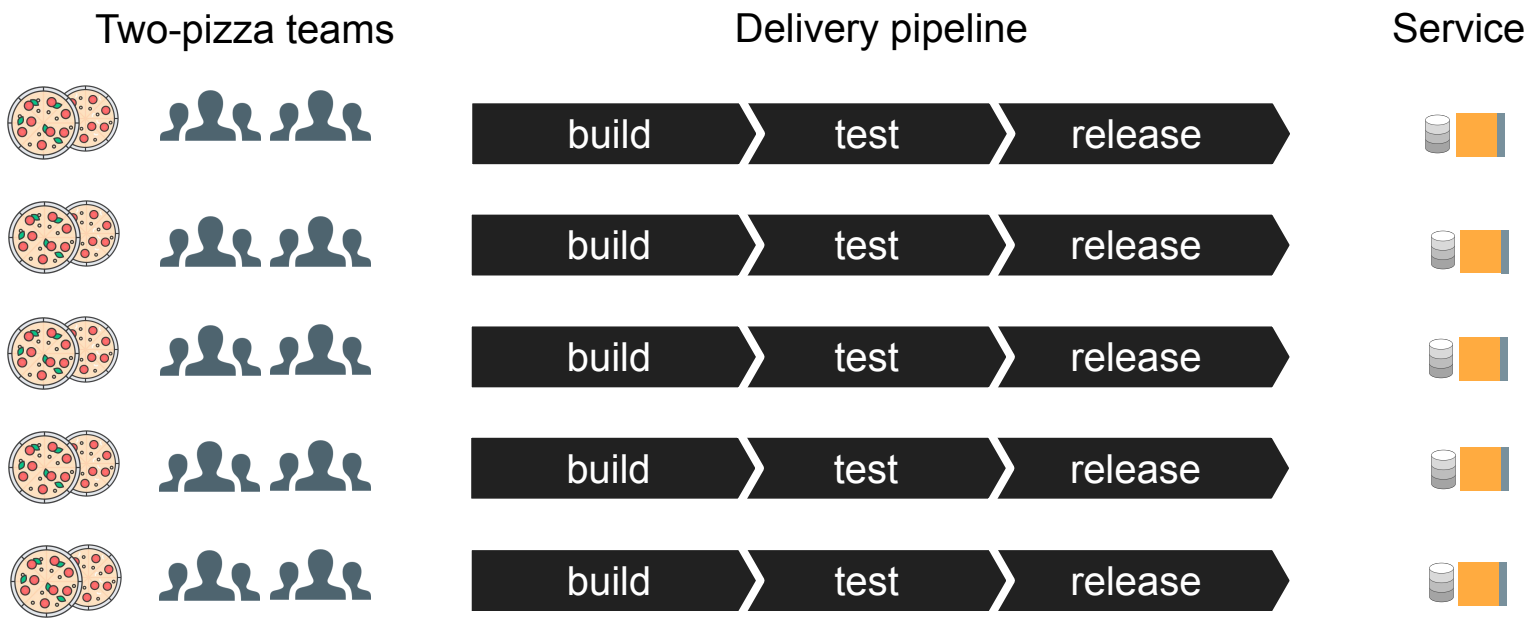
Principle #5:



Favor small, focused dev teams

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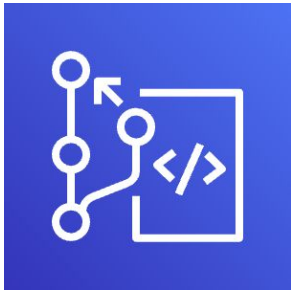
Principle #6: Automate everything



AWS
CodeCommit

AWS
CodePipeline

AWS
CodeDeploy

Adopt
DevOps

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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

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Using Container Services

What is a container?

Your container

Your application

Dependencies

Configurations

Hooks into OS

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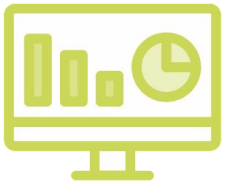
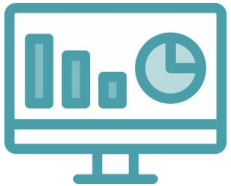
What problems can containers solve?

Getting software to run reliably in different environments



Developer's workstation

Production



Test environment

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Container benefits

Repeatable

Self-contained running environments

Faster to wind up and down than VMs

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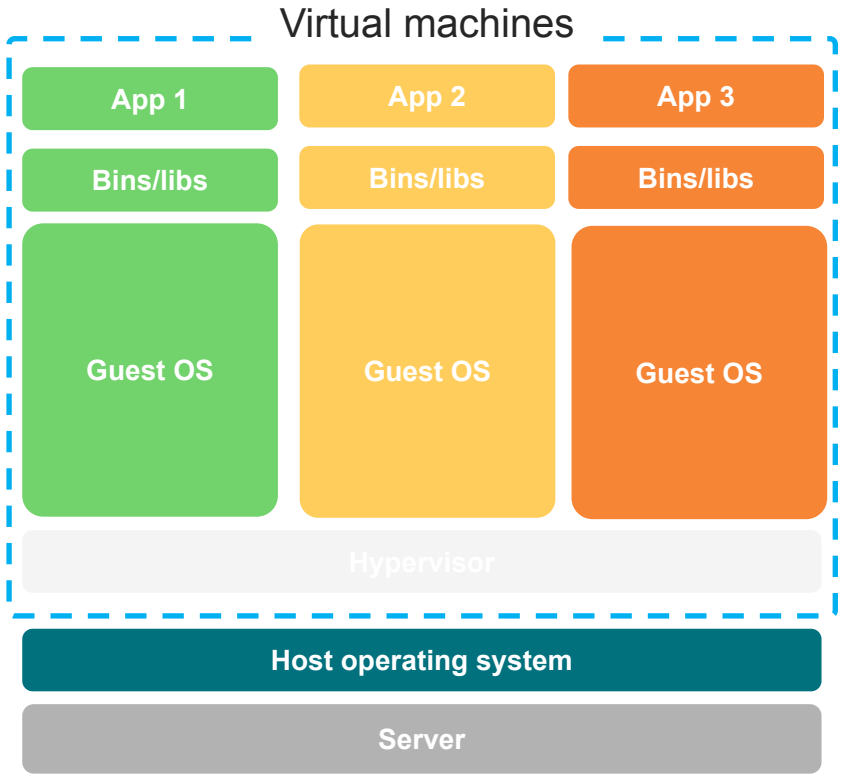
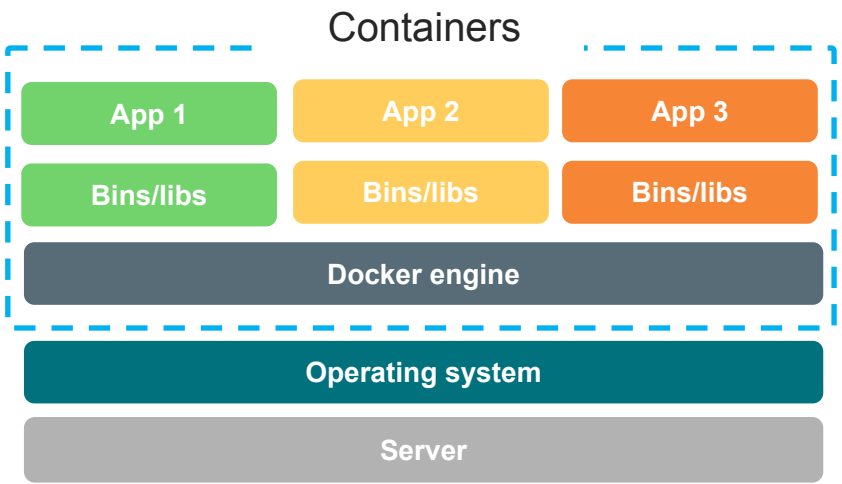
Virtual machines vs. containers



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



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Docker history

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Docker get started

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

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

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Docker repository

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

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Docker Getting Started

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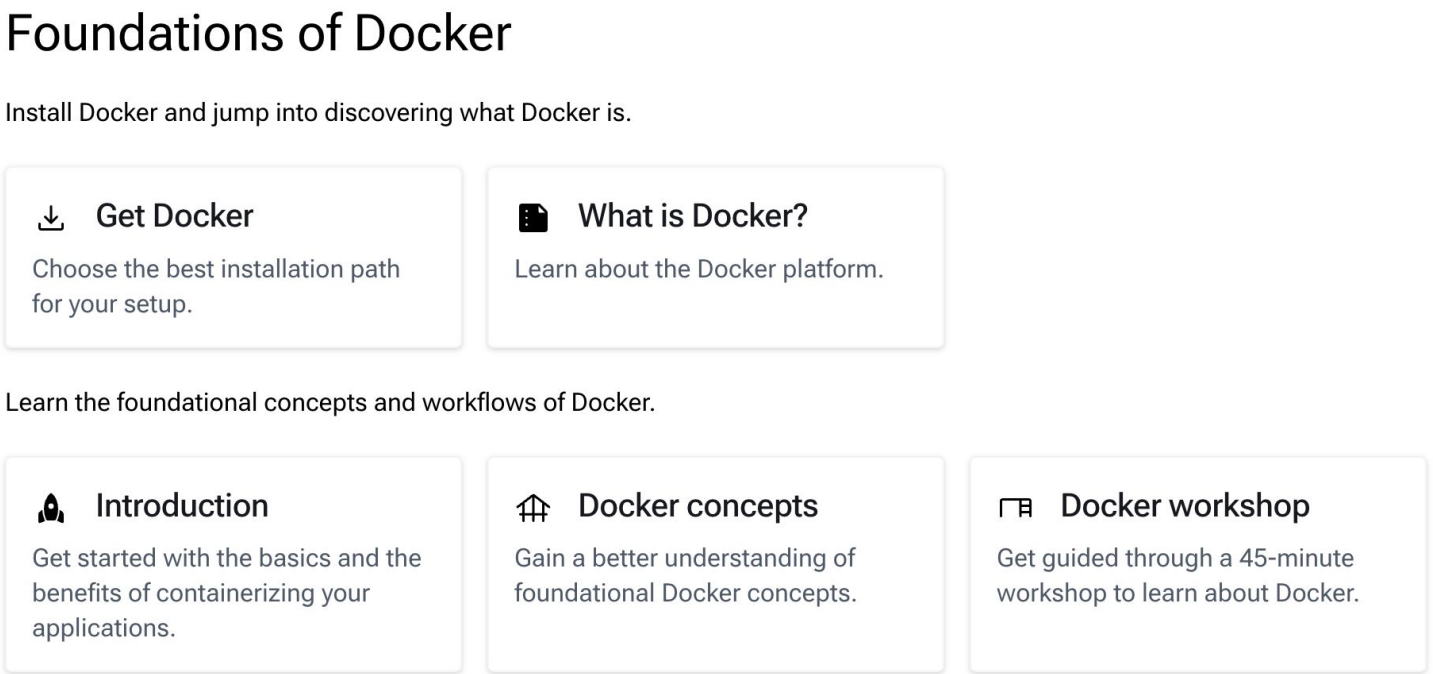

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Several Clouds

Thank you!

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