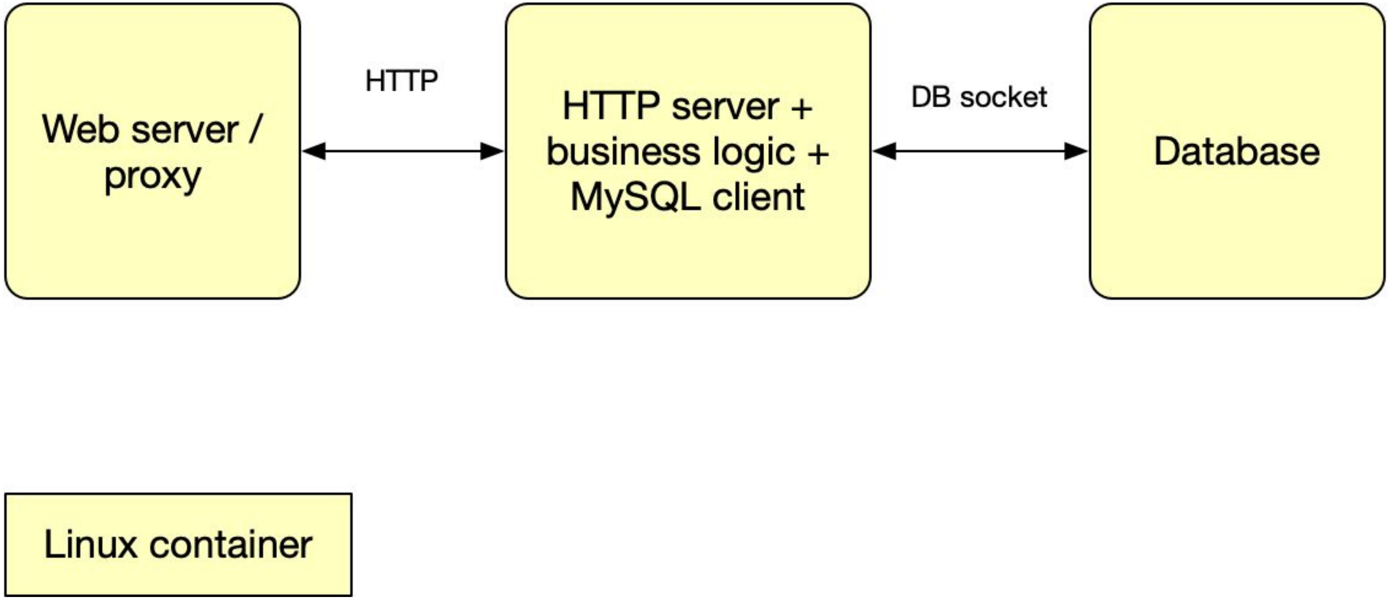
SECOND STATE

Lightweight microservices in WebAssembly

WasmEdgeRuntime

Michael Yuan, WasmEdge Maintainer
https://github.com/WasmEdge/WasmEdge

How it started



Pain points

1 Heavyweight (container + Linux OS + frameworks + app)

2 Slow, especially at startup time, requiring “warm up”

3 A general trade-off between security and overhead

4 Not portable – what happens with write-once-run-everywhere?

SECOND STATE

Opinionated runtime optimized for microservices

- 1/100 the size of typical LXC images
- 1000x faster startup time
- Near native runtime performance
- Secure by default and very small attack surface
- Completely portable across platforms
- Programming language agnostic
- Plays well with k8s, service mesh, distributed runtimes etc.

Trade offs

Too good to be true? There is no free lunch

- Not a general OS environment
- Must learn new language SDKs to create optimized services
- Common libraries need to be ported

SECOND STATE

WebAssembly Runtime

WasmEdgeRuntime

A lightweight, secure, high-performance and extensible WebAssembly Runtime

1. Support networking socket and web services
2. Support databases, caches, and DOs
3. Support AI inference in Tensorflow, OpenVino, PyTorch etc.
4. Seamlessly integrates into the existing cloud-native infra
5. Support writing wasm programs using JS

CLOUD NATIVE
COMPUTING FOUNDATION

https://github.com/WasmEdge/WasmEdge

How it’s going?

Is WebAssembly ready for prime time?
Can it support common web service patterns?

SECOND STATE

Tooling

kubernetes

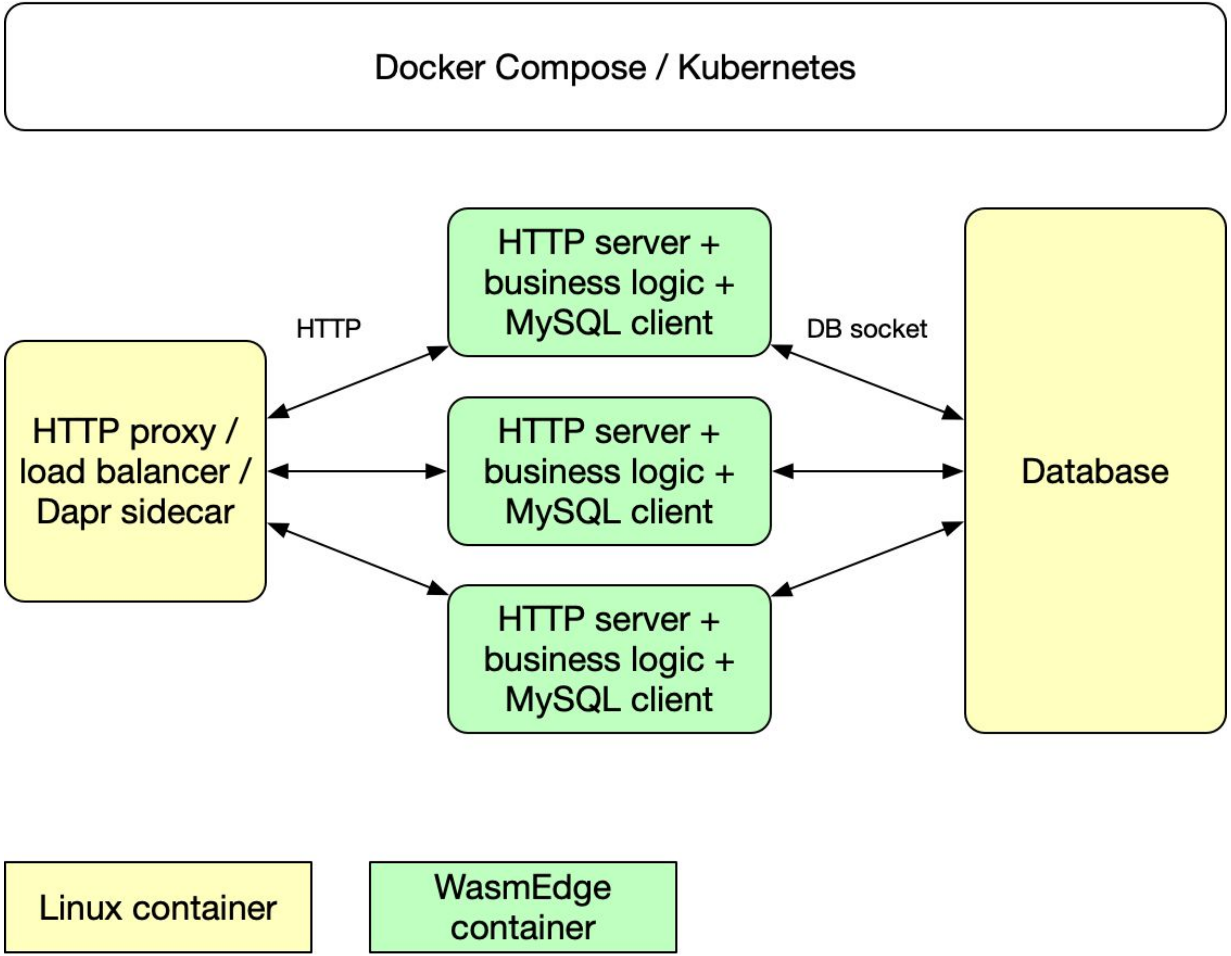
containerd

Libraries and frameworks

- Rust
  - Tokio
  - MIO
  - hyper
  - reqwest
  - mysql_async
  - rskafka
  - anna-rs
  - Dapr
- JavaScript
  - Node
  - fetch()
  - React SSR

Demo 1: A database backed web service

SECOND STATE



Docker Compose / Kubernetes

HTTP proxy / load balancer / Dapr sidecar

HTTP

HTTP server + business logic + MySQL client

HTTP server + business logic + MySQL client

HTTP server + business logic + MySQL client

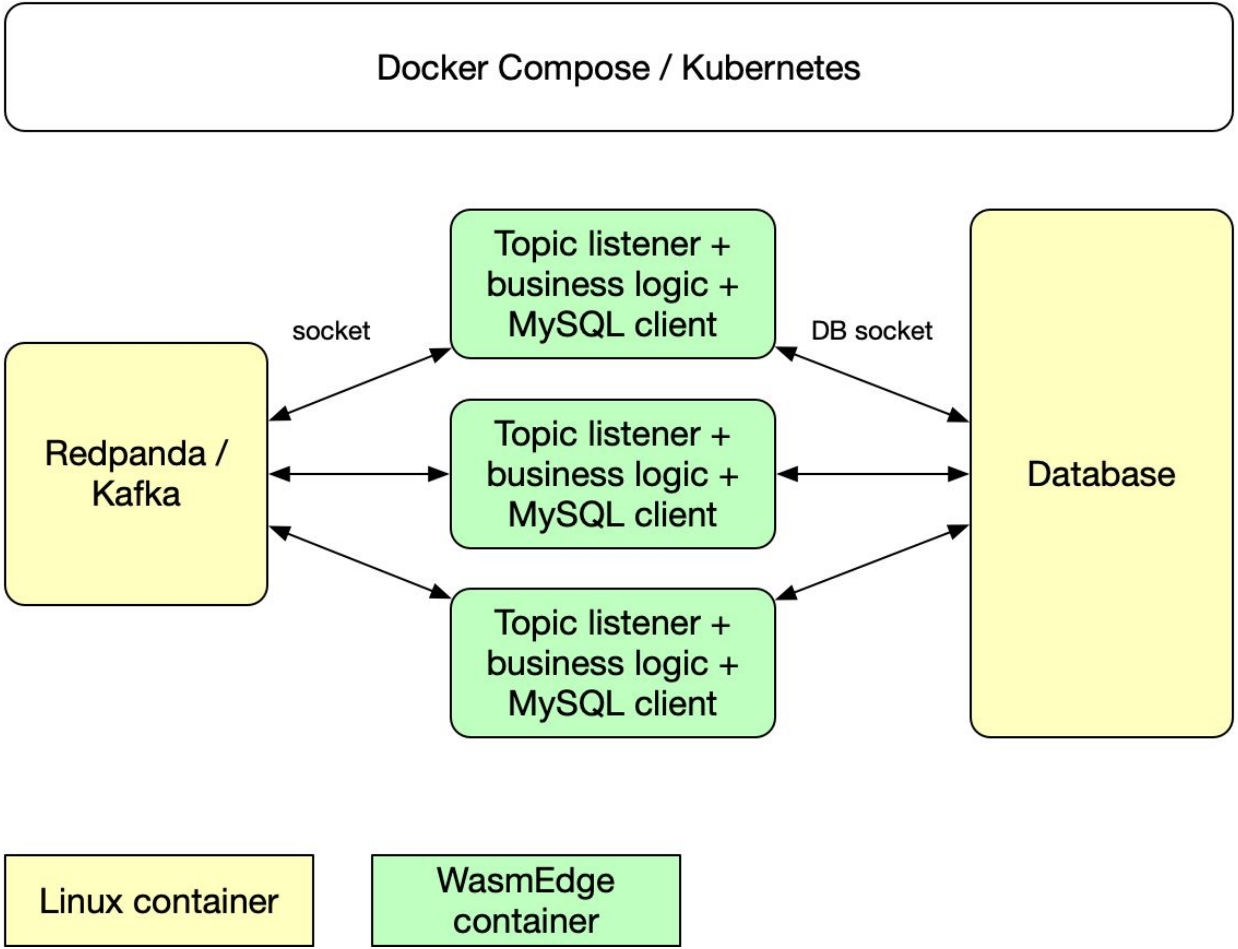
DB socket

Database

Linux container

WasmEdge container

Demo 2: An event driven service



Docker Compose / Kubernetes

Redpanda / Kafka

socket

Topic listener + business logic + MySQL client

Topic listener + business logic + MySQL client

Topic listener + business logic + MySQL client

DB socket

Database

Linux container

WasmEdge container

Demo 3: Edge web service for AI inference

SECOND STATE

WasmEdgeRuntime

Discuss and learn more:

https://github.com/WasmEdge/WasmEdge

CLOUD NATIVE
COMPUTING FOUNDATION

SECOND STATE

Thanks !