# Using WebAssembly Now: It's Easier Than You Think

Brooks Townsend and Taylor Thomas, Cosmonic

# Who are we?

**Brooks Townsend**

- Lead Software Engineer at Cosmonic
- wasmCloud maintainer
- Serial open source contributor
- Brewer of Elixir, Wasm enjoyer, Rustacean
- Demo enthusiast

**Taylor Thomas**

- Director of Engineering at Cosmonic
- Rustacean
- Co-creator of Krustlet and Bindle
- Open Source Maintainer
- Emeritus Helm Maintainer

# Agenda

- What is a Wasm?
- Where does it fit in?
- Demos galore ✨
- What can I do now?
- How to get involved

# Neither Web, nor Assembly

### Open W3C Standard

Open and widely supported standard

### Safe & Secure

Deny by default secure sandbox, featuring capability driven permissions

### Efficient and fast

Small size and near-native execution speed

### Polyglot

Choice of deployment language means ability to reuse existing libraries

### Portable

WebAssembly runs in all major browsers

# Good vs Bad

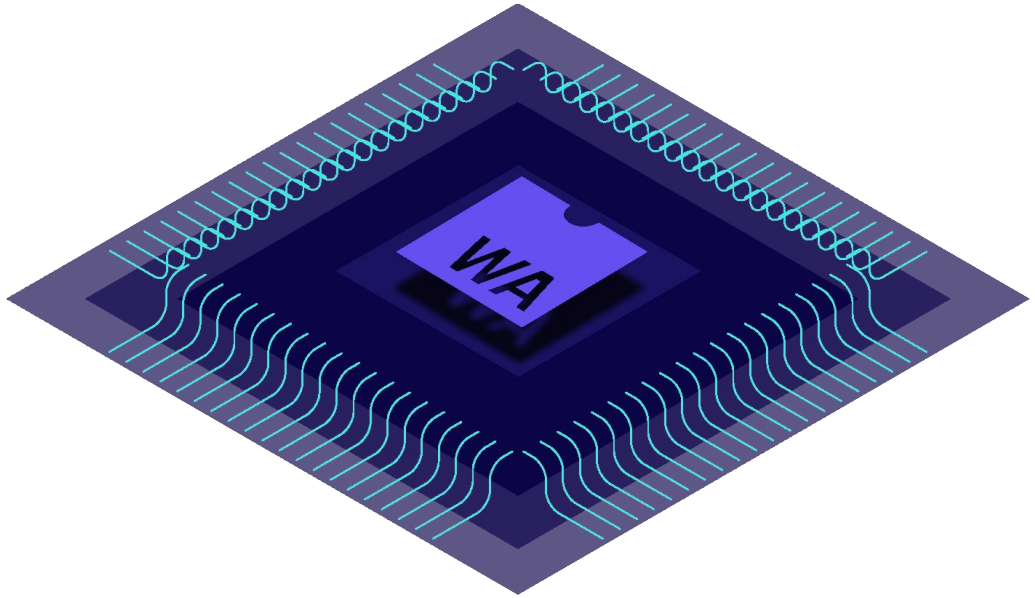
- General server side computing
  - Microservices
  - Functions
- Runtime optimization
- Constrained devices (“the edge”)
- Plugins
- Libraries
- Browser

- Networking is still difficult
- Things are now in the “fast moving” stage
- Slower than native code
- Toolchains aren’t there for some languages
  - No lift and shift with Wasm
- Some domains aren’t really a good fit (yet)
  - Performance tuned applications
  - Nginx, Redis, MySQL, etc.

# Why wasmCloud?

- If Wasm is so good, what do we need wasmCloud for?
- Runtime vs application runtime

# WebAssembly Host Runtime

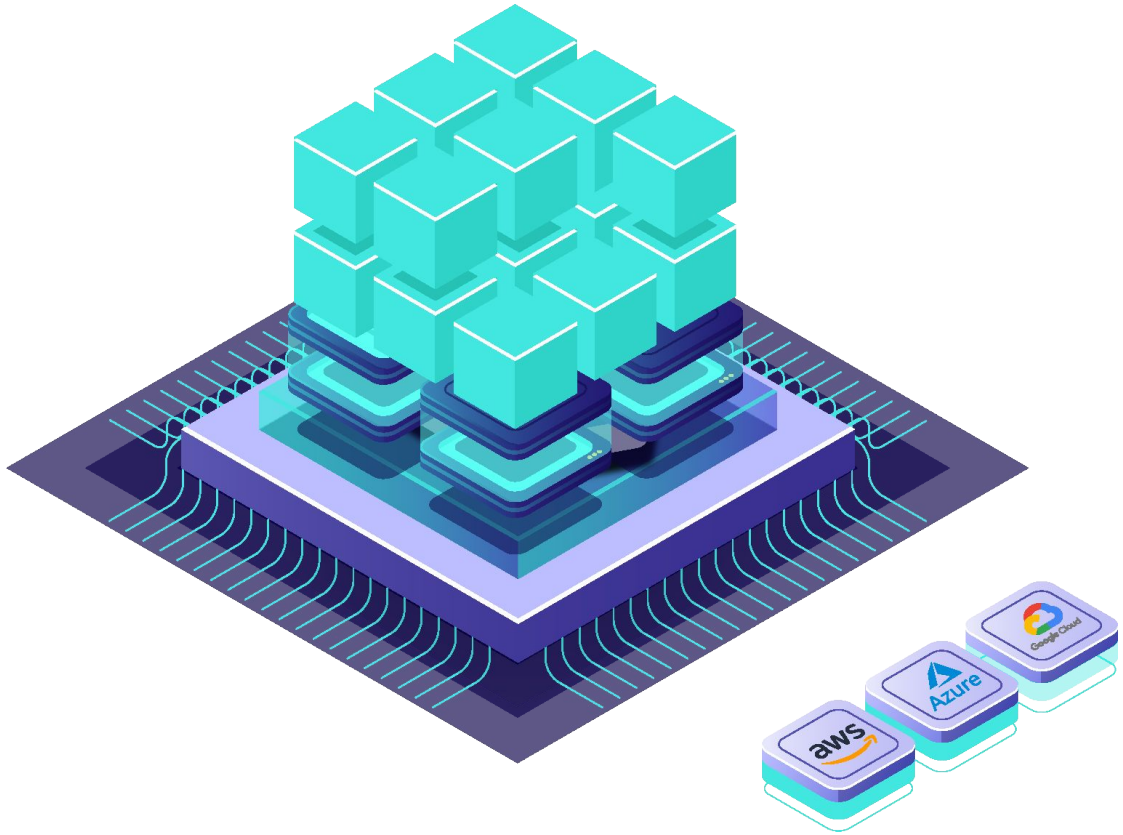



- Portable
- Secure
- Small
- Fast
- Language agnostic

# wasmCloud Application Runtime

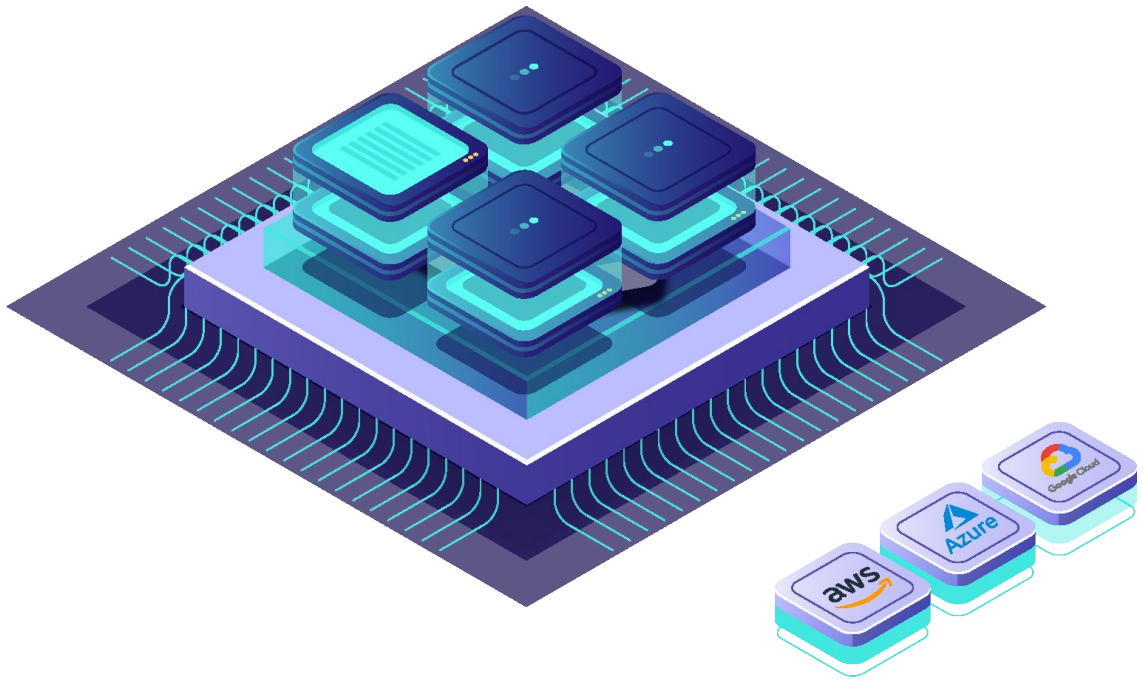
- Run and orchestrate Wasm
- Secure access to capabilities
- Horizontally and vertically scalable, stateless actors
- Manage networking, failover, request routing

# Actors



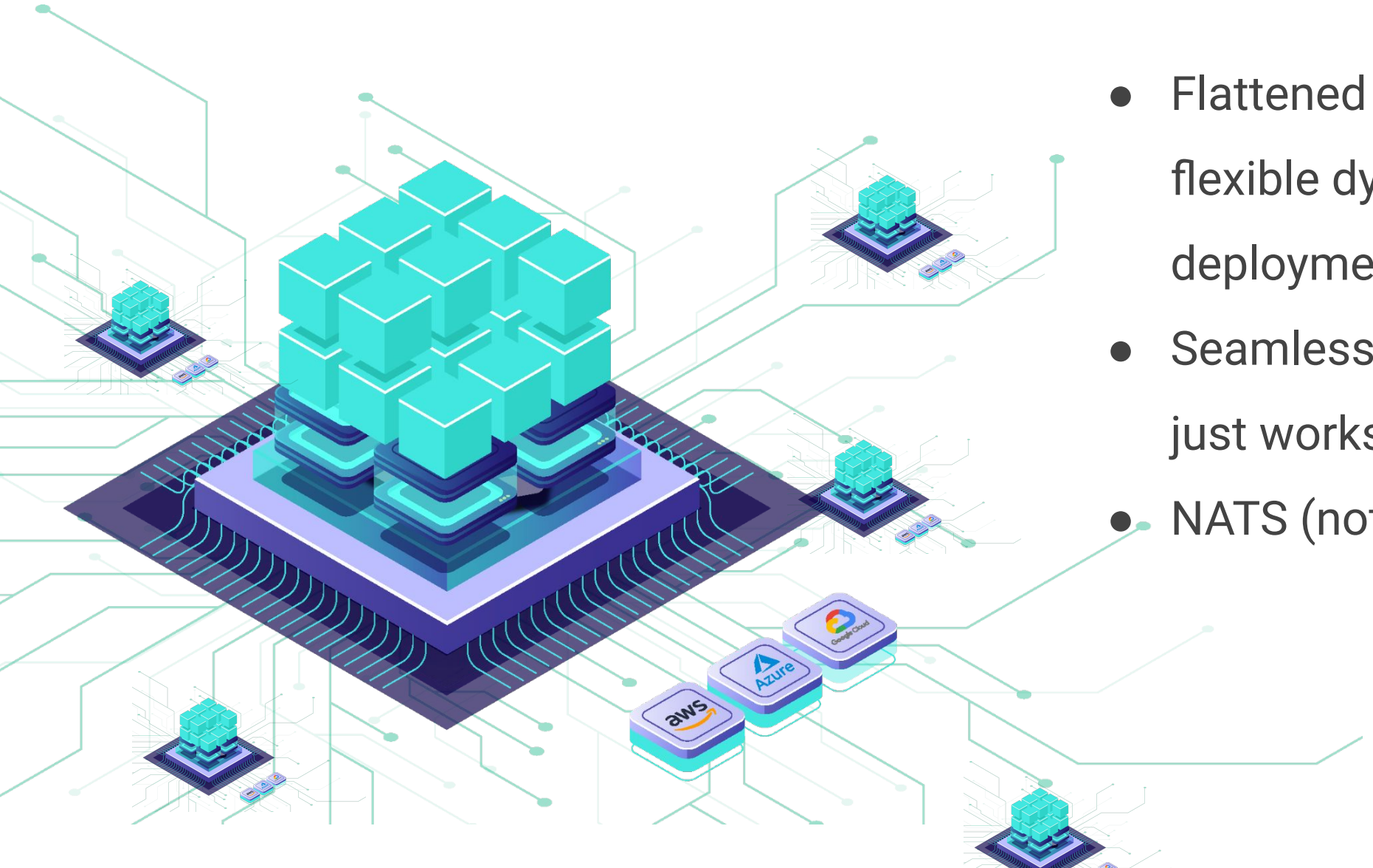

- Implement only your business logic
- Stateless and reactive
- Tiny footprint, portable & scalable
- Easy to develop & low boilerplate

# Capabilities



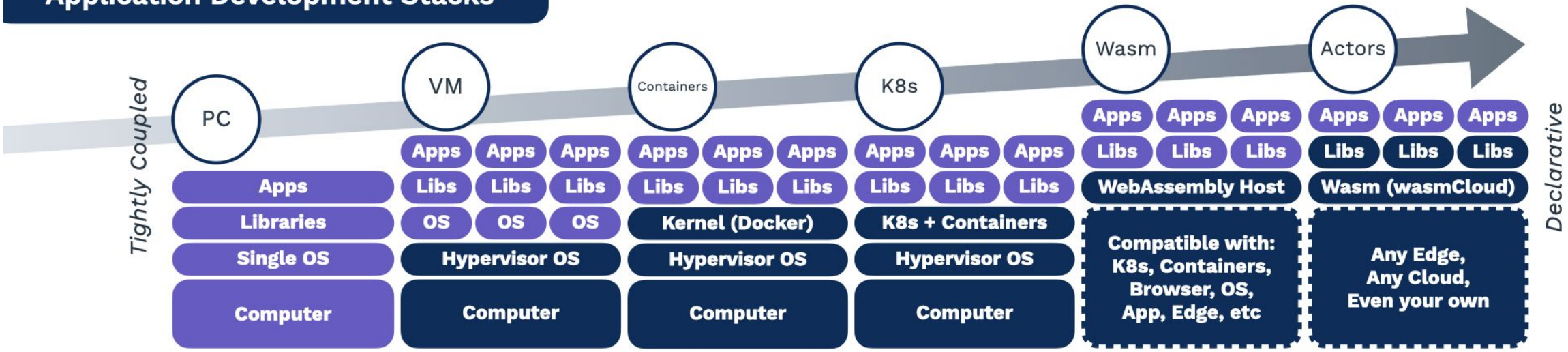

- Contract driven design
- Choose implementation at runtime, hot swap
- Decoupled libraries from business logic

# Lattice Network




- Flattened topology, enables flexible dynamic deployments
- Seamlessly connected, “it just works”
- NATS (not NATs)

# Application Development Stacks




| FORMAT | PC | CLOUD | CONTAINER | K8S | WASM | WASMCLOUD |
|---|---|---|---|---|---|---|
| **EXECUTION** | ***Image (Datacenter)*** | ***VM (Public Cloud)*** | ***Container (Docker)*** | ***Containers (K8s / Cloud)*** | ***WASM (Everywhere)*** | ***Distributed WASM (Everywhere)*** |
| **Dev Responsibility** | Full | OS, App, Lib | App, Lib | App, Lib | Wasm | Business Logic |
| **Abstraction** | - | CPU | Linux Kernel | K8s | Secure Sandbox | Sandbox + Capabilities |
| **Compatibility** | All | Most | Most | Most | Most | Most |
| **Size** | Large | Med | Small | Small | Tiny | Minuscule |
| **Portability** | - | Low | Med (CPU, Linux) | Med (CPU, Linux) | High | Highest |
| **Security** | System | OS | Process Boundary | Process Boundary | Capability | Actor |
| **Location** | On Prem & Co-location | Proprietary Cloud & Edge | Dev, Edge, Cloud, K8s | Dev, Edge, Cloud, K8s | Dev, App, Edge, Cloud, K8s, Browser, Devices | Dev, App, Edge, Cloud, K8s, Browser, Devices |

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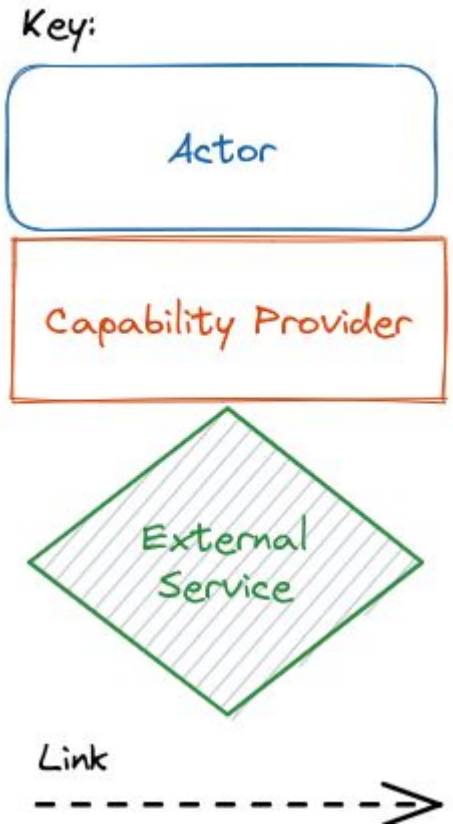
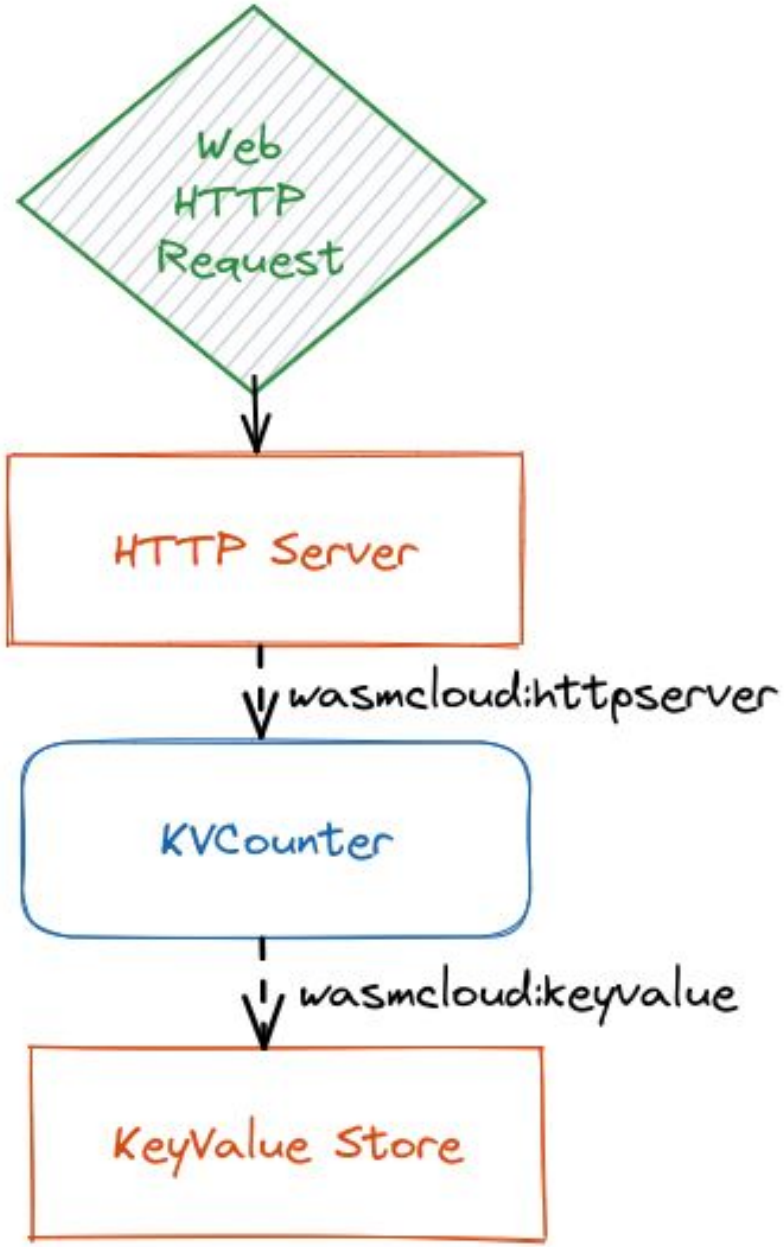
***Legend:*** **Developer Provided** **Service Provided** **Flexible**

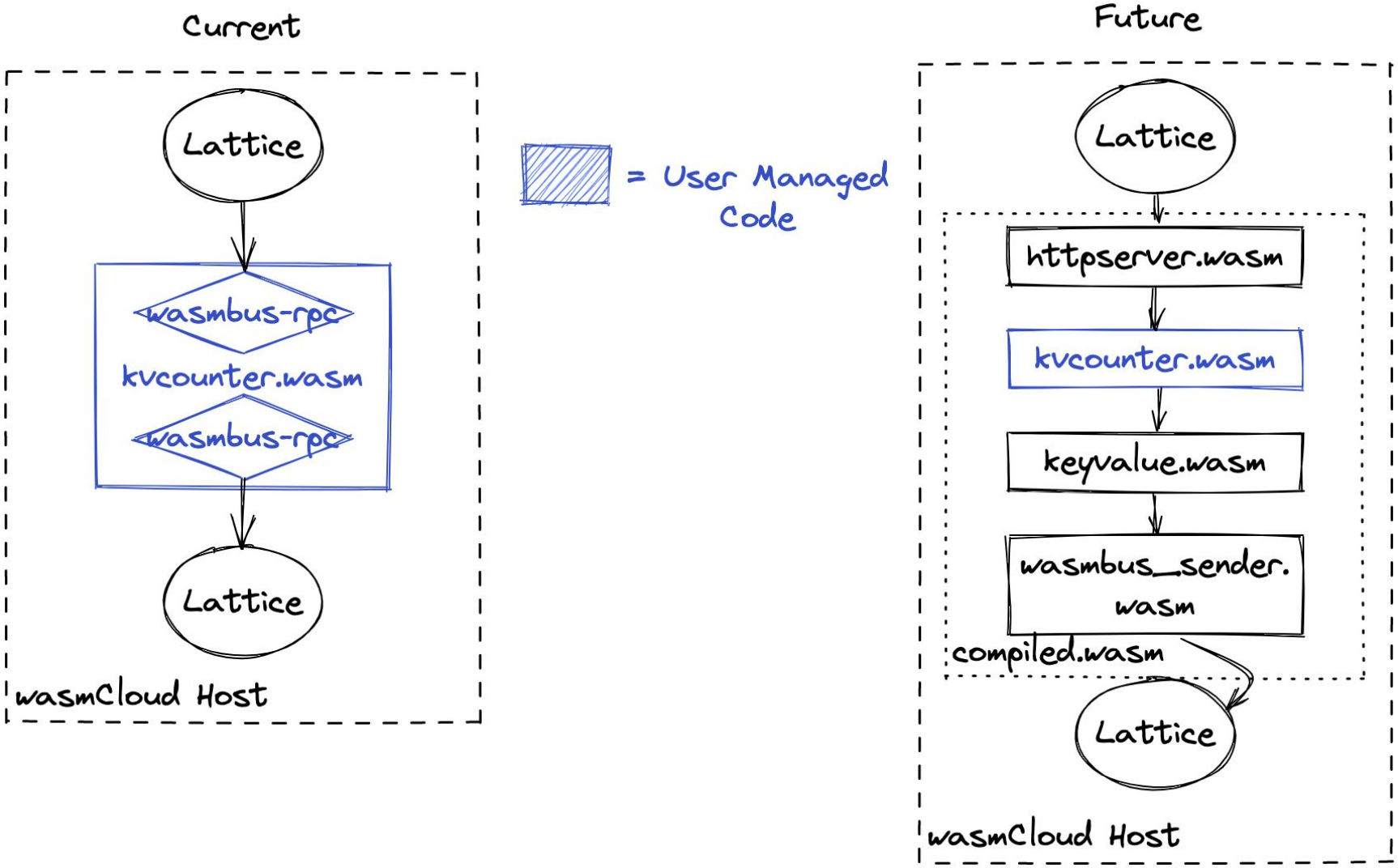
# DEMO TIME

# KVCounter

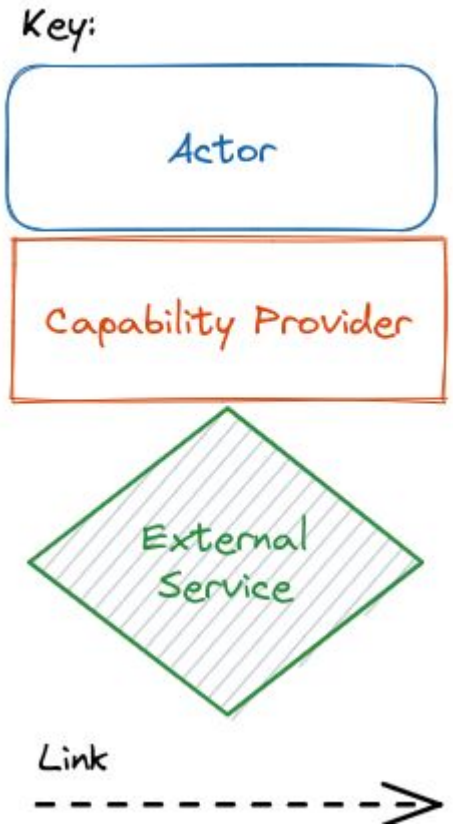

Key:
Actor
Capability Provider
External Service
Link


Web HTTP Request
HTTP Server
wasmcloud:httpserver
KVCounter
wasmcloud:keyvalue
KeyValue Store

# Components and the future



# TODO App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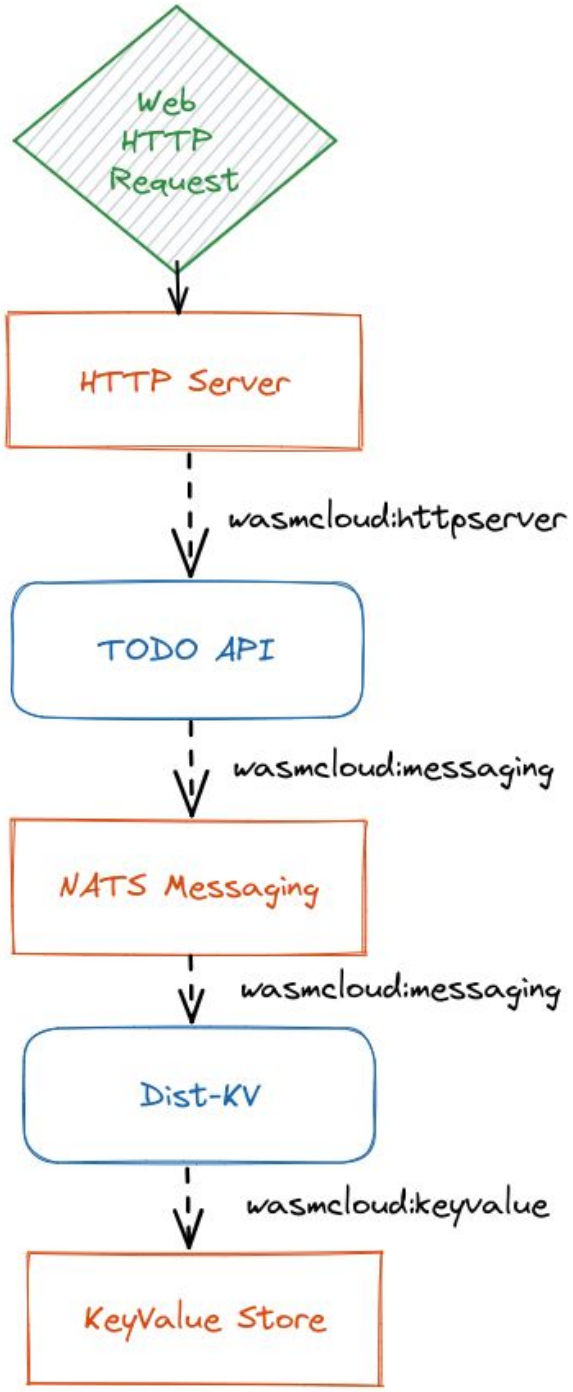
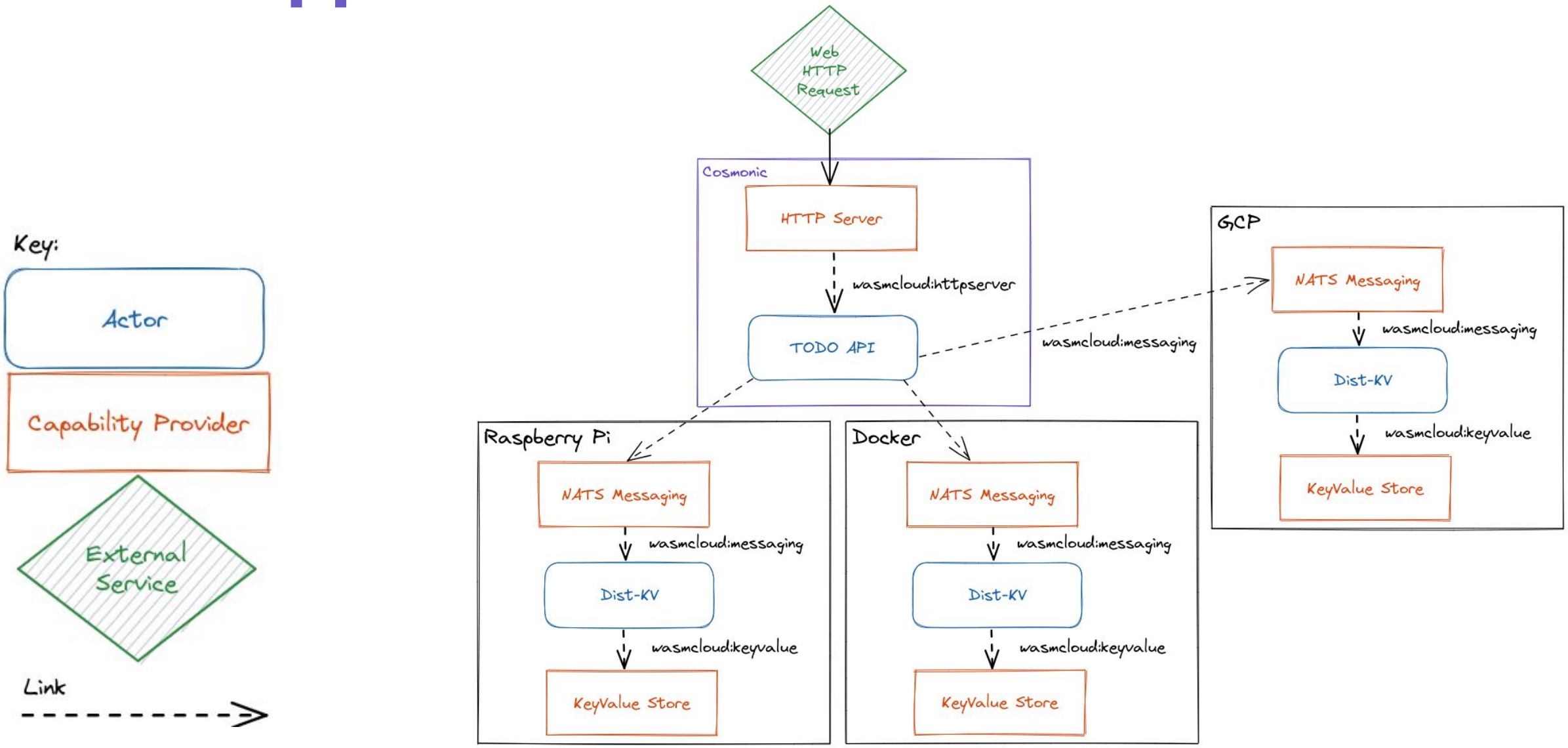

Web HTTP Request
HTTP Server
wasmcloud:httpserver
TODO API
wasmcloud:messaging
NATS Messaging
wasmcloud:messaging
Dist-KV
wasmcloud:keyvalue
KeyValue Store

# TODO App Architecture



# What could you do now?

1. Basic data/image/etc. processing
2. One small part of a service
    - Runs smaller and cheaper
3. A full stateful application
    - Use the various providers to connect to the data sources you need

# References

- https://slack.wasmcloud.com/
- https://github.com/wasmCloud/wasmCloud
- Additional resources
  - https://github.com/wasmCloud/capability-providers
  - https://github.com/wasmCloud/interfaces

# Join our community Slack and check out our GitHub!

https://slack.wasmcloud.com

https://github.com/wasmCloud/wasmCloud

# ❓ Questions ❓