

.NET Conf

2022



WebAssembly, WASI, .NET & Cloud Native

Phi Huynh, Microsoft MVP

Agenda

- What is WebAssembly
- WebAssembly outside the browser
- Why, what and how WASI
- Wasi with .NET
- Wasi with Docker
- Wasi with K8S
- Wasi ecosystem

What is WebAssembly?

- Binary instruction format
- Executed in a stack-based virtual machine
- WebAssembly file in **.wasm** extension



What is WebAssembly?

- **Fast**

Near native execution performance

- **Safe**

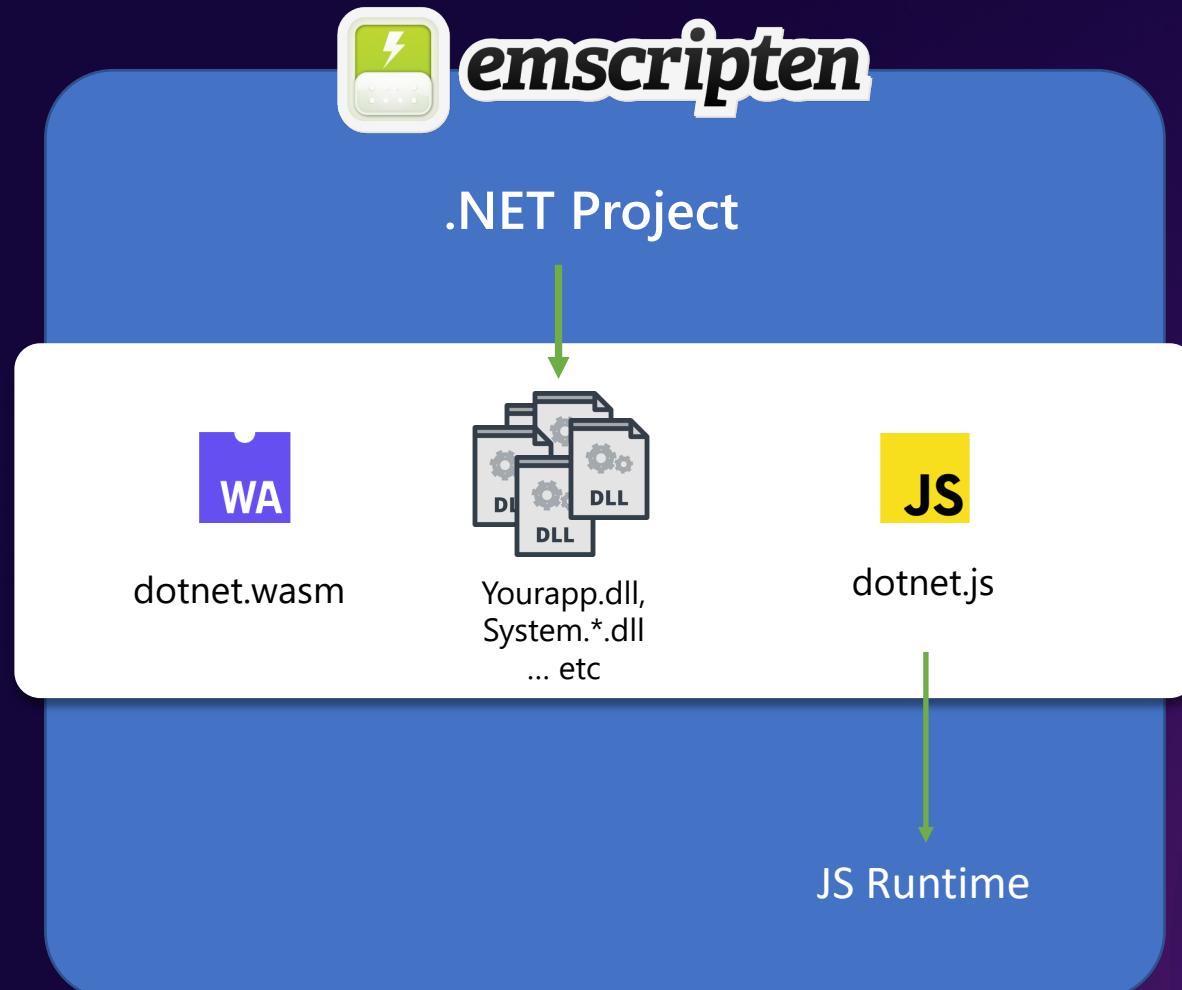
Wasm is a sandboxed, memory-safe execution environment

- **Portable**

All major browsers support Wasm and multiple runtimes available



WebAssembly and .NET



Demo

.NET7 & WebAssembly

WebAssembly

outside the browser?

Why?

Again, because it's

- Fast (near native)
- Safe & secure
- Less memory footprint
- Portable



Solomon Hykes
@solomonstre

...

If WASM+WASI existed in 2008, we wouldn't have needed to created Docker. That's how important it is. Webassembly on the server is the future of computing. A standardized system interface was the missing link. Let's hope WASI is up to the task!



Lin Clark ✅ @linclark · Mar 27, 2019

WebAssembly running outside the web has a huge future. And that future gets one giant leap closer today with...

📢 Announcing WASI: A system interface for running WebAssembly outside the web (and inside it too)

hacks.mozilla.org/2019/03/standa...

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What?

What is WASI

WebAssembly System Interface

- **Platform integration**

Wasi is a wrapper for underlying platform (OS) capabilities. Things like **File::open()**

- **Secure**

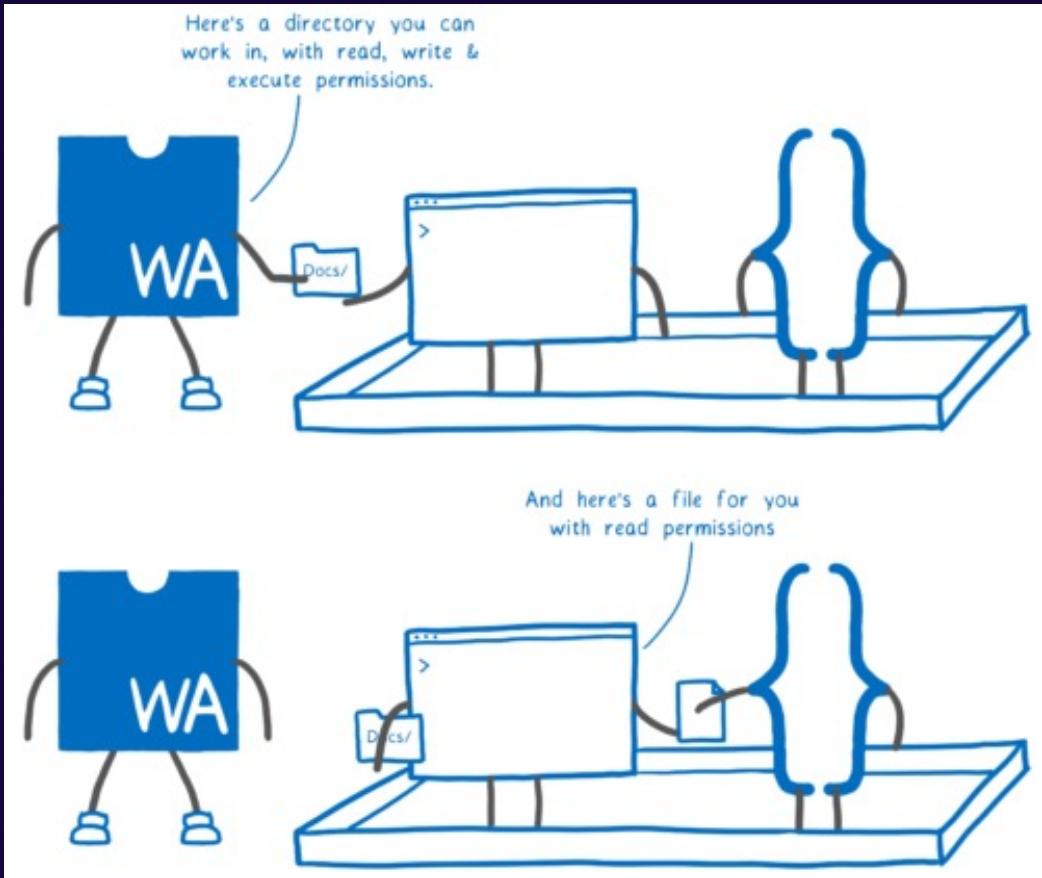
Permissions can be defined per app (module)

- **Future**

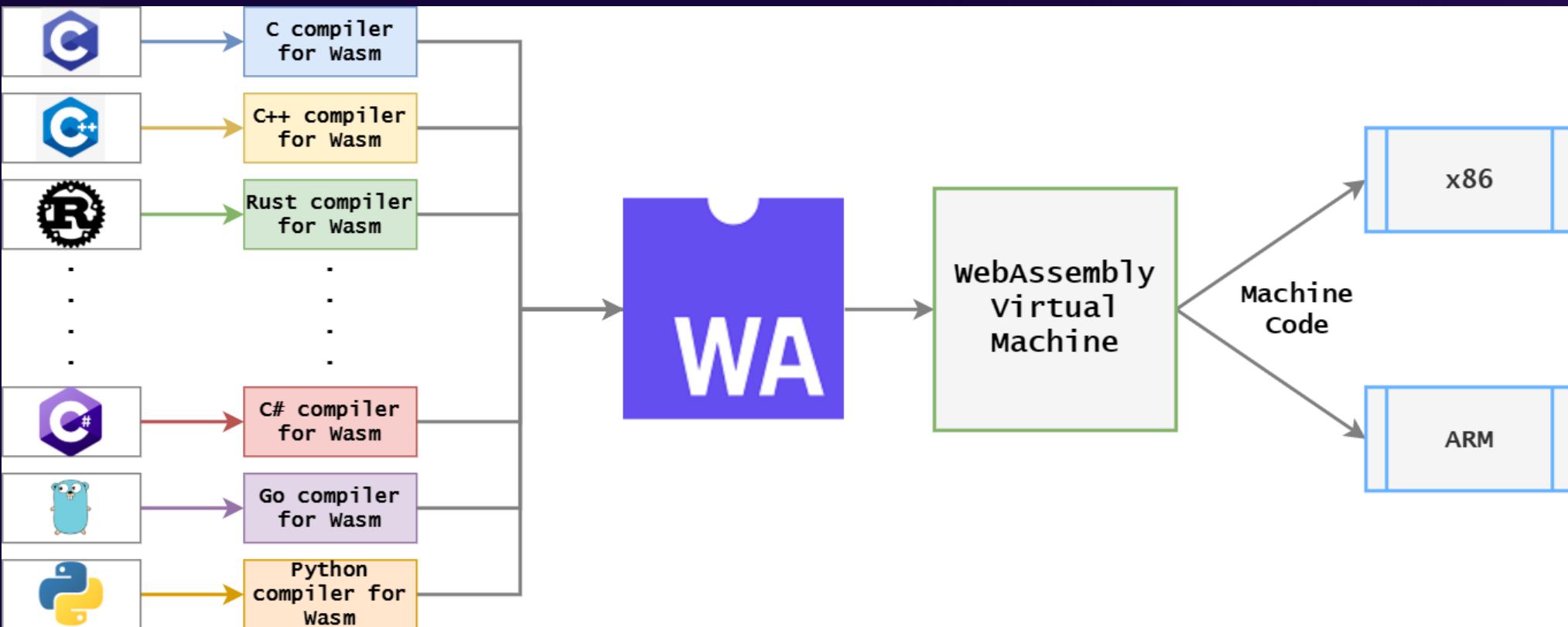
WASI could become the default compiling target for EVERYONE!



WASI: Security



WASI: cross-platform



WA SI

WASM Runtimes (WASI compliant)



Wasmtime

Wasmedge

Wasmer

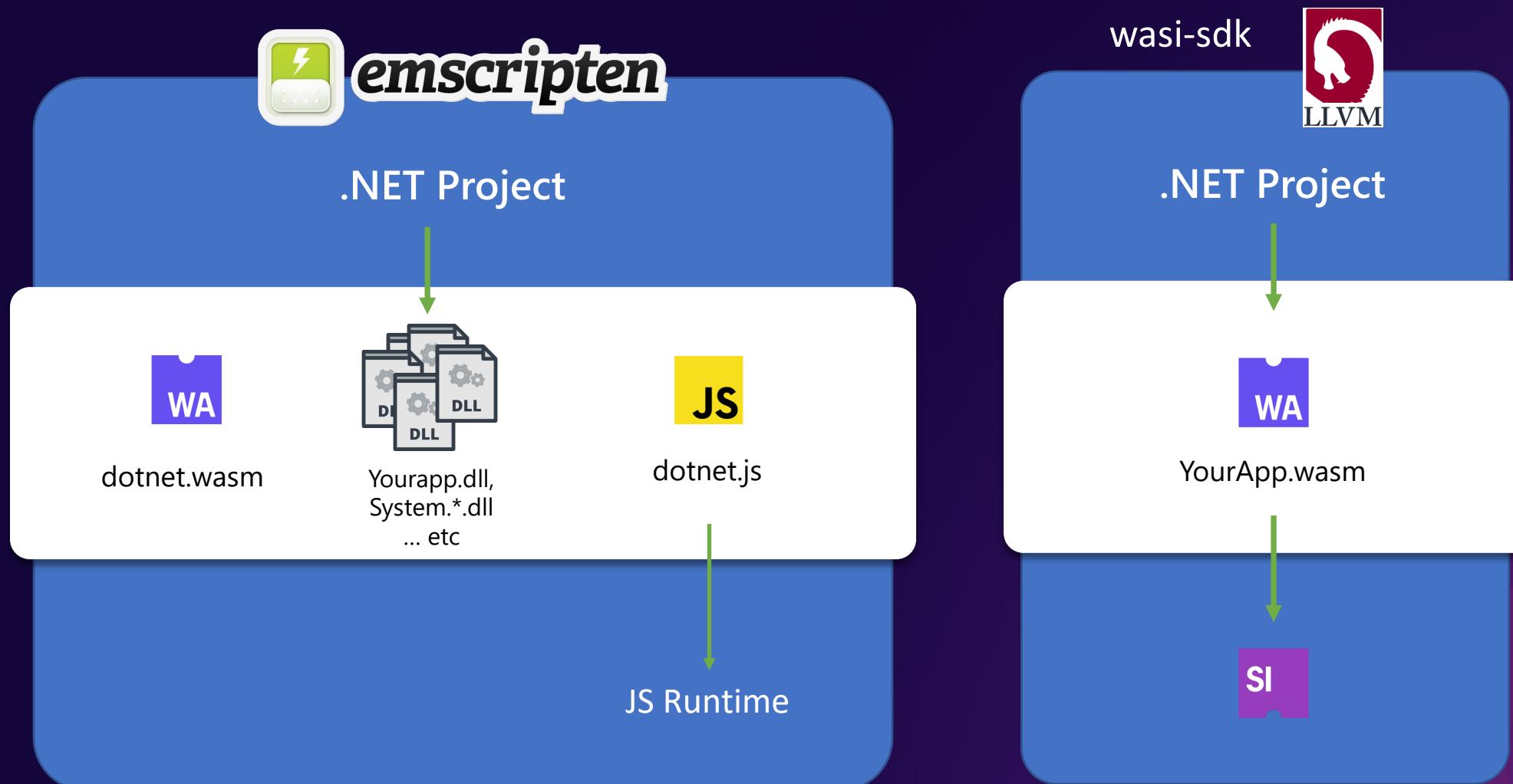
Add a lot more, listed here <https://github.com/appcypher/awesome-wasm-runtimes>

Experimental

WASI & .NET₇



WASI in .NET



Demo

Wasm, Wasi & .NET

WASI & Docker



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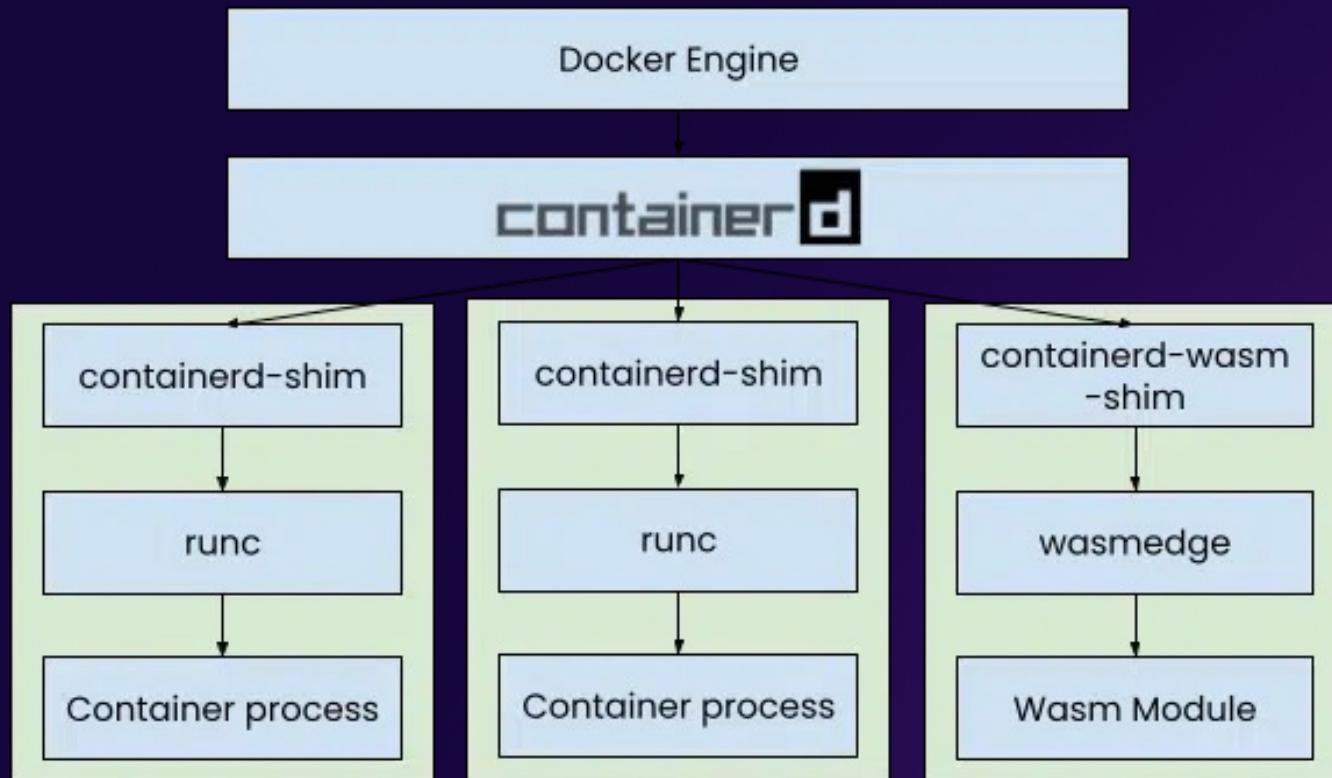
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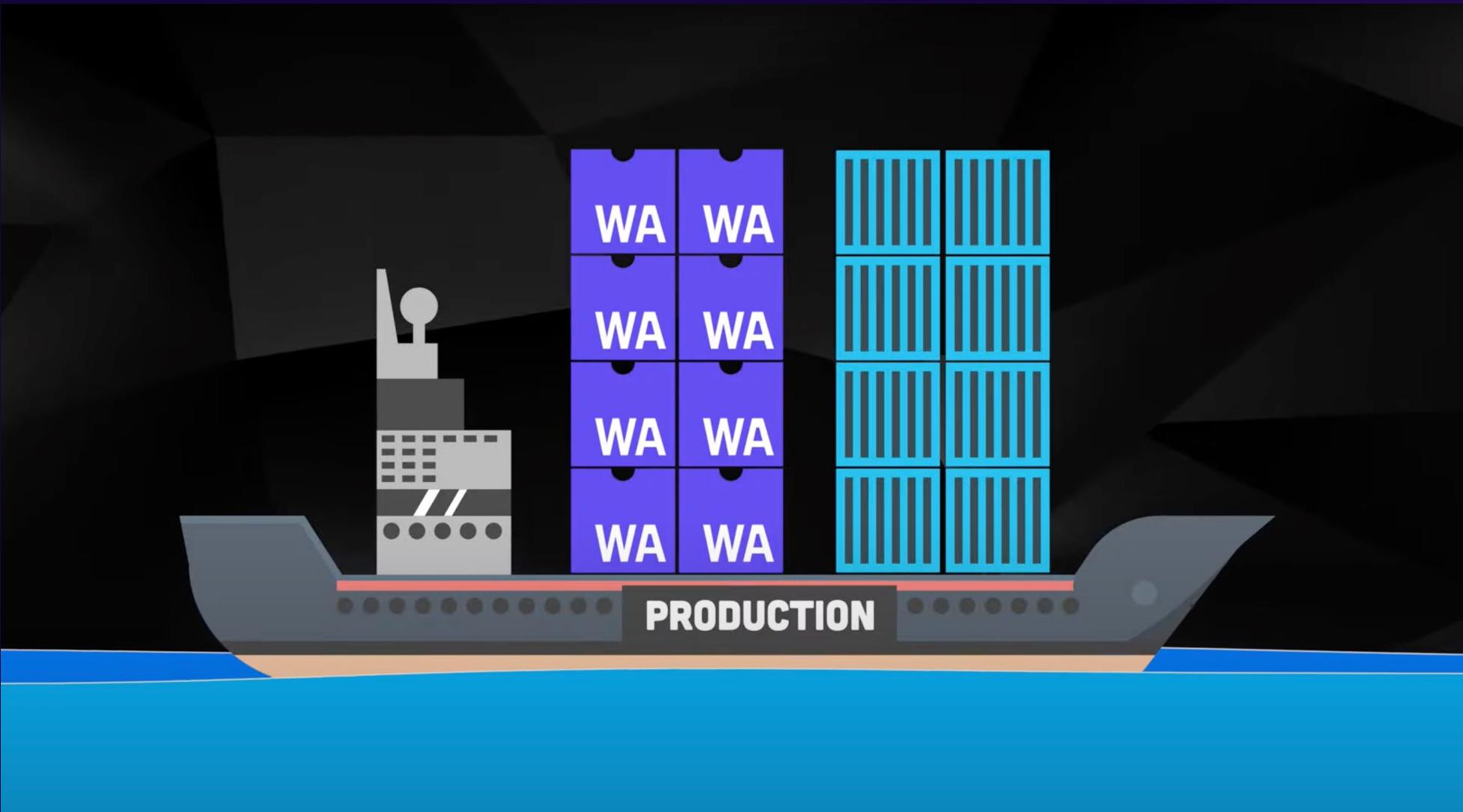
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Docker and WebAssembly

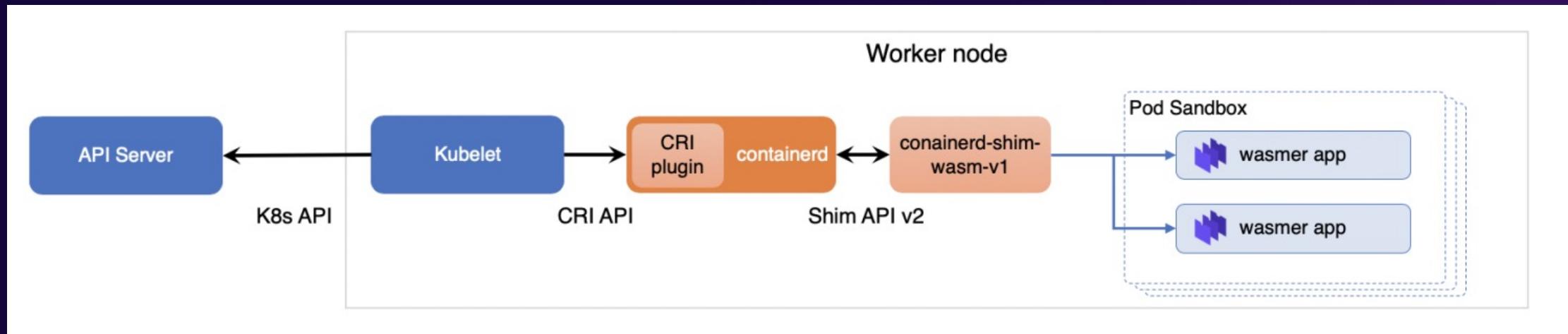




Demo

Wasm, Wasi & Docker

Wasi and Kubernetes



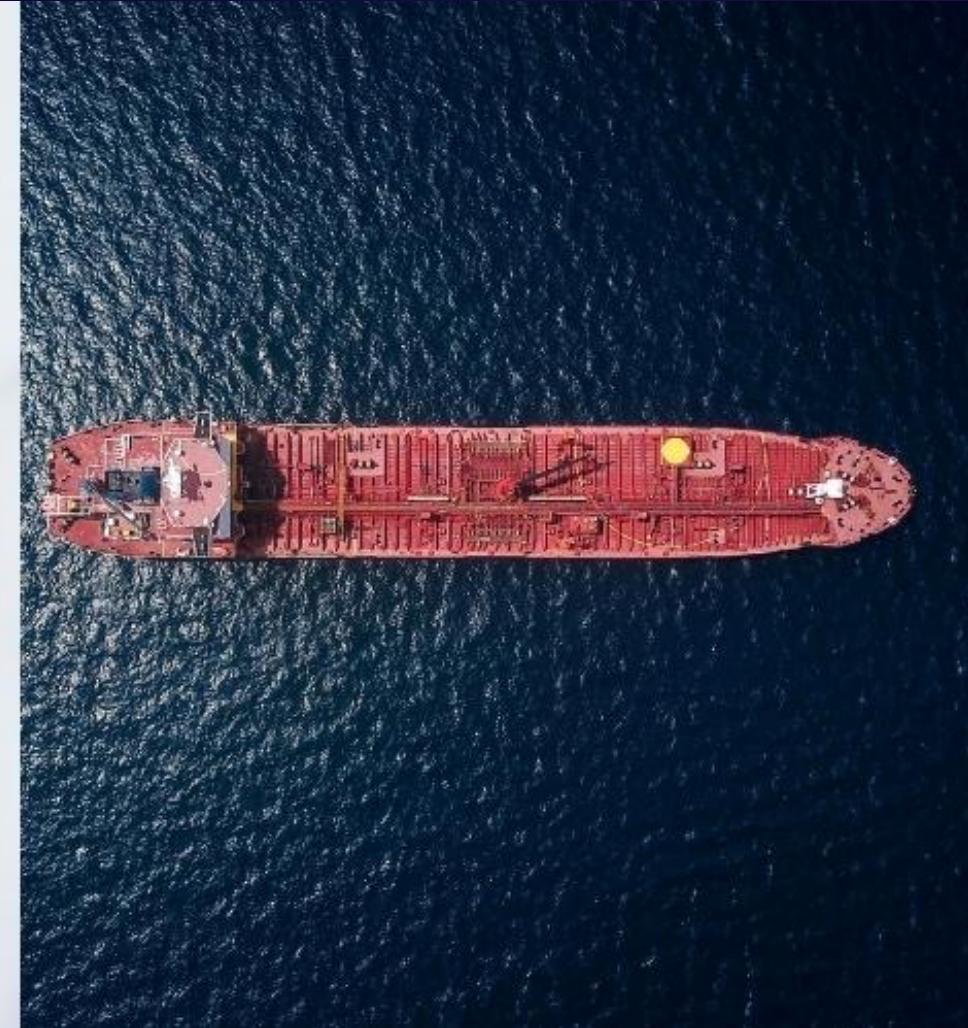
Containerless!



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Demo

Wasm, Wasi & Kubernetes

WASI ecosystem

Wapm

>_

Popular Standalone Apps

Run standalone WebAssembly apps on Linux, Windows, and Mac with Wasmer.

[> See all](#)



mozilla/spidermonkey

SpiderMonkey is Mozilla's JavaScript and WebAssembly Engine, used in Firefox, Servo...



katei/irb

Interactive Ruby



rustpython/rustpython

A Python-3 (CPython >= 3.5.0) Interpreter written in Rust 🐦 🐙 🐔



sqlite/sqlite

SQLite is a C-language library that implements a small, fast, self-contained,...



WASM & WASI ecosystem

Toolset

- Slight
- Spin
- Dockershim
- Wasm-to-oci
- Docker
- <https://opencontainers.org>
- Kruslet

Build tool

- LLVM

Runtime

- Wasmtime
- Wasmer
- WasmEdge
(<https://wasmedge.org>)
- <https://enarx.dev/docs/webassembly/dotnet>

Do not use WASI on production!

- No multi-threading yet
- No GC yet
- Many system interfaces are still in development

Experimental

Who to follow

- Steve Sanderson, Microsoft

<https://github.com/SteveSandersonMS>

- Lin Clark, Mozilla

<https://github.com/linclark>

Events

- Cloud Native WASM Day
- WASI bi-weekly calls

(<https://github.com/WebAssembly/meetings/tree/main/wasi>)



Key takeaways

- Bring .NET app to browser using WebAssembly
- Run WebAssembly (for C# app) outside the browser
- Toolset to compose & run WebAssembly apps on the server
- How WebAssembly can change the cloud native world

Thank you!