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THE LINUX FOUNDATION
OPEN SOURCE SUMMIT
EUROPE

Demystifying the Wasm Landscape

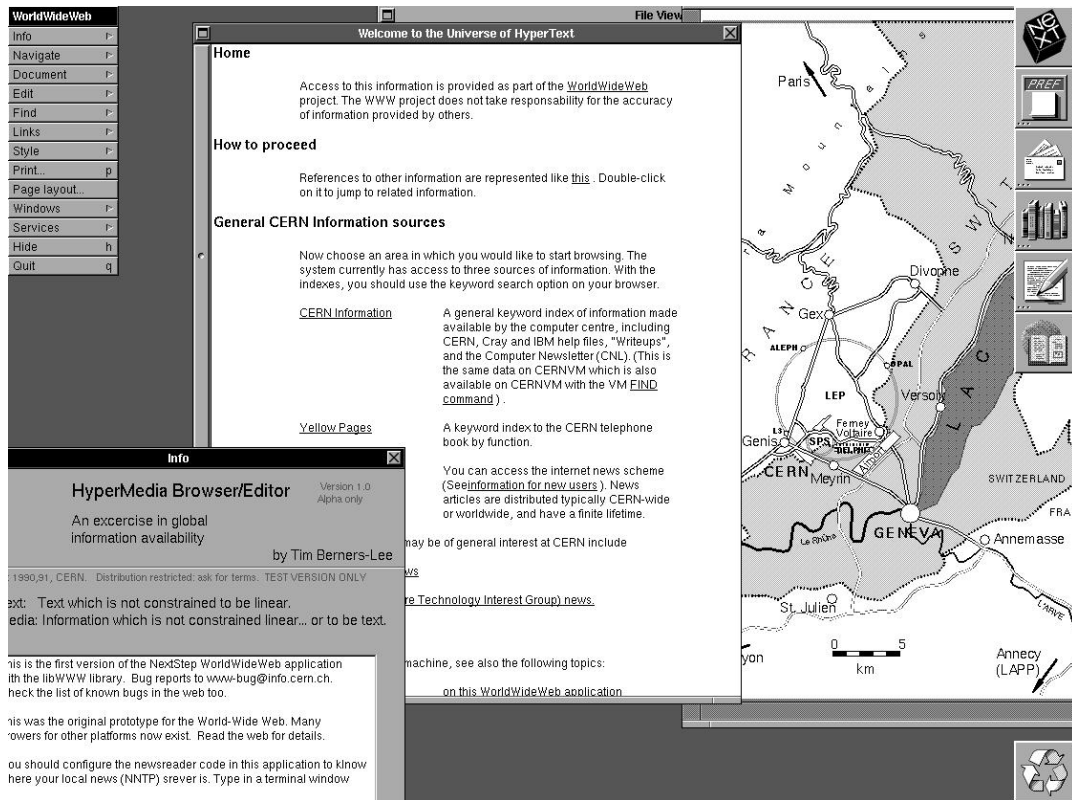
A primer

#ossummit @Divya_Mohan02





The origin story



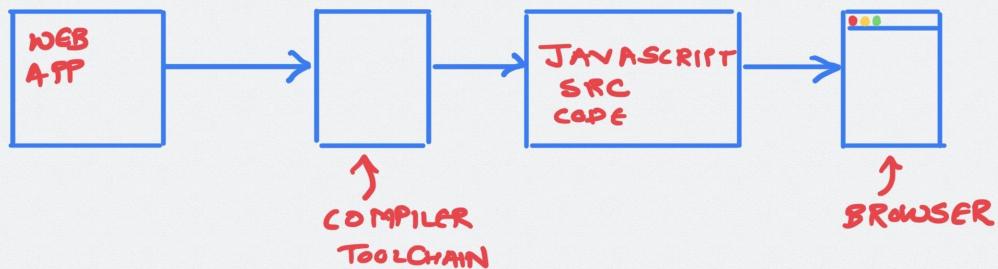
The age of



... And Plugins



WebApps of Yore



What didn't go well

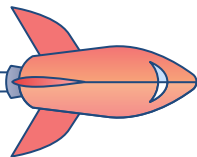
JavaScript

- **Not designed to be a compilation target**
- **Weakly typed**
- **Eventually faster**



Plugins

- **Massive security nightmare**
- **Compatibility issues across devices**
- **Better ways to enable client-side development**



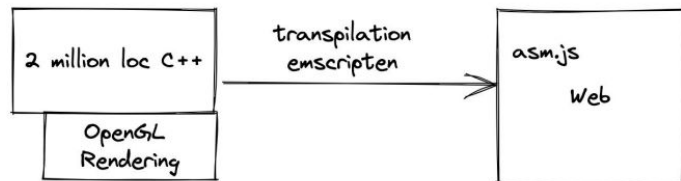
**One step
closer**

The asm.js specification



The asm.js specification

The Greatest Hack

- **The Solution:** transpile to asm.js
- WebGL rendering => eventually changed to Canvas2D



Bailey Hayes

 @baihay
 @ricochet

asm.js

an extraordinarily optimizable, low-level subset of JavaScript

[specification](#) (work in progress)

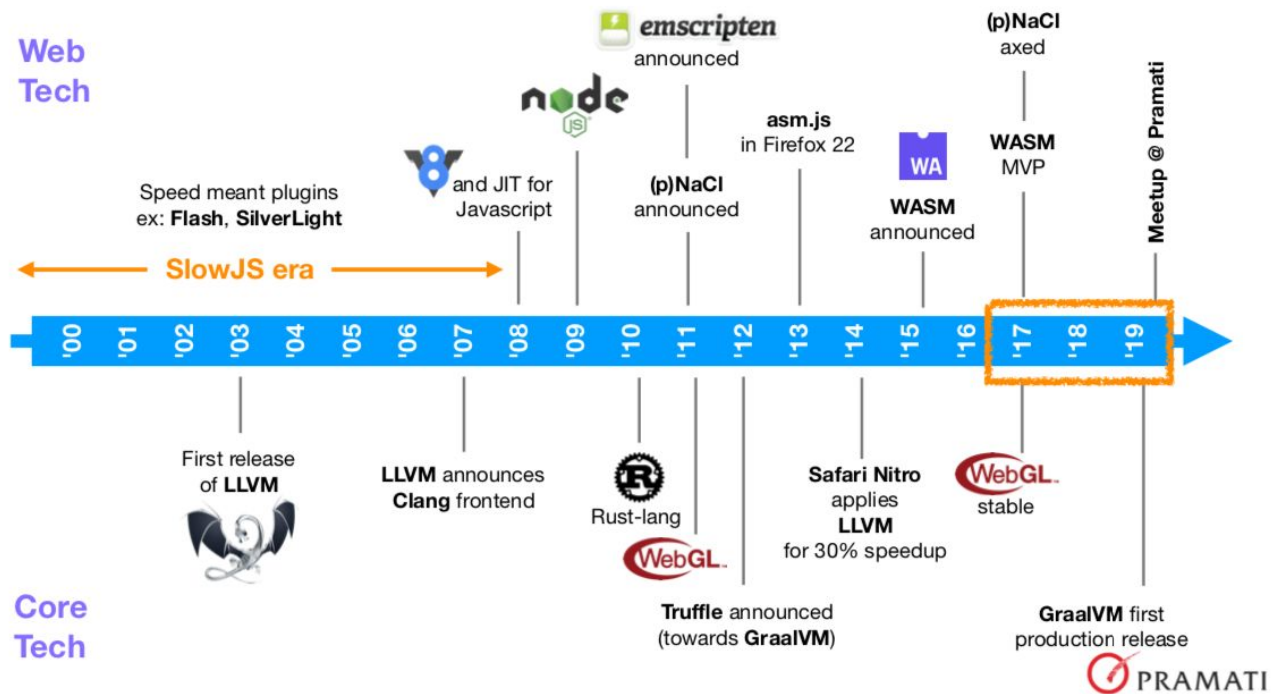
[frequently asked questions](#)

[big web app? compile it!](#) – slide deck by [@kripken](#)



CLOUD NATIVE
Wasm DAY

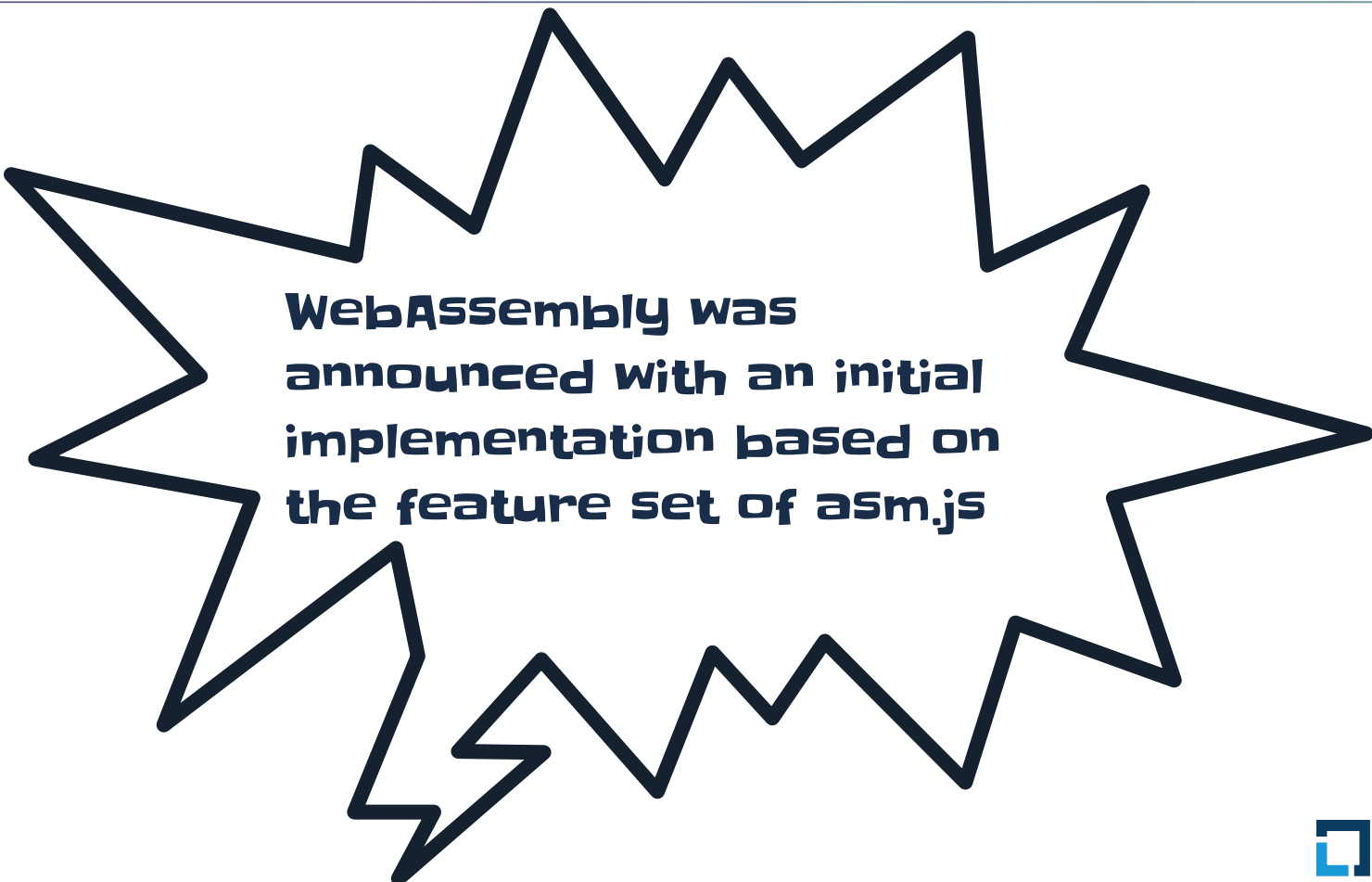
The Wasm timeline



Source: <http://sriku.org/blog/2019/08/24/talk-the-nuts-and-bolts-of-webassembly/>

Circa 2015





**WebAssembly was
announced with an initial
implementation based on
the feature set of asm.js**

A photograph of the Space Shuttle Columbia during its ascent. The shuttle is white with orange external tank and solid rocket boosters. It is surrounded by a massive, billowing white and orange plume of smoke and fire. The background is a clear blue sky with scattered white stars. In the foreground, there are some industrial structures and a green field.

**2017: WebAssembly MVP
announced**

What is WebAssembly?

- **Portable, language-agnostic compilation target**
 - **Binary code format + textual format**
- **Designed for the web, initially**
 - **But can extend to server-side & other environments**



WASI, the component model, & the wider Wasm ecosystem



- **System interface**
- **Proposals currently available**
 - **I/O**
 - **Filesystem**
 - **Clocks**
 - **Random**
 - **Handle Index**
 - **Limited networking capabilities (see [WAGI](#))**



The component model

- **Language-agnostic approach for s/w development**
- **Layering of Wasm modules**
- **Nothing is shared!**



Runtimes

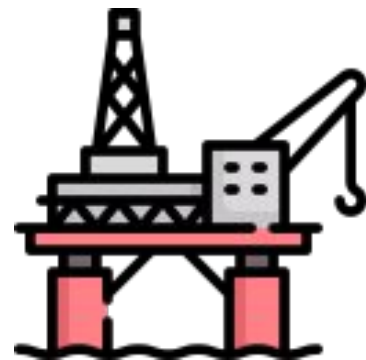
- **Wasmtime**
- **Wasmer**
- **Wasm3**
- **WAMR**
- **WasmEdge**
- **Lunatic**



And many many more. Refer [this listing](#) for more.

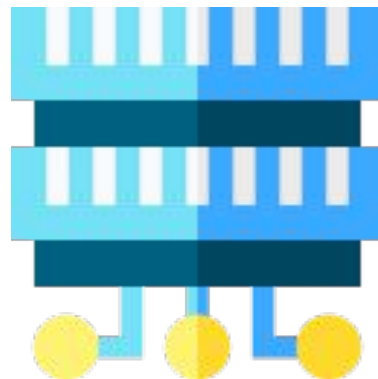
Platforms

- **Fermyon**
- **Suborbital**
- **Wasmcloud**
- **Faasm**
- **Mycelial**
- **Fluence**

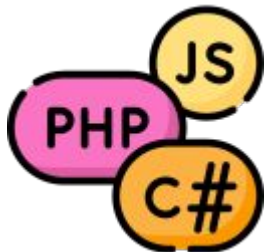
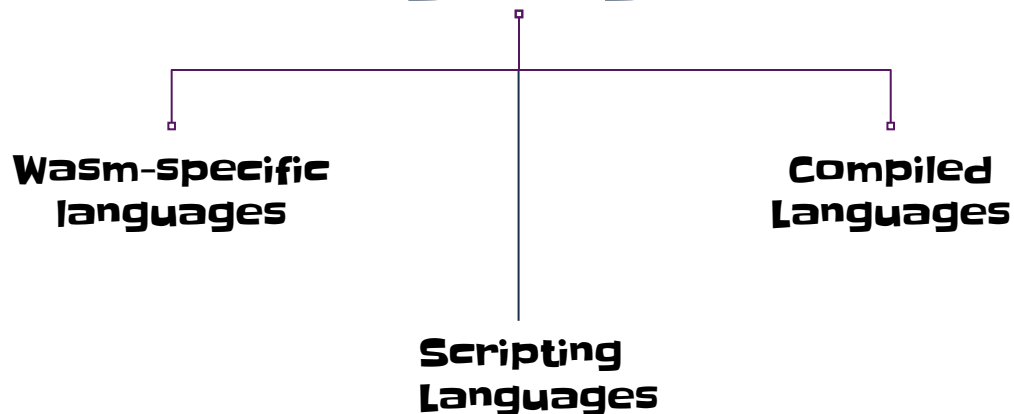


Compilers

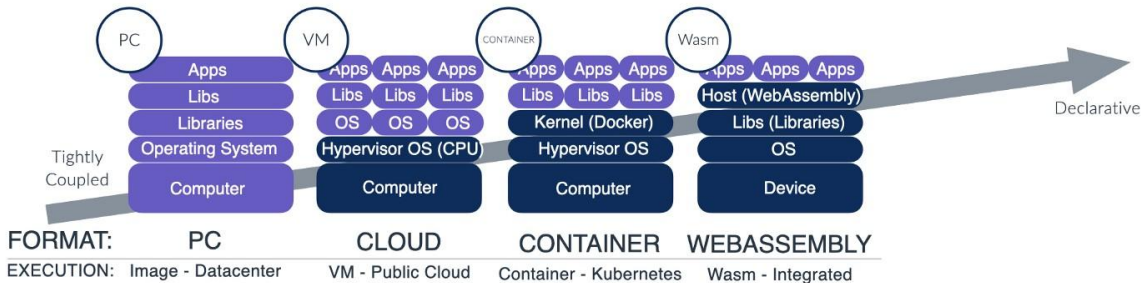
- **LLVM**
- **Cranelift**
- **aWasm in SLEdge**
- **Lucet**
- **wasmi**



Languages



Cloud Native & Wasm



Developer	Full	OS, App, Lib	App, Lib	Wasm
Abstraction	-	CPU	Linux Kernel	Secure Sandbox
Compatability	All	Most	Most	Most
Size	Large	Med	Small	Tiny
Portability	-	Low	Med (CPU, Linux)	High
Security	System	OS	Process Boundary	Capability
Where		Proprietary Cloud & Edge	Dev, Edge, Cloud, K8s	Dev, App, Edge, Cloud, K8s, Browser, Devices

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Legend:

Developer Provided

Device / Computer

Source:

<https://cosmonic.com/blog/kubecon-eu-2021-webassembly-keynote-cloud-native-and-wasm-better-together/>

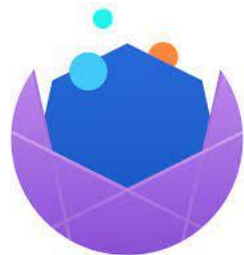


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Cloud Native projects

- **Krustlet**
- **Kubewarden**
- **OPA**
- **Envoy**

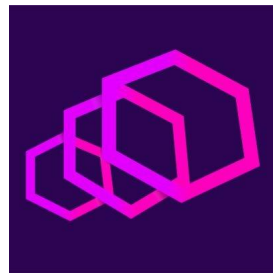
And many more.



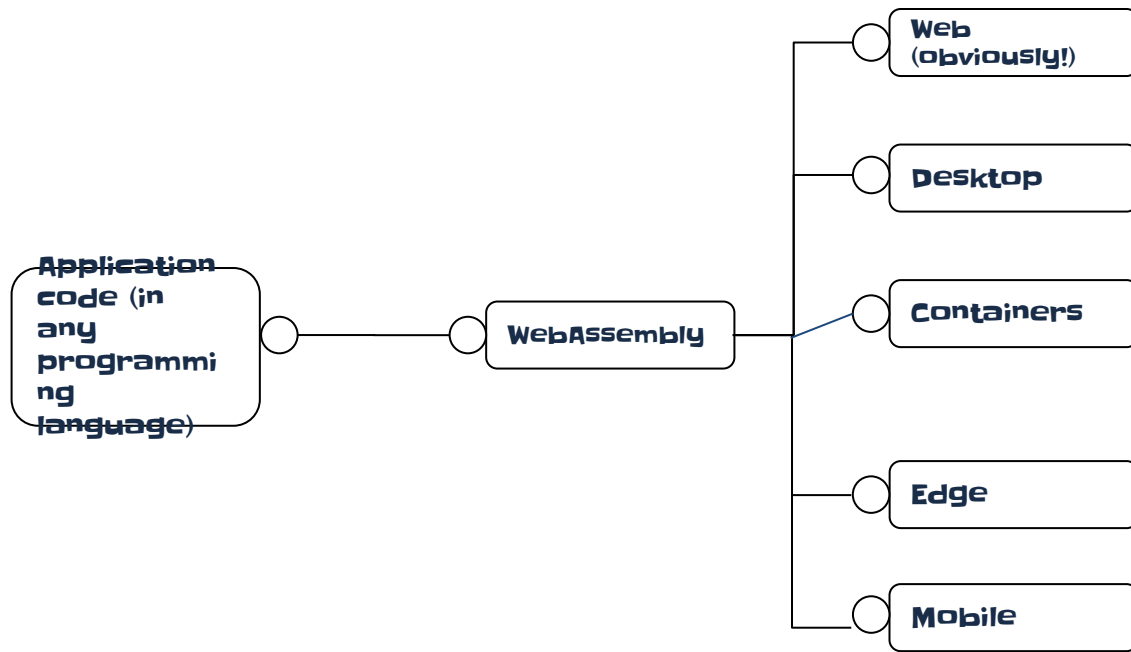
KRUSTLET



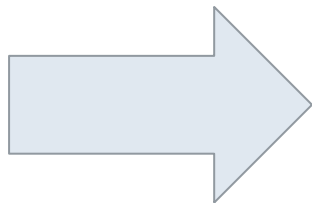
Open Policy Agent



Where can Wasm be used?



Where can Wasm be used?



Powering ⚡ emulation for



Where is Wasm used?

coggle

made for free at coggle.it



AVAREUM

The Future of Wasm

The future of Wasm

- **Default compilation target?**
- **Plug and play application development?**
- **Evolution of the component model**
 - **Language-neutral Wasm application development**
 - **Standardizing software development**

Community & Learning Resources

Community & Learning Resources

- **Wasm.builders**
- **Bytecode Alliance**
- **W3C Community Group**
- **Cloud Native Computing Foundation**
- **Confidential Computing Consortium**



Community & Learning Resources

- [WebAssembly weekly newsletter](#)
- [Lin Clark's blog](#)
- [Radu Matei's blog](#)
- [The WebAssembly specification](#)
- [Mozilla Developer docs](#)





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