

# **WebAssembly: začátek konce éry JavaScriptu?**

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**23.4.2025 v 18:00**

**Restaurace U Salzmannů, Salonek v 1. patře**

**Vstup a občerstvení zdarma**

# Few facts about me...

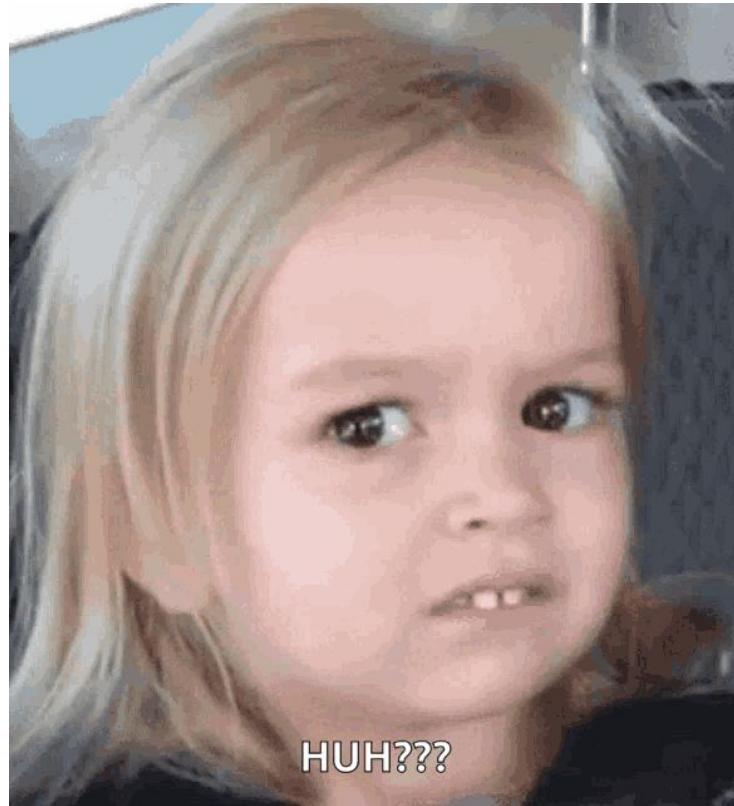


- 25+ years of experience in IT.
- Contributor to PHP magazines.
- Conference speaker.
- Loves crazy projects.
- Loves traveling.

~~WebAssembly: začátek konce~~

~~éry JavaScriptu?~~

# WebAssembly a japonský železniční megaprojekt: Dva sny, podobný příběh?

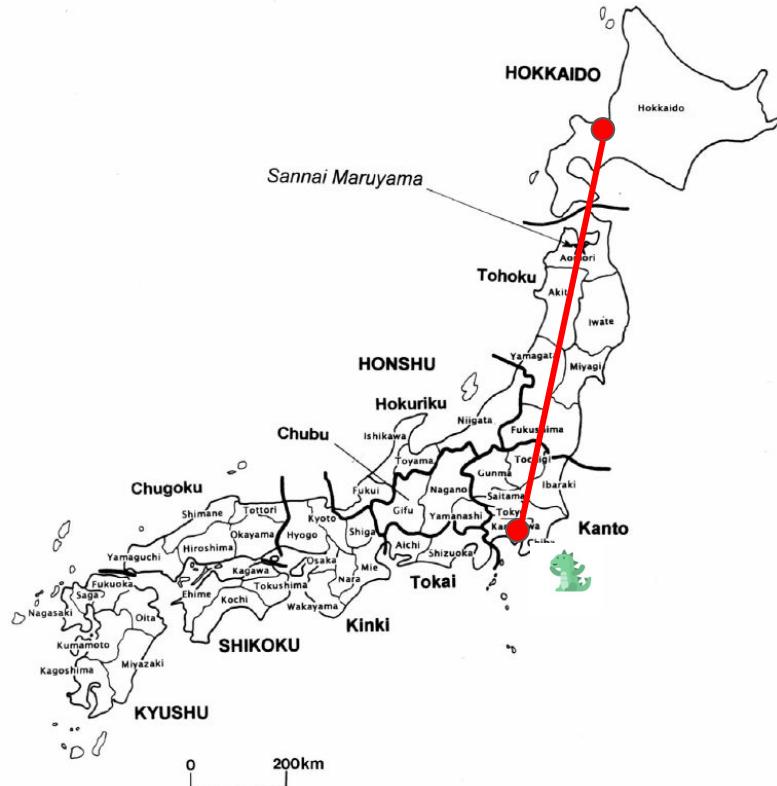


HUH???

# Tokyo-Sapporo: the world's

## busiest travel route.

830 km (1 150 km train)



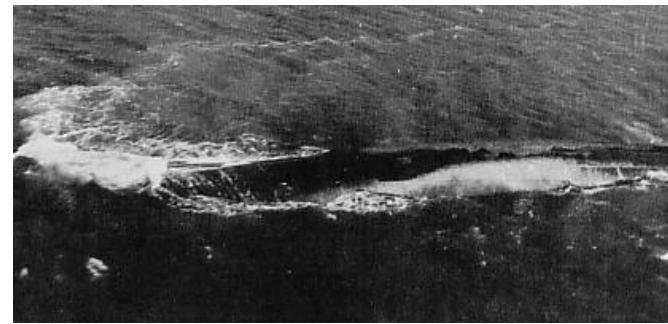
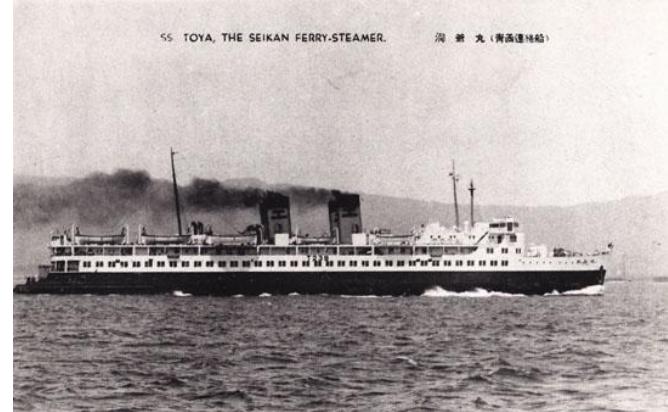






**September 26, 1954**

**Typhoon Marie strikes**



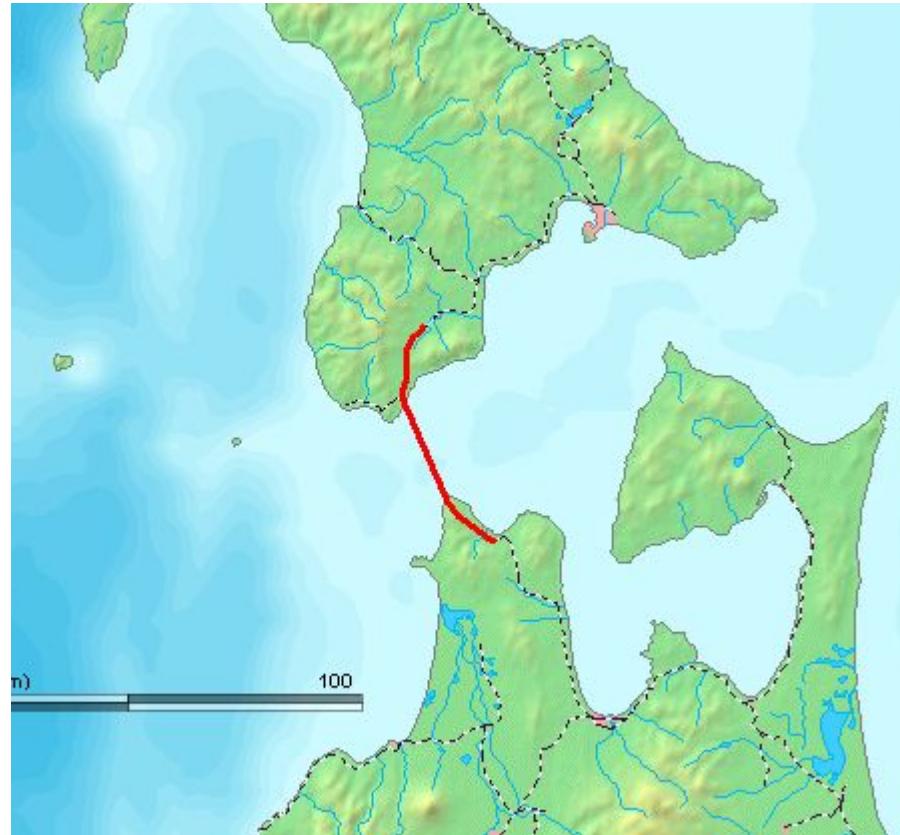
**Tōya Maru and four other ferries sank in the Tsugaru Strait, killing 1,430.**

**People and the economy**

**demand speed and safety.**

# Seikan Tunnel

- 1954 – typhoon Marie
- 1964 – work begins
- 1985 – main tunnel
- 1988 – opens



**A lot of things changed in 34**

**years...**

**How does air travel affect  
train usage?**



**A big ambitious thing that  
should change everything!**

# WebAssembly

# Atwood's Law (2007)

Any application that can be written in  
JavaScript, will eventually be written in  
JavaScript.



# **Rule of least power**

Rule of least power suggests choosing the least powerful language/platform suitable for a given purpose.

**Tim Berners-Lee**

# Can it run Doom? Even ultrasound can!



The Internet as a distribution platform

**What if JavaScript does not  
suffice?**

[New] [Hot] [Forum] [FAQ] [Submit] [M Zone]

**Featured Script**

**Arrow head title**

Have your big arrow pointing at your document's title, with this fun script!

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Do you use scripts from Dynamic Drive? Please give something back by [linking to us...](#)

[Home](#) ► [Special Document Effects](#) ► [Here](#)

**Autumn leaves All**

**Credits**

Name: [Kurt Grigg](#)

Homepage: [Homepage](#)

Note: Modified by Dynamic Drive for NS6 compatibility

**Description:** Have leaves blow and tumble on your webpage- quite the autumn effect.

**Demo:** All around...

**Directions** [Developer's View](#)

**Step 1:** Add the below chunk of code to the <BODY> section of your page:

[Select All](#)

```
<script language="JavaScript1.2">
//Autumn leaves- by Kurt Grigg (kurt.grigg@virgin.net)
//Modified by Dynamic Drive for NS6 functionality
//visit http://www.dynamicdrive.com for this script
//Pre-load your image below!
graphics=new Array(6)
```

**Step 2:** Finally, save the following six images by right clicking each image, and choosing "save as". Then, upload them to your webpage directory.

**Note:** Do NOT link directly to these images on our server

**Recommend Us!**

[If you like Dynamic Drive, please recommend us to a friend...](#)

**End**

All Script works with *Netscape 4 AND Internet Explorer 4+*

NS- Indicates script works with *Netscape 4 (NOT NS 6 yet)*

IE- Indicates script works with *Internet Explorer 4 and above*

IE5- Indicates script works with *Internet Explorer 5 and above*

NS6!- Temporary indicator set up on **script category pages** to indicate script works in NS6

# **Back to the late nineties...**

- ActiveX
- Java applets
- Flash

**activex**



**Microsoft  
Internet  
Explorer 5**



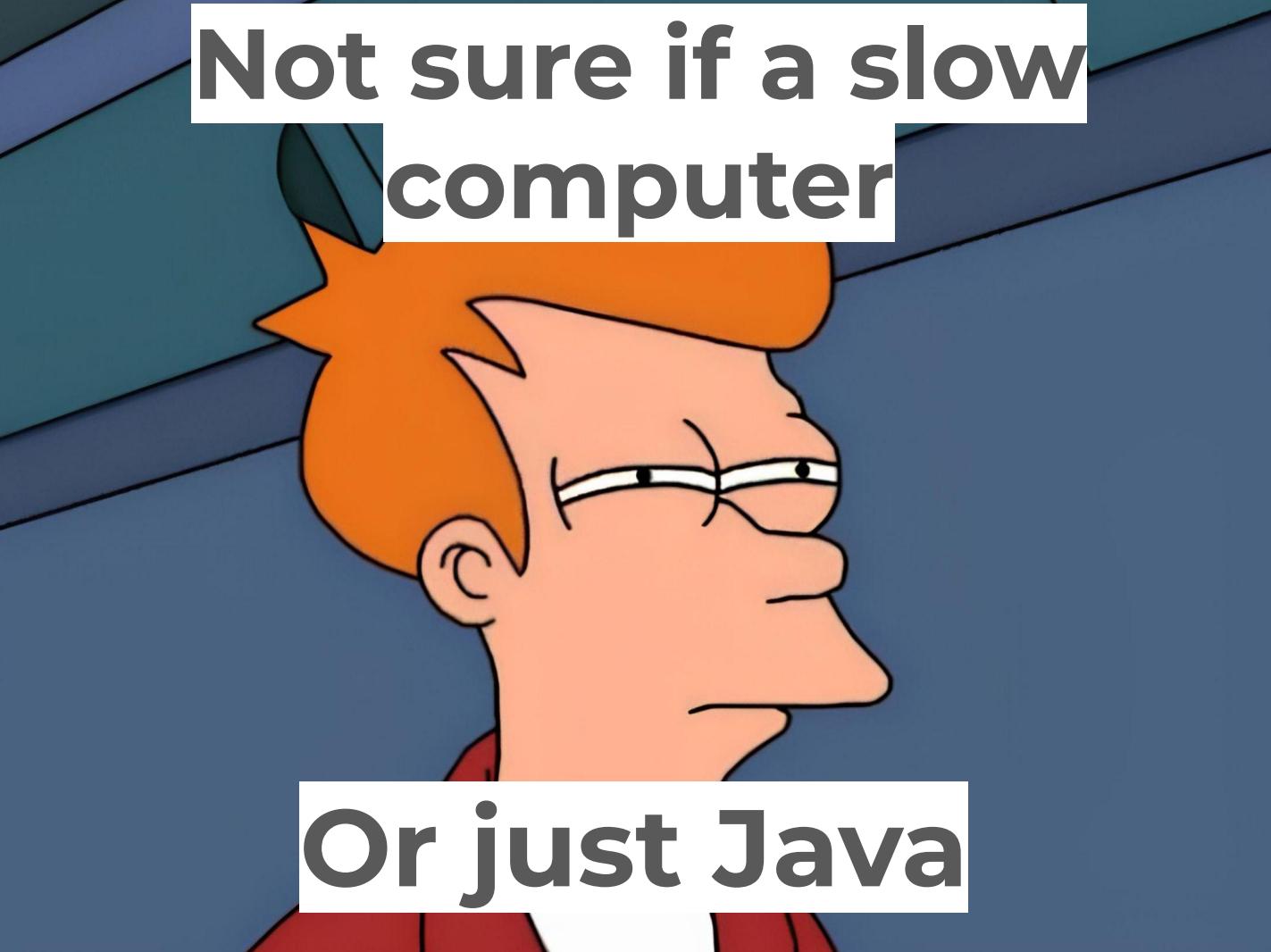
A photograph of a young woman with curly hair in a teal t-shirt and jeans, assisting an elderly woman with blonde hair in a pink cardigan and white top. The elderly woman is using a silver and black walker. They are outdoors on a path with greenery and fallen leaves. A white rectangular box with a thin black border is overlaid on the image, containing the text.

**We used to run  
untrusted compiled  
code directly in  
browsers.**

**Sure grandma let's  
get you to bed**

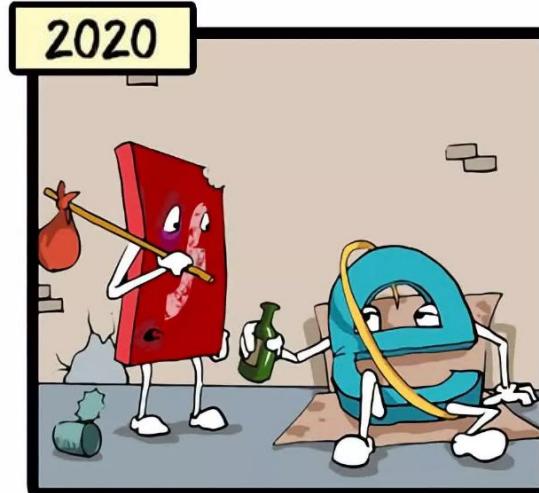
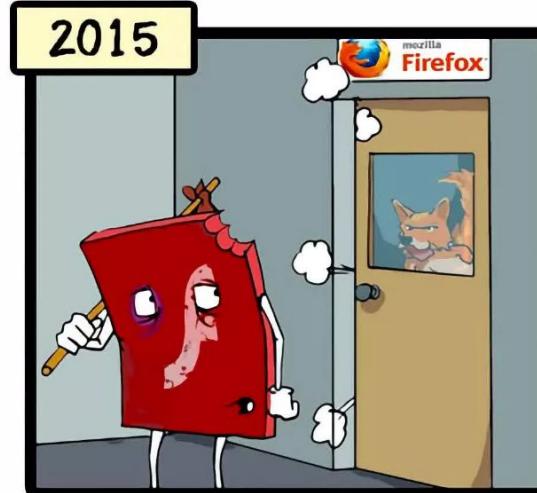
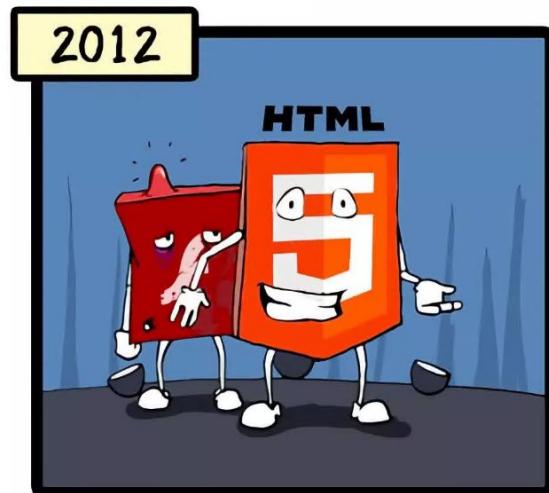
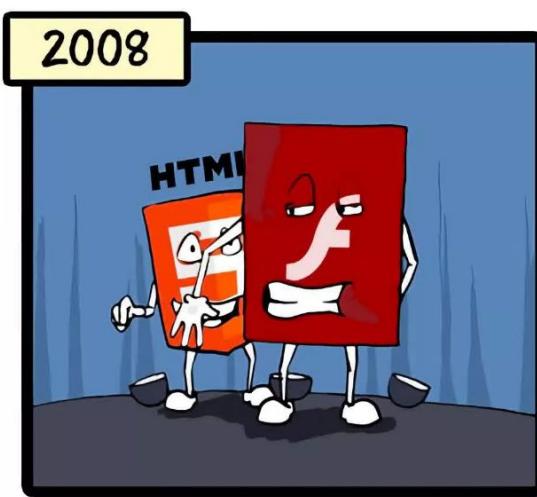
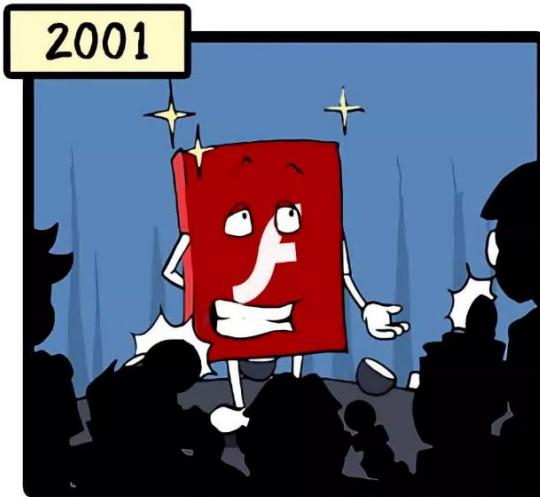
# Same problems, just multiplatform now...



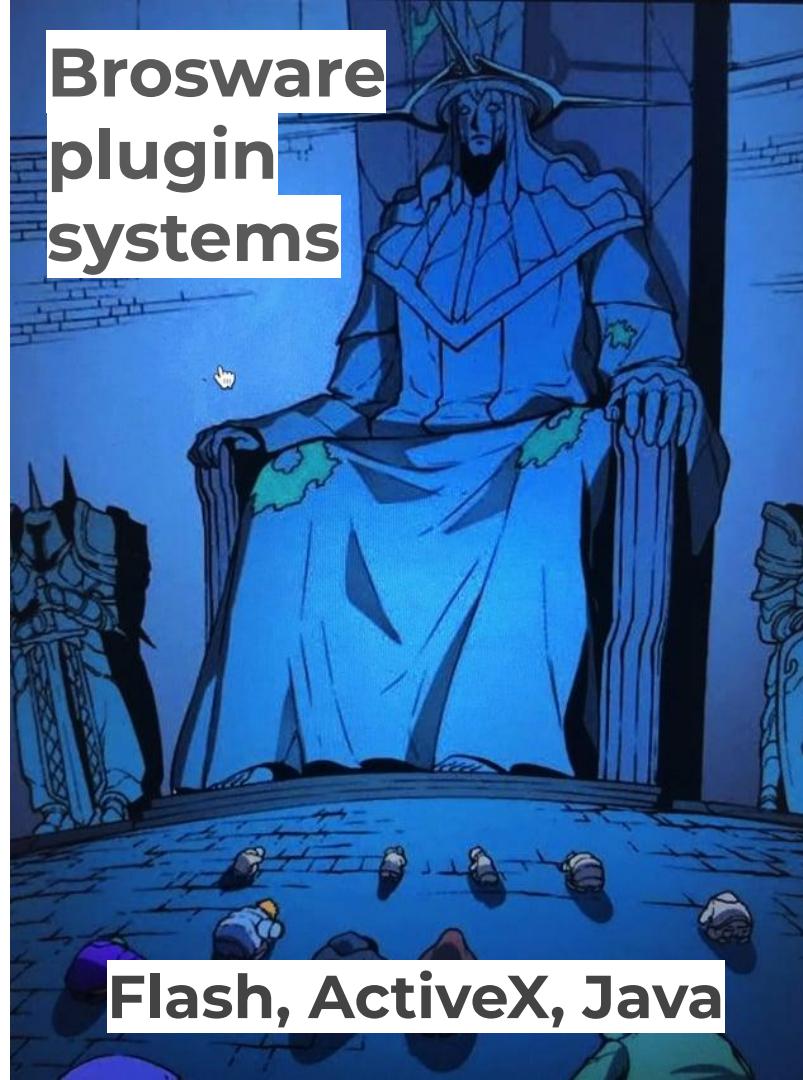
A cartoon illustration of a man with orange hair and glasses, looking thoughtful. He is wearing a red shirt. The background consists of blue and teal diagonal stripes.

**Not sure if a slow  
computer**

**Or just Java**



**Brosware  
plugin  
systems**

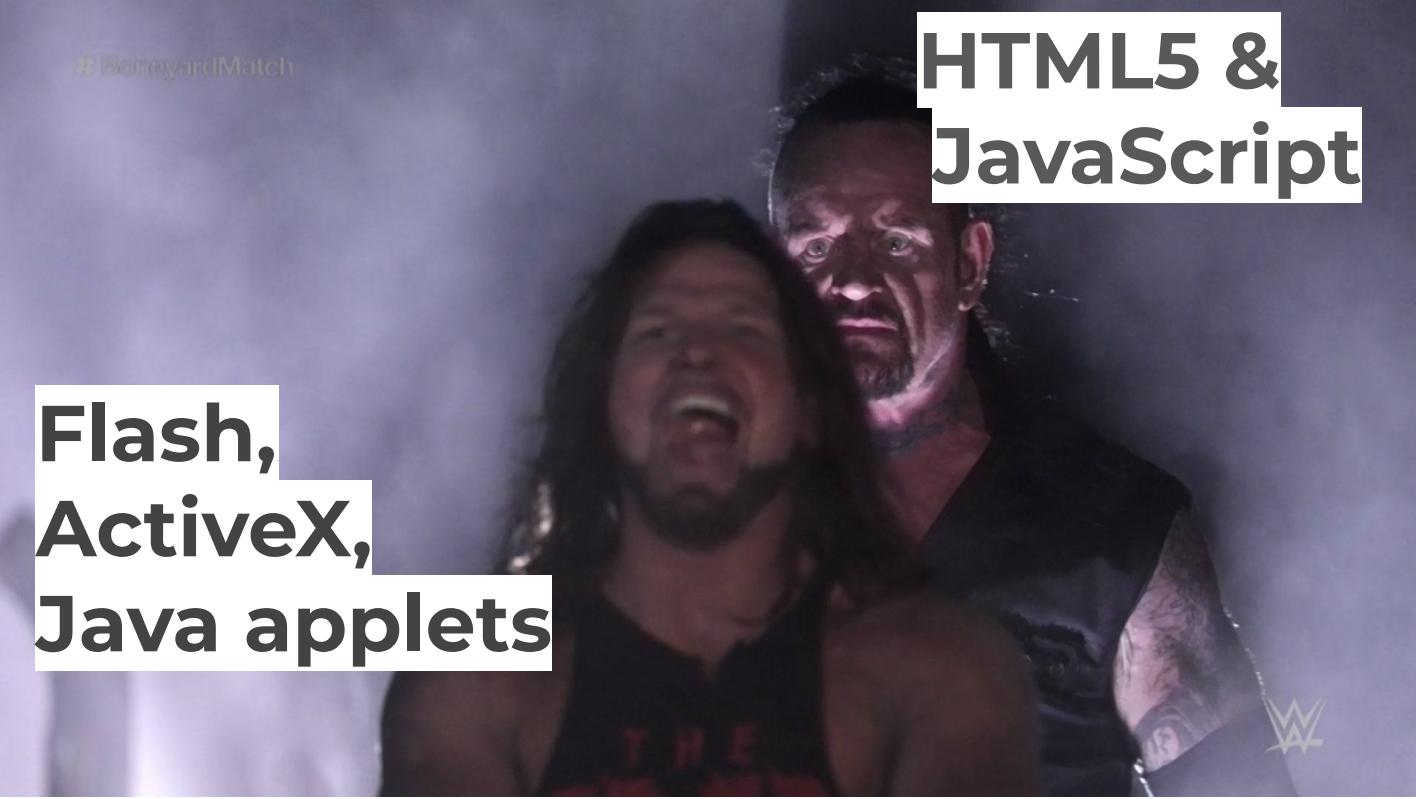


**Flash, ActiveX, Java**

x



This plug-in is not supported.



#BoneyardMatch

**Flash,  
ActiveX,  
Java applets**

**HTML5 &  
JavaScript**

# OK, what we need?

- Security
- Seamless integration with the Web
- Out-of-box support
- Efficiency

# Efficiency

# Road to webassembly - ASM.js

- Strict subset of JS (no GC, no OOP)
- AOT compilation
- Emscripten - compilation from C/C++.

# Can't slow down your code...



**...if your language uses only  
basic operations.**

# Road to webassembly - Google Native Client

- Sandboxed native code.
- ActiveX done right?
- Chrome only.



# Webassembly

- Collaborative effort
- Interoperability
- Build on basis of ASM.js
- MVP 2017



**Webassembly is  
here**



**Cool, no need for JS!**



**Cool, no need for JS?**

# Webassembly

- Primary target for compilers.
- Statically typed language.
- System languages like C, C++ or Rust.



Wait, it won't  
replace JS?

It never  
should...



# Webassembly

- Bare virtual machine (rule of least power).
- No Garbage Collection.
- No native access to DOM.
- Few data types.

**No objects**



**No strings**



**No arrays**

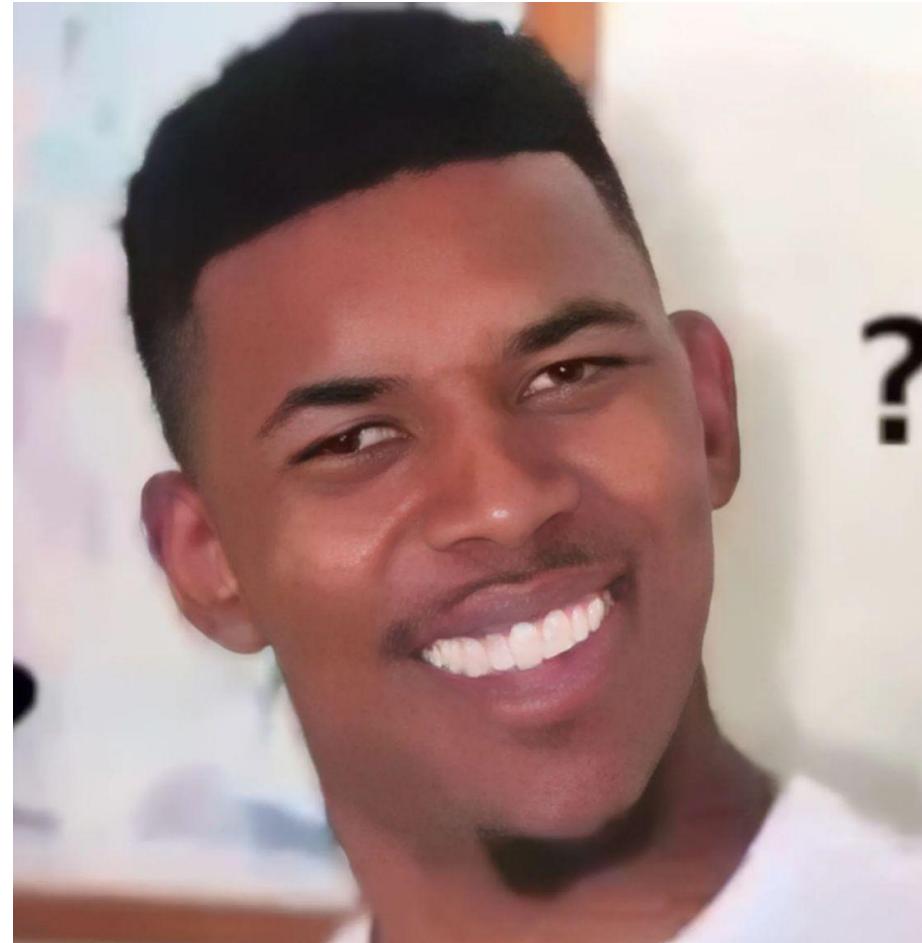


# Webassembly

- Basically just integer and float data type.
- Everything from scratch.
- Favors: existing compilers, runtimes...

# Extensions

- SIMD
- Stack Switching
- Branch Hinting
- Garbage Collector



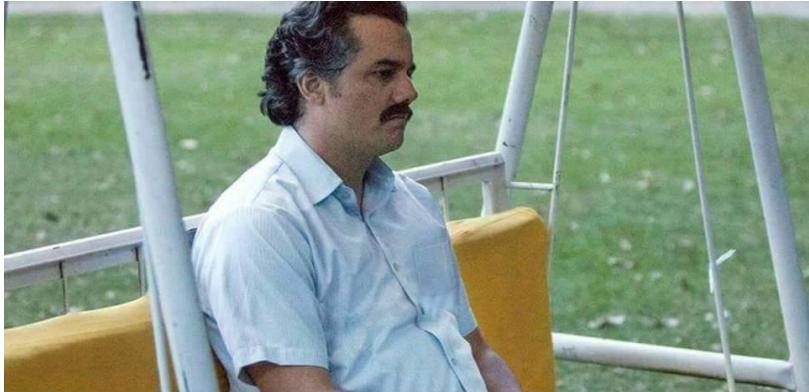
# Extensions

- Exceptions support (two versions)
- Threads
- JS String Builtins
- JS Promise Integration

State of support: <https://webassembly.org/features/>

# Probably won't happen

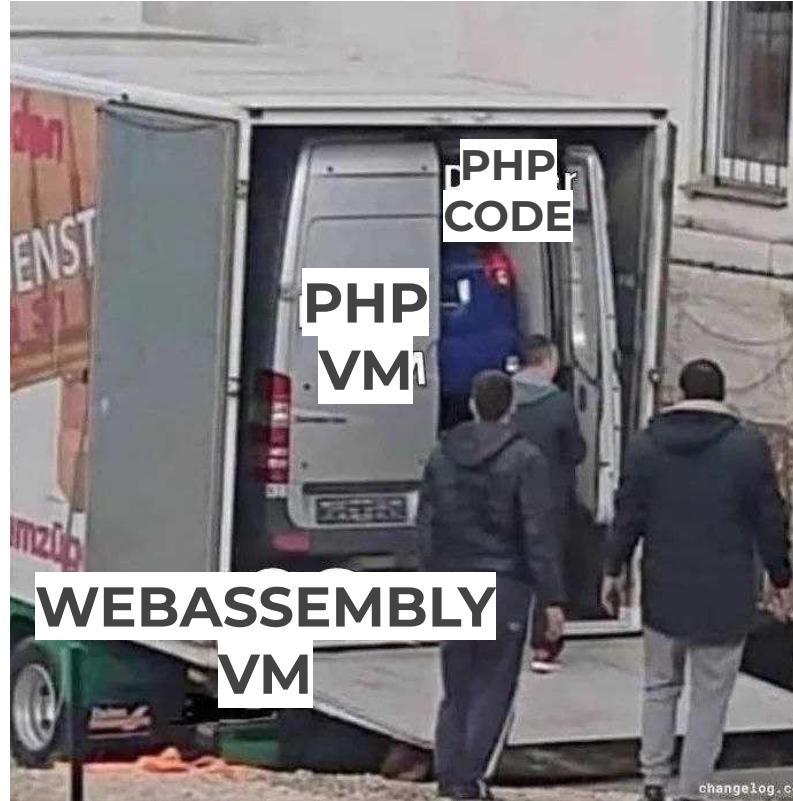
- OOP
- Direct DOM access
- Optional types



**tl;dr**

WebAssembly is better suited for compiling the PHP interpreter into WebAssembly rather than compiling PHP code directly into WebAssembly.

# Virtual machine on virtual machine approach



# **Virtual machine on virtual machine approach**

- This is not PHP-exclusive.
- The price of dynamicity.
- Runtime library.



# Deploy in One Click.

Deploy PHP 8 apps client-side in one click, run PHP in cloudflare with full access to D1 SQL, or write PHP desktop apps with GTK.

[Learn More](#)

**Php-Wasm runs anywhere Javascript+WASM is supported.**

- Supports NodeJS & Browsers.
- Full access to Javascript APIs from PHP
- Works with Node GTK.
- Supports SQLite & PostgreSQL.
- Powerful enough to run Drupal, Laravel & WordPress.
- Runs in CloudFlare with D1 SQL via PDO.

Php-Wasm is currently powering cutting-edge client side php apps like [WordPress-Playground](#), [Drupal-Playground](#) & [PlayWithLaravel](#).

# PHP running on brosware side

```
php.run(`<?php
    $time = strtotime('8:00pm 2 days ago');
    $date = date('Y-m-d H:i:s', $time);
    echo $date;
`);
```

## Untitled

```
1 <?php
2
3 echo "this is executed by PHP compiled into webassembly";
4
```

eval();all supported versions ▾

Live-preview

## Output for php 8.2.11

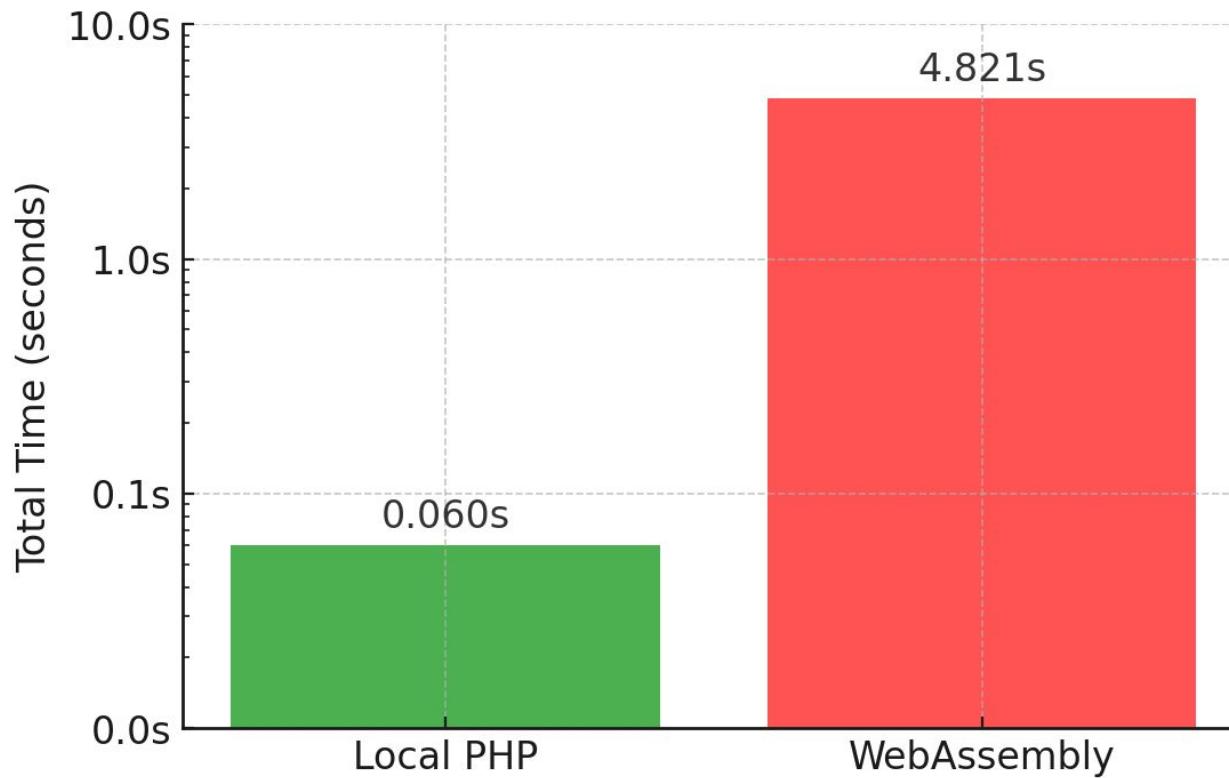
```
this is executed by PHP compiled into webassembly
```

7.75 ms | 464 KiB | 0 Q

preferences:  dark mode  live preview



# PHP is ~80x slower in WebAssembly



**WELCOME BACK**



**TO JAPAN!!!**



# 7. August 2014, Aomori



# Where to go?

- To Sapporo, 250km - 6.5 hours
- To Nagano, 520km - 4.5 hours



# Nagano wins!



# Seiken tunnel?

- Shinkansen extended to Hakodate in 2016 (sic!)
- **90% choose air travel.**
- Tokyo–Sapporo:
  - 8 hrs by train,
  - ~3.5 hrs by air (incl. transit).

# Seiken tunnel?

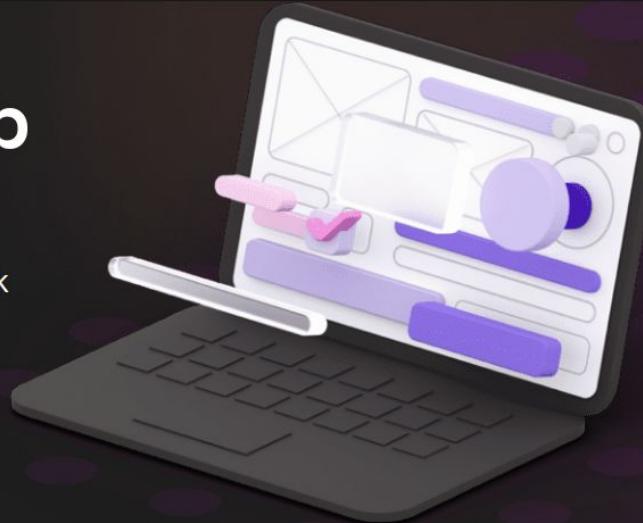
- Shinkansen extension to Sapporo delayed until end of fiscal 2038.
- Nearly 50 years since Seikan Tunnel breakthrough.

**Was it a fools dream  
after all?**

**Back to  
WebAssembly**

# Build beautiful web apps with Blazor

Use the power of .NET and C# to build full stack web apps without writing a line of JavaScript.

[Get started](#)[Read docs](#)

## Run anywhere

Host Blazor components in any web browser on WebAssembly, server-side in ASP.NET Core, or in native client apps.



## Productive

Create beautiful user experiences fast with Blazor's flexible and reusable component model that is simple, composable, declarative, and efficient.



## Web & Native

Use Blazor components on the web and in hybrid native apps for mobile & desktop.

A screenshot of a video player interface. The title bar says ".NET 101: What is Blazor? [Part 1] | Front-end Web Development with ...". Below the title, there's a "Copy link" button and a decorative hexagonal graphic.

## What is Blazor?

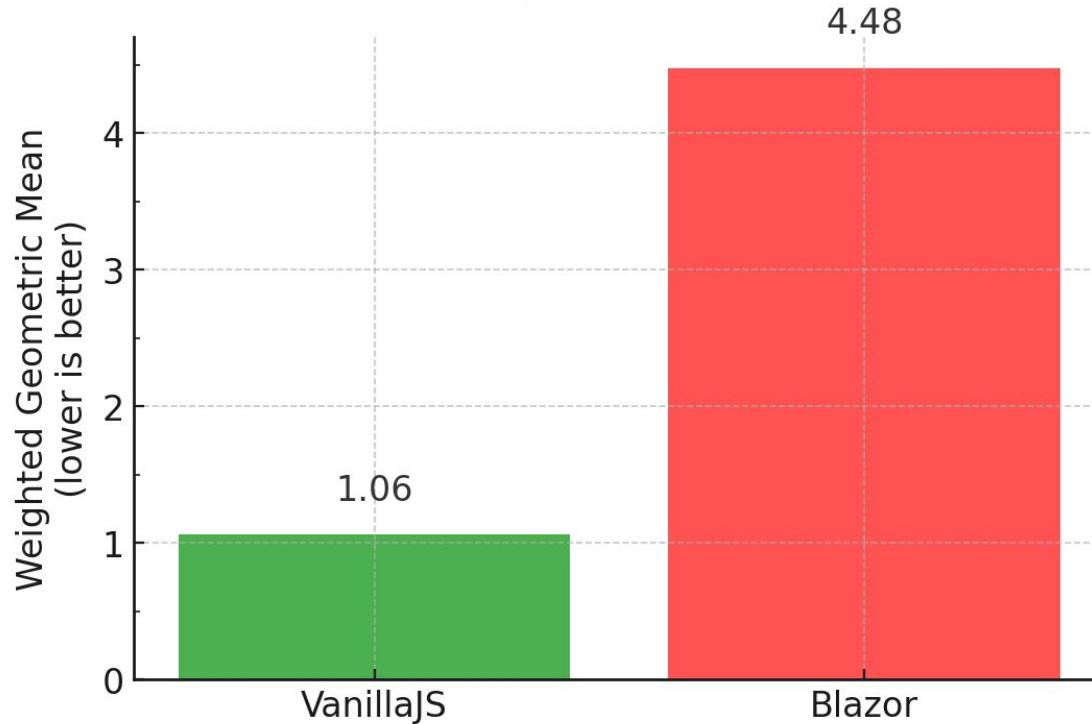
What is Blazor?

Duration in milliseconds  $\pm$  95% confidence interval (Slowdown = Duration / Fastest)

 Here! :-(



# Blazor is ~4.2x slower than VanillaJS





# AssemblyScript

A TypeScript-like language for WebAssembly.



Get Started



Github



npm

## Designed for WebAssembly

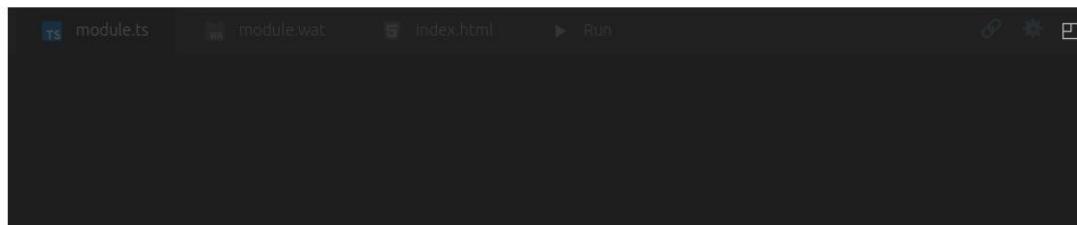
AssemblyScript targets WebAssembly's feature set specifically, giving developers low-level control over their code.

## Familiar TypeScript syntax

Its similarity with TypeScript makes it easy to compile to WebAssembly without learning a new language.

## Right at your fingertips

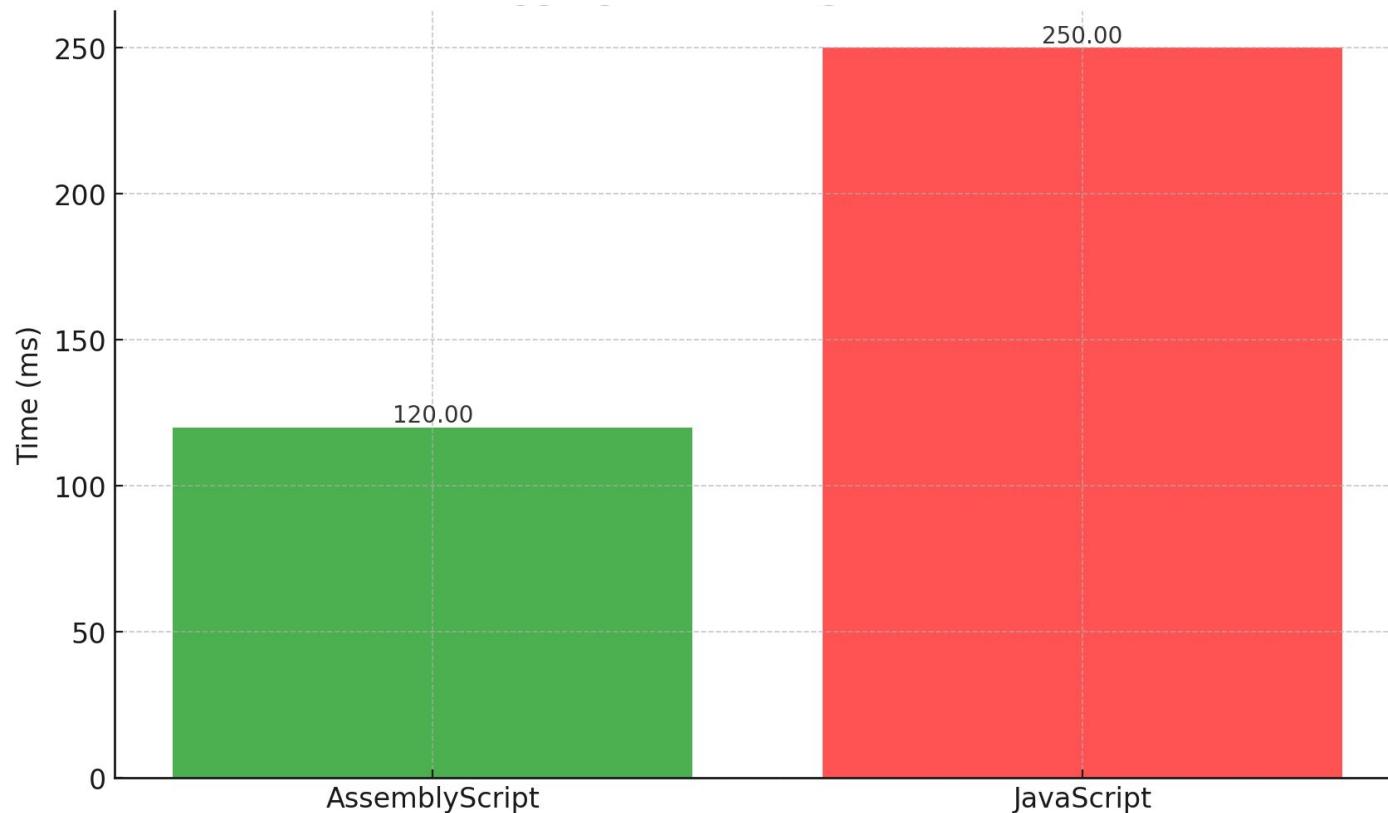
Integrates with the existing Web ecosystem - no heavy toolchains to set up. Simply `npm install` it!



# AssemblyScript

- TypeScript subset, e.g., no 'Any' data type.
- Compile directly to WebAssembly
- No extra VM, minimal runtime.
- No direct access to the DOM.

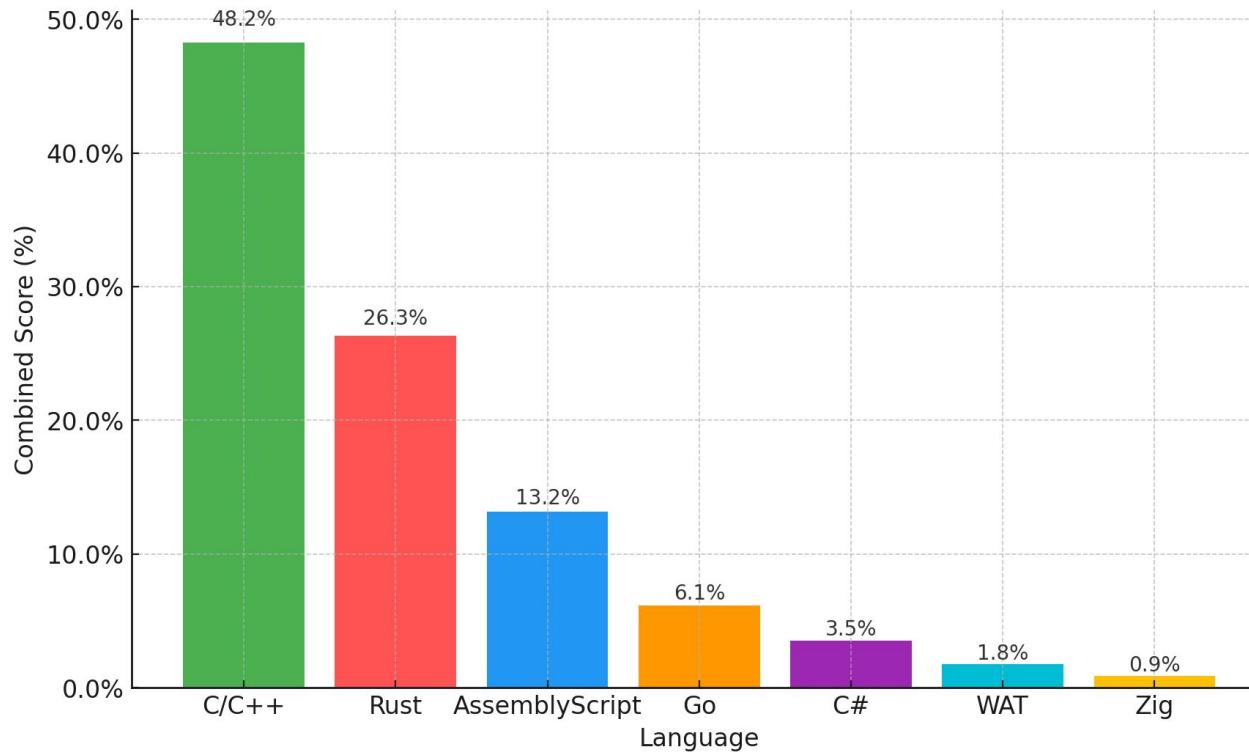
# **~2.1x faster than JavaScript (no DOM access)**



# So far...

- Performance issues:
  - “VM on VM”
  - No direct access to DOM
- Maybe other languages?

# Language usage



[D3wasm](#) - An experimental port of id Tech 4 engine to Emscripten / WebAssembly.

Online demonstration running **Doom 3 Demo**

Show help

Hint: use HOME key instead of ESC key (go to main menu), and INSERT key instead of ` key (open console)



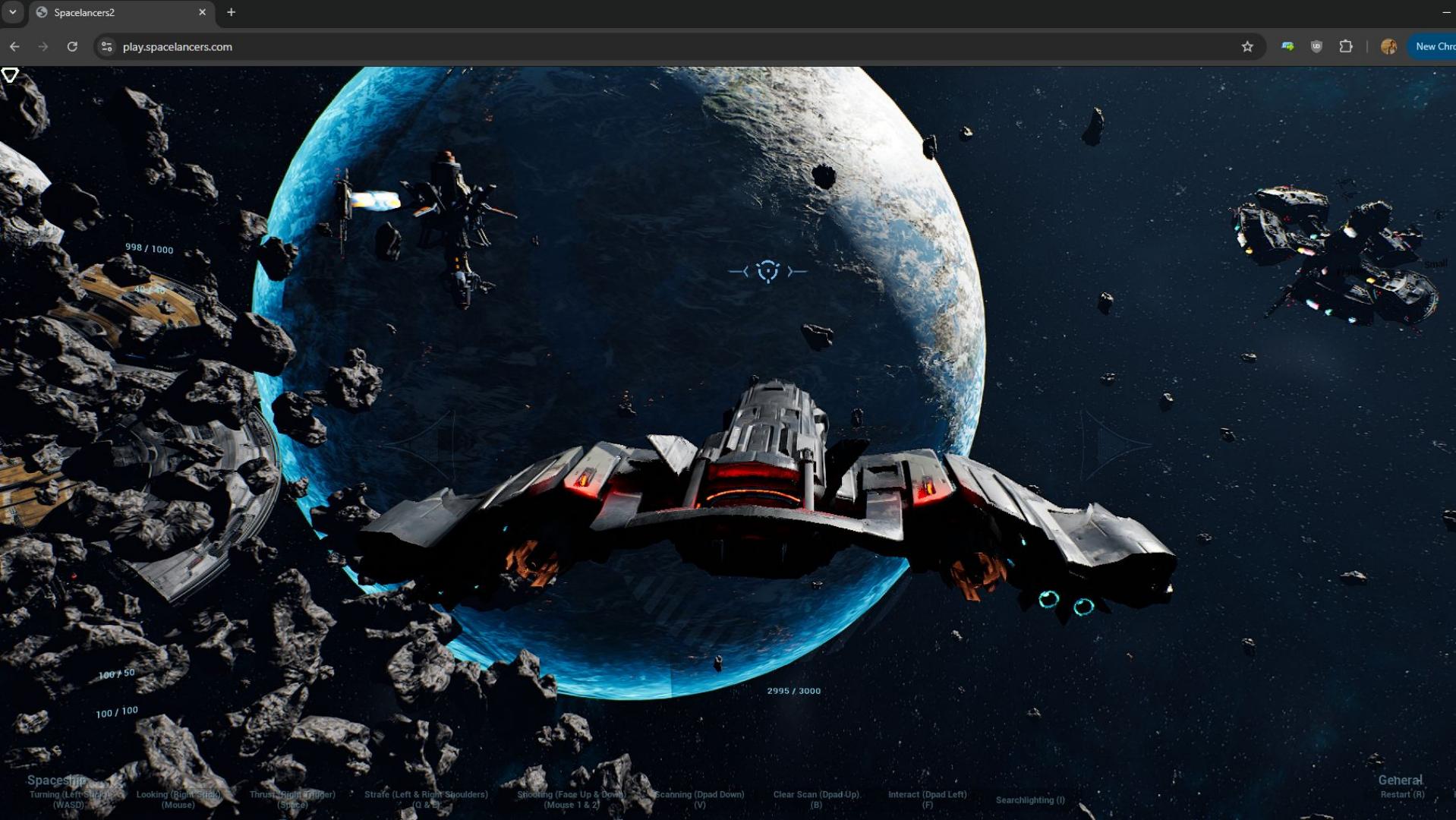
All information about this port, including purpose, source code, technical details, and legal info can be found on the [project](#) page.

**Disclaimer:**

The D3wasm project and this online demonstration are in no way associated with or supported by id Software, Bethesda Softworks or ZeniMax Media Inc. DOOM, id, id Software, id Tech and related logos are registered trademarks or trademarks of id Software LLC in the U.S. and/or other countries. All Rights Reserved.

The D3wasm source code is a derivative work of the [dhewm3](#) project, itself a derivative work of the General Public License source code release of Doom 3.

The **Doom 3 Demo** is available from Fileplanet ([link](#)).



Spaceship

(WASD)

Looking (Right Stick)  
(Mouse)Thrust (Right Trigger)  
(Space)Strafe (Left & Right Shoulders)  
(O & E)Shooting (Face Up & Down)  
(Mouse 1 & 2)Scanning (Dpad Down)  
(V)Clear Scan (Dpad Up)  
(B)Interact (Dpad Left)  
(F)

Searchlighting ()

General  
Restart (R)

**Support has been  
removed from Unreal  
Engine 5.**

**And now what?**

**Time for break... ;-)**

**WELCOME BACK**



**TO JAPAN!!!**



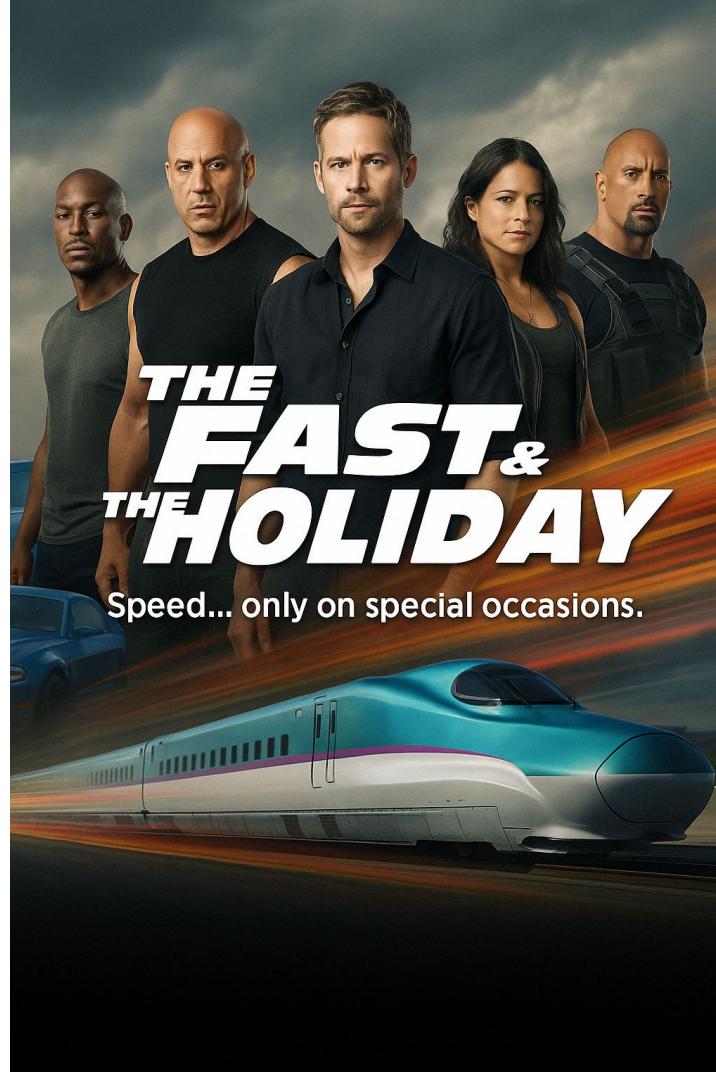
# 19. Jannuary, 2024

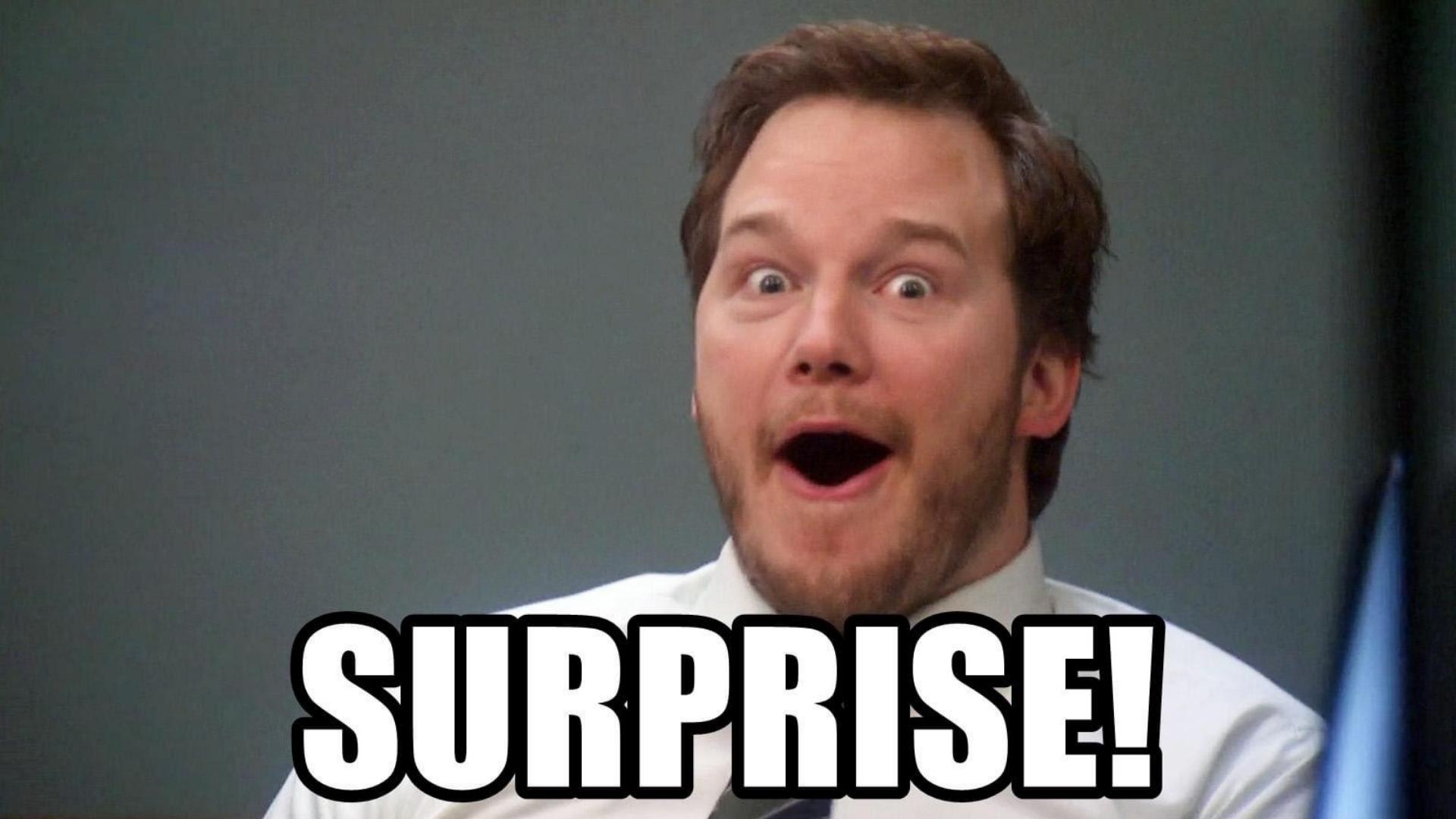
- JR Hokkaido made an announcement...



# Seikan Tunnel speed will rise

- From 160 km/h → 260 km/h
- But only during holiday.



A close-up photograph of a man with short brown hair and a light beard. He has wide eyes and a wide-open mouth, conveying a strong sense of surprise or shock. He is wearing a white collared shirt. The background is a plain, dark grey.

**SURPRISE!**

# Surprise!

- The Seikan Tunnel has two usages:
  - freight
  - and passenger.
- Faster trains risk toppling cargo.

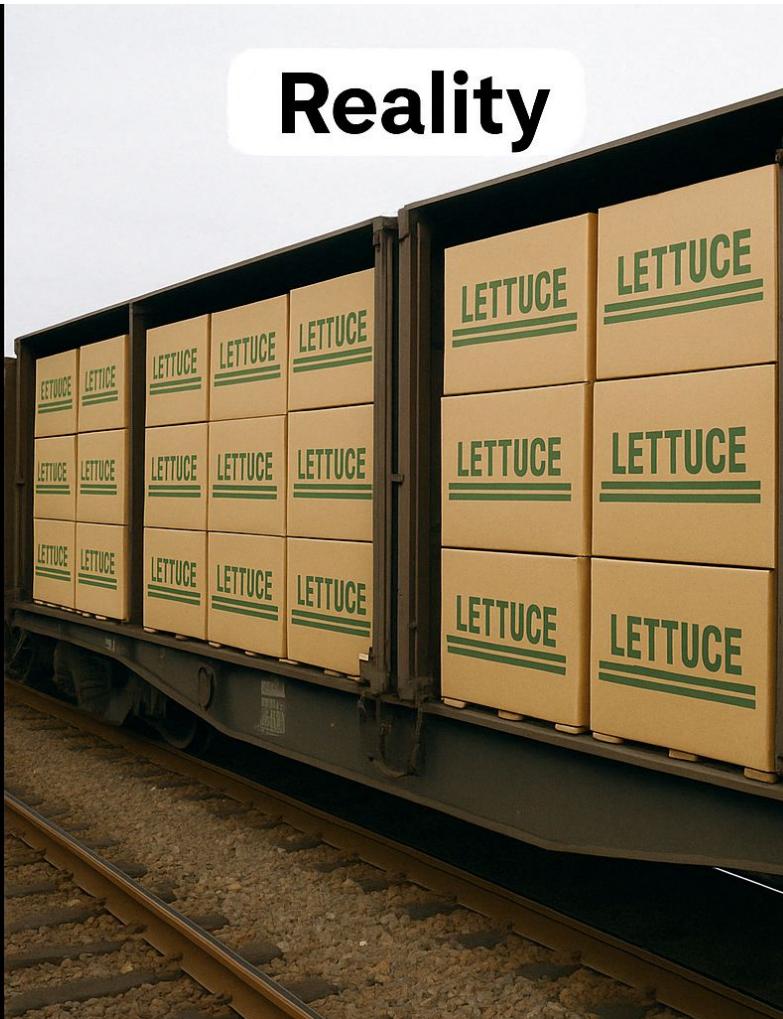
# **Surprise again!**

- Hokkaido has Japan's largest farmland.
- Some areas grow over half the nation's crops.
- Efficient transport is crucial.

# What you think



# Reality



**WebAssembly what  
if...**

...pivot?

# Glitch

A Game of  
**Giant** Imagination.

[Sign Up to Play](#)[Watch the Trailer](#)

**What people are saying:**

I no longer have the moral authority to belittle and humiliate #WoW addicts. @PlayGlitch has stolen my life. #praystoZille

from @var0sha on Twitter

[About](#)[Forums](#)[Encyclopedia](#)[Help](#)



**Pivot away from the  
web?**

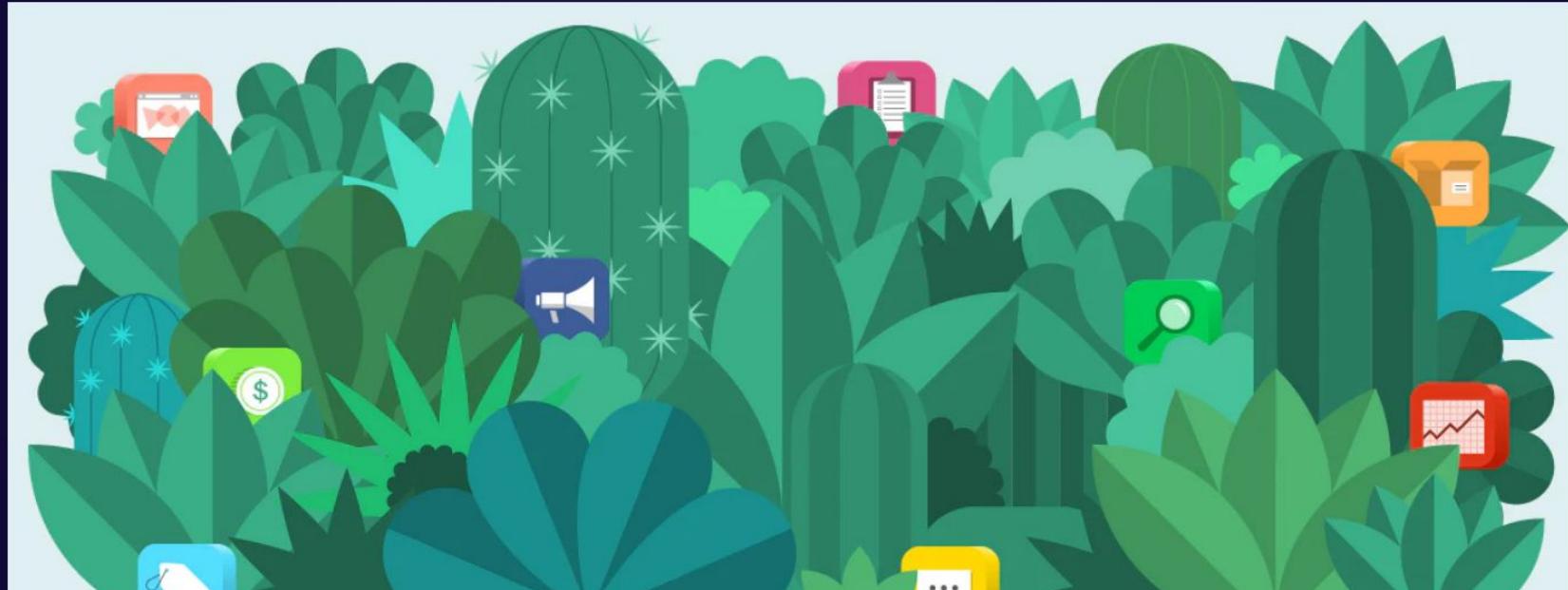
# Maybe outside web?

- Universal virtual machine.
- No tights to any existing language.
- Sandboxed plugins for existing programs.
- WASI - component model (CORBA vibes)

BLOG | DEVELOPMENT

# How Shopify Uses WebAssembly Outside of the Browser

At Shopify, we're keeping the flexibility of untrusted Partner code, but executing it on our own infrastructure with WebAssembly.

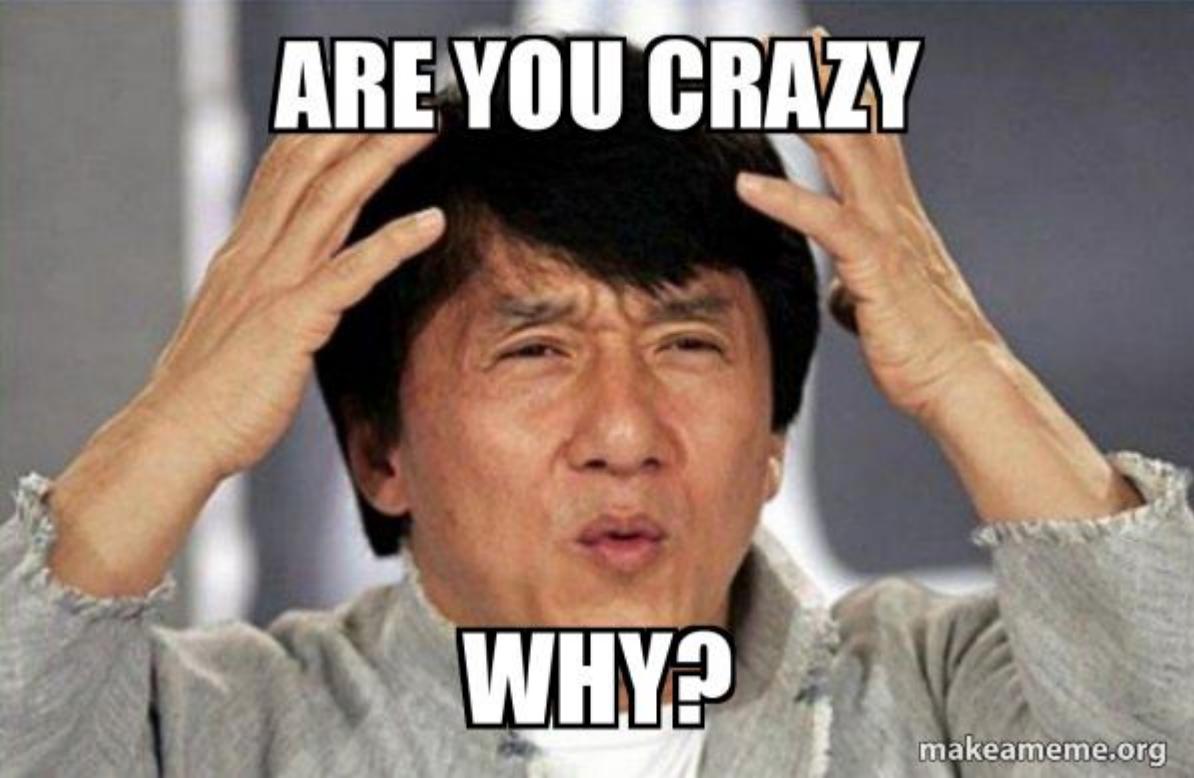


# Docker replacement?

# Docker replacement

*If WASM+WASI existed in 2008, we wouldn't have needed to create Docker. That's how important it is. WebAssembly on the server is the future of computing.*

Solomon Hykes (one of the co-founders of Docker)

A photograph of Jackie Chan from the chest up. He has a shocked or confused expression, with his hands raised and fingers spread, touching his hairline. He is wearing a light-colored, textured sweater over a white collared shirt.

**ARE YOU CRAZY**

**WHY?**

[makeameme.org](http://makeameme.org)

**Don't give up!**  
**Back to web...**



# Full stack, fully typed.

A cutting-edge Rust framework for the modern web.

[Video](#)[Documentation](#)

## Build interactive web applications in Rust.

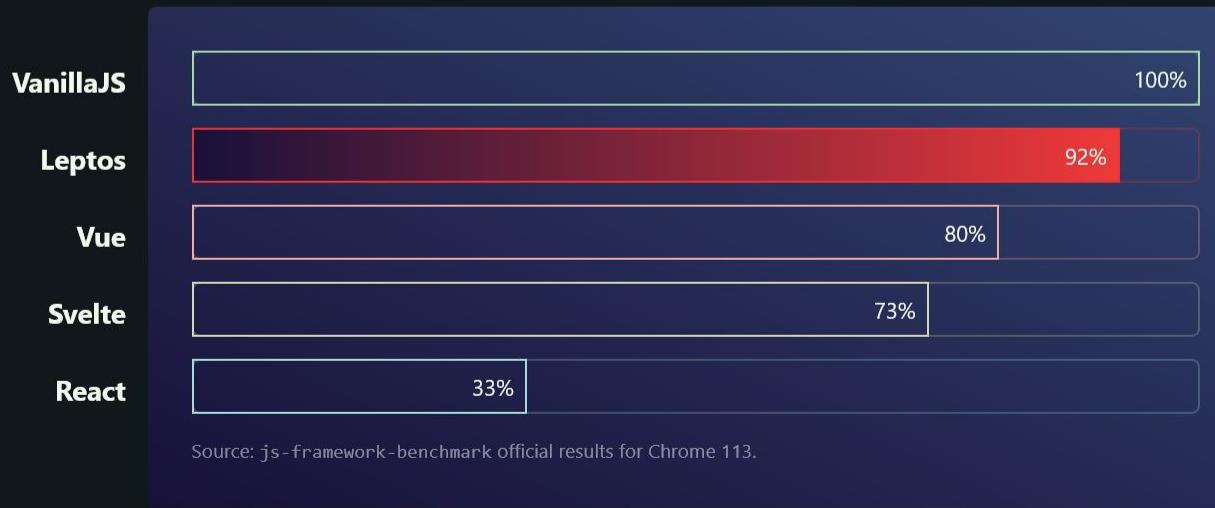
Leptos makes it easy to build applications in the most-loved programming language, combining the best paradigms of modern web development with the power of Rust.

- ✓ Create full-stack apps that start working immediately and are progressively enhanced with client-side interactivity.
- ✓ Start projects fast using simple tooling with minimal configuration.
- ✓ Easily manage state without fighting the borrow checker with reactive signals.
- ✓ Write “server functions” that work across both the server and client.
- ✓ Sleep well knowing Rust’s type safety is protecting your whole app.



Sleep well knowing Rust's type safety is  
protecting your whole app.

## High-performance



Your favorite UI patterns

prime

# THE LORD OF THE RINGS THE RINGS OF POWER

New episode Thursday

2 seasons 2024 Action • Adventure 15 HDR

S2 E5 When Durin grows suspicious of the Dwarven Rings, Celebrimbor must reassess his priorities. Amidst Númenor's shifting currents, Elendil searches for hope.



Continue watching



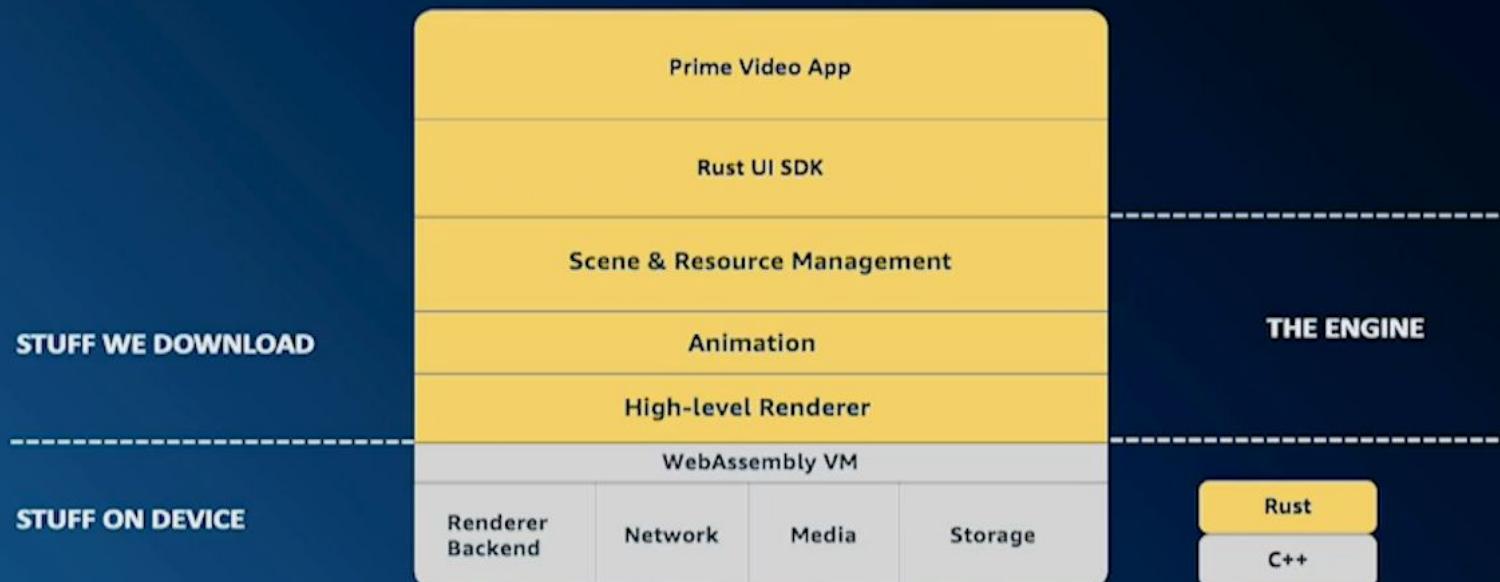
Science fiction movies



More info

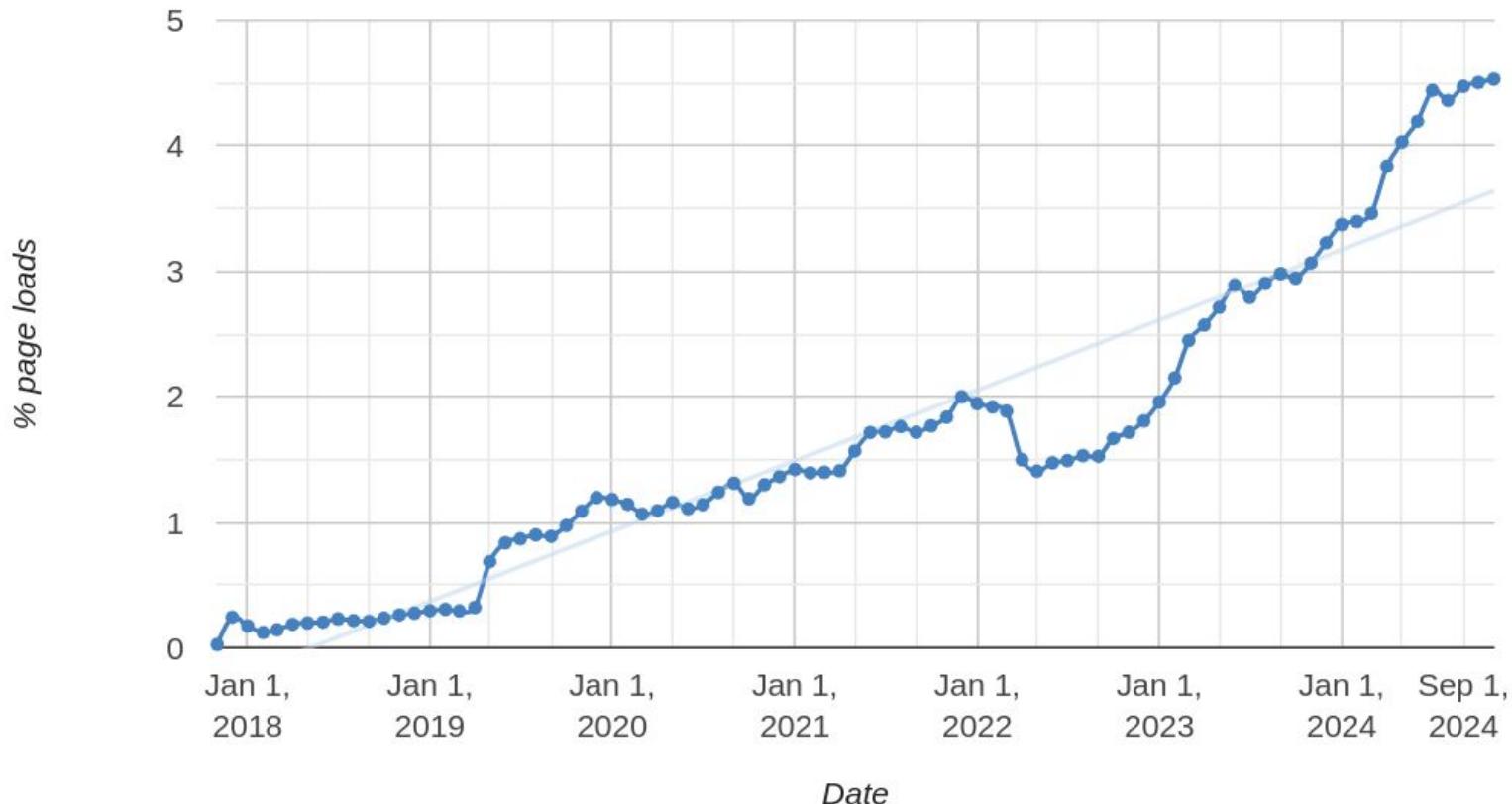


# HIGH-LEVEL ARCHITECTURE



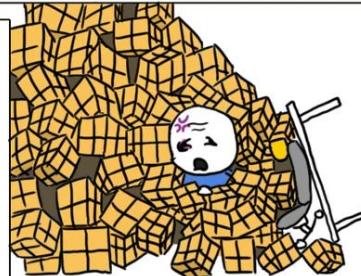
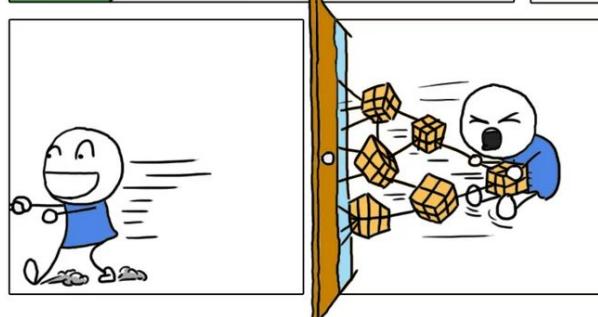
prime video  
amazon

# 4.5% of all page loads in Chrome



# As a replacement for JavaScript?

NPM DELIVERY



MONKEYUSER.COM

# **As a replacement for JavaScript?**

- The ecosystem can play a role.
- Language-specific thinking.
- Integration across the stack.



Search the docs (Press "/" to focus)

Docs Screencasts Support New



**Building modern web apps is hard.** Tools like Vue and React are extremely powerful, but the complexity they add to a full-stack developer's workflow is insane.

**It doesn't have to be this way...**

*Ok, I'm listening...*

Say hello to **Livewire**.

*Hi Livewire!*

Livewire is a full-stack framework for Laravel that makes building dynamic interfaces simple, without leaving the comfort of Laravel.

*Consider my interest piqued*

It's not like anything you've seen before. The best way to understand it is to just look at the code. Strap on your snorkel, we're diving in.

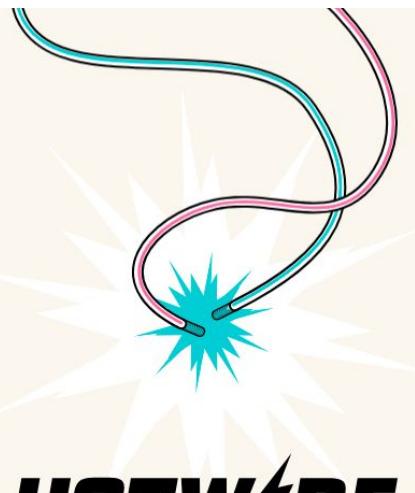
*...I'll get my floaties*

PLATINUM SPONSOR



**Fly.io**

OTHER LOVELY SPONSORS:



# HOTWIRE

HTML OVER THE WIRE

**Hotwire is an alternative approach to building modern web applications without using much JavaScript by sending HTML instead of JSON over the wire.** This makes for fast first-load pages, keeps template rendering on the server, and allows for a simpler, more productive development experience in any programming language, without sacrificing any of the speed or responsiveness associated with a traditional single-page application.

# Back to transpilation?

- Use transpilation for DOM-heavy tasks.
- Use WebAssembly for the rest.
- A prerequisite for this is good tooling.

# Back to transpilation?

- Proposal\* at ECMAScript TC39
- **Split JavaScript:**
  - **JS0**: Simplified core for runtime engines
  - **JSSugar**: Feature-rich, compiler-supported version

\* <https://docs.google.com/presentation/d/1yIROTu3N6MyHzNzWJXQAc7Bo1O0FHO3lNKfQMfPOA4o/edit#slide=id.p>

**SOCIETY**

X Tweet

f Share

Share

# \$7bn plan for new Japan undersea tunnel warms up after years on ice

Jan 03 ([Nikkei](#)) - The idea of a tunnel for auto traffic between Japan's main island of Honshu with Hokkaido to the north has gained new momentum after years of being considered a wasteful long shot.



## POPULAR NEWS

[White House spokesperson slams Japan for 700% rice tariff](#)

[Final Chapter for 'Bōsōzoku'](#)

[Osaka Installs 2-Meter Fence Under Glico Sign](#)

[Japan's 'Most Dangerous' Zoo to Close in September Over Legal Issues](#)

[One Month to Expo: International Pavilions Near Completion](#)

## MEDIA CHANNELS



# Recapitulation...

**Wait...**

2022 LLM come into  
chat...

# FE with AI?

# JS with AI

- FE is extremely repeatable — components.
- There is a lot of JS in the training set.
- JS is tolerant of errors.

# Key Takeaways

# Webassembly

- Cross-Platform Compatibility.
- Performance Efficiency.
- Security.

# Webassembly

- Complements, not replaces, JavaScript.
- "VM on VM" limits speed for some languages.
- Expansive DOM access.

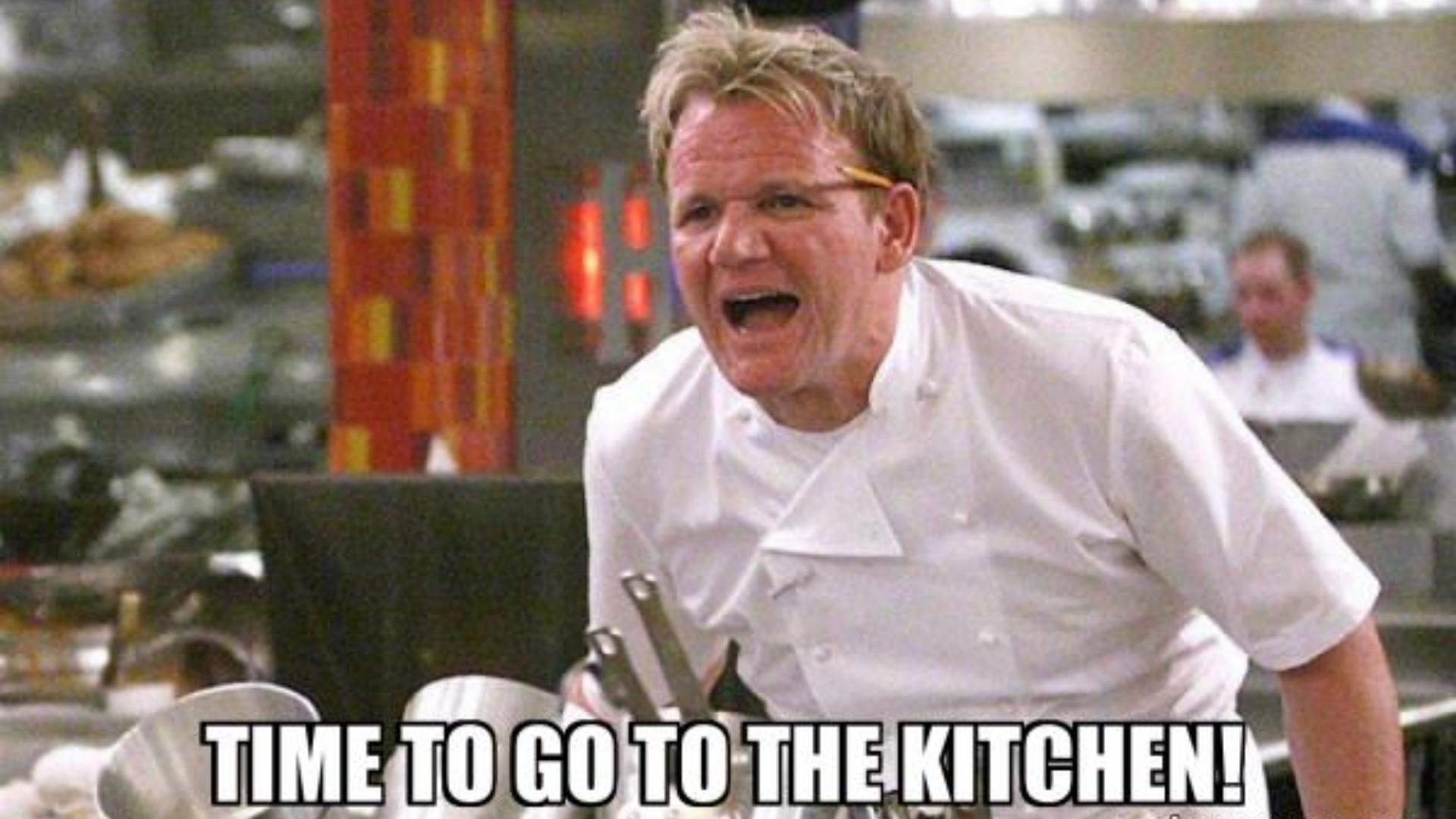
## **Final note... ...webassembly:**

- Overkill for typical CRUD (99% of the web).
- Not meant for traditional frontend.
- JS already covers the basics well.
- Role of AI.

# Target use cases

- Image, Video & Audio Editing
- CAD/3D Visualization/Games
- Demos
- RAW CPU power (eg.: compression)

**Like a seikan tunnel - a  
boring, but important  
infrastructure project...**



**TIME TO GO TO THE KITCHEN!**



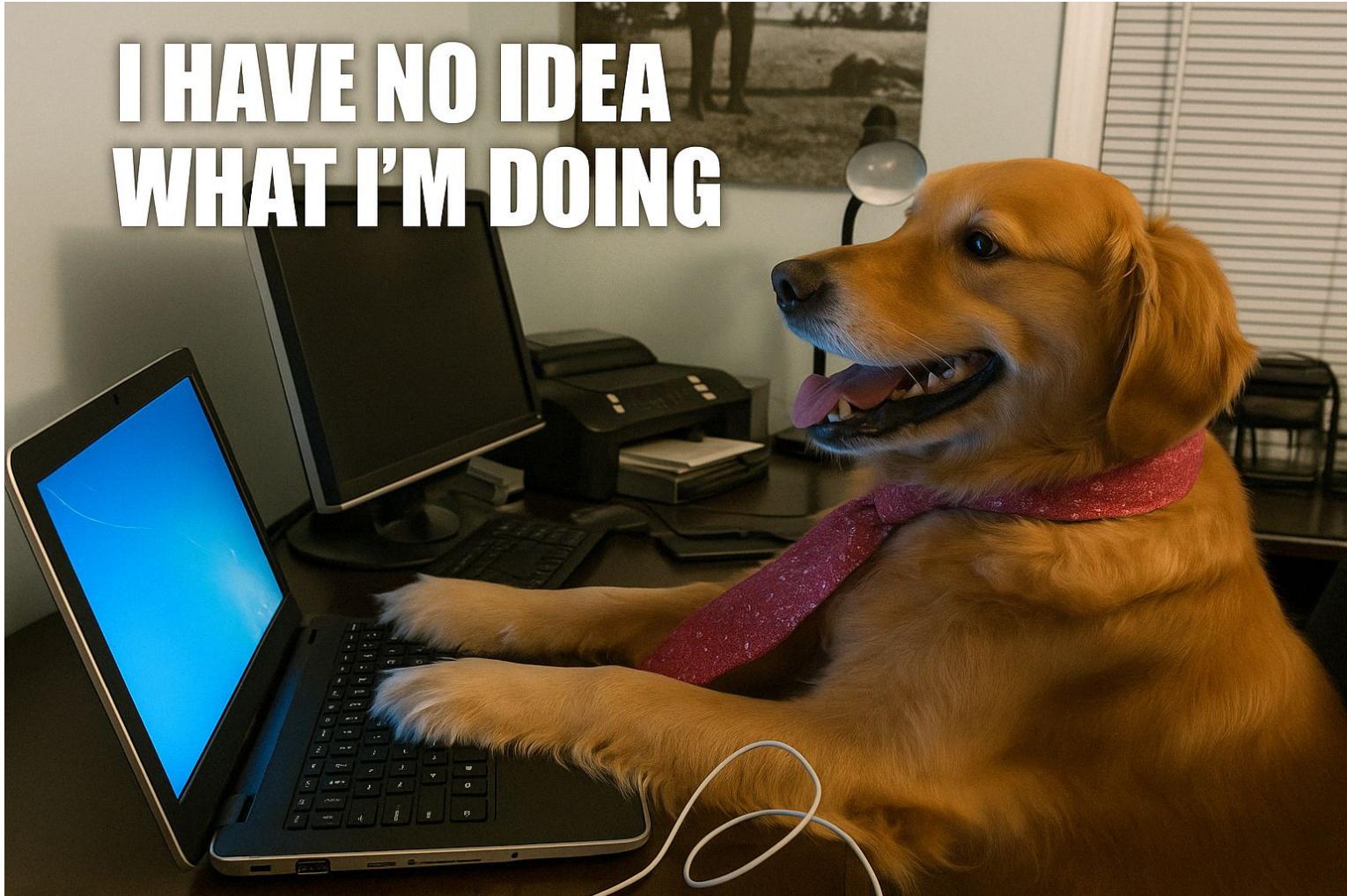
Everything's AI now...

Vibe coding!

# Vibe coding?

- Describe the problem in plain language to an LLM.
- Run the code, collect errors.
- Paste errors back for fixes.
- Rinse and repeat.

# I HAVE NO IDEA WHAT I'M DOING





# PHP-WASM Interactive Demo

## About PHP-WASM

This demo shows PHP running directly in your browser using WebAssembly. The PHP code interacts with the browser DOM using the Vrzno JavaScript bridge.

Each example below uses `<script type="text/php">` tags to run PHP code that can interact with webpage elements.

## Todo List Demo

A more complex example - a Todo list application:

Add a new task...

Add

### PHP Code:

```
<?php
$window = new Vrzno;
$document = $window->document;

// Copy the code for display
$scriptContent = $document->getElementById('todo')->textContent;
$document->getElementById('todo-source')->textContent = $scriptContent;

// Highlight the code
$window->highlightElement($document->getElementById('todo-source'));
```

<https://kambo-1st.github.io/php-wasm/>

Name	Memory	CPU
HTTP localhost (18752) Tab: http://localhost:9999/ Tab: http://localhost:9999/	18GB	0.03%
GPU (26584)	6GB	3.9%
HTTP localhost (26660) Tab: http://localhost:9999/ Tab: Initial template	5GB Evolution: -2MB	0.055%
Firefox (25872)	4GB	110%
HTTPS /kambo-1st.github.io (46672) Tab: PHP-WASM Interactive Demo Tab: PHP-WASM Interactive Demo	3GB	0.075%
HTTPS /google.com (40516)	2GB	2.5%

# 18GB of RAM...

# 18GB of RAM!!!!



# PHPX

Take back the web!

Create React-like components in PHP and render them on both server and client  
with WebAssembly

Get Started >

See Examples

## Experience the Power of PHPX

### Revolutionary Web Development

PHP meets React - the power of both worlds in a single elegant solution:

```
PHPX
1  <?php
2  function Counter() {
3      $count = useState(0);
4
5      $increment = function() use (&$count) {
6          $count[1]($count[0] + 1);
7      };
8  }
```

Copy

# Therapist: PHPX isn't real he can't hurt you.

## PHPX:

```
<?php
function Counter() {
    $count = useState(0);

    $increment = function() use (&$count) {
        $count[1]($count[0] + 1);
    };

    return (
        <div className="counter">
            <h2>Count: {$count[0]}</h2>
            <button
                onClick={$increment}
                className="px-4 py-2 bg-blue-500 text-white rounded"
            >
                Click me to increment
            </button>
        </div>
    );
}
```

# Full stack, fully typed.

A cutting-edge Rust framework for the modern web.

[Video](#)[Documentation](#)

## Build interactive web applications in Rust.

Leptos makes it easy to build applications in the most-loved programming language, combining the best paradigms of modern web development with the power of Rust.

- Create full-stack apps that start working immediately and are progressively enhanced with client-side interactivity.
- Start projects fast using simple tooling with minimal configuration.
- Easily manage state without fighting the borrow checker with reactive signals.

<https://leptos.dev/>

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-  Easily manage state without fighting the borrow checker with reactive signals.

<https://codesandbox.io/p/devbox/playground-forked-h67q8f>

## Library Selection

### JavaScript Implementation

Select Library

Pako (DEFLATE/zlib)

#### Implementation Details

Pako is a pure JavaScript implementation of zlib and DEFLATE algorithms, commonly used for compression in the browser environment. Compare with wasm-pako for a fair JS vs WASM comparison.

### WebAssembly Implementation

Select Library

WASM Pako (DEFLATE/zlib)

#### Implementation Details

WASM Pako provides the same DEFLATE/zlib algorithm compiled to WebAssembly from C implementation for higher performance. Compare with JS Pako for a fair comparison.

#### Important:

- For accurate benchmarking, compare algorithms of the same family:
- Pako (JS) with WASM Pako - both implement DEFLATE/zlib
  - LZ4JS (JS) with WASM LZ4 - both implement LZ4 algorithm

## Input Data

Sample Text

Sample JSON

Input  
Size:

Medium (~ 100KB)

<https://replit.com/@bohuslav/WebAssemblyCompressor>

*“That’s all Folks!”*

Isberg®

# Efektivní využití AI agentů ve vývoji

## Co se dozvítě?

- **AI agenti integrovaní v IDE**

Agenti schopní pracovat přímo s vaší codebase a upravovat kód za vás.

- **Pravidla pro efektivní promptování a dodávání kontextu**

Praktická pravidla, díky kterým AI lépe pochopí, co skutečně potřebujete.

- **AI ve VS Code a PHPStormu**

Jak si nastavit prostředí pro maximální produktivitu s AI asistencí.



Osteria Garage  
Salonek v 1. patře  
Částková 56, Plzeň



21.05.2025  
18:00 hod

Martin Hora