V8, WebAssembly, and Edge Computing

A new way of thinking about serverless

Intro

- Kas Perch
- @nodebotanist
- Developer Advocate @ Cloudflare
- Robotics addict/author

What this talk is about

- A **real-world case study** at production scale.
- The subject: **building a new type of serverless offering from the ground up.**
- How we used **technologies and standards straight off the web.**
- How this all relates to **the future of serverless.**

Building a Different Serverless Offering

- No containers
- No cold starts
- Web standards/ease of use for developers

Using V8 and Isolates.

- **Isolates** are a class that creates a separate instance of V8 interpreter
  - Isolates do **NOT** share memory space with each other.
  - They are, essentially, **sandboxes** for code to run in safely.

Does anyone else use this model in production?

The video game **Screeps** uses isolates to run user code, and is a popular game running in production.

TODO: add screencap of Screeps

But why use the V8 Engine?

V8 is secure.

- $15k bug bounty.
- Transparent about vulnerabilities/issues.

Developer Experience

- Raise your hand if you haven't written any JS, ever.
- Writing serverless functions in the same JS that developers are using all over the web.

We did have to fill in some gaps

We ended up fully emulating the Service Worker API to represent Cloudflare Workers-- they run on a fetch event.

We decided to use Web standards to meet the needs of the platform in order to keep that usability.

Performance

- V8 offers great just-in-time optimization of JS
- Couple this with the compile-optimized performance of...

WebAssembly!

- What it is
- Why it is a **Big Deal** for the web
- Why it matters for Serverless
- How we're using it

What WebAssembly is

- A compile target, not a programming language
- Allows you to write web code in other languages
- Similar to the JVM-- a compile target that allows you to write in the language you want for a runtime that runs on most machines
- In this case, it's all modern browsers, Node >= 8.0, and anything running on current V8 (like Workers)

Why WebAssembly is a big deal

- Re-use codebases that are written in other languages on the web
- Use languages that can be used to complete tasks more easily or efficiently than they can in JS
- Get compiled language performance out of V8

Demonstration: ImageMagick

How we're using WebAssembly

We're using a program written in Rust and compiled to WebAssembly to create Binary ASTs of user JS code on-the-fly, making it even more performant

How all of this converges to create a serverless platform

Things we care about in serverless

- Runtime
- Cold Starts
- Latency

Runtime

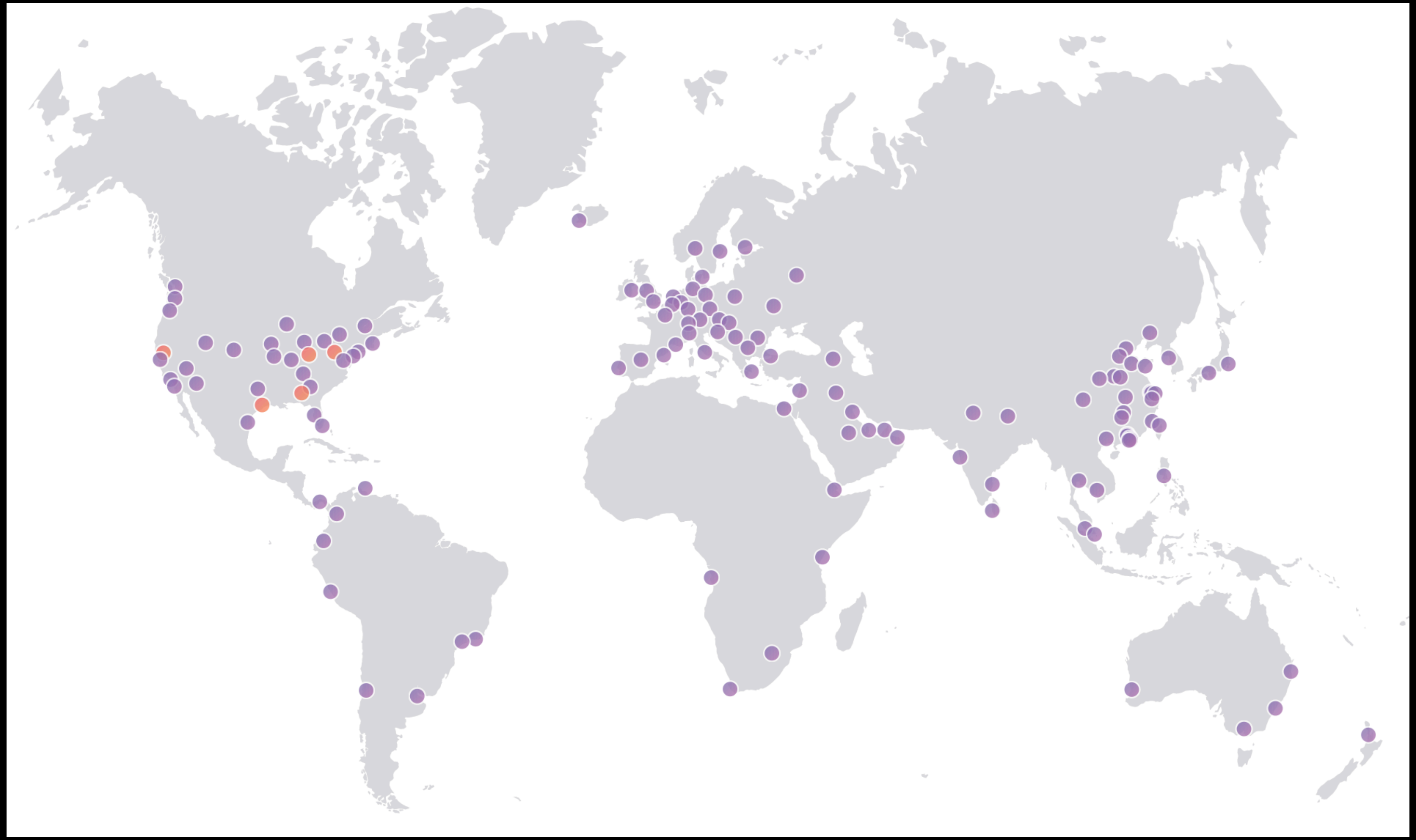
Between the just-in-time optimization of V8 and the compile-time optimization of WebAssembly, you get an extremely performant runtime for Workers functions

Getting rid of Cold Starts

- No containers to spin up, just V8 Isolates
- According to serverless-benchmark.com: ~85ms
- Internal measurement clocks in at 5ms

Decreasing Latency

We leveraged our existing network to run your code as physically close to your users as possible



Demonstration: How it all works

The future of serverless lies in doing things in different ways.

Creating new serverless architectures from the ground up and allowing users to try different strategies is a key part of any movement's maturity.

Want to learn more?

Scan me

Learn more at Kas' Talk at 14:00!

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