From Cloud to Edge Computing

Unleashing the power of WebAssembly at the edge

Alex Casalboni

Developer Advocate, Edgee
edgee.cloud

Agenda for today 📅

- What’s edge computing
- Cloud & edge evolution
- Wasm support @ CDNs
- Wasm @ Edge(e)

cloud academy
A QA COMPANY

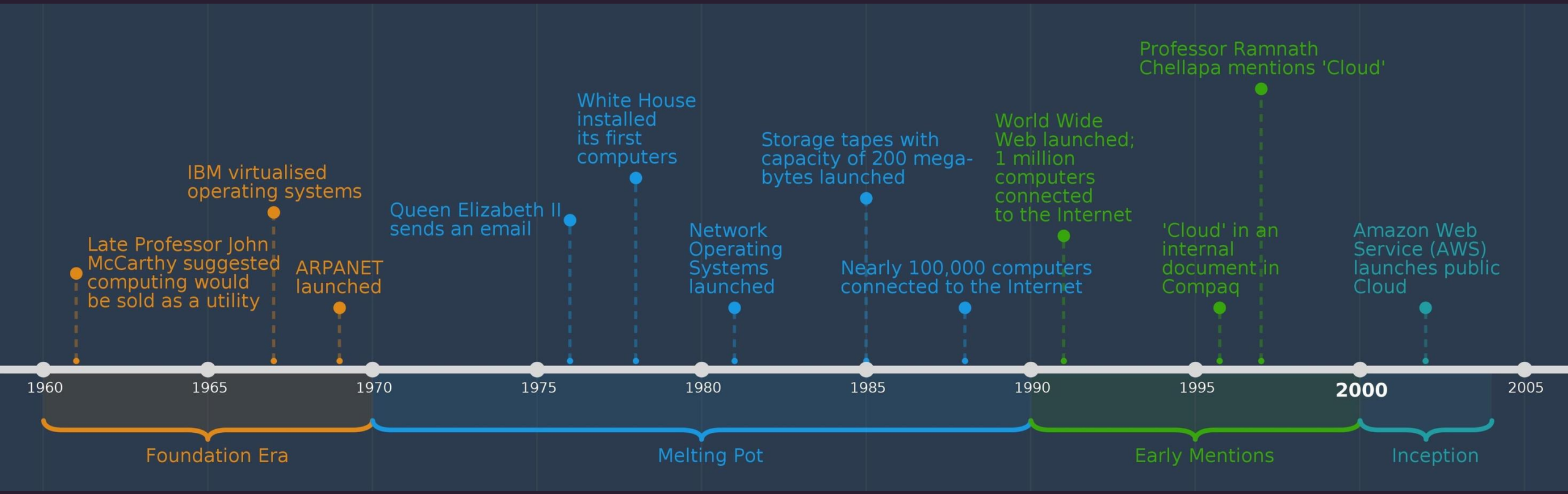
aws

edgee

Background	Web Developer & Software Engineering
Fun facts	Startupper for 5+ years, visited 41 countries
Hobbies	Reading, playing music, snowboarding
Proud of	Father of one

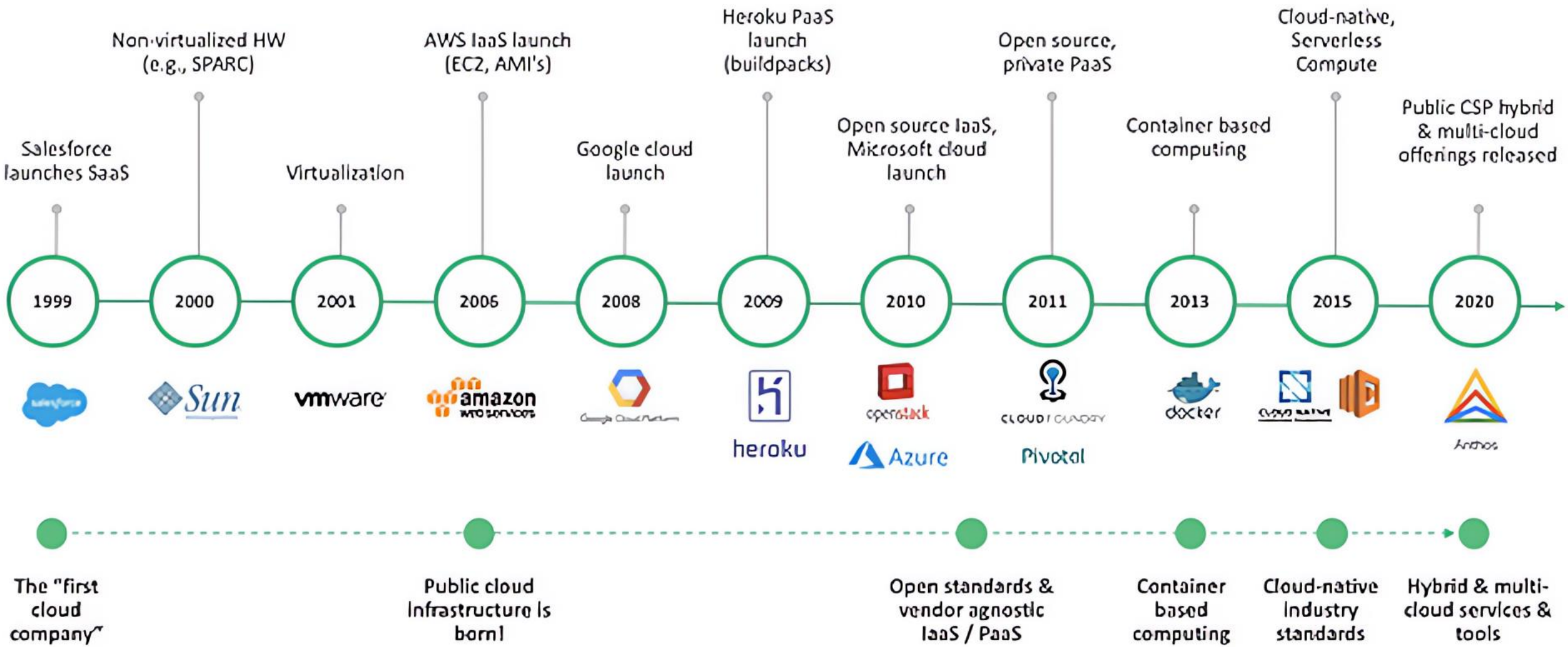
So what is exactly edge computing?

Cloud history



bcs.org/articles-opinion-and-research/history-of-the-cloud/

Cloud (recent) history



CDNs evolved too!

	Akamai	Amazon CloudFront	CLOUDFLARE	fastly
Founded	1998	2008	2009	2011

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Wasm support	❌ --no-expose-wasm	Not officially… but somebody succeeded!	2018 (Wasm) 2022 (Wasi)	Built-in since launch

A closer look

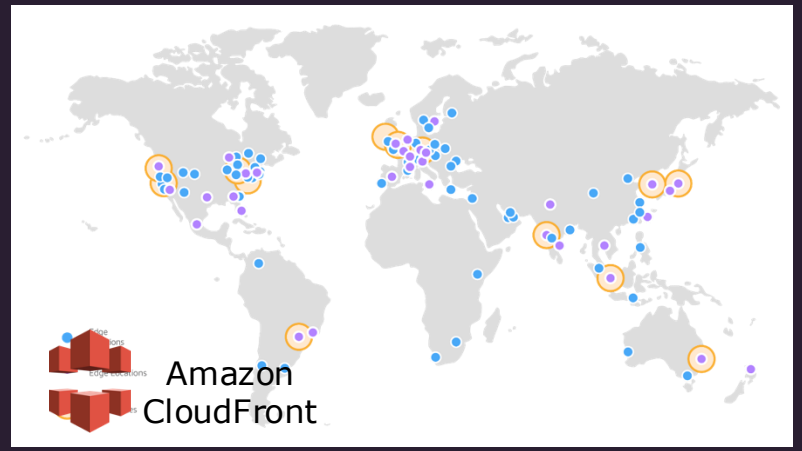
Wasm @ Cloudflare Workers:

- Beta support for Python (via Pyodide)
  - Optimized imports with linear memory snapshots
  - Bindings exposed via `JsProxy`
- Beta support for Rust (`workers-rs` crate)
  - `wasm32-unknown-unknown` target

Wasm @ Fastly Compute:

- Official SDKs for JS/TS, Rust, and Go
- Unofficial SDKs for Zig, Swift, Ruby, and .NET
  - Public `.witx` definitions to build your own SDK and package Wasm binaries
- Only `wasip1`

Globally distributed by default



Resource and performance constraints

On Fastly Compute:

- Max CPU time: 50ms
- Max memory: 128MB
- Max # of lookups: 16
- Max # of backend reqs: 32

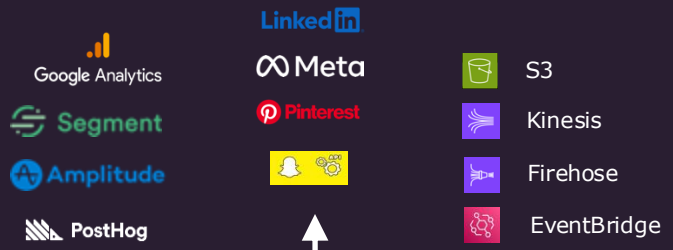
On Cloudflare Workers:

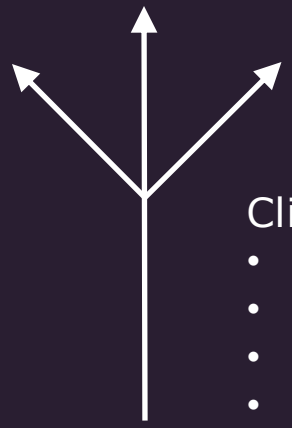
- Max CPU time: 10ms (free), 30s (paid)
- Max memory: 128MB
- Max # of lookups: 50 (free), 1000 (paid)
- Max # of sub-reqs: 50 (free), 1000 (paid)

(Well-known) Wasm benefits

- Cross-platform portability
- Near-native performance
- Lightweight & fast initialization
- Secure sandboxing
- Multi-language support & versatility

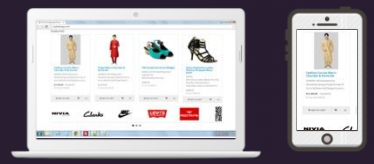
Wasm @ Edge(e)





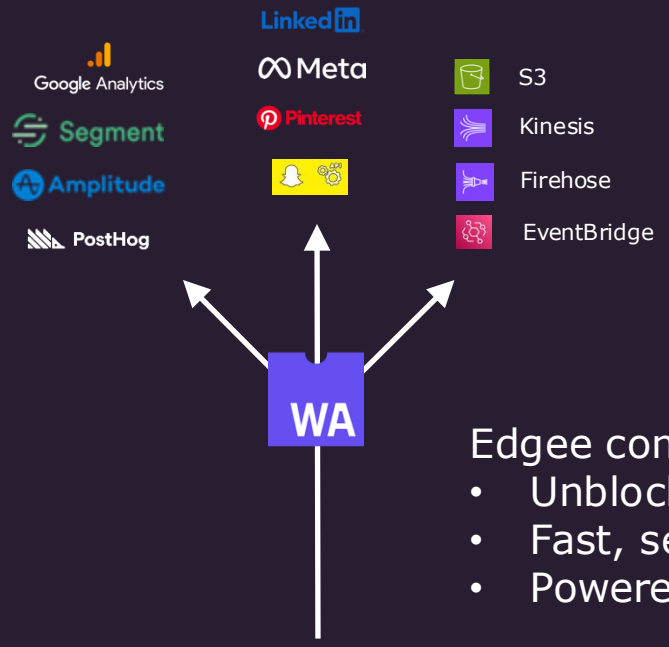
Client-side SDKs:

- Slow down performance
- Increased security risk
- Privacy compliance issues
- Lead to inaccurate analytics



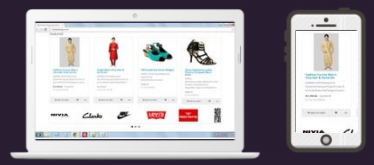
Client device

Cloud / website



Edgee components:

- Unblockable
- Fast, secure, compliant
- Powered by Wasm



edgee

Client device

Cloud / website

Vision: empower developers to build the next generation of high-performance, sustainable applications.

Mission: create an ecosystem of open source, interoperable components that can run where they're most effective.

Challenges:

- Run business logic efficiently after each HTTP request
- Support untrusted code (3rd-party components)
- Define domain-specific interfaces for many use cases
- Handle versioning of components and WIT interfaces

Meet the Edgee Component Registry

edgee.cloud/registry

Categories

- All
- Analytics
- Consent Mapping
- Conversion API
- Warehouse
- Native Cookies

Analytics

View all (6)

- edgee/amplitude — analytics — 1.0.0
- eulerian-technologies/eulerian-analytics — analytics — 1.0.9
- edgee/google-analytics — analytics — 1.0.0
- edgee/piano-analytics — analytics — 1.0.0

Consent Mapping

View all (3)

- edgee/axeptio-consent-mapping — consent mapping — 1.0.0
- edgee/didomi-consent-mapping — consent mapping — 1.0.0
- edgee/onetrust-consent-mapping — consent mapping — 1.0.0

Conversion API

View all (4)

- edgee/linkedin-capi — conversion api — 1.0.0
- edgee/meta-capi — conversion api — 1.0.0
- edgee/pinterest-capi — conversion api — 1.0.0
- edgee/snapchat-capi — conversion api — 1.0.0

Warehouse

View all (3)

- edgee/amazon-data-firehose — warehouse — 1.1.0
- edgee/amazon-kinesis — warehouse — 1.1.0
- edgee/amazon-s3 — warehouse — 1.2.0

Native Cookies

View all (3)

- edgee/amplitude-native-cookies
- edgee/google-analytics-native-cookies
- edgee/piano-analytics-native-cookies

Many more components and types coming soon

(CMP, A/B testing, security, AI inference, and more!)

roadmap.edgee.cloud/roadmap/data-collection-components

Technical overview

- Edge reverse proxy implemented in Rust
  - Domain-specific layer on top of Wasmtime
  - Shared codebase (proxy & CLI) /edgee-cloud/edgee

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  - Templates: /edgee-cloud/example-{LANG}-component
- Fully integrated with the Edgee managed service

```
package edgee:native;

world data-collection {
  export edgee:components/data-collection;
}
```

```
package edgee:components;

interface data-collection {
    type dict = list<tuple<string,string>>;
    enum event-type { page, track, user }
    enum consent { pending, granted, denied }
    enum http-method { GET, PUT, POST, DELETE }
    record event {...}

    variant data {}
    record page-data {...}
    record user-data {...}
    record track-data {...}

    record context {...}
    record client {...}
    record campaign {...}
    record session {...}

    record edgee-request {
        method: http-method,
        url: string,
        headers: dict,
        forward-client-headers: bool,
        body: string,
    }

    page:  func(e: event, settings: dict) -> result<edgee-request, string>;
    track: func(e: event, settings: dict) -> result<edgee-request, string>;
    user:  func(e: event, settings: dict) -> result<edgee-request, string>;
}
```

Meet the Edgee CLI

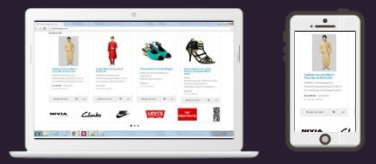
```
$ curl https://install.edgee.cloud | sh
```

```
$ brew tap edgee-cloud/edgee
$ brew install edgee
```

```
$ cargo binstall edgee
```

github.com/edgee-cloud/edgee

```
> edgee component build
 INFO Running: npm install && npm run generate && npm run build

added 122 packages, and audited 123 packages in 572ms

31 packages are looking for funding
  run `npm fund` for details

found 0 vulnerabilities

> generate
> npx @bytecodealliance/jco types .edgee/wit -o types/

  Generated Type Files:

 - types/interfaces/edgee-components-data-collection.d.ts  2.59 KiB
 - types/wit.d.ts                                          0.16 KiB
```

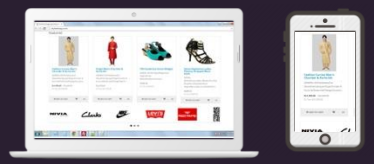


fastly

Edgee proxy

Client device

Yourwebsite.com



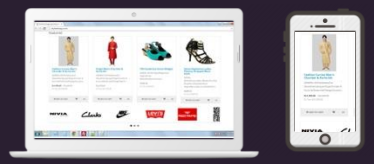
Client device

fastly Edgee proxy

Yourwebsite.com

aws event.edgee.app

WA WA WA
WA WA WA



Client device

fastly Edgee proxy

Yourwebsite.com

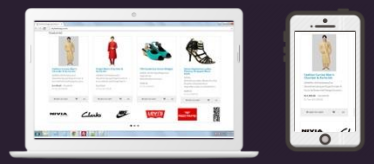
aws event.edgee.app

eu-west-1

eu-west-2

us-east-1

...



Client device

fastly Edgee proxy

Yourwebsite.com

aws api.edgee.app

edgee.cloud

Edgee CLI

Other API consumers

aws event.edgee.app

eu-west-1

eu-west-2

us-east-1

...

Takeaways & next steps

- CDNs aren’t just for caching & DDoS protection anymore
- Edge computing is a new way of building new apps & features
- Wasm + wasip2 at the edge still limited, but promising
- We wish WIT had built-in versioning capabilities (host)

My call to actions for you:

- Join our open community
- Check out the Edgee Component Registry

Thank you!

Alex Casalboni

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