

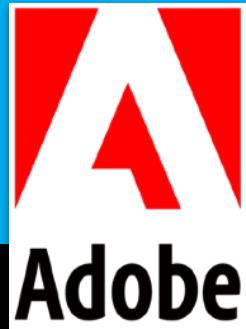
adaptTo()

APACHE SLING & FRIENDS TECH MEETUP
2 - 4 SEPTEMBER 2019



Sling & Serverless - Best Friends Forever?
Bertrand Delacrétaz - Principal Scientist, Adobe

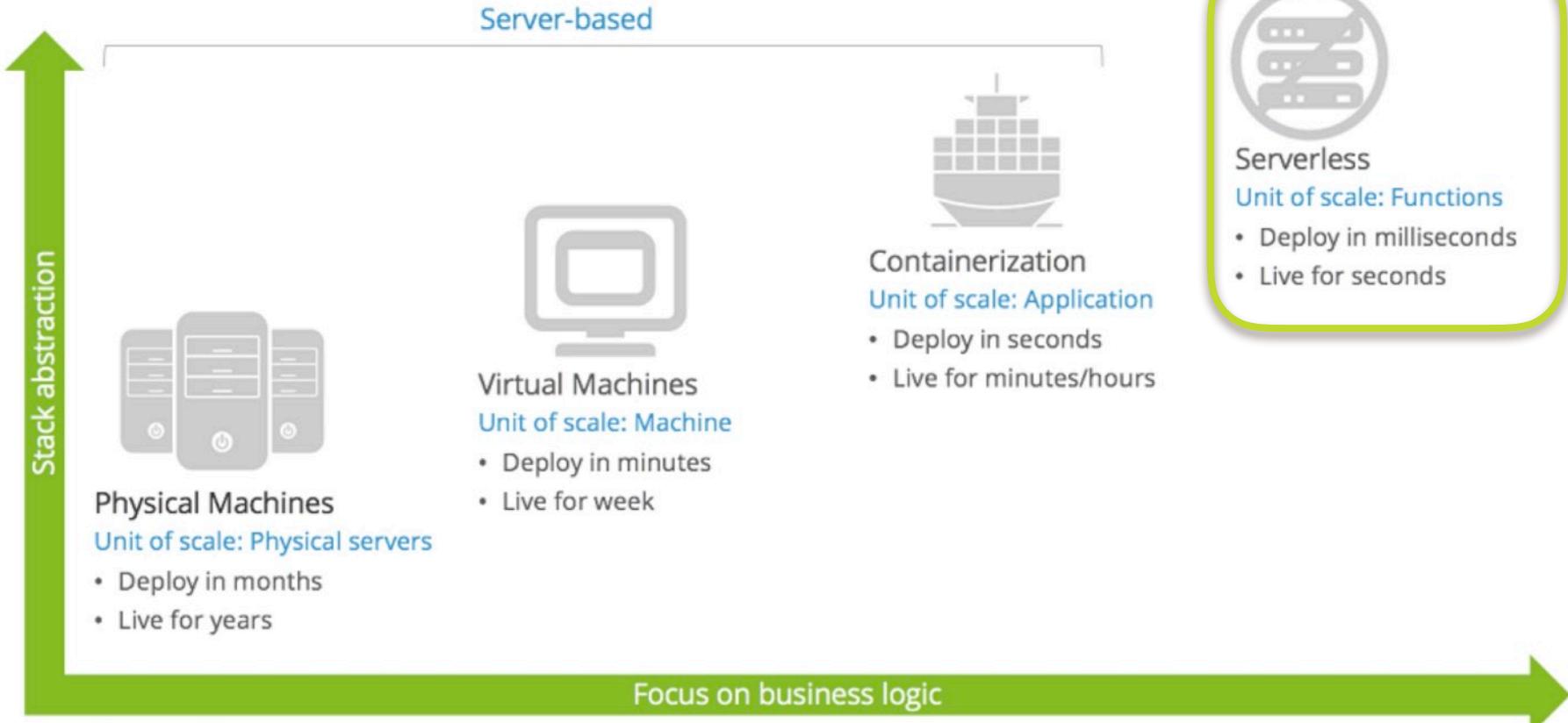
Images: stock.adobe.com, unless otherwise specified
slides revision: 2019-09-03



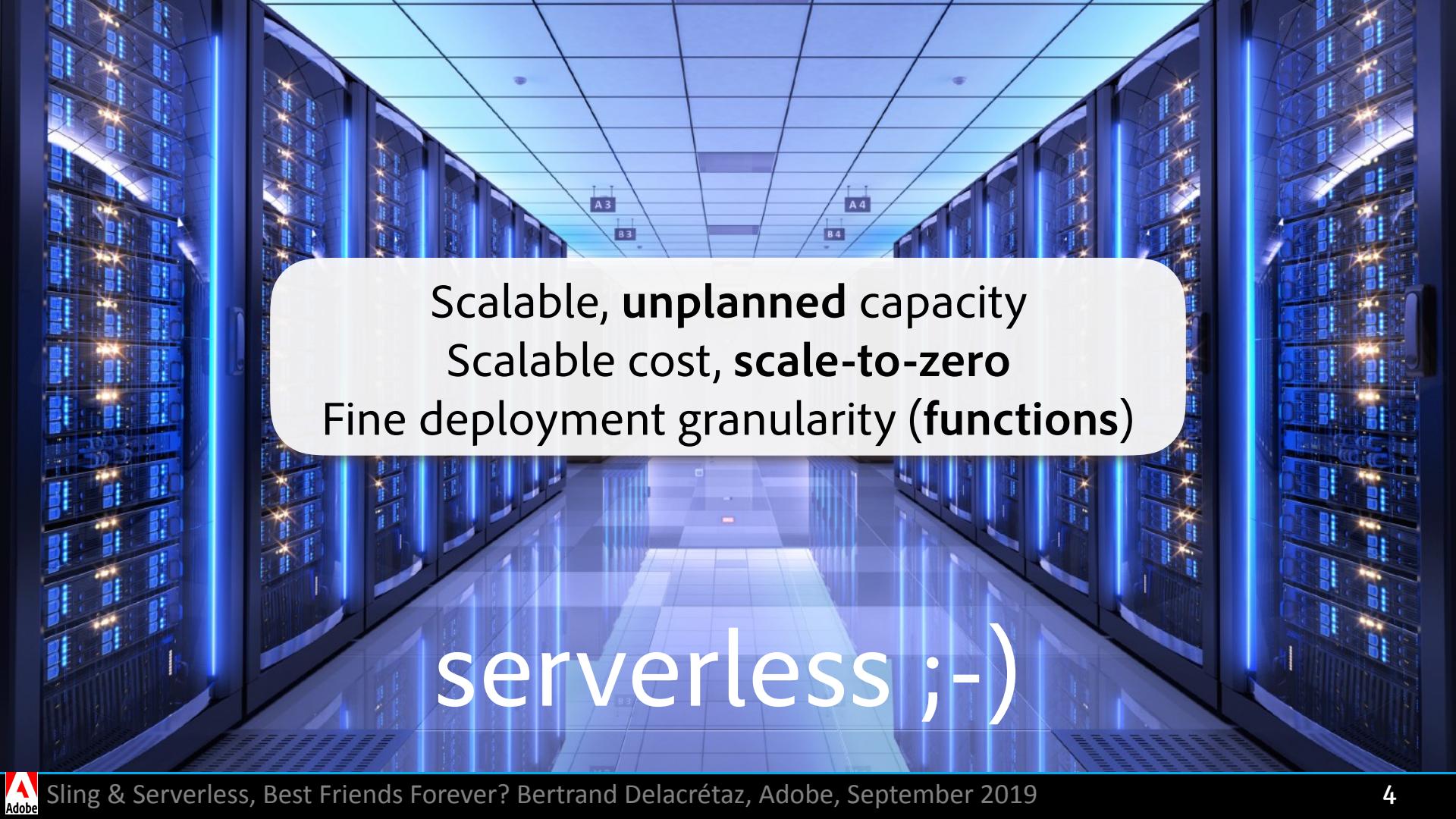


Serverless?

Cloud Technologies Evolution



Source: Deloitte Consulting LLP, via Alexander Klimetschek, @alexkli



Scalable, **unplanned** capacity
Scalable cost, **scale-to-zero**
Fine deployment granularity (**functions**)

serverless ;-)

Hello, Serverless World!

```
// The actual OpenWhisk action code
function main(params) {
    const name = params.name || 'World';

    const content = `

        <html>
            <body>
                <h1>Hello, ${escapeForHTML(name)}!</h1>
            </body>
        </html>
    `;

    console.log(content);
    return {body: content };
}
```

Installation:

```
wsk action update web-hello web-hello.js --web true
```

URL:

```
wsk -i action get web-hello --url
```





Units of Deployment

Serverless: Containers or Functions ?

Scalable, **unplanned** capacity + Scalable cost, **scale-to-zero**



```
// The actual OpenWhisk action code
function main(params) {
    const name = params.name || 'World';

    const content = `
        <html>
            <body>
                <h1>Hello, ${escapeForHTML(name)}!</h1>
            </body>
        </html>
    `;

    console.log(content);
    return {body: content};
}
```

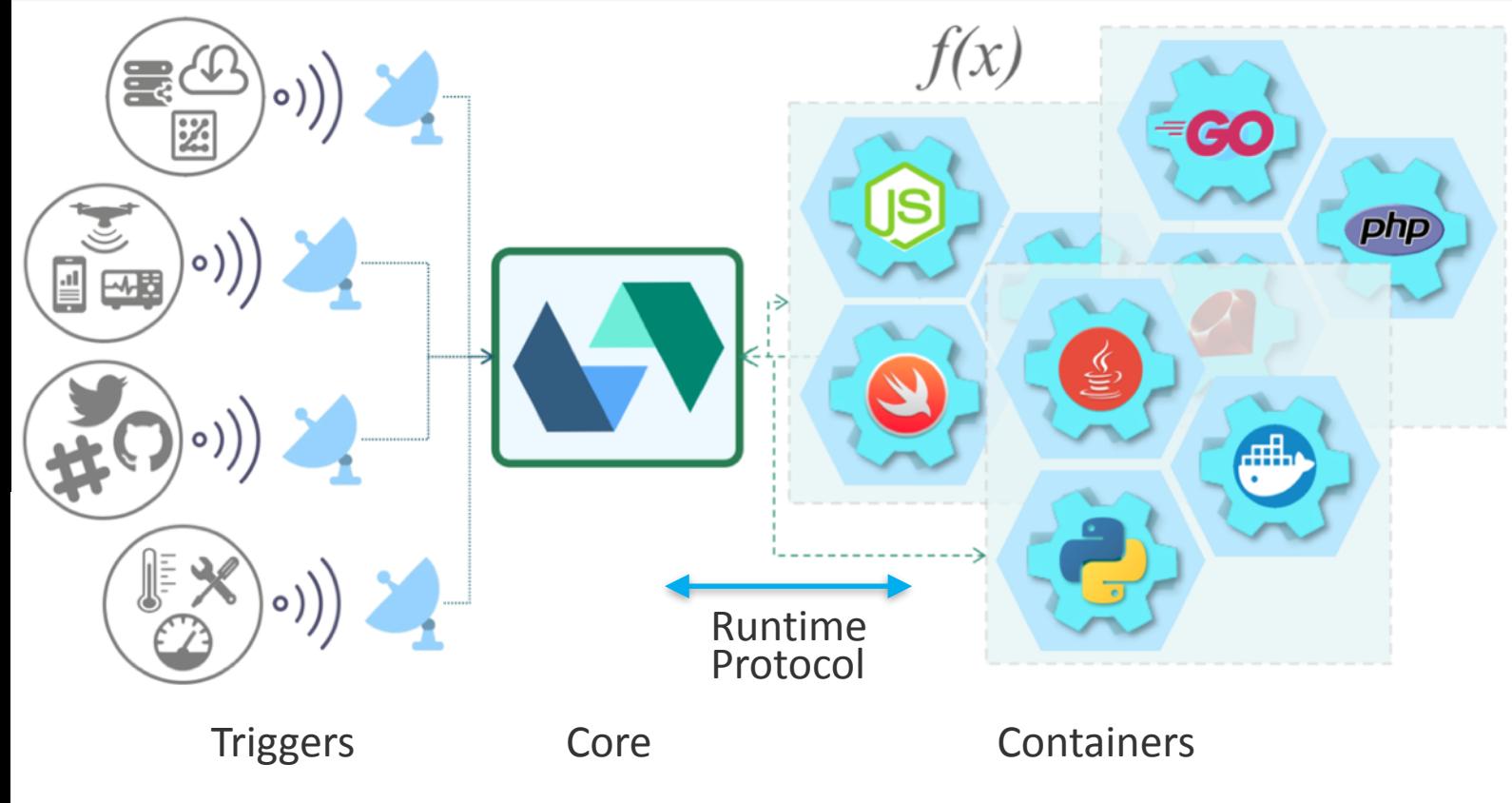
Fine deployment granularity ?

Needs fast startup

OpenWhisk: simple init/run HTTP API

Limited choice of languages?

OpenWhisk: Orchestrated Containers



OpenWhisk runtime protocol

The /init end point

After starting the Docker container, the invoker will POST to /init the following payload:

```
{  
    "value": {  
        "name" : "helloPHP",  
        "main" : "main",  
        "binary": false,  
        "code" : "<?php ...",  
    }  
}
```

The /run end point

To run the action, the invoker will POST to /run. This may happen multiple times, but never concurrently. The payload contains the arguments to be passed to the function to be executed. For example:

```
{  
    "value": {  
        "name" : "Rob",  
    }  
}
```

Runtime container responds to **/init** and **/run** HTTP requests
-> easy to create **any** runtime



GraalVM - native Java (in containers?)



Tous

Actualités

Maps

Images

Vidéos

Plus

Paramètres

Outils

Environ 35 900 résultats (0,39 secondes)

Speed up application launch time with GraalVM - De Bijnork...

<https://medium.com/.../speed-up-application-launch-time-with-graa...> ▾ Traduire cette page

6 déc. 2018 - Startup time of your application is crucial to allow fast scaling. ... SubstrateVM (part of GraalVM) is a native virtual machine that allows you to ...

Instant Netty Startup using GraalVM Native Image Generation - Medium

<https://medium.com/graalvm/instant-netty-startup-using-graalvm-n...> ▾ Traduire cette page

22 mai 2018 - Instant Netty Startup using GraalVM Native Image Generation allows us to skip class initialization at run time, which is crucial for fast startup.

Helidon flies faster with GraalVM | Dmitry's Technical Blog

<https://dmitrykornilov.net/2019/.../helidon-flies-faster-with-graalv...> ▾ Traduire cette page

17 avr. 2019 - GraalVM is an open source, high-performance, polyglot virtual machine ... A native executable offers important benefits, like shorter startup time ...

Why is GraalVM so fast? - Beginners - ClojureVerse

<https://clojureverse.org/Community%20Center/Beginners> ▾ Traduire cette page

Kept seeing updates from GraalVM and my friends talked about that for several times. ... and JVM has been optimized for so many years, By fast I'm mean startup speed. ... What is fast is native-image compilation it offers for Java programs.

Why GraalVM

<https://www.graalvm.org/docs/why-graal/> ▾ Traduire cette page

Run Java Faster. GraalVM can run in the context of ... Running your application inside a Java VM comes with startup and footprint costs. GraalVM has a feature to create native images for existing JVM-based applications. The image generation ...

For Java Programs · For Node.js Programs · For Ruby, R, or Python

Native Image Example - GraalVM

Impressive startup speed...assuming you pass the native-image tool hurdle!

SubstrateVM limitations



OSGi ?

Legacy code?

What	Support Status
Dynamic Class Loading / Unloading	Not supported
Reflection	Supported (Requires Configuration)
Dynamic Proxy	Supported (Requires Configuration)
Java Native Interface (JNI)	Mostly supported
Unsafe Memory Access	Mostly supported
Class Initializers	Supported
InvokeDynamic Bytecode and Method Handles	Not supported
Lambda Expressions	Supported
Synchronized, wait, and notify	Supported
Finalizers	Not supported
References	Mostly supported
Threads	Supported
Identity Hash Code	Supported
Security Manager	Not supported
JVMTI, JMX, other native VM interfaces	Not supported
JCA Security Services	Supported

<https://github.com/oracle/graal/blob/master/substratevm/LIMITATIONS.md>

Sling code -> native code experiments

```
/** This is where we wire the system, like the OSGi framework
 * would do. As it seems hard to run that framework in a GraalVM
 * environment for now, we wire things statically.
 */
private static OsgiContext initialize() {
    final OsgiContext result = new OsgiContext();

    // This would be automatic in a JUnit environment
    result.registerInjectActivateService(new MockEventAdmin());

    // Our minimal resource provider
    final MockResourceProvider mrp = new MockResourceProvider();
    result.registerInjectActivateService(mrp);

    // SlingRequestProcessor
    result.registerInjectActivateService(new SlingRequestProcessorWrapper(result.bundleContext()));

    // ResourceResolver
    //result.registerInjectActivateService(new MockResourceResolver(mrp));
    result.registerInjectActivateService(new MockServiceUserMapper());
    result.registerInjectActivateService(new ResourceAccessSecurityTracker());
    final ResourceResolverFactoryActivator rrfa = new ResourceResolverFactoryActivator();
    result.registerInjectActivateService(rrfa);
    result.registerInjectActivateService(new ResourceResolverFactoryService(rrfa));

    return result;
}
```

Static wiring with
Sling OSGi mocks

Static wiring worked well ok (with lots of suffering) until hitting what's probably a native-image bug exposed by our legacy code.

See SLING-8556 and sling-whiteboard/graalvm - and with more effort or once the tools mature that might work.



I GIVE UP!

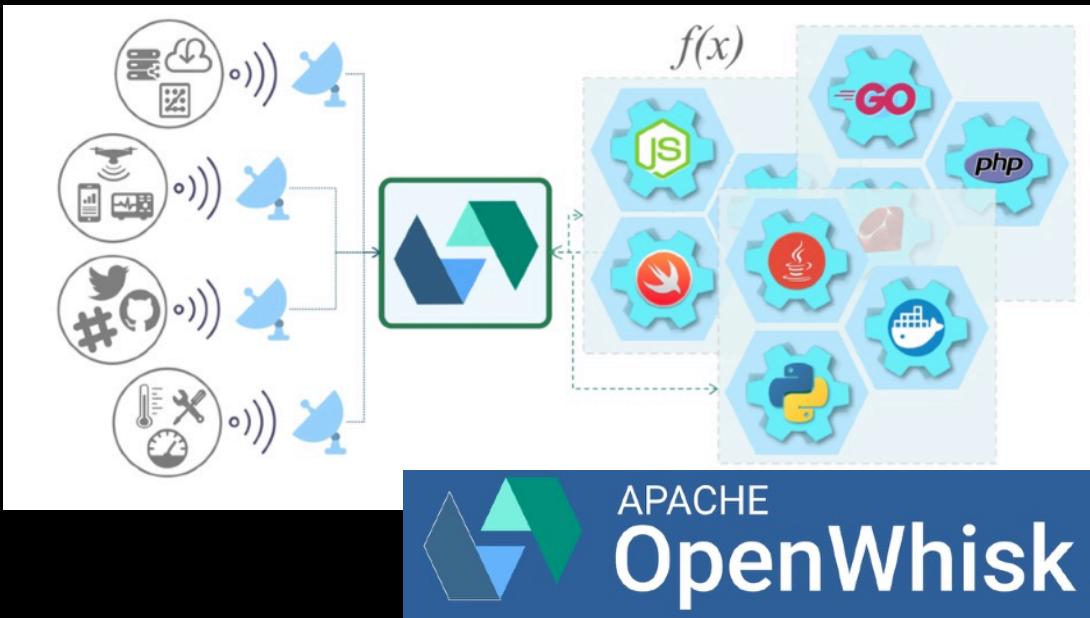


Embracing the Platform?



Embrace
The Platform!

serverless == JavaScript?



Are we doing Google Search
Driven Architecture now?. Hmm...

serverless javascript

Tous Images Actualités Vidéos Maps Plus Paramètres Outils

Environ 4 560 000 résultats (0,39 secondes)

Conseil : Recherchez des résultats uniquement en **français**. Vous pouvez indiquer votre langue de recherche sur la page Préférences.

serverless/serverless: Serverless Framework – Build web ... - GitHub
<https://github.com/serverless/serverless> ▾ Traduire cette page
Serverless Framework – Build web, mobile and IoT applications with serverless ... Supports Node.js, Python, Java, Go, C#, Ruby, Swift, Kotlin, PHP, Scala, & F# ...
Serverless · Serverless Examples · Serverless/serverless-graphql · 140 releases

How Does Serverless JavaScript Work? Service Workers and ...
<https://www.cloudflare.com/learning/serverless/serverless-javascript/> ▾ Traduire cette page
Serverless JavaScript is used to build serverless architecture at the network edge. Learn what serverless JavaScript is and how it works.

La puissance du JavaScript serverless | Udemy
<https://www.udemy.com/la-puissance-du-javascript-serverless/> ▾
Invitation à monter en compétence en JS sur les architectures en microservices, serverless très demandées en entreprise.

Next.js 8 supporte désormais les applications serverless - Le Monde ...
<https://www.lemondeinformatique.fr/lire-nextjs-8-supporte-desormais-les-applicatio...> ▾
15 févr. 2019 - Développement et Tests : Le framework JavaScript et React passe au serverless et réduit également l'usage mémoire et accélère l'exportation ...

Hello World Node.js Example - Serverless
<https://serverless.com/framework/docs/providers/aws/.../node/> ▾ Traduire cette page
Create a Node.js Hello World Lambda function. ... sls Commands * You can run commands with "serverless" or the shortcut "sls" * Pass "--verbose" to this ...

Claudia.js
<https://claudiajs.com/> ▾ Traduire cette page
Deploy Node.js projects to AWS Lambda and API Gateway easily ... Claudia.js. Serverless JavaScript, the easy way. Learn More Get started ...
Tutorials · Deploy to AWS Lambda ... · Documentation · Claudia API Builder

A crash course on Serverless with Node.js - By Adnan Rahić

OpenWhisk Action Annotations

Annotations enable dynamic selection of functions, like we do for OSGi services in Sling

```
/**  
 * A SlingSafeMethodsServlet that renders the current Resource as simple HTML  
 */  
  
@Component(service = Servlet.class,  
    name="org.apache.sling.servlets.get.DefaultGetServlet",  
    property = {  
        "service.description=Default GET Servlet",  
        "service.vendor=The Apache Software Foundation",  
  
        // Use this as a default servlet for Sling  
        "sling.servlet.resourceTypes=sling/servlet/default",  
        "sling.servlet.prefix=Integer=-1",  
  
        // Generic handler for all get requests  
        "sling.servlet.methods=GET",  
        "sling.servlet.methods=HEAD"  
    })
```

OSGI
service properties

```
{  
    "namespace": "guest",  
    "name": "somedoc-html",  
    "version": "0.0.1",  
    "exec": {  
        "kind": "nodejs:10",  
        "binary": false  
    },  
    "annotations": [  
        {  
            "key": "sling:contentType",  
            "value": "text/html"  
        },  
        {  
            "key": "sling:resourceType",  
            "value": "microsling/somedoc"  
        },  
        {  
            "key": "provide-api-key",  
            "value": false  
        },  
        {  
            "key": "sling:extensions",  
            "value": "html"  
        },  
    ]  
},
```

OpenWhisk
Annotations



Serverless µSling!

2007...

 Sling / SLING-47
microsling - simple webapp to demonstrate the core principles of Sling

Details

Type: New Feature
Priority: Minor
Affects Version/s: None
Component/s: Engine
Labels: None

Status: Fixed
Resolution: None
Fix Version/s: None

CLOSED

Description

Following our recent API redesign discussions (see <http://cwiki.apache.org/confluence/display/SLING/Sling+API+Redesign> in particular), I have started working on "microsling", a webapp that demonstrates my understanding of the "most important parts" of Sling.

and's brain grep

cat /dev/brain | egrep -i 'tech|thoughts|noise'

Home Who?

microsling - Yet Another (cool) Web Applications Framework

October 12, 2007



From the new and improved department: I spent part of this week writing a "reduced to the max" version of the Sling core that I've called microsling. It's been a lot of fun of course, and I think the tests are fairly impressive in terms of power per line of code, thanks to the power of the JCR API. Using "modern" Java, with scripting in the right place, microsling allows you to use *SlingServlets* to process requests in a RESTful way, acting on abstract *Resources* and using request processing scripts in various languages. *SlingServlets* are provided to create content and to render it using Velocity templates or server-side javascript. An 1'200 lines of Java code, all inclusive, microsling matches the complete vision of the Sling but this is already powerful stuff – and very simple to

You have searched the bertrand's brain grep blog archives for 'microsling'. If you are unable to find anything in these search results, you can try one of these links.

CAT MYSELF | SORT | HEAD -2

Bertrand Delacrétaz here – my "résumé" will tell you more. The opinions expressed here are my own, I'm not representing any group or company on this blog. YMMV.

 FOLLOW ME ON TWITTER

microsling Search

LS /VAR/CATEGORIES Select Category

Actions selected based on Annotations

INPUT: resource type, request extension

FOR all OpenWhisk Actions A in this namespace,
ORDERED by preference:

GET the annotations of action A

IF annotations match

THEN return A as the Action to use

IF no Action found, use default renderers

sling-whiteboard: serverless-microsling/lib/openwhisk-renderer.js

```
{  
  "namespace": "guest",  
  "name": "somedoc-html",  
  "version": "0.0.1",  
  "exec": {  
    "kind": "nodejs:10",  
    "binary": false  
  },  
  "annotations": [  
    {  
      "key": "sling:contentType",  
      "value": "text/html"  
    },  
    {  
      "key": "sling:resourceType",  
      "value": "microsling/somedoc"  
    },  
    {  
      "key": "provide-api-key",  
      "value": false  
    },  
    {  
      "key": "sling:extensions",  
      "value": "html"  
    },  
  ]  
}
```

OpenWhisk
Annotations

DEMO: Serverless Microsling

This is some document
This is the somedoc-html rendering

localhost:3233/api/v1/web/guest/default/microsling/demo/docs/somedoc.html

Some Document
This is some document

localhost:3233/api/v1/web/guest/default/microsling/demo/docs/somedoc.txt

Dynamic selection
Overrides
New content types

- lib
 - JS default-renderers.js
 - JS openwhisk-renderer.js
 - JS render.js
 - JS resolve-content.js
- node_modules
- rendering-actions
 - JS markdown-default.js
 - JS somedoc-html.js

localhost:3233/api/v1/web/guest/default/microsling/demo/index.json

JSON Raw Data Headers

resourceType: "microsling/demo"
title: "Demo root resource"
body: "This is the content of the demo root resource"



adaptTo()

CODA

CODA

GraalVM Native Images
are difficult with existing
code.

Embracing the platform
usually helps - worked for
our prototype.

Action annotations can be
used in a similar way to
OSGi service properties.



I'm @bdelacretaz - thank you!

Next?

- a) build on Karl & Radu's experiments for fast-starting Sling instances -> switch to containers -> "full" Sling?
- b) build on the serverless microsling prototype to create rendering pipelines -> scalable rendering?

