

The Serverless PHP Application

Rob Allen

PHPUGFFM, September 2021

A high-angle, sepia-toned photograph of a factory floor. A curved conveyor belt in the foreground carries a line of rectangular boxes. In the background, several workers in white uniforms and hairnets are visible, some standing near workstations. The scene is filled with industrial equipment, including metal frames, tables, and a scale. The overall atmosphere is one of a busy, traditional manufacturing environment.

Serverless?

Platform options

Physical servers (Dell/HP)

Platform options

Virtual machines (EC2)

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Containers (Kubernetes)

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Platform (CloudFoundry)

Containers (Kubernetes)

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Platform options

Serverless (OpenWhisk)

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Serverless (OpenWhisk)

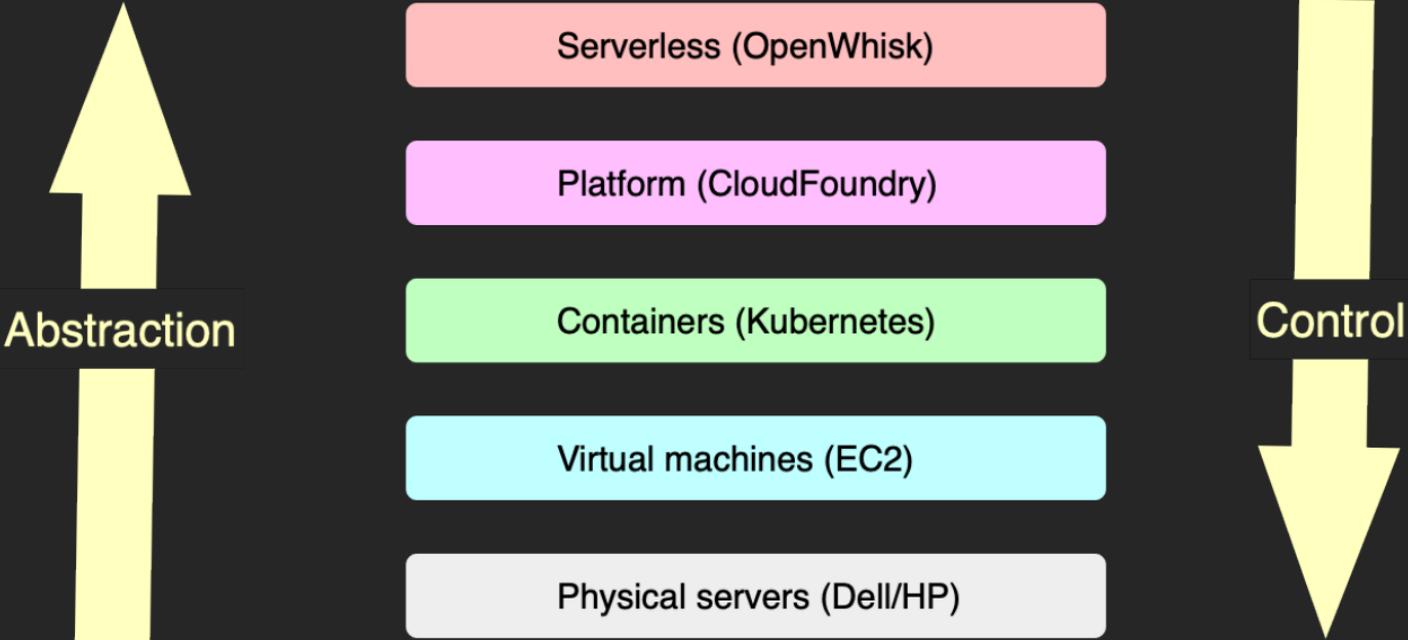
Platform (CloudFoundry)

Containers (Kubernetes)

Virtual machines (EC2)

Physical servers (Dell/HP)

Platform options



Serverless

Serverless is all about composing software systems from a collection of cloud services.

With serverless, you can lean on off-the-shelf cloud services resources for your application architecture, focus on business logic and application needs.

Nate Taggart, CEO Stackery

FaaS

Your code

FaaS

Deployed to the cloud

FaaS

Runs when needed

FaaS

Scaled automatically

FaaS

Pay only for execution

Where are the servers?





Use-cases

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Synchronous

Service is invoked and provides immediate response
(HTTP requests: APIs, chat bots)



Use-cases

Synchronous

Service is invoked and provides immediate response
(HTTP requests: APIs, chat bots)

Asynchronous

Push a message which drives an action later
(web hooks, timed events, database changes)



Benefits

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- No need to maintain infrastructure

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- Concentrate on application code

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- Pay only for what you use, when you use it

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- No need to maintain infrastructure
- Concentrate on application code
- Pay only for what you use, when you use it
- Language agnostic

Challenges

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- Start up latency

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- Time limit

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- State is external

Challenges

- Start up latency
- Time limit
- State is external
- Different way of thinking

When should you use serverless?

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- Responding to web hooks

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- Additional features without extending current platform



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- PWA/Static site contact form, et al.

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- Variable traffic levels

When should you use serverless?

- Responding to web hooks
- Additional features without extending current platform
- PWA/Static site contact form, et al.
- Variable traffic levels
- When you want your costs to scale with traffic

It's about value



Beau @BeauVrolyk · 30m

Replying to @akrabat @kelseyhightower

1) "Serverless" is a point on the path to true app isolation. Apps want to just run, their authors don't care about infrastructure at all.



Beau @BeauVrolyk · 29m

Replying to @akrabat @kelseyhightower

2) The App author should not need to know, anymore than a Journalist knows about printing presses or what the voltage of the power used.



Beau @BeauVrolyk · 25m

Replying to @akrabat @kelseyhightower

3) We are relearning what was known in the time-share days. Pricing needs to be based on something customers value, not infa. items like VMs



Serverless platforms



Google Cloud Platform



IBM Cloud



APACHE
OpenWhisk



Serverless languages



Serverless platforms with PHP support



Hello World

AWS Lambda (Bref):

```
<?php
```

```
return function ($event) {  
    $name = $event['name'] ?? 'world';  
    return 'Hello ' . $name;  
};
```

Hello World

Apache OpenWhisk:

```
<?php
```

```
function main(array $args): array
{
    $name = $args['name'] ?? 'world';
    return ["greeting" => 'Hello ' . $name];
}
```

Hello World

OpenFAAS

```
<?php
```

```
class Handler
{
    public function handle(string $data): void {
        $decoded = json_decode($data, true);
        $name = $decoded['name'] ?? 'world';
        return 'Hello ' . $name;
    }
}
```

Hello World

Google Cloud Functions (alpha)

```
<?php
```

```
use Psr\Http\Message\ServerRequestInterface as Request;

function helloHttp(Request $request)
{
    $name = $request->getQueryParams('name') ?? 'world';
    return 'Hello ' . $name;
}
```



APACHE

OpenWhisk

The anatomy of an action

```
function main(array $args): array
{
    // Marshall inputs from event parameters
    $name = $args['name'] ?? 'world';
    // Do the work
    $message = 'Hello ' . $name
    // Return result
    return ["body" => $message];
}
```



Hello World

Entry point



Event parameters



```
function main(array $args): array
{
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Deploy to OpenWhisk

```
$ zip -q hello.zip hello.php
```



Deploy to OpenWhisk

```
$ zip -q hello.zip hello.php  
$ wsk action update --kind php:7.4 hello hello.zip  
ok: updated action hello
```



Run it

```
$ wsk action invoke hello --result --param name Rob
```

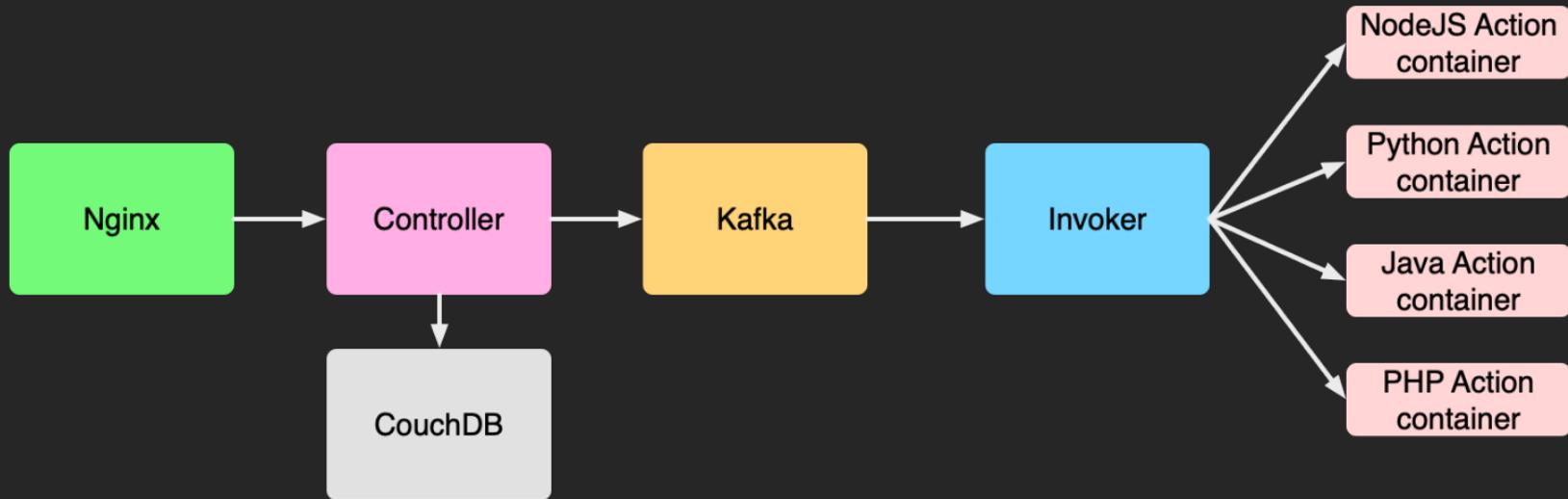
Run it

```
$ wsk action invoke hello --result --param name Rob
{
  "body": "Hello Rob!"
}
```

A vintage teal and white van is shown from a front-quarter perspective with its hood raised. The engine compartment is visible, and the car's distinctive rounded front end, chrome grille, and round headlights are prominent. The text "Under the hood" is written in a yellow, serif font across the center of the image. The background shows a parking lot with other vehicles and trees under a clear sky.

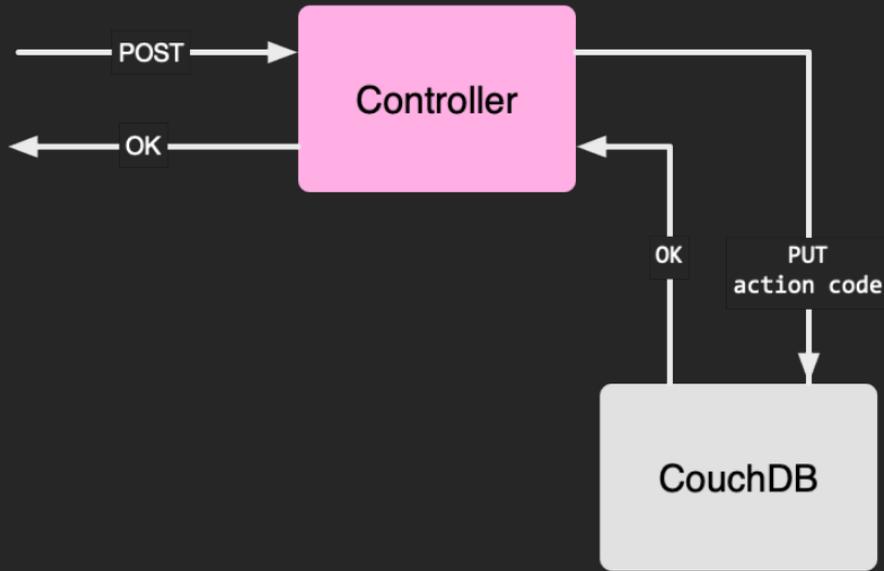
Under the hood

OpenWhisk's architecture



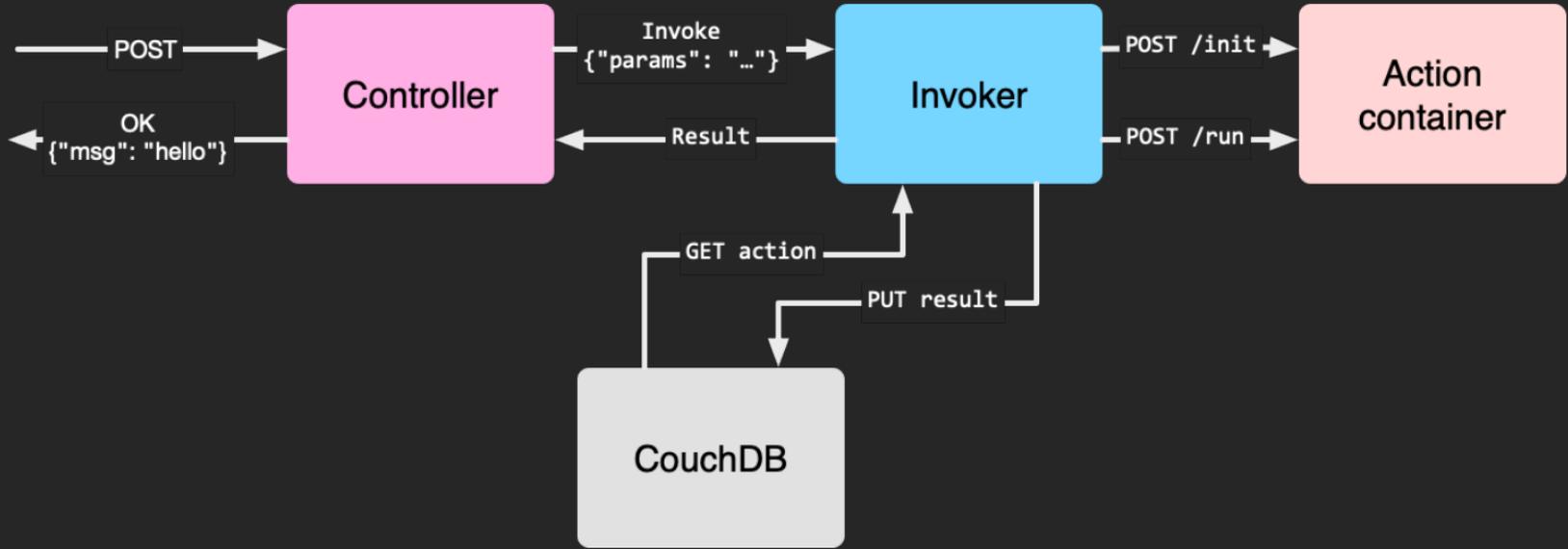
Create an action

```
$ wsk action create hello hello.php
```



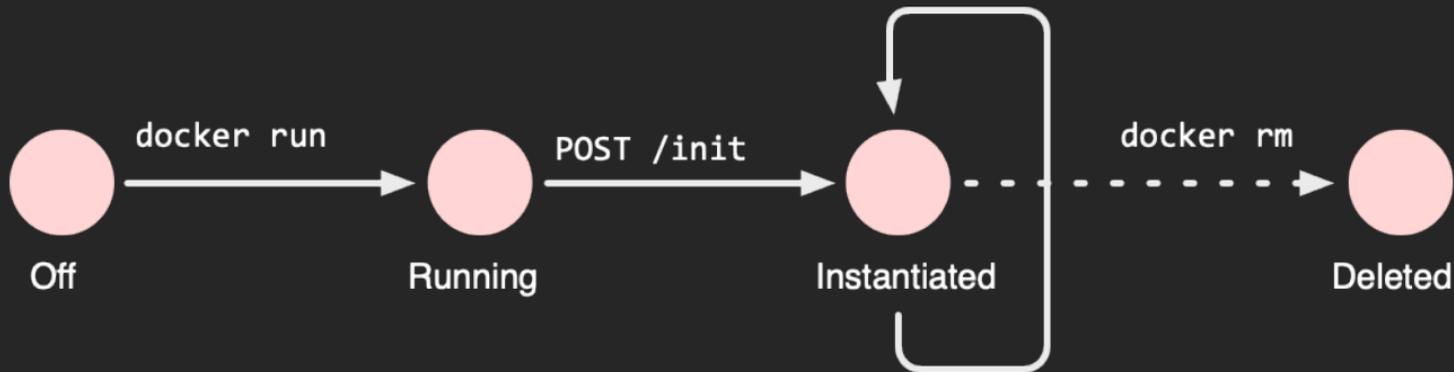
Invoke an action

```
$ wsk action invoke hello -r
```



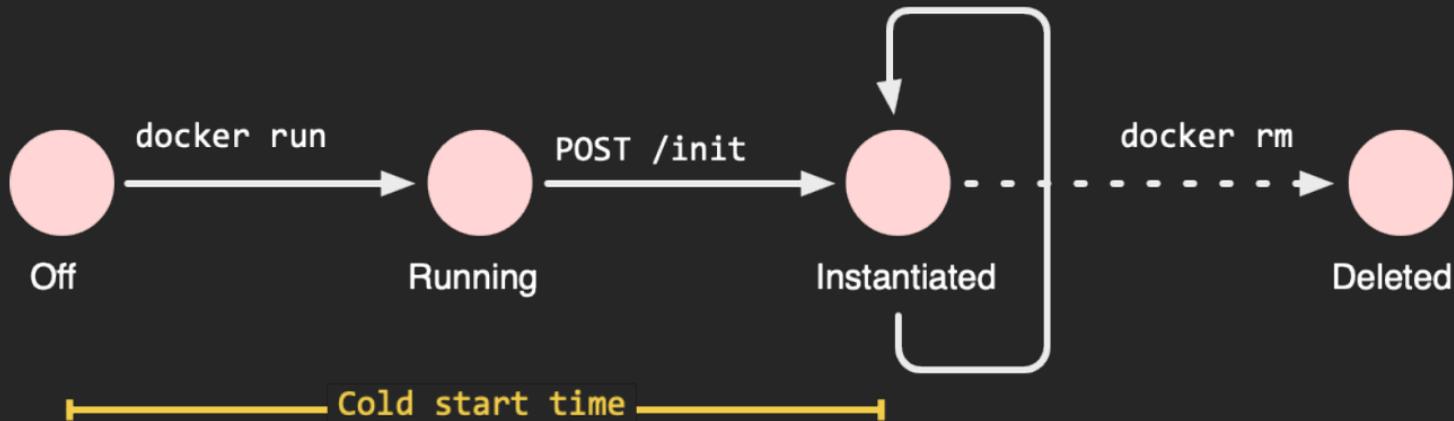
Action container lifecycle

- Hosts the user-written code
- Controlled via two end points: `/init` & `/run`



Action container lifecycle

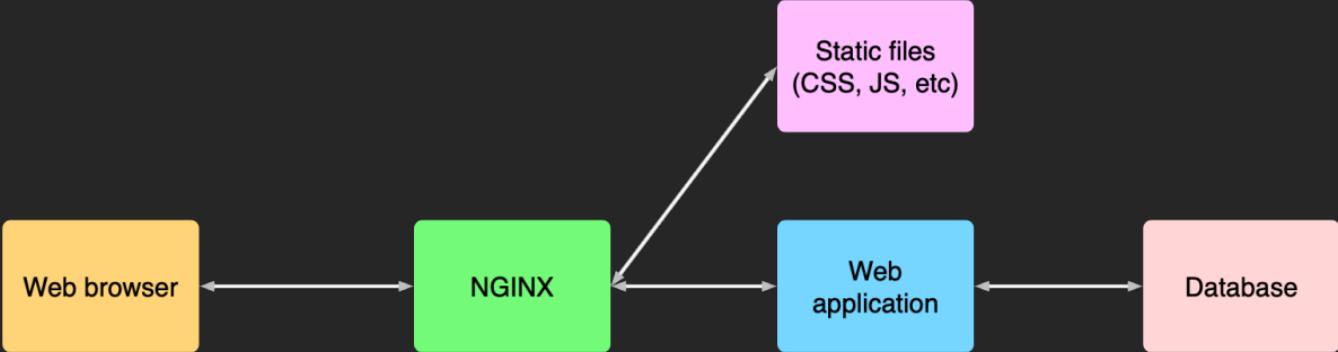
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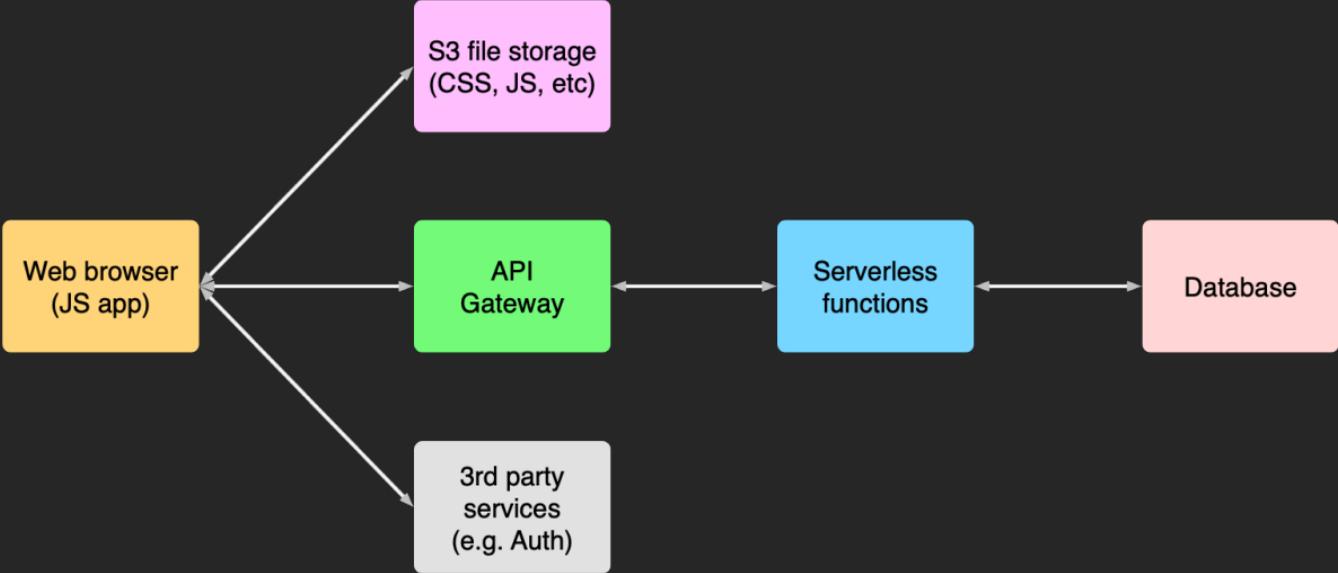
Architecture

M·AGRIPPA·L·F·COS·TERTIUM

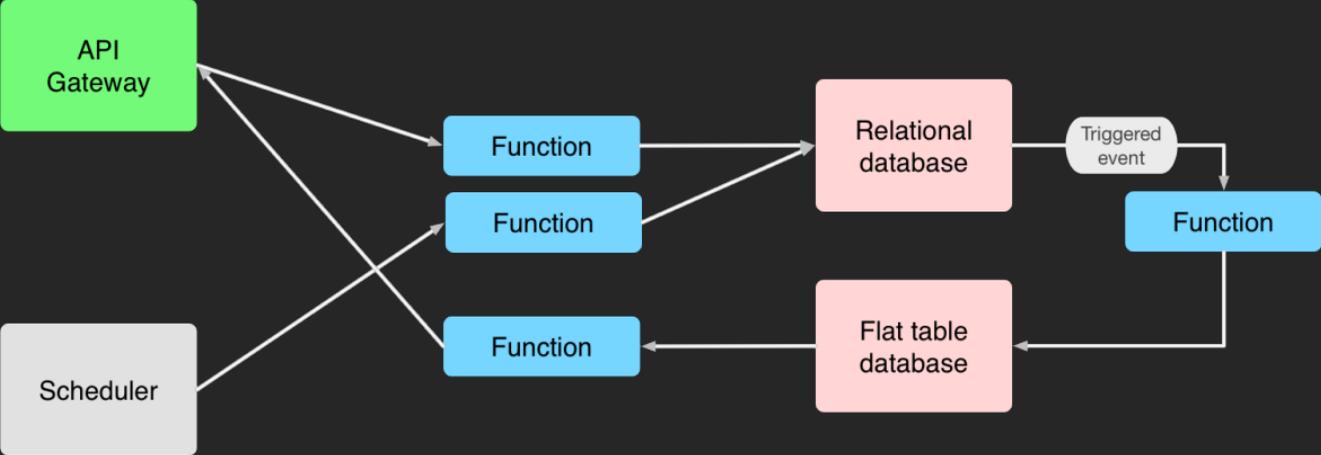
Monolith architecture



Serverless architecture



Serverless architecture pattern



Functions are key

Functions are the Unit of Deployment



Functions are the Unit of Scale



Functions are Stateless



Functions have Structure

Structure

If it's non-trivial, software engineering principles apply!

- Use multiple methods

Structure

If it's non-trivial, software engineering principles apply!

- Use multiple methods
- Use multiple files

Structure

If it's non-trivial, software engineering principles apply!

- Use multiple methods
- Use multiple files
- Integrate reusable dependencies



AWS Lambda with PHP

Relies on Lambda's *layers* system

Process:

1. Create a layer containing:
 1. the PHP executable
 2. a bootstrap script
2. Write the PHP function!



brief

running PHP made simple

Everything you need to easily
deploy and run serverless PHP applications.



Bref PHP function

index.php:

```
<?php declare(strict_types=1);
```

```
require __DIR__ . '/vendor/autoload.php';
```

```
return function($event) {  
    return 'Hello ' . ($event['name'] ?? 'world');  
}
```

serverless.yml

```
service: helloapp
provider:
  name: aws
  runtime: provided.al2

functions:
  hello:
    handler: index.php
    layers:
      - ${bref:layer.php-80}
```

serverless.yml

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functions:
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      - ${bref:layer.php-80}
```

Deploy

```
$ serverless deploy
Serverless: Packaging service...
...
Serverless: Stack update finished...
```

Service Information

```
service: helloapp
stage: dev
region: eu-west-2
stack: helloapp-dev
functions:
  hello: helloapp-dev-hello
```

Run

```
$ serverless invoke -f hello  
"Hello world"
```

Run

```
$ serverless invoke -f hello  
"Hello world"
```

```
$ serverless invoke -f hello -d '{"name": "Rob"}'  
"Hello Rob"
```

Run locally in Docker

```
$ serverless invoke local --docker -f hello  
Serverless: Building Docker image...
```

```
...
```

```
REPORT RequestId: 6a653a94-ee51-1f3e-65c7-1f1954842f29  
  Init Duration: 265.93 ms Duration: 145.37 ms  
  Billed Duration: 200 ms Memory Size: 1024 MB  
  Max Memory Used: 27 MB
```

```
"Hello world"
```

Xdebug also works!

Add AWS API Gateway

```
serverless.yml:
```

```
functions:
```

```
  hello:
```

```
    handler: index.php
```

```
    ...
```

```
  events:
```

```
    - http: "GET /hello"
```

```
    - http: "GET /hi/{name}"
```

Return a PSR-15 RequestHandler

```
class HelloHandler implements RequestHandlerInterface
{
    public function handle(ServerRequest $request): Response
    {
        $name = ($request->getQueryParams()['name'] ?? 'world');
        $body = 'Hello ' . $name;

        return new Response(200,
            ['Content-Type' => 'text/plain'],
            $body);
    }
}
```

Deploy

```
$ serverless deploy
Serverless: Packaging service...
...
```

Service Information

```
service: helloapp
stage: dev
stack: helloapp-dev
endpoints:
```

```
GET - https://l1v6cz13zb.execute-api.eu-west-2
      .amazonaws.com/dev/hello
```

Test

```
$ curl -i https://11v6cz...naws.com/dev/hello?name=Rob
HTTP/2 200
content-type: text/plain
content-length: 9
```

Hello Rob





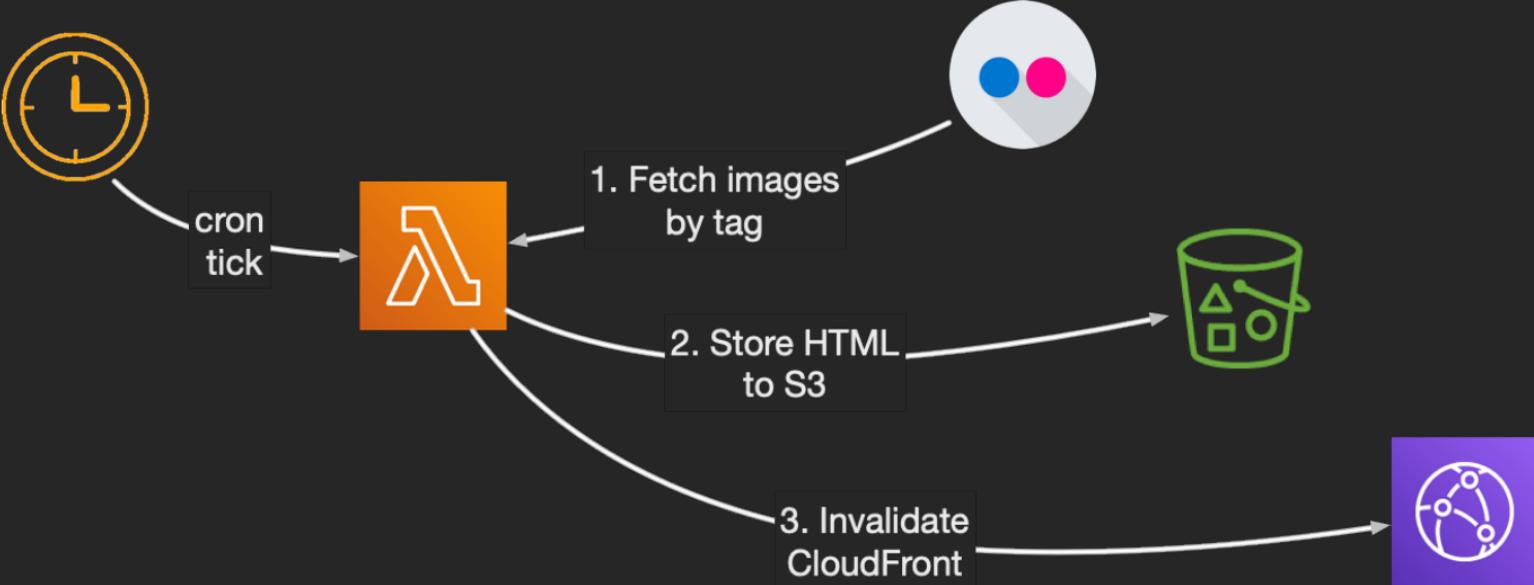
Case study
Project 365 photo website

Project 365

Static website to display my photo-a-day picture for each day of the year.

- Hosted on S3
- CloudFront CDN
- Lambda/PHP function

Lambda/PHP function



Infrastructure as code

```
serverless.yml:  
  
functions:  
  update:  
    handler: update.php  
    layers:  
      - ${bref:layer.php-80}  
    events:  
      - schedule:  
        rate: cron(0 */2 * * ? *)
```



Infrastructure as code

```
functions:  
  update:  
    handler: update.php  
    layers:  
      - ${bref:layer.php-80}  
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Infrastructure as code

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```

Infrastructure as code

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functions:  
  update:  
    handler: update.php  
    layers:  
      - ${bref:layer.php-80}  
events:  
  - schedule:  
    rate: cron(0 */2 * * ? *)
```

Process

1. Gather credentials from environment
2. Download photos from Flickr API
3. Create HTML page
4. Upload to S3
5. Invalidate CloudFront cache

main()

```
return function ($event) {  
    $year = $event['year'] ?? date('Y');  
  
    $photos = (new PhotoFetcher())->fetchForYear($year);  
    $html = (new PageCreator())->create($year, $photos);  
  
    $filename = "$year.html";  
    $uploader = new Uploader();  
    $uploader->uploadOne($filename, $html, $s3Bucket);  
  
    $uploader->invalidateCache($filename);  
}
```

main()

```
return function ($event) {  
    $year = $event['year'] ?? date('Y');  
  
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    $html = (new PageCreator())->create($year, $photos);  
  
    $filename = "$year.html";  
    $uploader = new Uploader();  
    $uploader->uploadOne($filename, $html, $s3Bucket);  
  
    $uploader->invalidateCache($filename);  
}
```

The finished website



A photograph of a rocket launch at dusk or dawn. The rocket is ascending vertically, leaving a large, bright plume of white and orange smoke and fire. The launch pad is visible in the foreground, and the sky is a mix of dark blue and orange. The text "To sum up" is overlaid in a yellow, serif font in the upper center of the image.

To sum up

Thank you!

Photo credits

- Assembly line: <https://www.flickr.com/photos/adiram/3886212918>
- Under the hood: <https://www.flickr.com/photos/atomichotlinks/7736849388>
- Pantheon: <https://www.flickr.com/photos/shawnstilwell/4335732627>
- Watch mechanism: <https://www.flickr.com/photos/shinythings/2168994732>
- Holiday snaps: <https://www.flickr.com/photos/kjgarbutt/5358075923>
- Rocket launch: <https://www.flickr.com/photos/gsfcr/16495356966>
- Stars: <https://www.flickr.com/photos/gsfcr/19125041621>