Serverless PHP

@tobiasnyholm

happyr

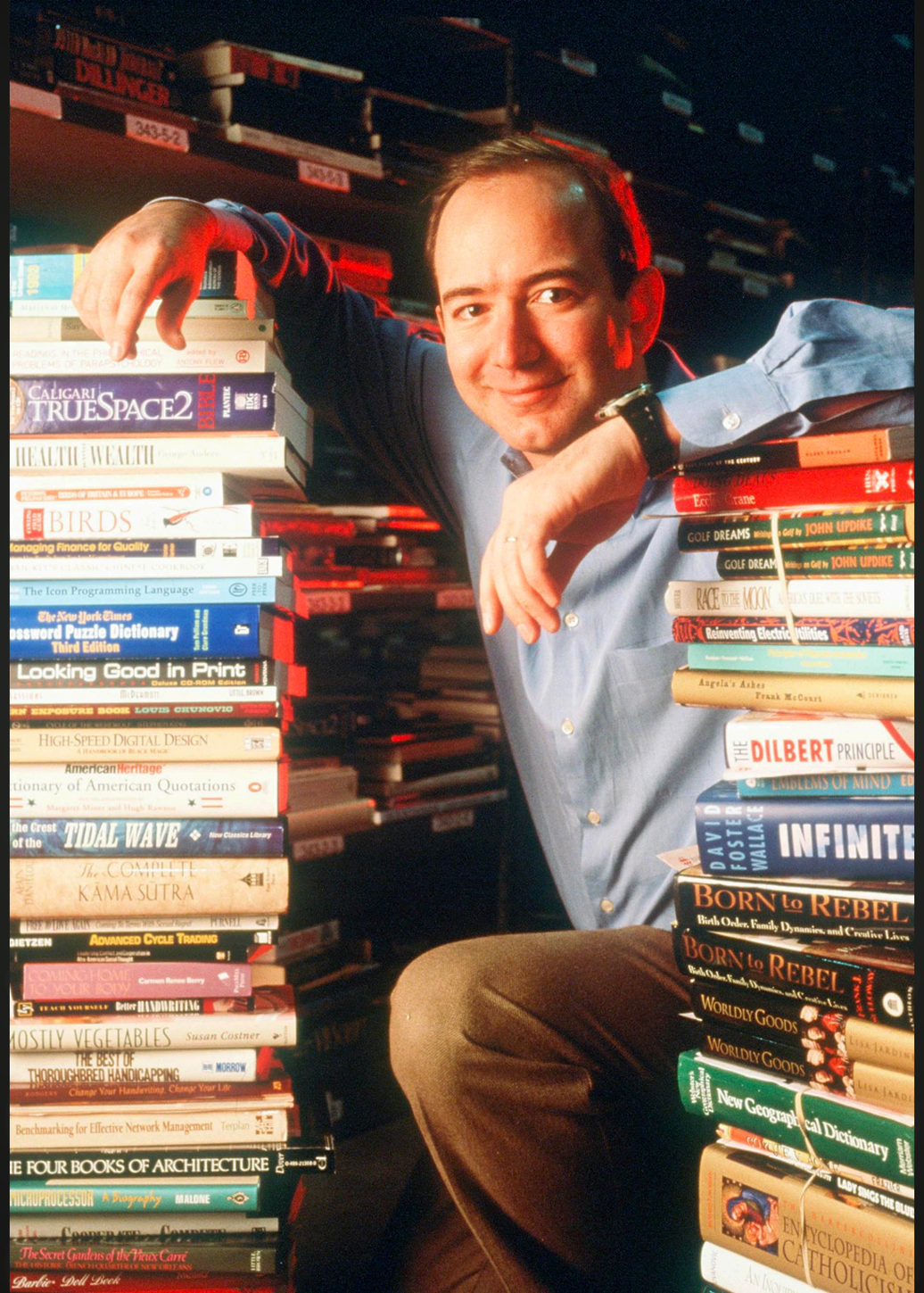
Serverless

Why?

How?

There are still servers

Fake History



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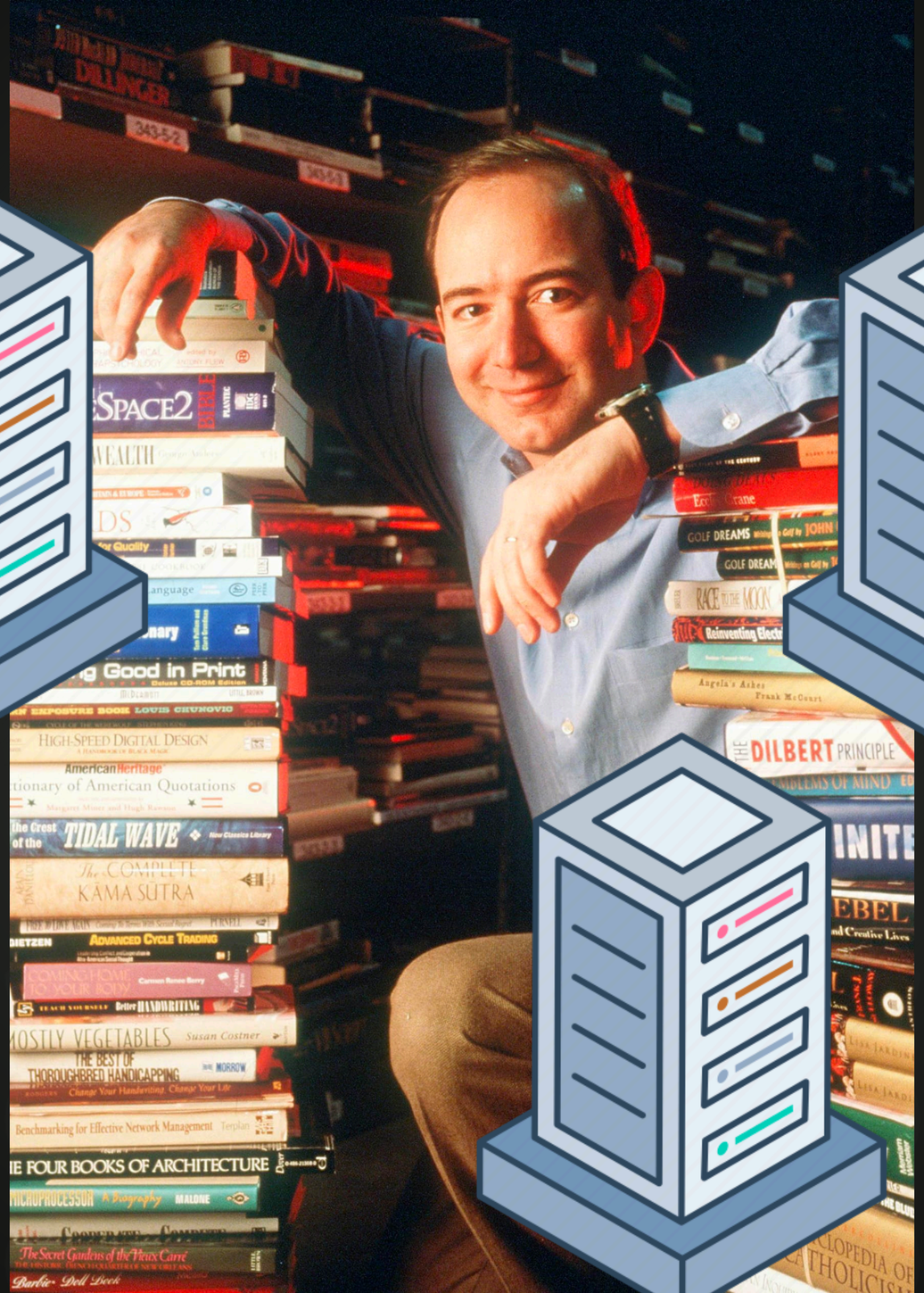
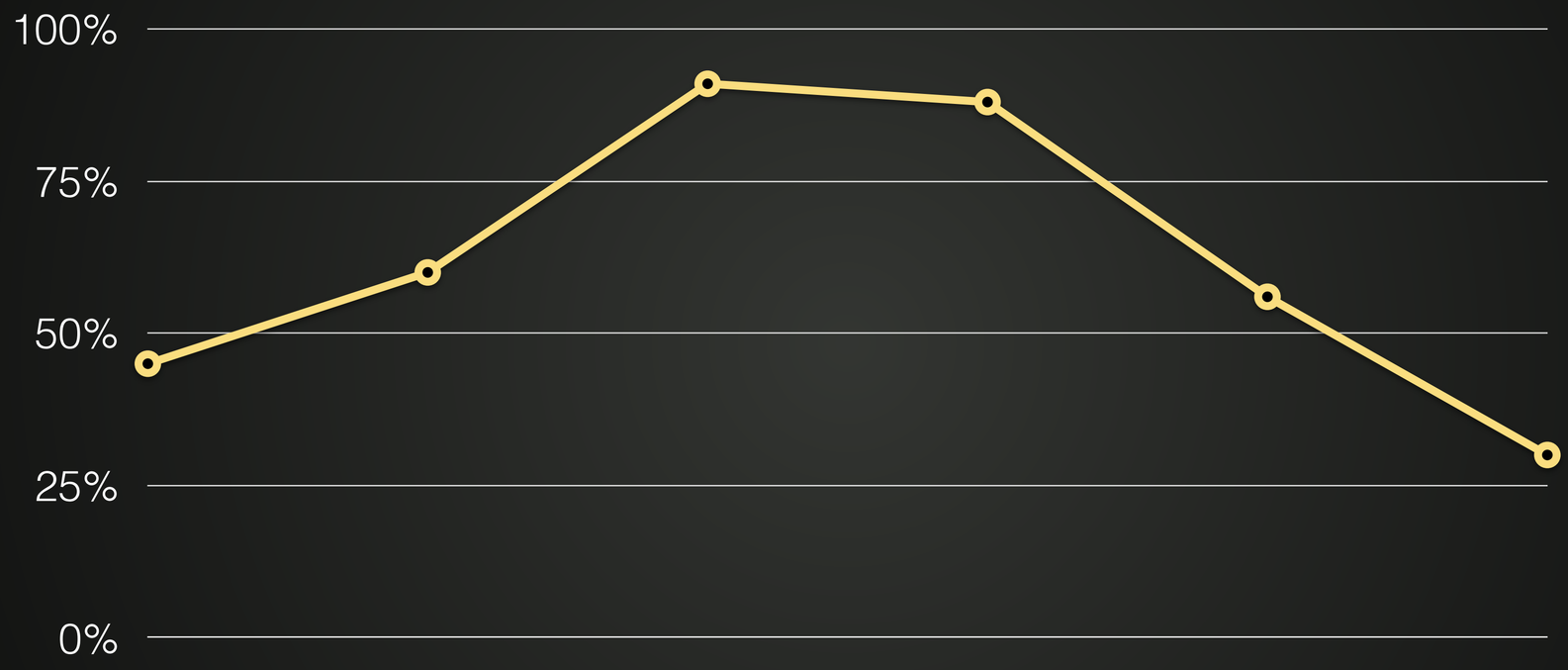
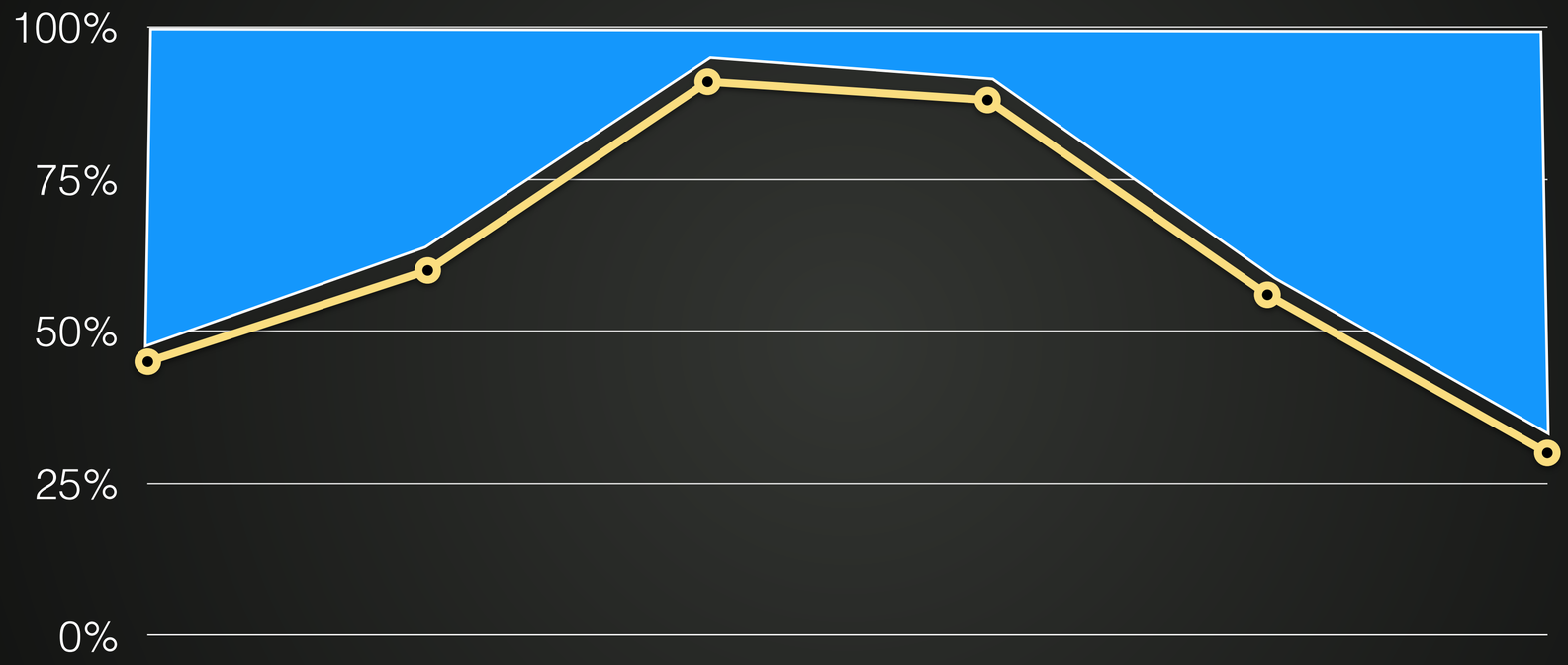


Machine usage



Machine usage



AWS Lambda

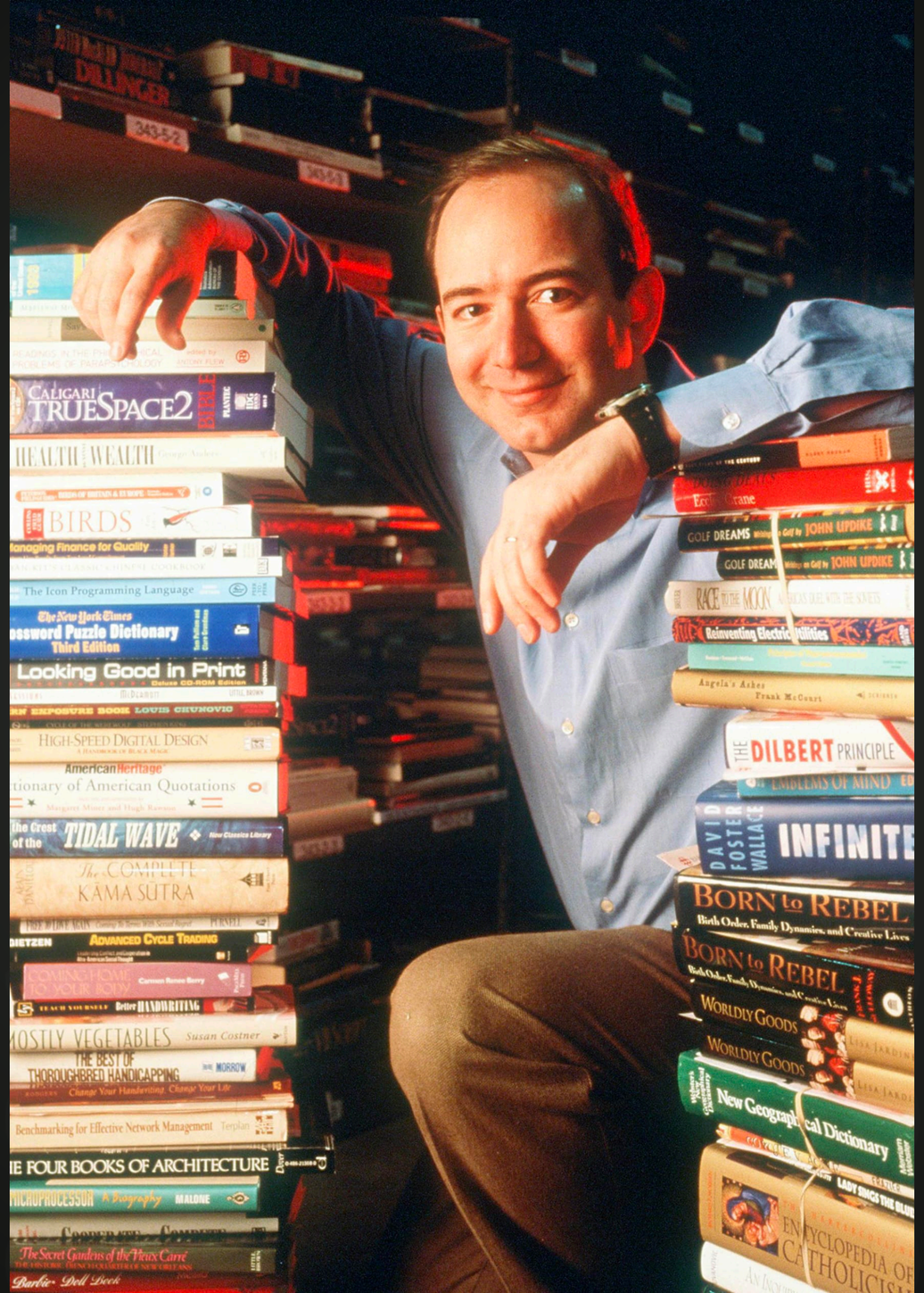
AWS Lambda

Fall 2018

```
function exec(cmd, handler)
{
    const childfork = require('child_process');

    return childfork.exec(cmd, handler);
}

exec("/usr/bin/php " + filename, myHandler);
```



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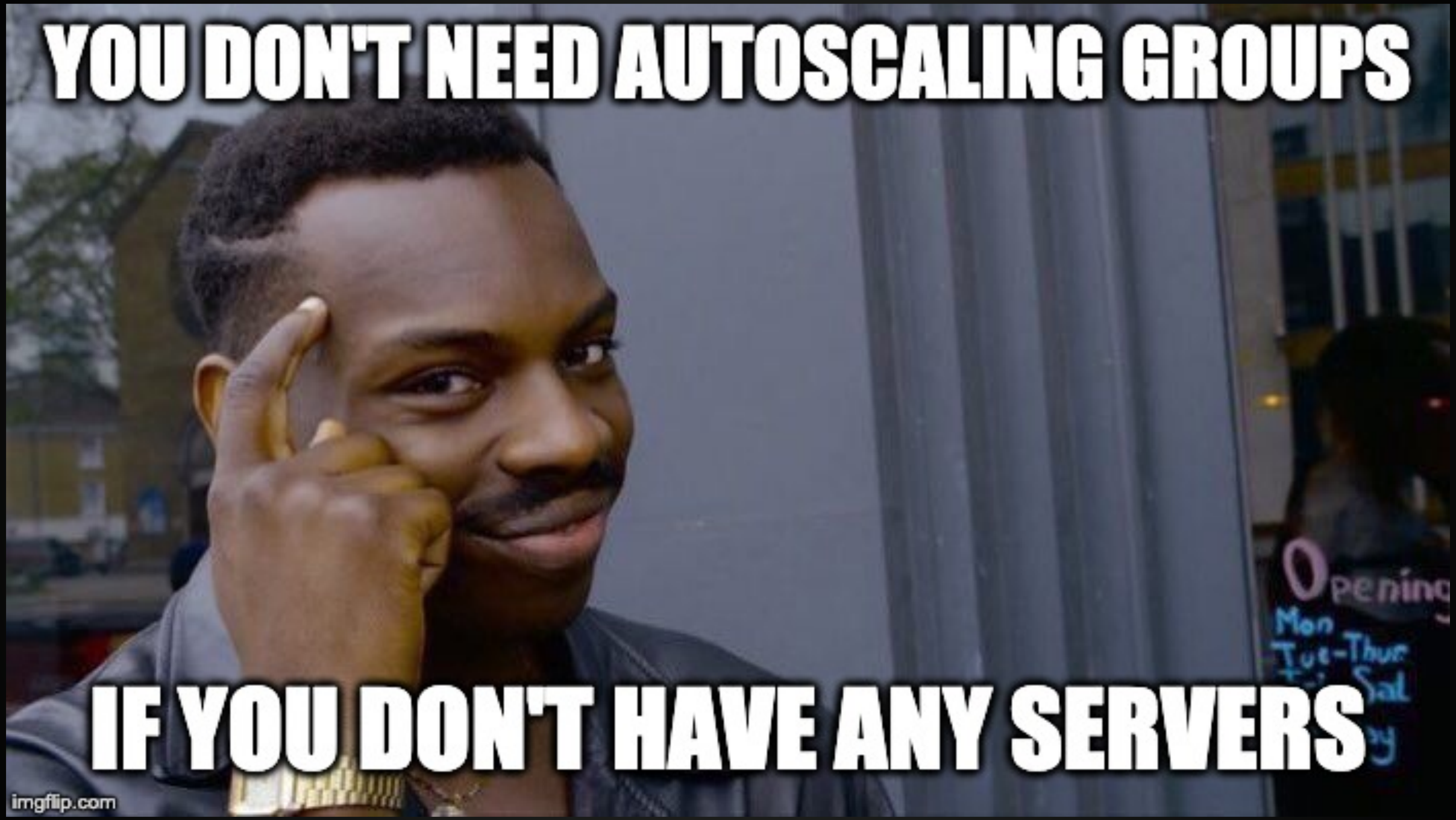
FROM amazonlinux:2018.03

Why?

3 killer reasons for Serverless

- Scales
- Cheap
- Easy to setup


YOU DON'T NEED AUTOSCALING GROUPS
IF YOU DON'T HAVE ANY SERVERS
imgflip.com

```php
<?php

function foo($x)
{
    return ($x >= 1) && ($x <= 1) && ($x !== 1);
}
```

foo(1.) Submit *Score: 2*

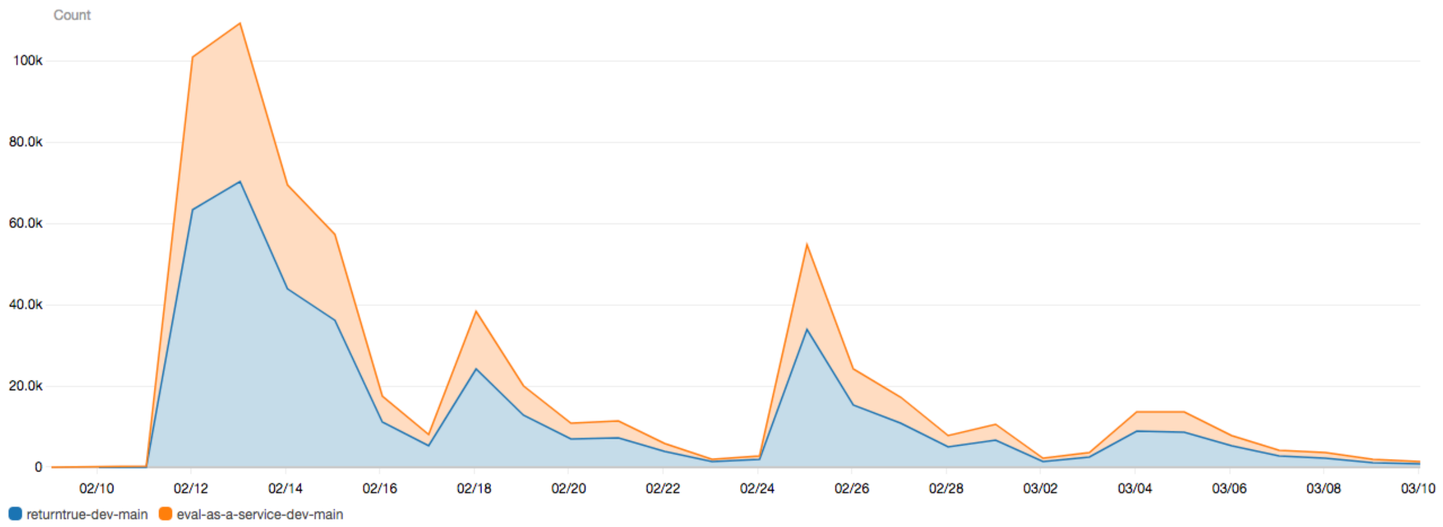
```
true
```

Well done! Move to the next step

Return true to win

returntrue.win

Matthieu Napoli



400k HTTP requests

650k executions

Matthieu Napoli

Show some code

$ composer req bref/bref

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

λ(function (array $event) {
    return 'hello ' . $event['name'];
});
```

$ composer req bref/bref

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

lambda(function (array $event) {
    return 'hello ' . $event['name'];
});
```

```
#!/bin/sh

# Fail on error
set -e

while true
do
    # We redirect stderr to stdout so that everything
    # written on the output ends up in Cloudwatch automatically
    /opt/bin/php $LAMBDA_TASK_ROOT/$_HANDLER 2>&1
done
```

Serverless is easy

```yaml
service: app
provider:
    name: aws
    runtime: provided
plugins:
    - ./vendor/bref/bref
functions:
    website:                          ••
        handler: index.php
        layers:
            - ${bref:layer.php-73-fpm}
        # Configuration of API Gateway
        events:
            -   http: 'ANY /'
            -   http: 'ANY /{proxy+}'
```

```php
echo 'hello world';
```

```php
#!/opt/bin/php
<?php declare(strict_types=1);

use Bref\Runtime\LambdaRuntime;
use Bref\Runtime\PhpFpm;

$appRoot = getenv('LAMBDA_TASK_ROOT');
require $appRoot . '/vendor/autoload.php';

$lambdaRuntime = LambdaRuntime::fromEnvironmentVariable();
$handler = $appRoot . '/' . getenv('_HANDLER');

$phpFpm = new PhpFpm($handler);
$phpFpm->start();

while (true) {
    $lambdaRuntime->processNextEvent(function ($event) use ($phpFpm): array {
        $response = $phpFpm->proxy($event);

        $multiHeader = array_key_exists('multiValueHeaders', $event);
        return $response->toApiGatewayFormat($multiHeader);
    });

    try {
        $phpFpm->ensureStillRunning();
    } catch (\Throwable $e) {
        echo $e->getMessage();
        exit(1);
    }
```

```php
use Bref\Runtime\LambdaRuntime;
use Bref\Runtime\PhpFpm;

$appRoot = getenv('LAMBDA_TASK_ROOT');
require $appRoot . '/vendor/autoload.php';

$lambdaRuntime = LambdaRuntime::fromEnvironmentVariable();
$handler = $appRoot . '/' . getenv('_HANDLER');

$phpFpm = new PhpFpm($handler);
$phpFpm->start();

while (true) {
    $lambdaRuntime->processNextEvent(function ($event) use ($phpFpm): array {
        $response = $phpFpm->proxy($event);

        $multiHeader = array_key_exists('multiValueHeaders', $event);
        return $response->toApiGatewayFormat($multiHeader);
    });

    try {
        $phpFpm->ensureStillRunning();
    } catch (\Throwable $e) {
        echo $e->getMessage();
        exit(1);
    }
}
```

Serverless is easy

Only /tmp is writeable

```php
class Kernel
{
    // ...
    public function getLogDir()
    {
        // When on the lambda only /tmp is writeable
        if (getenv('LAMBDA_TASK_ROOT') !== false) {
            return '/tmp/log/';
        }

        return $this->getProjectDir().'/var/log';
    }

    public function getCacheDir()
    {
        // When on the lambda only /tmp is writeable
        if (getenv('LAMBDA_TASK_ROOT') !== false) {
            return '/tmp/cache/'.$this->environment;
        }

        return $this->getProjectDir().'/var/cache/'.$this->environment;
    }
}
```

Bref with Laravel

https://bref.sh/docs/frameworks/laravel.html

Cold starts

```yaml
service: app
provider:
    name: aws
    runtime: provided
plugins:
    - ./vendor/bref/bref
functions:
    website:
        handler: index.php
        layers:
            - ${bref:layer.php-73-fpm}
        # Configuration of API Gateway
        events:
            - http: 'ANY /'
            - http: 'ANY /{proxy+}
            - schedule:
                rate: rate(5 minutes)
                input:
                    warmer: true
```

Cron

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

lamba(function (array $event) {
    return 'hello ' . $event['name'];
});
```

```yaml
events:
    - schedule:
        schedule: cron(0/1 * * * ? *)
        input:
            foo: bar
```

PHP extensions

Extensions installed and enabled

- Core
- bcmath
- ctype
- curl
- date
- dom
- exif
- fileinfo
- filter
- ftp
- gettext
- hash
- iconv
- json
- libxml
- mbstring
- mysqli
- mysqlnd
- opcache
- openssl
- pcntl
- pcre
- PDO
- pdo_sqlite
- Phar
- posix
- readline
- Reflection
- session
- SimpleXML
- sodium
- SOAP
- sockets
- SPL
- sqlite3
- standard
- tokenizer
- xml
- xmlreader
- xmlwriter
- zlib

Extensions installed but disabled by default

- **intl** - Internationalization extension (referred as Intl) is a wrapper for ICU library, enabling PHP programmers to perform various locale-aware operations.
- **APCu** - APCu is APC stripped of opcode caching.
- **phpredis** - The phpredis extension provides an API for communicating with the Redis key-value store.
- **PostgreSQL PDO Driver** - PDO_PGSQL is a driver that implements the PHP Data Objects (PDO) interface to enable access from PHP to PostgreSQL databases.
- **MySQL PDO Driver** - PDO_MYSQL is a driver that implements the PHP Data Objects (PDO) interface to enable access from PHP to MySQL databases.
- **Mongodb** - Unlike the mongo extension, this extension is developed atop the » libmongoc and » libbson libraries. It provides a minimal API for core driver functionality: commands, queries, writes, connection management, and BSON serialization.
- **pthreads** - pthreads is an object-orientated API that provides all of the tools needed for multi-threading in PHP. PHP applications can create, read, write, execute and synchronize with Threads, Workers and Threaded objects.


My App


My App


My App


My App

PHP extensions

http://developer.happyr.com/newrelic-on-bref-aws-lambda

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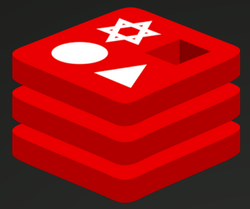
Architecture

Front door



Analytics

Match Engine

Measure

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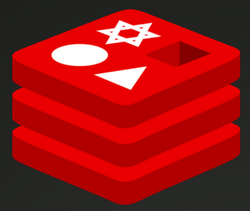

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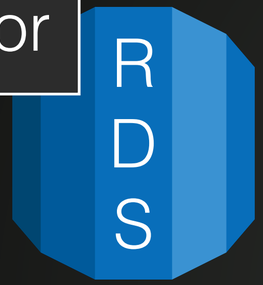

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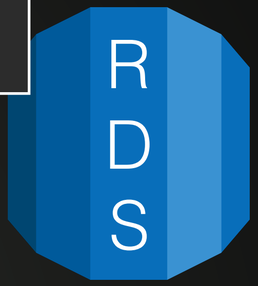

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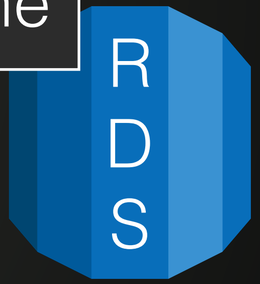
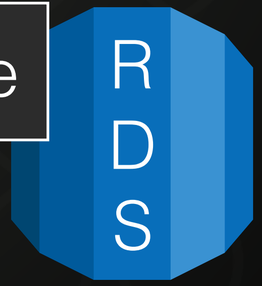


Measure



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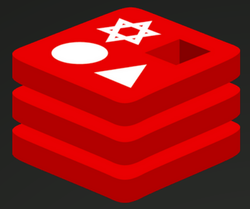

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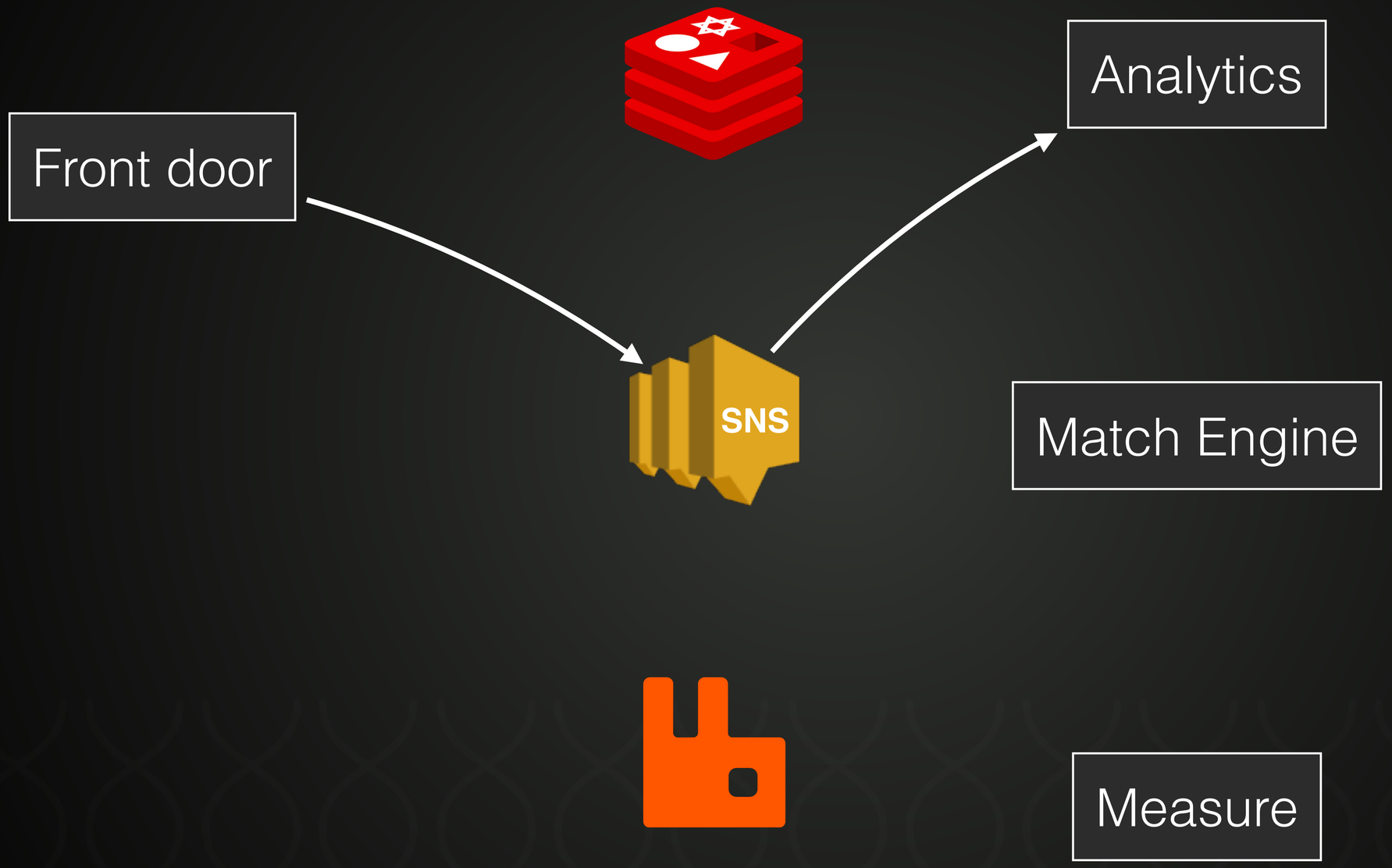
Front door
SNS
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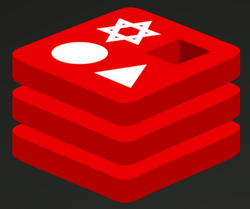

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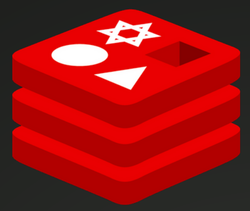

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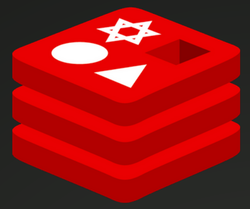

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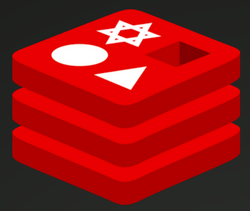

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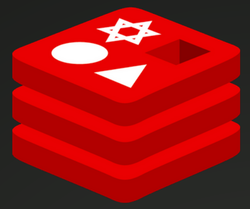

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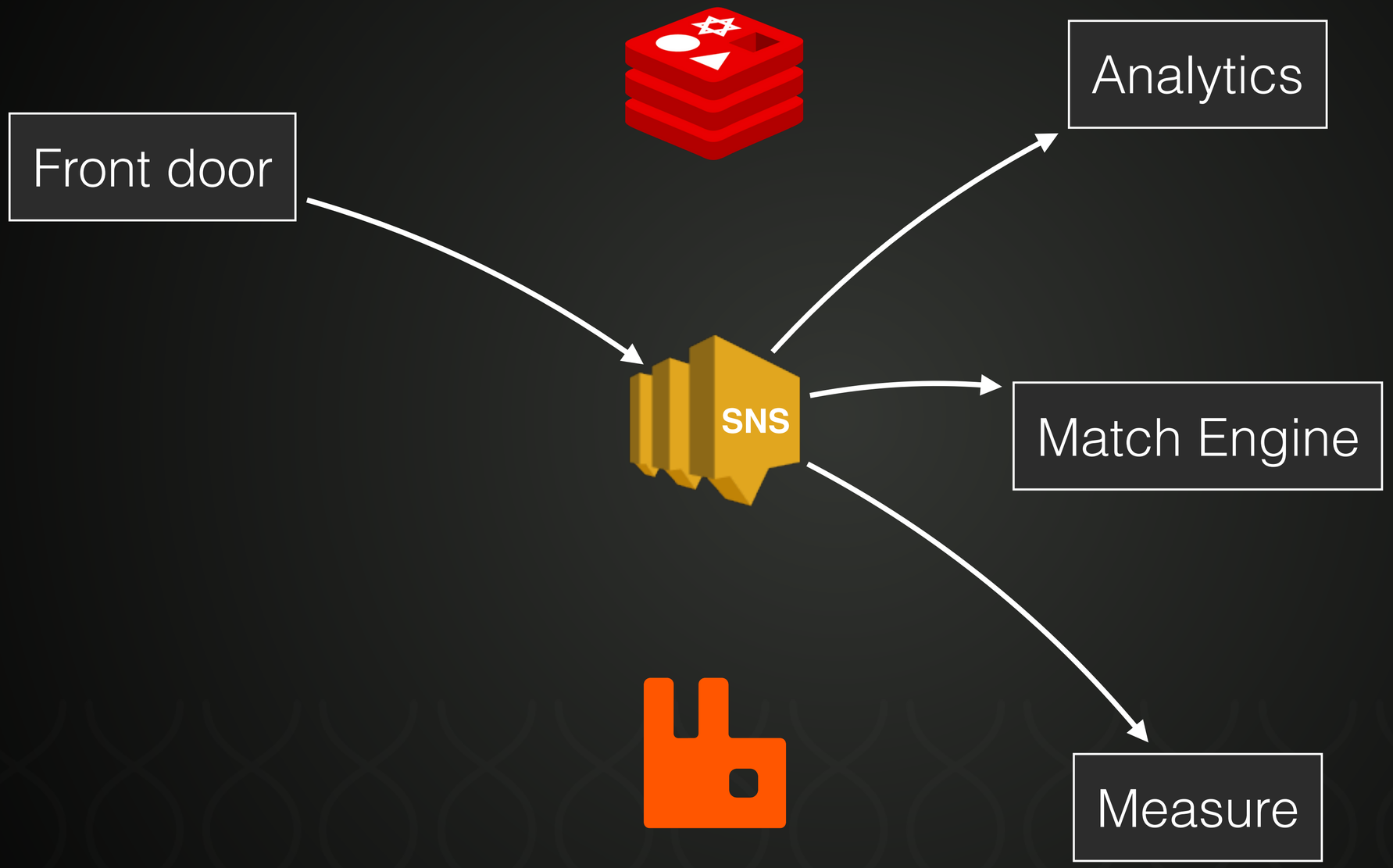
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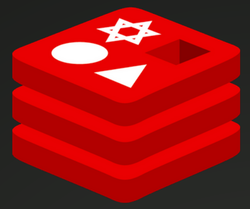

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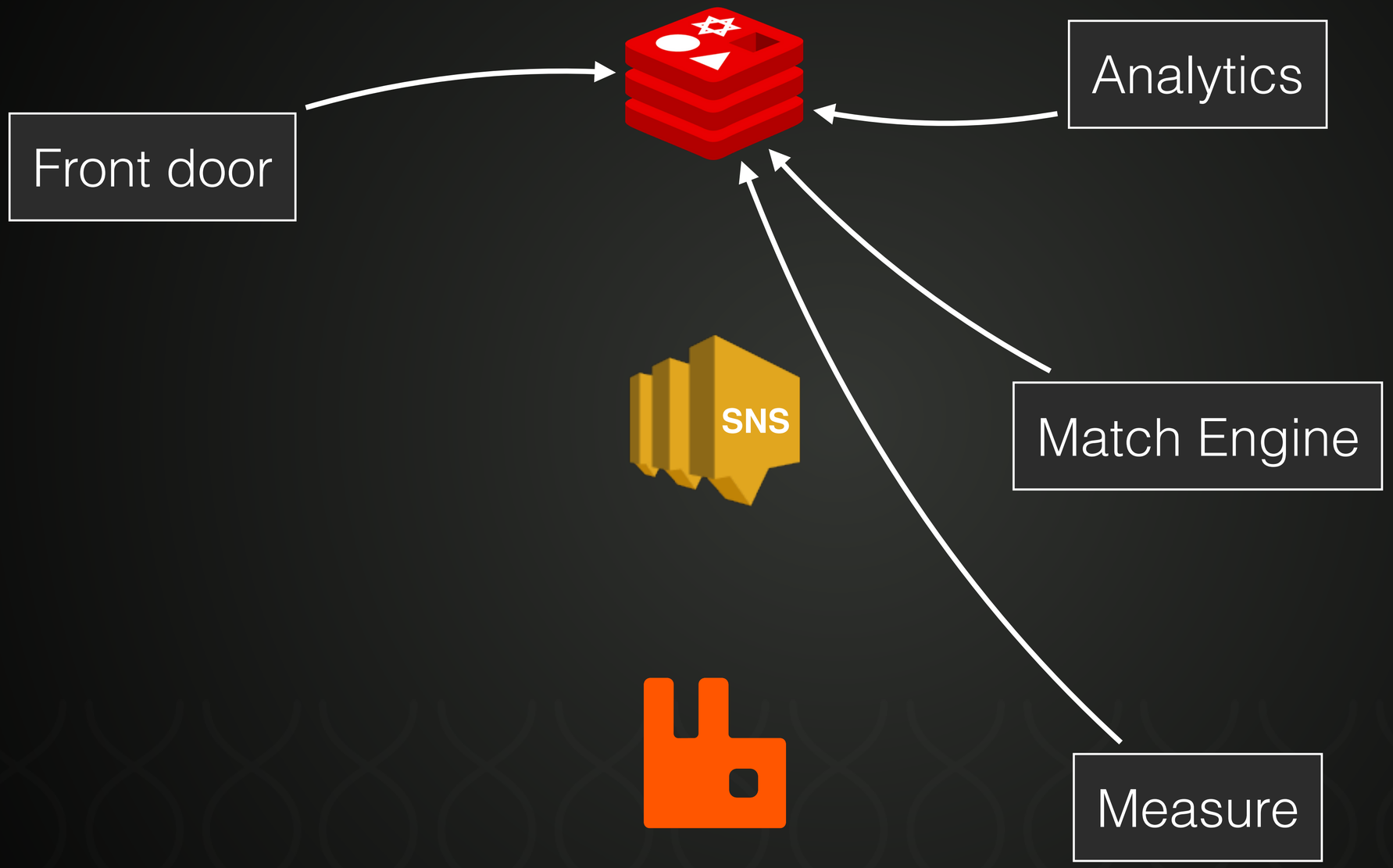
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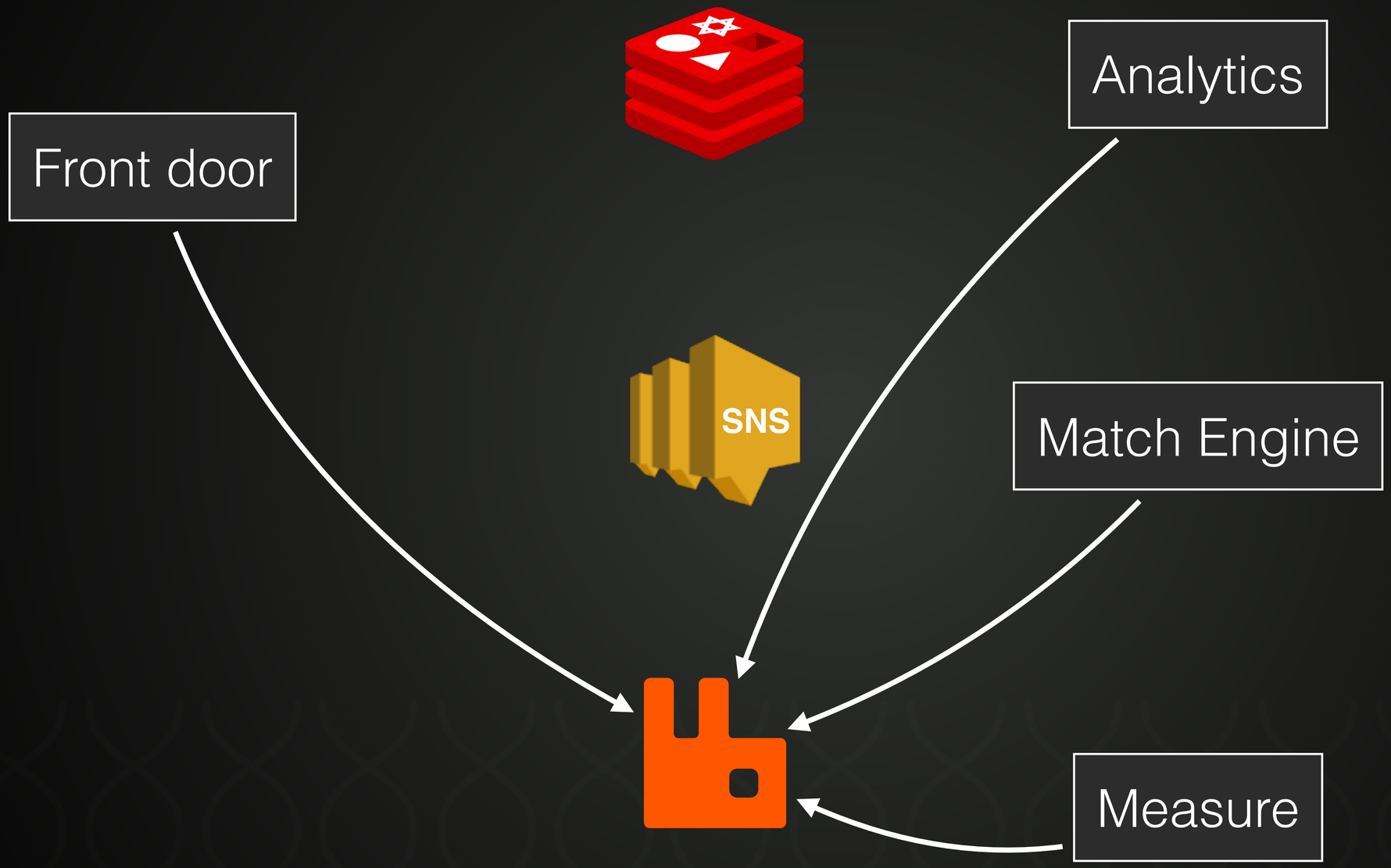
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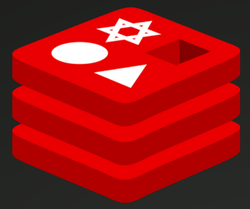

Analytics

Match Engine

Retry app

Measure

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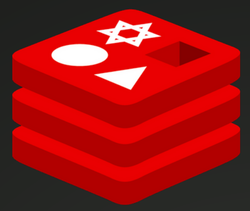

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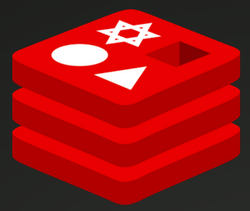

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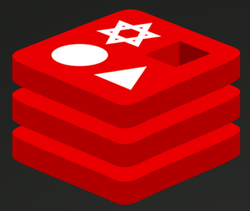

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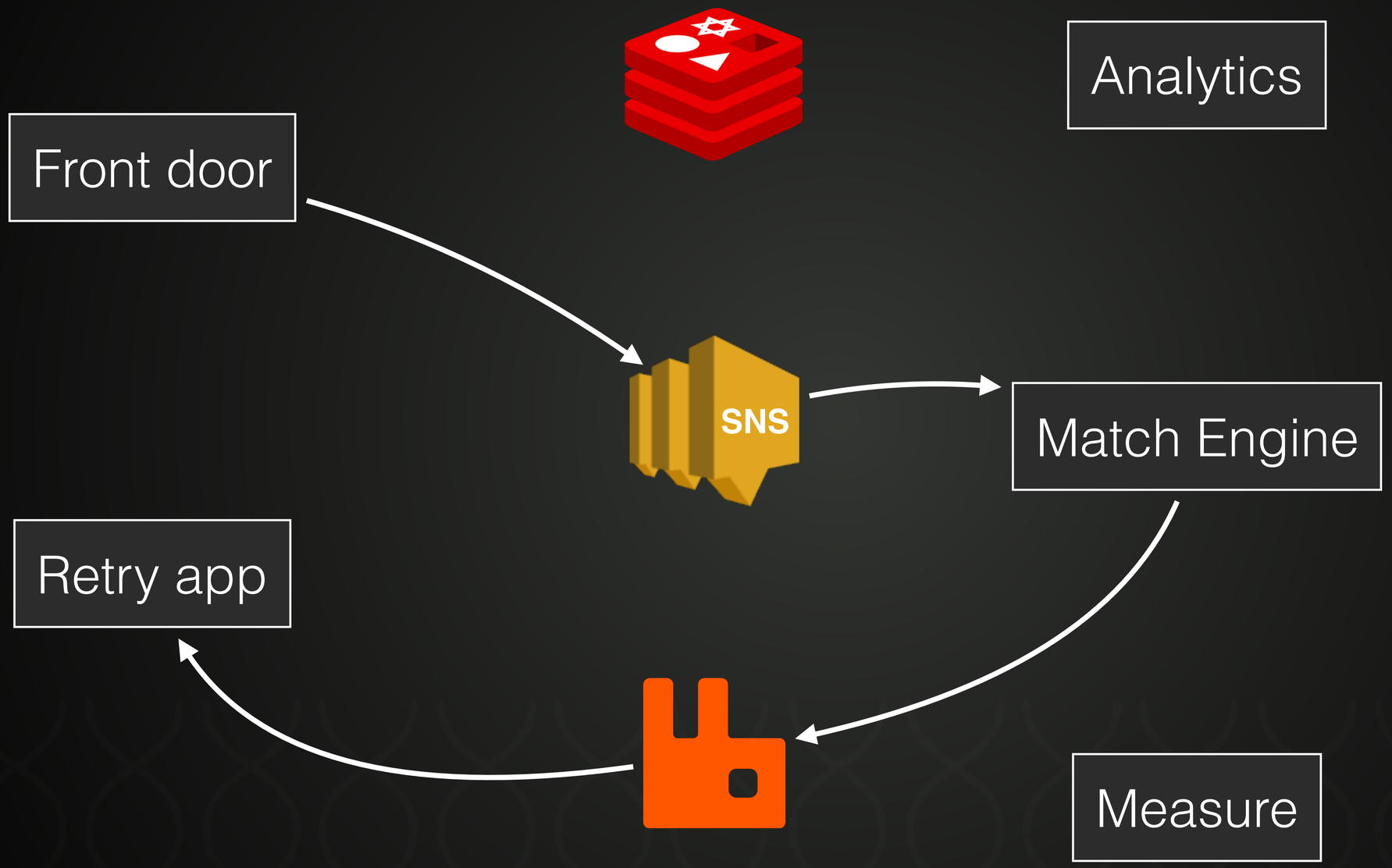
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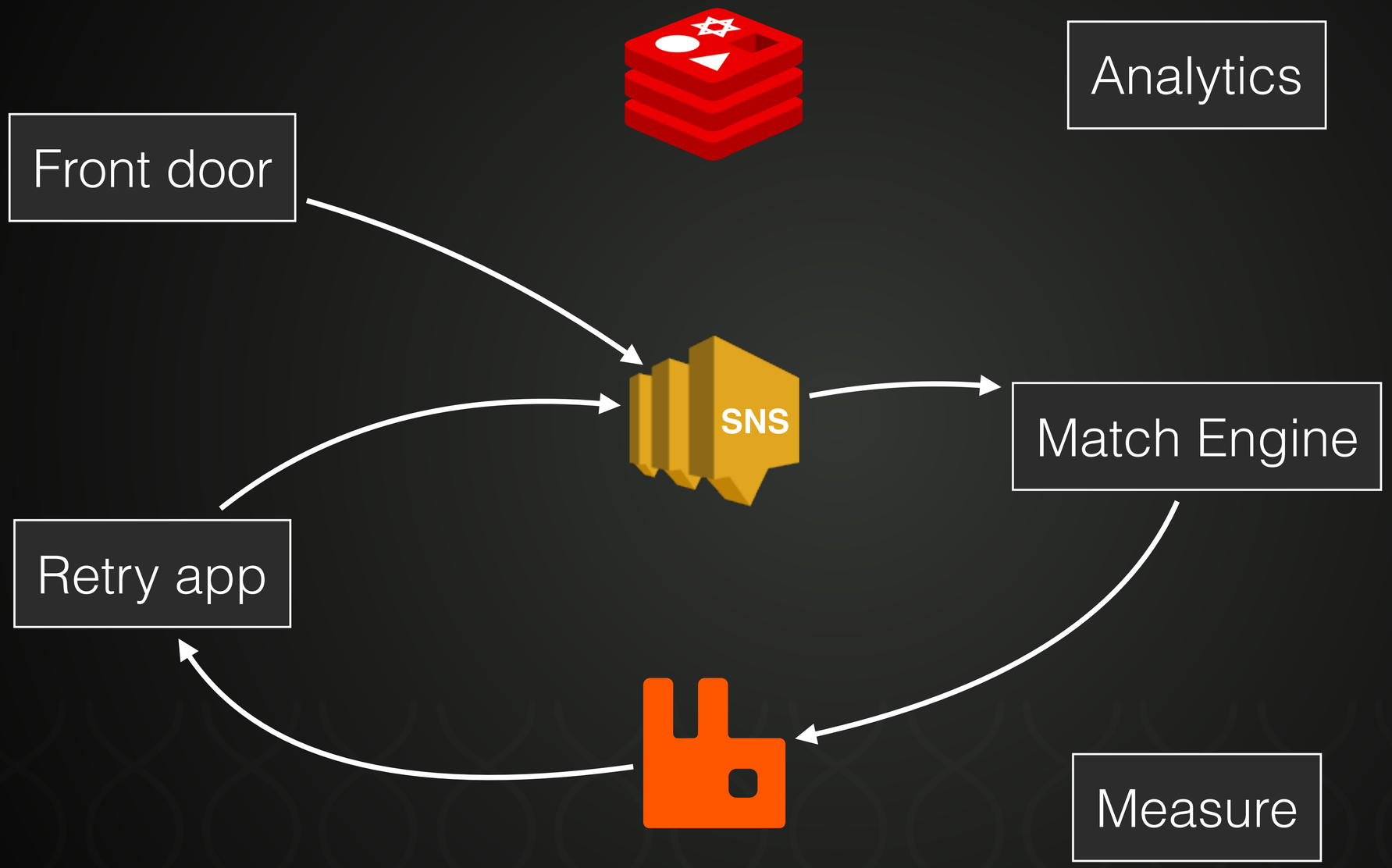
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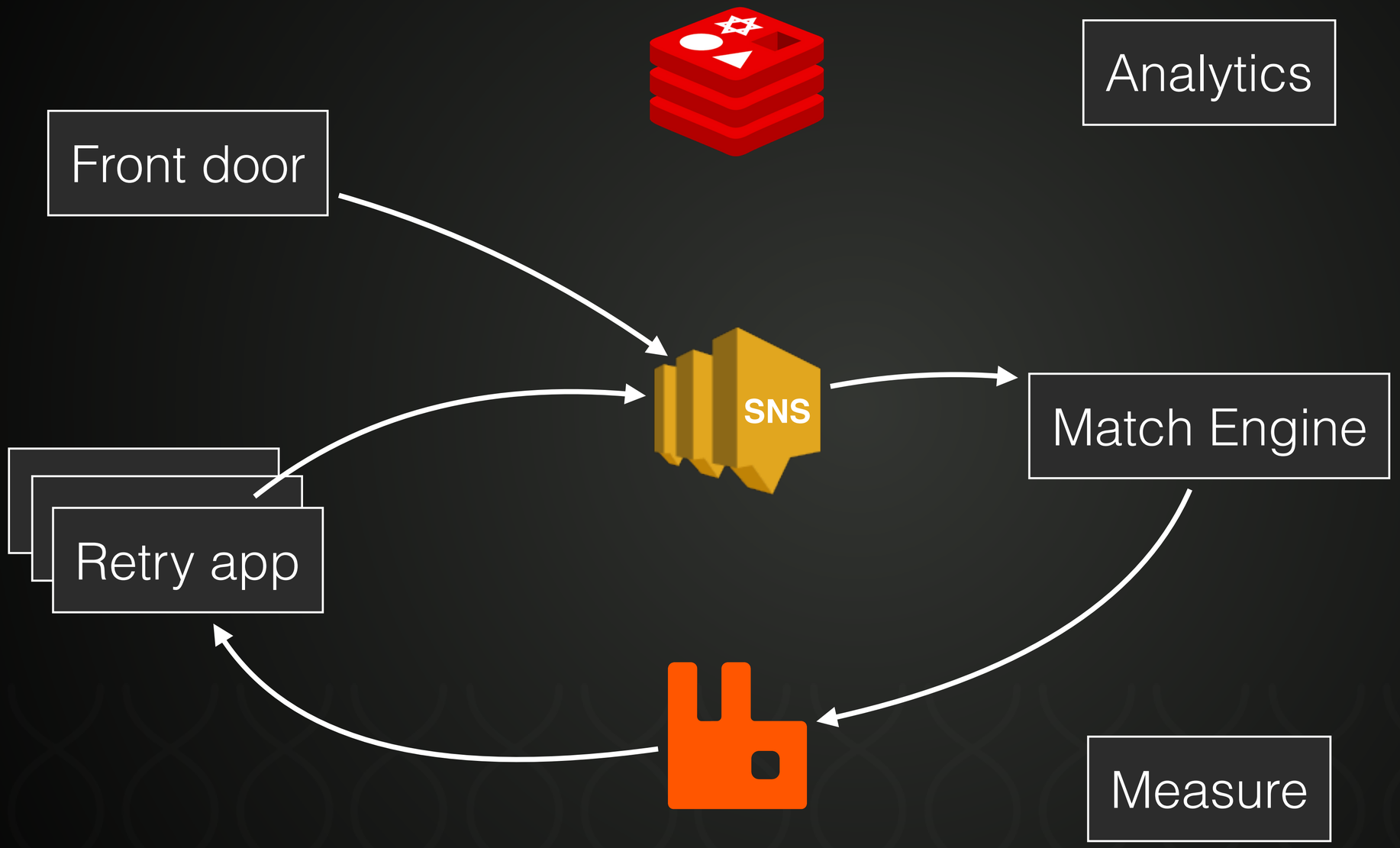
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Messaging

http://developer.happyr.com/symfony-messenger-on-aws-lambda

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```php
include \dirname(__DIR__).'/vendor/autoload.php';

$publisher = new \Aws\Sns\SnsClient([
    'version' => '2010-03-31',
    'region' => \getenv('AWS_TARGET_REGION'),
]);

$publisher->publish([
    'TopicArn' => 'my_topic_arn',
    'Message' => 'my_json_message',
]);
```

```php
use App\Kernel;
use Rawls\SnsConsumer\SnsConsumer;


lambda(static function (array $event) {
    $kernel = new Kernel($_SERVER['APP_ENV'], (bool) $_SERVER['APP_DEBUG']);
    $kernel->boot();
    $container = $kernel->getContainer();

    /** @var SnsConsumer $consumer */
    $consumer = $container->get(SnsConsumer::class);

    foreach ($event['Records'] as $record) {
        if (!isset($record['Sns'])) {
            continue;
        }

        $consumer->consume($record['Sns']);
    }

    return 'OK.';
});
```

```php
final class SnsConsumer
{
    public function consume(array $event)
    {
        try {
            $envelope = $this->serializer->decode(['body' => $event['Message']]);
            $this->bus->dispatch($envelope);
        } catch (\Throwable $e) {
            if ($e instanceof MessageDecodingFailedException) {
                $prev = $e->getPrevious();
                if ($prev instanceof HydratorNotFoundException) {
                    // Dont retry.
                    return;
                }
            }

            $retryAttempt = (int) ($event['MessageAttributes']['retry_attempt']['Value'] ?? 0);

            $mqMessage = new Message($event['Message'], [
                'delivery_mode' => 2, // Persistent
                'content_type' => 'application/json',
                'headers' => [
                    'SnsTopicArn' => $event['TopicArn'],
                    'retry_attempt' => $retryAttempt + 1,
                ],
            ]);
            $this->channel->publish($mqMessage, 'sns_retry', $this->getRoutingKeyFromRetryAttempt($
        }
    }
```

@tobiasnyholm

```
            $retryAttempt = (int) ($event['MessageAttributes']['retry_attempt']['Value'] ?? 0);

            $mqMessage = new Message($event['Message'], [
                'delivery_mode' => 2, // Persistent
                'content_type' => 'application/json',
                'headers' => [
                    'SnsTopicArn' => $event['TopicArn'],
                    'retry_attempt' => $retryAttempt + 1,
                ],
            ]);
            $this->channel->publish($mqMessage, 'sns_retry', $this->getRoutingKeyFromRetryAttempt($
        }
    }

    private function getRoutingKeyFromRetryAttempt(int $retries): string
    {
        switch ($retries) {
            case 0:
            case 1:
                return 'retry_0';
            case 2:
            case 3:
                return 'retry_1';
            default:
                return 'retry_2';
        }
    }
}
```

Handle failure

http://developer.happyr.com/sns-retry

@tobiasnyholm

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```php
use Rawls\QueueAdapter\ChannelFactory;
use Rawls\QueueAdapter\Impl\AmqpExtChannel;

include \dirname(__DIR__).'/vendor/autoload.php';

$channel = ChannelFactory::create(\getenv('HAPPYR_MQ'));
$publisher = new \Aws\Sns\SnsClient([
    'version' => '2010-03-31',
    'region' => \getenv('AWS_TARGET_REGION'),
]);

lambda(function (array $event) use ($channel, $publisher) {
    if (!isset($event['queue'])) {
        throw new RuntimeException('Queue must be defined');
    }

    echo \sprintf('Reading from queue: %s... ', $event['queue']); // No line break
    $count = 0;
    while ($message = $channel->get(false, $event['queue'])) {
        $attr = $message->getAttributes();
        if (!isset($attr['headers']['SnsTopicArn'])) {
            echo "No SnsTopicArn found \n";

            continue;
        }

        try {
            $publisher->publish([
```

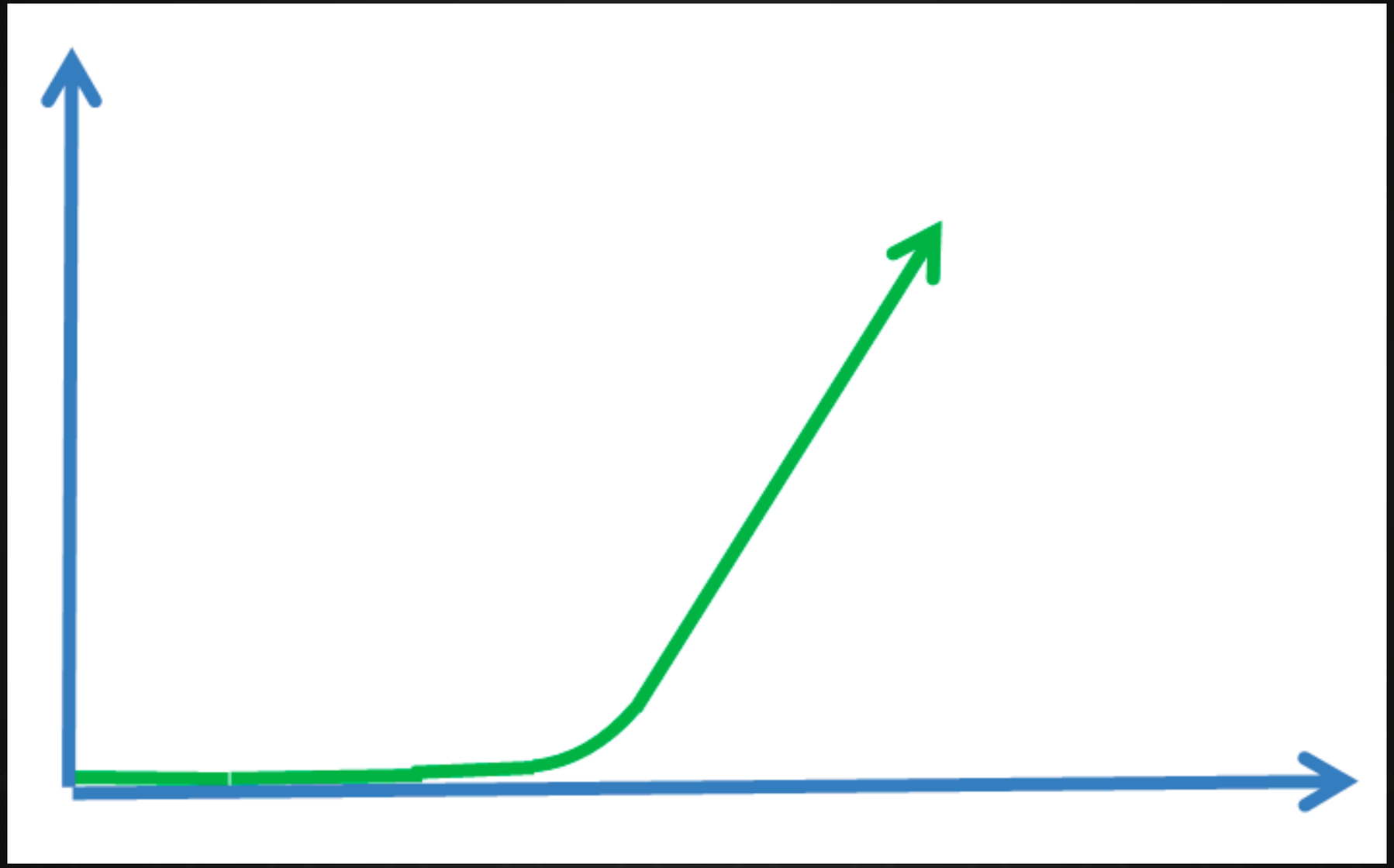
```
        try {
            $publisher->publish([
              'TopicArn' => $attr['headers']['SnsTopicArn'],
              'Message' => $message->getMessage(),
              'MessageAttributes' => [
                'application_id' => ['StringValue' => ''.$attr['headers']['application_id'] ?? ''],
                'retry_attempt' => ['StringValue' => ''.$attr['headers']['retry_attempt'] ?? 1],
              ],
            ]);
        } catch (\Throwable $throwable) {
            echo "\nCould not publish message \n";

            // Start handling other messages.
            continue;
        }

        // If we cannot publish the message, we will never ack it.
        $message->ack();
        ++$count;
    }

    if ($count > 0) {
        echo \sprintf('Republished %d messages.', $count)."\n";
    }
});
```

Next: QA environment



Future: Serverless Aurora Postgres

Questions?

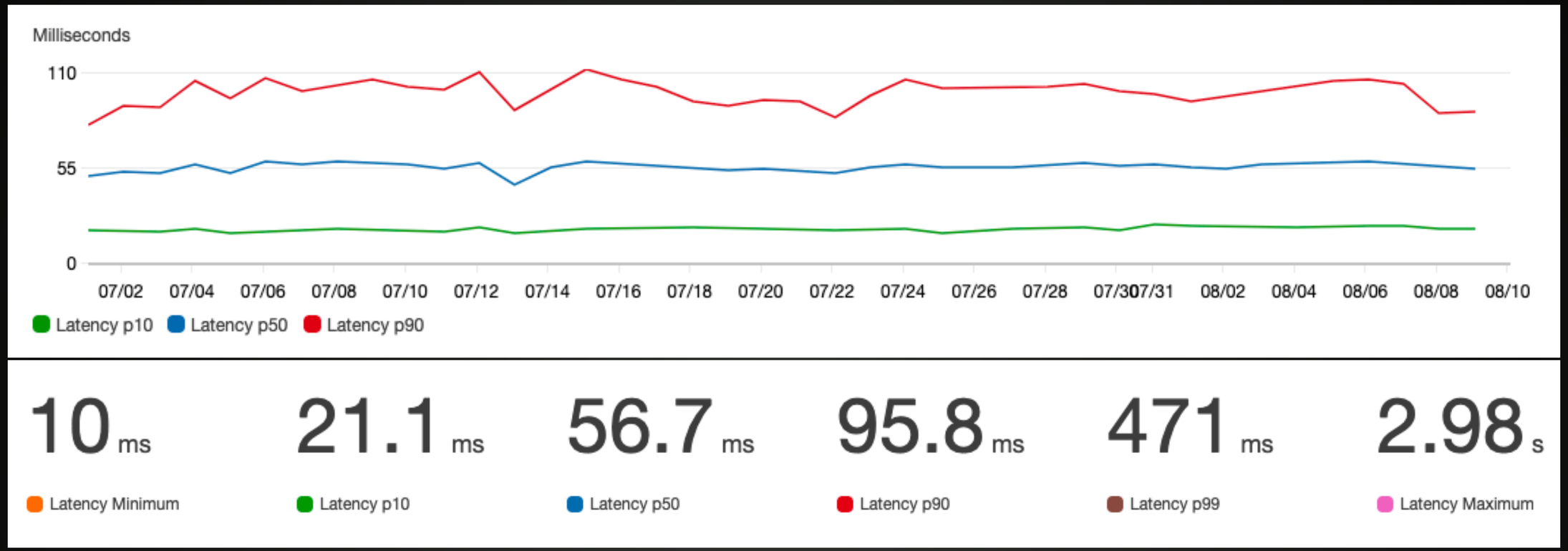
@tobiasnyholm

Costs?

https://cost-calculator.bref.sh/

Questions?

@tobiasnyholm



externals.io

Questions?

@tobiasnyholm

https:// bref.sh

https:// nyholm.tech