Working with Webhooks

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What is a Webhook?

An HTTP POST request.

Why Webhooks?

Event-driven HTTP = Webhooks

Webhooks in the Wild

Slack Integrations

github APP 5:37 PM

[nexmo-python-quickstart] New branch "account-examples" was pushed by lornajane

[nexmo-community/nexmo-python-quickstart] Pull request submitted by lornajane

#46 Add get-balance and configure-account building blocks

We've added a couple of building blocks for account, so I thought I'd add python examples to get us started.

GitHub Builds

All checks have failed

1 failing check

continuous-integration/travis-ci/pr — The Travis CI build failed

This branch has no conflicts with the base branch

Only those with write access to this repository can merge pull requests.

Webhook Use Cases

- Notify of events
- Deliver data when available
- Broadcast to multiple receivers as-it-happens

How APIs Work

How APIs Work

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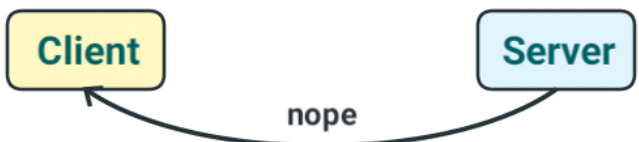
How APIs Work



How Webhooks Work

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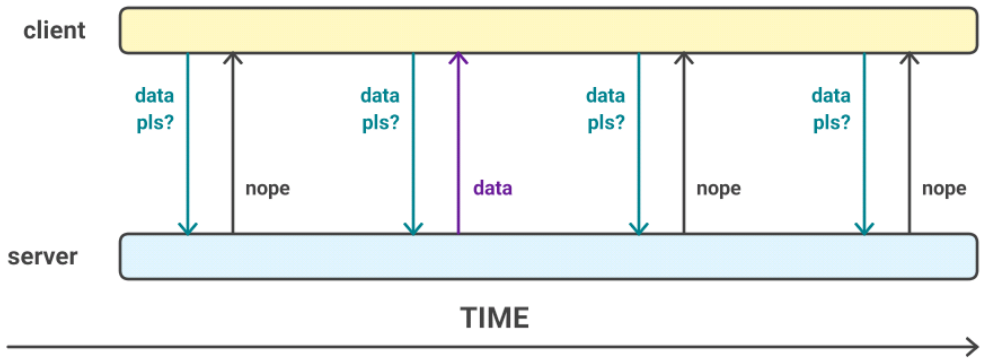
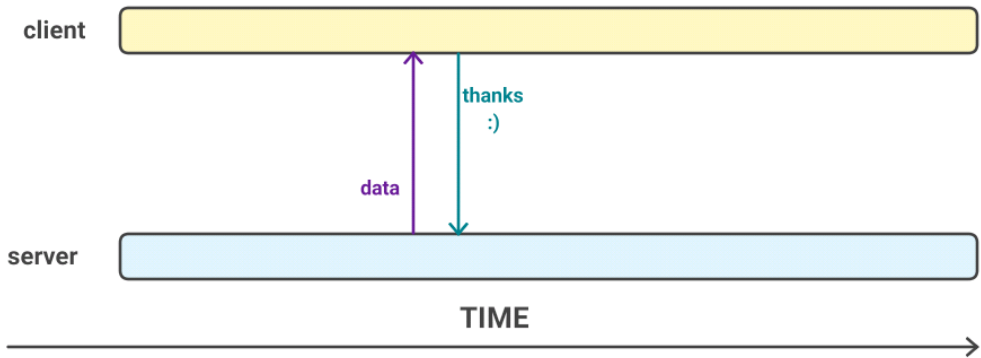
What About Time?

APIs Over Time



Webhooks Over Time



Where To Webhook To?

Webhooks Need Pre-arrangement

With APIs, the client calls the server.

With Webhooks, the client has to register with the server, to get data later.

Designing Webhooks: Example

A GitHub "push" event contains nested data.

```
"ref": "refs/tags/simple-tag",
"before": "a10867b14bb761a232cd80139fbd4c0d33264240",
"after": "0000000000000000000000000000000000000000",
"compare": "https://github.com/Codertocat/Hello-World/compare/a10867b14bb
"commits": [ ],
"repository": {
    "owner": { },
    "html_url": "https://github.com/Codertocat/Hello-World"
},
"sender": { }
```

Designing Webhooks

Think about how your users will use the API.

- What's their context/technology/device?
- What are they doing when they call the endpoint?
- What are they likely to do next?

Receiving Webhooks

Warning: minor tangent ahead

Ngrok for Testing Webhooks

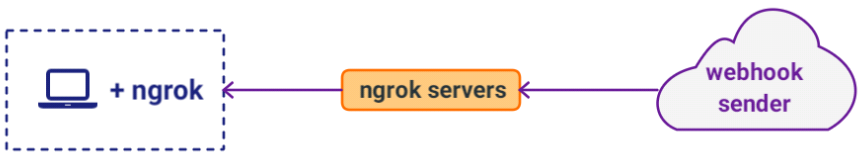
https://ngrok.com/ - secure tunnel to your dev platform

Use this tool to:

- webhook into code running locally
- inspect the request and response of the webhook
- replay requests and see the responses

Ngrok for Testing Webhooks

Start the tunnel on your laptop: receive a public URL



Example: Nexmo SMS

When you register a phone number and receive an SMS, your application receives a webhook.

I'm running open endpoints on the internet and accepting data, now what?

Webhook Security

When working with webhooks:

- be aware of attack vectors
- always use SSL
- consider shared secrets and hashing
- all good HTTP security practices apply

Nexmo SMS Security

Nexmo can sign messages using a shared secret.

The PHP library https://github.com/nexmo/nexmo-php can do this for you.

```
$signature = new \Nexmo\Client\Signature($_GET,
    SIGNATURE_SECRET, 'sha256');

$isValid = $signature->check($_GET['sig']);
```

Receiving Webhooks: Best Practice

It's just an HTTP request! Advice:

- DO: accept, store and acknowledge quickly
- DON'T: process before acknowledging

Using Queues in PHP Applications

Queues protect you against bursty traffic.

Queues separate work from webservers.

- This example uses https://beanstalkd.github.io/ and Laravel
- Other good alternatives: Redis or Laravel Horizon, Amazon SQS, RabbitMQ

SlimPHP and Beanstalkd

```php
$container = $app->getContainer();

$container['queue'] = function ($container) {
    return new \Pheanstalk\Pheanstalk(
        getenv('QUEUE_HOST'),
        getenv('QUEUE_PORT')
    );
};
```

Pro-tip: Try `vlucas\phpdotenv` for dev platform environment vars.

SlimPHP and Beanstalkd

```
13 $app->get('/webhooks/inbound-sms', function ($request, $response, $arg
14     $params = $request->getQueryParams();
15
16     $data = ["event" => "message",
17         "text" => $params['text'],
18         "receivedAt" => date("U"),
19         "payload" => $params];
20     error_log("New message: " . $params['text']);
21     $this->queue->useTube('sms')
22         ->put(json_encode($data));
23 });
```

Laravel and Beanstalkd

```
1  use App\Jobs\InboundSms;
2  Route::get('inbound-sms', function(Request $request) {
3      // get incoming parameters (includes GET and POST)
4      $params = $request->input();
5      $data = ["event" => "message", "text" => $params['text'],
6          "receivedAt" => date("U"), "payload" => $params];
7      error_log("New message: " . $params['text']);
8
9      InboundSms::dispatch($data);
10     return "OK";
11 });
```

So The Data is In a Queue. Now What?

Let's talk about Workers

Workers are long-running scripts that process a series of jobs.

Workers need to be independent:

- if things go wrong, exit
- separate tool to monitor/restart as needed
- beware long-running process hazards
- everything processed "at least once" (but maybe more than once, and in any order...)

Processing SMSes with PHP

```
13 while($job = $queue->reserve()) {
14     $received = json_decode($job->getData(), true);
15     error_log($received['text']);
16
17     // delegate to the class that will do the work
18     $worker->process($received);
19
20     $queue->delete($job);
21 }
```

Processing SMSes with PHP

```
 9 class Worker {
10     public function process($data) {
11         $signature = new \Nexmo\Client\Signature( $data['payload'],
12             getenv('NEXMO_API_SIGNATURE_SECRET'),
13             'sha256');
14         if ($signature->check($data['payload']['sig'])) {
15             $this->write_to_file($this->outfile, $data['text']);
16             return true;
17         }
18         return false;
19     }
```

Processing SMSes with Laravel

```
1  Route::get('inbound-sms', function(Request $request)
2  {
3      $params = $request->input();
4      $data = ["event" => "message", "text" => $params['text'],
5          "receivedAt" => date("U"), "payload" => $params];
6      error_log("New message: " . $params['text']);
7
8      InboundSms::dispatch($data);
9      return "OK";
10 });
```

Publishing Webhooks

Sending webhooks is an implementation of Publish/Subscribe pattern.

- Put desired webhooks into a queue, and send at a steady rate.
- Everything we discussed about queues and workers applies.
- DO NOT send from live webserver.

Webhooks

... are awesome :)

Webhooks in Your Applications

- Use them WHEN you want to notify other systems
- Examples of HOW to use webhooks hopefully gave you some ideas
- Webhooks are HTTP: we already understand this

Thanks!

- Feedback please! https://joind.in/
- PHP Web Services from O'Reilly
- Nexmo: https://nexmo.com
- Me: https://lornajane.net
- Ngrok: https://ngrok.com/
- Code: https://github.com/lornajane/incoming-sms-beanstalkd-php

Bonus slides

Serverless Webhook Endpoints

Serverless technology:

- Functions as a Service
- Scalable: ideal for bursty workloads
- Pay-as-you-go, and with free tiers
- PHP supported on some platforms (they all support NodeJS)

Code: https://github.com/lornajane/fortunes-by-sms

Serverless PHP SMS Reply Code Example

```
 4 function main(array $params) : array {
 5     $cookie = getCookies()[random_int(0, 430)];
 6     parse_str($params['__ow_query'], $query);
 7
 8     $url = "https://rest.nexmo.com/sms/json";
 9     $options = ["http" => [ "method" => "POST", "content" => json_enco
10     $context = stream_context_create($options);
11     $response = file_get_contents($url, false, $context);
12     return ["body" => $cookie];
13 }
```

Serverless PHP SMS Reply Deployment

Zip the code (and dependencies if needed), then deploy

```
rm -f sms-fortune.zip
zip -rq sms-fortune.zip index.php

ibmcloud fn action update sms-fortune/incoming-php \
    --kind php:7.2 --web raw sms-fortune.zip
```

Link your Nexmo number to the URL of this action, share and enjoy.

Here's one I made earlier: 201-579-9898