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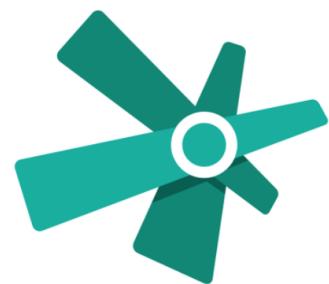
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The Power Behind Real-Time Push Notifications Using Webhooks

Who am I?

Kyle Tolle

kyletolle.com | @kyletolle

Software Engineer at [Spatial Networks](#)

Implemented webhooks in [Fulcrum](#), our mobile data collection service

First off
Ask questions at any time!

Slides for this talk

Presentation:

https://kyletolle.github.io/dsw_webhooks_talk

Code:

https://github.com/kyletolle/dsw_webhooks_talk

How many of you

- have some knowledge of webhooks?
- have used webhooks before?
- offer webhooks at your company?

Overview

- Flexibility and integrations
- How clients use APIs
- Why webhooks are a thing
- Barebones webhooks demo
- Webhooks integration demo
- Other use cases for webhooks
- Recapping and wrapping up

Our fictional client

Government Agency for Bear Attacks

Why bear attacks?

Vicious



Relentless



Unexpected



So I'm here
to talk about webhooks

But first

we need some background

Let's start with
what we know

Startups

Staying small, focused, and agile
makes your value clear

Flexibility is your power

They fit you into their workflow

More likely to use your service

What's this mean in practice?

Give clients *easy* access to their data

They can hook you up to other services

This is a good way to
Avoid vendor lock-in
&
Build goodwill

How do you deliver this flexibility?

Integrating with specific services

But you have to predict it

And then maintain it

Instead, what about...

General patterns for integration

These are even better for
allowing many of them

Flexible going forward

Not hardcoding for the service-du-jour

Integrate with other services that are relevant later

Extends your relevancy

Gives customers flexibility to do anything they want

Fit into their business and workflow over time

Document it well

Make it easy to understand and get started with

**They can build their own
integrations**

Also helpful when you do integration work for clients

How do we do this?

As web developers

what general integration pattern are we already familiar with?

APIs

Why do we have APIs?

APIs allow
people to get their data

How do APIs work?

The client calls us

Why do they want their data?
To do things with it!

How do they use the API?

- Call our API
- Frequently
- In a script/application

This is
polling

Polling is straight-forward

But there are some
Downsides

#1

Your client writes the code

How long until
someone murders your servers?

#2

To react faster, they have to poll more

More polling means more resources

- development time
- support time
- processors
- memory
- bandwidth

#3

It's mostly useless

Most polls won't return new data

#4

And it's still not Real-Time™

Okay
we see the disadvantages

But so what?

We already have an API

- It exists
- It works

Let's come back to what's important

**Fast response time
is what's valuable**

&

Polling helps them react quickly

But it's only one approach

How else can we help them react quickly?

Because, if we can do this...

It'll make our service more valuable

And that means happier customers

Maybe even some extra revenue

We know that polling is
Client -> Us

But what about the other way around?

Us -> Client

Hmm, this is interesting

Instead of
them calling us

to see if data changes

We let them know

when data has changed

Let's do this over the web

since it's common infrastructure

Client gives us a URL

&

We have events we watch for

When an event happens,
we make an HTTP POST request

to our client's URL

and deliver some data

Boom, Webhooks!



The Benefits

#1

We write the code

#2

Fewer resources required

#3

We send the data just as it changes

This is Real-Time™

This is what I mean by
Push Notifications for the web

Exciting for integration!

We'll see real-world examples later

We've got our background!
How about implementing it?

Let's see a small example
Show us making a single request

Start small & build momentum

The Idea

- Generate a random number
- Send a webhook to our client with that number

We'll have a client server running, [Polis.rb](#)

A small web server which logs POST data

Random Number Generator

```
require_relative '../lib/webhooks'

class RandomNumberGenerator
  include Webhooks

  def initialize
    self.webhooks = %w{http://localhost:9000}
  end

  def generate
    random_number = SecureRandom.random_number(1000)

    send_webhooks(:random_number, :generate, random_number)

    return random_number
  end
```

In IRB

```
require './examples/random_number_generator.rb'  
> puts RandomNumberGenerator.new.generate  
=> 863
```

From the client

We see the webhook request

```
$ PORT=9000 bf
...
Logging POST request:
...
Body:
{"event": "random_number:generate", "data": 863}
...
```

Webhooks module

```
require 'net/http'
require 'securerandom'
require 'json'

module Webhooks
  attr_accessor :webhooks

  def send_webhooks(resource, action, data)
    event_type = "#{resource}:#{action}"
    payload    = JSON.generate({
      event: event_type,
      data:  data })
  end

  webhooks.each do |webhook|
    url = URI.parse(webhook)
```

Client code

```
...
class Polis < Sinatra::Base
...
post '/' do
  # Note: Thanks to this SO page: http://stackoverflow.com/a/631849
  http_headers = env.select{|h| h =~ /HTTP_*/}
  body_string  = request.body.read

...
logger.info <<-LOG
  Logging POST request:
  Headers:
  #{http_headers}
  Body:
  #{body_string}
```

We sent our first webhook!

There's no official spec

It's a general practice to
Send data to a URL
when something happens

Requires some effort

to implement the specifics

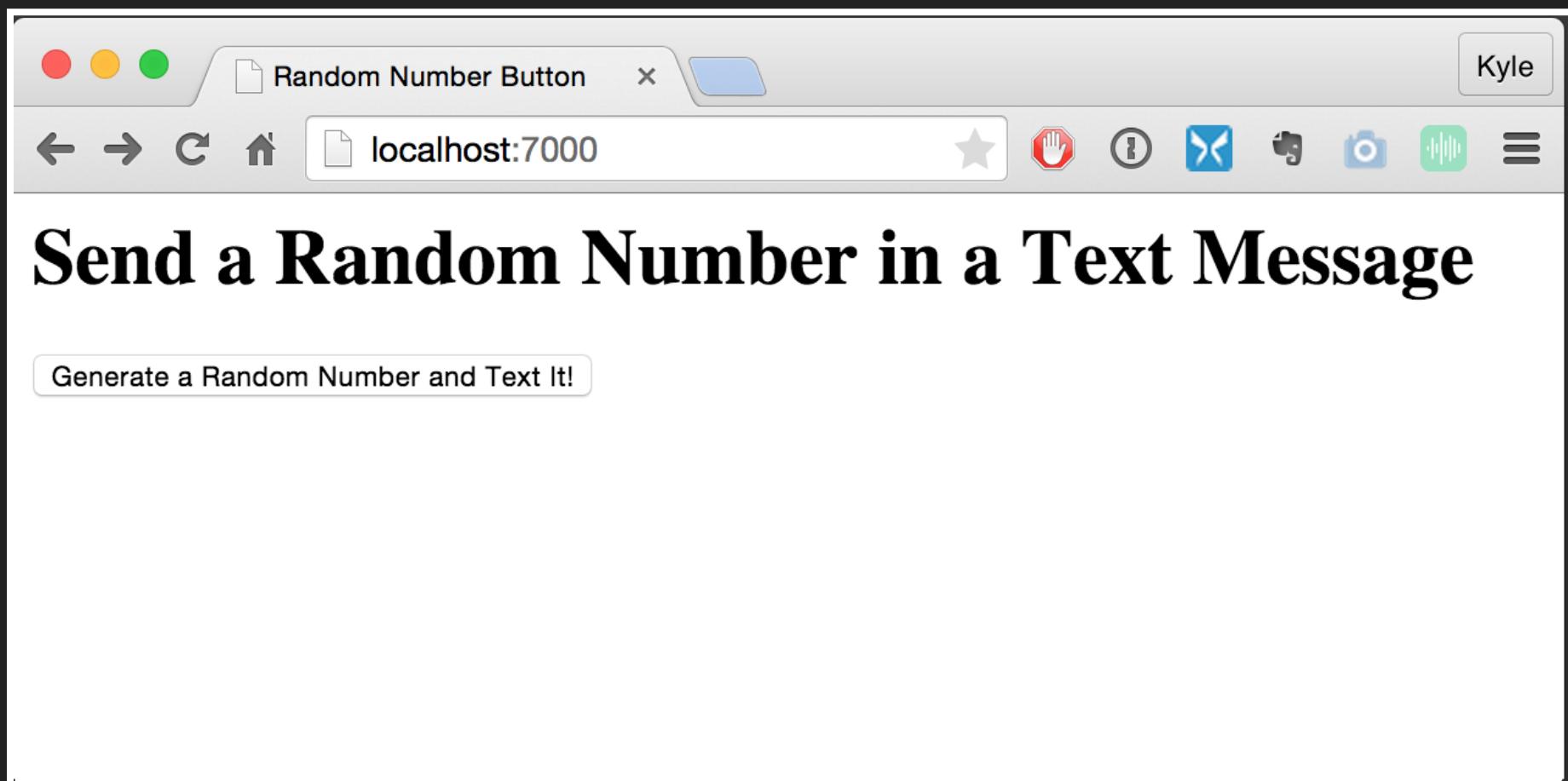
but the idea has been around for a while

How about another demo?

- Push a button on a site
- Generate a random number
- Send a text message

Random Number Button

Before we push the button



After we push the button



And the text sent



To: +1 (937) 688-1254

Details

SMS with +1 (937) 688-1254

Today, 6:57 PM

Sent from your Twilio trial
account - Here's a
random number: 641

|Text Message



Client code

```
...
class RandomNumberTexter < Sinatra::Base
...

post '/' do
  request.body.rewind
  post_body = request.body.read

  if request.content_type == 'application/json'
    payload = JSON.parse post_body

    is_random_number_generate = payload['event'] == 'random_number'
    return unless is_random_number_generate

    has_payload_data = payload['data']
    return unless has_payload_data
```

It still feels like magic



Who uses them?

Loads of companies!

- Github
- Slack
- Dropbox
- Twilio

Get ready for more examples

Let open the floodgates of possibility



Organize customer support

Several services feed into our #support channel in Slack

- Support emails
- Tender help forum posts
- Intercom messages

Keep developers in the loop

GitHub issues and pull requests feed into #github

Continuous integration runs after pushing to GitHub

CI passes/failures show in #engineering

Have fun with your service

GeoBooze

Post to Slack? *

OH YEAH! NAH

Name *

Red Porter

Brewery

Black Shirt

Beer Type

SELECT CREATE NEW

ABV

+



★#random Yesterday

boozebot BOT 22:12 Bottoms up! Coleman McCormick just had some Old Granddad at Home.

Rating: ★★★★☆

Comments: One of the dad baby shower gifts.

See a photo (198KB) 

tim 22:12 lol

rj 22:13 Awesome!

+

Enable timely communication

Send an email notification

when something needs immediate attention

Sync with external services

Sync with [CartoDB](#) for visualization and analysis
using [PHP](#) or [Google Apps Script](#)

Sync to external databases

Pull down data locally

to run through custom analysis pipelines

Fetch data from external services

Programmatically add weather data from [Forecast.io](#)

- Automatic
- Standardized
- Accurate

Platform and language agnostic

Common web patterns make it
plug and play with many tech stacks
and more flexible for our clients

They may not care about webhooks at first, but
Clients can grow into them

Services make integrations easier

- Zapier
 - Connects many services together
- Pushbullet
 - Push notifications to devices
- Google Apps Script
 - Run webhook endpoints on Google

Webhooks Recap

- Communicate events between your server and a client's using HTTP
- Webhooks accompany an API to enable powerful integrations
- Only real requirement is a web server
- You can do lots of cool stuff with them

Force multiplier

We don't have a huge engineering team

Webhooks allow us to have a greater impact

Other things to think about

- Use background jobs
- Send requests sequentially
- Persisting requests
- Handle failures
- Performance

Webhooks Docs for Fulcrum

- <http://fulcrumapp.com/guides/webhooks/webhooks-for-push-notifications/>
- <http://fulcrumapp.com/developers/overview/webhooks/>
- <http://fulcrumapp.com/guides/webhooks/webhooks-getting-started/>

What's Next?

- Create gem(s) to help others add webhooks to their code
 - Would you find this useful?
- Create/extend tools for using, testing, debugging
- Make webhooks easier to debug
- Add scoping to webhooks

Links to Code

- Webhooks module, random number generator, random number button site
 - <https://github.com/kyletolle/webhooks.rb>
- Simple webhooks endpoint
 - <https://github.com/kyletolle/polis.rb>
- Random number texter
 - https://github.com/kyletolle/random_number_texter
- Script to create this presentation
 - https://github.com/kyletolle/markdown_to_reveal

I'd love your feedback

Thanks!