

WebSocket

to me!

Chris Guzman

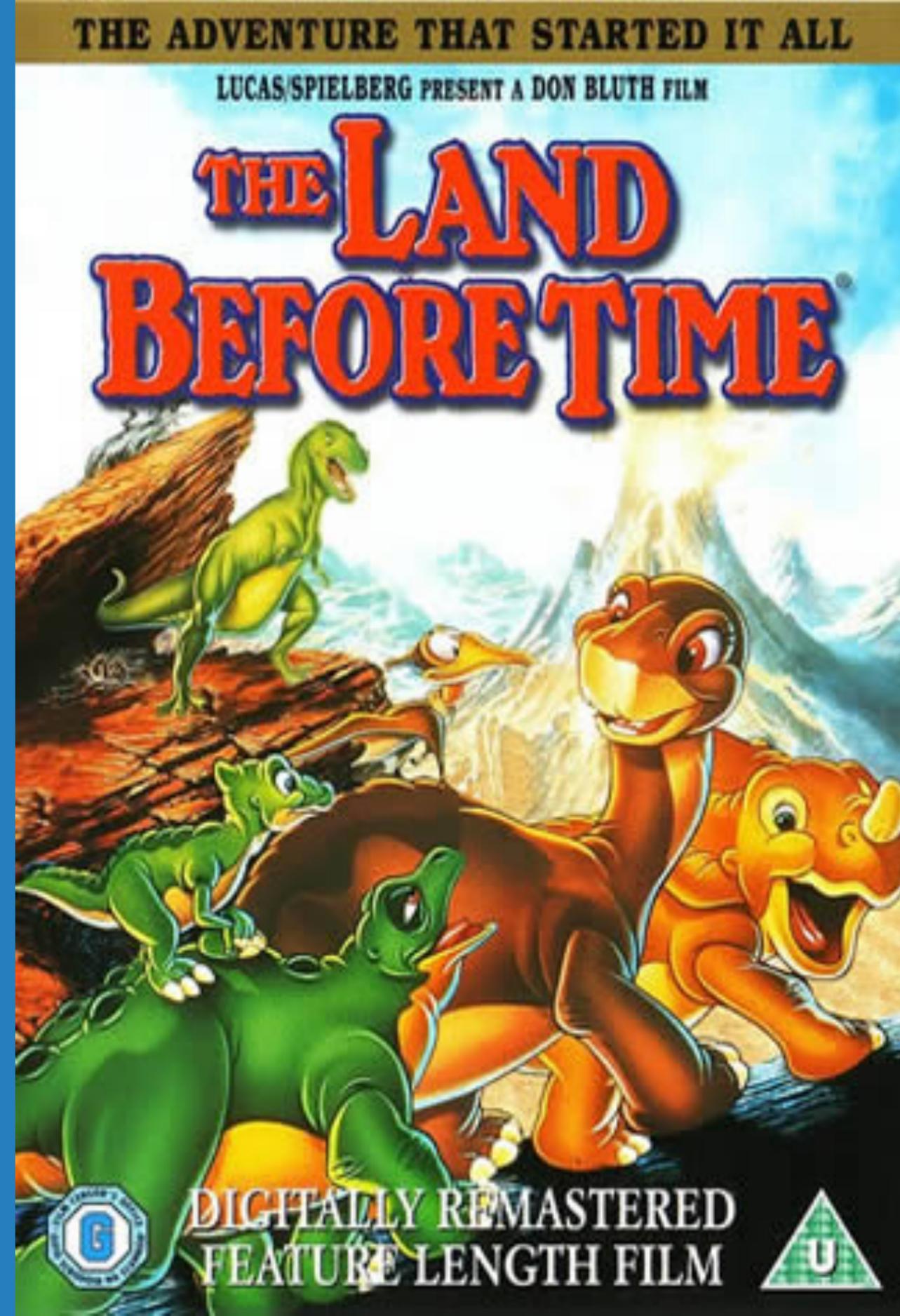
Developer Advocate @ Nexmo

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nexmo®

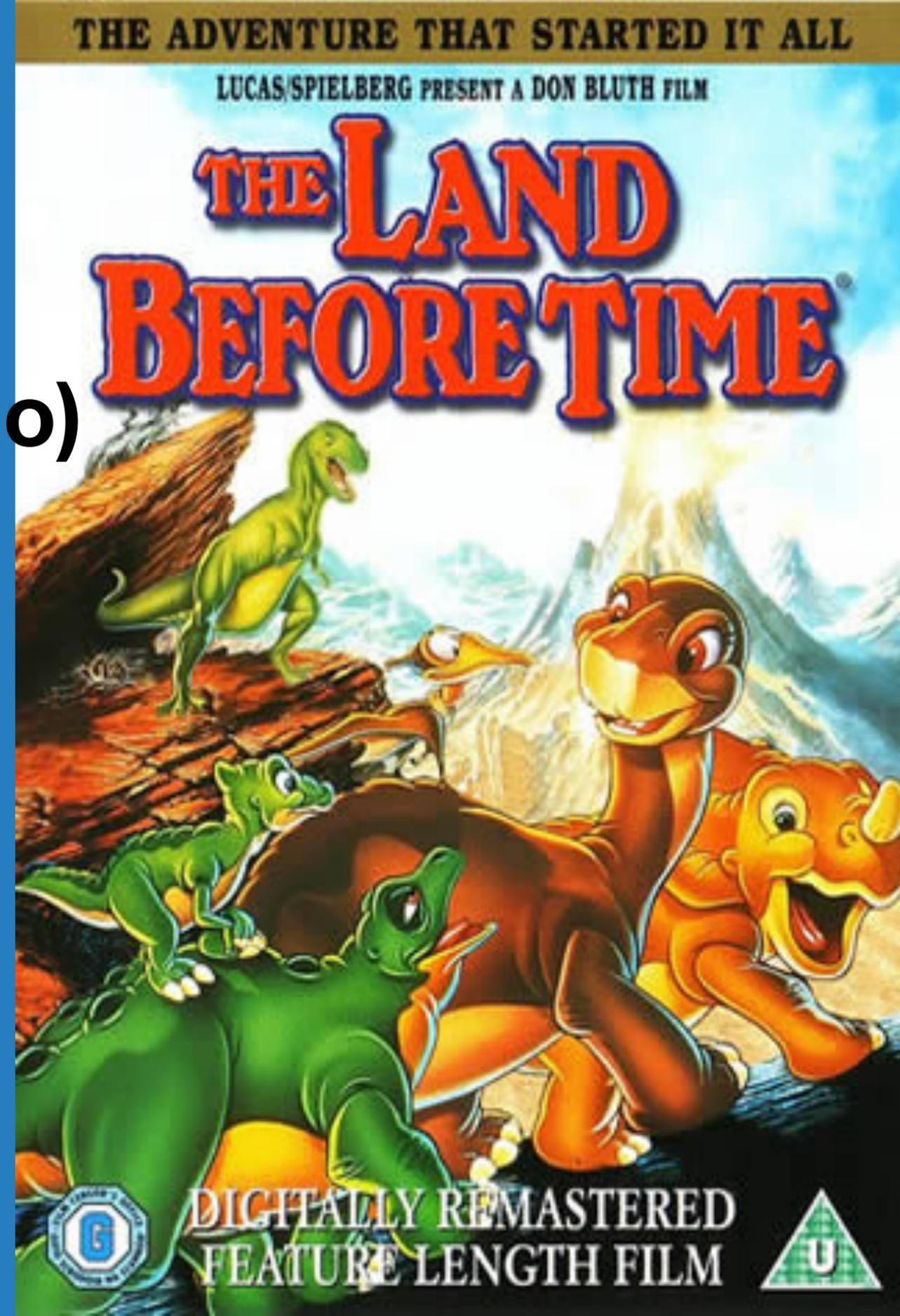
The Vonage® API Platform

Before..



Before...

(A few years ago)



HTTP Polling

TCP/IP Sockets

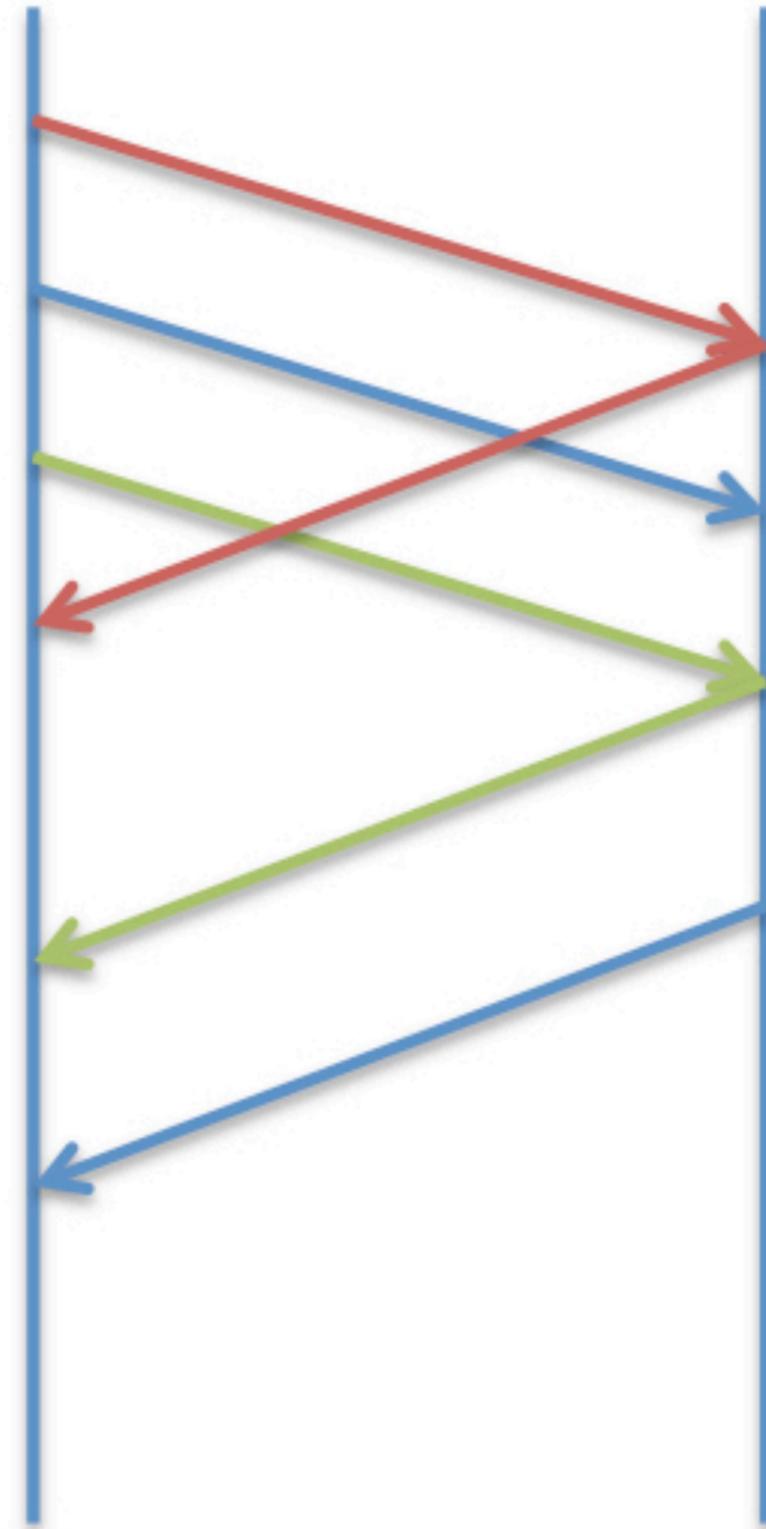
WebSockets

/web'säkəts/

bi-directional

Client

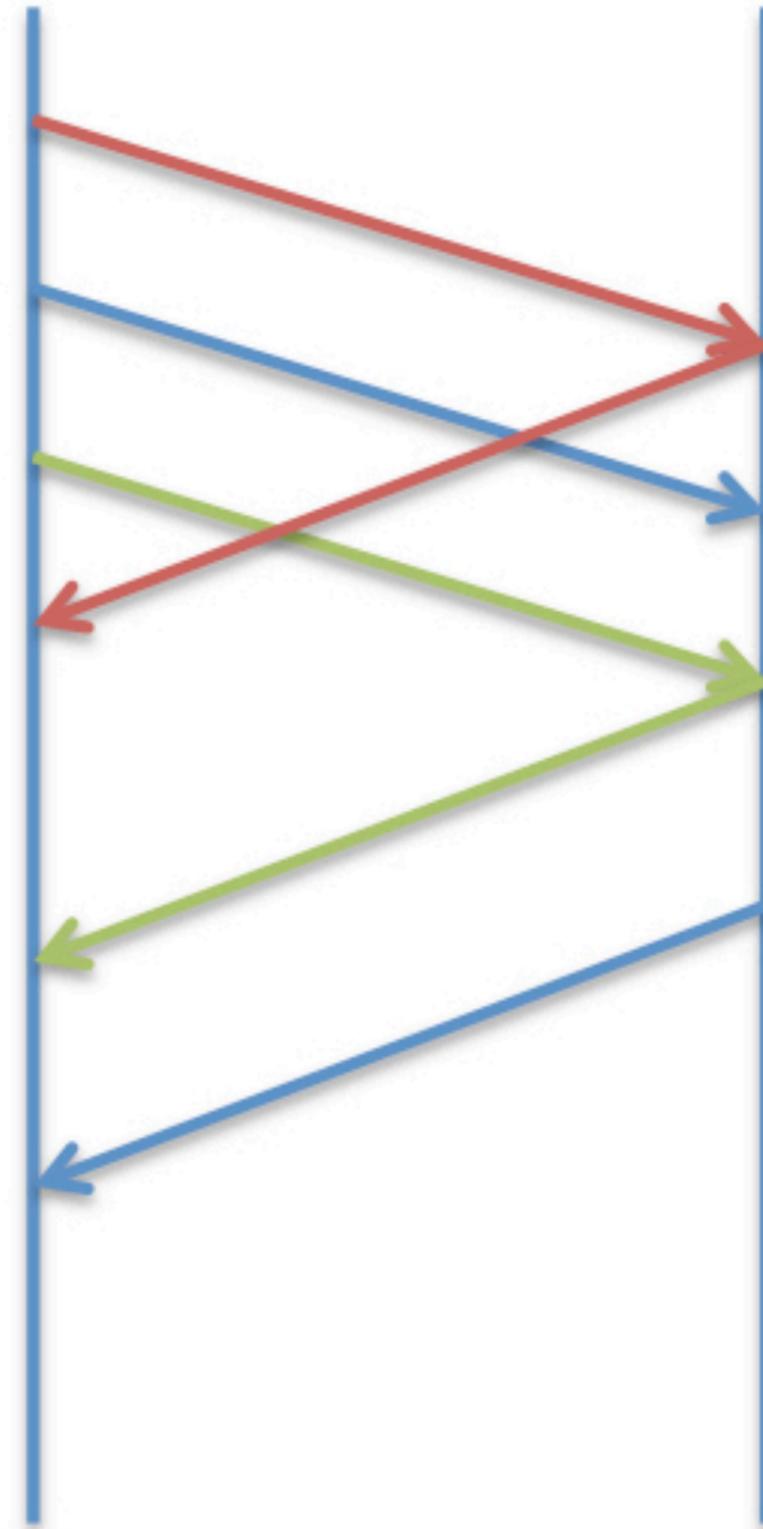
Server



realtime communication

Client

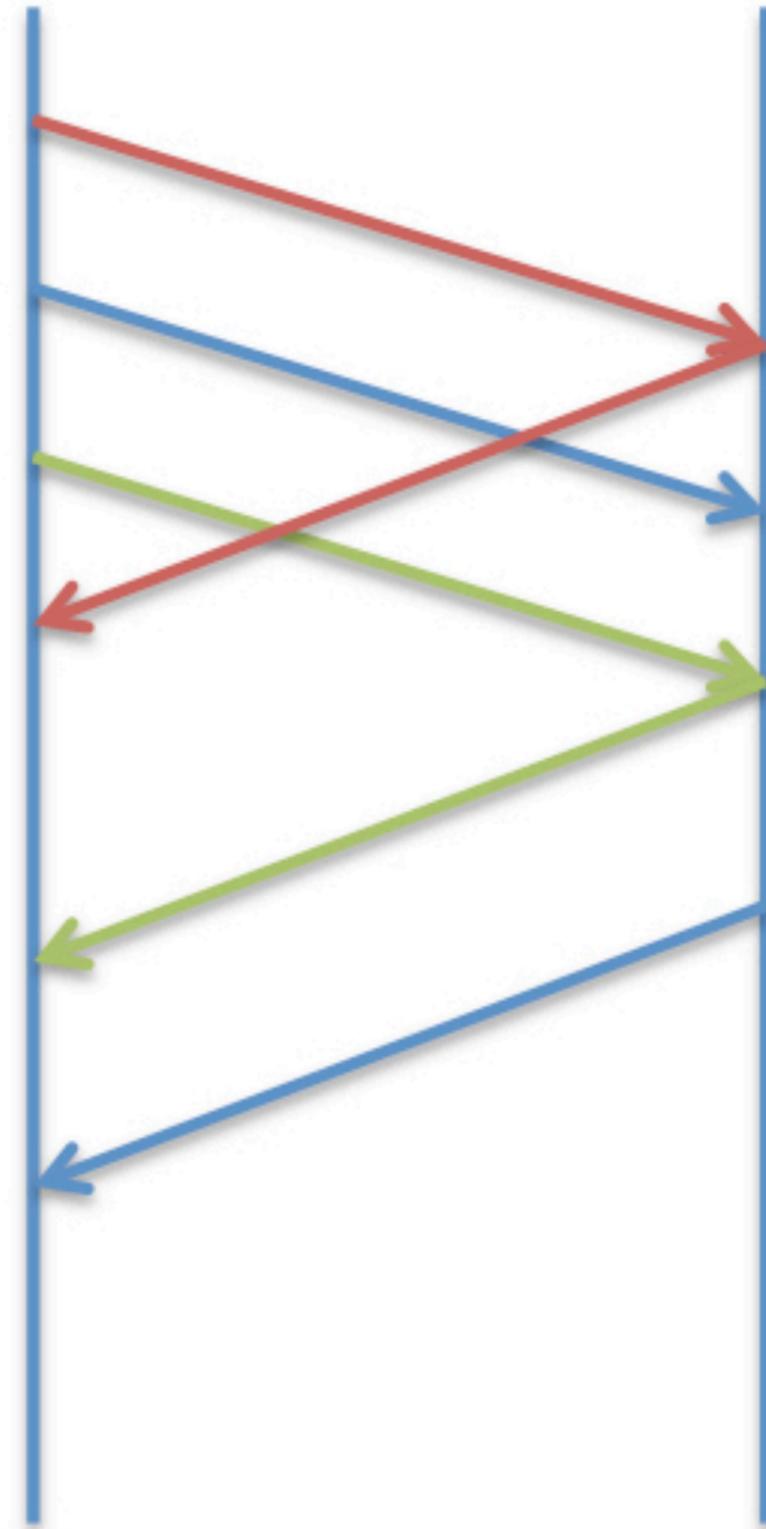
Server



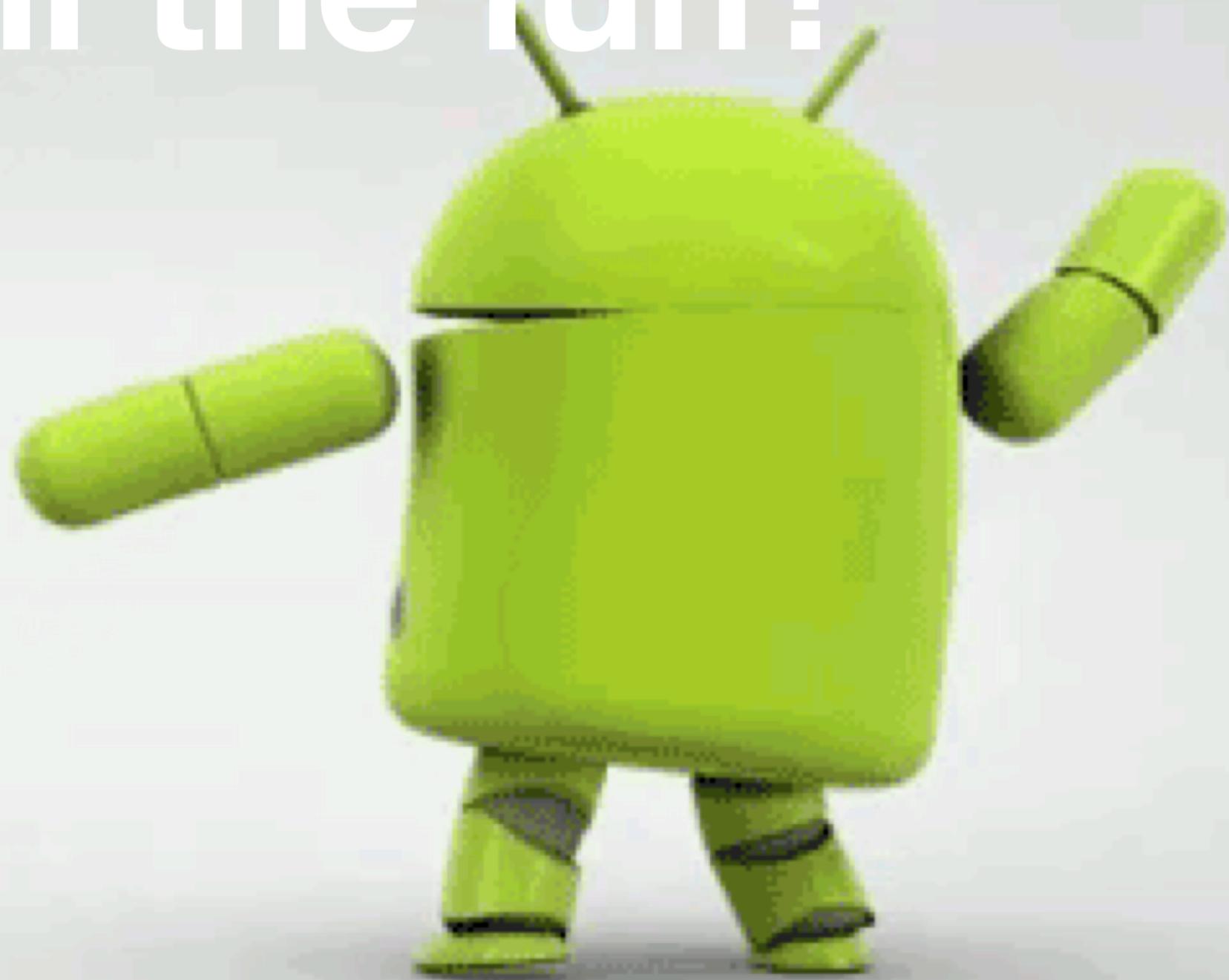
servers & clients

Client

Server

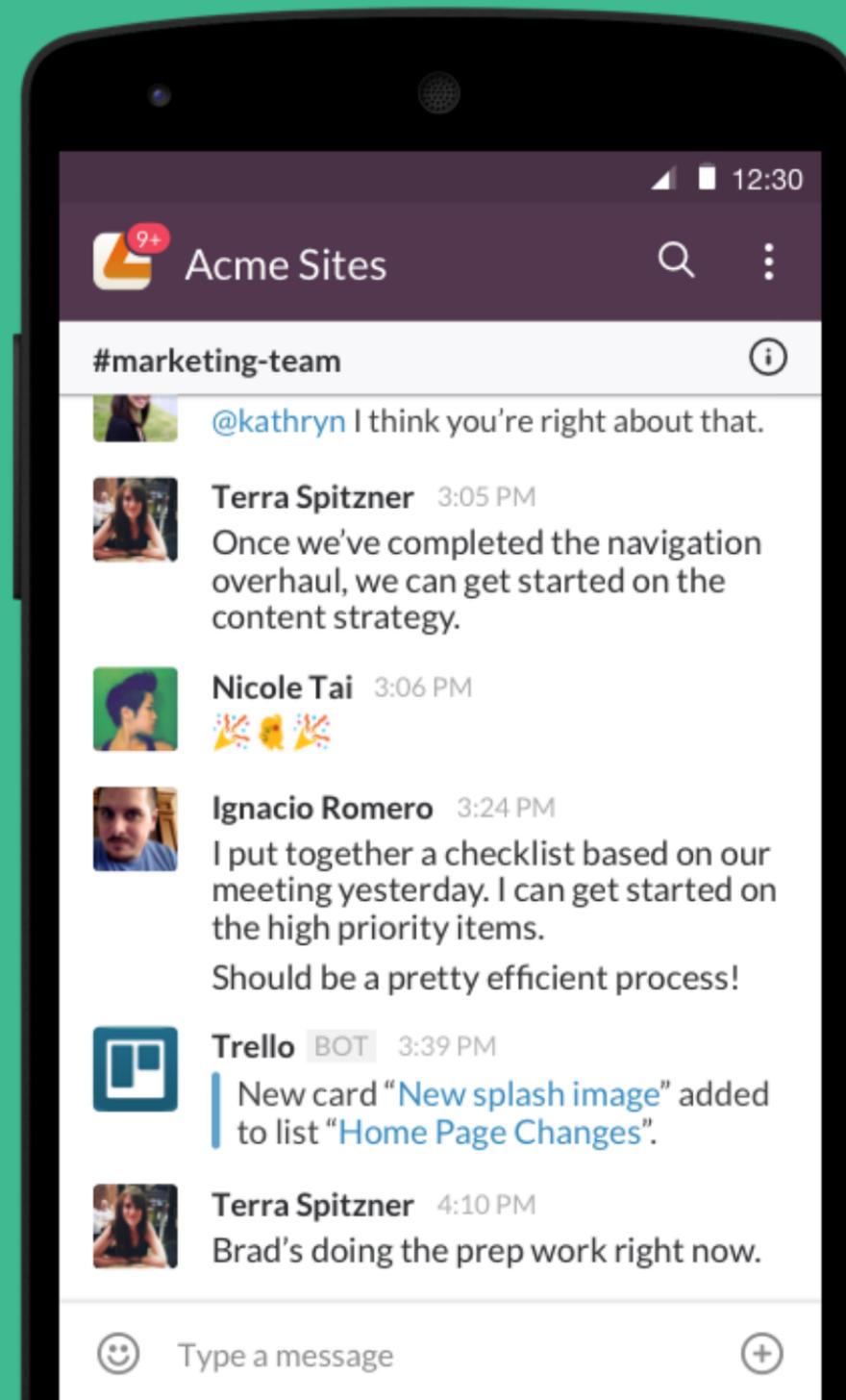


**Why should browsers
have all the fun?**

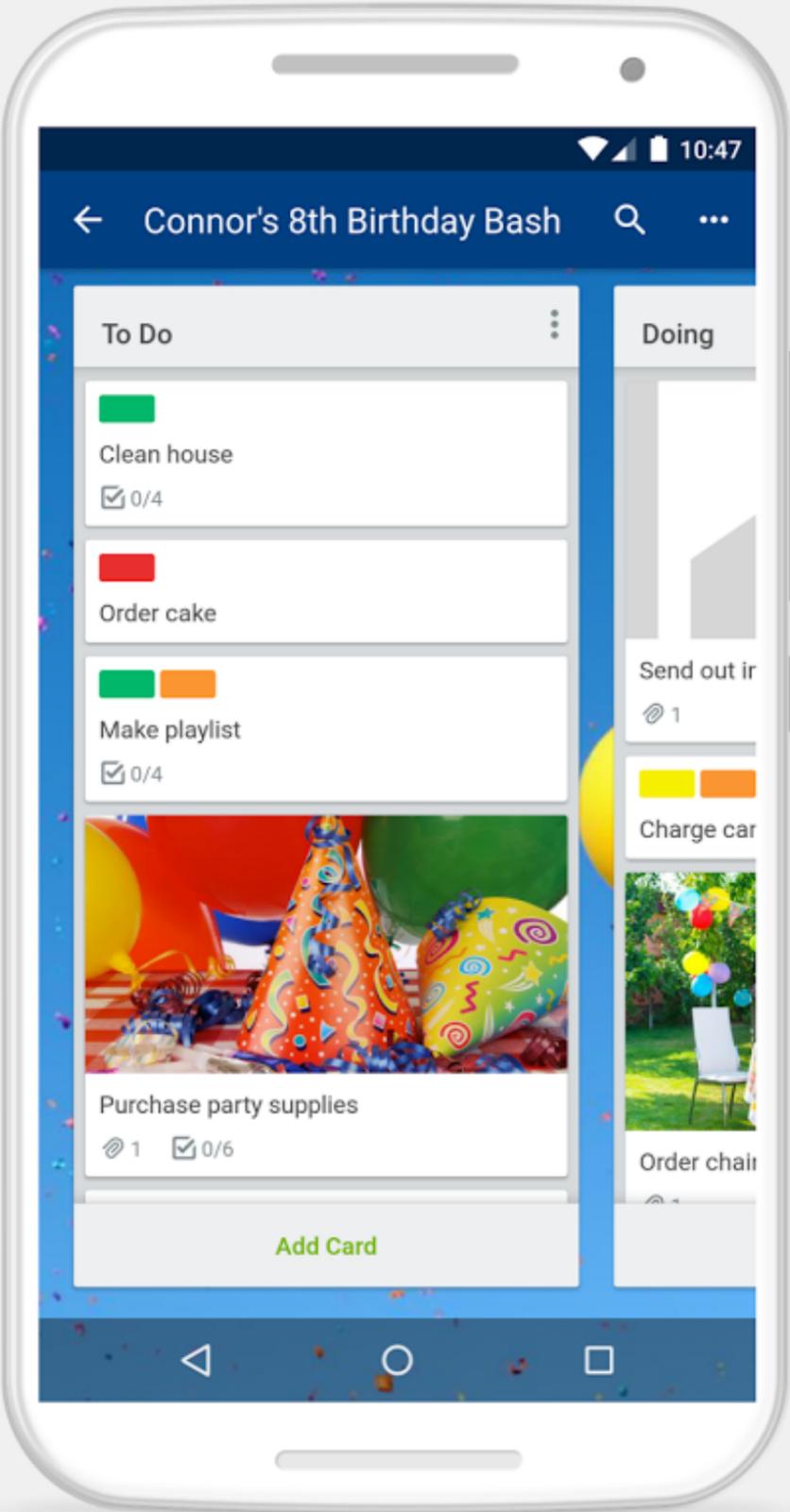


Who uses WebSockets?

All your team's messages, files
and services in one place.



Trello is the tool that lets you organize anything



How can I stop him?



Let's
Get
Started

Handshake



NEW EPISODE
CN
CARTOON NETWORK

gifs.com

HTTP request from client to server

GET /chat HTTP/1.1

Host: server.example.com

Upgrade: websocket

Connection: Upgrade

Connection upgrades to the WebSocket protocol

HTTP/1.1 101 Switching Protocols

Upgrade: websocket

Connection: Upgrade

Lifecycle



Open

Send & receive messages

Close

PERSISTENT CONNECTION



- **Connecting:**
 - **Enqueue messages**
 - **Won't be sent yet**
- **Open:**
 - **Peer has accepted**
 - **Send away!**
- **Closing:**
 - **Graceful shutdown started**
 - **Send enqueued messages but no more**

- **Closed:**
 - **all messages sent/received**
- **Canceled:**
 - **Connection failed.**
 - **Messages may fail**

Echo



Echo Test

The first section of this page will let you do an HTML5 WebSocket test against the echo server. The second section walks you through creating a WebSocket application yourself.

You can also [inspect WebSocket messages](#) using your browser.

Try it out!

 This browser supports WebSocket.

Location:

Use secure WebSocket (TLS)

Message:

Log:

OkHttp



Download v3.7.0



An HTTP & HTTP/2 client for Android and Java applications

Overview

HTTP is the way modern applications network. It's how we exchange data & media. Doing HTTP efficiently makes your stuff load faster and saves bandwidth.

OkHttp is an HTTP client that's efficient by default:

- HTTP/2 support allows all requests to the same host to share a socket.
- Connection pooling reduces request latency (if HTTP/2 isn't available).
- Transparent GZIP shrinks download sizes.
- Response caching avoids the network completely for repeat requests.

Overview

Examples

Download

Contributing

License

What is OkHttp

- **HTTP client**
- **Powered Retrofit**
- **Added native WebSocket support recently**

```
private final class EchoWebSocketListener
    extends WebSocketListener {

    public void onOpen(WebSocket, Response){}

    public void onMessage(WebSocket, String){}

    public void onMessage(WebSocket, ByteString){}

    public void onClose(WebSocket,
        int code, String reason){}

    public void onFailure(WebSocket,
        Throwable, Response){}
}
```

```
public void onOpen(WebSocket websocket, Response response) {  
    websocket.send("Hello!");  
    websocket.send(ByteString.decodeHex("deadbeef"));  
    // 1000 is like HTTP's 200  
    websocket.close(1000, "Goodbye!");  
}
```

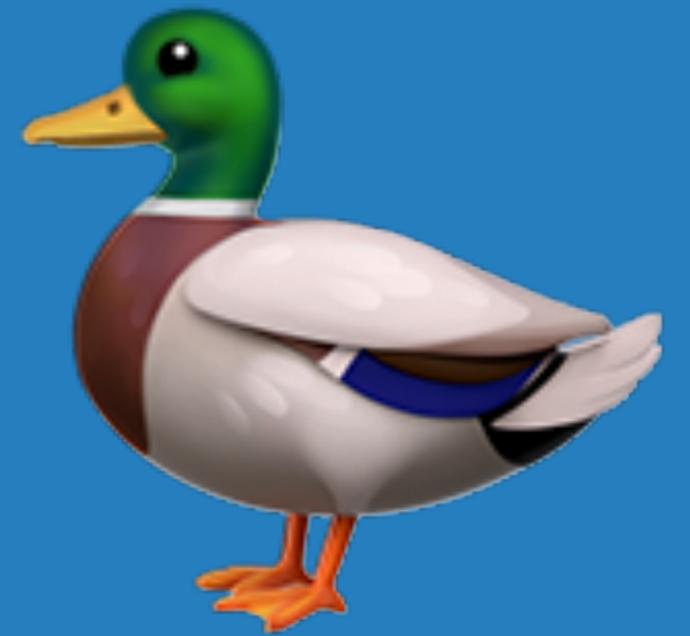
```
public void onMessage(WebSocket websocket, String text) {  
    Log.d(TAG, "Receiving: " + text);  
}
```

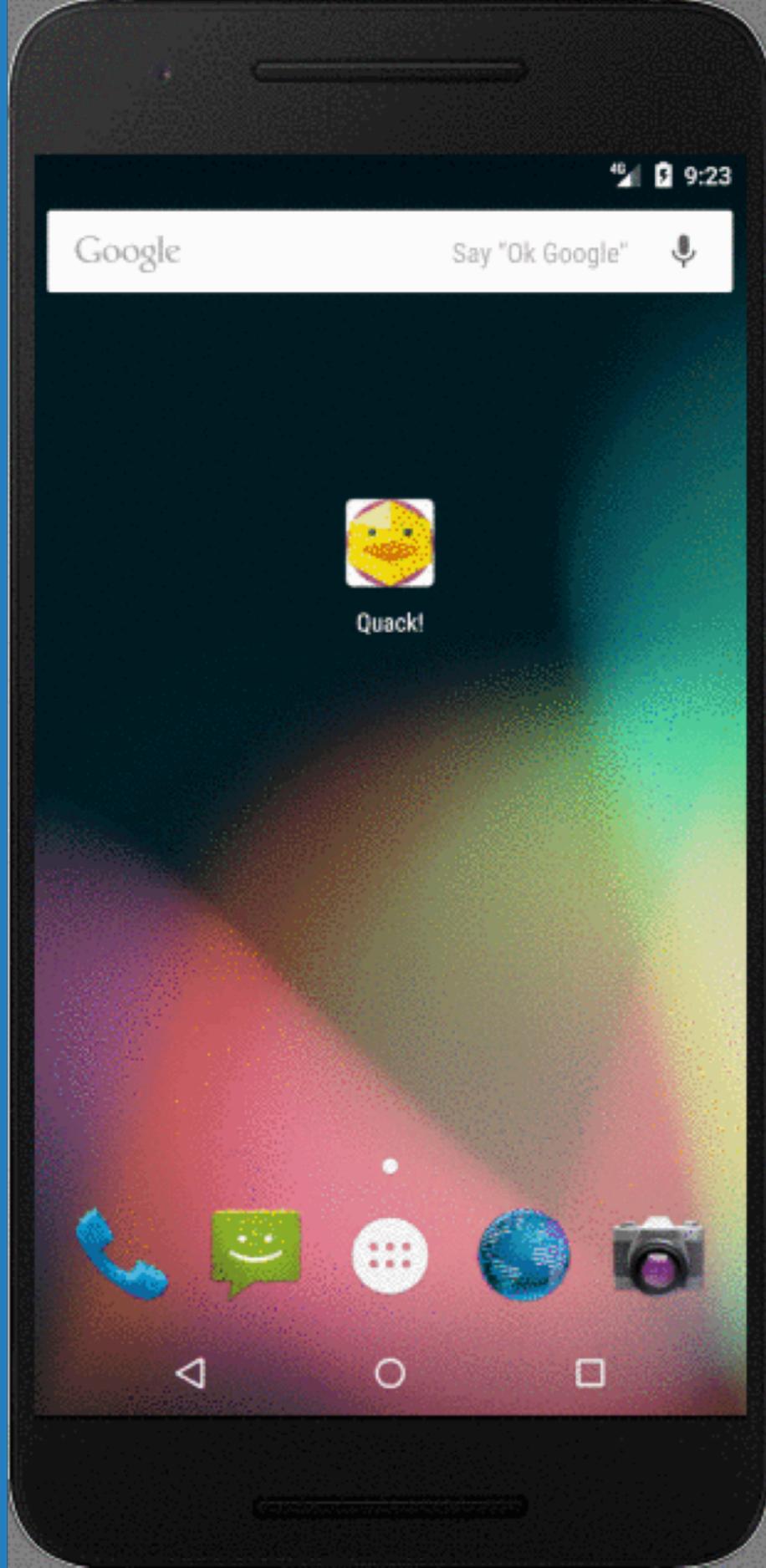
```
public void onMessage(WebSocket websocket, ByteString bytes) {  
    Log.d(TAG, "Receiving bytes: " + bytes.hex());  
}
```

```
public void onClose(Websocket websocket,  
    int code, String reason) {  
    Log.d(TAG, "Closing: " + code + " / " + reason);  
}
```

```
public void onFailure(Websocket websocket,  
    Throwable t, Response response) {  
    Log.e(TAG, "Error: " + response.toString(), t);  
}
```

Quack!





github.com/ChrisGuzman/Quack



Update UI on
the main thread

Update UI on the main thread

(And introducing the emoji scale of ease)

runOnUiThread()

```
public void onMessage(WebSocket websocket, String text) {  
    runOnUiThread(new Runnable() {  
        @Override  
        public void run() {  
            chatTxt.setText(text);  
        }  
    });  
}
```

Rating:



Piece of cake

EventBus

```
public void onMessage(WebSocket websocket, String text) {  
    EventBus.getDefault().post(new MessageEvent(text));  
}
```

```
@Subscribe(threadMode = ThreadMode.MAIN)  
public void onMessage(MessageEvent event) {  
    textView.setText(event.getText());  
}
```

Rating:



**Simple & easy to use, if that's
your cup of tea**

Manage threads

- AsyncTask
- Handlers
- Loopers
- HandlerThread
- ThreadPool
- Loader
- IntentService
- BroadcastReceiver
- LocalBroadcastManager



Stacy Devino:

Async Tasks, Threads, Pools, and Executors

Android Performance Patterns Season 5

Rating:

A little messy, but all the ingredients are there



RxJava

```
Observable.create(new Observable.OnSubscribe<RxEvent>() {  
    @Override  
    public void call(final Subscriber<? super RxEvent> subscriber) {  
        @Override  
        public void onMessage(WebSocket websocket, String text) {  
            subscriber.onNext(new RxEventStringMessage(websocket, text));  
        }  
    }  
})
```

<https://github.com/jacek-marchwicki/JavaWebsocketClient>

Rating:



Easier if you watch someone do it first. Can take some time to setup

Kinda like chipotle

Binary data with ByteString



Encode

```
ByteArrayOutputStream stream =  
    new ByteArrayOutputStream();  
  
bitmap.compress(  
    Bitmap.CompressFormat.JPEG, 100, stream);  
  
byte[] bitMapData = stream.toByteArray();  
  
OkHttpWebSocket.send(ByteString.of(bitMapData));
```

Decode

```
String strBase64 = bytes.base64();
```

```
byte[] decodedString = Base64.decode(  
    strBase64, Base64.DEFAULT);
```

```
Bitmap decodedByte = BitmapFactory.decodeByteArray(  
    decodedString, 0, decodedString.length);
```

```
imageView.setImageBitmap(decodedByte);
```

Or...

Send link to media

Download over HTTP

Show media after downloaded

Persistent Connection

- **Wrap OkHttpClient in a singleton**
- **Pass around activities**
- **Stop when backgrounded**
- **Make new connection when foregrounded**

Heartbeat



- **Server pings, client pongs.**
- **No pong? Server closes connection.**
- **Prevents proxies & firewalls from closing inactive connections**
- **Also helpful to conserve resources**

OkHttp Ping/Pong

- **OkHttp handles pings automatically, though not customizable**
- **You can set a ping interval with**
`OkHttpClient.Builder().pingInterval()`

What about Sockets?

- **Just different protocol**
- **Agreed upon standards**
- **GCM/FCM uses idle socket connection**

WebSocket Benefits

- More likely to be offered as API
- Implement security scheme
(ws vs wss)

Watch out!

- **Implement your own queue**
- **Don't expect graceful shutdowns!**
- **You sent your messages, but peer closed abruptly?**
 - Peer won't get messages.**
- **Constant open connection can drain batteries**
- **Could be negatively affected by Doze**
- **Not supported directly by HTTP/2**

Workarounds

- **Don't keep connections open in the background**
- **Fall back to push notifications for persistence**
- **WebSockets are more performant than polling:
Less device waking**

Other libraries?



SOCKET.IO 1.0 IS HERE

FEATURING THE FASTEST AND MOST RELIABLE REAL-TIME ENGINE

```
~/Projects/tweets/index.js  
  
1. var io = require('socket.io')(80);  
2. var cfg = require('./config.json');  
3. var tw = require('node-tweet-stream')(cfg);  
4. tw.track('socket.io');  
5. tw.track('javascript');  
6. tw.on('tweet', function(tweet){  
7.   io.emit('tweet', tweet);  
8. });
```

https://your-node-app.com

Tweets about **socket.io** and **javascript**

-  RT @rickySolon: "The Software Developer's Library... [now](#)
-  .@reactjs If anyone else gets lost, I found these po... [now](#)
-  For those looking at #bootcamps in the #Chicago ... [now](#)
-  RT @daedalus418: The Habits of Effective JavaScri... [now](#)

Socket.io

- Not really websockets, but that's good!
- It falls back to polling if no WS connection
- Need to use Socket.IO on client *and* server
- Has binary streaming (image, audio, video)
- Open source, run by contributors

PubNub

- Provide subscribe/publish key, & channel name
- Has public channels you can mess around with

Pusher

- **WebSockets, with HTTP fallback**
- **(beta) Support for GCM/FCM**

Fun

Experiments

Pusher Realtime Reddit API POWERED BY PUSHER

This is Reddit, viewer discretion is strongly advised

Fork me on GitHub

AskReddit

Listening ↻

Have you ever encountered someone you know in person on Reddit? What happened?

what do you's where to bed?

What is keeping you from your dreams? What are you going to do about it?

Married people of Reddit: Why are you still married?

Which questions are you tired of seeing on this sub?

Americans of Reddit, how popular are peanut butter and jelly sandwiches these days?

Redditors, Which song was ruined for you when you used it as ringtone?

What's happened in your lives that seems like something straight from a book/movie/fairy-tale? Whether good or bad, how did it impact your life?

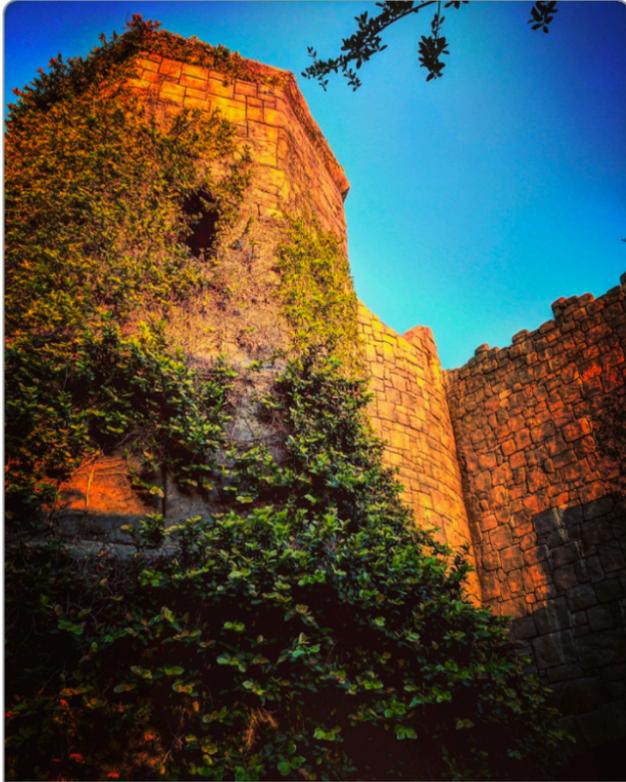
Can anyone who works for an Airline share more details about how people are actually selected for involuntary

reddit.com/r/pics/comments/6591d6/when_this_is_your_work_place/

pics

Listening ↻

Scottsdale, Arizona in full bloom [OC]



When this is your work place

Oh Chip, you drive me nuts!

Love it when this happens

gifs

Listening ↻



Reese Witherspoon makes the cutest face eva



If Darth Vader and Annie Wilkes would have a baby it would definety look like that! SO evil and CUTE | Evil Baby looks evil

a

Listening ↻



[1080 x 1920] Coronado Beach, CA



Saw an Arkansas Post: Had to Keep it



Twitter Stream

A realtime stream of actual messages on Twitter at a maximum rate of 50 Tweets per second.
Author: [Stephen Blum](#)

-  **julien baker fan act**@loganhamilton_
please dont get me killed @POTUS
-  **Steven Edmunds**@stevenedmunds39
Allisha Gray Overall 4th pick in the WNBA Draft 2017
-  **Santignac**@PepePotente
como cuando te estas rasurando y sin querer te cortas un huevit... epaleeee
-  **D a n i a**👑@Dania_12maria
MI tweet fijado es para ti @RKARTISTA
-  **Jen**@Jennalauren11
@kgainespdx @dgibsonpdx who voted no imma fight them
-  **Sean McCue**@SKMQU
@mikeviltig 🐕🍷

[Chat with us](#) 



Wikipedia Changes

This data stream provides any recent modifications to the database of Wikipedia articles, in all languages and categories.

event	item	user	link
wiki modification	User:Ocfootballknut/sandbox/Draft Work Area	Ocfootballknut	https://en.wikipedia.org/w/index.php?diff=775297549&oldid=775297462
wiki modification	Vezot	EP111	https://en.wikipedia.org/w/index.php?diff=775297550&oldid=763506242
wiki modification	Clap Your Hands Say Yeah	Happyomen	https://en.wikipedia.org/w/index.php?diff=775297552&oldid=775296637
wiki modification	Talk:Casablanca (film)	Kmhkmh	https://en.wikipedia.org/w/index.php?diff=775297551&oldid=775285753
wiki modification	Like the Way I Do	EI C	https://en.wikipedia.org/w/index.php?diff=775297553&oldid=775295992
wiki modification	Serpentine soil	73.170.227.250	https://en.wikipedia.org/w/index.php?diff=775297554&oldid=775297526
wiki modification	Draft:Jay Dunlap	Mgabir26	https://en.wikipedia.org/w/index.php?diff=775297555&oldid=775297258
wiki modification	Sulaiman Khatib	Wiae	https://en.wikipedia.org/w/index.php?diff=775297556&oldid=775297515

[view in console](#)

What else?

- Long polling/Comet/Keep Alive
- Server Side Events
- IRC (TCP)
- MQTT (how **FB Messenger** worked)
- XMPP (how **WhatsApp** works)
- HTTP/2

WebSockets vs WebRTC

- **WebRTC is peer to peer, not client/server**
- **WebRTC is better suited for audio/video**
- **WebSockets are better for text or transferring of bytes**

- **Java-WebSocket**
- **AndroidAsync**
- **How we built r/place**
- **Building r/place in a weekend**
- **r/place alternatives**

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chris-guzman.com

github.com/ChrisGuzman/Quack

The Vonage[®] API Platform