PiterPy

TECHNICAL CONFERENCE FOR HARDCORE PYTHON DEVELOPERS

SAINT PETERSBURG
2019 NOVEMBER 1

Python network workflow

REST, JSON, GraphQL or gRPC?

Grigory Petrov

What's next?

Speaker	Grigory Petrov
Specialization	Generalist
Role	DevRel at Evrone
Experience	20 years
Talk time	30 minutes
Questions	At the end of the talk, 15 minutes
Slides	

Let's use social networks to communicate

	grigoryvp	@evrone.com
t.me/	grigoryvp	
fb.com/	grigoryvp	
vk.com/	grigoryvp	
github.com/	grigoryvp	
twitter.com/	grigoryvp	
instagram.com/	grigoryvp	

↓

@grigoryvp

Some history of network communications

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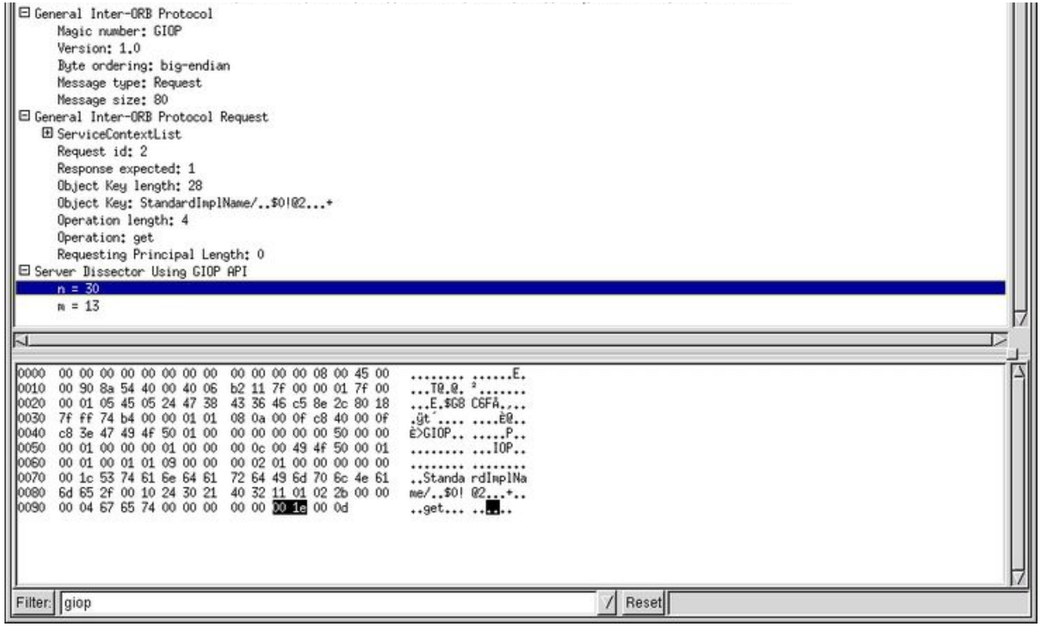
- 1990s: CORBA RPC.



```
⊟ General Inter-ORB Protocol
    Magic number: GIOP
    Version: 1.0
    Byte ordering: big-endian
    Message type: Request
    Message size: 80
⊟ General Inter-ORB Protocol Request
  ⊞ ServiceContextList
    Request id: 2
    Response expected: 1
    Object Key length: 28
    Object Key: StandardImplName/..$0!@2...+
    Operation length: 4
    Operation: get
    Requesting Principal Length: 0
⊟ Server Dissector Using GIOP API
    n = 30
    m = 13
```

```
0000  00 00 00 00 00 00 00 00  00 00 00 00 08 00 45 00   ........ ......E.
0010  00 90 8a 54 40 00 40 06  b2 11 7f 00 00 01 7f 00   ...T@.@. ².......
0020  00 01 05 45 05 24 47 38  43 36 46 c5 8e 2c 80 18   ...E.$G8 C6FÅ.,..
0030  7f ff 74 b4 00 00 01 01  08 0a 00 0f c8 40 00 0f   .ÿt´.... ....È@..
0040  c8 3e 47 49 4f 50 01 00  00 00 00 00 00 50 00 00   È>GIOP.. .....P..
0050  00 01 00 00 00 01 00 00  00 0c 00 49 4f 50 00 01   ........ ...IOP..
0060  00 01 00 01 01 09 00 00  00 02 01 00 00 00 00 00   ........ ........
0070  00 1c 53 74 61 6e 64 61  72 64 49 6d 70 6c 4e 61   ..Standa rdImplNa
0080  6d 65 2f 00 10 24 30 21  40 32 11 01 02 2b 00 00   me/..$0! @2...+..
0090  00 04 67 65 74 00 00 00  00 00 00 1e 00 0d         ..get... ......
```

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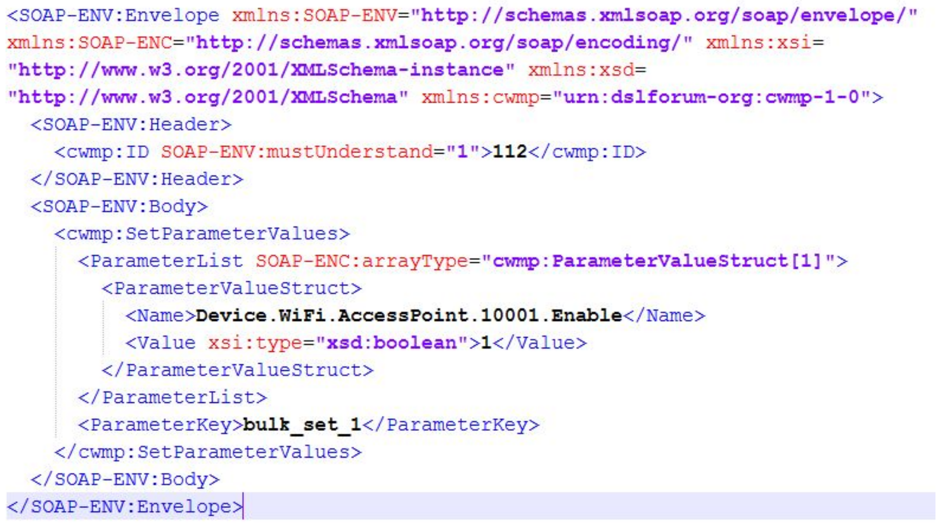

```
<SOAP-ENV:Envelope xmlns:SOAP-ENV="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:SOAP-ENC="http://schemas.xmlsoap.org/soap/encoding/" xmlns:xsi=
"http://www.w3.org/2001/XMLSchema-instance" xmlns:xsd=
"http://www.w3.org/2001/XMLSchema" xmlns:cwmp="urn:dslforum-org:cwmp-1-0">
  <SOAP-ENV:Header>
    <cwmp:ID SOAP-ENV:mustUnderstand="1">112</cwmp:ID>
  </SOAP-ENV:Header>
  <SOAP-ENV:Body>
    <cwmp:SetParameterValues>
      <ParameterList SOAP-ENC:arrayType="cwmp:ParameterValueStruct[1]">
        <ParameterValueStruct>
          <Name>Device.WiFi.AccessPoint.10001.Enable</Name>
          <Value xsi:type="xsd:boolean">1</Value>
        </ParameterValueStruct>
      </ParameterList>
      <ParameterKey>bulk_set_1</ParameterKey>
    </cwmp:SetParameterValues>
  </SOAP-ENV:Body>
</SOAP-ENV:Envelope>
```

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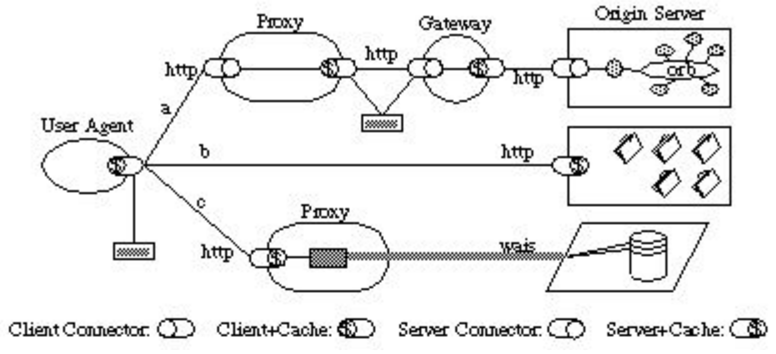
- Year 2000: Roy Fielding REST doctoral dissertation.



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- Year 2003: Rails with its opinion about REST, JSON and URLs.

Why so popular?

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Complexity offload.

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Complexity offload into:

- URLs.

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URLs.

- HTTP Headers.

Why so popular?

Complexity offload into:

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- JSON payloads.

Why so popular?

Complexity offload into:

URLs.

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JSON payloads.

- Existing browsers and servers.

Why so popular?

Roy Fielding, REST author

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- Co-authored URI and HTTP.

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- "REST" **is** "Web".

Why so popular?

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"REST" **is** "Web".

- Well suited for CRUD.

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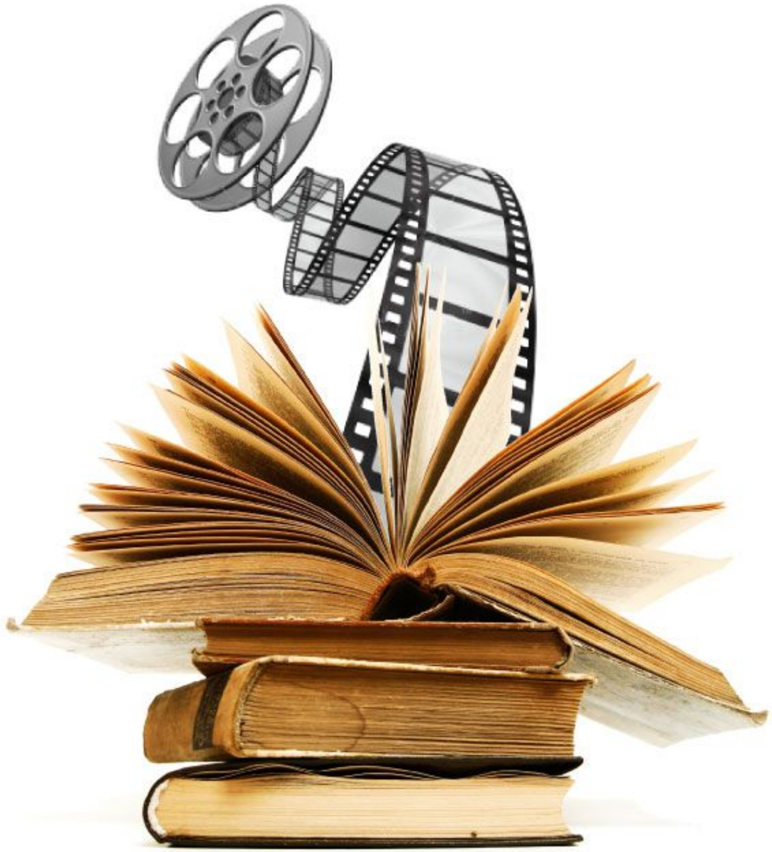
- Year 2004: Gmail

Evolution from SSR to SPA



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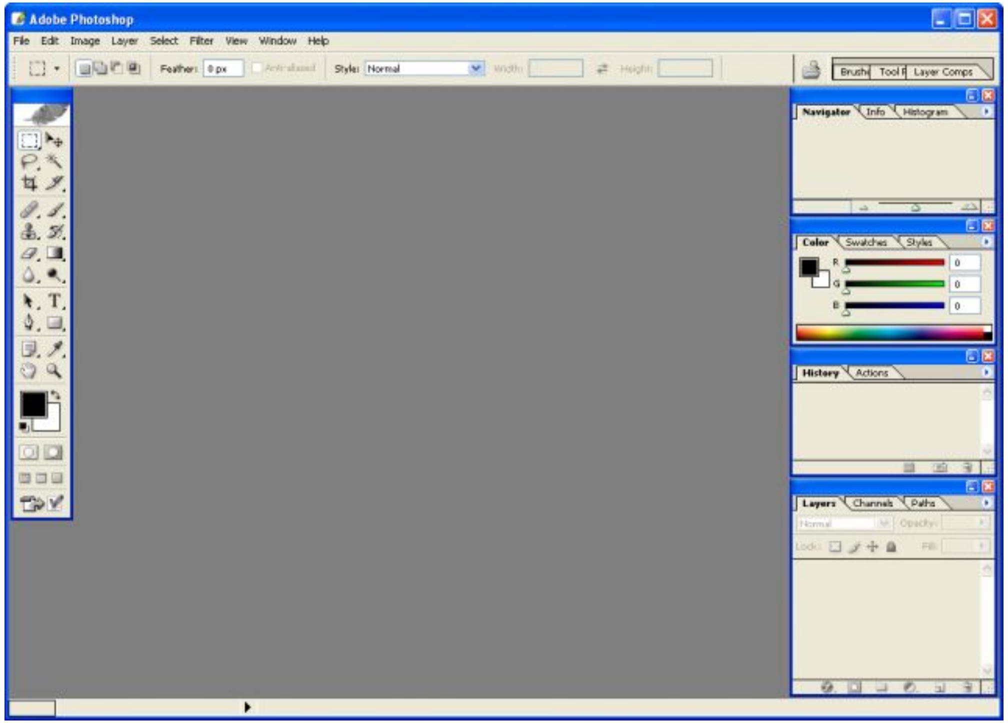
We expect "applications" to be fast



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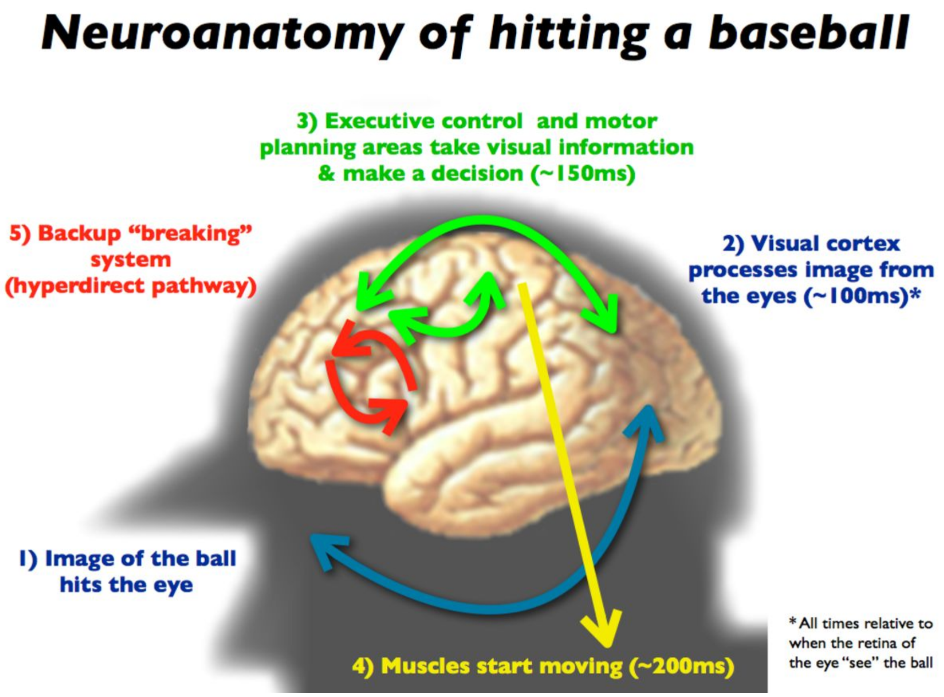
We expect "application" reaction under 150ms



Neuroanatomy of hitting a baseball
3) Executive control and motor planning areas take visual information & make a decision (~150ms)
5) Backup "breaking" system (hyperdirect pathway)
2) Visual cortex processes image from the eyes (~100ms)*
1) Image of the ball hits the eye
4) Muscles start moving (~200ms)
*All times relative to when the retina of the eye "see" the ball

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Network efficiency challenge

Network efficiency challenge

- TCP 3-way handshake, graceful shutdown and RTT latency.

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- HTTPS handshake.

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Underfetching.

- Over-fetching and internet speed.

Network efficiency challenge

TCP 3-way handshake, graceful shutdown and RTT latency.
HTTPS handshake.
6-connection limit.
Underfetching.
Over-fetching and internet speed.

- Payload size.

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REST evolution to answer the efficiency challenge

{REST}

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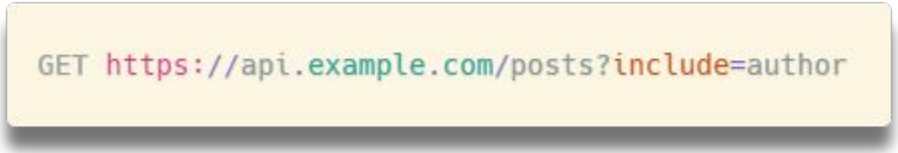

```
GET https://api.example.com/posts?include=author
```

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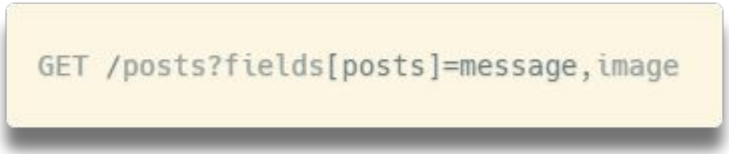
REST evolution to answer the efficiency challenge

May 2013, "JSON:API" extracted from Ember.js

Compound documents.

- Sparse fieldsets.



```
GET /posts?fields[posts]=message,image
```

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Also, not to confuse with:

- OpenAPI and RAML API definition languages.

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- "JSON Schema" data definition language.

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- Django Rest Framework with **drf_yasg**.

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- **aiohttp-apispec**

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aiohttp-apispec

- ... and much more.

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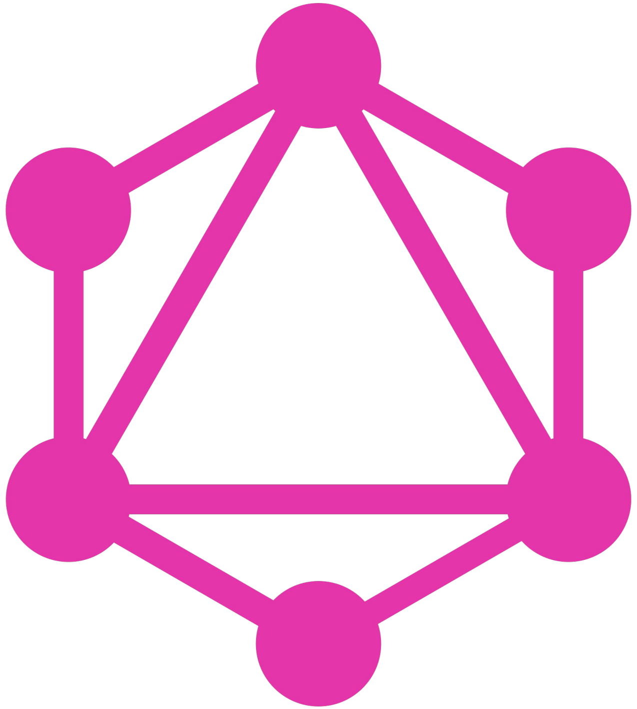
Other challengers: GraphQL



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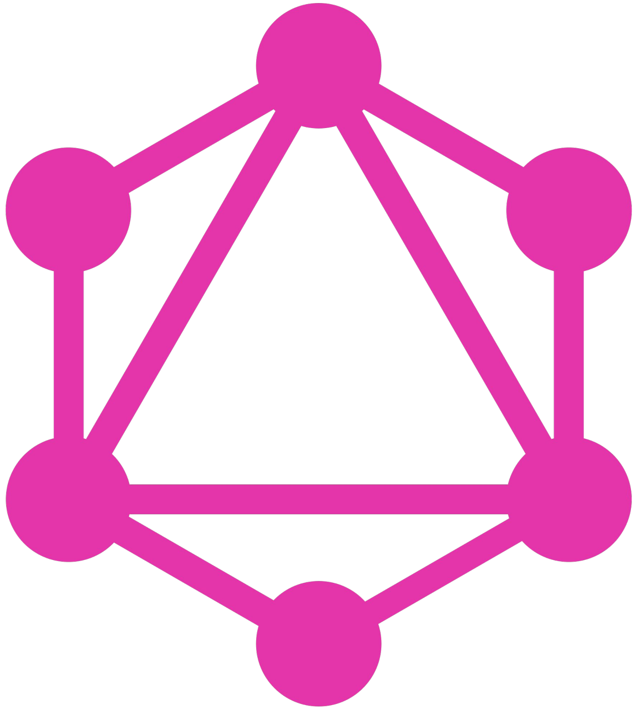

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- **Graphene** with **graphene-django**.

Other challengers: GraphQL

Graphene with **graphene-django**.

- **Ariadne**, **Strawberry**, **Tartiflette**, **tartiflette-aiohttp**.

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Trades REST "resources" for transfer efficiency.

- Fast, low-level, backend-to-backend.

Other challengers: gRPC

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- Official **grpcio-tools** generator from Google.

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- **mypy-protobuf** from Dropbox.

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Other challengers: HTTP/2

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- Fixes TCP and HTTP issues.

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Fixes TCP and HTTP issues.

- Brings back REST!

Other challengers: HTTP/2

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- **Hypercorn** with ASGI for **Quart**.

Other challengers: HTTP/2

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- **Hyper-h2** or **httpx** for HTTP/2 clients (alpha versions!).

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- **Django-channels**, **Sanic, Twisted**.

Other challengers: HTTP/2

Hypercorn with ASGI for **Quart**.

Hyper-h2 or **httpx** for HTTP/2 clients (alpha versions!).

Django-channels, **Sanic, Twisted**.

- Or just use the HTTP/2 proxy.

~~Conclusion~~ What I want to discuss at this conference

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- GraphQL and JSON:API are net hacks.

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GraphQL and JSON:API are net hacks.

    Can be replaced with HTTP/2 for some use cases.

REST is best with CRUD, but not limited to it.

We can mix REST, RPC, gRPC, GraphQL, AMQP.

- Existing environment and business needs matters.

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The End

Questions?

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