

Exploring boto3 Events With Mitmproxy



Michael
Twomey



fourTheorem

AWS Bites

The screenshot shows the homepage of the AWS Bites website. At the top left is the "AWS BITES" logo with two speech bubble icons. To the right is a purple star icon. The main title "Quick bites of AWS" is in white, with "every week!" in yellow. Below the title is a short description: "AWS Bites is a weekly **podcast** where we answer interesting questions about **AWS** and **cloud computing**. A new episode goes live **every Friday morning**. Brought to you by [@eoins](#) and [@loige](#)." At the bottom, there's a "Listen to AWS Bites on:" section with links for YouTube, Spotify, Apple Podcasts, Google Podcasts, Anchor.fm, and RSS. A note at the bottom says "Or on Castbox, Overcast, Pocket Casts, and Amazon Podcasts".

AWS BITES

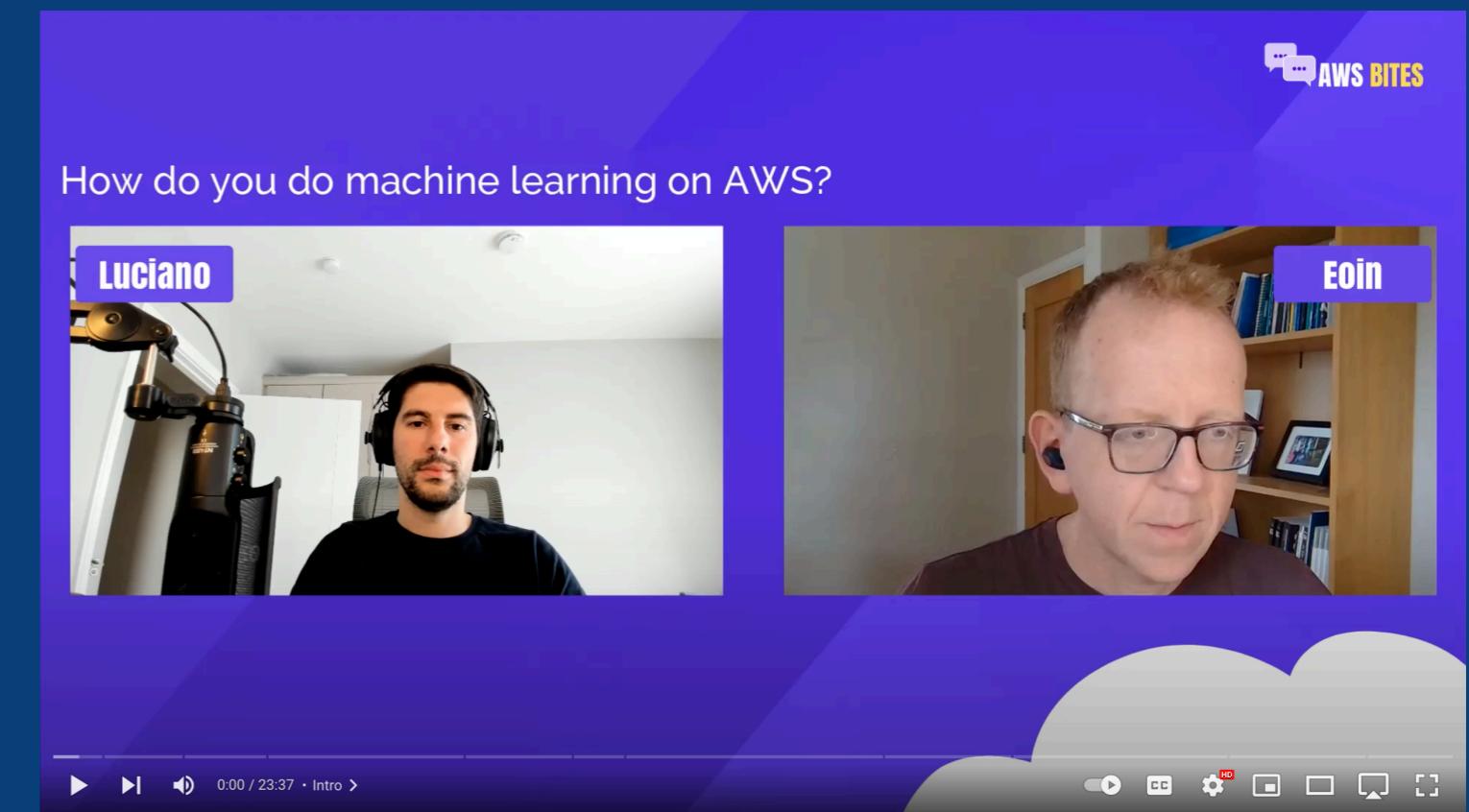
Quick bites of AWS
every week!

AWS Bites is a weekly **podcast** where we answer interesting questions about **AWS** and **cloud computing**. A new episode goes live **every Friday morning**. Brought to you by [@eoins](#) and [@loige](#).

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I'll be talking
about solving
a problem

AWS S3 ☁

boto3 🐍

HTTP 🌎

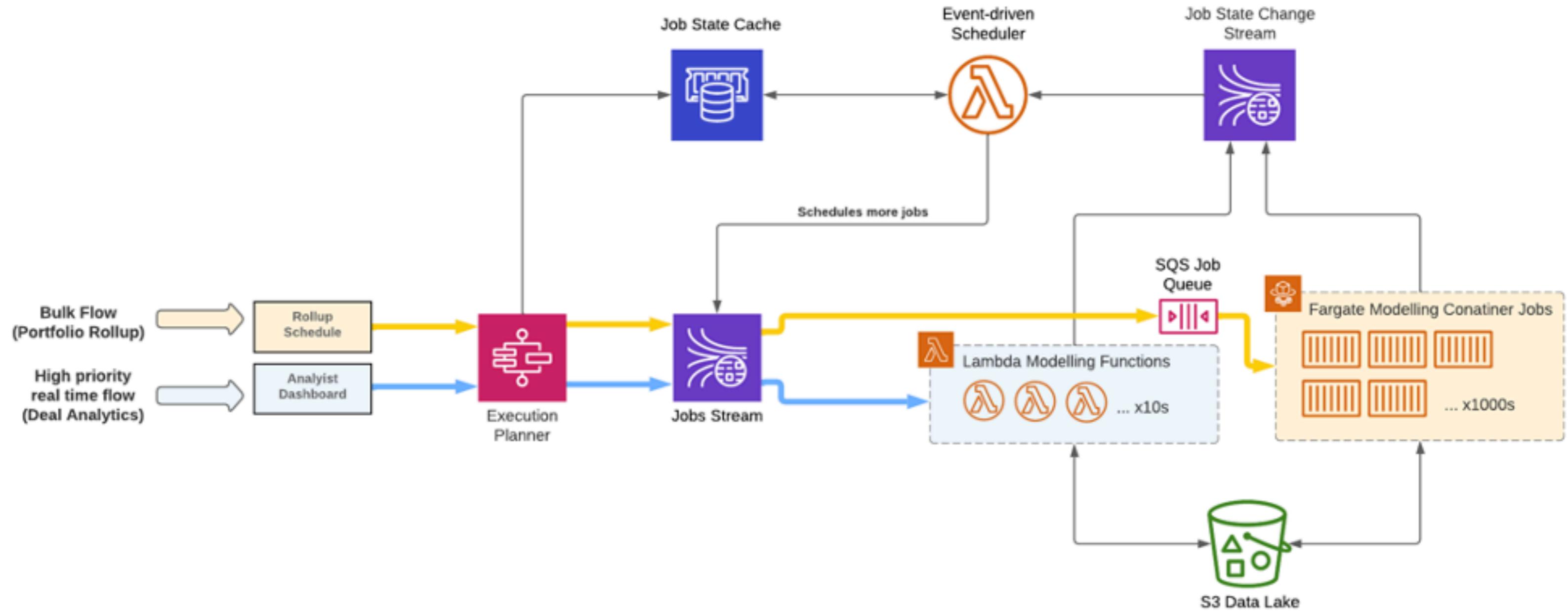
TLS 🔒

Python 🐍

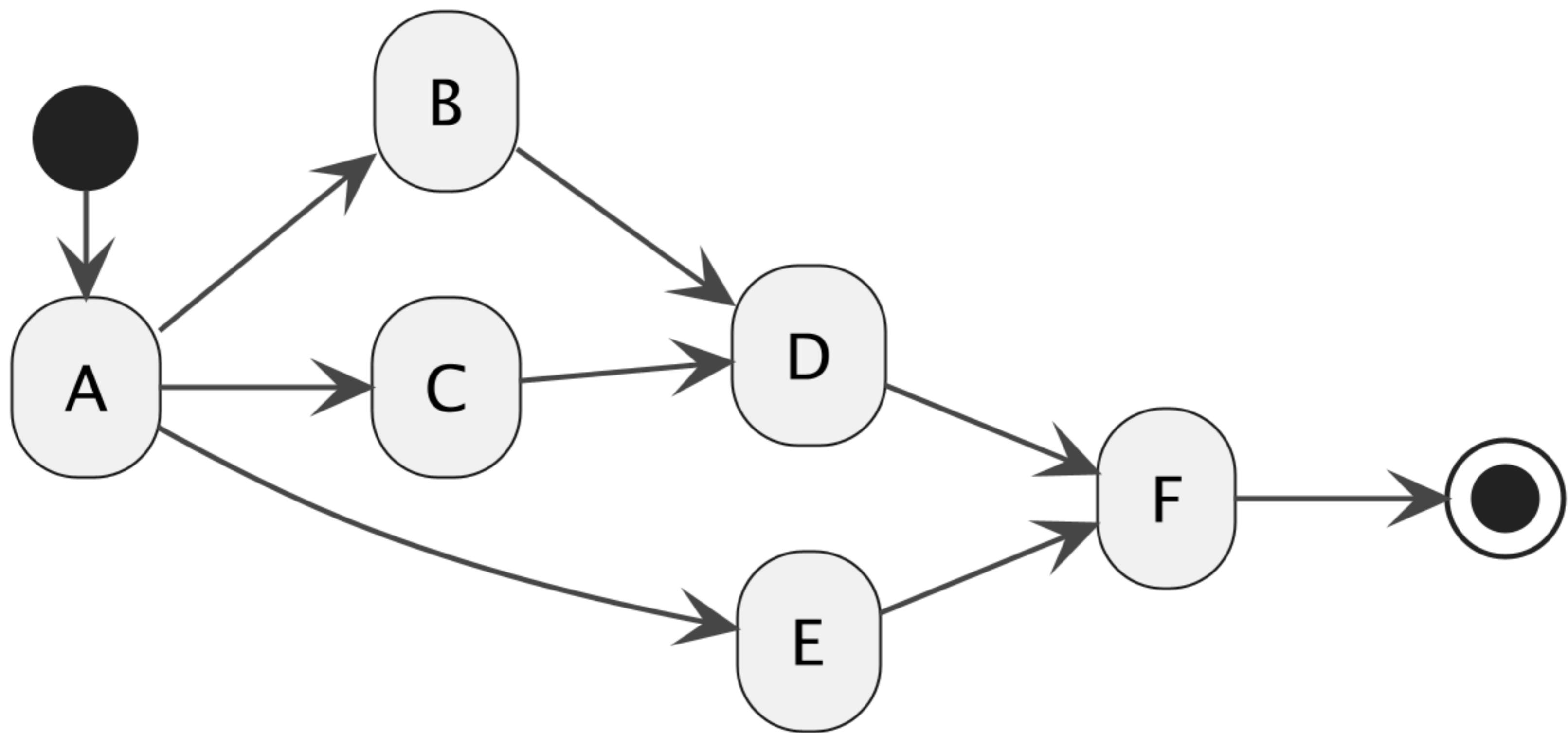
mitmproxy

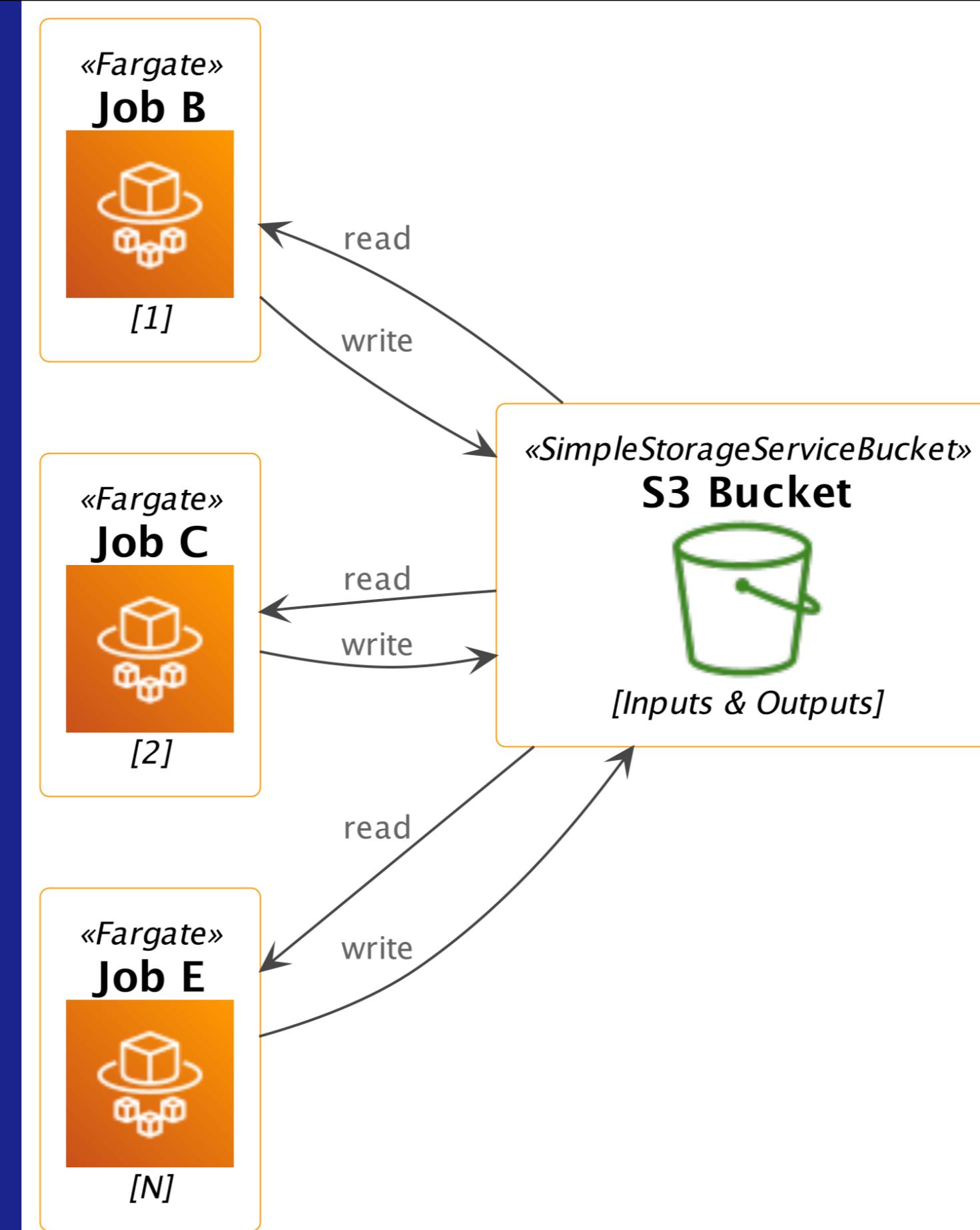


The Setup



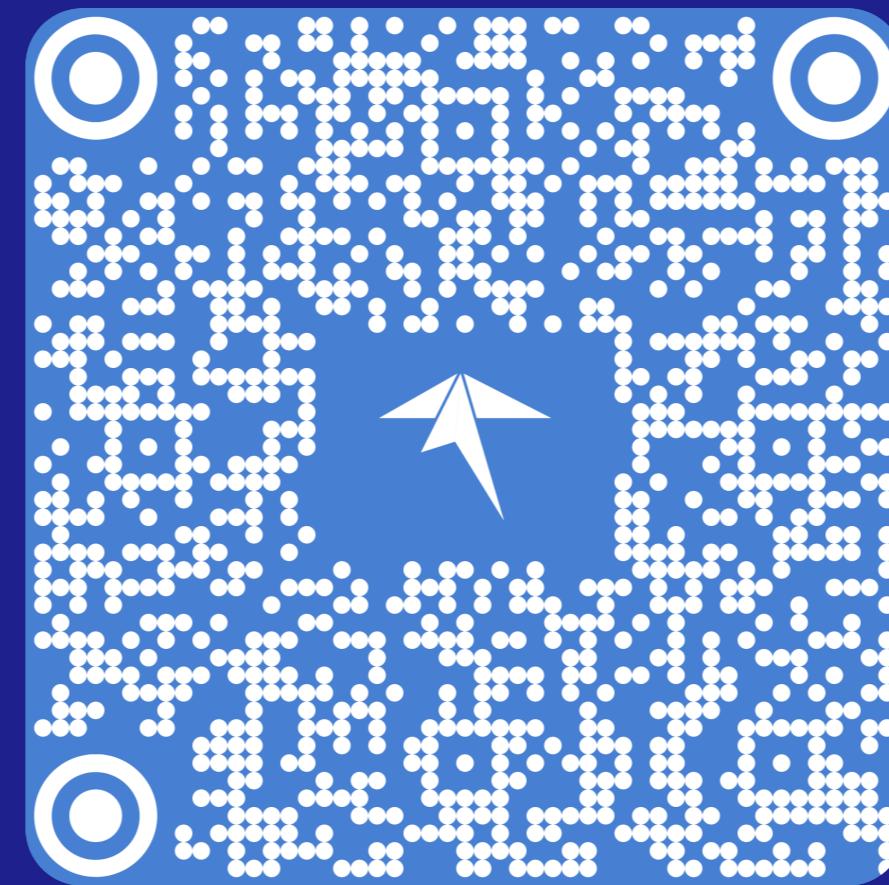






"A serverless architecture for high performance financial modelling"

<https://aws.amazon.com/blogs/hpc/a-serverless-architecture-for-high-performance-financial-modelling/>



```
import boto3

s3 = boto2.client("s3")
for input in stuff_to_process:
    # HTTP GET https://example.s3.eu-west-1.amazonaws.com/my-input-data
    response = s3.get_object(
        Bucket="example", Key="my-input-data"
    )
    data = do_stuff_with_input(response)
    # HTTP PUT https://example.s3.eu-west-1.amazonaws.com/my-output-data
    response = s3.put_object(
        Bucket="example", Key="my-output-data", Body=data
    )
# Fancier: multi-part upload with threaded transfer manager
s3.upload_fileobj(data, 'example', 'my-output-data')
```

The Problem:
We got one of the
dreaded questions

"Why is my compute job so slow?"

A clue in the logs

```
Traceback (most recent call last):
  File "...examples/s3_get_object.py", line 12, in <module>
    response = s3.get_object(Bucket=bucket, Key=key)
               ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^

  File "...botocore/client.py", line 535, in _api_call
    return self._make_api_call(operation_name, kwargs)
               ^^^^^^^^^^^^^^^^^^

  File "...botocore/client.py", line 980, in _make_api_call
    raise error_class(parsed_response, operation_name)
botocore.exceptions.ClientError: An error occurred (429) when
calling the GetObject operation (reached max retries: 4): Too Many
Requests
```

*"Are we triggering a lot of
S3 request retries?"*

**Request
retries?**

**Rate
limits?**

**Isn't the
cloud as
infinite as
your
wallet?**

**S3 PUT
object**

**3,500
requests
per
second**

boto3 tries to be helpful

```
import boto3

s3 = boto2.client("s3")
# Implicitly retries, blocking:
response = s3.get_object(...)
```

Digression: boto3 Retry Mechanism

1. For a known set of errors catch them
2. Keep count of the number of times we've tried
3. If we've hit a maximum retry count fail and allow the error to bubble up
4. Otherwise take the count and multiply by some random number and some scale factor
5. Sleep for that long
6. Retry the call

```
# From https://github.com/boto/botocore/blob/develop/botocore/retryhandler.py

base * (growth_factor ** (attempts - 1))

base = random.random()    # random float between 0.0 and 1.0
growth_factor = 2
attempts = 2

random.random() * (growth_factor ** (attempts - 1))
0.75 * (2 ** (2 - 1)) = 1.5

attempt 1 = 1 second max
attempt 2 = 2 second max
attempt 3 = 8 second max
attempt 4 = 16 second max
attempt 5 = 32 second max

# Default of 5 retries
32 + 16 + 8 + 2 + 1 = 59 seconds max sleep total, with 5x requests
```

Theory

Even though we mostly eventually succeed, we take a really long time doing stuff

where we are in the problem

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. ??

**How Can We
Be Sure it's
Retrying?**

Logging?

```
logging.basicConfig(level=logging.DEBUG)
```

```
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-parameter-build.s3.GetObject: calling handler <function sse_md5 at 0x110d3f920>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-parameter-build.s3.GetObject: calling handler <function validate_bucket_name at 0x110d3f880>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-parameter-build.s3.GetObject: calling handler <function remove_bucket_from_url_paths_from_model at 0x110d5d9e0>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-parameter-build.s3.GetObject: calling handler <bound method S3RegionRedirectorv2.annotate_request_context of <botocore.utils.S3RegionRedirectorv2 object at 0x114319fd0>>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-parameter-build.s3.GetObject: calling handler <function generate_idempotent_uuid at 0x110d3f6a0>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-endpoint-resolution.s3: calling handler <function customize_endpoint_resolver_builtins at 0x110d5dbc0>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-endpoint-resolution.s3: calling handler <bound method S3RegionRedirectorv2.redirect_from_cache of <botocore.utils.S3RegionRedirectorv2 object at 0x114319fd0>>
2023-11-07 12:05:04 DEBUG botocore.regions Calling endpoint provider with parameters: {'Bucket': 'micktwomey-scratch-example', 'Region': 'eu-west-1', 'UseFIPS': False, 'UseDualStack': False, 'ForcePathStyle': False, 'Accelerate': False, 'UseGlobalEndpoint': False, 'DisableMultiRegionAccessPoints': False, 'UseArnRegion': True}
2023-11-07 12:05:04 DEBUG botocore.regions Endpoint provider result: https://micktwomey-scratch-example.s3.eu-west-1.amazonaws.com
2023-11-07 12:05:04 DEBUG botocore.regions Selecting from endpoint provider's list of auth schemes: "sigv4". User selected auth scheme is: "None"
2023-11-07 12:05:04 DEBUG botocore.regions Selected auth type "v4" as "v4" with signing context params: {'region': 'eu-west-1', 'signing_name': 's3', 'disableDoubleEncoding': True}
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-call.s3.GetObject: calling handler <function add_expect_header at 0x110d3fc40>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-call.s3.GetObject: calling handler <function add_recursion_detection_header at 0x110d3df80>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-call.s3.GetObject: calling handler <function inject_api_version_header_if_needed at 0x110d5d1c0>
2023-11-07 12:05:04 DEBUG botocore.endpoint Making request for OperationModel(name=GetObject) with params: {'url_path': '/test/prefix1/ham/spam/foo.txt', 'query_string': {}, 'method': 'GET', 'headers': {'User-Agent': 'Boto3/1.28.79 md/Botocore#1.31.79 ua/2.0 os/macos#23.0.0 md/arch#x86_64 lang/python#3.11.5 md/pyimpl#CPython cfg/retry-mode#legacy Botocore/1.31.79'}, 'body': b'', 'auth_path': '/micktwomey-scratch-example/test/prefix1/ham/spam/foo.txt', 'url': 'https://micktwomey-scratch-example.s3.eu-west-1.amazonaws.com/test/prefix1/ham/spam/foo.txt', 'context': {'client_region': 'eu-west-1', 'client_config': <botocore.config.Config object at 0x114319550>, 'has_streaming_input': False, 'auth_type': 'v4', 's3_redirect': {'redirected': False, 'bucket': 'micktwomey-scratch-example', 'params': {'Bucket': 'micktwomey-scratch-example', 'Key': 'test/prefix1/ham/spam/foo.txt'}}, 'signing': {'region': 'eu-west-1', 'signing_name': 's3', 'disableDoubleEncoding': True}}}
2023-11-07 12:05:04 DEBUG botocore.hooks Event request-created.s3.GetObject: calling handler <bound method RequestSigner.handler of <botocore.singers.RequestSigner object at 0x114319510>>
2023-11-07 12:05:04 DEBUG botocore.hooks Event choose-signer.s3.GetObject: calling handler <bound method ClientCreator._default_s3_presign_to_sigv2 of <botocore.client.ClientCreator object at 0x110e138d0>>
2023-11-07 12:05:04 DEBUG botocore.hooks Event choose-signer.s3.GetObject: calling handler <function set_operation_specific_signer at 0x110d3f560>
2023-11-07 12:05:04 DEBUG botocore.hooks Event before-sign.s3.GetObject: calling handler <function remove_arn_from_signing_path at 0x110d5db20>
2023-11-07 12:05:04 DEBUG botocore.auth Calculating signature using v4 auth.
2023-11-07 12:05:04 DEBUG botocore.auth CanonicalRequest:
GET
/test/prefix1/ham/spam/foo.txt
```

```
host:micktwomey-scratch-example.s3.eu-west-1.amazonaws.com
x-amz-content-sha256:e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855
x-amz-date:20231107T120504Z
x-amz-security-token:...

host;x-amz-content-sha256;x-amz-date;x-amz-security-token
e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855
2023-11-07 12:05:04 DEBUG botocore.auth StringToSign:
```

Events?

```
event_hooks = [ ]  
  
def event_emitting_call(arg):  
    # ... do some work  
    for hook in event_hooks:  
        hook("event", arg)  
  
def register(callable):  
    event_hooks.append(callable)  
  
register(print)  
event_emitting_call("hello")  
# prints ("event", "hello")
```

```
s3 = boto3.client("s3")
s3.meta.events.register(
    "needs-retry.*", my_function
)
```

```
"provide-client-params.s3.ListObjects"
"provide-client-params.s3.*"
"provide-client-params.*"
" * "
```

```
import boto3

def print_event(event_name, **kwargs):
    print(event_name)

    print("\nS3:")
    s3 = boto3.client("s3")
    s3.meta.events.register("*", print_event)
    s3.list_buckets()

    print("\nEC2:")
    ec2 = boto3.client("ec2")
    ec2.meta.events.register("*", print_event)
    ec2.describe_instances()
```

S3:

```
provide-client-params.s3.ListBuckets
before-parameter-build.s3.ListBuckets
before-call.s3.ListBuckets
request-created.s3.ListBuckets
choose-signer.s3.ListBuckets
before-sign.s3.ListBuckets
before-send.s3.ListBuckets
response-received.s3.ListBuckets
needs-retry.s3.ListBuckets
after-call.s3.ListBuckets
```

EC2:

```
provide-client-params.ec2.DescribeInstances
before-parameter-build.ec2.DescribeInstances
before-call.ec2.DescribeInstances
request-created.ec2.DescribeInstances
choose-signer.ec2.DescribeInstances
before-sign.ec2.DescribeInstances
before-send.ec2.DescribeInstances
response-received.ec2.DescribeInstances
needs-retry.ec2.DescribeInstances
after-call.ec2.DescribeInstances
```

```
import boto3
from rich import print

def print_event(event_name, **kwargs):
    print(event_name, kwargs)

s3 = boto3.client("s3")
s3.meta.events.register("*", print_event)
```

```
provide-client-params.s3.ListBuckets
{
    'params': { },
    'model': OperationModel(name=ListBuckets),
    'context': {
        'client_region': 'eu-west-1',
        'client_config': <botocore.config.Config>,
        'has_streaming_input': False,
        'auth_type': None
    }
}
```

```
request-created.s3.ListBuckets
{
    'request': <botocore.awsrequest.AWSRequest>,
    'operation_name': 'ListBuckets'
}
```

```
# example of how your hook is called
my_hook(
    "request-created.s3.ListBuckets",
    request=...,
    operation_name=...
)
```



```
needs_retry.s3.ListBuckets
{
    'response': (
        <botocore.awsrequest.AWSResponse>,
        {
            'ResponseMetadata': {
                'RequestId': 'QZV9EWHJMR4T8VQ9',
                ...
            }
            'endpoint': s3(https://s3.eu-west-1.amazonaws.com),
            'operation': OperationModel(name=ListBuckets),
            'attempts': 1,
            'caught_exception': None,
            'request_dict': {
                'url_path': '/',
                'query_string': '',
                'method': 'GET',
                ...
            }
        }
    )
}
```

```
needs-retry.s3.ListBuckets
...
'attempts': 1,
'caught_exception': None,
...

# example of how your hook is called
my_hook(
    "needs-retry.s3.ListBuckets",
    attempts=1,
    caught_exception=None,
    ...
)
```

**We have an event
to watch but we
don't know what
failure looks like**

**No Documentation
of needs-
retry.s3.ListBuckets
Event** 😭

where we are

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. Want to use events to monitor these but don't have docs
4. ??

**How do we
figure out what
the event looks
like for real?**

**1. Triggering
the rate limit
for real**



**2. Hacking
the library**



**3. Hacking
Python**



**4. Hacking
the OS**



**5. Hacking
the network**



HTTP: The Bits We Care About

Client Request



```
GET /cat.jpeg HTTP/1.1
Host: example.s3.eu-west-
2.amazonaws.com
...
```

Server Response



```
HTTP/1.1 200 OK 🤞😊
Content-Type: image/jpeg
...
```

Hacking HTTP

Bet: AWS uses
"429 Too Many
Requests" for
rate limits

Bet: boto3 looks
at the HTTP
response code

Bet: boto3
ignores
everything
except that 429



**ERROR
FREE
REQUESTS**



**BROKEN
RATE LIMITS**

imgflip.com

From Success 😭

```
HTTP/1.1 200 OK ➡  
Content-Length: 34202  
Content-Type: application/json  
...  
{  
    ...  
}
```

To Failure! 😒

```
HTTP/1.1 429 Rate limit exceeded ➡  
Content-Length: 34202  
Content-Type: application/json;  
...  
{  
    ...  
}
```

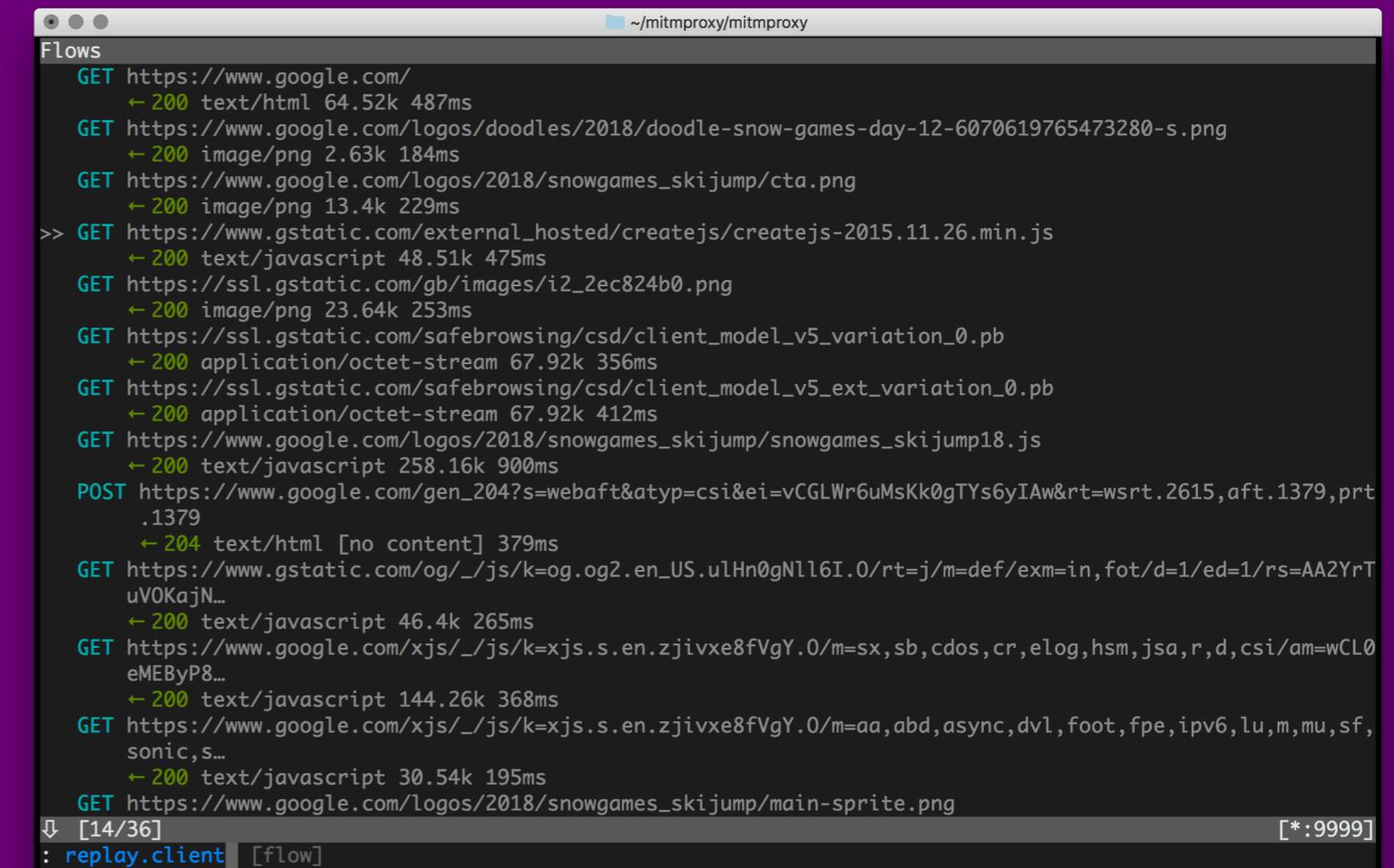
Where We Are

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. Want to use events to monitor these but don't have docs
4. Want to somehow modify responses to simulate retries and see what happens
5. ??

How: mitmproxy

<https://mitmproxy.org>

mitmproxy is a free
and open source
interactive HTTPS
proxy.



The screenshot shows the mitmproxy interface with a list of network flows. The title bar reads '~/mitmproxy/mitmproxy'. The 'Flows' section lists several GET requests to Google's website, including various logos and scripts. The bottom status bar shows '[14/36]' and 'replay.client [flow]'. The right side of the window has a dark sidebar with the text '[*:9999]'.

```
Flows
GET https://www.google.com/
  ← 200 text/html 64.52k 487ms
GET https://www.google.com/logos/doodles/2018/doodle-snow-games-day-12-6070619765473280-s.png
  ← 200 image/png 2.63k 184ms
GET https://www.google.com/logos/2018/snowgames_skijump/cta.png
  ← 200 image/png 13.4k 229ms
>> GET https://www.gstatic.com/external_hosted/createjs/createjs-2015.11.26.min.js
  ← 200 text/javascript 48.51k 475ms
GET https://ssl.gstatic.com/gb/images/i2_2ec824b0.png
  ← 200 image/png 23.64k 253ms
GET https://ssl.gstatic.com/safefetch/csd/client_model_v5_variation_0.pb
  ← 200 application/octet-stream 67.92k 356ms
GET https://ssl.gstatic.com/safefetch/csd/client_model_v5_ext_variation_0.pb
  ← 200 application/octet-stream 67.92k 412ms
GET https://www.google.com/logos/2018/snowgames_skijump/snowgames_skijump18.js
  ← 200 text/javascript 258.16k 900ms
POST https://www.google.com/gen_204?s=webaft&atyp=csi&ei=vCGLWr6uMsKk0gTYs6yIAw&rt=wsrt.2615,aft.1379,prt
  .1379
  ← 204 text/html [no content] 379ms
GET https://www.gstatic.com/og/_/js/k=og.og2.en_US.ulHn0gNlI6I.0/rt=j/m=def/exm=in,fot/d=1/ed=1/rs=AA2YrT
  uV0KajN...
  ← 200 text/javascript 46.4k 265ms
GET https://www.google.com/xjs/_/js/k=xjs.s.en.zjivxe8fVgY.0/m=sx,sb,cdos,cr,elog,hsm,jsa,r,d,csi/am=wCL0
  eMEByP8...
  ← 200 text/javascript 144.26k 368ms
GET https://www.google.com/xjs/_/js/k=xjs.s.en.zjivxe8fVgY.0/m=aa,abd,async,dvl,foot,fpe,ipv6,lu,m,nu,sf,
  sonic,s...
  ← 200 text/javascript 30.54k 195ms
GET https://www.google.com/logos/2018/snowgames_skijump/main-sprite.png
  ← 200 image/png 1.12k 100ms
[14/36]
: replay.client [flow]
```

1. Run `mitmproxy` (or `mitmweb` for a fancier web interface)
2. Set the HTTP proxy settings to `mitmproxy`'s (defaults to `http://localhost:8080`)
3. Run your program
4. Watch in `mitmproxy`

HTTP GET Example

```
import httpx

httpx.get("http://httpbin.org/get")
```

```
export http_proxy=localhost:8080
export https_proxy=localhost:8080
```

```
python http_get.py
```

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy ⌂⌘2

Flows

```
>>17:16:49 HTTP GET httpbin.org /get 200 application/json 303b 229ms
```

[1/1] [*:8080]

Flow:	Select	D Duplicate	r Replay	e Export	d Delete	m Mark	b Save body	
Proxy:	? Help	q Quit	E Events	O Options	i Intercept	f Filter	w Save flows	z Clear list

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-07 17:16:49 GET http://httpbin.org/get
← 200 OK application/json 303b 229ms

Request	Response	Detail
Host: httpbin.org Accept: */* Accept-Encoding: gzip, deflate, br Connection: keep-alive User-Agent: python-httplib/0.25.1 No request content		[m:auto]

[1/1] [*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete b Save body ↵ Next flow p Prev flow
Proxy: ? Help q Back E Events o Options i Intercept f Filter w Save flows z Clear list

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-07 17:16:49 GET http://httpbin.org/get
← 200 OK application/json 303b 229ms

Request	Response	Detail
Date: Tue, 07 Nov 2023 17:16:49 GMT		
Content-Type: application/json		
Content-Length: 303		
Connection: keep-alive		
Server: gunicorn/19.9.0		
Access-Control-Allow-Origin: *		
Access-Control-Allow-Credentials: true		
ls:		

JSON [m:auto]

```
{  
    "args": {},  
    "headers": {  
        "Accept": "*/*",  
        "Accept-Encoding": "gzip, deflate, br",  
        "Host": "httpbin.org",  
        "User-Agent": "python-httplibx/0.25.1",  
        "X-Amzn-Trace-Id": "Root=1-654a7101-66e698be1113a5f9629b4805"  
    },  
    "origin": "46.7.6.55",  
    "url": "http://httpbin.org/get"  
}
```

[1/1] [*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete b Save body u Next flow p Prev flow
Proxy: ? Help q Back E Events O Options i Intercept f Filter w Save flows z Clear list

```
mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy ⌂⌘2
Flow Details
2023-11-07 17:16:49 GET http://httpbin.org/get
    ← 200 OK application/json 303b 229ms
Request Response Detail
Server Connection:
Address httpbin.org:80
Resolved Address 3.219.235.85:80
HTTP Version HTTP/1.1
Client Connection:
Address [::1]:58065
HTTP Version HTTP/1.1
Timing:
Client conn. established 2023-11-07 17:16:49.165
First request byte 2023-11-07 17:16:49.166
Request complete 2023-11-07 17:16:49.168
Server conn. initiated 2023-11-07 17:16:49.169
Server conn. TCP handshake 2023-11-07 17:16:49.280
First response byte 2023-11-07 17:16:49.393
Response complete 2023-11-07 17:16:49.395
Client conn. closed 2023-11-07 17:16:49.397
Server conn. closed 2023-11-07 17:16:49.398
[1/1] [*:8080]
Flow: e Edit D Duplicate r Replay e Export d Delete b Save body ↵ Next flow p Prev flow
Proxy: ? Help q Back E Events O Options i Intercept f Filter w Save flows z Clear list
```

S3 Example

```
import boto3

s3 = boto3.client("s3")
s3.get_object(
    Bucket="micktwomey-scratch-example",
    Key="test/prefix1/ham/spam/foo.txt",
)
```

```
export http_proxy=localhost:8080
export https_proxy=localhost:8080
```

```
python s3_get_object.py
```

Wut?

```
...
File "/Users/mick/src/github.com/micktowomey/exploring-boto3-events-with-
mitmproxy/.venv/lib/python3.11/site-packages/botocore/endpoint.py", line
377, in _send
    return self.http_session.send(request)
               ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
File "/Users/mick/src/github.com/micktowomey/exploring-boto3-events-with-
mitmproxy/.venv/lib/python3.11/site-packages/botocore/httpsession.py", line
491, in send
    raise SSLError(endpoint_url=request.url, error=e)
botocore.exceptions.SSLError: SSL validation failed for https://micktowomey-
scratch-example.s3.eu-west-1.amazonaws.com/test/prefix1/ham/spam/foo.txt
[SSL: CERTIFICATE_VERIFY_FAILED] certificate verify failed: unable to get
local issuer certificate (_ssl.c:1006)
```

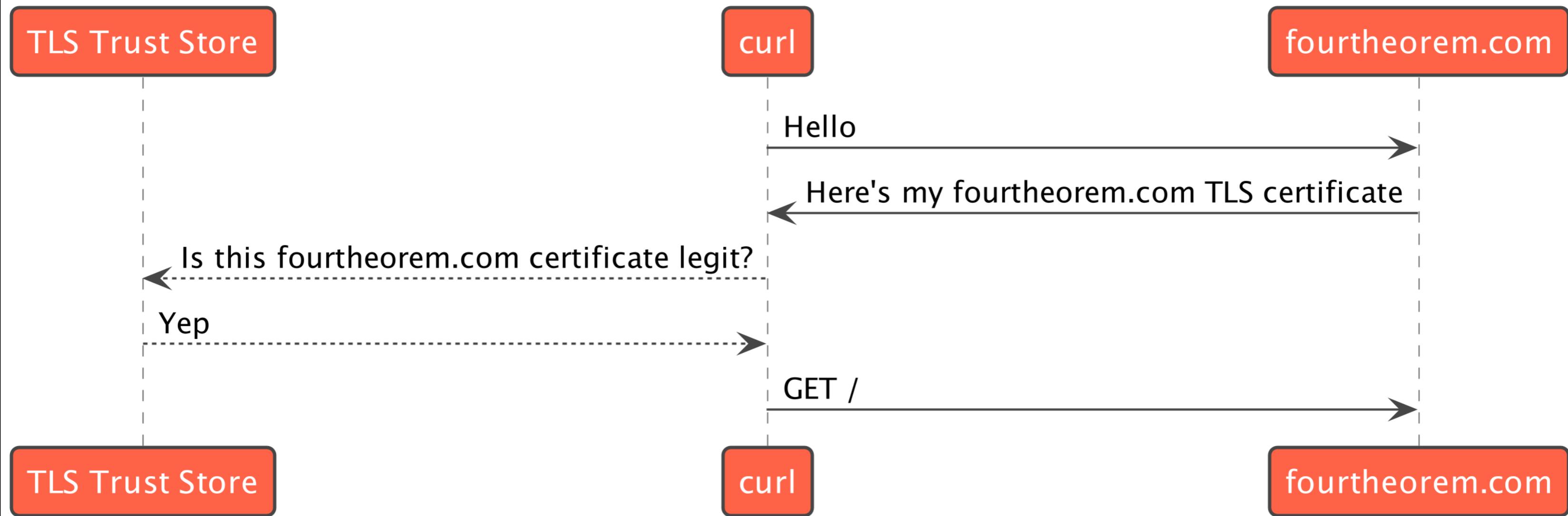
TLS is doing its job

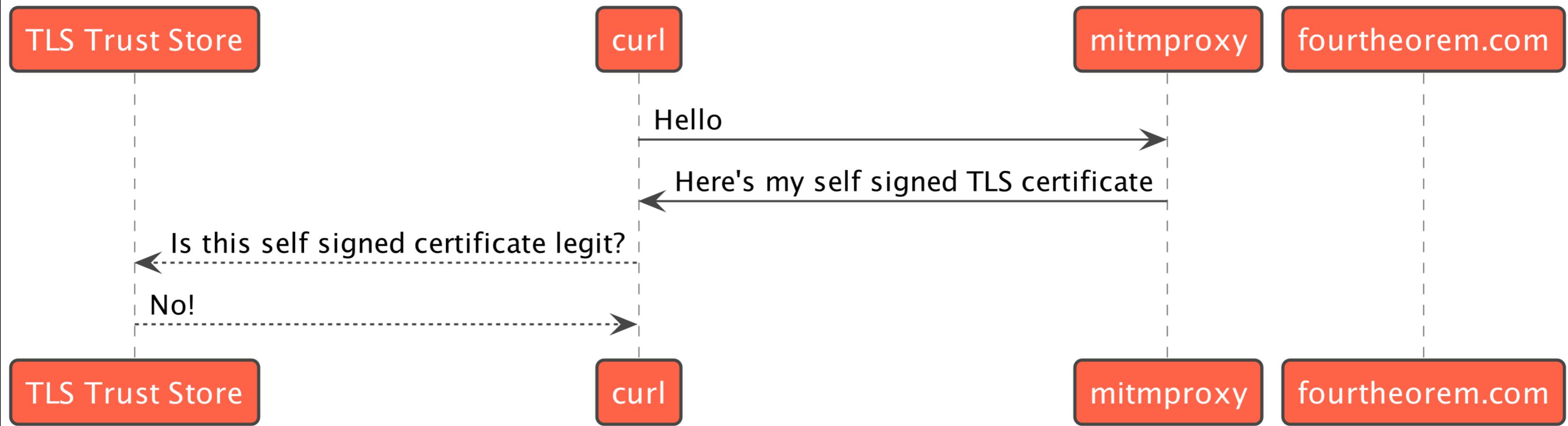
```
http_proxy=localhost:8080 \
https_proxy=localhost:8080 \
curl https://fourtheorem.com/
```

curl: (60) SSL certificate problem: unable to get local issuer certificate

More details here: <https://curl.se/docs/sslcerts.html>

curl failed to verify the legitimacy of the server and therefore could not establish a secure connection to it. To learn more about this situation and how to fix it, please visit the web page mentioned above.





(ab)using self signed certs for the win!

```
$ ls -l ~/.mitmproxy/
total 48
-rw-r--r-- 1 mick staff 1172 Sep  4 19:26 mitmproxy-ca-cert.cer
-rw-r--r-- 1 mick staff 1035 Sep  4 19:26 mitmproxy-ca-cert.p12
-rw-r--r-- 1 mick staff 1172 Sep  4 19:26 mitmproxy-ca-cert.pem
-rw------- 1 mick staff 2411 Sep  4 19:26 mitmproxy-ca.p12
-rw------- 1 mick staff 2847 Sep  4 19:26 mitmproxy-ca.pem
-rw-r--r-- 1 mick staff  770 Sep  4 19:26 mitmproxy-dhparam.pem
```

⚠ Danger! ⚠ Here be Dragons!

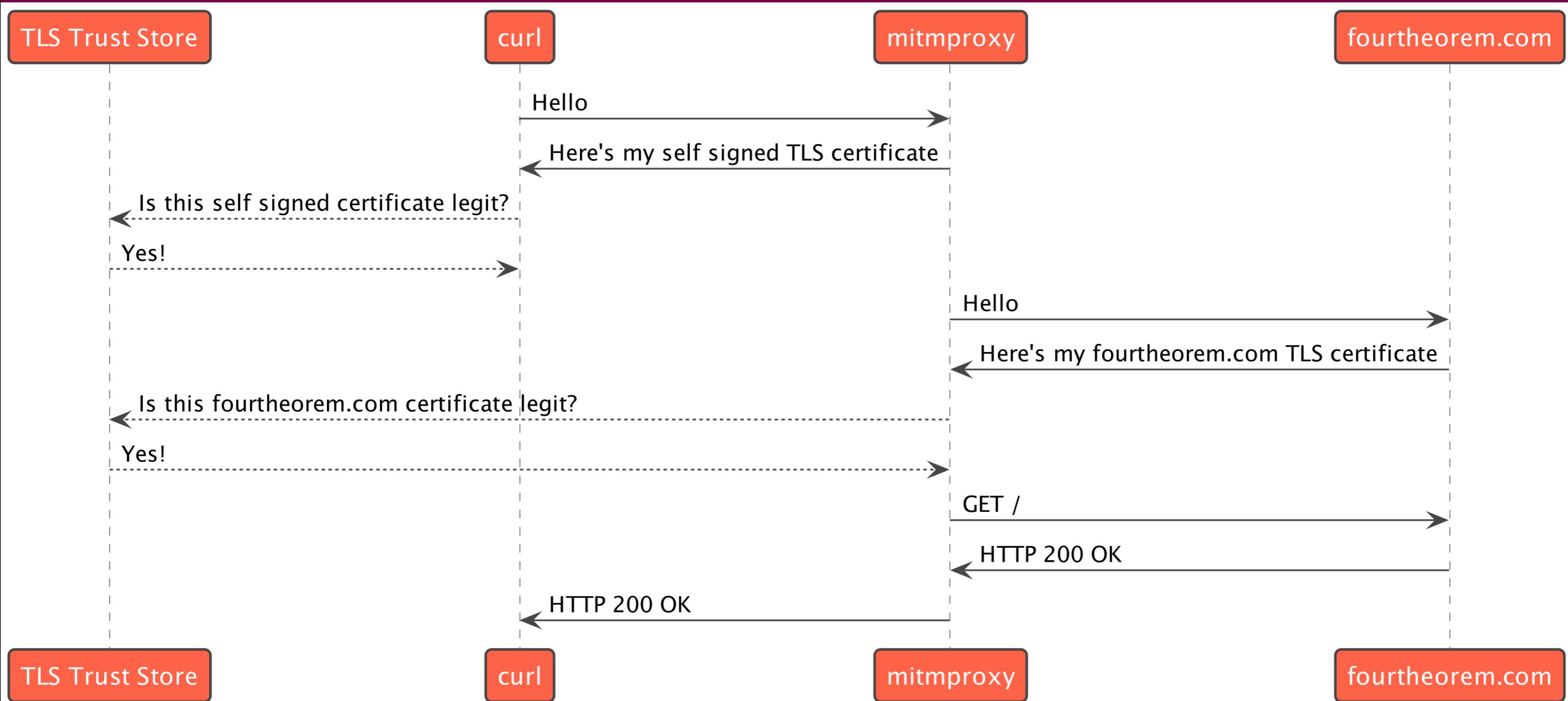


Full guide:

<https://docs.mitproxy.org/stable/concepts-certificates/>

```
$ https_proxy=localhost:8080 \
curl --cacert ~/.mitmproxy/mitmproxy-ca-cert.pem \
-I https://www.fourtheorem.com
HTTP/1.1 200 Connection established
```

```
HTTP/1.1 200 OK
Server: openresty
Date: Sun, 04 Sep 2022 20:09:03 GMT
Content-Type: text/html; charset=utf-8
Content-Length: 520810
Connection: keep-alive
...
.
```



```
* Uses proxy env variable https_proxy == 'localhost:8080'  
* Trying 127.0.0.1:8080...  
* Connected to localhost (127.0.0.1) port 8080 (#0)  
* allocate connect buffer!  
* Establish HTTP proxy tunnel to www.google.ie:443  
...  
* Proxy replied 200 to CONNECT request  
...  
* successfully set certificate verify locations:  
* CAfile: /Users/mick/.mitmproxy/mitmproxy-ca-cert.pem  
* CApth: none  
* (304) (OUT), TLS handshake, Client hello (1):  
* (304) (IN), TLS handshake, Server hello (2):  
* (304) (IN), TLS handshake, Unknown (8):  
* (304) (IN), TLS handshake, Certificate (11):  
* (304) (IN), TLS handshake, CERT verify (15):  
* (304) (IN), TLS handshake, Finished (20):  
* (304) (OUT), TLS handshake, Finished (20):  
* SSL connection using TLSv1.3 / AEAD-AES256-GCM-SHA384  
* ALPN, server accepted to use h2  
* Server certificate:  
* subject: CN=*.google.ie  
* start date: Sep 17 11:58:59 2022 GMT  
* expire date: Sep 19 11:58:59 2023 GMT  
* subjectAltName: host "www.google.ie" matched cert's "*.google.ie"  
* issuer: CN=mitmproxy; O=mitmproxy  
* SSL certificate verify ok.  
...
```

AWS_CA_BUNDLE

```
https_proxy=localhost:8080 \
AWS_CA_BUNDLE=$HOME/.mitmproxy/mitmproxy-ca-
cert.pem \
python examples/s3_get_object.py
```



mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘2

Flows

>>16:40:41 HTTPS GETamazonaws.com /test/prefix1/ham/spam/**foo.txt** 200 text/plain 6b 110ms

[1/1]

[*:8080]

Flow: ⌘ Select D Duplicate r Replay e Export d Delete m Mark b Save body

Proxy: ? Help q Quit E Events O Options i Intercept f Filter w Save flows z Clear list

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-07 16:40:41 GET https://micktwomey-scratch-example.s3.eu-west-1.amazonaws.com/test/prefix1/ham/spam/foo.txt
← 200 OK text/plain 6b 110ms

	Request	Response	Detail
Host:	micktwomey-scratch-example.s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	Boto3/1.28.79 md/Botocore#1.31.79 ua/2.0 os/macos#23.0.0 md/arch#x86_64 lang/python#3.11.5 md/pyimpl#CPython cfg/retry-mode#legacy Botocore/1.31.79		
X-Amz-Date:	20231107T164041Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEHEaCwV1LXd1c3QtMSJHMEUCIHgUJK0rWtpx6ZTh4i8wIP1LYQ+F1ZkLd1QThDlqv07qAiEAtfy+umHCf3 AS3NEjtTM3LCvR0Iu57UB1LsIaRYE9ds4qhMIqv//////////ARAAGgwz0TYw0DcxMDk3NzYiDE0axb/VgH2C6orMeyraAod/ RSue4N2xk1c7eKhSgg8uUs09Q5A60sG58QIQ+90kfizE0YYdPHf3kkIbPphkMEQbXQ/QRml0md1Ic7MSlpVl59ufCfwUkZfp6B w3voojvPrB1uZjGpw7Ksd01vAb59JkvNN+6NoPpYk0Xid2I9vx7NlR6idIbjmlZmNjajyzSTYHaYVJi5hjPhirBpt86QsdZwt 80yI1yLaTH04FffESEbZxFTCKxxm4oCF0J9j0L6+sIQh5wDIKYA62Q+We0r6Drmrxt6K09NTldQ04ZK8E7IRVm6xrY2oZM+o2Z y9/PXvaPqZgM+hFX00yhHeR3RqrKHUTVp1eepapSDLiI4o5T0SJDQ94NT9XPJ7lNNxZZG8J/fJR0s3a3TT62vWfj8IyaxUwIBJ heNsrWqJuyDNTFg4zP67sSHcI+zYGM66AU5Sj+vcuwpzHUF9yALQ3zLfA4mVYvUleNcwh9GpqgY6pgE/fFkcuUChENFFaa6JiA 7lIlocsM0nq/TVl1N/Szmzg9kHboII6Y8qrVrf66g0PSVmDl+VSDg2+mu0BEr4TGoKfxfhb7Abor4k7RSvB4MXZdESKj977Pz 1s68CPj3tvppf19yzUhdqXv9eGU8baLrwRHKTwly94gpc5kD0DvSPTihBR6cUuCJbDM0oX2Nvdup6L3SmCuUBgc01BKN28MjIW Yt8GCw		
X-Amz-Content-SHA256:	e3b0c44298fc1c149afbf4c8996fb92427ae41e4649b934ca495991b7852b855		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAVY0FBVCIMVZDM3VP/20231107/eu-west-1/s3/aws4_request, SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-security-token, Signature=7b391ecc3402462e0c64766c5f07a38b35258c150ba54b2fb2ab8d6cccd4549f		
amz-sdk-invocation-id:	c1cb0eef-010b-4fad-af70-077be6636cc9		
amz-sdk-request:	attempt=1		
No request content			[m:auto]

[1/1] [*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete b Save body ↵ Next flow p Prev flow
Proxy: ? Help q Back E Events o Options i Intercept f Filter w Save flows z Clear list

Flow Details		mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy		File Edit View Insert Tools Help	
				File Edit View Insert Tools Help	
Request		Response		Detail	
x-amz-id-2:	ZtbuzYalwmED0MWZcP9I0un7uGin2a0Ukmeo0NeDy13UfxwC/WRFq8FMyI4KgVFsxnyHlDlh5Ec=				
x-amz-request-id:	G1B3PKNVJSJ5MKQF				
Date:	Tue, 07 Nov 2023 16:40:42 GMT				
Last-Modified:	Fri, 20 Oct 2023 17:06:43 GMT				
ETag:	"b1946ac92492d2347c6235b4d2611184"				
x-amz-server-side-encryption:	AES256				
Accept-Ranges:	bytes				
Content-Type:	text/plain				
Server:	AmazonS3				
Content-Length:	6				
Raw				[m:auto]	
hello					

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘2

Flow Details

2023-11-07 16:40:41 GET https://micktwomey-scratch-example.s3.eu-west-1.amazonaws.com/test/prefix1/ham/spam/foo.txt
← 200 OK text/plain 6b 110ms

Request

Response

Detail

Server Connection:

Address micktwomey-scratch-example.s3.eu-west-1.amazonaws.com:443
Resolved Address 52.218.109.0:443
HTTP Version HTTP/1.1
ALPN http/1.1

Server Certificate:

Type RSA, 2048 bits
SHA256 digest 63 4c 10 56 3c 85 c7 ae c4 b4 72 43 69 9f 8d 2e dd 80 18 92 2a d7 06 cb 7a d2 17 8a 7b a3 c0 29
Valid from 2023-10-10 00:00:00+00:00
Valid to 2024-09-12 23:59:59+00:00
Serial 3497643272326306858947754322096787020
Subject CN *.s3-eu-west-1.amazonaws.com
Issuer C US
O Amazon
CN Amazon RSA 2048 M01
Alt names s3-eu-west-1.amazonaws.com, *.s3-eu-west-1.amazonaws.com, s3.eu-west-1.amazonaws.com,
*.s3.eu-west-1.amazonaws.com, s3.dualstack.eu-west-1.amazonaws.com,
*.s3.dualstack.eu-west-1.amazonaws.com, *.s3.amazonaws.com, *.s3-control.eu-west-1.amazonaws.com,
s3-control.eu-west-1.amazonaws.com, *.s3-control.dualstack.eu-west-1.amazonaws.com,
s3-control.dualstack.eu-west-1.amazonaws.com, *.s3-accesspoint.eu-west-1.amazonaws.com,
*.s3-accesspoint.dualstack.eu-west-1.amazonaws.com, *.s3-deprecated.eu-west-1.amazonaws.com,
s3-deprecated.eu-west-1.amazonaws.com, s3-external-3.amazonaws.com, *.s3-external-3.amazonaws.com

Client Connection:

Address [::1]:56923
HTTP Version HTTP/1.1

↓ [1/1]

[*:8080]

Flow: e Edit

D Duplicate

r Replay

e Export

d Delete

b Save body

↶ Next flow

p Prev flow

Proxy: ? Help

q Back

E Events

o Options

i Intercept

f Filter

w Save flows

z Clear list

```
mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy
```

Flow Details

2023-11-07 16:40:41 GET https://micktwomey-scratch-example.s3.eu-west-1.amazonaws.com/test/prefix1/ham/spam/foo.txt
← 200 OK text/plain 6b 110ms

Request	Response	Detail
*.s3.eu-west-1.amazonaws.com, s3.dualstack.eu-west-1.amazonaws.com, .s3.dualstack.eu-west-1.amazonaws.com, *.s3.amazonaws.com, *.s3-control.eu-west-1.amazonaws.com, s3-control.eu-west-1.amazonaws.com, *.s3-control.dualstack.eu-west-1.amazonaws.com, s3-control.dualstack.eu-west-1.amazonaws.com, *.s3-accesspoint.eu-west-1.amazonaws.com, .s3-accesspoint.dualstack.eu-west-1.amazonaws.com, *.s3-deprecated.eu-west-1.amazonaws.com, s3-deprecated.eu-west-1.amazonaws.com, s3-external-3.amazonaws.com, *.s3-external-3.amazonaws.com		

Client Connection:

Address	[::1]:56923
HTTP Version	HTTP/1.1
TLS Version	TLSv1.3
Server Name Indication	micktwomey-scratch-example.s3.eu-west-1.amazonaws.com
Cipher Name	TLS_AES_256_GCM_SHA384
ALPN	http/1.1

Timing:

Client conn. established	2023-11-07 16:40:41.285
Server conn. initiated	2023-11-07 16:40:41.288
Server conn. TCP handshake	2023-11-07 16:40:41.354
Server conn. TLS handshake	2023-11-07 16:40:41.419
Client conn. TLS handshake	2023-11-07 16:40:41.429
First request byte	2023-11-07 16:40:41.430
Request complete	2023-11-07 16:40:41.432
First response byte	2023-11-07 16:40:41.538
Response complete	2023-11-07 16:40:41.540
Client conn. closed	2023-11-07 16:40:41.560
Server conn. closed	2023-11-07 16:40:41.560

↓ [1/1] [*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete b Save body ↵ Next flow p Prev flow
Proxy: ? Help q Back E Events o Options i Intercept f Filter w Save flows z Clear list

What were we doing again?

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. Want to use events to monitor these but don't have docs
4. Want to somehow modify responses to simulate retries and see what happens
5. Can intercept requests using mitmproxy
6. ??

More than a HTTP debugger

<https://docs.mitmproxy.org/stable/mitmproxytutorial-interceptrequests/>

<https://docs.mitmproxy.org/stable/mitmproxytutorial-modifyrequests/>

1. Hit `i` to create an intercept
2. `~d s3.eu-west-1.amazonaws.com & ~s`
`~d` match on domain, `~s` match on server response
3. Run the command
4. In the UI go into the response and hit `e`
5. Change the response code to `429`
6. Hit `a` to allow the request to continue
7. Watch what happens in the command

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘1

Flows

↓ [0/0]

[*:8080]

Flow: L Load flows n Create new

Proxy: ? Help

q Quit

E Events

O Options

i Intercept

f Filter

- Layout

ctrl → Switch F Follow new

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘1

Flows

↓ [0/0]

: set intercept '~d s3.eu-west-1.amazonaws.com & ~s'()

[*:8080]

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘1

Flows

↓ [0/0] [i:~d s3.eu-west-1.amazonaws.com & ~s] [*:8080]
Flow: L Load flows n Create new
Proxy: ? Help q Quit E Events O Options i Intercept f Filter - Layout ctrl → Switch F Follow new

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

⌘1

Flows

>>21:25:46 HTTPS GET ...amazonaws.com / 200 application/xml 398b 658ms

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Flow: ↵ Select D Duplicate r Replay e Export d Delete m Mark a Resume b Save body

Proxy: ? Help q Quit E Events O Options i Intercept f Filter w Save flows z Clear list - Layout

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
← 200 OK application/xml 398b 658ms

	Request	Response intercepted	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaCWV1LXd1c3QtMSJHMEUCIDSpsvSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQfkx4y4/BihWkuXLbNkoXPHm6ylTso3dYqhgMI3//////////ARAAGgwzOTYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG+6W/0RG0dXH77kuellZJIhol59mqFne04aNT29+ImilKhY3TawQQmTH4FI6clfur48vQkb7yQBK2LMQYCUBSbRb8Hny14ziWugW7i3YkJVKCkm9ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVVHzyU2WMAdygJXAexdAZ17/fn0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxV0JAPweyb+vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1kVgtgygESB0r+iw/yq2xmdufneDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ2YigXmc6fxIrW6uJlzch/gespoPLMXIQzyl6ihSGaT4+WfH9BccFdjpsYYoCCeNmYaZo5SmajqjLbUwvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/gw1Jy1qgY6pgFvt+kIagxlgbS60a9iiN2yNmNgXiEJ0MWiZWFSZehYYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02MGhoTp3paspl2C+o+iUcr5IWFFepbZxUlPpmrCrZjFeuspnn8XqZGLXLL2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9sV23h/cqrDhwI		
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb92427ae41e4649b934ca495991b7852b855		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAVY0FBVCIBZEC6NVH/20231109/eu-west-1/s3/aws4_request, SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-security-token, Signature=a8eec836da4c874e6106816bab940e4d4923ac8d6744716d56a548efb3406e2b		

No request content

[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete a Resume b Save body u Next flow p Prev flow
Proxy: ? Help q Back E Events o Options i Intercept f Filter w Save flows z Clear list - Layout

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
← 200 OK application/xml 398b 658ms

	Request	Response intercepted	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaC fkx4y4/BihWkuXLbNkoXPHm6ylTso3dYq +6W/0RG0dXH77kuellZJIhol59mqFne04 ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVV +vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1k 2YigXmc6fxIrW6uJlzch/gespoPLMXIQz gw1Jy1qgY6pgFvt+kIagxlgbS60a9iii MGhoTp3paspl2C+o+iUcr5IWFFepbZxUl V23h/cqrDhwI	Part 1) cookies 2) urlencoded form 3) multipart form 4) path 5) method 6) query 7) reason 8) request-headers 9) response-headers a) request-body b) response-body c) status_code d) set-cookies e) url	svSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQ z0TYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG FI6clfur48vQkb7yQBK2LMQYCUbSbRb8Hny14ziWugW7i3YkJVKCkm9 n0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxVOJAPweyb neDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ YYoCCeNmYaZo5SmajqjLbUvvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/ YYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02 L2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9s
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb9242	7852b855	
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAV SignedHeaders=host;x-amz-content- Signature=a8eec836da4c874e6106816	9/eu-west-1/s3/aws4_request, -security-token, 6d56a548efb3406e2b	
No request content			[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Proxy: ? Help

q Back

E Events

O Options

i Intercept

f Filter

w Save flows

z Clear list - Layout

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
 ← 200 OK application/xml 398b 658ms

	Request	Response intercepted	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaC fkx4y4/BihWkuXLbNkoXPHm6ylTso3dYq +6W/0RG0dXH77kuellZJIhol59mqFne04 ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVV +vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1k 2YigXmc6fxIrW6uJlzch/gespoPLMXIQz gw1Jy1qgY6pgFvt+kIagxlgbS60a9iii MGhoTp3paspl2C+o+iUcr5IWFFepbZxUl V23h/cqrDhwI	Part 1) cookies 2) urlencoded form 3) multipart form 4) path 5) method 6) query 7) reason 8) request-headers 9) response-headers a) request-body b) response-body c) status_code d) set-cookies e) url	svSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQ z0TYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG FI6clfur48vQkb7yQBK2LMQYCUbSbRb8Hny14ziWugW7i3YkJVKCkm9 n0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxVOJAPweyb neDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ YYoCCeNmYaZo5SmajqjLbUvvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/ YYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02 L2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9s 7852b855 9/eu-west-1/s3/aws4_request, -security-token, 6d56a548efb3406e2b
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb9242		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAV SignedHeaders=host;x-amz-content- Signature=a8eec836da4c874e6106816		
No request content			[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Proxy: ? Help

q Back

E Events

O Options

i Intercept

f Filter

w Save flows

z Clear list - Layout

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
← 200 OK application/xml 398b 658ms

	Request	Response intercepted	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaCWV1LXd1c3QtMSJHMEUCIDSpsvSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQfkx4y4/BihWkuXLbNkoXPHm6ylTso3dYqhgMI3//////////ARAAGgwzOTYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG+6W/0RG0dXH77kuellZJIhol59mqFne04aNT29+ImilKhY3TawQQmTH4FI6clfur48vQkb7yQBK2LMQYCUBSbRb8Hny14ziWugW7i3YkJVKCkm9ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVVHzyU2WMAdygJXAexdAZ17/fn0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxV0JAPweyb+vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1kVgtgygESB0r+iw/yq2xmdufneDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ2YigXmc6fxIrW6uJlzch/gespoPLMXIQzyl6ihSGaT4+WfH9BccFdjpsYYoCCeNmYaZo5SmajqjLbUwvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/gw1Jy1qgY6pgFvt+kIagxlgbS60a9iiN2yNmNgXiEJ0MWiZWFSZehYYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02MGhoTp3paspl2C+o+iUcr5IWFFepbZxUlPpmrCrZjFeuspnn8XqZGLXLL2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9sV23h/cqrDhwI		
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb92427ae41e4649b934ca495991b7852b855		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAVY0FBVCIBZEC6NVH/20231109/eu-west-1/s3/aws4_request, SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-security-token, Signature=a8eec836da4c874e6106816bab940e4d4923ac8d6744716d56a548efb3406e2b		

No request content

[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]
: flow.set @focus status_code 429

[*:8080]

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
← 429 OK application/xml 398b 658ms

	Request	Response intercepted	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaCWV1LXd1c3QtMSJHMEUCIDSpsvSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQfkx4y4/BihWkuXLbNkoXPHm6ylTso3dYqhgMI3//////////ARAAGgwzOTYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG+6W/0RG0dXH77kuellZJIhol59mqFne04aNT29+ImilKhY3TawQQmTH4FI6clfur48vQkb7yQBK2LMQYCUBSbRb8Hny14ziWugW7i3YkJVKCkm9ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVVHzyU2WMAdygJXAexdAZ17/fn0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxV0JAPweyb+vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1kVgtgygESB0r+iw/yq2xmdufneDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ2YigXmc6fxIrW6uJlzch/gespoPLMXIQzyl6ihSGaT4+WfH9BccFdjpsYYoCCeNmYaZo5SmajqjLbUwvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/gw1Jy1qgY6pgFvt+kIagxlgbS60a9iiN2yNmNgXiEJ0MWiZWFSZehYYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02MGhoTp3paspl2C+o+iUcr5IWFFepbZxUlPpmrCrZjFeuspnn8XqZGLXLL2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9sV23h/cqrDhwI		
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb92427ae41e4649b934ca495991b7852b855		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAVY0FBVCIBZEC6NVH/20231109/eu-west-1/s3/aws4_request, SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-security-token, Signature=a8eec836da4c874e6106816bab940e4d4923ac8d6744716d56a548efb3406e2b		

No request content

[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]
Alert: [21:26:30.367] Set status_code on 1 flows.

[*:8080]

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

Flow Details

2023-11-09 21:25:46 GET https://s3.eu-west-1.amazonaws.com/
 ← 429 OK application/xml 398b 658ms

	Request	Response	Detail
Host:	s3.eu-west-1.amazonaws.com		
Accept-Encoding:	identity		
User-Agent:	aws-cli/2.9.12 Python/3.11.3 Darwin/22.6.0 source/x86_64 prompt/off command/s3.ls		
X-Amz-Date:	20231109T212545Z		
X-Amz-Security-Token:	IQoJb3JpZ2luX2VjEKb//////////wEaCWV1LXd1c3QtMSJHMEUCIDSpsvSA2REqh+Dd3w3IF36x4ZSLpyWImV0+FVP4mhAhAiEA6RwvBvvbRxQfkx4y4/BihWkuXLbNkoXPHm6ylTso3dYqhgMI3//////////ARAAGgwzOTYw0DcxMDk3NzYiDEx0PLx1X4LEAVDpyCraAuQgmaLo/Gze2vLynG+6W/0RG0dXH77kuellZJIhol59mqFne04aNT29+ImilKhY3TawQQmTH4FI6clfur48vQkb7yQBK2LMQYCUBSbRb8Hny14ziWugW7i3YkJVKCkm9ZC1k4tw5z7n3WgT6C58c9fsNF320NtdVVHzyU2WMAdygJXAexdAZ17/fn0gs9o6x+tTTASfqxUmpwaBTLCyAc1Ex4bv7P7Pkh1DJCxV0JAPweyb+vdrEQWp2vARE/SW+mrfPTQZVLQQpwZ1kVgtgygESB0r+iw/yq2xmdufneDIZyAND7Yls3crqilBXdc44CcRFGspyDa9Y0PsZputtLXRjFwzXMJ2YigXmc6fxIrW6uJlzch/gespoPLMXIQzyl6ihSGaT4+WfH9BccFdjpsYYoCCeNmYaZo5SmajqjLbUwvh6Vz0j0778Ilgn61UfiGnkbUgcTaf/gw1Jy1qgY6pgFvt+kIagxlgbS60a9iiN2yNmNgXiEJ0MWiZWFSZehYYkiCUSBnw9PmuG0Gozpsrku3i7Tdxgw1sjSaTHj5BX8/q7J/+WNM02MGhoTp3paspl2C+o+iUcr5IWFFepbZxUlPpmrCrZjFeuspnn8XqZGLXLL2gnFC7tdpYVDC/CoYdCTTuteYn15Cd54VhZo0DbndUyl0/kpIn9q9sV23h/cqrDhwI		
X-Amz-Content-SHA256:	e3b0c44298fc1c149afb4c8996fb92427ae41e4649b934ca495991b7852b855		
Authorization:	AWS4-HMAC-SHA256 Credential=ASIAVY0FBVCIBZEC6NVH/20231109/eu-west-1/s3/aws4_request, SignedHeaders=host;x-amz-content-sha256;x-amz-date;x-amz-security-token, Signature=a8eec836da4c874e6106816bab940e4d4923ac8d6744716d56a548efb3406e2b		

No request content

[m:auto]

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Flow:	e Edit	D Duplicate	r Replay	e Export	d Delete	V Restore	b Save body	Next flow	p Prev flow
Proxy:	? Help	q Back	E Events	0 Options	i Intercept	f Filter	w Save flows	z Clear list	- Layout

mitmproxy ~s/g/m/exploring-boto3-events-with-mitmproxy

`⌘1

Flows

>>21:25:46 HTTPS GET ...amazonaws.com / 429 application/xml 398b 658ms

↓ [1/1] [i:~d s3.eu-west-1.amazonaws.com & ~s]

[*:8080]

Flow: ↵ Select D Duplicate r Replay e Export d Delete m Mark V Restore b Save body

Proxy: ? Help q Quit E Events O Options i Intercept f Filter w Save flows z Clear list - Layout

```
❯ https_proxy=localhost:8080 AWS_CA_BUNDLE=$HOME/.mitmproxy/mitmproxy-ca-cert.pem aws s3 ls  
An error occurred () when calling the ListBuckets operation:  
x 254 ✘ 54s a scratch.AWSAdministratorAccess/eu-west-1 21:26:39  
❯
```

I'm Lazy

```
import logging

from mitmproxy import flowfilter
from mitmproxy import http

class RateLimitExceededFilter:
    filter: flowfilter.TFilter

    def __init__(self):
        self.filter = flowfilter.parse("~d s3.eu-west-1.amazonaws.com & ~s")

    def response(self, flow: http.HTTPFlow) -> None:
        if flowfilter.match(self.filter, flow):
            logging.info(
                f"Flow {flow.request} matches filter: setting HTTP 429"
            )
            flow.response.status_code = 429
            flow.response.reason = "Too Many Requests"

addons = [RateLimitExceededFilter()]
```

```
mitmproxy -s  
examples/mitm_interception.py
```

mitmproxy -s example ~/s/g/m/exploring-boto3-events-with-mitmproxy

⌘1

Flows

↓ [0/0] [scripts:1] [*:8080]
Flow: L Load flows n Create new
Proxy: ? Help q Quit E Events O Options i Intercept f Filter - Layout ctrl → Switch F Follow new

```
❯ https_proxy=localhost:8080 AWS_CA_BUNDLE=$HOME/.mitmproxy/mitmproxy-ca-cert.pem aws s3 ls  
An error occurred () when calling the ListBuckets operation:  
x 254 a scratch.AWSAdministratorAccess/eu-west-1 20:50:00
```

mitmproxy -s example ~/s/g/m/exploring-boto3-events-with-mitmproxy

⌘1

Flows

>>20:32:40 HTTPS GET ...amazonaws.com / 429 application/xml 398b 137ms

↓ [1/1] [scripts:1]

[*:8080]

Flow: ↵ Select

D Duplicate

r Replay

e Export

d Delete

m Mark

b Save body

Proxy: ? Help

q Quit

E Events

o Options

i Intercept

f Filter

w Save flows

z Clear list - Layout

Flow Details

2023-11-09 20:32:40 GET https://s3.eu-west-1.amazonaws.com/
← 429 Too Many Requests application/xml 398b 137ms

	Request	Response	Detail
x-amz-id-2:	+wB3WIjx8bmius4XI+5wE7U9xIx0gaw1KL48FfsiQLY3S89IylFB3dp3Hi9iWPGKVnn0NKHDR90=		
x-amz-request-id:	A1P49R1GY171MVZ2		
Date:	Thu, 09 Nov 2023 20:32:42 GMT		
Content-Type:	application/xml		
Transfer-Encoding:	chunked		
Server:	AmazonS3		

XML [m:auto]

```
<?xml version="1.0" encoding="UTF-8"?>
<ListAllMyBucketsResult xmlns="http://s3.amazonaws.com/doc/2006-03-01/">
  <Owner>
    <ID>1305744cb586daf054976969e08336547e38cf32939d2bacd7f31a896db7b67e</ID>
    <DisplayName>aws-scratch-account</DisplayName>
  </Owner>
  <Buckets>
    <Bucket>
      <Name>micktwomey-scratch-example</Name>
      <CreationDate>2022-09-04T15:13:22.000Z</CreationDate>
    </Bucket>
  </Buckets>
</ListAllMyBucketsResult>
```

↓ [1/1] [scripts:1]

[*:8080]

Flow: e Edit D Duplicate r Replay e Export d Delete b Save body ↵ Next flow p Prev flow

Proxy: ? Help q Back E Events O Options i Intercept f Filter w Save flows z Clear list – Layout

Flows

>>21:30:03	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	325ms
21:30:04	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	42ms
21:30:05	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	53ms
21:30:09	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	61ms
21:30:12	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	37ms
21:50:53	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	135ms
21:50:54	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	193ms
21:50:56	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	71ms
21:50:59	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	121ms
21:51:05	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	358ms
21:51:23	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	146ms
21:51:24	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	197ms
21:51:25	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	35ms
21:51:26	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	74ms
21:51:32	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	197ms
21:51:53	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	121ms
21:51:54	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	55ms
21:51:56	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	124ms
21:51:57	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	83ms
21:52:03	HTTPS	GET	...amazonaws.com /		err	...sed connection		
21:52:29	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	248ms
21:52:30	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	42ms
21:52:31	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	37ms
21:52:34	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	210ms
21:52:36	HTTPS	GET	...amazonaws.com /		429	application/xml	398b	37ms

↓ [1/25] [scripts:1]

[*:8080]

Flow: ↵ Select

D Duplicate

r Replay

e Export

d Delete

m Mark

b Save body

Proxy: ? Help

q Quit

E Events

o Options

i Intercept

f Filter

w Save flows

z Clear list - Layout

```
import boto3
from rich import print
import time

def print_event(event_name: str, attempts: int, operation, response, request_dict,
**_):
    print(
        event_name,
        operation,
        attempts,
        response[1]["ResponseMetadata"]["HTTPStatusCode"],
        request_dict["context"]["retries"],
    )

s3 = boto3.client("s3")
s3.meta.events.register("needs-retry.s3.ListBuckets", print_event)
s3.list_buckets()
```

Flows

>>21:30:03	HTTPS	GET	...amazonaws.com /	429	application/xml	398b	325ms
21:30:04	HTTPS	GET	...amazonaws.com /	429	application/xml	398b	42ms
21:30:05	HTTPS	GET	...amazonaws.com /	429	application/xml	398b	53ms
21:30:09	HTTPS	GET	...amazonaws.com /	429	application/xml	398b	61ms
21:30:12	HTTPS	GET	...amazonaws.com /	429	application/xml	398b	37ms

↓ [1/5] [scripts:1]

[*:8080]

Flow: ↵ Select

D Duplicate

r Replay

e Export

d Delete

m Mark

b Save body

Proxy: ? Help

q Quit

E Events

o Options

i Intercept

f Filter

w Save flows

z Clear list - Layout

~/s/g/m/exploring-boto3-events-with-mitmproxy

⊟⌘2

```
> https_proxy=localhost:8080 AWS_CA_BUNDLE=$HOME/.mitmproxy/mitmproxy-ca.pem python examples/retry_metrics.py
retry event?
nope!
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
Traceback (most recent call last):
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/examples/retry_metrics.py", line 19, in <module>
    s3.list_buckets()
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/.venv/lib/python3.11/site-packages/botocore/client.py", line 535, in _api_call
    return self._make_api_call(operation_name, kwargs)
           ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/.venv/lib/python3.11/site-packages/botocore/client.py", line 980, in _make_api_call
    raise error_class(parsed_response, operation_name)
botocore.exceptions.ClientError: An error occurred () when calling the ListBuckets operation (reached max retries: 4):
```

...ng-boto3-events-with-mitmproxy   scratch.AWSAdministratorAccess/eu-west-1   impure 23:37:03
 

Will this ever end?

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. Want to use events to monitor these but don't have docs
4. Want to somehow modify responses to simulate retries and see what happens
5. Can intercept requests using mitmproxy
6. Now know the shape of the data we get in 429 responses
7. ??

```
import boto3
from rich import print

def increment_metric(name):
    print(f"{name} | increment | count=1")

def handle_retry(event_name: str, attempts: int, **_):
    print("retry event?")
    if attempts > 1:
        increment_metric(event_name)
    else:
        print("nope!")

s3 = boto3.client("s3")
s3.meta.events.register("needs-retry.s3.*", handle_retry)
s3.list_buckets()
print("All done!")
```

~\$g/m/exploring-boto3-events-with-mitmproxy

⌘2

```
> https_proxy=localhost:8080 AWS_CA_BUNDLE=$HOME/.mitmproxy/mitmproxy-ca.pem python examples/retry_metrics.py
retry event?
nope!
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
retry event?
needs-retry.s3.ListBuckets|increment|count=1
Traceback (most recent call last):
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/examples/retry_metrics.py", line 19, in <module>
    s3.list_buckets()
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/.venv/lib/python3.11/site-packages/botocore/client.py", line 535, in _api_call
    return self._make_api_call(operation_name, kwargs)
           ^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^^
  File "/Users/mick/src/github.com/micktwomey/exploring-boto3-events-with-mitmproxy/.venv/lib/python3.11/site-packages/botocore/client.py", line 980, in _make_api_call
    raise error_class(parsed_response, operation_name)
botocore.exceptions.ClientError: An error occurred () when calling the ListBuckets operation (reached max retries: 4):
```

```
...tmp... git main +1 !2 ➜ 8s ♫ exploring-boto3-events-with-mitmproxy ↵ scratch.AWSAdministratorAccess/eu-west-1 ↵ impure 21:52:37
> []
```

```
1 fields @timestamp, event_name
2 | filter ispresent(event_name)
3 | filter event_name = 'needs-retry.s3.PutObject'
4 | filter attempts > 1
5 | sort by @timestamp asc
6 | stats count() by bin(1m)
7 # | limit 200
8
```

Run query

Save

Actions ▼

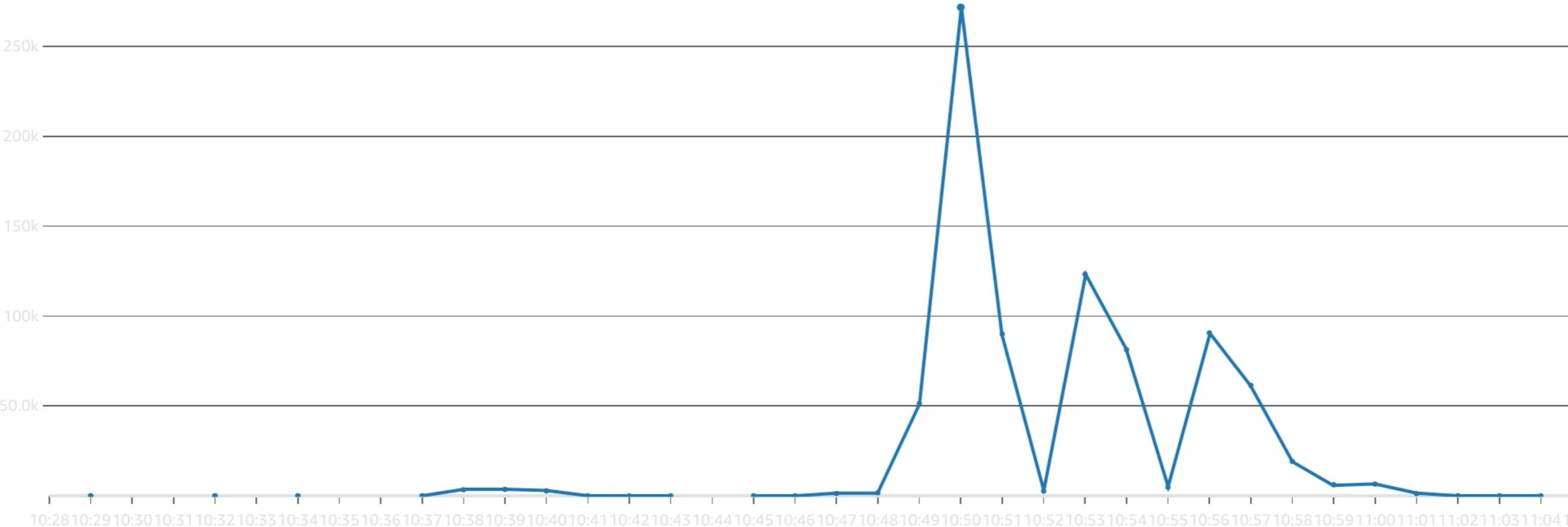
Histor

Queries are allowed to run for up to 15 minutes.

Logs

Visualization

Line ▼



Finally!

1. Got some jobs taking a long time
2. Guessed it's retries causing this
3. Want to use events to monitor these but don't have docs
4. Want to somehow modify responses to simulate retries and see what happens
5. Can intercept requests using mitmproxy
6. Now know the shape of the data we get in 429 responses
7. Can emit metrics and graph them

What We Covered

How
request
retries
behave

AWS API
limits

mitmproxy

boto3's
event
system

That
nothing is
ever
simple!

Thank You! 🎉



mastodon.ie/@micktwomey



fourtheorem.com

[**github.com/micktwomey/
exploring-boto3-events-
with-mitmproxy**](https://github.com/micktwomey/exploring-boto3-events-with-mitmproxy)

