

DISTRIBUTED LOAD TESTING WITH K6

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HI,



I'M THIJS



***I'M THE TECH
EVANGELIST***

AT

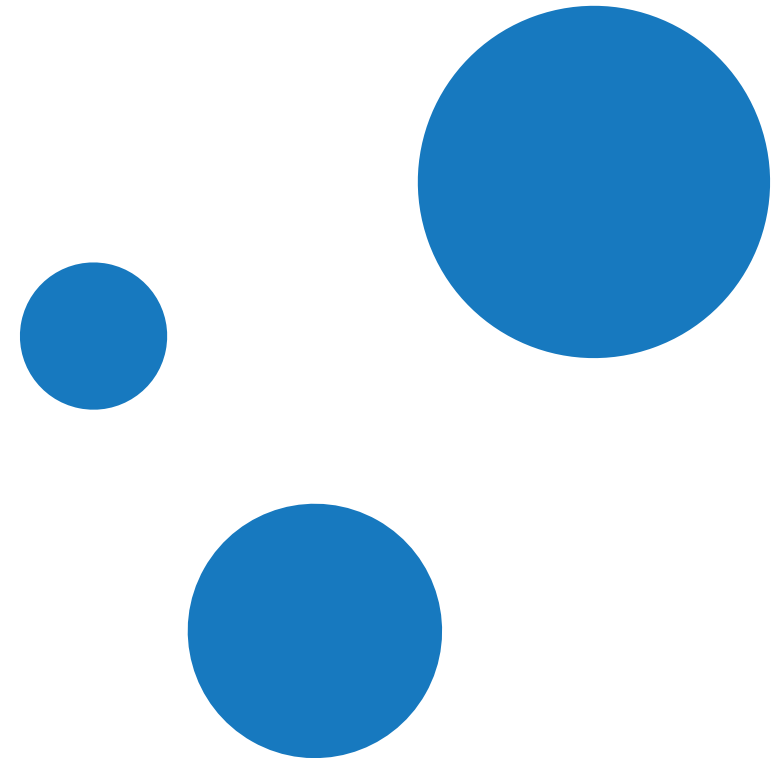


***VARNISH
SOFTWARE***



VARNISH

SOFTWARE



VARNISH CACHE

About Varnish Software

We deliver enterprise solutions based on open source **Varnish Cache**



10M



22%



10M

10M active websites worldwide powered by **Varnish**

22% of the world's top 10,000 sites use **Varnish**

10M pulls on Docker hub of the **Varnish** image

2005 - Open source Varnish Cache project begins

2014 - *Varnish Enterprise* solution launched to support content-heavy, high-traffic businesses

2020 - *Varnish Edge Cloud* launched to support 5G content delivery within telco networks

2010 - Varnish Software spun out of Redpill Linpro

2017 - Varnish start delivering custom, private CDNs to enterprises

***WE MAKE THE
WEB FASTER***



WE ENHANCE DIGITAL EXPERIENCES BY LOWERING NETWORK LATENCY



***WE BUILD SOFTWARE-DEFINED
WEB ACCELERATION & CONTENT
DELIVERY SOLUTIONS***

ACHIEVE GROWTH, PERFORMANCE & SUSTAINABILITY GOALS

1.3 Tbps
per server

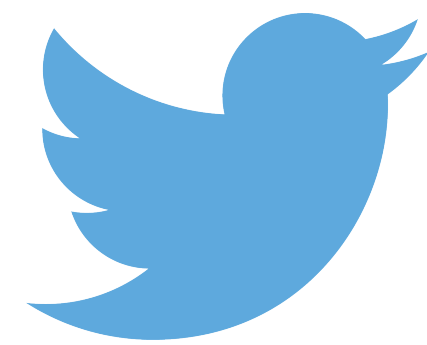
1.17 Gbps
per watt

WORLD'S FASTEST EDGE CONTENT DELIVERY SOFTWARE

I'M



@THIJSFERYN



O'REILLY®

Compliments of
VARNISH
SOFTWARE



Getting Started with Varnish Cache

ACCELERATE YOUR WEB APPLICATIONS

Thijs Feryn

Thijs Feryn

VARNISH 6

BY EXAMPLE

A practical guide to web acceleration and content
delivery with Varnish 6 technology



**MEASURE
HOW MUCH
IT CAN
HANDLE**



**WAS
LOOKING FOR A
LOAD TESTING
TOOL**

**NEXT-GEN
CONTENT
DELIVERY** **LIVE!**

W  **ORLD TOUR**





BY



Grafana Labs

K6 CAPABILITIES

- ✓ **CLI TOOLS**
- ✓ **SCRIPTING (JAVASCRIPT ES2015/ES6)**
- ✓ **MODULES**
- ✓ **CHECKS, THRESHOLDS & METRICS**
- ✓ **TEST SCENARIO & TEST EXECUTOR CUSTOMIZATION**
- ✓ **TEST BUILDER, BROWSER RECORDER & BROWSER TESTING**
- ✓ **RESULT STORAGE & VISUALIZATION INTEGRATIONS**

***WRITE PERFORMANCE
TESTS IN JS***

```
import http from 'k6/http';  
  
export default function () {  
  http.get('https://test.k6.io');  
}
```


RUN PERFORMANCE TESTS

✓ **LOCALLY** *OPEN SOURCE*

✓ **IN THE CLOUD** *COMMERCIAL PRODUCT*

✓ **VIA KUBERNETES** *OPEN SOURCE*

```
$ k6 run script.js
```



```
$ k6 c1oud script.js
```

apiVersion: k6.io/v1alpha1

kind: TestRun

metadata:

name: k6-sample

spec:

parallelism: 4

script:

configMap:

name: k6-test

file: test.js


```
$ kubectl apply -f k6.yaml
```



**FOCUS ON
LOCAL
EXECUTOR**

```
$ k6 run script.js
```



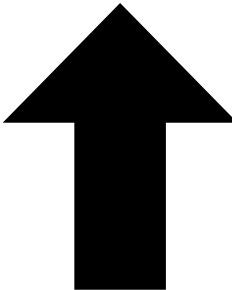
execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

data_received.....	: 17 kB	49 kB/s					
data_sent.....	: 442 B	1.3 kB/s					
http_req_blocked.....	: avg=251.56ms	min=251.56ms	med=251.56ms	max=251.56ms	p(90)=251.56ms	p(95)=251.56ms	
http_req_connecting.....	: avg=98.21ms	min=98.21ms	med=98.21ms	max=98.21ms	p(90)=98.21ms	p(95)=98.21ms	
http_req_duration.....	: avg=97.36ms	min=97.36ms	med=97.36ms	max=97.36ms	p(90)=97.36ms	p(95)=97.36ms	
{ expected_response:true }	: avg=97.36ms	min=97.36ms	med=97.36ms	max=97.36ms	p(90)=97.36ms	p(95)=97.36ms	
http_req_failed.....	: 0.00%	✓ 0	x 1				
http_req_receiving.....	: avg=221µs	min=221µs	med=221µs	max=221µs	p(90)=221µs	p(95)=221µs	
http_req_sending.....	: avg=77µs	min=77µs	med=77µs	max=77µs	p(90)=77µs	p(95)=77µs	
http_req_tls_handshaking.....	: avg=116.87ms	min=116.87ms	med=116.87ms	max=116.87ms	p(90)=116.87ms	p(95)=116.87ms	
http_req_waiting.....	: avg=97.06ms	min=97.06ms	med=97.06ms	max=97.06ms	p(90)=97.06ms	p(95)=97.06ms	
http_reqs.....	: 1	2.855063/s					
iteration_duration.....	: avg=349.8ms	min=349.8ms	med=349.8ms	max=349.8ms	p(90)=349.8ms	p(95)=349.8ms	
iterations.....	: 1	2.855063/s					

running (00m00.4s), 0/1 VUs, 1 complete and 0 interrupted iterations
default ✓ [=====] 1 VUs 00m00.4s/10m0s 1/1 iters, 1 per VU


```
data_received.....: 17 kB 49 kB/s
data_sent.....: 442 B 1.3 kB/s
http_req_blocked.....: avg=251.56ms min=251.56ms med=251.56ms max=251.56ms
http_req_connecting.....: avg=98.21ms min=98.21ms med=98.21ms max=98.21ms
http_req_duration.....: avg=97.36ms min=97.36ms med=97.36ms max=97.36ms
  { expected_response:true }.....: avg=97.36ms min=97.36ms med=97.36ms max=97.36ms
http_req_failed.....: 0.00% ✓ 0 x 1
http_req_receiving.....: avg=221µs min=221µs med=221µs max=221µs
http_req_sending.....: avg=77µs min=77µs med=77µs max=77µs
http_req_tls_handshaking.....: avg=116.87ms min=116.87ms med=116.87ms max=116.87ms
http_req_waiting.....: avg=97.06ms min=97.06ms med=97.06ms max=97.06ms
http_reqs.....: 1 2.855063/s
iteration_duration.....: avg=349.8ms min=349.8ms med=349.8ms max=349.8ms
iterations.....: 1 2.855063/s
```

SCALING UP  ***THE TESTS***

```
$ k6 run -u 100 -d 1m script.js
```

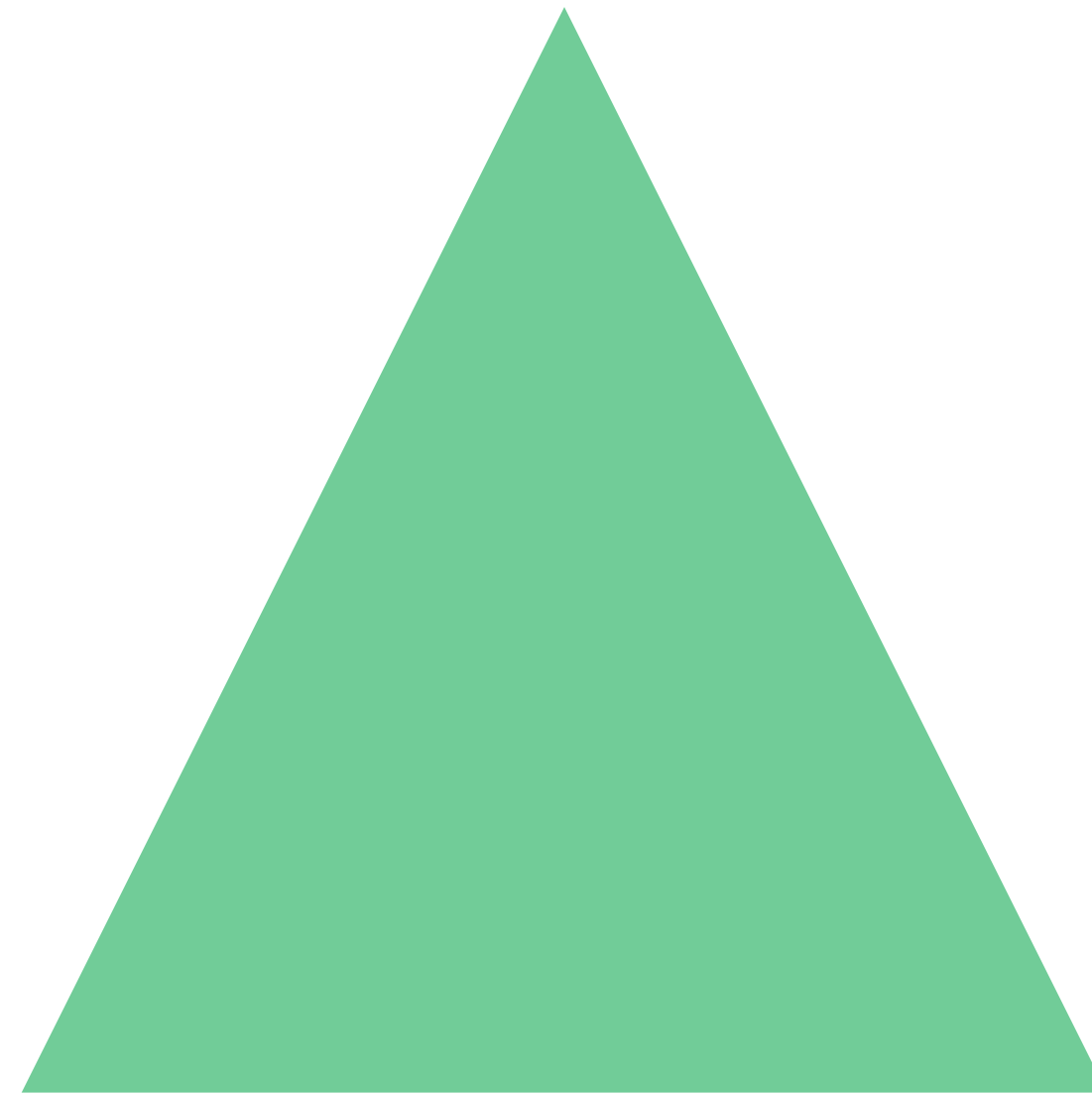


```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  vus: 100,
  duration: '1m',
};

export default function () {
  http.get('https://test.k6.io');
  sleep(1);
}
```

VUS



ITERATIONS

TIME

THE HTTP REQUESTS


```
import http from 'k6/http';  
  
export default function () {  
  http.get('https://test.k6.io');  
}
```

```
import http from 'k6/http';

export default function () {
  for (let id = 1; id <= 100; id++) {
    http.get(`https://test.k6.io?id=${id}`);
  }
}
```

```
import http from 'k6/http';

export default function () {
  const params = {
    cookies: { lang: 'nl' },
    headers: { 'Accept-Language': 'nl' }
  };

  http.get('https://test.k6.io', params);
}
```


REQUEST PARAMETERS

- ✓ COOKIES & COOKIE JAR
- ✓ HEADERS
- ✓ AUTHENTICATION TYPE
- ✓ REDIRECTS
- ✓ TAGS
- ✓ TIMEOUT
- ✓ COMPRESSION

```
import http from 'k6/http';  
  
export default function () {  
  let data = 'name=Thijs';  
  
  http.post('https://httpbin.test.k6.io/post', data);  
}
```

```
import http from 'k6/http';

export default function () {
  let data = { name: 'Thijs' };

  http.post('https://httpbin.test.k6.io/post',
    JSON.stringify(data), {
      headers: { 'Content-Type': 'application/json' }
    });
}
```

```
http.get(url, [params]);  
http.head(url, [params]);  
http.post(url, [body] [params]);  
http.delete(url, [body] [params]);  
http.patch(url, [body] [params]);  
http.put(url, [body] [params]);  
http.options(url, [body] [params]);  
http.request(method, url, [body] [params]);  
http.batch(array | object);
```



```
import http from 'k6/http';
import { check } from 'k6';

export default function () {
  const responses = http.batch([
    ['GET', 'https://test.k6.io'],
    ['GET', 'https://test.k6.io/style.css'],
    ['GET', 'https://test.k6.io/images/logo.png'],
  ]);

  check(responses[0], {
    'main page status was 200': (res) => res.status === 200,
  });
}
```

CHECKS 

```
import http from 'k6/http';
import { check } from 'k6';

export default function () {
  const res = http.get('http://httpbin.test.k6.io');
  check(res, {
    'response code was 200': (res) => res.status == 200,
  });
}
```

BOOL check(val, sets, [tags])

**FALSE
ASSERTION
DOESN'T STOP THE
TEST RUN**

BOOL check(val, sets, [tags])

**CREATES A
RATE METRIC**

```
BOOL check(res, {  
    'response code was 200': (res) => res.status == 200,  
});
```

```
BOOL check(res, {  
    'response code was 200': (res) => res.status == 200,  
    'HTTP/2 used': (res) => res.proto === 'HTTP/2.0',  
});
```



execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

✓ response code was 200

checks.....	: 100.00%	✓ 1	x 0						
data_received.....	: 16 kB	30 kB/s							
data_sent.....	: 578 B	1.1 kB/s							
http_req_blocked.....	: avg=157.91ms	min=99.93ms	med=157.91ms	max=215.88ms	p(90)=204.29ms	p(95)=210.08ms			
http_req_connecting.....	: avg=100.63ms	min=98.17ms	med=100.63ms	max=103.1ms	p(90)=102.6ms	p(95)=102.85ms			
http_req_duration.....	: avg=104.4ms	min=103.51ms	med=104.4ms	max=105.3ms	p(90)=105.12ms	p(95)=105.21ms			
{ expected_response:true }	: avg=104.4ms	min=103.51ms	med=104.4ms	max=105.3ms	p(90)=105.12ms	p(95)=105.21ms			
http_req_failed.....	: 0.00%	✓ 0	x 2						
http_req_receiving.....	: avg=382.99µs	min=77µs	med=383µs	max=689µs	p(90)=627.8µs	p(95)=658.4µs			
http_req_sending.....	: avg=56µs	min=54µs	med=56µs	max=58µs	p(90)=57.6µs	p(95)=57.8µs			
http_req_tls_handshaking.....	: avg=56.33ms	min=0s	med=56.33ms	max=112.67ms	p(90)=101.41ms	p(95)=107.04ms			
http_req_waiting.....	: avg=103.96ms	min=102.76ms	med=103.96ms	max=105.16ms	p(90)=104.92ms	p(95)=105.04ms			
http_reqs.....	: 2	3.804914/s							
iteration_duration.....	: avg=525.51ms	min=525.51ms	med=525.51ms	max=525.51ms	p(90)=525.51ms	p(95)=525.51ms			
iterations.....	: 1	1.902457/s							

running (00m00.5s), 0/1 VUs, 1 complete and 0 interrupted iterations

default ✓ [=====] 1 VUs 00m00.5s/10m0s 1/1 iters, 1 per VU

✓ response code was 200

```
checks.....: 100.00% ✓ 1      x 0
data_received.....: 16 kB    30 kB/s
data_sent.....: 578 B    1.1 kB/s
http_req_blocked.....: avg=157.91ms min=99.93ms med=157.91ms max=215.88ms
http_req_connecting.....: avg=100.63ms min=98.17ms med=100.63ms max=103.1ms
http_req_duration.....: avg=104.4ms min=103.51ms med=104.4ms max=105.3ms
  { expected_response:true }.....: avg=104.4ms min=103.51ms med=104.4ms max=105.3ms
http_req_failed.....: 0.00% ✓ 0      x 2
http_req_receiving.....: avg=382.99µs min=77µs med=383µs max=689µs
http_req_sending.....: avg=56µs min=54µs med=56µs max=58µs
http_req_tls_handshaking.....: avg=56.33ms min=0s med=56.33ms max=112.67ms
http_req_waiting.....: avg=103.96ms min=102.76ms med=103.96ms max=105.16ms
http_reqs.....: 2      3.804914/s
iteration_duration.....: avg=525.51ms min=525.51ms med=525.51ms max=525.51ms
iterations.....: 1      1.902457/s
```



```
execution: local
  script: script.js
  output: -
```

```
scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
  * default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)
```

```
x response code was 200
↳ 0% - ✓ 0 / x 1
```

```
checks.....: 0.00% ✓ 0 x 1
data_received.....: 5.7 kB 15 kB/s
data_sent.....: 468 B 1.2 kB/s
http_req_blocked.....: avg=284.65ms min=284.65ms med=284.65ms max=284.65ms p(90)=284.65ms p(95)=284.65ms
http_req_connecting.....: avg=105.53ms min=105.53ms med=105.53ms max=105.53ms p(90)=105.53ms p(95)=105.53ms
http_req_duration.....: avg=106.14ms min=106.14ms med=106.14ms max=106.14ms p(90)=106.14ms p(95)=106.14ms
http_req_failed.....: 100.00% ✓ 1 x 0
http_req_receiving.....: avg=272µs min=272µs med=272µs max=272µs p(90)=272µs p(95)=272µs
http_req_sending.....: avg=31µs min=31µs med=31µs max=31µs p(90)=31µs p(95)=31µs
http_req_tls_handshaking.....: avg=145.6ms min=145.6ms med=145.6ms max=145.6ms p(90)=145.6ms p(95)=145.6ms
http_req_waiting.....: avg=105.84ms min=105.84ms med=105.84ms max=105.84ms p(90)=105.84ms p(95)=105.84ms
http_reqs.....: 1 2.552479/s
iteration_duration.....: avg=391.62ms min=391.62ms med=391.62ms max=391.62ms p(90)=391.62ms p(95)=391.62ms
iterations.....: 1 2.552479/s
```

```
running (00m00.4s), 0/1 VUs, 1 complete and 0 interrupted iterations
default ✓ [=====] 1 VUs 00m00.4s/10m0s 1/1 iters, 1 per VU
```

x response code was 200

↳ 0% - ✓ 0 / x 1

checks.....	0.00%	✓ 0	x 1		
data_received.....	5.7 kB	15 kB/s			
data_sent.....	468 B	1.2 kB/s			
http_req_blocked.....	avg=284.65ms	min=284.65ms	med=284.65ms	max=284.65ms	
http_req_connecting.....	avg=105.53ms	min=105.53ms	med=105.53ms	max=105.53ms	
http_req_duration.....	avg=106.14ms	min=106.14ms	med=106.14ms	max=106.14ms	
http_req_failed.....	100.00%	✓ 1	x 0		
http_req_receiving.....	avg=272µs	min=272µs	med=272µs	max=272µs	
http_req_sending.....	avg=31µs	min=31µs	med=31µs	max=31µs	
http_req_tls_handshaking.....	avg=145.6ms	min=145.6ms	med=145.6ms	max=145.6ms	
http_req_waiting.....	avg=105.84ms	min=105.84ms	med=105.84ms	max=105.84ms	
http_reqs.....	1	2.552479/s			
iteration_duration.....	avg=391.62ms	min=391.62ms	med=391.62ms	max=391.62ms	
iterations.....	1	2.552479/s			

THRESHOLDS


```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  thresholds: {
    http_req_failed: ['rate<0.01'],
    http_req_duration: ['p(95)<200'],
  },
};

export default function () {
  http.get('https://test.k6.io');
  sleep(1);
}
```



execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

data_received.....	: 17 kB	13 kB/s				
data_sent.....	: 442 B	325 B/s				
http_req_blocked.....	: avg=254.78ms	min=254.78ms	med=254.78ms	max=254.78ms	p(90)=254.78ms	p(95)=254.78ms
http_req_connecting.....	: avg=102.58ms	min=102.58ms	med=102.58ms	max=102.58ms	p(90)=102.58ms	p(95)=102.58ms
✓ http_req_duration.....	: avg=105.6ms	min=105.6ms	med=105.6ms	max=105.6ms	p(90)=105.6ms	p(95)=105.6ms
{ expected_response:true }...	: avg=105.6ms	min=105.6ms	med=105.6ms	max=105.6ms	p(90)=105.6ms	p(95)=105.6ms
✓ http_req_failed.....	: 0.00%	✓ 0	x 1			
http_req_receiving.....	: avg=218µs	min=218µs	med=218µs	max=218µs	p(90)=218µs	p(95)=218µs
http_req_sending.....	: avg=86µs	min=86µs	med=86µs	max=86µs	p(90)=86µs	p(95)=86µs
http_req_tls_handshaking.....	: avg=123.75ms	min=123.75ms	med=123.75ms	max=123.75ms	p(90)=123.75ms	p(95)=123.75ms
http_req_waiting.....	: avg=105.3ms	min=105.3ms	med=105.3ms	max=105.3ms	p(90)=105.3ms	p(95)=105.3ms
http_reqs.....	: 1	0.734366/s				
iteration_duration.....	: avg=1.36s	min=1.36s	med=1.36s	max=1.36s	p(90)=1.36s	p(95)=1.36s
iterations.....	: 1	0.734366/s				
vus.....	: 1	min=1	max=1			
vus_max.....	: 1	min=1	max=1			

running (00m01.4s), 0/1 VUs, 1 complete and 0 interrupted iterations

default ✓ [=====] 1 VUs 00m01.4s/10m0s 1/1 iters, 1 per VU

```
data_received.....: 17 kB 13 kB/s
data_sent.....: 442 B 325 B/s
http_req_blocked.....: avg=254.78ms min=254.78ms med=254.78ms max=254.78ms
http_req_connecting.....: avg=102.58ms min=102.58ms med=102.58ms max=102.58ms
✓ http_req_duration.....: avg=105.6ms min=105.6ms med=105.6ms max=105.6ms
  { expected_response:true }.....: avg=105.6ms min=105.6ms med=105.6ms max=105.6ms
✓ http_req_failed.....: 0.00% ✓ 0 x 1
http_req_receiving.....: avg=218µs min=218µs med=218µs max=218µs
http_req_sending.....: avg=86µs min=86µs med=86µs max=86µs
http_req_tls_handshaking.....: avg=123.75ms min=123.75ms med=123.75ms max=123.75ms
http_req_waiting.....: avg=105.3ms min=105.3ms med=105.3ms max=105.3ms
http_reqs.....: 1 0.734366/s
iteration_duration.....: avg=1.36s min=1.36s med=1.36s max=1.36s
iterations.....: 1 0.734366/s
vus.....: 1 min=1 max=1
vus_max.....: 1 min=1 max=1
```

```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  thresholds: {
    http_req_failed: ['rate<0.01'],
    http_req_duration: ['p(95)<90'],
  },
};

export default function () {
  http.get('https://test.k6.io');
  sleep(1);
}
```



execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

data_received	17 kB	13 kB/s				
data_sent	442 B	330 B/s				
http_req_blocked	avg=236.38ms	min=236.38ms	med=236.38ms	max=236.38ms	p(90)=236.38ms	p(95)=236.38ms
http_req_connecting	avg=96.84ms	min=96.84ms	med=96.84ms	max=96.84ms	p(90)=96.84ms	p(95)=96.84ms
x http_req_duration	avg=100.79ms	min=100.79ms	med=100.79ms	max=100.79ms	p(90)=100.79ms	p(95)=100.79ms
{ expected_response:true }	avg=100.79ms	min=100.79ms	med=100.79ms	max=100.79ms	p(90)=100.79ms	p(95)=100.79ms
✓ http_req_failed	0.00%	✓ 0	x 1			
http_req_receiving	avg=284µs	min=284µs	med=284µs	max=284µs	p(90)=284µs	p(95)=284µs
http_req_sending	avg=49µs	min=49µs	med=49µs	max=49µs	p(90)=49µs	p(95)=49µs
http_req_tls_handshaking	avg=108.25ms	min=108.25ms	med=108.25ms	max=108.25ms	p(90)=108.25ms	p(95)=108.25ms
http_req_waiting	avg=100.45ms	min=100.45ms	med=100.45ms	max=100.45ms	p(90)=100.45ms	p(95)=100.45ms
http_reqs	1	0.746762/s				
iteration_duration	avg=1.33s	min=1.33s	med=1.33s	max=1.33s	p(90)=1.33s	p(95)=1.33s
iterations	1	0.746762/s				
vus	1	min=1	max=1			
vus_max	1	min=1	max=1			

running (00m01.3s), 0/1 VUs, 1 complete and 0 interrupted iterations

default ✓ [=====] 1 VUs 00m01.3s/10m0s 1/1 iters, 1 per VU

ERRO[0001] thresholds on metrics 'http_req_duration' have been crossed


```

data_received.....: 17 kB 13 kB/s
data_sent.....: 442 B 330 B/s
http_req_blocked.....: avg=236.38ms min=236.38ms med=236.38ms max=236.38ms
http_req_connecting.....: avg=96.84ms min=96.84ms med=96.84ms max=96.84ms
x http_req_duration.....: avg=100.79ms min=100.79ms med=100.79ms max=100.79ms
  { expected_response:true }.....: avg=100.79ms min=100.79ms med=100.79ms max=100.79ms
✓ http_req_failed.....: 0.00% ✓ 0 x 1
http_req_receiving.....: avg=284µs min=284µs med=284µs max=284µs
http_req_sending.....: avg=49µs min=49µs med=49µs max=49µs
http_req_tls_handshaking.....: avg=108.25ms min=108.25ms med=108.25ms max=108.25ms
http_req_waiting.....: avg=100.45ms min=100.45ms med=100.45ms max=100.45ms
http_reqs.....: 1 0.746762/s
iteration_duration.....: avg=1.33s min=1.33s med=1.33s max=1.33s
iterations.....: 1 0.746762/s
vus.....: 1 min=1 max=1
vus_max.....: 1 min=1 max=1

```

running (00m01.3s), 0/1 VUs, 1 complete and 0 interrupted iterations

default ✓ [=====] 1 VUs 00m01.3s/10m0s 1/1 iters, 1 per

ERR0 [0001] thresholds on metrics 'http_req_duration' have been crossed

```
.....: 17 kB 13 kB/s
.....: 442 B 330 B/s
.....: avg=236.38ms min=236.38ms med=236.38ms max=236.38ms p(90)=236.38ms p(95)=236.38ms
.....: avg=96.84ms min=96.84ms med=96.84ms max=96.84ms p(90)=96.84ms p(95)=96.84ms
.....: avg=100.79ms min=100.79ms med=100.79ms max=100.79ms p(90)=100.79ms p(95)=100.79ms
e }.....: avg=100.79ms min=100.79ms med=100.79ms max=100.79ms p(90)=100.79ms p(95)=100.79ms
.....: 0.00% ✓ 0 x 1
.....: avg=284µs min=284µs med=284µs max=284µs p(90)=284µs p(95)=284µs
.....: avg=49µs min=49µs med=49µs max=49µs p(90)=49µs p(95)=49µs
.....: avg=108.25ms min=108.25ms med=108.25ms max=108.25ms p(90)=108.25ms p(95)=108.25ms
.....: avg=100.45ms min=100.45ms med=100.45ms max=100.45ms p(90)=100.45ms p(95)=100.45ms
.....: 1 0.746762/s
.....: avg=1.33s min=1.33s med=1.33s max=1.33s p(90)=1.33s p(95)=1.33s
.....: 1 0.746762/s
.....: 1 min=1 max=1
.....: 1 min=1 max=1
```

complete and 0 interrupted iterations

```
=====] 1 VUs 00m01.3s/10m0s 1/1 iters, 1 per VU
```

cs 'http_req_duration' have been crossed

```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  thresholds: {
    http_req_duration: ['p(90) < 400', 'p(95) < 800',
'p(99.9) < 2000']
  },
};

export default function () {
  http.get('https://test.k6.io');
  sleep(1);
}
```



***CATEGORIZE CHECKS,
THRESHOLDS, METRICS &
REQUESTS***

SYSTEM TAGS

✓ **PROTO**

✓ **NAME**

✓ **TLS_VERSION**

✓ **SUBPROTO**

✓ **GROUP**

✓ **SCENARIO**

✓ **STATUS**

✓ **CHECK**

✓ **SERVICE**

✓ **METHOD**

✓ **ERROR**

✓ **EXPECTED
RESPONSE**

✓ **URL**

✓ **ERROR_CODE**

```
import http from 'k6/http';
import { sleep } from 'k6';

export default function () {
  http.get('https://test.k6.io', {
    tags: {
      location: "eu",
    },
  });
  sleep(1);
}
```

```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  tags: {
    location: 'eu',
  },
};

export default function () {
  http.get('https://test.k6.io');
  sleep(1);
}
```

```
$ k6 run script.js --tag location="eu"
```

```
import http from 'k6/http';
import { sleep } from 'k6';
import exec from 'k6/execution';

export function setup () {
  var location = 'eu';
  switch(exec.vu.tags['location']) {
    case 'us':
    case 'apac':
    case 'eu':
      location = exec.vu.tags['location'];
  }
  return {"location": location};
}

export default function (data) {
  var res = http.get(`https://${data.location}.test.com/`);
  console.log(res.request.url);
  sleep(1);
}
```



```
import http from 'k6/http';

export const options = {
  thresholds: {
    'http_req_duration': ['p(95)<500'],
    'http_req_duration{location:eu}': ['p(95)<400'],
    'http_req_duration{location:us}': ['p(95)<200'],
  },
};
```

```
export default function () {
  http.get('https://test.k6.io/');
}
```



**THRESHOLDS
PER TAG**

GROUPS

```
import http from 'k6/http';
import { sleep } from 'k6';
import { group } from 'k6';
import { check } from 'k6';

export default function (data) {
  let res;

  group('get', function () {
    res = http.get('https://test.k6.io/contacts.php');
    check(res, {
      'is contacts status 200': (r) => r.status === 200,
    });
    res = http.get('https://test.k6.io/news.php');
    check(res, {
      'is news status 200': (r) => r.status === 200,
    });
    sleep(1);
  });
};
```

```
group('post', function () {
  res = http.post('https://test.k6.io/flip_coin.php', 'bet=heads');
  check(res, {
    'is heads status 200': (r) => r.status === 200,
  });
  res = http.post('https://test.k6.io/flip_coin.php', 'bet=tails');
  check(res, {
    'is tails status 200': (r) => r.status === 200,
  });
  sleep(1);
});
}
```

```
group('post', function () {  
  res = http.post('https://test.k6.io/flip_coin.php', 'bet=heads');  
  check(res, {  
    'is status 200': (r) => r.status === 200,  
  });  
  res = http.post('https://test.k6.io/flip_coin.php', 'bet=tails');  
  check(res, {  
    'is status 200': (r) => r.status === 200,  
  });  
});  
}
```

**GROUP NAME IS
ADDED AS A TAG**



execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

get

- ✓ is contacts status 200
- ✓ is news status 200

post

- ✓ is heads status 200
- ✓ is tails status 200

```
checks.....: 100.00% ✓ 4 x 0
data_received.....: 9.6 kB 3.6 kB/s
data_sent.....: 840 B 317 B/s
group_duration.....: avg=1.32s min=1.2s med=1.32s max=1.44s p(90)=1.42s p(95)=1.43s
http_req_blocked.....: avg=63.06ms min=2µs med=8.5µs max=252.25ms p(90)=176.58ms p(95)=214.41ms
http_req_connecting.....: avg=24.25ms min=0s med=0s max=97ms p(90)=67.9ms p(95)=82.45ms
http_req_duration.....: avg=99ms min=97.15ms med=99.05ms max=100.74ms p(90)=100.66ms p(95)=100.7ms
  { expected_response:true }...: avg=99ms min=97.15ms med=99.05ms max=100.74ms p(90)=100.66ms p(95)=100.7ms
http_req_failed.....: 0.00% ✓ 0 x 4
http_req_receiving.....: avg=132µs min=56µs med=127µs max=218µs p(90)=193.7µs p(95)=205.84µs
http_req_sending.....: avg=35.75µs min=11µs med=37.5µs max=57µs p(90)=55.5µs p(95)=56.25µs
http_req_tls_handshaking.....: avg=28.84ms min=0s med=0s max=115.38ms p(90)=80.76ms p(95)=98.07ms
http_req_waiting.....: avg=98.83ms min=96.88ms med=98.91ms max=100.62ms p(90)=100.54ms p(95)=100.58ms
http_reqs.....: 4 1.508202/s
iteration_duration.....: avg=2.65s min=2.65s med=2.65s max=2.65s p(90)=2.65s p(95)=2.65s
iterations.....: 1 0.37705/s
vus.....: 1 min=1 max=1
vus_max.....: 1 min=1 max=1
```

running (00m02.7s), 0/1 VUs, 1 complete and 0 interrupted iterations
default ✓ [=====] 1 VUs 00m02.7s/10m0s 1/1 iters, 1 per VU

■ get

- ✓ is contacts status 200
- ✓ is news status 200

■ post

- ✓ is heads status 200
- ✓ is tails status 200

checks.....	: 100.00%	✓ 4	x 0						
data_received.....	: 9.6 kB	3.6 kB/s							
data_sent.....	: 840 B	317 B/s							
group_duration.....	: avg=1.32s	min=1.2s	med=1.32s	max=1.44s	p(90)=1.42s	p(95)=1.44s			
http_req_blocked.....	: avg=63.06ms	min=2µs	med=8.5µs	max=252.25ms	p(90)=176.58ms	p(95)=176.58ms			
http_req_connecting.....	: avg=24.25ms	min=0s	med=0s	max=97ms	p(90)=67.9ms	p(95)=67.9ms			
http_req_duration.....	: avg=99ms	min=97.15ms	med=99.05ms	max=100.74ms	p(90)=100.66ms	p(95)=100.66ms			
{ expected_response:true }	: avg=99ms	min=97.15ms	med=99.05ms	max=100.74ms	p(90)=100.66ms	p(95)=100.66ms			
http_req_failed.....	: 0.00%	✓ 0	x 4						
http_req_receiving.....	: avg=132µs	min=56µs	med=127µs	max=218µs	p(90)=193.7µs	p(95)=193.7µs			
http_req_sending.....	: avg=35.75µs	min=11µs	med=37.5µs	max=57µs	p(90)=55.5µs	p(95)=55.5µs			
http_req_tls_handshaking.....	: avg=28.84ms	min=0s	med=0s	max=115.38ms	p(90)=80.76ms	p(95)=80.76ms			
http_req_waiting.....	: avg=98.83ms	min=96.88ms	med=98.91ms	max=100.62ms	p(90)=100.54ms	p(95)=100.54ms			
http_reqs.....	: 4	1.508202/s							
iteration_duration.....	: avg=2.65s	min=2.65s	med=2.65s	max=2.65s	p(90)=2.65s	p(95)=2.65s			
iterations.....	: 1	0.37705/s							
vus.....	: 1	min=1	max=1						

TEST LIFECYCLE 

```
// 1. init code

export function setup() {
  // 2. setup code
}

export default function (data) {
  // 3. VU code
}

export function teardown(data) {
  // 4. teardown code
}
```

```
// 1. init code
```

```
export function setup() {  
  // 2. setup code  
}
```

```
export default function (data) {  
  // 3. VU code  
}
```

```
export function teardown(data) {  
  // 4. teardown code  
}
```



ONCE PER VU


```
// 1. init code
export function setup() {
  // 2. setup code
}

export default function (data) {
  // 3. VU code
}

export function teardown(data) {
  // 4. teardown code
}
```

ONCE PER VU

ONCE

```
// 1. init code
```

```
export function setup() {  
  // 2. setup code  
}
```

```
export default function (data) {  
  // 3. VU code  
}
```

```
export function teardown(data) {  
  // 4. teardown code  
}
```

ONCE PER VU

ONCE

**ONCE PER
ITERATION**

```
// 1. init code
```

```
export function setup() {  
  // 2. setup code  
}
```

```
export default function (data) {  
  // 3. VU code  
}
```

```
export function teardown(data) {  
  // 4. teardown code  
}
```

ONCE PER VU

ONCE

**ONCE PER
ITERATION**

ONCE

```
// 1. init code
import http from 'k6/http';

export function setup() {
  // 2. setup code
  const res = http.get('https://httpbin.test.k6.io/json');
  return { 'slides': res.json().slideshow.slides}
}

export default function (data) {
  // 3. VU code
  data.slides.forEach((slide) => {
    const res = http.get(`https://httpbin.test.k6.io/anything/${slide.title}`);
  });
}

export function teardown(data) {
  // 4. teardown code
  console.log('Test finished, ' + data.slides.length + ' slides processed.');
```

ACCESS METRICS

```
import http from 'k6/http';

export default function () {
  const res = http.get('http://httpbin.test.k6.io');
  console.log('Response time was ' +
String(res.timings.duration) + ' ms');
}
```



```
import http from 'k6/http';

export default function () {
  const res = http.get('http://httpbin.test.k6.io');
  console.log('Response time was ' +
String(res.timings.duration) + ' ms');
}
```

```
res.timings.blocked  
res.timings.connecting  
res.timings.tls_handshaking  
res.timings.sending  
res.timings.waiting  
res.timings.receiving  
res.timings.duration
```

CUSTOM METRICS

```
import http from 'k6/http';
import { Counter } from 'k6/metrics';
import { randomItem } from 'https://jslib.k6.io/k6-utils/1.2.0/index.js';

const res200 = new Counter('res200');
const res300 = new Counter('res300');
const res400 = new Counter('res400');
const res500 = new Counter('res500');
const statuses = [200, 300, 400, 500];

export default function () {
  let res, status;
  for (let id = 1; id <= 20; id++) {
    status = randomItem(statuses);
    res = http.get(`https://httpbin.test.k6.io/status/${status}`);
    if(res.status >= 200 && res.status < 300) {
      res200.add(1);
    } else if(res.status >= 300 && res.status < 400) {
      res300.add(1);
    } else if(res.status >= 400 && res.status < 500) {
      res400.add(1);
    } else if(res.status >= 500 && res.status < 600) {
      res500.add(1);
    }
  }
}
```

```

data_received.....: 10 kB  4.7 kB/s
data_sent.....: 2.7 kB  1.2 kB/s
http_req_blocked.....: avg=11.58ms  min=1µs      med=5.5µs    max=231.65ms  p(90)=9.
http_req_connecting.....: avg=4.81ms  min=0s      med=0s      max=96.32ms  p(90)=0s
http_req_duration.....: avg=98.32ms  min=93.82ms  med=99.33ms  max=101.34ms  p(90)=10
  { expected_response:true }.....: avg=98.63ms  min=94.89ms  med=99.53ms  max=101.34ms  p(90)=10
http_req_failed.....: 50.00% ✓ 10      x 10
http_req_receiving.....: avg=113.95µs  min=20µs    med=95.5µs  max=258µs    p(90)=22
http_req_sending.....: avg=22.4µs   min=8µs     med=22µs    max=47µs     p(90)=31
http_req_tls_handshaking.....: avg=5.15ms   min=0s     med=0s     max=103.18ms  p(90)=0s
http_req_waiting.....: avg=98.18ms  min=93.71ms  med=99.12ms  max=101.1ms  p(90)=10
http_reqs.....: 20      9.070484/s
iteration_duration.....: avg=2.2s     min=2.2s    med=2.2s    max=2.2s     p(90)=2.
iterations.....: 1      0.453524/s
res200.....: 6      2.721145/s
res300.....: 4      1.814097/s
res400.....: 8      3.628194/s
res500.....: 2      0.907048/s
vus.....: 1      min=1      max=1
vus_max.....: 1      min=1      max=1

```

CUSTOM METRIC TYPES

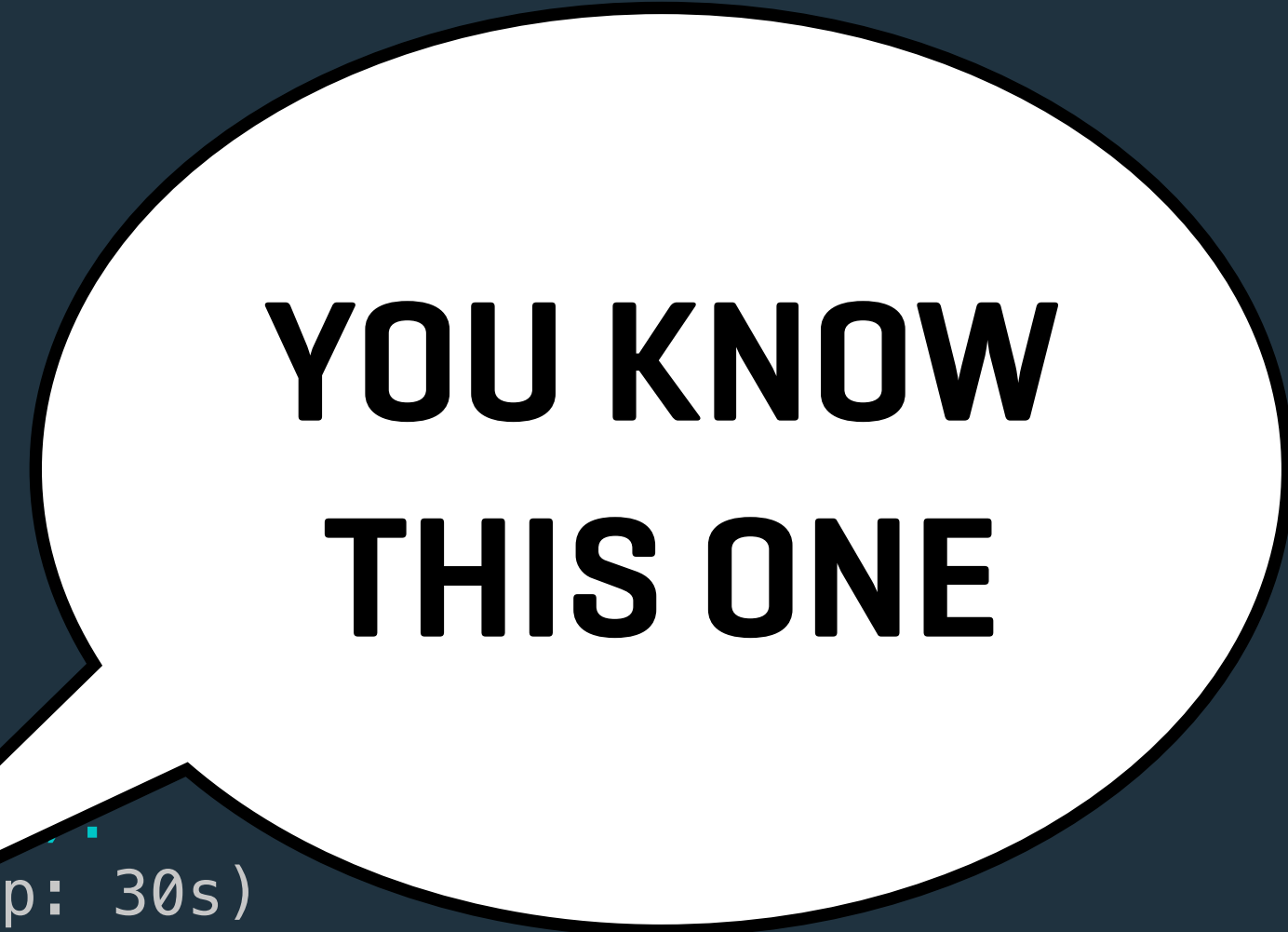
✓ **COUNTER** *CUMULATIVE SUM OF VALUES*

✓ **GAUGE** *MIN, MAX & LAST VALUE*

✓ **RATE** *PERCENTAGE OF NON-ZERO VALUES*

✓ **TREND** *MIN, MAX, AVERAGE & PERCENTILES*

END OF TEST METRICS



```
execution: local
script: script.js
output: -
```

```
scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop)
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)
```

```
data_received.....: 17 kB 49 kB/s
data_sent.....: 442 B 1.3 kB/s
http_req_blocked.....: avg=251.56ms min=251.56ms med=251.56ms max=251.56ms p(90)=251.56ms p(95)=251.56ms
http_req_connecting.....: avg=98.21ms min=98.21ms med=98.21ms max=98.21ms p(90)=98.21ms p(95)=98.21ms
http_req_duration.....: avg=97.36ms min=97.36ms med=97.36ms max=97.36ms p(90)=97.36ms p(95)=97.36ms
  { expected_response:true }...: avg=97.36ms min=97.36ms med=97.36ms max=97.36ms p(90)=97.36ms p(95)=97.36ms
http_req_failed.....: 0.00% ✓ 0 x 1
http_req_receiving.....: avg=221µs min=221µs med=221µs max=221µs p(90)=221µs p(95)=221µs
http_req_sending.....: avg=77µs min=77µs med=77µs max=77µs p(90)=77µs p(95)=77µs
http_req_tls_handshaking.....: avg=116.87ms min=116.87ms med=116.87ms max=116.87ms p(90)=116.87ms p(95)=116.87ms
http_req_waiting.....: avg=97.06ms min=97.06ms med=97.06ms max=97.06ms p(90)=97.06ms p(95)=97.06ms
http_reqs.....: 1 2.855063/s
iteration_duration.....: avg=349.8ms min=349.8ms med=349.8ms max=349.8ms p(90)=349.8ms p(95)=349.8ms
iterations.....: 1 2.855063/s
```

```
running (00m00.4s), 0/1 VUs, 1 complete and 0 interrupted iterations
default ✓ [=====] 1 VUs 00m00.4s/10m0s 1/1 iters, 1 per VU
```

```
import http from 'k6/http';

export const options = {
  summaryTrendStats: ['avg', 'min', 'max', 'count'],
};

export default function () {
  http.get('https://test.k6.io/');
}
```



**REDUCE
TRENDS**



execution: local
script: script.js
output: -

scenarios: (100.00%) 1 scenario, 1 max VUs, 10m30s max duration (incl. graceful stop):
* default: 1 iterations for each of 1 VUs (maxDuration: 10m0s, gracefulStop: 30s)

data_received	17 kB	45 kB/s		
data_sent	442 B	1.2 kB/s		
http_req_blocked	avg=269.38ms	min=269.38ms	max=269.38ms	count=1
http_req_connecting	avg=107.45ms	min=107.45ms	max=107.45ms	count=1
http_req_duration	avg=109.02ms	min=109.02ms	max=109.02ms	count=1
{ expected_response:true }	avg=109.02ms	min=109.02ms	max=109.02ms	count=1
http_req_failed	0.00%	✓ 0	x 1	
http_req_receiving	avg=1.61ms	min=1.61ms	max=1.61ms	count=1
http_req_sending	avg=52µs	min=52µs	max=52µs	count=1
http_req_tls_handshaking	avg=121.68ms	min=121.68ms	max=121.68ms	count=1
http_req_waiting	avg=107.35ms	min=107.35ms	max=107.35ms	count=1
http_reqs	1	2.635775/s		
iteration_duration	avg=378.99ms	min=378.99ms	max=378.99ms	count=1
iterations	1	2.635775/s		

running (00m00.4s), 0/1 VUs, 1 complete and 0 interrupted iterations

default ✓ [=====] 1 VUs 00m00.4s/10m0s 1/1 iters, 1 per VU

```
$ k6 run --summary-trend-  
stats="avg,min,max" script.js
```

```
$ k6 run --no-summary script.js
```



```
$ k6 run --out json script.js
```

```
$ k6 run --out json=k6.json script.js
```

```
$ k6 run --out csv=k6.csv script.js
```

REAL TIME METRICS

RESULT STORES & VISUALIZATIONS

- ✓ AWS
CLOUDWATCH
- ✓ APACHE KAFKA
- ✓ CLOUD
- ✓ CSV
- ✓ DATADOG
- ✓ DYNATRACE
- ✓ ELASTICSEARCH
- ✓ GRAFANA CLOUD
PROMETHEUS
- ✓ INFLUXDB
- ✓ JSON
- ✓ NETDATA
- ✓ NEW RELIC
- ✓ PROMETHEUS
- ✓ STATSD
- ✓ TIMESCALEDDB



Prometheus

```
$ go install go.k6.io/xk6/cmd/xk6@latest
```

```
$ xk6 build --with github.com/szkiba/xk6-  
prometheus@latest
```

```
$ k6 run -o "prometheus=namespace=k6&port=9090"
```

```
$ curl http://localhost:9090
```

```
# HELP k6_data_received The amount of received data
# TYPE k6_data_received counter
k6_data_received 8.4039802e+07
# HELP k6_data_sent The amount of data sent
# TYPE k6_data_sent counter
k6_data_sent 803484
# HELP k6_http_req_blocked Time spent blocked before initiating
# TYPE k6_http_req_blocked summary
k6_http_req_blocked{quantile="0.5"} 0.001541
k6_http_req_blocked{quantile="0.9"} 0.003791
k6_http_req_blocked{quantile="0.95"} 0.012
k6_http_req_blocked{quantile="1"} 1096.216625
k6_http_req_blocked_sum 154652.24431000135
k6_http_req_blocked_count 7432
# HELP k6_http_req_blocked_current Time spent blocked before initiating the request
(current)
# TYPE k6_http_req_blocked_current gauge
k6_http_req_blocked_current 0.001667
# HELP k6_http_req_connecting Time spent establishing TCP connection
# TYPE k6_http_req_connecting summary
k6_http_req_connecting{quantile="0.5"} 0
k6_http_req_connecting{quantile="0.9"} 0
k6_http_req_connecting{quantile="0.95"} 0
k6_http_req_connecting{quantile="1"} 138.566084
k6_http_req_connecting_sum 36255.94142099999
k6_http_req_connecting_count 7432
# HELP k6_http_req_connecting_current Time spent establishing TCP connection (current)
```



**PROMETHEUS
OUTPUT**


```
# HELP k6_http_req_receiving_current Time spent receiving response data (current)
# TYPE k6_http_req_receiving_current gauge
k6_http_req_receiving_current 0.029083
# HELP k6_http_req_sending Time spent sending data
# TYPE k6_http_req_sending summary
k6_http_req_sending{quantile="0.5"} 0.006375
k6_http_req_sending{quantile="0.9"} 0.016209
k6_http_req_sending{quantile="0.95"} 0.024875
k6_http_req_sending{quantile="1"} 0.618167
k6_http_req_sending_sum 76.600194999999983
k6_http_req_sending_count 7432
# HELP k6_http_req_sending_current Time spent sending data (current)
# TYPE k6_http_req_sending_current gauge
k6_http_req_sending_current 0.008167
# HELP k6_http_req_tls_handshaking Time spent handshaking TLS session
# TYPE k6_http_req_tls_handshaking summary
k6_http_req_tls_handshaking{quantile="0.5"} 0
k6_http_req_tls_handshaking{quantile="0.9"} 0
k6_http_req_tls_handshaking{quantile="0.95"} 0
k6_http_req_tls_handshaking{quantile="1"} 933.331792
k6_http_req_tls_handshaking_sum 108611.024792999998
k6_http_req_tls_handshaking_count 7432
# HELP k6_http_req_tls_handshaking_current Time spent handshaking TLS session (current)
# TYPE k6_http_req_tls_handshaking_current gauge
k6_http_req_tls_handshaking_current 0
# HELP k6_http_req_waiting Time spent waiting for response
# TYPE k6_http_req_waiting summary
k6_http_req_waiting{quantile="0.5"} 100.567167
```



Grafana

```
$ k6 run hls.js -o  
"prometheus=namespace=k6&port=9090"
```

```
$ k6 run hls.js -o  
"prometheus=namespace=k6&port=9090"
```

```
$ k6 run hls.js -o  
"prometheus=namespace=k6&port=9090"
```

```
global:
  scrape_interval: 5s
  scrape_timeout: 5s
  evaluation_interval: 10s

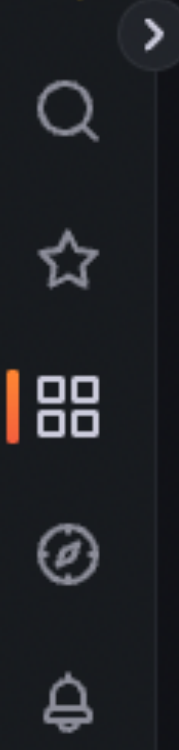
scrape_configs:
- job_name: k6-dublin
  static_configs:
    - targets: ['k6-dublin.test.com:9090']
      labels:
        location: 'ir'
- job_name: k6-california
  static_configs:
    - targets: ['k6-california.test.com:9090']
      labels:
        location: 'us'

- job_name: k6-singapore
  static_configs:
    - targets: ['k6-singapore.test.com:9090']
      labels:
        location: 'sg'
```

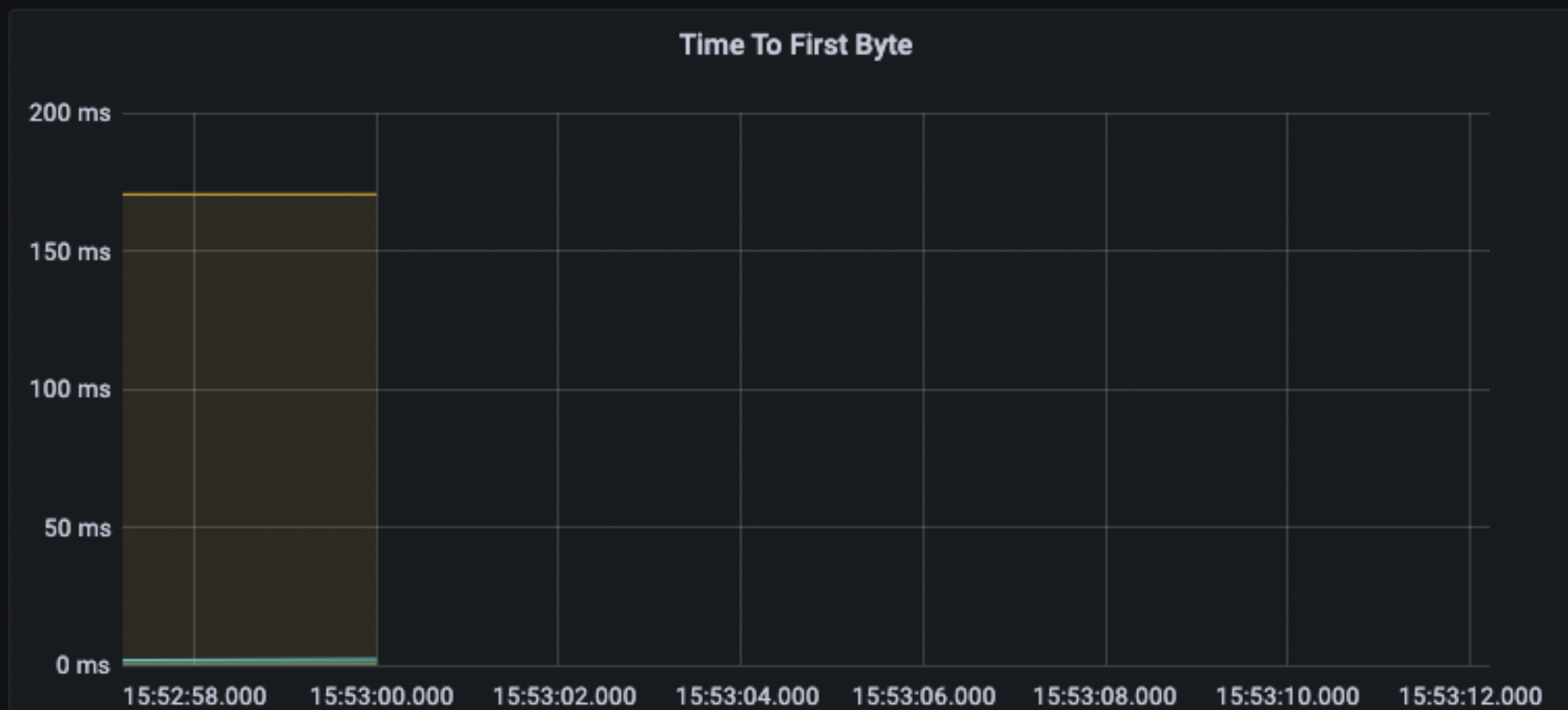
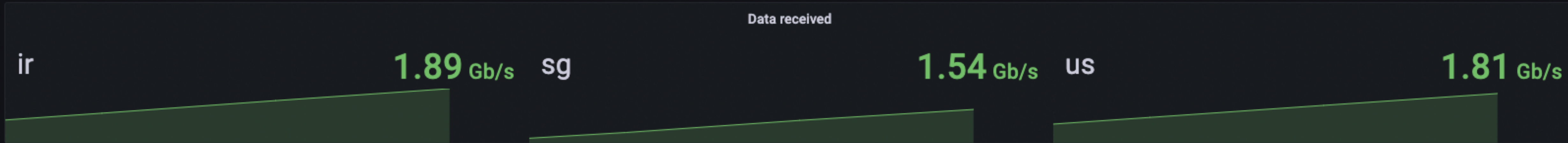
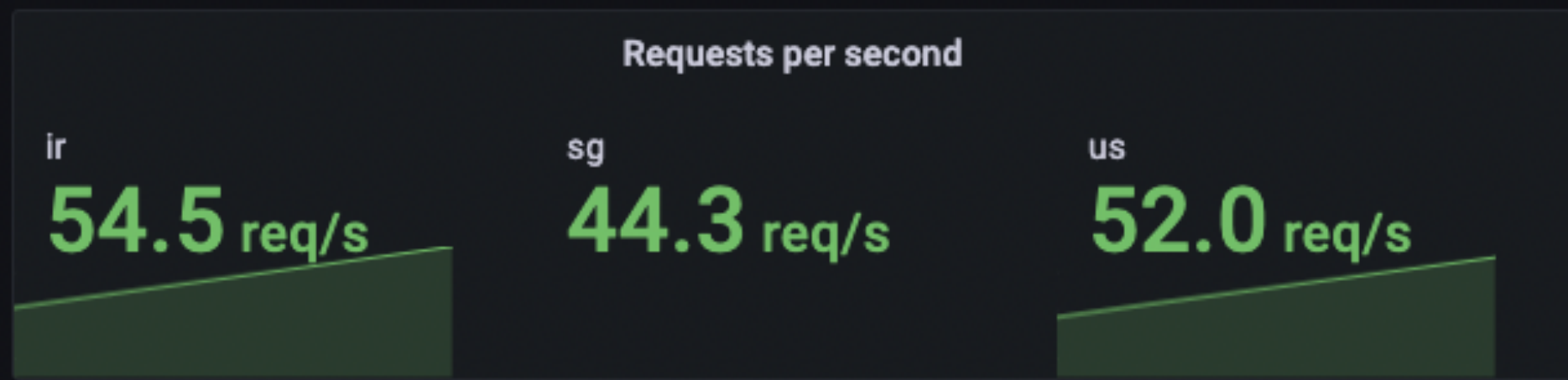


LABELS

```
k6_http_req_duration{location="ir", quantile="0.5"} 3.243162
k6_http_req_duration{location="ir", quantile="0.9"} 66.362954
k6_http_req_duration{location="ir", quantile="0.95"} 75.922755
k6_http_req_duration{location="ir", quantile="1"} 174.131426
k6_http_req_duration{location="us", quantile="0.5"} 3.987286
k6_http_req_duration{location="us", quantile="0.9"} 59.605656
k6_http_req_duration{location="us", quantile="0.95"} 75.764216
k6_http_req_duration{location="us", quantile="1"} 127.388737
```

Row title



k6_vus

```
sum(rate(k6_http_reqs[$__rate_interval])) by (country)
```

```
rate(k6_http_req_failed_sum[$__rate_interval])
```

k6_http_req_waiting_current

k6_http_req_duration_current

```
rate(k6_data_received[$__rate_interval])*8
```

DISTRIBUTED TESTS

```
$ k6 run script.js -a :6565 -o  
"prometheus=namespace=k6&port=9090" --paused
```

```
$ k6 run script.js -a :6565 -o  
"prometheus=namespace=k6&port=9090" --paused
```

```
$ k6 run script.js -a :6565 -o  
"prometheus=namespace=k6&port=9090" --paused
```

```
import http from 'k6/http';

export const options = {
  scenarios: {
    contacts: {
      executor: 'externally-controlled',
      vus: 2,
      maxVUs: 5000,
      duration: '2h',
    },
  },
},

export default function (data) {
  const res = http.get('https://test.k6.io/');
}
```

```
$ k6 resume -a ireland.test.com:6565
status: 4
paused: "false"
vus: "0"
vus-max: "5000"
stopped: false
running: false
tainted: false
```

```
$ k6 scale -u 100 -a ireland.test.com:6565
status: 7
paused: "false"
vus: "100"
vus-max: "5000"
stopped: false
running: true
tainted: false
```

```
$ k6 resume -a us.test.com:6565
```

```
status: 4  
paused: "false"  
vus: "0"  
vus-max: "5000"  
stopped: false  
running: false  
tainted: false
```

```
$ k6 scale -u 100 -a us.test.com:6565
```

```
status: 7  
paused: "false"  
vus: "100"  
vus-max: "5000"  
stopped: false  
running: true  
tainted: false
```



```
$ k6 resume -a singapore.test.com:6565
```

```
status: 4  
paused: "false"  
vus: "0"  
vus-max: "5000"  
stopped: false  
running: false  
tainted: false
```

```
$ k6 scale -u 100 -a singapore.test.com:6565
```

```
status: 7  
paused: "false"  
vus: "100"  
vus-max: "5000"  
stopped: false  
running: true  
tainted: false
```

```
$ curl -X GET \  
http://ireland.test.com:6565/v1/status
```

```
{"data":{"type":"status","id":"default","attributes":  
{"status":7,"paused":false,"vus":100,"vus-  
max":5000,"stopped":false,"running":true,"tainted":false}}}
```

```
$ curl -X PATCH \  
http://california.test.com:6565/v1/status \  
-H 'Content-Type: application/json' \  
-d '{  
  "data": {  
    "attributes": {  
      "vus": 500  
    }  
  }  
}'
```

```
{"data":{"type":"status","id":"default","attributes":  
{"status":7,"paused":false,"vus":500,"vus-  
max":5000,"stopped":false,"running":true,"tainted":false}}}
```

```
$ curl -X GET \
  http://ireland.test.com:6565/v1/metrics/http_req_duration
```

```
{"data":
{"type": "metrics", "id": "http_req_duration", "attributes":
{"type": "trend", "contains": "time", "tainted": null, "sample":
{"avg": 108.10542307692306, "max": 116.119, "med": 107.834, "min": 1
02.749, "p(90)": 111.269, "p(95)": 113.75349999999999}}}}}
```

SCENARIOS

SCENARIO PARAMETERS

✓ VU

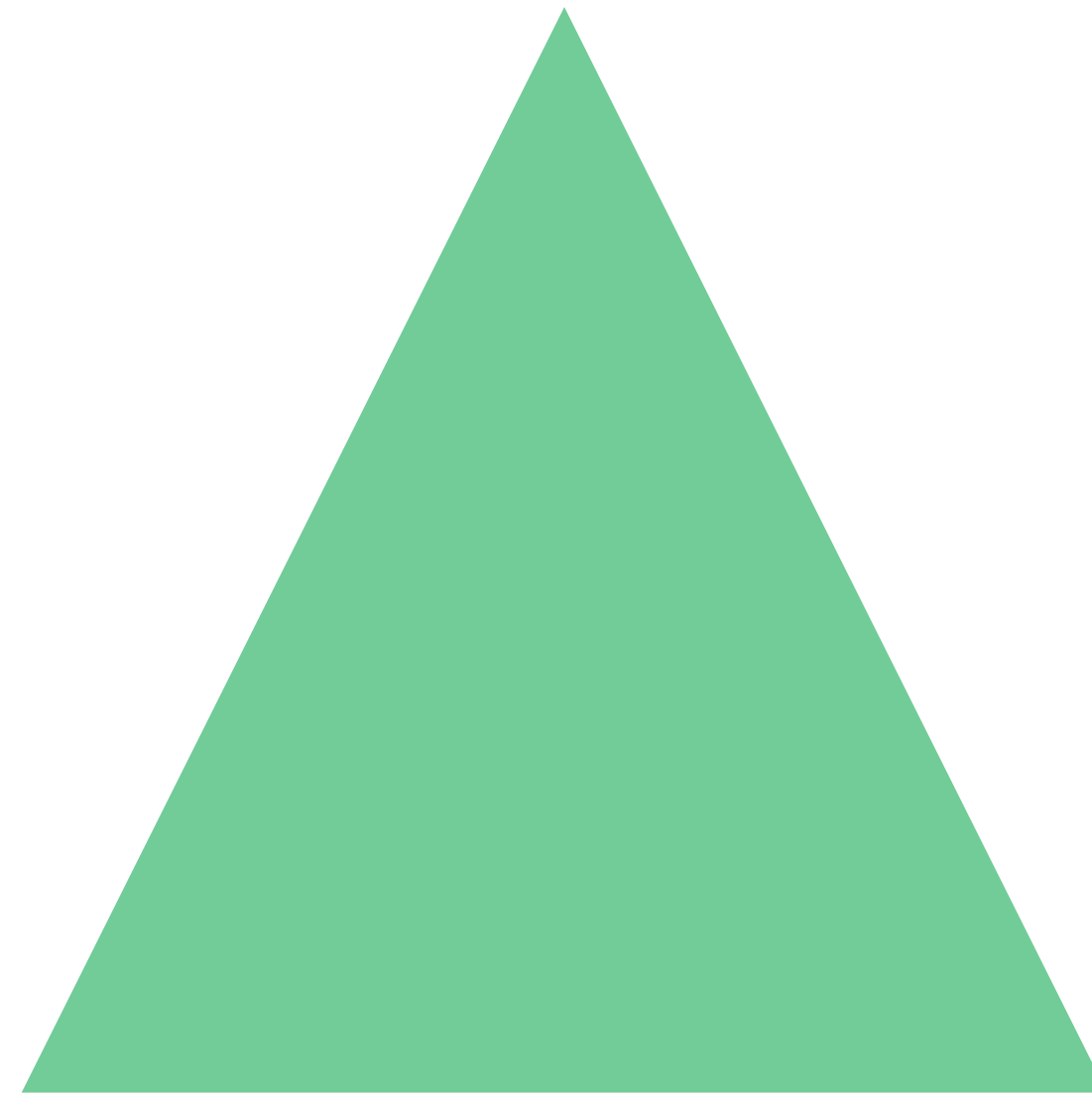
✓ ITERATIONS

✓ DURATION

✓ START TIME

✓ EXECUTOR

VUS



ITERATIONS

TIME

```
import http from "k6/http";

export const options = {
  scenarios: {
    shared_iter_scenario: {
      executor: "shared-iterations",
      vus: 10,
      iterations: 100,
      startTime: "0s",
    },
    per_vu_scenario: {
      executor: "per-vu-iterations",
      vus: 10,
      iterations: 10,
      startTime: "10s",
    },
  },
};

export default function () {
  http.get("https://test.k6.io/");
}
```

EXECUTORS

✓ **SHARED ITERATIONS**

✓ **PER VU ITERATIONS**

✓ **CONSTANT VUS**

✓ **RAMPING VUS**

✓ **CONSTANT ARRIVAL RATE**

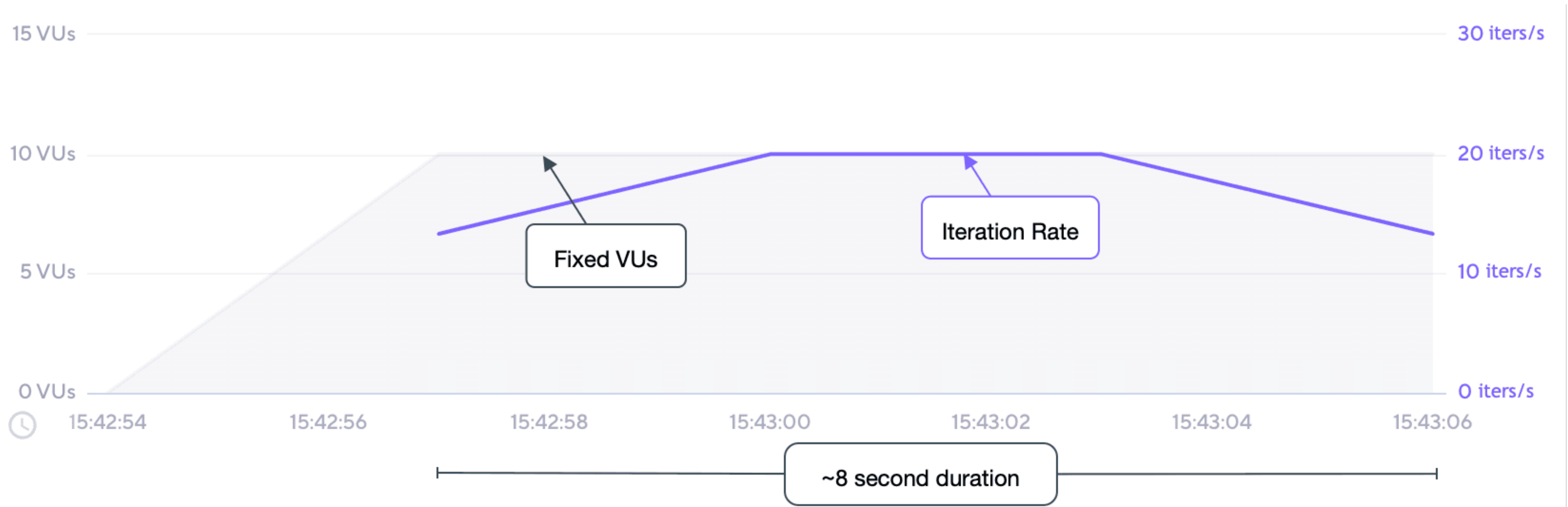
✓ **RAMPING ARRIVAL RATE**

✓ **EXTERNALLY
CONTROLLED**

```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'shared-iterations',
      vus: 10,
      iterations: 200,
      maxDuration: '30s',
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
  sleep(0.5);
}
```

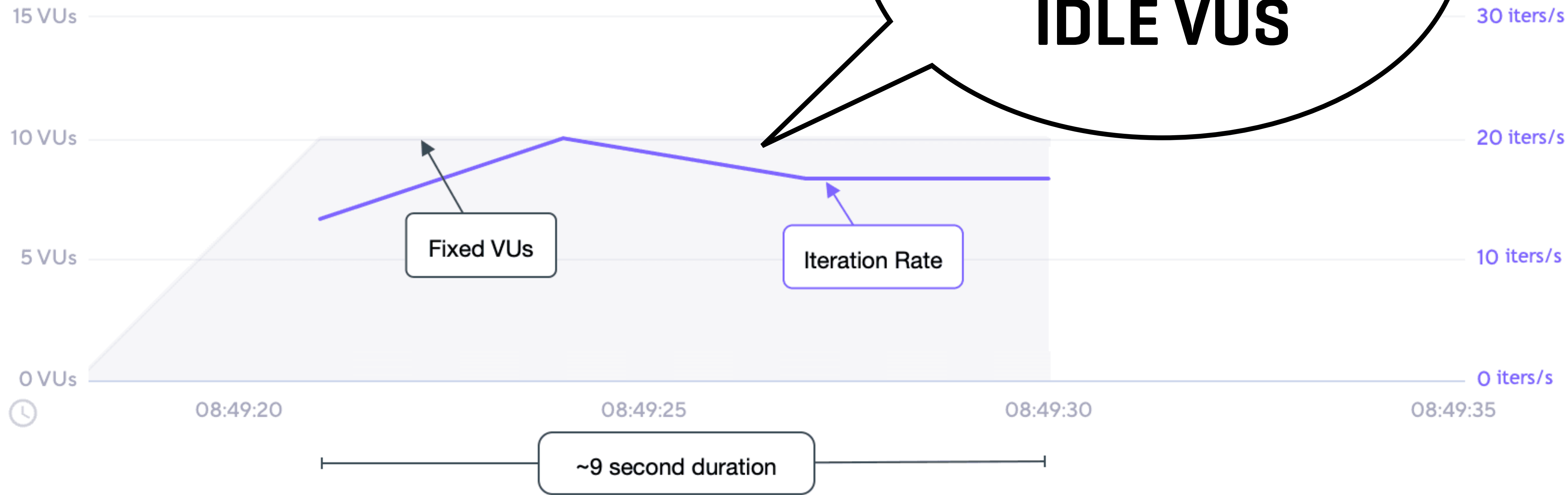


```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'per-vu-iterations',
      vus: 10,
      iterations: 20,
      maxDuration: '30s',
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
  sleep(0.5);
}
```


**LOWER
EFFICIENCY DUE TO
IDLE VUS**



```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'constant-vus',
      vus: 10,
      duration: '30s',
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
  sleep(0.5);
}
```



600 ITERATIONS

Fixed VUs

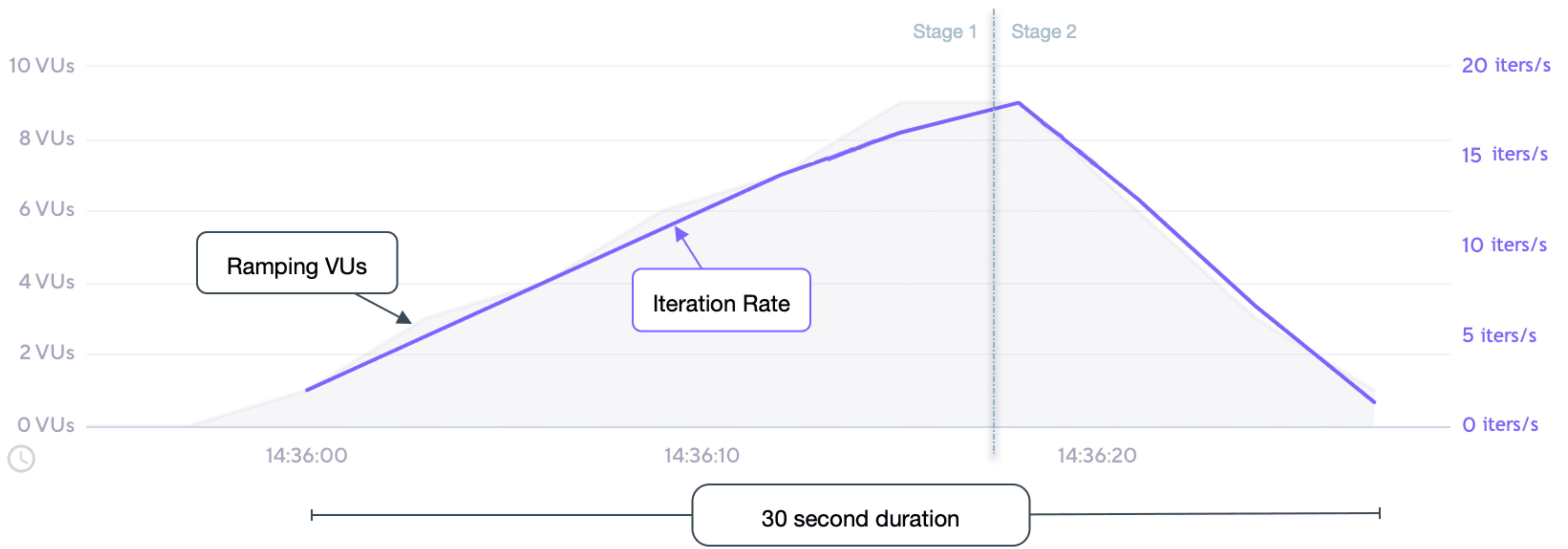
Iteration Rate

30 second duration

```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'ramping-vus',
      startVUs: 0,
      stages: [
        { duration: '20s', target: 10 },
        { duration: '10s', target: 0 },
      ],
      gracefulRampDown: '0s',
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
  sleep(0.5);
}
```



```
import http from 'k6/http';
import { sleep } from 'k6';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'constant-arrival-rate',
      duration: '30s',
      rate: 30,
      timeUnit: '1s',
      preAllocatedVUs: 2,
      maxVUs: 50,
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
  sleep(0.5);
}
```



30 second duration

**FOCUS ON
ITERATIONS PER
SECOND**


```
import http from 'k6/http';

export const options = {
  discardResponseBodies: true,
  scenarios: {
    contacts: {
      executor: 'externally-controlled',
      vus: 10,
      maxVUs: 50,
      duration: '10m',
    },
  },
};

export default function () {
  http.get('https://test.k6.io/contacts.php');
}
```

THE END

