

## Resumo executivo - Capacidade Máxima de Usuários

### Endpoint `/checkout/crypto` (CPU Bound):

- Capacidade Máxima: ~200 usuários simultâneos com resposta adequada
- Ponto de Degradação: A partir de 500 usuários, observa-se aumento exponencial na latência
- Ponto de Ruptura: Entre 500-700 usuários simultâneos, a aplicação começa a apresentar timeouts e erros significativos (>50% de falhas)

### Endpoint `/checkout/simple` (I/O Bound):

- Capacidade Máxima: Suporta até 300 usuários simultâneos com degradação controlada (p95 < 2s)
- Capacidade Normal: Suporta até 50 usuários simultâneos com latência p95 < 500ms
- Comportamento: Mantém estabilidade mesmo sob picos súbitos de tráfego

### Evidências:

#### Smoke:

```
TOTAL RESULTS

checks_total.....: 132423 4413.845056/s
checks_succeeded.: 100.00% 132423 out of 132423
checks_failed....: 0.00% 0 out of 132423

✓ status is 200
✓ response time < 500ms
✓ response has status field

HTTP
http_req_duration.....: avg=561.02µs min=0s med=547.79µs max=40.43ms p(90)=1.05ms p(95)=1.18ms
{ expected_response:true }.....: avg=561.02µs min=0s med=547.79µs max=40.43ms p(90)=1.05ms p(95)=1.18ms
http_req_failed.....: 0.00% 0 out of 44141
http_reqs.....: 44141 1471.281685/s

EXECUTION
iteration_duration.....: avg=672.33µs min=0s med=579.09µs max=70.02ms p(90)=1.1ms p(95)=1.28ms
iterations.....: 44141 1471.281685/s
vus.....: 1 min=1 max=1
vus_max.....: 1 min=1 max=1

NETWORK
data_received.....: 13 MB 425 kB/s
data_sent.....: 3.4 MB 112 kB/s

running (0m30.0s), 0/1 VUs, 44141 complete and 0 interrupted iterations
default ✓ [=====] 1 VUs 30s
```

#### Spike:

```
TOTAL RESULTS

checks_total.....: 53310 480.161055/s
checks_succeeded.: 100.00% 53310 out of 53310
checks_failed....: 0.00% 0 out of 53310

✓ status is 201
✓ response has id
✓ response has status APPROVED

HTTP
http_req_duration.....: avg=205.31ms min=100.33ms med=206.29ms max=321.74ms p(90)=284.98ms p(95)=295.41ms
{ expected_response:true }.....: avg=205.31ms min=100.33ms med=206.29ms max=321.74ms p(90)=284.98ms p(95)=295.41ms
http_req_failed.....: 0.00% 0 out of 17770
http_reqs.....: 17770 160.053685/s

EXECUTION
iteration_duration.....: avg=1.2s min=1.1s med=1.2s max=1.32s p(90)=1.28s p(95)=1.29s
iterations.....: 17770 160.053685/s
vus.....: 2 min=1 max=300
vus_max.....: 300 min=300 max=300

NETWORK
data_received.....: 5.3 MB 47 kB/s
data_sent.....: 3.7 MB 34 kB/s

running (1m51.0s), 000/300 VUs, 17770 complete and 0 interrupted iterations
default ✓ [=====] 000/300 VUs 1m50s
```

## Load:

```
■ TOTAL RESULTS

checks_total.....: 20586 97.903387/s
checks_succeeded...: 100.00% 20586 out of 20586
checks_failed.....: 0.00% 0 out of 20586

✓ status is 201
✓ response has id
✓ response has status APPROVED

HTTP
http_req_duration.....: avg=207.71ms min=100.93ms med=208.82ms max=328.64ms p(90)=287.39ms p(95)=297.51ms
{ expected_response:true }....: avg=207.71ms min=100.93ms med=208.82ms max=328.64ms p(90)=287.39ms p(95)=297.51ms
http_req_failed.....: 0.00% 0 out of 6862
http_reqs.....: 6862 32.634462/s

EXECUTION
iteration_duration.....: avg=1.2s min=1.1s med=1.2s max=1.38s p(90)=1.28s p(95)=1.29s
iterations.....: 6862 32.634462/s
vus.....: 1 min=1 max=50
vus_max.....: 50 min=50 max=50

NETWORK
data_received.....: 2.0 MB 9.7 kB/s
data_sent.....: 1.4 MB 6.8 kB/s

running (3m30.3s), 00/50 VUs, 6862 complete and 0 interrupted iterations
default ✓ [=====] 00/50 VUs 3m30s
```

## Stress:

```
■ TOTAL RESULTS

checks_total.....: 221064 593.97099/s
checks_succeeded...: 1.53% 3384 out of 221064
checks_failed.....: 98.46% 217680 out of 221064

X status is 201
↳ 1% - ✓ 1128 / X 72560
X response has id
↳ 1% - ✓ 1128 / X 72560
X response has status SECURE_TRANSACTION
↳ 1% - ✓ 1128 / X 72560

HTTP
http_req_duration.....: avg=493.82ms min=0s med=0s max=30.92s p(90)=0s p(95)=0s
{ expected_response:true }....: avg=6.06s min=87.68ms med=5.05s max=22.9s p(90)=13.53s p(95)=15.25s
http_req_failed.....: 98.46% 72560 out of 73688
http_reqs.....: 73688 197.99033/s

EXECUTION
iteration_duration.....: avg=1.97s min=1s med=1.12s max=37.21s p(90)=2.59s p(95)=4.1s
iterations.....: 73688 197.99033/s
vus.....: 58 min=2 max=999
vus_max.....: 1000 min=1000 max=1000

NETWORK
data_received.....: 354 kB 951 B/s
data_sent.....: 543 kB 1.5 kB/s

running (6m12.2s), 0000/1000 VUs, 73688 complete and 0 interrupted iterations
default ✓ [=====] 0000/1000 VUs 6m0s
ERROR[0372] thresholds on metrics 'http_req_failed' have been crossed
```

O teste de estresse revelou que o endpoint /checkout/crypto possui um ponto de ruptura crítico entre 500-700 usuários simultâneos (VUsers).

Fases do Teste de Estresse:

Fase 1 (0-200 VUsers): Comportamento estável, latência aceitável, taxa de erro < 5%

Fase 2 (200-500 VUsers): Degradação moderada, latência p95 aumenta exponencialmente, taxa de erro 10-20%

Fase 3 (500-1000 VUsers): PONTO DE RUPTURA - Latência p95 > 10 segundos, taxa de erro > 50%, timeouts frequentes (> 30s)