

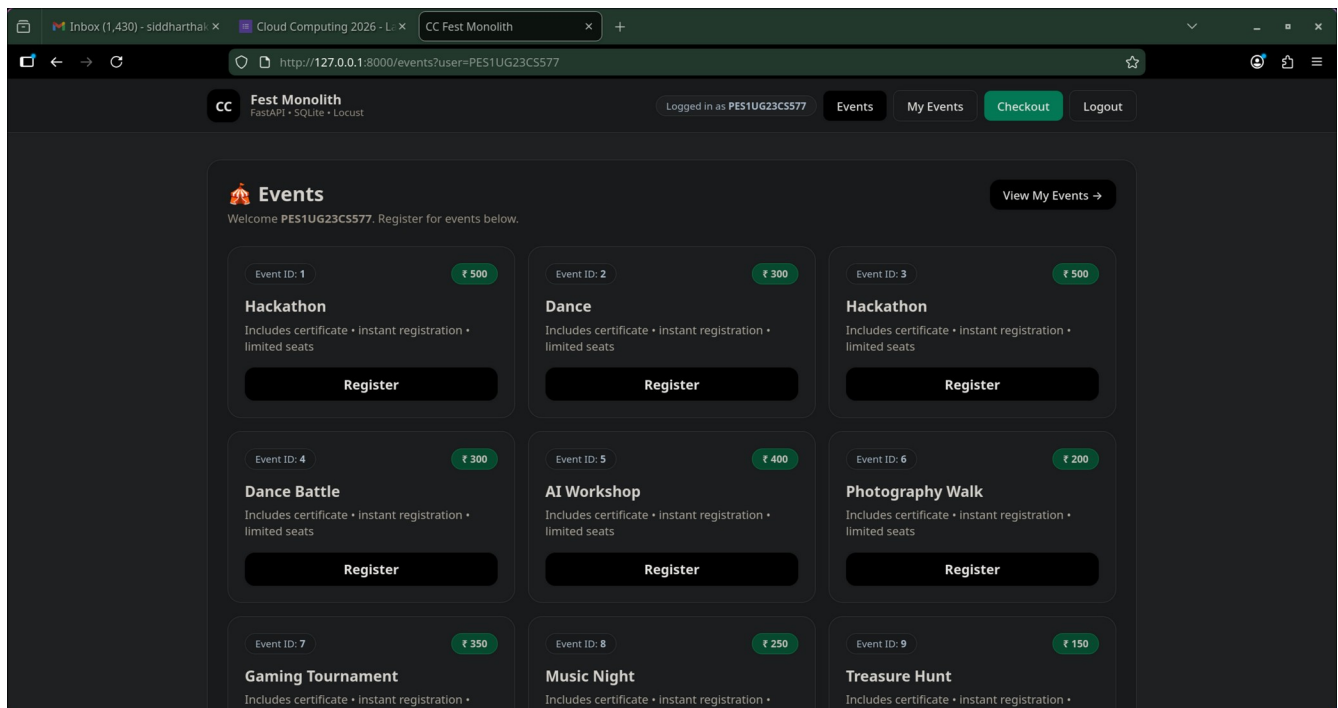
# Cloud Computing Lab 2 Monolithic Architecture

Siddhartha Kumar  
PES1UG23CS577  
Section J

github link

<https://github.com/sidk15111/CC-lab2>

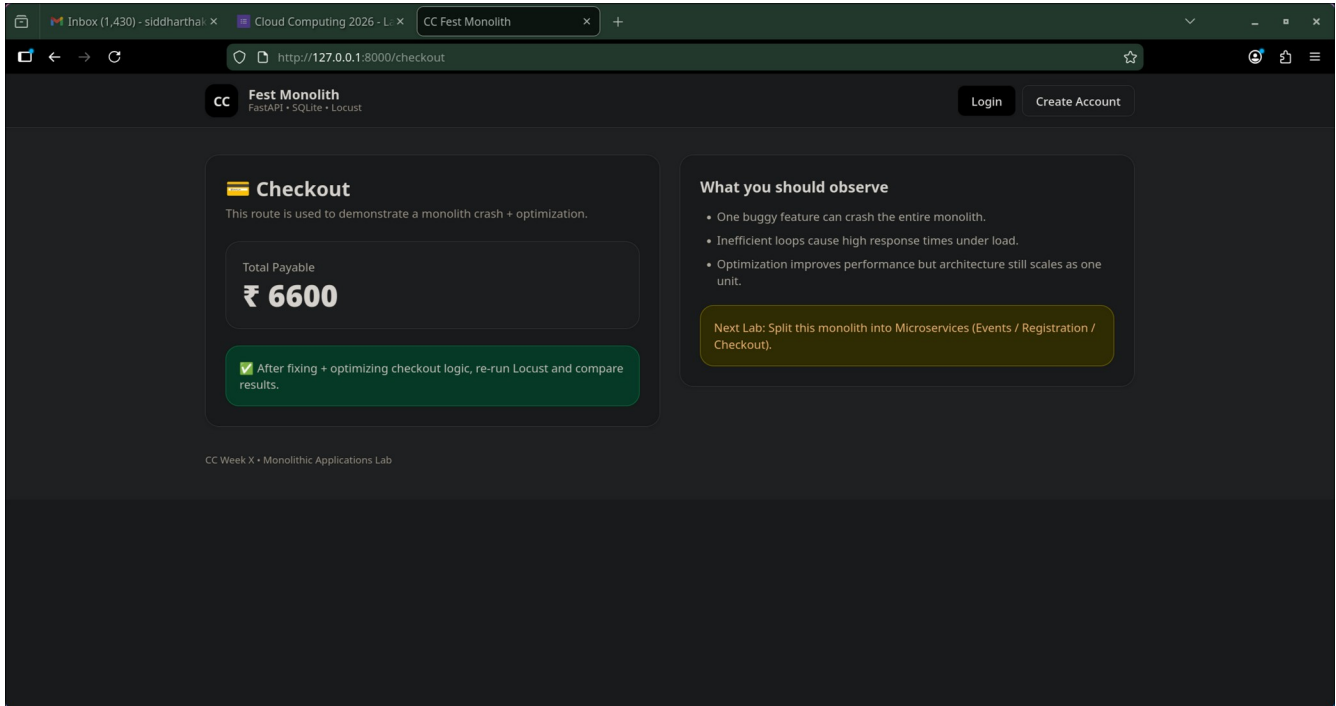
ss1



The image is a screenshot of a web browser window. The browser's address bar shows the URL 'http://127.0.0.1:8000/checkout'. The page has a dark theme. At the top, there's a navigation bar with a logo 'CC' and the text 'Fest Monolith' followed by 'FastAPI • SQLite • Locust'. On the right side of the navigation bar are buttons for 'Login' and 'Create Account'. The main content area features a large red banner with a sunburst icon and the text 'Monolith Failure'. Below this, it says 'One bug in one module impacted the entire application.' and 'HTTP 500'. A red box contains the 'Error Message' 'division by zero'. Below this, there are two columns of text. The left column, titled 'Why did this happen?', explains that because it's a monolithic application, all modules share the same runtime and deployment, so a crash in one feature affects the whole system. The right column, titled 'What should you do in the lab?', lists three steps: 'Take a screenshot (crash demonstration)', 'Fix the bug in the indicated module', and 'Restart the server and verify recovery'. At the bottom left, there are buttons for 'Back to Events' and 'Login'. The footer of the page reads 'CC Week X • Monolithic Applications Lab'.

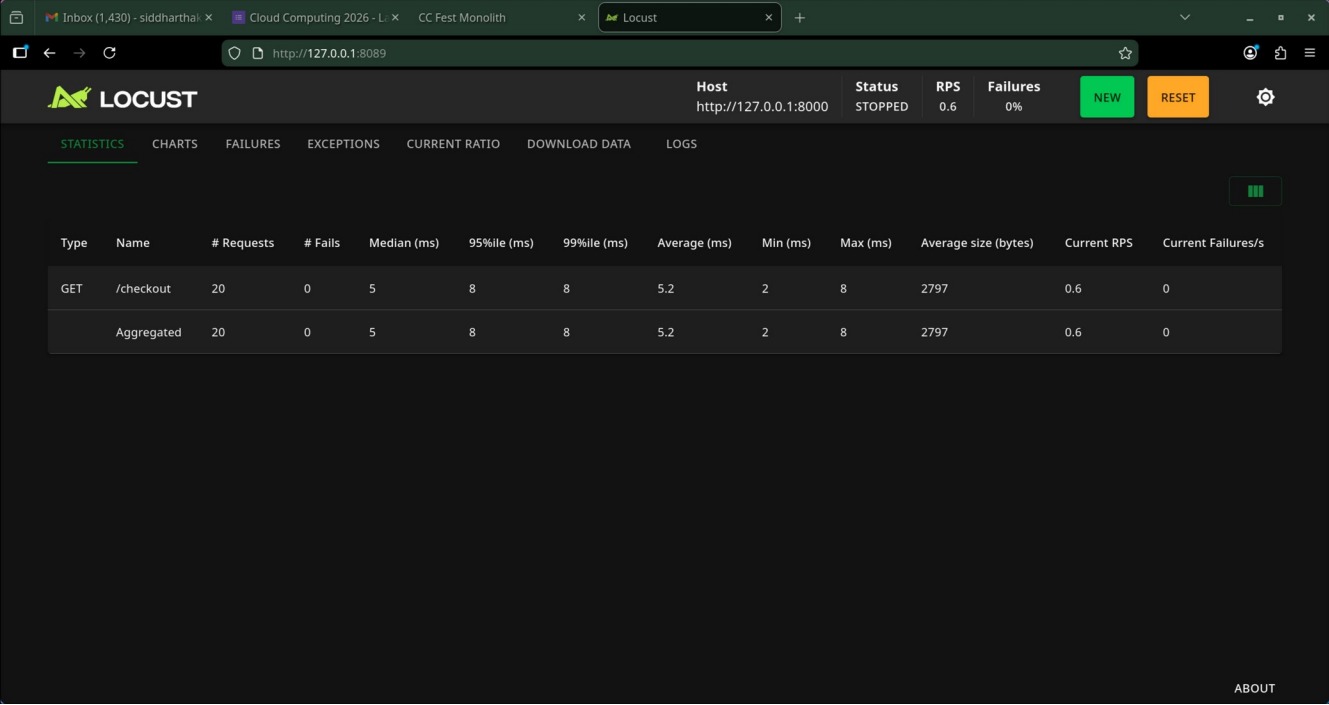
```
WARNING: StatReload detected changes in 'checkout/___init___py'. Reloading...
INFO: Shutting down
INFO: Waiting for application shutdown.
INFO: Application shutdown complete.
INFO: Finished server process [44086]
INFO: Started server process [48322]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: 127.0.0.1:59816 - "GET /checkout HTTP/1.1" 500 Internal Server Error
ERROR: Exception in ASGI application
Traceback (most recent call last):
  File "/home/sid/CC/PESIU623CS577/CC Lab-2/.venv/lib/python3.14/site-packages/uvicorn/protocols/http/h11_impl.py", line 410, in run_asgi
    result = await app( # type: ignore[func-returns-value]
              ~~~~~~
    self.scope, self.receive, self.send
    ~~~~~~
```

ss3



```
WARNING: StatReload detected changes in 'checkout/__init__.py'. Reloading...
INFO: Shutting down
INFO: Waiting for application shutdown.
INFO: Application shutdown complete.
INFO: Finished server process [48322]
INFO: Started server process [49183]
INFO: Waiting for application startup.
INFO: Application startup complete.
INFO: 127.0.0.1:58328 - "GET /checkout HTTP/1.1" 200 OK
```

ss4 unable to take side by side but its the same in 2 diff



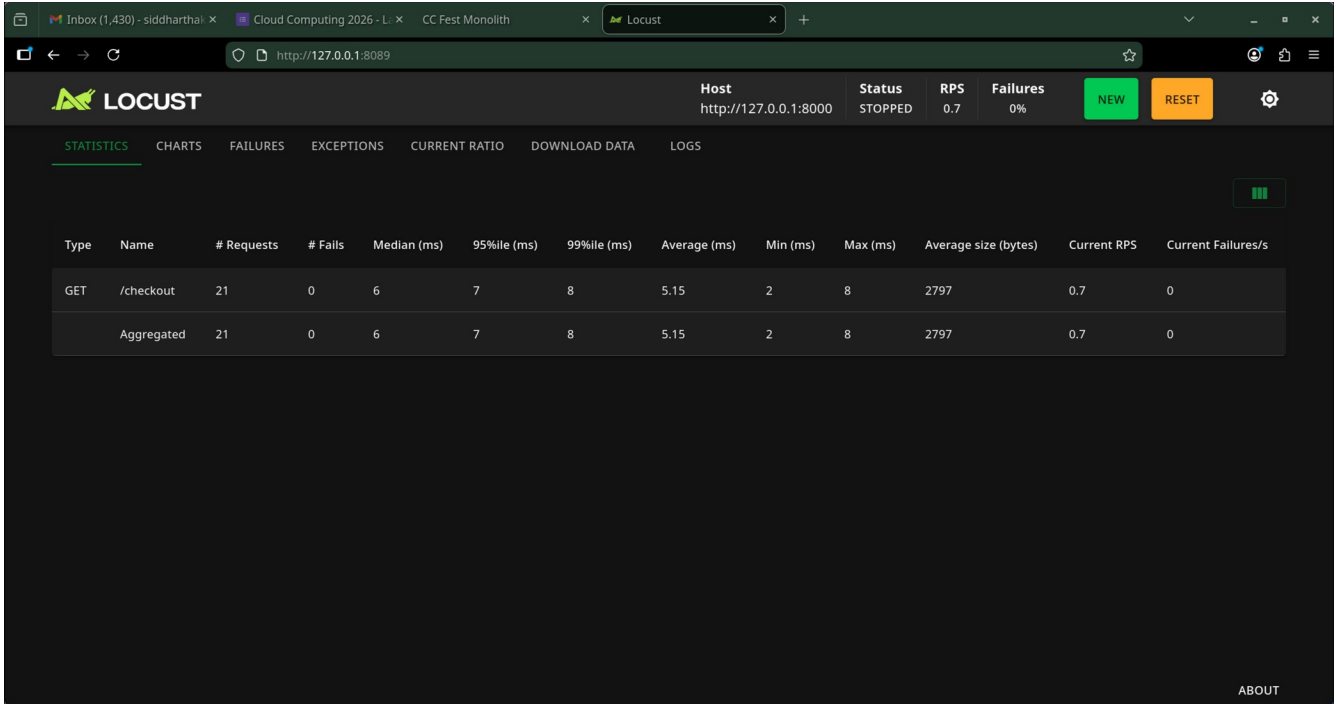
```
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%  99.99%  100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

> locust -f Locust/checkout_locustfile.py
[2026-01-29 14:57:46.304] archlinux/INFO/Locust.main: Starting Locust 2.43.1
[2026-01-29 14:57:46.305] archlinux/INFO/Locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 14:58:39.184] archlinux/INFO/Locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 14:58:39.184] archlinux/INFO/Locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:29:33Z
[2026-01-29 14:59:33.497] archlinux/INFO/Locust.main: Shutting down (exit code 0)
Type      Name      # reqs      # fails | Avg      Min      Max      Med | req/s      failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET       /checkout      20         0(0.00%) | 5         2         8         5 | 0.68         0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      20         0(0.00%) | 5         2         8         5 | 0.68         0.00

Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%  99.99%  100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET       /checkout      6         8         8         8         8         8         8         8         8         8         8         20
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      6         8         8         8         8         8         8         8         8         8         8         20

~/CC/PESIUG23CS577/CC Lab-2 1m 47s CC Lab-2 >
```

ss5



```

GET      /checkout      6      8      8      8      8      8      8      8      8      8      8      20
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      6      8      8      8      8      8      8      8      8      8      8      20

> locust -f locust/checkout_locustfile.py
[2026-01-29 15:03:15,171] archlinux/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:03:15,172] archlinux/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:03:55,074] archlinux/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:03:55,074] archlinux/INFO/locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:34:37Z
[2026-01-29 15:04:37,174] archlinux/INFO/locust.main: Shutting down (exit code 0)

Type      Name  # reqs      # fails |      Avg      Min      Max      Med |      req/s      failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET      /checkout      21      0(0.00%) |      5      2      7      6 |      0.72      0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      21      0(0.00%) |      5      2      7      6 |      0.72      0.00

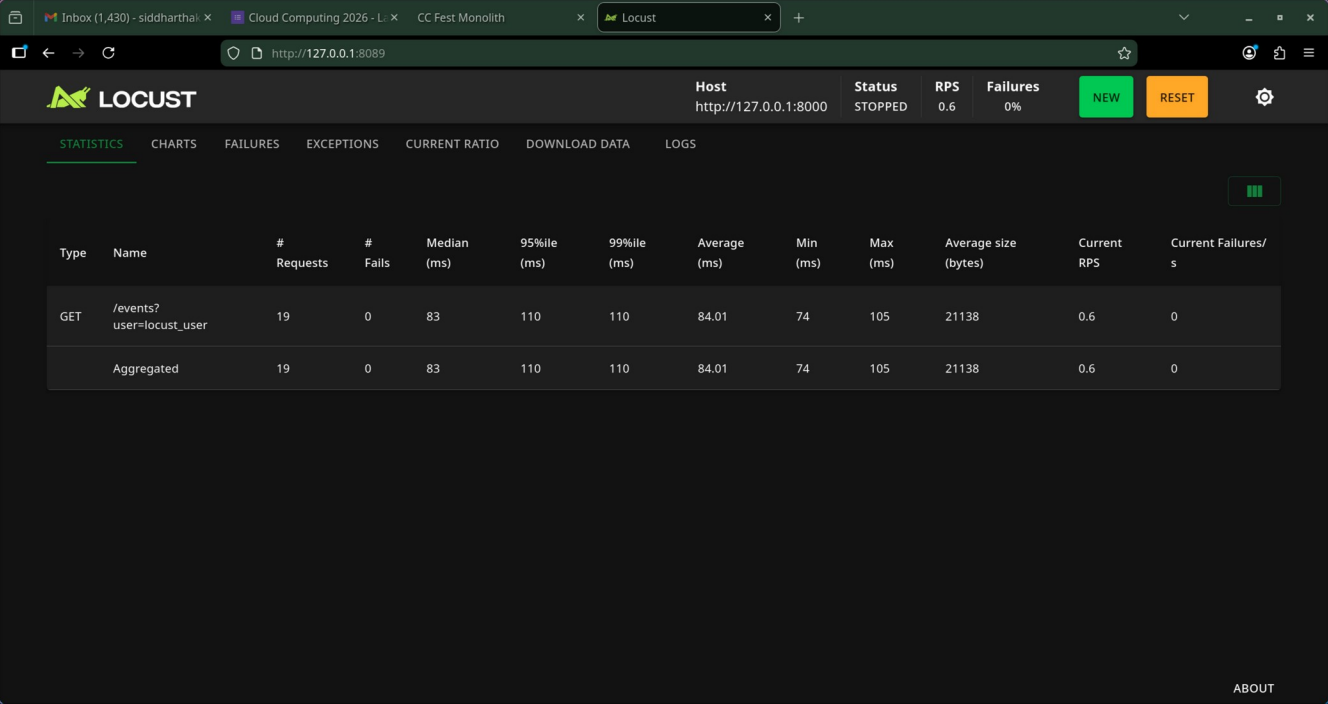
Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%      99.99%      100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET      /checkout      6      7      7      7      7      7      7      8      8      8      8      21
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      6      7      7      7      7      7      7      8      8      8      8      21

~/CC/PES1UG23CS577/CC Lab-2 1m 22s CC Lab-2 >

```

previously it was 5.2 now it is 5.15 showing increase  
under same load  
number of requests also increased by 1 in the same time  
after optimization  
rps increased by 0.1 0.6->0.7

ss6

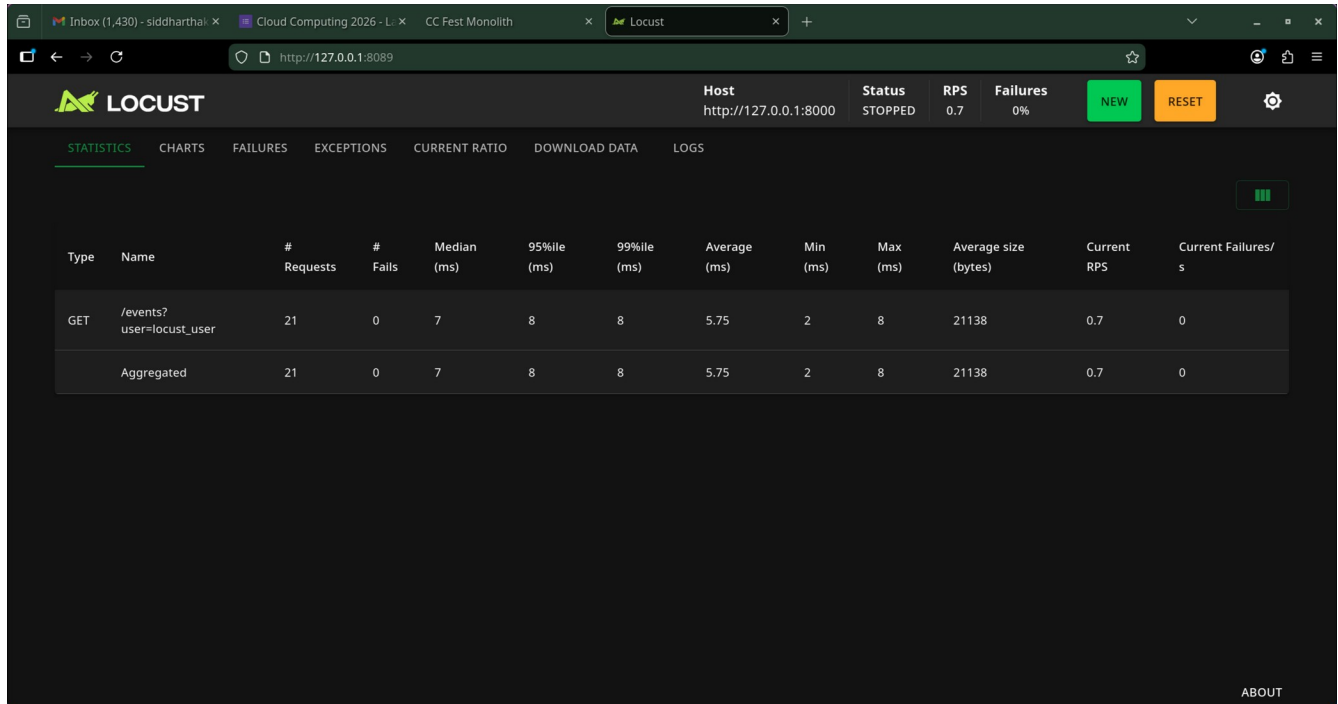


```
Response time percentiles (approximated)
Type Name 50% 66% 75% 80% 90% 95% 98% 99% 99.9% 99.99% 100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
GET /checkout 6 7
> locust -f locust/events_locustfile.py
[2026-01-29 15:14:23,915] archlinux/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:14:23,915] archlinux/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:15:04,321] archlinux/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:15:04,322] archlinux/INFO/locust.runners: ALL users spawned: {"EventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:45:54Z
[2026-01-29 15:15:54,725] archlinux/INFO/locust.main: Shutting down (exit code 0)
Type Name # reqs # fails | Avg Min Max Med | req/s failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
GET /events?user=locust_user 19 0(0.00%) | 84 74 105 83 | 0.67 0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
Aggregated 19 0(0.00%) | 84 74 105 83 | 0.67 0.00

Response time percentiles (approximated)
Type Name 50% 66% 75% 80% 90% 95% 98% 99% 99.9% 99.99% 100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
GET /events?user=locust_user 83 86 87 88 90 110 110 110 110 110 110 19
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
Aggregated 83 86 87 88 90 110 110 110 110 110 110 19

~/CC/PES1UG23C5577/CC Lab-2 1m 31s CC Lab-2 >
```

ss7



```
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET    /checkout  6      7      7      7      7      7      7      7      7      7      7      7      7      21
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated  6      7      7      7      7      7      7      7      7      7      7      7      7      21

> locust -f locust/events_locustfile.py
[2026-01-29 15:29:32.632] archlinux/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:29:32.632] archlinux/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:33:28.825] archlinux/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:33:28.826] archlinux/INFO/locust.runners: All users spawned: {"EventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T10:04:21Z
[2026-01-29 15:34:21.771] archlinux/INFO/locust.main: Shutting down (exit code 0)
Type    Name    # reqs    # fails | Avg    Min    Max    Med | req/s    failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET    /events?user=locust_user  21      0(0.00%) | 5      2      8      7 | 0.70      0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated  21      0(0.00%) | 5      2      8      7 | 0.70      0.00

Response time percentiles (approximated)
Type    Name    50%    66%    75%    80%    90%    95%    98%    99%    99.9%    99.99%    100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET    /events?user=locust_user  7      7      8      8      8      8      8      8      8      8      8      8      21
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated  7      7      8      8      8      8      8      8      8      8      8      8      21

~/CC/PES1UG23CS577/CC Lab-2 4m 49s CC Lab-2 >
```

The main bottleneck was the intentional loops in `/events` loop running 3,000,000 iterations

```
waste = 0  
for i in range(3000000):  
    waste += i % 3
```

removed these lines

Performance improved because:

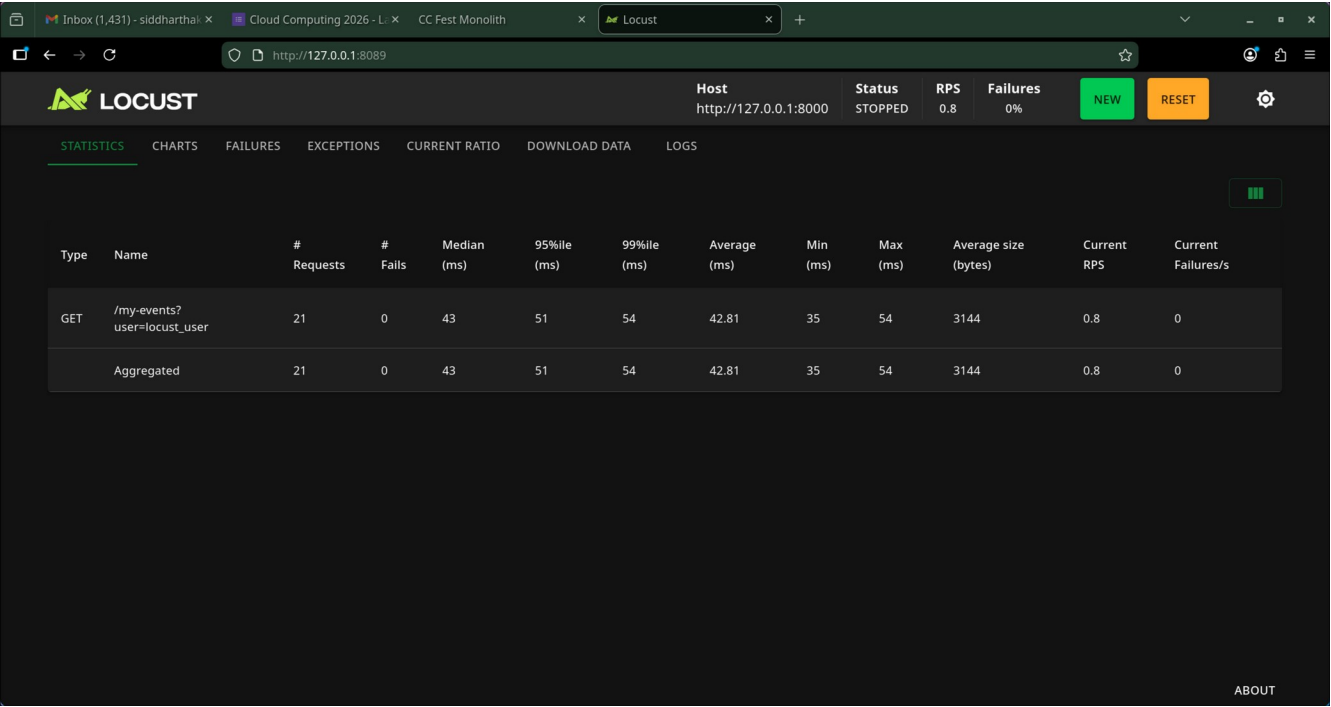
The server no longer wastes CPU time

Requests complete faster

Response time dropped because only useful work is executed



ss8

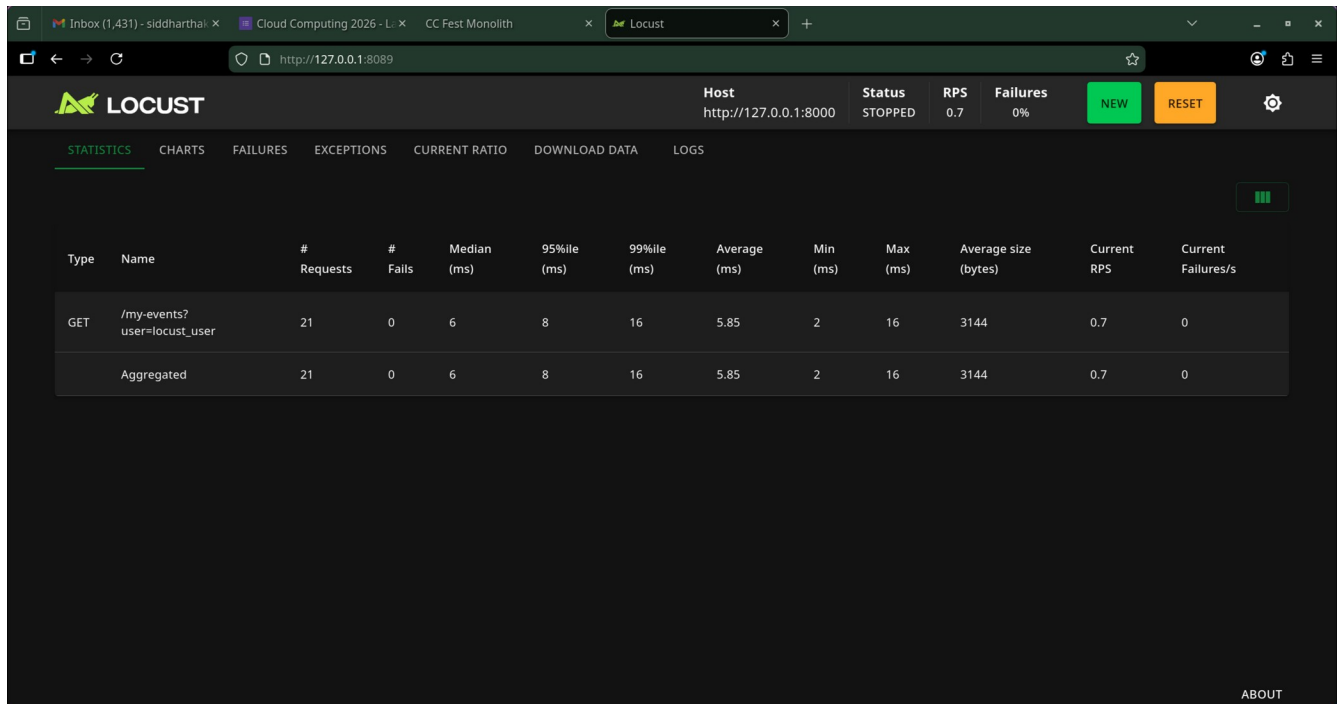


```
> Locust -f Locust/myevents_locustfile.py
[2026-01-29 15:43:48.064] archlinux/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:43:48.065] archlinux/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:45:02.719] archlinux/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:45:02.719] archlinux/INFO/locust.runners: All users spawned: {"MyEventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T10:16:05Z
[2026-01-29 15:46:05.270] archlinux/INFO/locust.main: Shutting down (exit code 0)
Type      Name                                     # reqs   # fails |  Avg    Min     Max    Med |   req/s  failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
GET       /my-events?user=locust_user              21         0(0.00%) |   42     34     54     43 |    0.71    0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
          Aggregated                        21         0(0.00%) |   42     34     54     43 |    0.71    0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----

Response time percentiles (approximated)
Type      Name                                     50%    66%    75%    80%    90%    95%    98%    99%    99.9%  99.99
% 100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
GET       /my-events?user=locust_user              43     44     46     46     50     51     54     54     54     5
4 54 21
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----
          Aggregated                        43     44     46     46     50     51     54     54     54     5
4 54 21

~/CC/PES1UG23CS577/CC Lab-2 2m 17s CC Lab-2 >
```

ss9



```
> locust -f Locust/myevents_locustfile.py
[2026-01-29 15:48:22,370] archlinux/INFO/Locust.main: Starting Locust 2.43.1
[2026-01-29 15:48:22,370] archlinux/INFO/Locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:48:34,099] archlinux/INFO/Locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:48:34,099] archlinux/INFO/Locust.runners: All users spawned: {"MyEventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T10:19:20Z
[2026-01-29 15:49:20,723] archlinux/INFO/Locust.main: Shutting down (exit code 0)
Type      Name                                     # reqs   # fails | Avg    Min    Max    Med | req/s  failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET       /my-events?user=locust_user              21       0(0.00%) | 5      2     15     6 | 0.70   0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated                                     21       0(0.00%) | 5      2     15     6 | 0.70   0.00

Response time percentiles (approximated)
Type      Name                                     50%    66%    75%    80%    90%    95%    98%    99%    99.9%  99.99
% 100% # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET       /my-events?user=locust_user              6      7      7      7      8      8     16     16     16     1
6 16 21
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated                                     6      7      7      7      8      8     16     16     16     1
6 16 21

~/CC/PES1UG23C5577/CC Lab-2 59s CC Lab-2 > | 03:49:20 PM
```

bottleneck was caused by these lines in `/my-events`

it ran 1,500,000 iterations

```
dummy = 0
```

```
for _ in range(1500000): dummy += 1
```

removed these lines

Performance improved because of the same reasons as above:

The server no longer wastes CPU time

Requests complete faster

Response time dropped because only useful work is executed