LAB 2 - MONOLITHIC ARCHITECTURE

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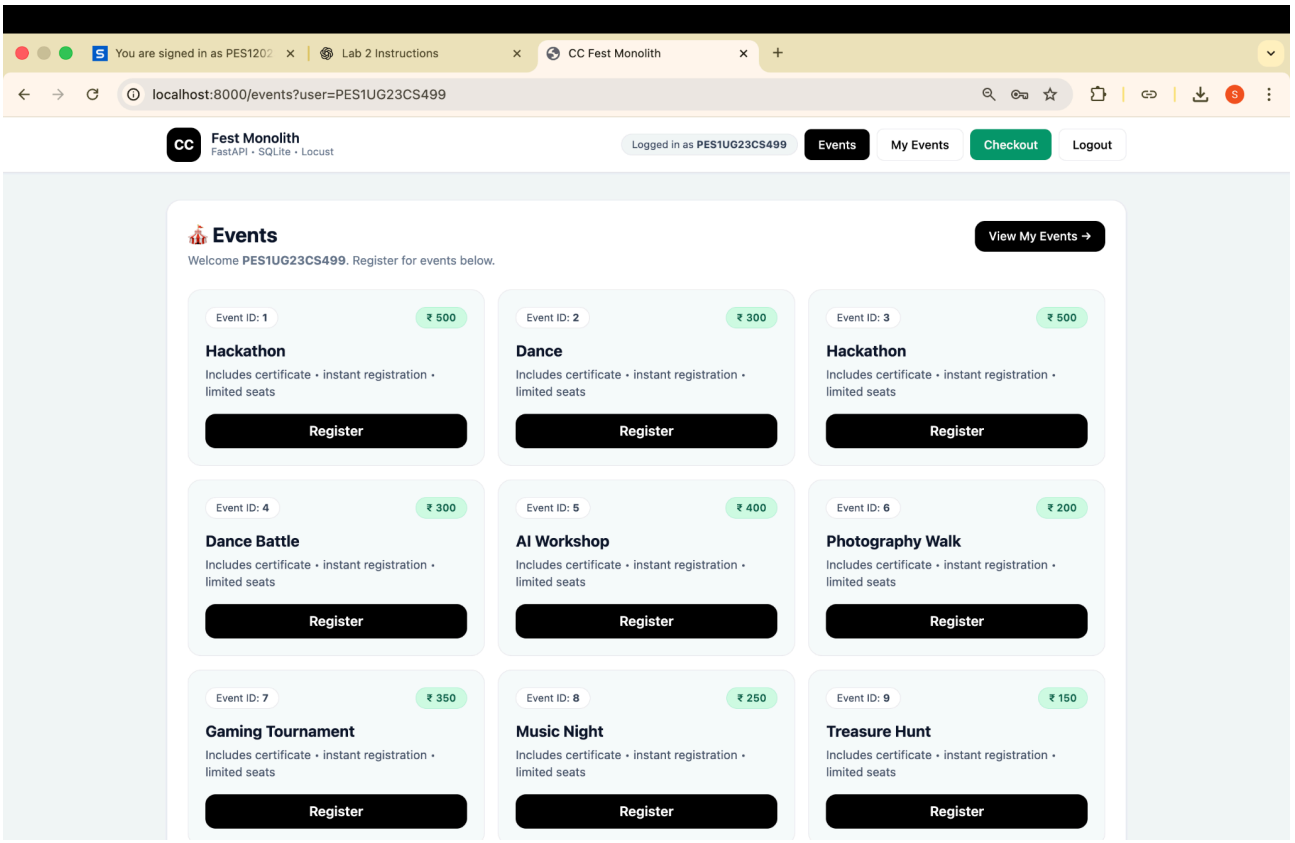
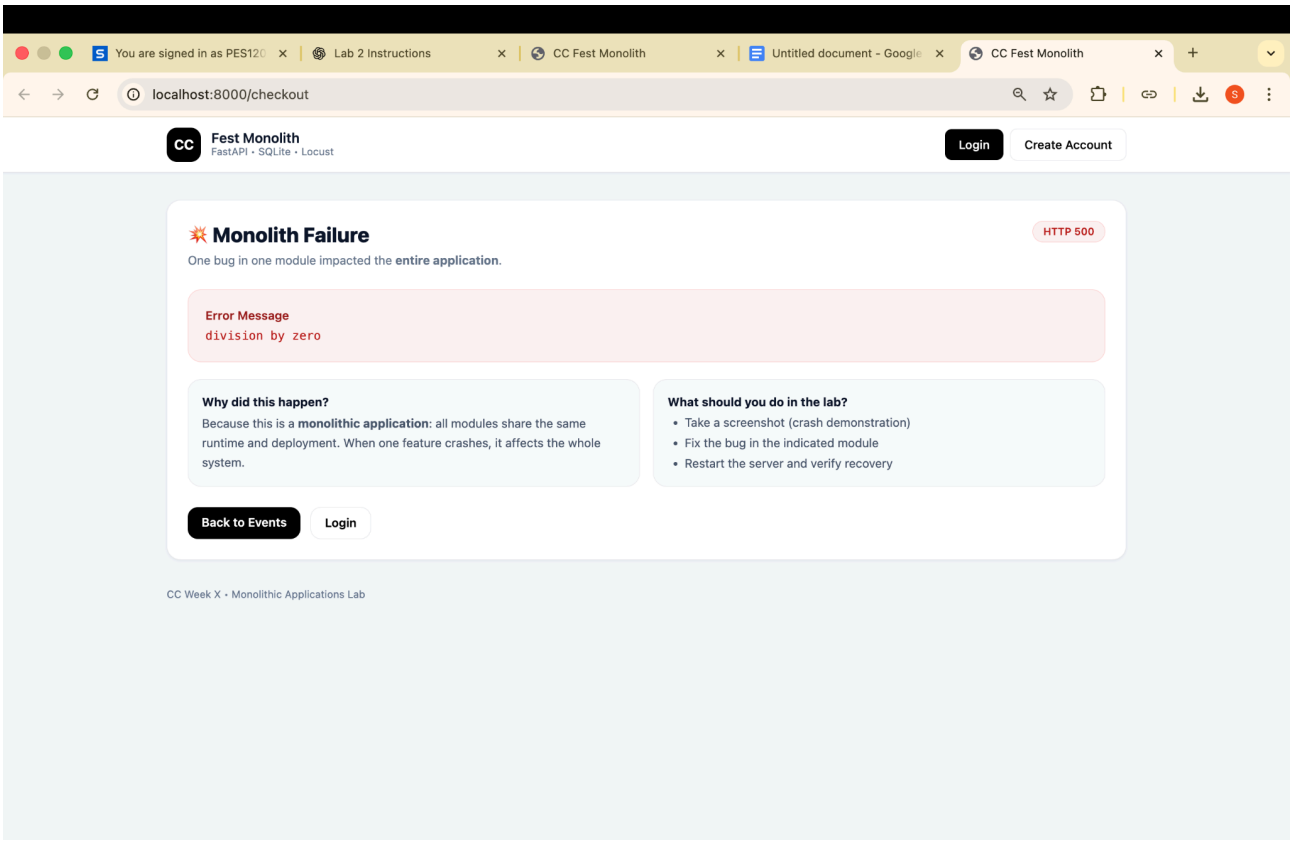
SECTION: I

SS1: EVENTS PAGE

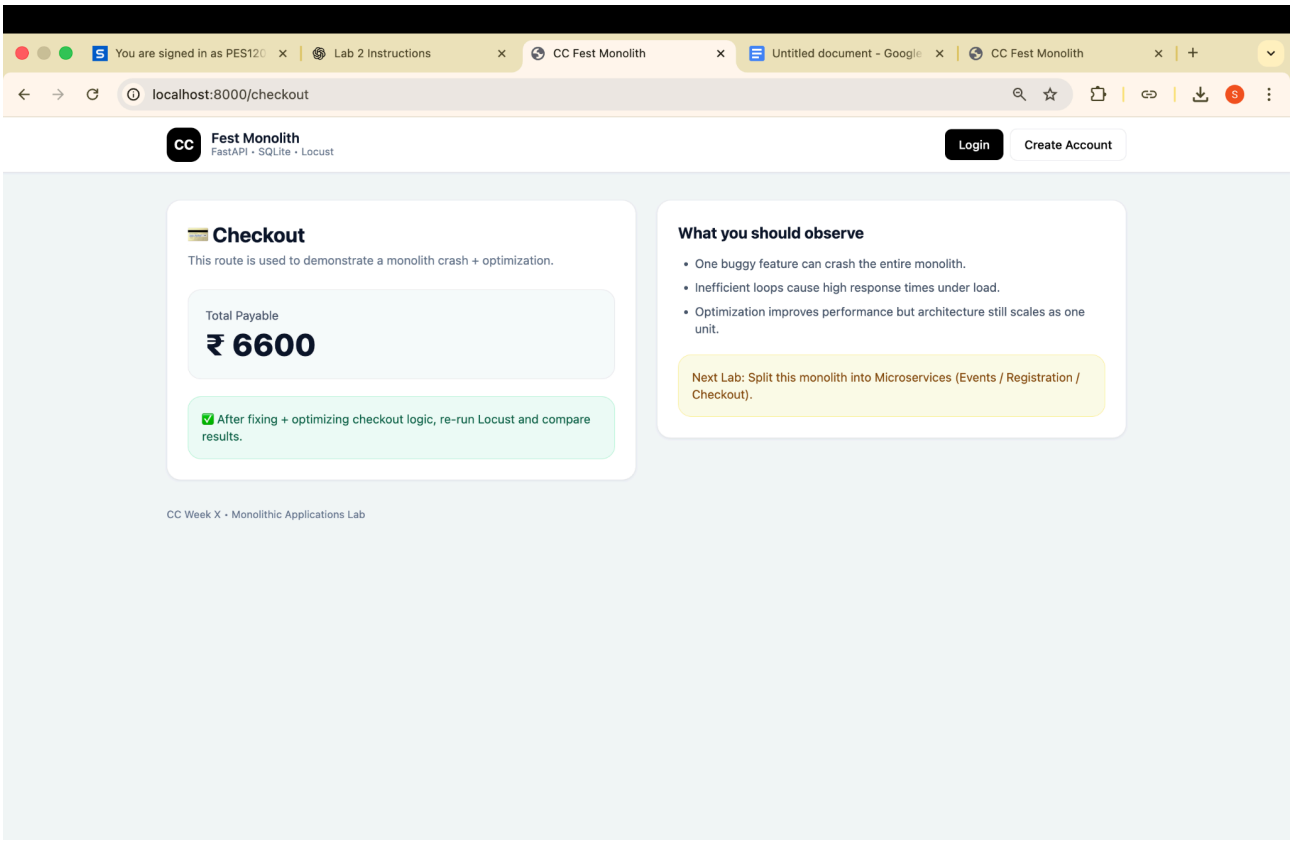


SS2:

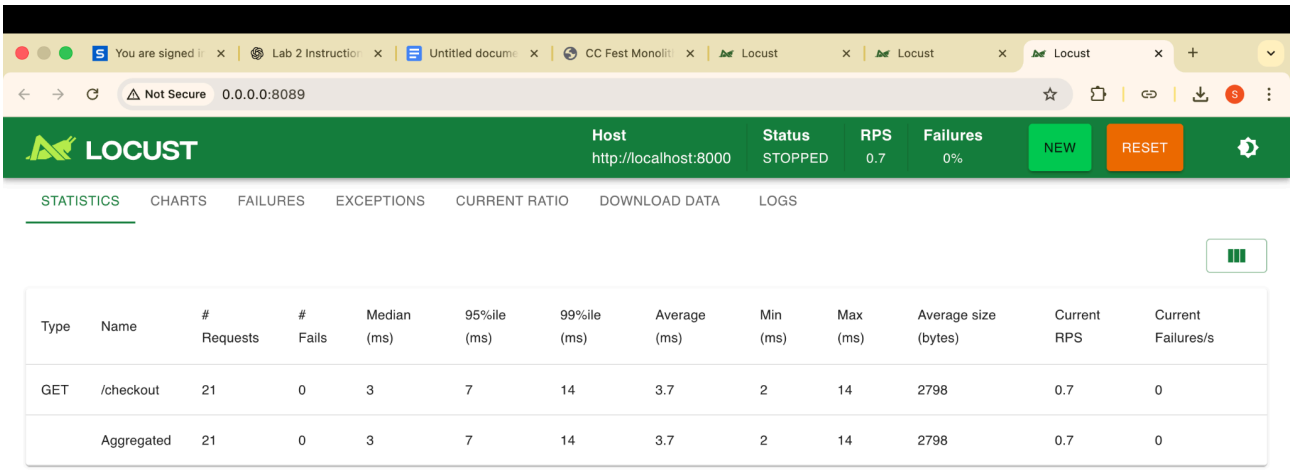



```
          ^^^^^^^^^^^^
File "/Library/Frameworks/Python.framework/Versions/3.11/lib/python3.11/site-packages/anyio/_backends/_asyncio.py", line 967, in run
  result = context.run(func, *args)
           ^^^^^^^^^^^^^^^^^^^^^^^^
File "/Users/saiabhinav/Desktop/PES1UG23CS499/CCLab2/main.py", line 113, in checkout
  total = checkout_logic()
          ^^^^^^^^^^^^^^^^
File "/Users/saiabhinav/Desktop/PES1UG23CS499/CCLab2/checkout/__init__.py", line 10, in checkout_logic
  1 / 0
  ~~^~~
ZeroDivisionError: division by zero
```

SS3:



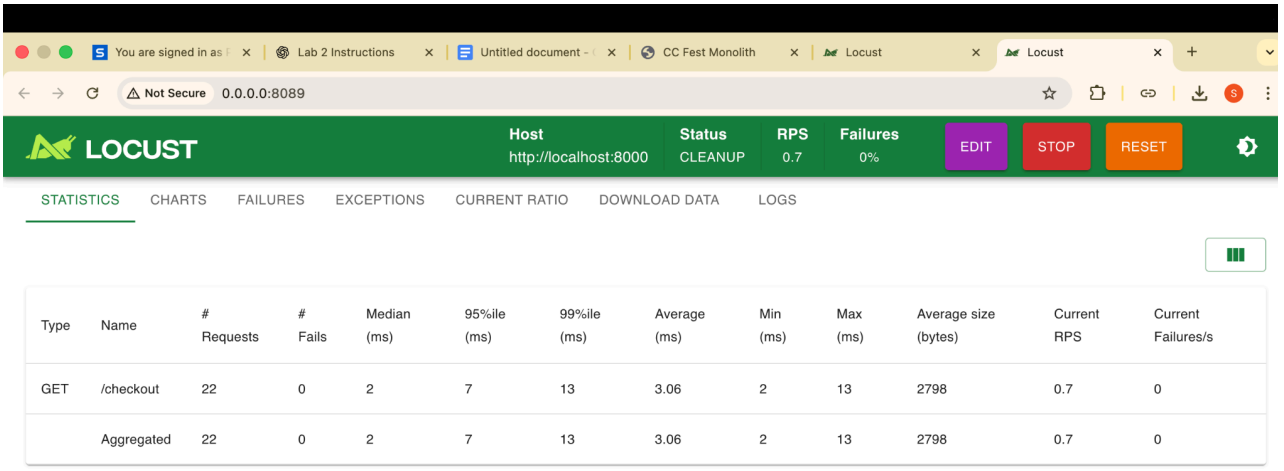
SS4:



Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/checkout	21	0	3	7	14	3.7	2	14	2798	0.7	0
	Aggregated	21	0	3	7	14	3.7	2	14	2798	0.7	0

```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/checkout_locustfile.py
[2026-01-29 14:50:30,297] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 14:50:30,299] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 14:50:42,171] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 14:50:42,172] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:22:09Z
[2026-01-29 14:52:09,444] SAIs-MacBook-Pro/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%) |      3       1      13      3 |    0.72        0.00
--------||-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated      21     0(0.00%) |      3       1      13      3 |    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        3      3      4      5      6      7     14     14     14     14     21
--------||--------|------|------|------|------|------|------|------|------|------|------|------
         Aggregated        3      3      4      5      6      7     14     14     14     14     21

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

SS5:

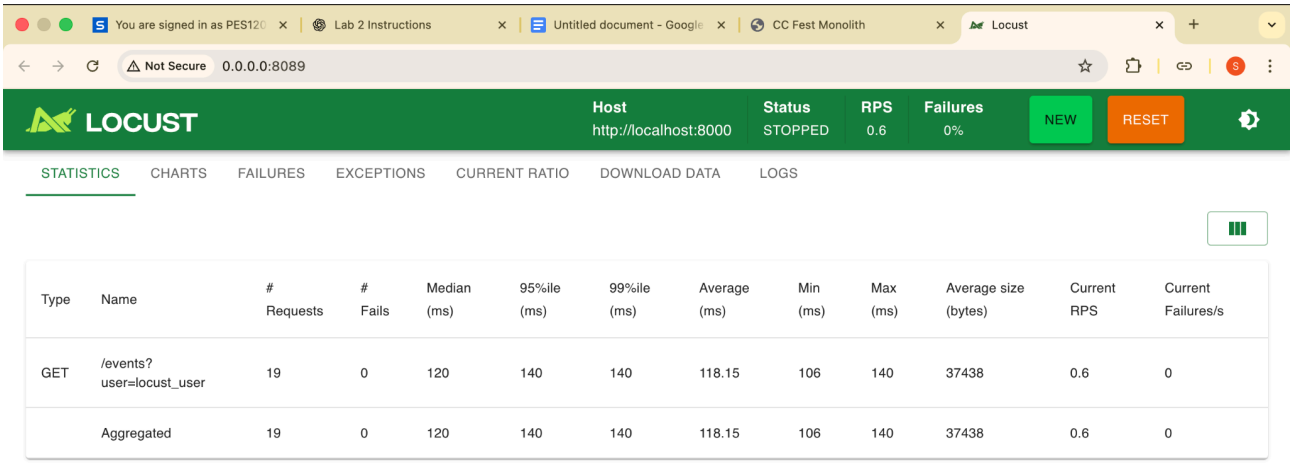


Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/checkout	22	0	2	7	13	3.06	2	13	2798	0.7	0
	Aggregated	22	0	2	7	13	3.06	2	13	2798	0.7	0

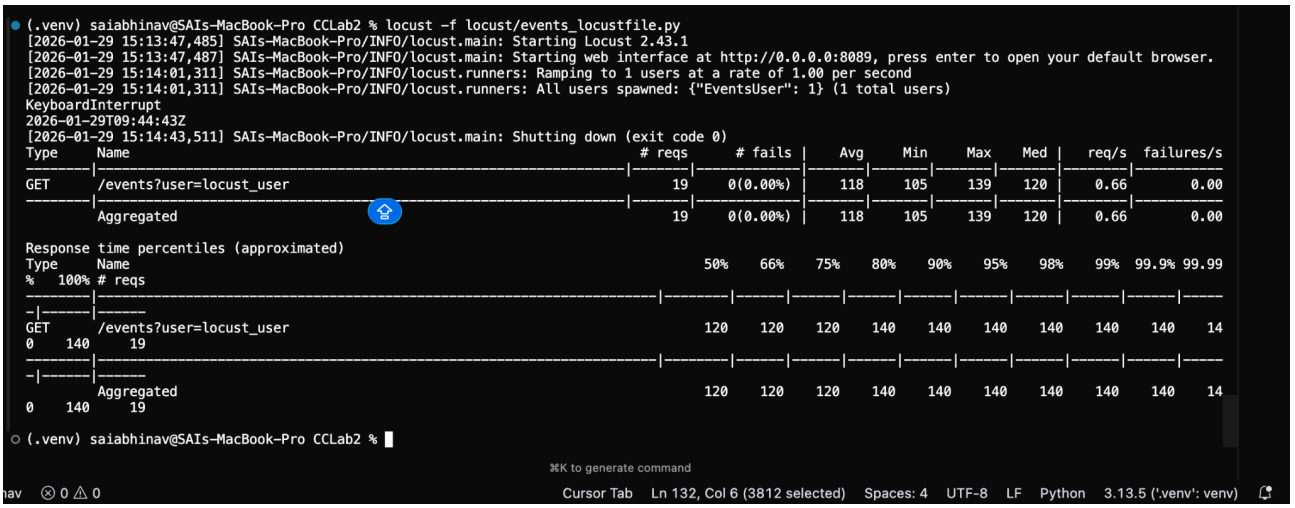
```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/checkout_locustfile.py
[2026-01-29 14:46:52,025] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 14:46:52,026] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 14:47:18,466] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 14:47:18,466] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:18:50Z
[2026-01-29 14:48:50,583] SAIs-MacBook-Pro/INFO/locust.main: Shutting down (exit code 0)
Type     Name                                                                          # reqs      # fails |    Avg     Min     Max    Med |   req/s  failures/s
--------|-----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
GET      /checkout                                                                       22     0(0.00%) |      3       1      12      2 |    0.74        0.00
--------|-----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                      22     0(0.00%) |      3       1      12      2 |    0.74        0.00

Response time percentiles (approximated)
Type     Name                                                                                 50%    66%    75%    80%    90%    95%    98%    99%  99.9% 99.99%   100%
 # reqs
--------|-----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|------|------
|------
GET      /checkout                                                                              2      3      3      3      6      7     13     13     13     13     13
     22
--------|-----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|------|------
|------
         Aggregated                                                                             2      3      3      3      6      7     13     13     13     13     13
     22

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

AVERAGE RESPONSE TIME DROPPED FROM 3.7 TO 3.06 WITH CURRENT FPS: 0.7

SS6:

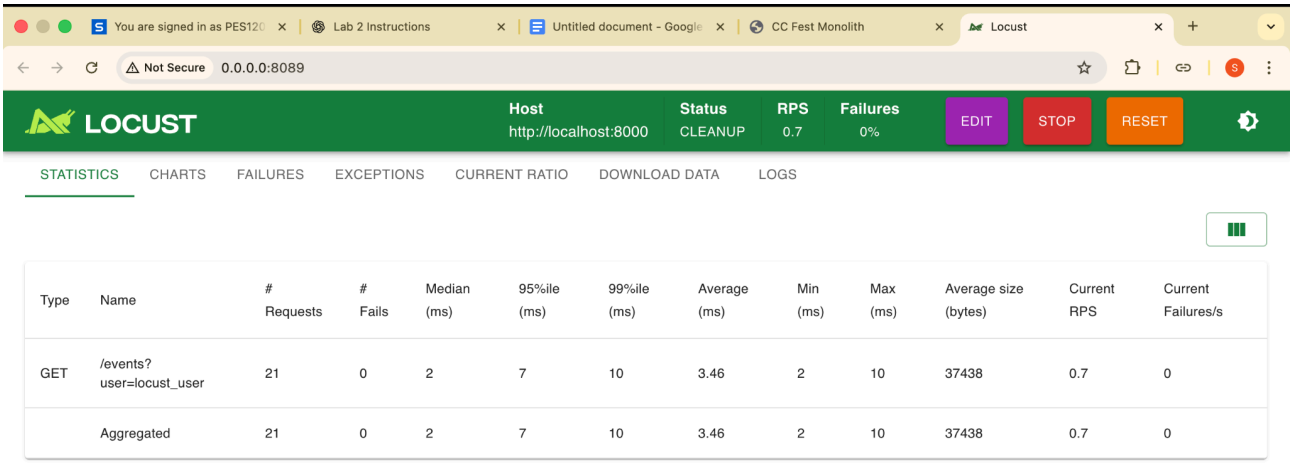


Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events?user=locust_user	19	0	120	140	140	118.15	106	140	37438	0.6	0
	Aggregated	19	0	120	140	140	118.15	106	140	37438	0.6	0

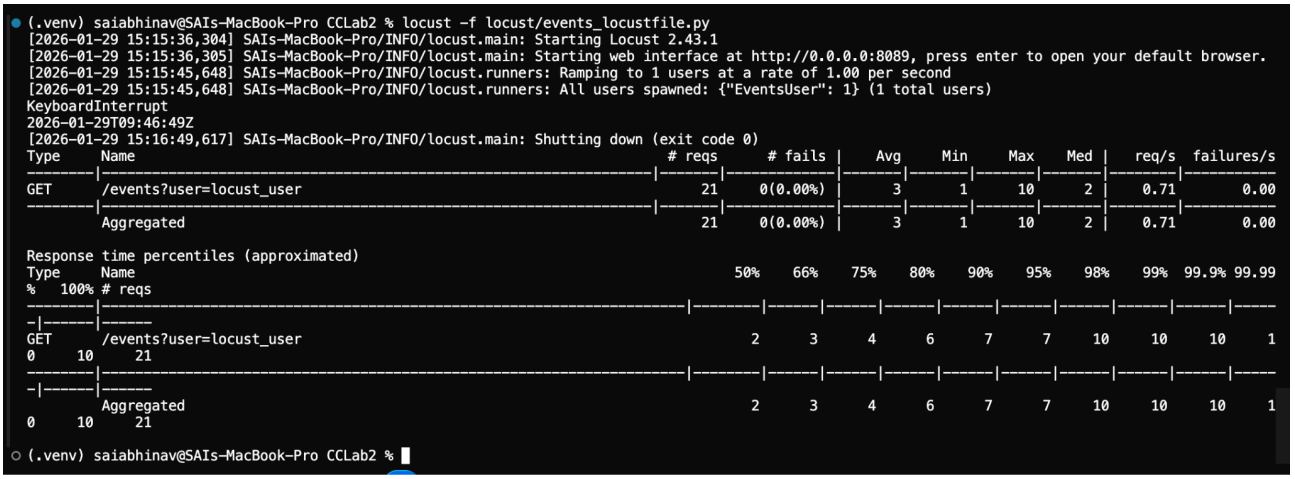


```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/events_locustfile.py
[2026-01-29 15:13:47,485] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:13:47,487] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:14:01,311] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:14:01,311] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"EventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:44:43Z
[2026-01-29 15:14:43,511] SAIs-MacBook-Pro/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%) |    118     105     139    120 |    0.66        0.00
--------|----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                       19     0(0.00%) |    118     105     139    120 |    0.66        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                                                           120    120    120    140    140    140    140    140    140    14
0    140     19
--------|----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated                                                                         120    120    120    140    140    140    140    140    140    14
0    140     19

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

SS7:



Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events?user=locust_user	21	0	2	7	10	3.46	2	10	37438	0.7	0
	Aggregated	21	0	2	7	10	3.46	2	10	37438	0.7	0



```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/events_locustfile.py
[2026-01-29 15:15:36,304] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:15:36,305] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:15:45,648] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:15:45,648] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"EventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:46:49Z
[2026-01-29 15:16:49,617] SAIs-MacBook-Pro/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%) |      3       1      10      2 |    0.71        0.00
--------|----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                       21     0(0.00%) |      3       1      10      2 |    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      /events?user=locust_user                                                           2      3      4      6      7      7     10     10     10      1
0     10     21
--------|----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated                                                                         2      3      4      6      7      7     10     10     10      1
0     10     21

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

AVERAGE RESPONSE TIME DROPPED FROM 118.15 TO 3.46

SS8:

LOCUST

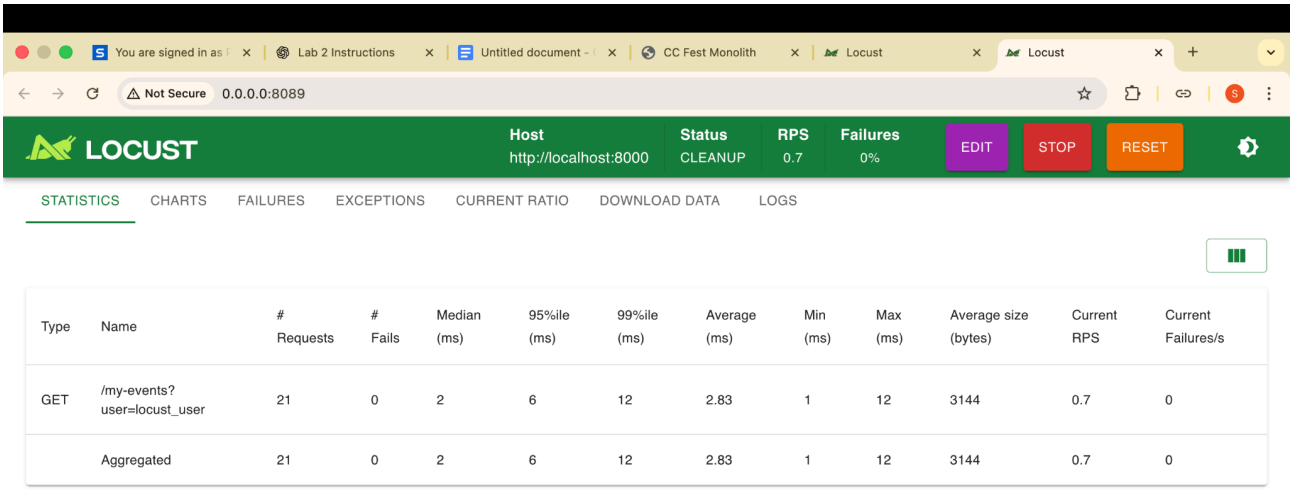
Host	Status	RPS	Failures			
http://localhost:8000	STOPPED	0.6	0%	NEW	RESET	

STATISTICS CHARTS FAILURES EXCEPTIONS CURRENT RATIO DOWNLOAD DATA LOGS

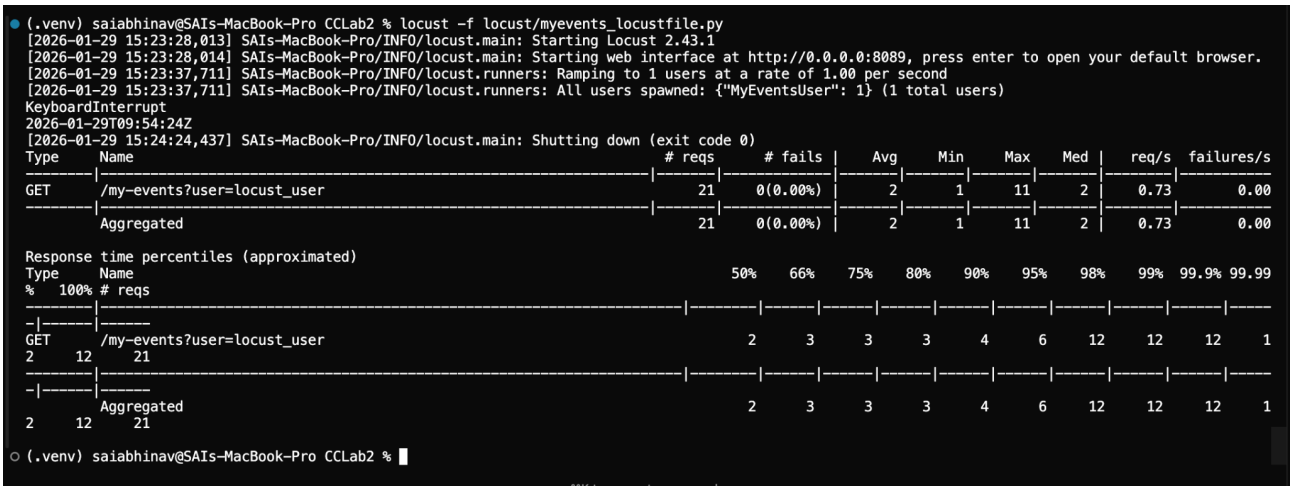
Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/my-events?user=locust_user	20	0	49	74	74	55	44	74	3144	0.6	0
	Aggregated	20	0	49	74	74	55	44	74	3144	0.6	0

```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/myevents_locustfile.py
[2026-01-29 15:20:56,433] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:20:56,435] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:21:08,575] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:21:08,576] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"MyEventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:52:02Z
[2026-01-29 15:22:02,345] SAIs-MacBook-Pro/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                                                      20     0(0.00%) |     54      43      74     49 |    0.70        0.00
--------|----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                       20     0(0.00%) |     54      43      74     49 |    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                                                      50     56     68     70     74     74     74     74     74      7
4     74     20
--------|----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated                                                                       50     56     68     70     74     74     74     74     74      7
4     74     20

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

SS9:



Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/my-events?user=locust_user	21	0	2	6	12	2.83	1	12	3144	0.7	0
	Aggregated	21	0	2	6	12	2.83	1	12	3144	0.7	0



```
(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 % locust -f locust/myevents_locustfile.py
[2026-01-29 15:23:28,013] SAIs-MacBook-Pro/INFO/locust.main: Starting Locust 2.43.1
[2026-01-29 15:23:28,014] SAIs-MacBook-Pro/INFO/locust.main: Starting web interface at http://0.0.0.0:8089, press enter to open your default browser.
[2026-01-29 15:23:37,711] SAIs-MacBook-Pro/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:23:37,711] SAIs-MacBook-Pro/INFO/locust.runners: All users spawned: {"MyEventsUser": 1} (1 total users)
KeyboardInterrupt
2026-01-29T09:54:24Z
[2026-01-29 15:24:24,437] SAIs-MacBook-Pro/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%) |      2       1      11      2 |    0.73        0.00
--------|----------------------------------------------------------------------------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                      21     0(0.00%) |      2       1      11      2 |    0.73        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                                                       2      3      3      3      4      6     12     12     12     1
2     12     21
--------|----------------------------------------------------------------------------|--------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated                                                                        2      3      3      3      4      6     12     12     12     1
2     12     21

(.venv) saiabhinav@SAIs-MacBook-Pro CCLab2 %
```

AVERAGE RESPONSE TIME DROPPED FROM 55 TO 2.83

EXPLANATION:

Route 1: `/events`

1)What was the bottleneck?

The `/events` route contained an unnecessary computation loop that executed millions of iterations without contributing to any business logic. This caused high CPU usage and significantly increased response time when multiple users accessed the route simultaneously, as observed during load testing.

---

2)What change did you make?

The redundant loop was completely removed, and the route was optimized to only fetch event data from the database and render the response. This eliminated unnecessary processing in the request handling logic.

---

3)Why did the performance improve?

By removing the wasteful computation, CPU overhead was reduced and the server was able to process requests more efficiently. As a result, the average response time dropped significantly (from approximately 118 ms to 3.46 ms), as shown in the load testing results.

Route 2: `/my-events`

1)What was the bottleneck?

The `/my-events` route included an unnecessary dummy loop that ran for a large number of iterations, introducing artificial delay and increasing response time under load.

---

2)What change did you make?

The redundant loop was removed so that the route only performs the required database join query and renders the user's registered events without extra computation.

---

3)Why did the performance improve?

Eliminating the unnecessary loop reduced CPU usage and request processing time. This allowed the application to respond faster under load, reducing the average response time from approximately 55 ms to 2.83 ms, as observed in the load testing results.

Optimization is the process of improving application performance by removing unnecessary computations and inefficient logic. In this lab, redundant loops were eliminated so that each route performed only essential database operations and response rendering. This reduced CPU usage, lowered response time, and improved overall performance under load.