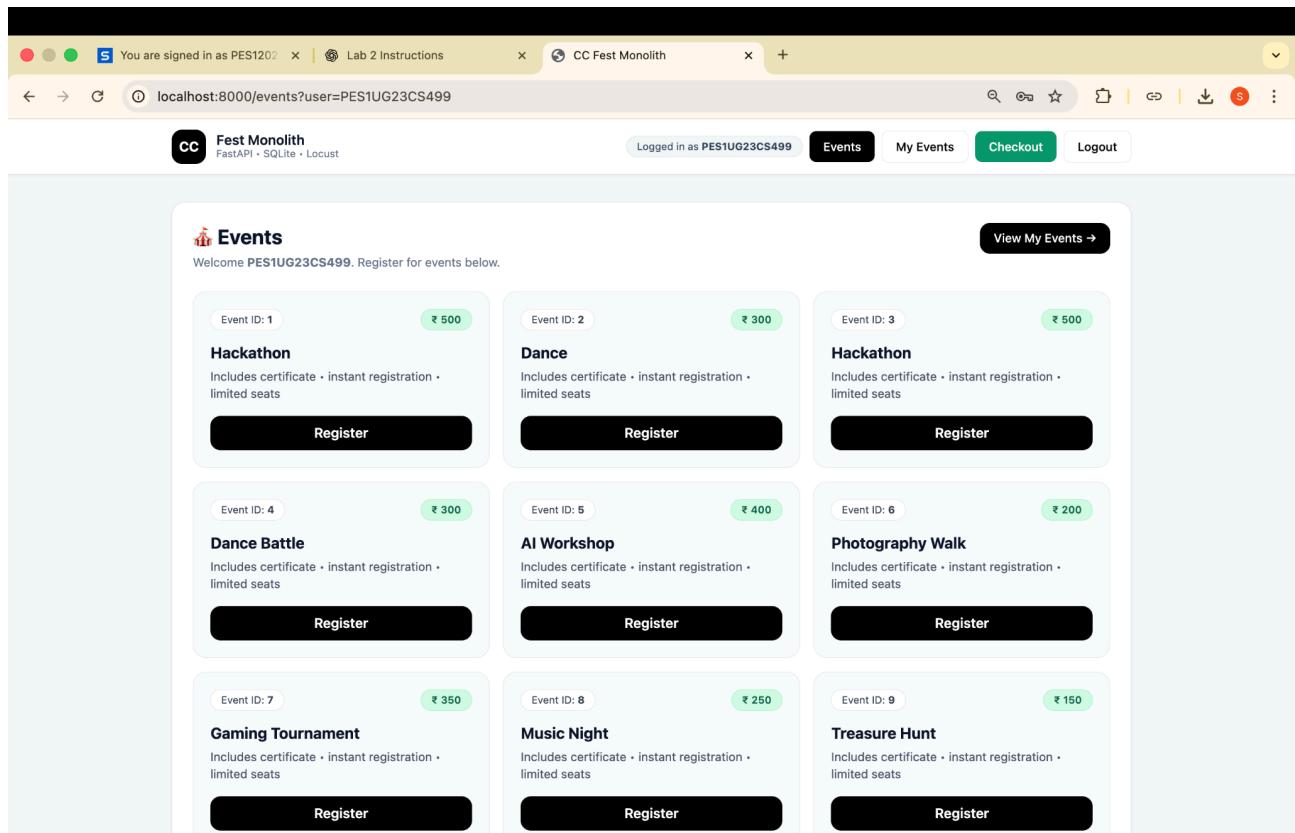


LAB 2 - MONOLITHIC ARCHITECTURE

NAME: SAI ABHINAV A M
SRN: PES1UG23CS499
SECTION: I

SS1: EVENTS PAGE



The screenshot shows a web browser window for 'CC Fest Monolith' at the URL localhost:8000/events?user=PES1UG23CS499. The page is titled 'Events' and displays a grid of nine event cards. Each card includes the event ID, name, price, a brief description, and a 'Register' button.

Event ID	Event Name	Price	Description	Action
1	Hackathon	₹ 500	Includes certificate • instant registration • limited seats	Register
2	Dance	₹ 300	Includes certificate • instant registration • limited seats	Register
3	Hackathon	₹ 500	Includes certificate • instant registration • limited seats	Register
4	Dance Battle	₹ 300	Includes certificate • instant registration • limited seats	Register
5	AI Workshop	₹ 400	Includes certificate • instant registration • limited seats	Register
6	Photography Walk	₹ 200	Includes certificate • instant registration • limited seats	Register
7	Gaming Tournament	₹ 350	Includes certificate • instant registration • limited seats	Register
8	Music Night	₹ 250	Includes certificate • instant registration • limited seats	Register
9	Treasure Hunt	₹ 150	Includes certificate • instant registration • limited seats	Register

SS2:

You are signed in as PES120 | Lab 2 Instructions | CC Fest Monolith | Untitled document - Google | CC Fest Monolith

localhost:8000/checkout

Fest Monolith
FastAPI · SQLite · Locust

Monolith Failure

One bug in one module impacted the entire application.

Error Message
division by zero

Why did this happen?
Because this is a **monolithic application**: all modules share the same runtime and deployment. When one feature crashes, it affects the whole system.

What should you do in the lab?

- Take a screenshot (crash demonstration)
- Fix the bug in the indicated module
- Restart the server and verify recovery

HTTP 500

Back to Events | Login

CC Week X - Monolithic Applications Lab

```
-----  
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:

The screenshot shows a web browser window with multiple tabs open. The active tab is 'localhost:8000/checkout' under the title 'Fest Monolith'. The page content includes a 'Checkout' section with a total payable amount of ₹ 6600. A note says 'After fixing + optimizing checkout logic, re-run Locust and compare results.' To the right, a 'What you should observe' section lists three bullet points: 'One buggy feature can crash the entire monolith.', 'Inefficient loops cause high response times under load.', and 'Optimization improves performance but architecture still scales as one unit.' Below this is a note: 'Next Lab: Split this monolith into Microservices (Events / Registration / Checkout).'

SS4:

The screenshot shows the Locust web interface at 'http://localhost:8000'. The top navigation bar shows tabs for 'STATISTICS', 'CHARTS', 'FAILURES', 'EXCEPTIONS', 'CURRENT RATIO', 'DOWNLOAD DATA', and 'LOGS'. The 'STATISTICS' tab is selected. The main table displays the following data:

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    14    21
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated 3     3     4     5     6     7     14    14    14    14    14    21

```

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

SS5:

Type	Name	# Requests	# Fails	Median (ms)	95%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
	Aggregated	22	0	2	7	13	3.06	2	13	2798	0.7

```

● (.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    13
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated 2     3     3     3     6     7     13    13    13    13    13    13

```

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

SS6:

You are signed in as PES120 | Lab 2 Instructions | Untitled document - Google | CC Fest Monolith | Locust | Not Secure 0.0.0.0:8089

LOCUST

Host http://localhost:8000 Status STOPPED RPS 0.6 Failures 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	/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(0.0%)	118	105	139	120	0.66	0.00
Aggregated		19	0(0.0%)	118	105	139	120	0.66	0.00

Response time percentiles (approximated)

Type	Name	%	100%	# reqs	50%	66%	75%	80%	90%	95%	98%	99%	99.9%	99.99%
GET	/events?user=locust_user	0	140	19	120	120	120	140	140	140	140	140	140	140
Aggregated		0	140	19	120	120	120	140	140	140	140	140	140	14

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

⌘K to generate command

Cursor Tab Ln 132, Col 6 (3812 selected) Spaces: 4 UTF-8 LF Python 3.13.5 ('.venv': venv)

SS7:

The screenshot shows the Locust web interface with the following details:

- Host:** http://localhost:8000
- Status:** CLEANUP
- RPS:** 0.7
- Failures:** 0%
- Buttons:** EDIT, STOP, RESET, and a gear icon.

Below the header, there are tabs for STATISTICS, CHARTS, FAILURES, EXCEPTIONS, CURRENT RATIO, DOWNLOAD DATA, and LOGS. The STATISTICS tab is selected.

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    10
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                         2       3     4     6     7     7    10    10    10    10
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

AVERAGE RESPONSE TIME DROPPED FROM 118.15 TO 3.46

SS8:

The screenshot shows the Locust web interface with the following details:

- Host:** http://localhost:8000
- Status:** STOPPED
- RPS:** 0.6
- Failures:** 0%
- Buttons:** NEW, RESET, Settings
- Menu:** STATISTICS, CHARTS, FAILURES, EXCEPTIONS, CURRENT RATIO, DOWNLOAD DATA, LOGS
- Logs:** Shows command-line output for starting Locust and its shutdown.
- Data Table:**

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

SS9:

The screenshot shows the Locust web interface with the following details:

- Host:** http://localhost:8000
- Status:** CLEANUP
- RPS:** 0.7
- Failures:** 0%
- Buttons:** EDIT, STOP, RESET, Settings
- Menu:** STATISTICS, CHARTS, FAILURES, EXCEPTIONS, CURRENT RATIO, DOWNLOAD DATA, LOGS
- Data Table:**

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    12    1
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                         2     3     3     3     4     6    12    12    12    12    1
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+

```

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.