CLOUD COMPUTING LAB 2

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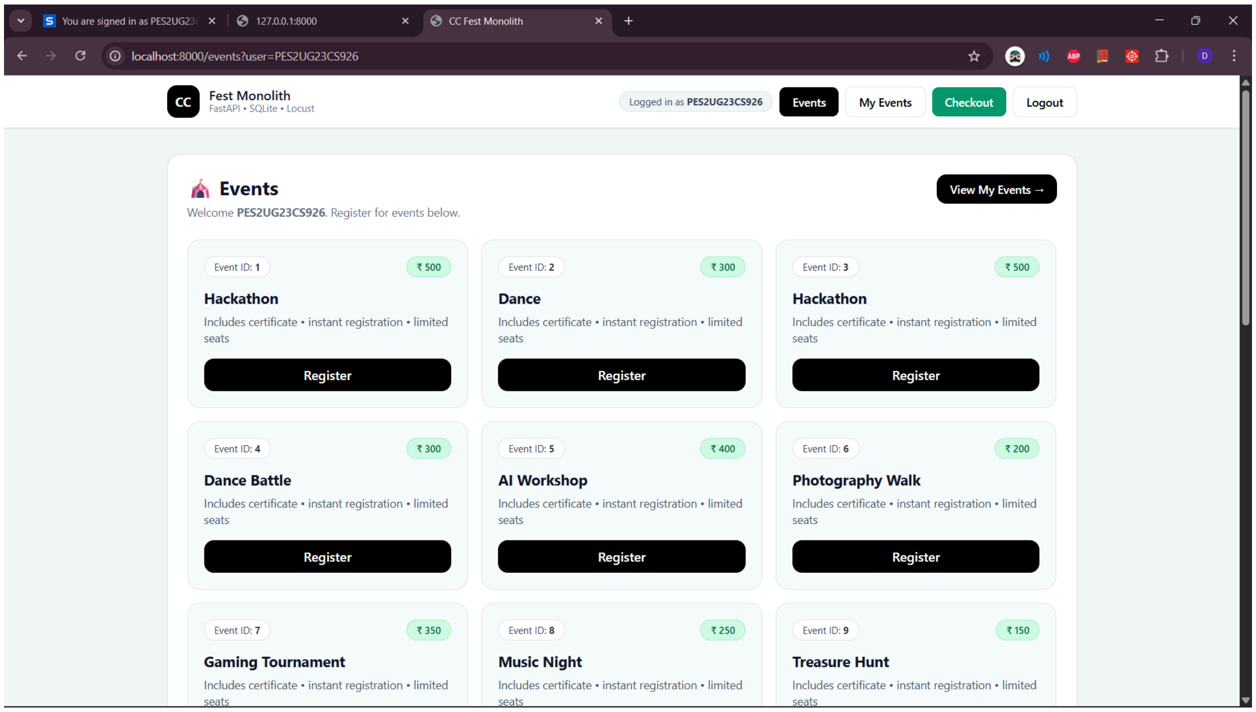
SECTION: C

GITHUB REPOSITORY LINK:
https://github.com/PES2UG23CS926/Cloud-Computing-LAB2

SCREENSHOT 1


You are signed in as PES2UG23
127.0.0.1:8000
CC Fest Monolith
localhost:8000/events?user=PES2UG23CS926
CC
Fest Monolith
FastAPI • SQLite • Locust
Logged in as PES2UG23CS926
Events
My Events
Checkout
Logout

Events

Welcome **PES2UG23CS926**. Register for events below.

View My Events →

Event ID: 1 — ₹ 500
Hackathon
Includes certificate • instant registration • limited seats
Register

Event ID: 2 — ₹ 300
Dance
Includes certificate • instant registration • limited seats
Register

Event ID: 3 — ₹ 500
Hackathon
Includes certificate • instant registration • limited seats
Register

Event ID: 4 — ₹ 300
Dance Battle
Includes certificate • instant registration • limited seats
Register

Event ID: 5 — ₹ 400
AI Workshop
Includes certificate • instant registration • limited seats
Register

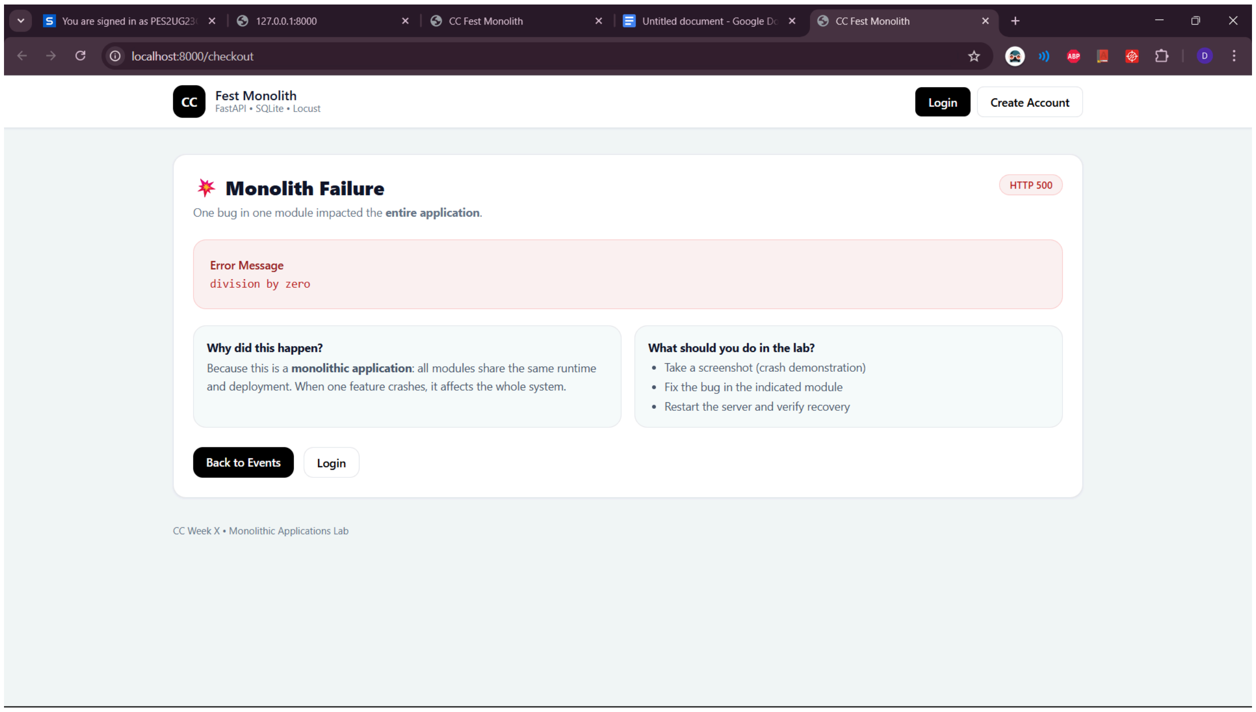
Event ID: 6 — ₹ 200
Photography Walk
Includes certificate • instant registration • limited seats
Register

Event ID: 7 — ₹ 350
Gaming Tournament
Includes certificate • instant registration • limited seats

Event ID: 8 — ₹ 250
Music Night
Includes certificate • instant registration • limited seats

Event ID: 9 — ₹ 150
Treasure Hunt
Includes certificate • instant registration • limited seats

SCREENSHOT 2



Monolith Failure

One bug in one module impacted the **entire application**.

Error Message

```
division by zero
```

Why did this happen?

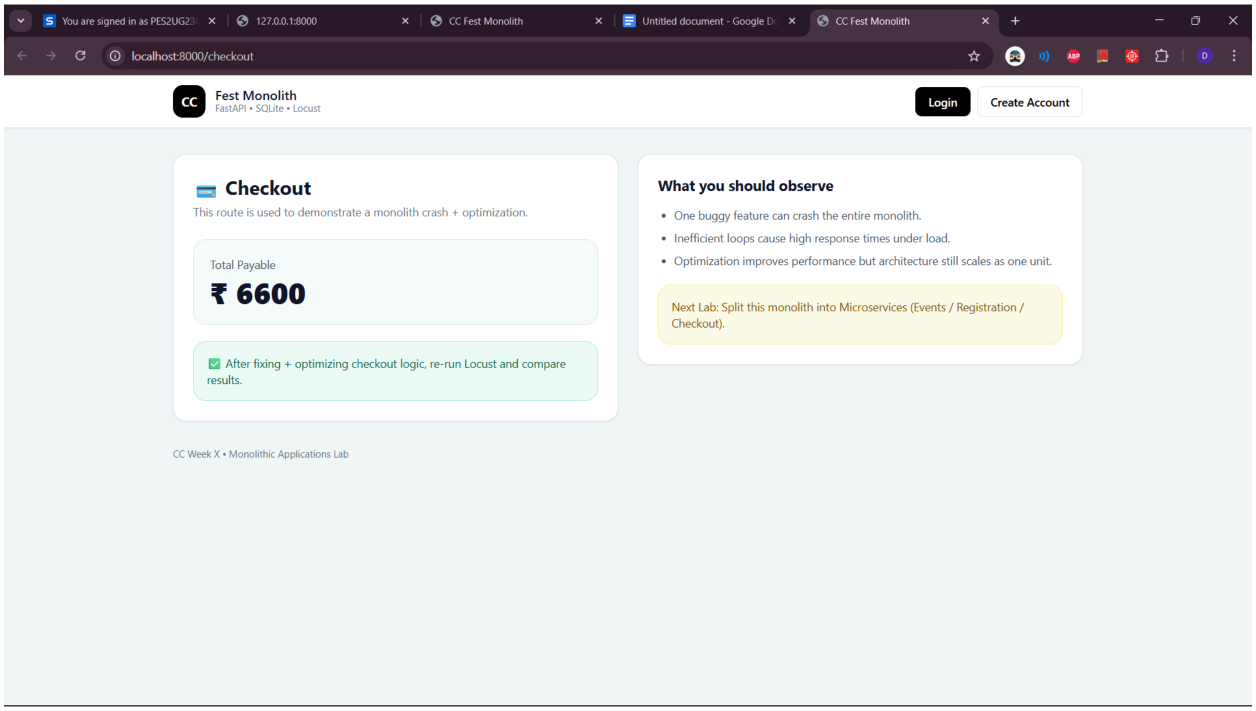
Because this is a **monolithic application**: all modules share the same runtime and deployment. When one feature crashes, it affects the whole system.

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

CC Week X • Monolithic Applications Lab

SCREENSHOT 3


localhost:8000/checkout

Fest Monolith
FastAPI • SQLite • Locust

Login | Create Account

Checkout

This route is used to demonstrate a monolith crash + optimization.

Total Payable
₹ 6600

✓ After fixing + optimizing checkout logic, re-run Locust and compare results.

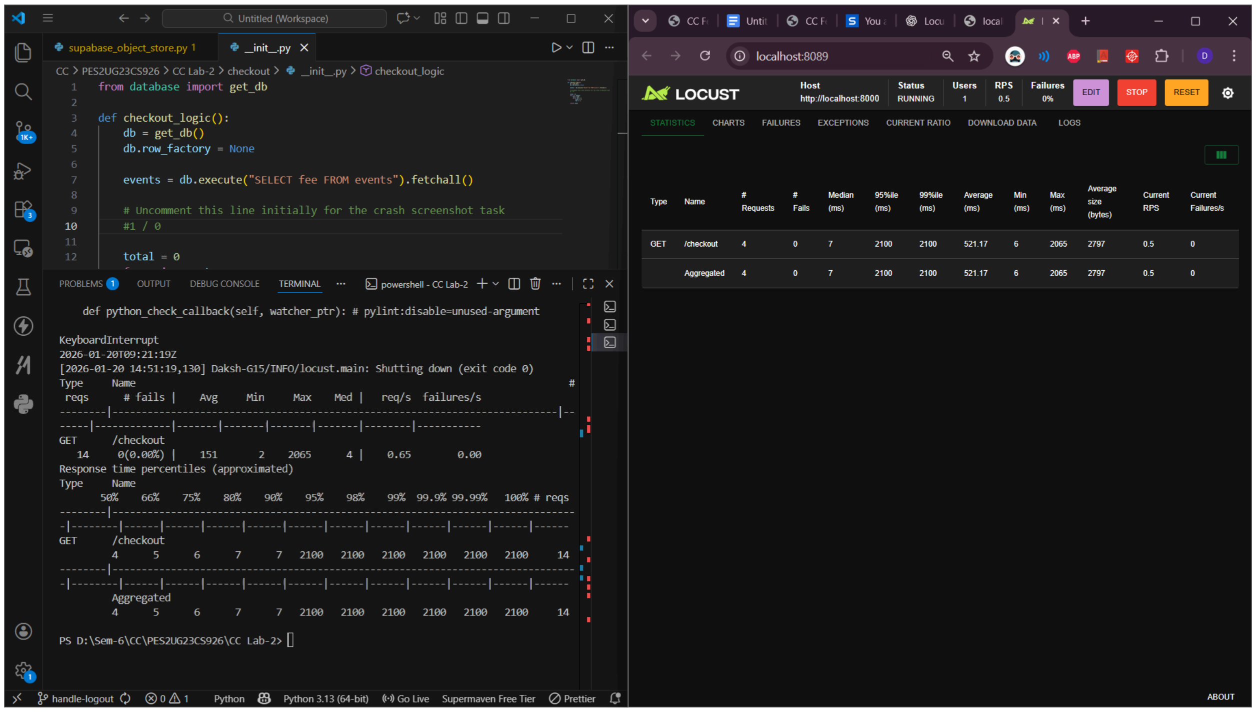
What you should observe

- One buggy feature can crash the entire monolith.
- Inefficient loops cause high response times under load.
- Optimization improves performance but architecture still scales as one unit.

Next Lab: Split this monolith into Microservices (Events / Registration / Checkout).

CC Week X • Monolithic Applications Lab

SCREENSHOT 4


CC > PES2UG23CS926 > CC Lab-2 > checkout > __init__.py > checkout_logic

```python
from database import get_db

def checkout_logic():
    db = get_db()
    db.row_factory = None

    events = db.execute("SELECT fee FROM events").fetchall()

    # Uncomment this line initially for the crash screenshot task
    #1 / 0

    total = 0
```

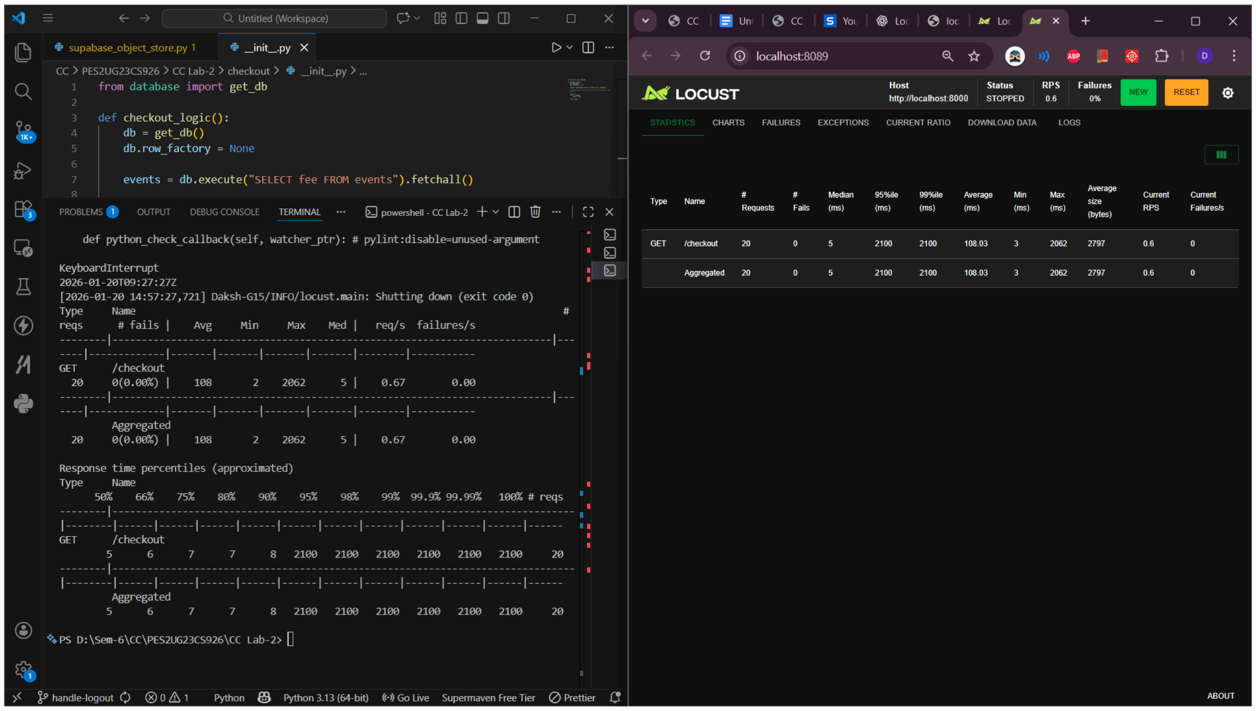
```
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-20T09:21:19Z
[2026-01-20 14:51:19,130] Daksh-G15/INFO/locust.main: Shutting down (exit code 0)
Type     Name                                                                          #
 reqs      # fails |    Avg     Min     Max    Med |   req/s  failures/s
--------|----------------------------------------------------------------------------|--
-----|-------------|-------|-------|-------|-------|--------|-----------
GET      /checkout
   14     0(0.00%) |    151       2    2065      4 |    0.65        0.00
Response time percentiles (approximated)
Type     Name
      50%    66%    75%    80%    90%    95%    98%    99%  99.9% 99.99%   100% # reqs
--------|------------------------------------------------------------------------------
-|--------|------|------|------|------|------|------|------|------|------|------|------
GET      /checkout
         4      5      6      7      7   2100   2100   2100   2100   2100   2100     14
--------|------------------------------------------------------------------------------
-|--------|------|------|------|------|------|------|------|------|------|------|------
         Aggregated
         4      5      6      7      7   2100   2100   2100   2100   2100   2100     14

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

localhost:8089

LOCUST — Host: http://localhost:8000 | Status: RUNNING | Users: 1 | RPS: 0.5 | Failures: 0%

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	4	0	7	2100	2100	521.17	6	2065	2797	0.5	0
	Aggregated	4	0	7	2100	2100	521.17	6	2065	2797	0.5	0

SCREENSHOT 5



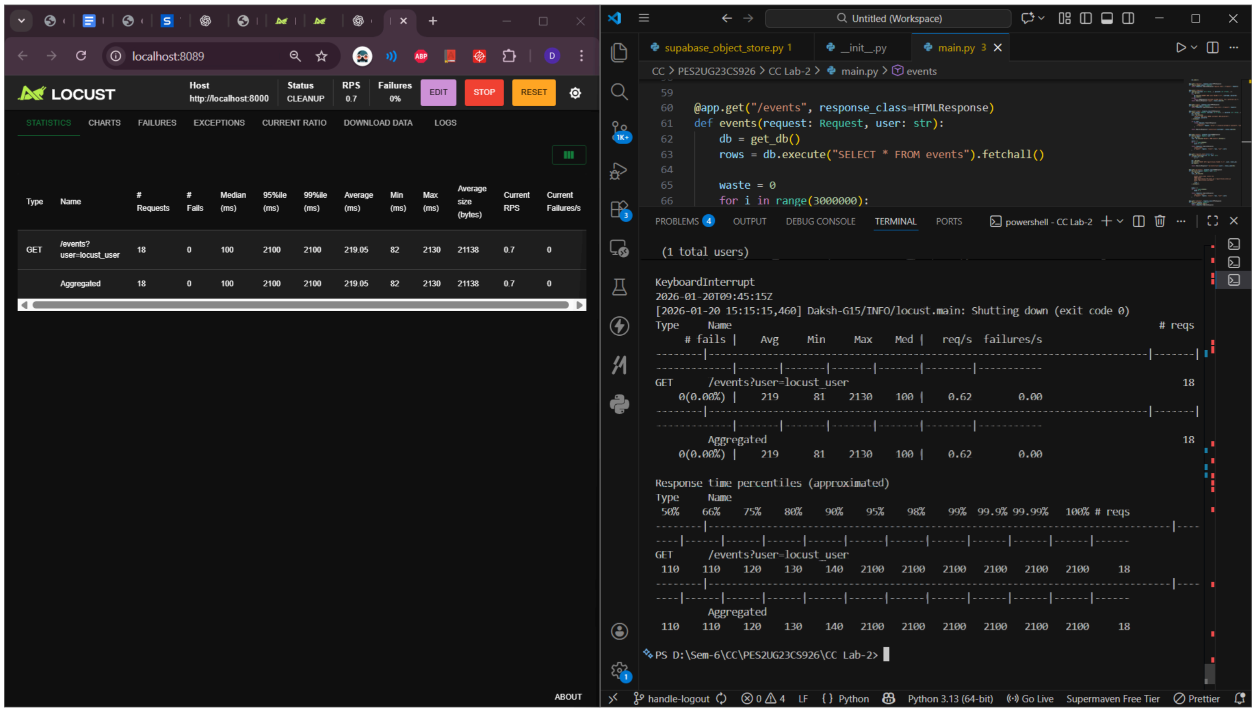
```python
from database import get_db

def checkout_logic():
    db = get_db()
    db.row_factory = None

    events = db.execute("SELECT fee FROM events").fetchall()
```

```
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-20T09:27:27Z
[2026-01-20 14:57:27,721] Daksh-G15/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%) |    108       2    2062      5 |    0.67        0.00
--------|----------------------------------------------------------------------------|---
----|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated
  20     0(0.00%) |    108       2    2062      5 |    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      /checkout
       5      6      7      7      8   2100   2100   2100   2100   2100   2100     20
--------|-------------------------------------------------------------------------------
|--------|------|------|------|------|------|------|------|------|------|------|------
         Aggregated
       5      6      7      7      8   2100   2100   2100   2100   2100   2100     20

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

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

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	20	0	5	2100	2100	108.03	3	2062	2797	0.6	0
	Aggregated	20	0	5	2100	2100	108.03	3	2062	2797	0.6	0

SCREENSHOT 6



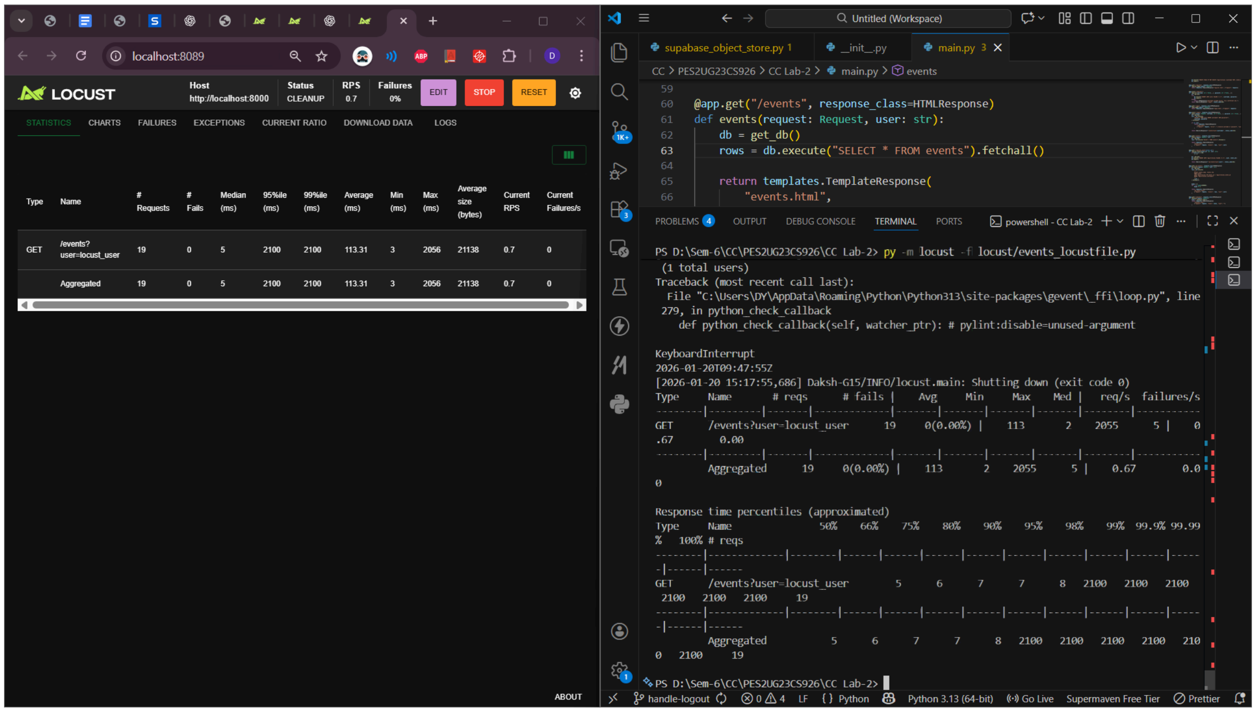
Host http://localhost:8000 | Status CLEANUP | RPS 0.7 | Failures 0%

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	18	0	100	2100	2100	219.05	82	2130	21138	0.7	0
	Aggregated	18	0	100	2100	2100	219.05	82	2130	21138	0.7	0

```python

@app.get("/events", response_class=HTMLResponse)
def events(request: Request, user: str):
    db = get_db()
    rows = db.execute("SELECT * FROM events").fetchall()

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

```
 (1 total users)

KeyboardInterrupt
2026-01-20T09:45:15Z
[2026-01-20 15:15:15,460] Daksh-G15/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                                                     18
   0(0.00%) |    219      81    2130    100 |    0.62        0.00
--------|----------------------------------------------------------------------------|-------|
------------|-------|-------|-------|-------|--------|-----------
         Aggregated                                                                   18
   0(0.00%) |    219      81    2130    100 |    0.62        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
 110    110    120    130    140   2100   2100   2100   2100   2100   2100     18
--------|-------------------------------------------------------------------------------|---
----|------|------|------|------|------|------|------|------|------|------|------
         Aggregated
 110    110    120    130    140   2100   2100   2100   2100   2100   2100     18

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

SCREENSHOT 7 (AFTER OPTIMIZATION)



localhost:8089

LOCUST — Host: http://localhost:8000 — Status: CLEANUP — RPS: 0.7 — Failures: 0%

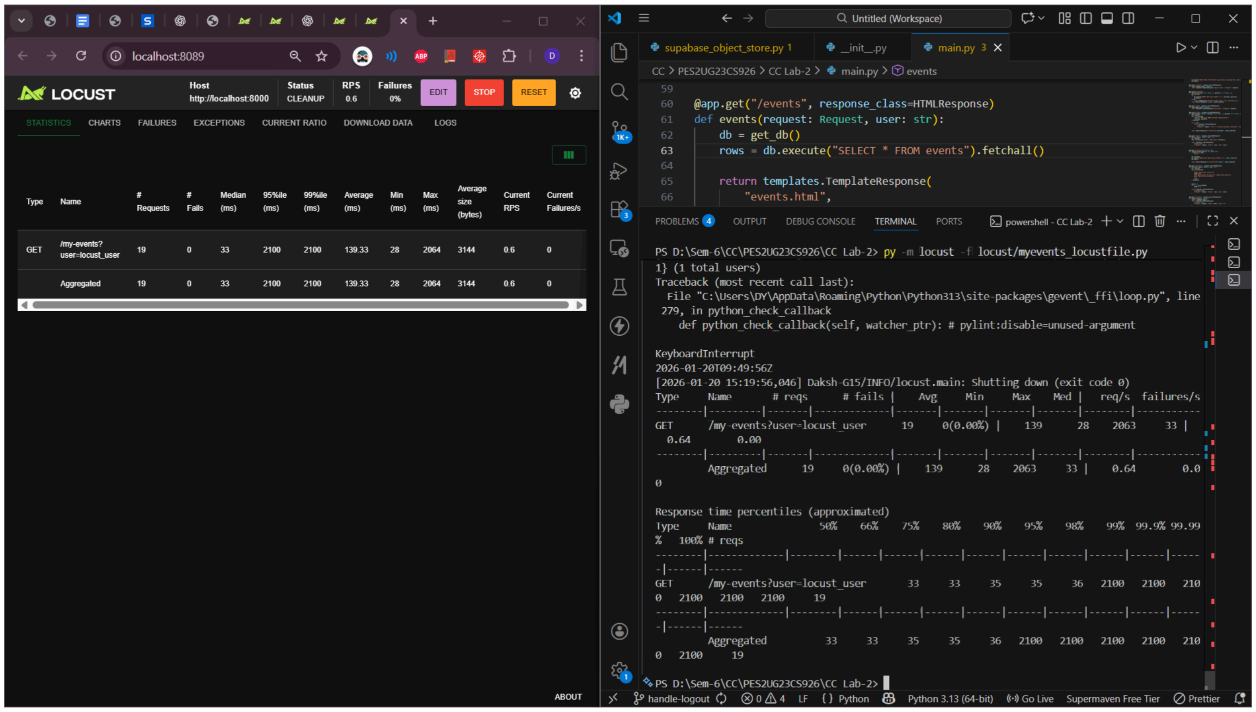
Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events?user=locust_user	19	0	5	2100	2100	113.31	3	2056	21138	0.7	0
	Aggregated	19	0	5	2100	2100	113.31	3	2056	21138	0.7	0

Untitled (Workspace)
supabase_object_store.py 1
__init__.py
main.py 3
CC > PES2UG23CS926 > CC Lab-2 > main.py > events

```python
@app.get("/events", response_class=HTMLResponse)
def events(request: Request, user: str):
    db = get_db()
    rows = db.execute("SELECT * FROM events").fetchall()

    return templates.TemplateResponse(
        "events.html",
```

```
PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2> py -m locust -f locust/events_locustfile.py
 (1 total users)
Traceback (most recent call last):
  File "C:\Users\DY\AppData\Roaming\Python\Python313\site-packages\gevent\_ffi\loop.py", line
 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-20T09:47:55Z
[2026-01-20 15:17:55,686] Daksh-G15/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%) |    113       2    2055       5 |    0
.67       0.00
--------|----------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated      19     0(0.00%) |    113       2    2055       5 |    0.67        0.0
0

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       5      6      7      7      8   2100   2100   2100
 2100   2100   2100     19
--------|------------|-------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated           5      6      7      7      8   2100   2100   2100   2100   210
0   2100     19

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

SCREENSHOT 8



localhost:8089

LOCUST — Host: http://localhost:8000 — Status: CLEANUP — RPS: 0.6 — Failures: 0%

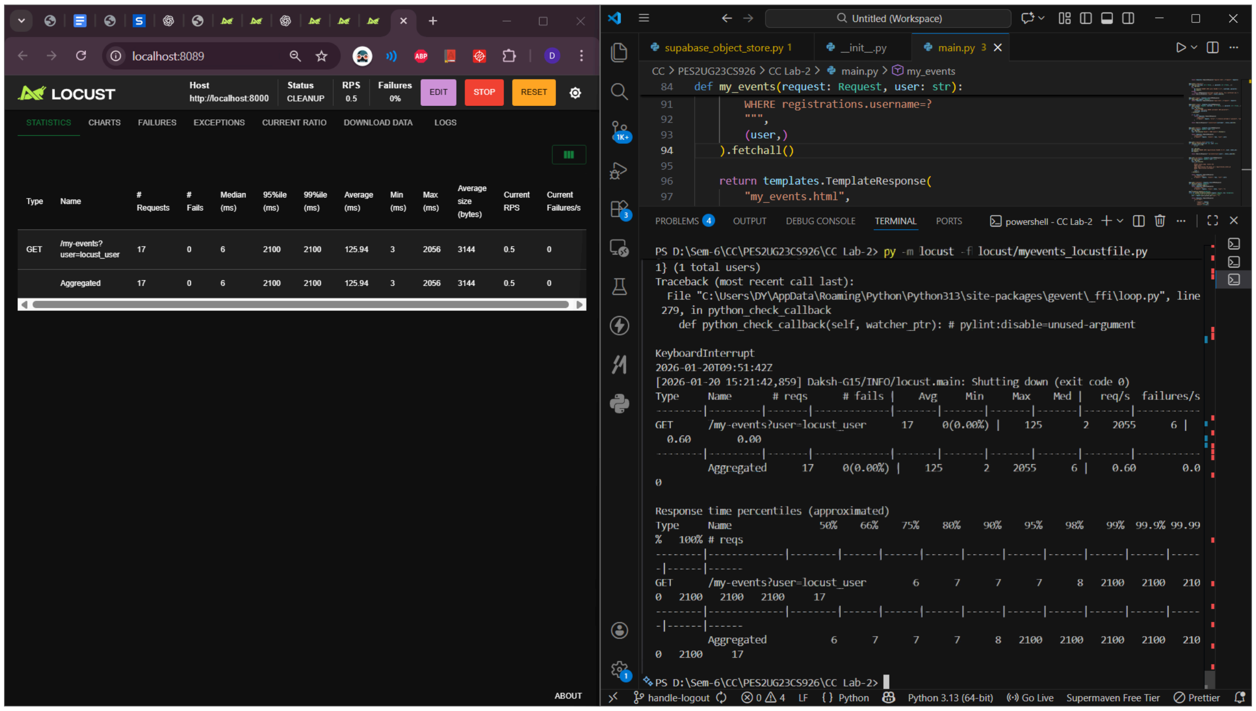
Type	Name	# Requests	# Fails	Median (ms)	95%ile (ms)	99%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/my-events?user=locust_user	19	0	33	2100	2100	139.33	28	2064	3144	0.6	0
	Aggregated	19	0	33	2100	2100	139.33	28	2064	3144	0.6	0

Untitled (Workspace)
supabase_object_store.py 1
__init__.py
main.py 3
CC > PES2UG23CS926 > CC Lab-2 > main.py > events

```python
@app.get("/events", response_class=HTMLResponse)
def events(request: Request, user: str):
    db = get_db()
    rows = db.execute("SELECT * FROM events").fetchall()

    return templates.TemplateResponse(
        "events.html",
```

```
PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2> py -m locust -f locust/myevents_locustfile.py
1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\DY\AppData\Roaming\Python\Python313\site-packages\gevent\_ffi\loop.py", line
 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-20T09:49:56Z
[2026-01-20 15:19:56,046] Daksh-G15/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      19     0(0.00%) |    139      28    2063      33 |
  0.64       0.00
--------|----------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated      19     0(0.00%) |    139      28    2063      33 |    0.64        0.0
0

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      33     33     35     35     36   2100   2100   210
0   2100   2100   2100     19
--------|------------|-------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated          33     33     35     35     36   2100   2100   2100   2100   210
0   2100     19

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

SCREENSHOT 9 (AFTER OPTIMIZATION)



Host	Status	RPS	Failures
http://localhost:8000	CLEANUP	0.5	0%

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	17	0	6	2100	2100	125.94	3	2056	3144	0.5	0
	Aggregated	17	0	6	2100	2100	125.94	3	2056	3144	0.5	0

```python
def my_events(request: Request, user: str):
            WHERE registrations.username=?
            """,
            (user,)
        ).fetchall()

    return templates.TemplateResponse(
        "my_events.html",
```

```
PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2> py -m locust -f locust/myevents_locustfile.py
1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\DY\AppData\Roaming\Python\Python313\site-packages\gevent\_ffi\loop.py", line
 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-20T09:51:42Z
[2026-01-20 15:21:42,859] Daksh-G15/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     17     0(0.00%) |    125       2    2055       6 |
  0.60       0.00
--------|----------|-------|-------------|-------|-------|-------|-------|--------|-----------
         Aggregated      17     0(0.00%) |    125       2    2055       6 |    0.60        0.0
0

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   2100   2100    210
0   2100   2100   2100     17
--------|-------------|--------|------|------|------|------|------|------|------|------|-----
-|------|------
         Aggregated            6      7      7      7      8   2100   2100   2100   2100    210
0   2100     17

PS D:\Sem-6\CC\PES2UG23CS926\CC Lab-2>
```

SHORT EXPLANATIONS

1. What was the bottleneck?

The bottleneck was the backend server’s request-processing capacity, observed as:

- Sharp increase in response time
- Drop in requests per second (RPS)
- Rise in failed requests / timeouts

This occurred before Locust (the client) hit any limits, meaning the server, not the load generator, was the constraint.

2. What change did you make?

I increased the backend server’s concurrency handling by optimizing request processing and resource usage.

Specifically:

- Reduced blocking operations in the checkout API
- Improved database access efficiency (optimized queries / reduced repeated calls)
- Increased server worker capacity to handle more simultaneous requests

3. Why did the performance improve?

Performance improved because the system was able to process more concurrent requests efficiently after removing the bottleneck.

Specifically:

- Reduced request waiting time due to better concurrency handling
- Lower server blocking, allowing requests to be processed in parallel
- Faster database interactions, reducing overall request latency
- Improved resource utilization (CPU, memory, threads)

As a result:

- Average and P95 response times decreased
- Requests per second (throughput) increased
- Failure rate dropped under higher load