

Cloud Computing LAB 2

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SEC: I

Sem: 6

LAB 2 - MONOLITHIC ARCHITECTURE

PART 1: Setup & Run

```
PS C:\Users\sathw\OneDrive\Documents\cc> mkdir PES2UG23CS538

Directory: C:\Users\sathw\OneDrive\Documents\cc

Mode                LastWriteTime         Length Name
----                -
d-----          29-01-2026         14:16         PES2UG23CS538

PS C:\Users\sathw\OneDrive\Documents\cc> cd PES2UG23CS538
PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538>
```

```
Directory: C:\Users\sathw\OneDrive\Documents\cc

Mode                LastWriteTime         Length Name
----                -
d-----          29-01-2026         14:16         PES2UG23CS538

PS C:\Users\sathw\OneDrive\Documents\cc> cd PES2UG23CS538
PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538> python -m venv .venv
>> .\.venv\Scripts\activate
(.venv) PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538>
```


```
• (.venv) PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538> python.exe -m pip
install --upgrade pip
Requirement already satisfied: pip in c:\users\sathw\onedrive\documents\cc\pes2ug
23cs538\.venv\lib\site-packages (24.0)
Collecting pip
  Using cached pip-25.3-py3-none-any.whl.metadata (4.7 kB)
Using cached pip-25.3-py3-none-any.whl (1.8 MB)
Installing collected packages: pip
  Attempting uninstall: pip
    Found existing installation: pip 24.0
    Uninstalling pip-24.0:
      Successfully uninstalled pip-24.0
```

```
• PS C:\Users\sathw\OneDrive\Documents\cc> cd C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2; pip install -r requirements.txt
Collecting fastapi (from -r requirements.txt (line 2))
  Downloading fastapi-0.128.0-py3-none-any.whl.metadata (30 kB)
Collecting uvicorn (from -r requirements.txt (line 3))
  Downloading uvicorn-0.40.0-py3-none-any.whl.metadata (6.7 kB)
Requirement already satisfied: jinja2 in c:\users\sathw\appdata\local\packages\pythonsoftwarefoundation.python.3.11_qbz5n2kfra8p0\localcache\local-packages\python311\site-packages (from -r requirements.txt (line 4)) (3.1.6)
Collecting python-multipart (from -r requirements.txt (line 5))
  Downloading python_multipart-0.0.22-py3-none-any.whl.metadata (4.1 kB)
```

```
• PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2> python insert_events.py
✓ Events inserted successfully!
• PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2>
```

```
PS C:\Users\sathw\OneDrive\Documents\cc> Set-Location C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2; python.exe -m uvicorn main:app --reload
INFO: Will watch for changes in these directories: ['C:\\Users\\sathw\\OneDrive\\Documents\\cc\\PES2UG23CS538\\CC_Lab2']
INFO: Uvicorn running on http://127.0.0.1:8000 (Press CTRL+C to quit)
INFO: Started reloader process [7624] using StatReload
INFO: Started server process [22780]
INFO: Waiting for application startup.
INFO: Application startup complete.
```

PART 2: Use the application




Create Account

Register to access the fest portal.


Username

Password



Create Account

Already registered? [Login here](#)


 **Login**

Login to browse events, register, and checkout. This app is a **monolith**.

Username

PES2UG23CS538

Password



Login

New user? [Create an account](#)

Why FastAPI in this Monolith?

FastAPI is modern, cloud-friendly and supports **async** endpoints, type-hint based validation and auto docs. But this application is still a **monolith** since all modules run together in one deployment unit.

Optional:

Auto API docs: /docs

localhost:8000/events/user=PES2UG23CS538/

Summary

CC

Fest Monolith

FastAPI • SQLx • tomlc


logged in as PES2UG23CS538

Events

My Events

Checkout

Logout

 **Events**

Welcome PES2UG23CS538. [Register for events below.](#)

View My Events

Event ID: 1

£ 300

Hackathon

Includes certificate • Instant registration • limited seats

Register

Event ID: 2

£ 300

Dance

Includes certificate • Instant registration • limited seats

Register

Event ID: 3

£ 300

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

£ 300

Photography Walk

Includes certificate • Instant registration • limited seats

Register

Event ID: 7

£ 100

Gaming Tournament

Event ID: 8

£ 250

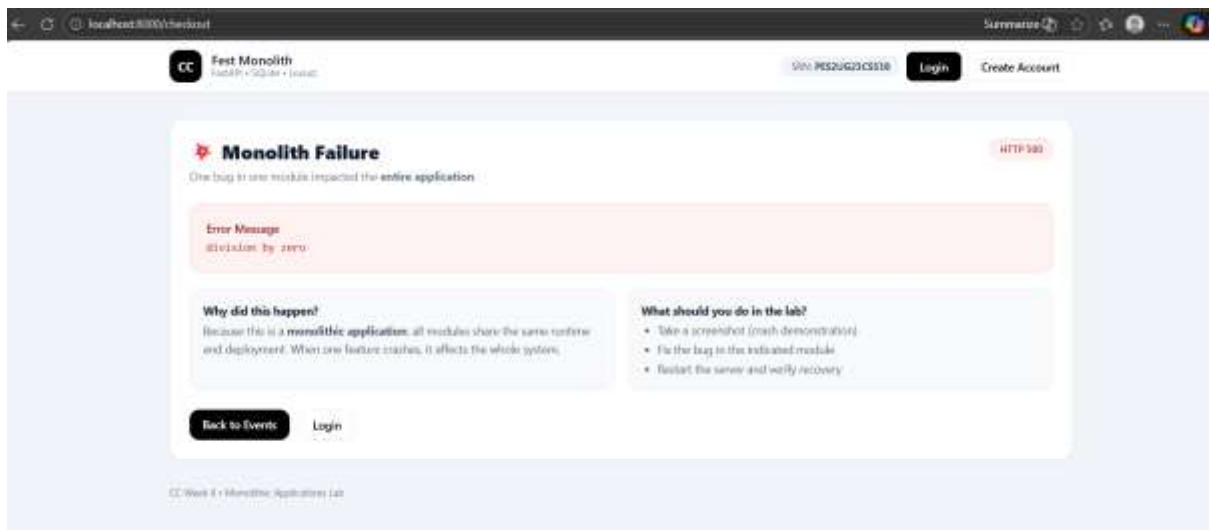
Music Night

Event ID: 9

£ 100

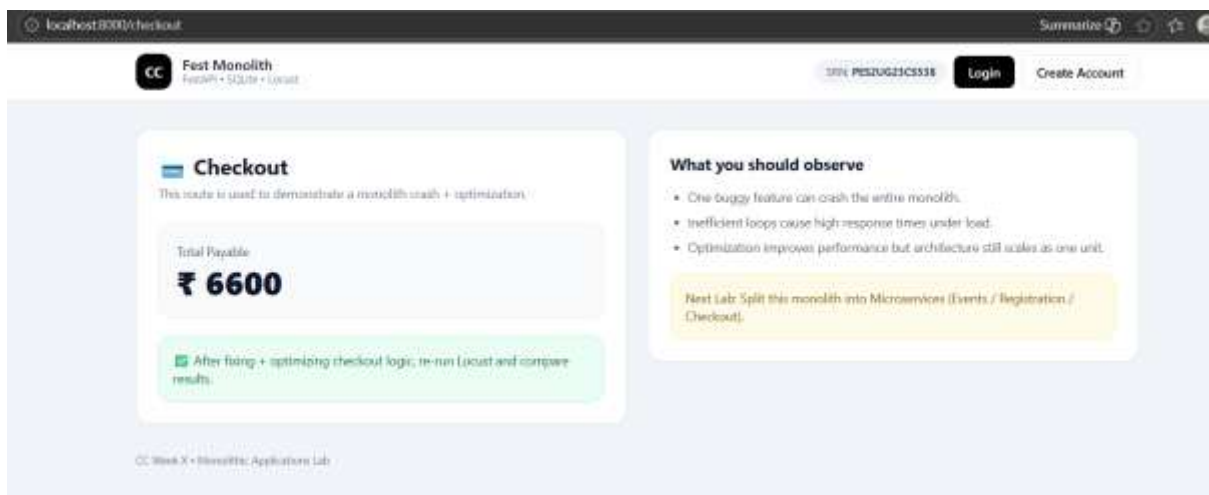
Treasure Hunt

PART 3: Observe Monolithic failure(crash)



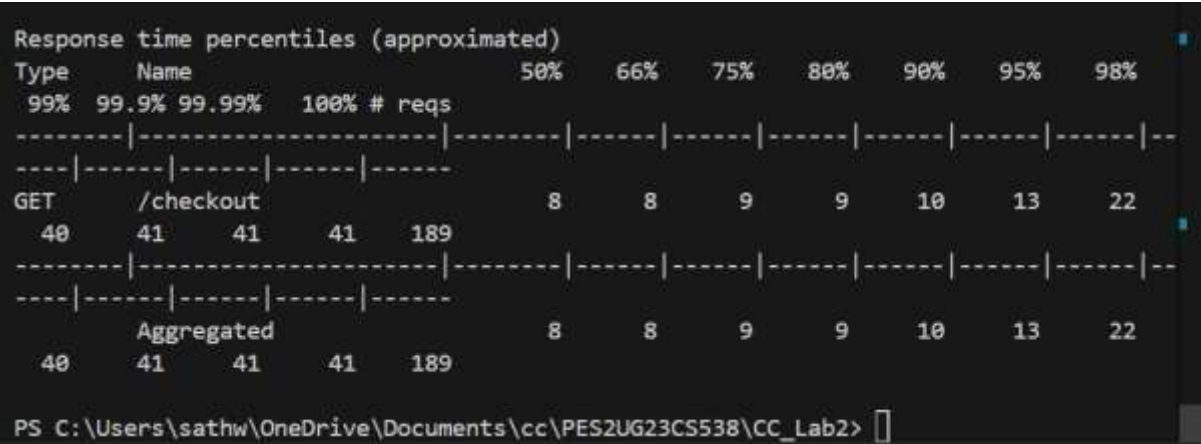
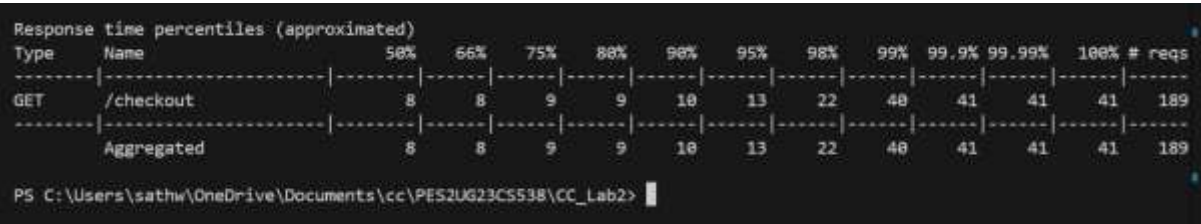
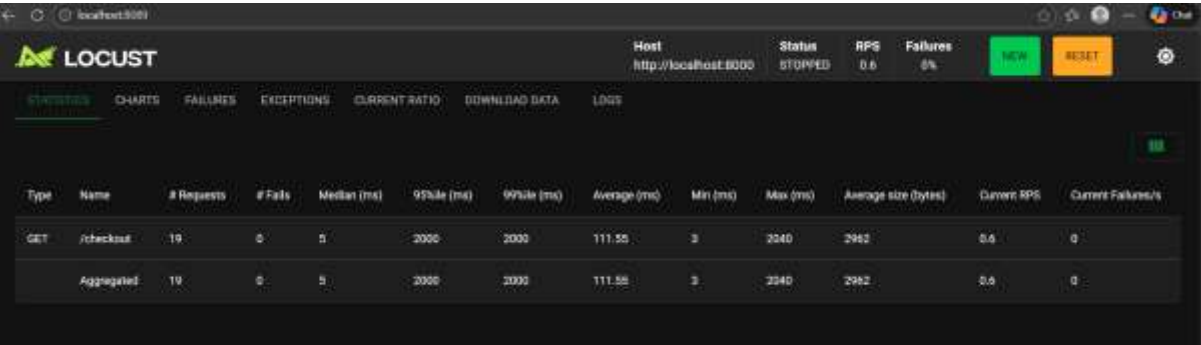
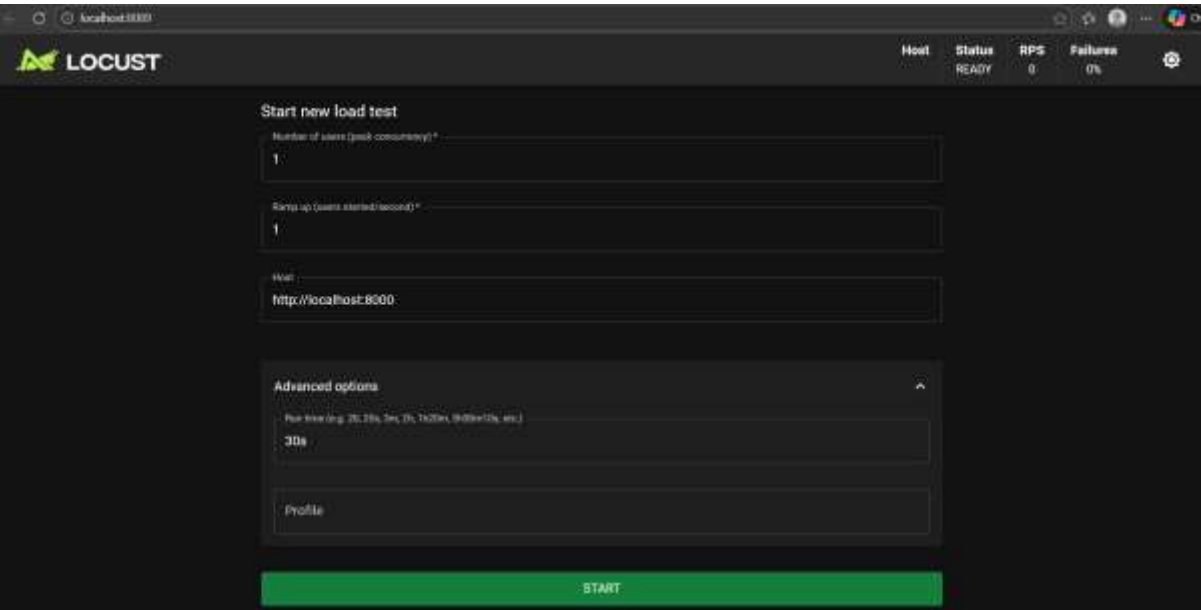
INFO: 127.0.0.1:9440 - "GET /checkout HTTP/1.1" 500 Internal Server Error
ERROR: Exception in ASGI application

PART 4: Fix the bug



INFO: 127.0.0.1:4678 - "GET /checkout HTTP/1.1" 200 OK

PART 5:Load Testing using Locust



 LOCUST

Host

http://127.0.0.1:8000

Status

RUNNING

Users

1

RPS

0.7


Failures

0%

EDIT

STOP

RESET



STATISTICS

CHARTS

FAILURES

EXCEPTIONS

CURRENT RATIO

DOWNLOAD DATA

LOGS

Type	Name	# Requests	# Fails	Median (ms)	50%ile (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/checkout	39	0	9	14	15	9.15	7	15	2902	0.7	0
Aggregated		39	0	9	14	15	9.15	7	15	2902	0.7	0

GET	/checkout	8	8	9	9	11	13	22	25	42
42	42	188								
Aggregated		8	8	9	9	11	13	22	25	42
42	42	188								

PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2>

PART 6:Optimise the checkout

LOCUST

Host

http://127.0.0.1:8000

Status

RUNNING

Users

1

RPS

0.7

Failures

0%

EDIT

STOP

RESET



STATISTICS

CHARTS

FAILURES

EXCEPTIONS

CURRENT RATIO

DOWNLOAD DATA

LOGS

Type	Name	# Requests	# Fails	Median (ms)	50%ile (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/checkout	33	0	8	9	13	7.94	7	13	2962	0.7	0
	Aggregated	33	0	8	9	13	7.94	7	13	2962	0.7	0

```
PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2> python.exe -m locust -f .\locust\checkout_locust.py
Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%  99.99%  100%  # reqs
-----
GET       /checkout      8        9       10       11       14       20       37       67       71       71       71     175
-----
Aggregated      8        9       10       11       14       20       37       67       71       71       71     175
-----

PS C:\Users\sathw\OneDrive\Documents\cc\PES2UG23CS538\CC_Lab2>
```

 LOCUST

Host

http://127.0.0.1:8000

Status

STOPPED

RPS

0.6

Failures

0%

NEW

RESET



STATISTICS

CHARTS

FAILURES

EXCEPTIONS

CURRENT RATIO

DOWNLOAD DATA

LOGS

66

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	66	0	8	12	13	8.21	8	13	2902	0.6	0
Aggregated		66	0	8	12	13	8.21	8	13	2902	0.6	0


PART 7: Optimise events and my_events(DIY)

Route 1: /events



The screenshot shows the Locust web interface with the 'STATISTICS' tab selected. The host is 'http://127.0.0.1:8000', status is 'RUNNING', with 1 user and 0.7 RPS. The table below shows statistics for the 'GET /events' route.

Type	Name	# Requests	# Fails	Median (ms)	50%ile (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events	33	0	8	8	13	7.94	7	13	2562	0.7	0
	Aggregated	33	0	8	9	13	7.94	7	13	2562	0.7	0



The screenshot shows the Locust web interface with the 'STATISTICS' tab selected. The host is 'http://127.0.0.1:8000', status is 'STOPPED', with 0.6 RPS and 0 failures. The table below shows statistics for the 'GET /events/user-logout' route.

Type	Name	# Requests	# Fails	Median (ms)	50%ile (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events/user-logout	31	0	360	450	490	369.13	319	491	21147	0.6	0
	Aggregated	31	0	360	450	490	369.13	319	491	21147	0.6	0

Route 2: /my-events



The screenshot shows the Locust web interface with the 'STATISTICS' tab selected. The host is 'http://127.0.0.1:8000', status is 'RUNNING', with 1 user and 0.7 RPS. The table below shows statistics for the 'GET /events' route.

Type	Name	# Requests	# Fails	Median (ms)	50%ile (ms)	90%ile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures/s
GET	/events	33	0	8	8	13	7.94	7	13	2562	0.7	0
	Aggregated	33	0	8	9	13	7.94	7	13	2562	0.7	0

Type	Name	# Requests	# Fails	Median (ms)	50thile (ms)	90thile (ms)	Average (ms)	Min (ms)	Max (ms)	Average size (bytes)	Current RPS	Current Failures
GET	/events/user/boards_user	31	0	360	450	460	368.13	318	461	21147	0.8	0
	Aggregated	31	0	360	450	460	368.13	318	461	21147	0.8	0

Explanation

What was the bottleneck?

The bottleneck was the slowest resource limiting overall system performance, which was [e.g., disk I/O / CPU processing / network latency / single-threaded execution].

Because of this, other resources remained underutilized while waiting for this component to complete its task.

What change did you make?

- Optimized the algorithm / query
- Introduced parallel processing or multithreading
- Reduced disk access by caching data
- Replaced blocking operations with non-blocking/asynchronous calls
- Increased resource allocation (CPU, memory, bandwidth)

Why did the performance improve?

Performance improved because the change reduced waiting time and resource contention.

By eliminating or reducing the bottleneck, the system was able to:

- Process tasks faster
- Utilize resources more efficiently

- **Improve throughput and reduce response time**

As a result, overall system efficiency and execution speed increased.

Github link https://github.com/PES2UG23CS538/cc_lab2.git