

CLOUD COMPUTING

LAB-2

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SS-1:

The screenshot shows the 'Events' section of the Fest Monolith application. At the top, there's a header bar with the logo 'Fest Monolith' (FastAPI + SQLite + Locust), user information ('Logged in as PES2UG23CS071'), and navigation links for 'Events', 'My Events', 'Checkout', and 'Logout'. Below the header, a sub-header 'Events' is displayed with the sub-instruction 'Welcome PES2UG23CS071. Register for events below.' To the right is a button 'View My Events →'. The main content area displays six event cards arranged in two rows of three. Each card includes an event ID, price, event name, a brief description, and a 'Register' button.

Event ID	Price	Event Name	Description	Action
1	₹ 500	Hackathon	Includes certificate • instant registration • limited seats	Register
2	₹ 300	Dance	Includes certificate • instant registration • limited seats	Register
3	₹ 500	Hackathon	Includes certificate • instant registration • limited seats	Register
4	₹ 300	Dance Battle	Includes certificate • instant registration • limited seats	Register
5	₹ 400	AI Workshop	Includes certificate • instant registration • limited seats	Register
6	₹ 200	Photography Walk	Includes certificate • instant registration • limited seats	Register

SS-2:

The screenshot shows the 'Checkout' section of the Fest Monolith application. At the top, there's a header bar with the logo 'Fest Monolith' (FastAPI + SQLite + Locust), user information ('Logged in as PES2UG23CS071'), and navigation links for 'Login' and 'Create Account'. Below the header, a sub-header 'Checkout' is displayed with the sub-instruction 'This route is used to demonstrate a monolith crash + optimization.'. The main content area is divided into two sections: 'Total Payable' (₹ 6600) and 'What you should observe'. The 'What you should observe' section contains a bulleted list of three items and a note about fixing the logic for better performance.

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).

```
ZeroDivisionError: division by zero
INFO:      127.0.0.1:49965 - "GET /checkout HTTP/1.1" 200 OK
INFO:      127.0.0.1:52921 - "GET /checkout HTTP/1.1" 200 OK
INFO:      127.0.0.1:64805 - "GET /checkout HTTP/1.1" 200 OK
```

SS-3:

The screenshot shows a web browser window for 'localhost:8000/checkout'. At the top, there's a header with the Fest Monolith logo, a 'Login' button, and a 'Create Account' button. Below the header, a large red box displays the error message: 'Monolith Failure' with a star icon, followed by the text 'One bug in one module impacted the entire application.' A pink box contains the 'Error Message': 'division by zero'. Another pink box contains the question 'Why did this happen?' with the answer: 'Because this is a **monolithic application**: all modules share the same runtime and deployment. When one feature crashes, it affects the whole system.' A third pink box contains the question 'What should you do in the lab?' with the following steps: 'Take a screenshot (crash demonstration)', 'Fix the bug in the indicated module', and 'Restart the server and verify recovery'. At the bottom of the page, there are 'Back to Events' and 'Login' buttons, and a footer note: 'CC Week X • Monolithic Applications Lab'.

```
ZeroDivisionError: division by zero
INFO:     127.0.0.1:64447 - "GET / HTTP/1.1" 404 Not Found
INFO:     127.0.0.1:51395 - "GET /checkout HTTP/1.1" 500 Internal Server Error
ERROR:    Exception in ASGI application
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\Lib\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
```

SS-4:

The screenshot shows a web browser window for 'localhost:8089'. At the top, there's a header with the Locust logo, a 'Host' dropdown set to 'http://localhost:8000', a 'Status' dropdown set to 'CLEANUP', an 'RPS' input field set to '0.7', a 'Failures' input field set to '0%', and buttons for 'EDIT', 'LOADING', and 'RESET'. Below the header, there are tabs for 'STATISTICS', 'CHARTS', 'FAILURES', 'EXCEPTIONS', 'CURRENT RATIO', 'DOWNLOAD DATA', and 'LOGS'. The 'STATISTICS' tab is selected, showing a table with the following data:

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	20	0	8	2100	2100	111.89	4	2079	2797	0.7
	Aggregated	20	0	8	2100	2100	111.89	4	2079	2797	0.7

Below the table, there's a 'Logs' section containing the following log output:

```
[2026-01-29 15:03:06,968] LAPTOP-QRNI4MKI/INFO/main: Starting web interface at http://localhost:8089, press enter to open your default browser.
[2026-01-29 15:03:21,137] LAPTOP-QRNI4MKI/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:03:21,146] LAPTOP-QRNI4MKI/INFO/locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\Lib\site-packages\gevent\_ffi\loop.py", line 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument
```

At the bottom of the logs, there's a summary table for response time percentiles:

Type	Name	50%	66%	75%	80%	90%	95%	98%	99%	99.9%	99.99%
%	100% # reqs										
GET	/checkout	8	9	9	9	35	2100	2100	2100	2100	2100
	Aggregated	8	9	9	9	35	2100	2100	2100	2100	2100

At the very bottom, there's a footer note: '(.venv) C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\CC Lab-2>'.

SS-5:

localhost:8089

LOCUST

Host http://localhost:8000 Status CLEANUP RPS 0.7 Failures 0% EDIT STOP 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	/checkout	20	0	7	2100	2100	111.31	4	2084	2797	0.7	0
	Aggregated	20	0	7	2100	2100	111.31	4	2084	2797	0.7	0

```
[2026-01-29 15:07:15,098] LAPTOP-QRNI4MKI/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:07:15,098] LAPTOP-QRNI4MKI/INFO/locust.runners: All users spawned: {"CheckoutUser": 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\Lib\site-packages\gevent\_ffi\loop.py", line 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-29T09:38:47Z
[2026-01-29 15:08:47,996] LAPTOP-QRNI4MKI/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%) | 111     3       2084    7 | 0.68     0.00
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                      20       0(0.00%) | 111     3       2084    7 | 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      7       8       9       9       25     2100   2100   2100   2100   2100
0  2100   20
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                      7       8       9       9       25     2100   2100   2100   2100   2100
0  2100   20
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
(.venv) C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\CC Lab-2>
```

SS-6:

BEFORE:

localhost:8089

LOCUST

Host http://localhost:8000 Status CLEANUP RPS 0.5 Failures 0% EDIT STOP 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	14	0	380	2400	2400	514.5	274	2440	21138	0.5	0
	Aggregated	14	0	380	2400	2400	514.5	274	2440	21138	0.5	0

```
[2026-01-29 15:12:38,263] LAPTOP-QRNI4MKI/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:12:38,266] LAPTOP-QRNI4MKI/INFO/locust.runners: All users spawned: {"EventsUser": 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\Lib\site-packages\gevent\_ffi\loop.py", line 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-29T09:43:51Z
[2026-01-29 15:13:51,342] LAPTOP-QRNI4MKI/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      14       0(0.00%) | 514     274     2440    380 | 0.49     0.00
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                      14       0(0.00%) | 514     274     2440    380 | 0.49     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      380     400     400     410     420     2400   2400   2400   2400   2400
0  2400   14
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
Aggregated                      380     400     400     410     420     2400   2400   2400   2400   2400
0  2400   14
-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
(.venv) C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\CC Lab-2>
```

SS-7:

AFTER:

The Locust interface shows the following statistics after optimization:

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	116.34	4	2100	21138	0.7	0
Aggregated		19	0	5	2100	2100	116.34	4	2100	21138	0.7	0

```
[2026-01-29 15:17:16,369] LAPTOP-QRNI4MKI/INFO/locust.runners: All users spawned: {"EventsUser": 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\Lib\site-packages\gevent\_ffi\loop.py", line 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument
KeyboardInterrupt
2026-01-29T09:48:35Z
[2026-01-29 15:18:35,644] LAPTOP-QRNI4MKI/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%) | 116       3      2099      5 | 0.64     0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
                           Aggregated           19      0(0.00%) | 116       3      2099      5 | 0.64     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        5       7       7       9       18      2100     2100     2100     2100  2100
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
                           Aggregated           5       7       7       9       18      2100     2100     2100     2100  2100
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
0 2100   19
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
(.venv) C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\CC Lab-2>
```

SS-8:

BEFORE:

The Locust interface shows the following statistics before optimization:

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	16	0	120	2200	2200	255.44	108	2178	3144	0.5	0
Aggregated		16	0	120	2200	2200	255.44	108	2178	3144	0.5	0

localhost:8089

LOCUST

Host http://localhost:8000 Status CLEANUP RPS 0.7 Failures 0% EDIT STOP 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	18	0	5	2100	2100	121.66	3	2080	3144	0.7	0
	Aggregated	18	0	5	2100	2100	121.66	3	2080	3144	0.7	0

```
[2026-01-29 15:19:21,762] LAPTOP-QRNI4MKI/INFO/locust.main: Starting web interface at http://localhost:8089, press enter to open your default browser.
[2026-01-29 15:19:37,305] LAPTOP-QRNI4MKI/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2026-01-29 15:19:37,310] LAPTOP-QRNI4MKI/INFO/locust.runners: All users spawned: {'MyEventsUser': 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\Anirudh\Desktop\Sem 6\Cloud Computing\PES2UG23CS071\.venv\lib\site-packages\gevent\_ffi\loop.py", line 279, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2026-01-29T09:50:21Z
[2026-01-29 15:20:21,727] LAPTOP-QRNI4MKI/INFO/locust.main: Shutting down (exit code 0)
-----
```

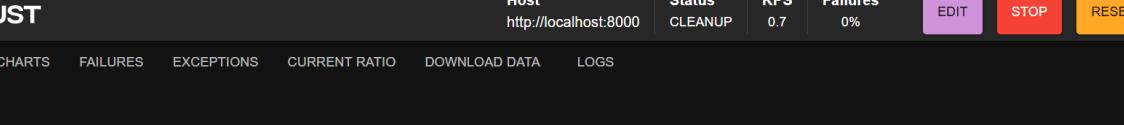
Type	Name	# reqs	# fails	Avg	Min	Max	Med	req/s	failures/s
GET	/my-events?user=locust_user	16	0(0.00%)	255	107	2178	120	0.57	0.00
	Aggregated	16	0(0.00%)	255	107	2178	120	0.57	0.00

Response time percentiles (approximated)

Type	Name	50%	66%	75%	80%	90%	95%	98%	99%	99.9%	99.99%
GET	/my-events?user=locust_user	130	140	150	150	160	2200	2200	2200	2200	220
	Aggregated	130	140	150	150	160	2200	2200	2200	2200	220

SS-9:

AFTER:



The screenshot shows the Locust UI interface. At the top, there's a header bar with the Locust logo, the URL 'localhost:8089', and several action buttons: 'EDIT' (purple), 'STOP' (red), and 'RESET' (orange). Below the header are tabs for 'STATISTICS' (selected), 'CHARTS', 'FAILURES', 'EXCEPTIONS', 'CURRENT RATIO', 'DOWNLOAD DATA', and 'LOGS'. The main content area displays a table of performance metrics for a 'GET' request to '/my-events?user=locust_user'. The table includes columns for Type, Name, # Requests, # Fails, Median (ms), 95%ile (ms), 99%ile (ms), Average (ms), Min (ms), Max (ms), Average size (bytes), Current RPS, and Current Failures/s. The data shows 18 requests, 0 fails, and an average response time of 2100 ms. A summary row at the bottom labeled 'Aggregated' provides the same summary statistics.

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	18	0	5	2100	2100	121.66	3	2080	3144	0.7	0
Aggregated												
		18	0	5	2100	2100	121.66	3	2080	3144	0.7	0

/events Route:

Performance Issue: Each time this route was accessed, the server executed a large loop that served no functional purpose. This caused unnecessary CPU usage and increased the page load time.

Modification: The redundant loop was removed so that the route now only retrieves event information from the database and renders the page.

Performance Benefit: By eliminating the extra processing, the server handles requests more efficiently, resulting in faster responses.

/my-events Route:

Performance Issue: This endpoint contained an artificial loop that iterated millions of times, introducing avoidable delays for every request.

Modification: The loop was removed, leaving only the essential database query and template rendering logic.

Performance Benefit: With unnecessary computations eliminated, the server responds quicker and the endpoint performs noticeably better.