



PES UNIVERSITY, BANGALORE  
Department of Computer Science and Engineering  
B. Tech (CSE) – 6th Semester – Jan-May 2025

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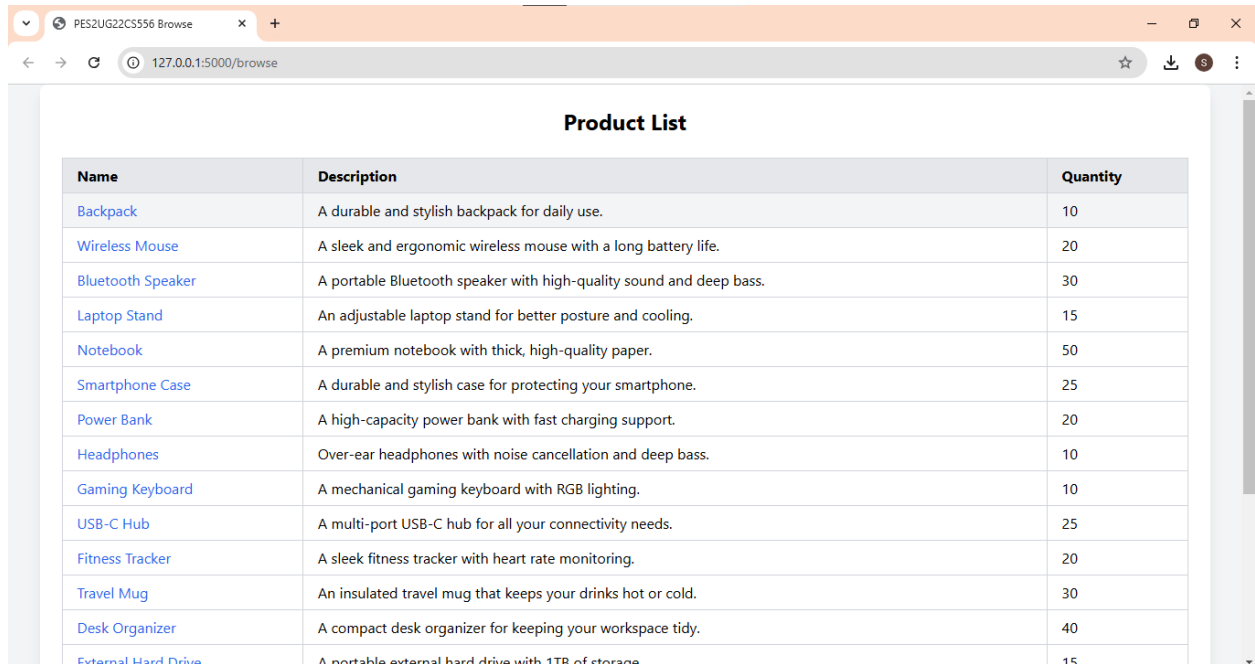
**UE22CS351B – Cloud Computing**  
**Lab Assignment 3**

PRACTICE OF DIFFERENT CC SERVICES  
**MONOLITH ARCHITECTURE SETUP**

**Siri N Shetty**  
**PES2UG22CS556**

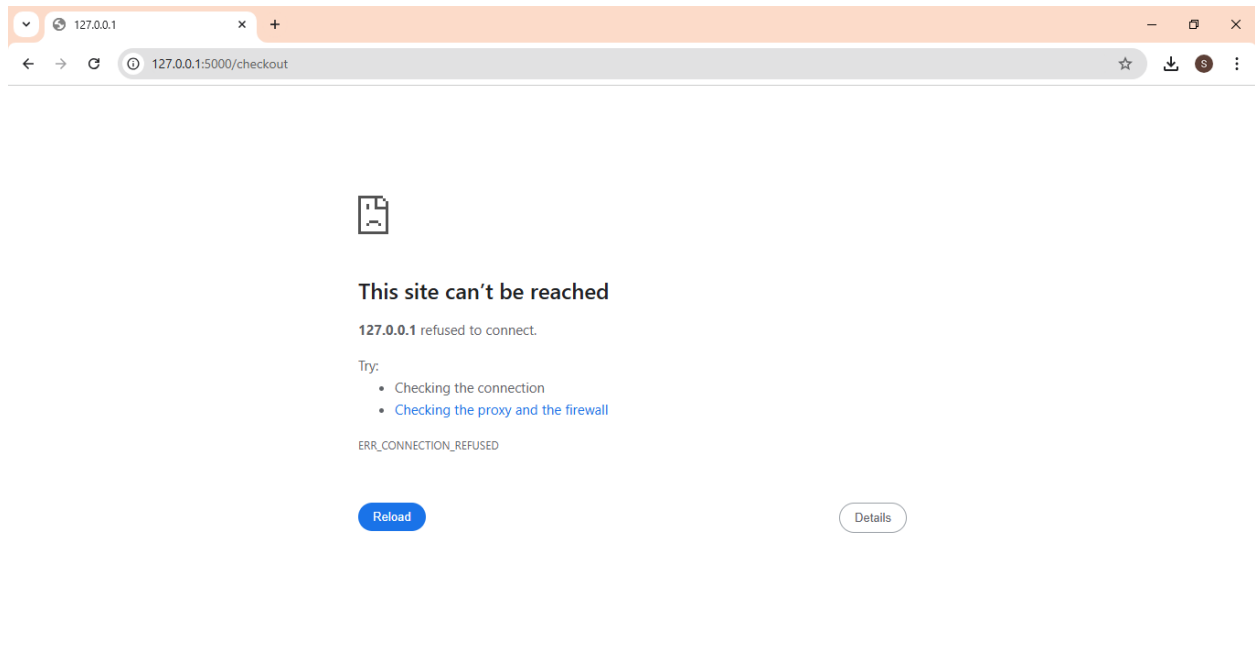
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## SS1 – On Final Setup

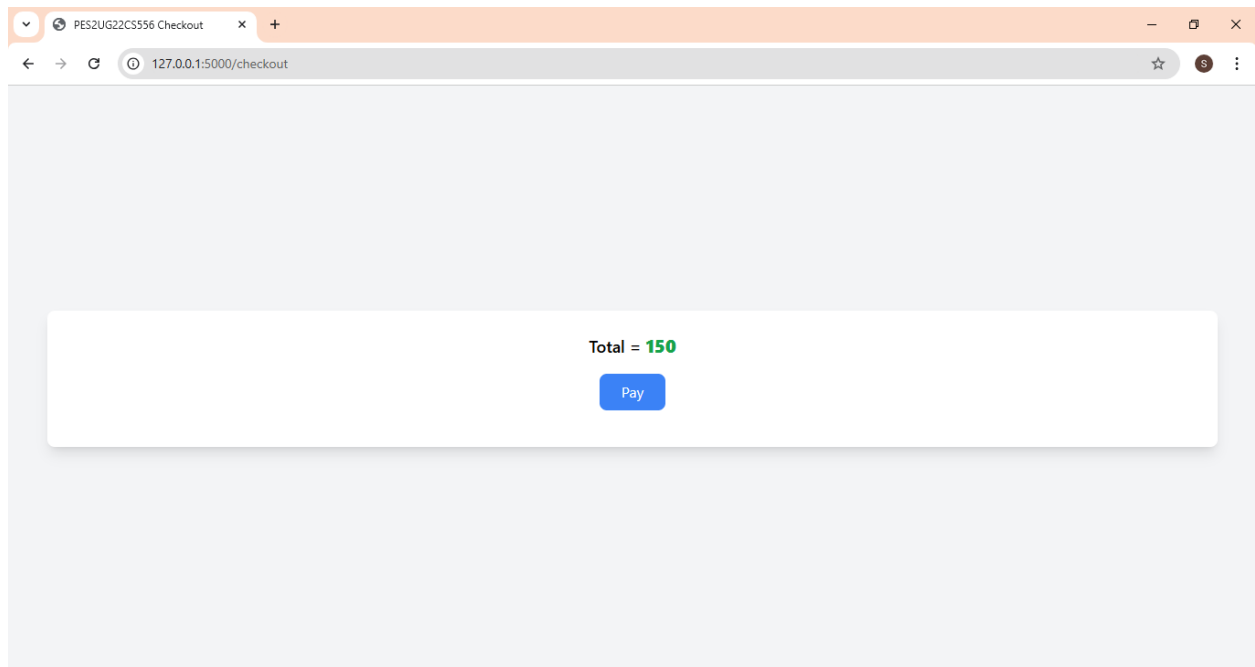


Name	Description	Quantity
<a href="#">Backpack</a>	A durable and stylish backpack for daily use.	10
<a href="#">Wireless Mouse</a>	A sleek and ergonomic wireless mouse with a long battery life.	20
<a href="#">Bluetooth Speaker</a>	A portable Bluetooth speaker with high-quality sound and deep bass.	30
<a href="#">Laptop Stand</a>	An adjustable laptop stand for better posture and cooling.	15
<a href="#">Notebook</a>	A premium notebook with thick, high-quality paper.	50
<a href="#">Smartphone Case</a>	A durable and stylish case for protecting your smartphone.	25
<a href="#">Power Bank</a>	A high-capacity power bank with fast charging support.	20
<a href="#">Headphones</a>	Over-ear headphones with noise cancellation and deep bass.	10
<a href="#">Gaming Keyboard</a>	A mechanical gaming keyboard with RGB lighting.	10
<a href="#">USB-C Hub</a>	A multi-port USB-C hub for all your connectivity needs.	25
<a href="#">Fitness Tracker</a>	A sleek fitness tracker with heart rate monitoring.	20
<a href="#">Travel Mug</a>	An insulated travel mug that keeps your drinks hot or cold.	30
<a href="#">Desk Organizer</a>	A compact desk organizer for keeping your workspace tidy.	40
<a href="#">External Hard Drive</a>	A portable external hard drive with 1TB of storage.	15

## SS2 – Error at checkout



## SS3 – After fixing the bug in /checkout/\_\_init\_\_.py



## SS4 – Before optimizing the /checkout route

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556> cd locust
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> locust -f checkout-locustfile.py
[2025-01-23 00:57:51,860] DESKTOP-F9UMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 00:57:51,861] DESKTOP-F9UMPJU/INFO/locust.main: Starting web interface at http://
localhost:8089 (accepting connections from all network interfaces)
[2025-01-23 00:59:35,593] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 1 users at a rate o
f 1.00 per second
[2025-01-23 00:59:39,683] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: {"checkout"
: 1} (1 total users)
[2025-01-23 01:01:22,926] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 2 users at a rate o
f 100.00 per second
[2025-01-23 01:01:26,991] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: {"checkout"
: 2} (2 total users)
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_che
python_check_callback
python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2025-01-22T19:32:38Z
[2025-01-23 01:02:38,496] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
Type      Name                                     # reqs      # fails |    Avg    Min    Max    Med |    r
M-----|-----|-----|-----|-----|-----|-----|-----|-----|
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in 2100 |
p-|    0.66    0.00
python_check_callback                                     -----|----
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

2100 |

KeyboardInterrupt
2025-01-22T19:32:38Z
[2025-01-23 01:02:38,496] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
```

```
[2025-01-23 01:02:38,496] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
Type      Name      # reqs      # fails      Avg      Min      Max      98%
Aggregated      120      0(0.00%)      2059      2027      2125

Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2025-01-22T19:32:38Z
[2025-01-23 01:02:38,496] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
Type      Name      # reqs      # fails      Avg      Min      Max      Med      req/s      failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET      /checkout      120      0(0.00%)      2059      2027      2125      2100      0.66      0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      120      0(0.00%)      2059      2027      2125      2100      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      /checkout      2100      2100      2100      2100      2100      2100      2100      2100      2100      2100      2100      120
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      2100      2100      2100      2100      2100      2100      2100      2100      2100      2100      2100      120

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust>
```

PE\$2UG22CS556 Checkout

Locust

localhost:8089

 **LOCUST**

HOST  
http://localhost:5000

STATUS  
RUNNING

USERS  
2


RPS  
1

FAILURES  
0%

EDIT

STOP

RESET



STATISTICSCHARTSFAILURESEXCEPTIONSCURRENT RATIODOWNLOAD DATALOGS

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	118	0	2100	2100	2100	2059.22	2028	2126	698	1	0
	Aggregated	118	0	2100	2100	2100	2059.22	2028	2126	698	1	0

## SS5 – After optimizing the /checkout route

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> locust -f checkout-locustfile.py
[2025-01-23 01:09:03,925] DESKTOP-F9UMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 01:09:03,925] DESKTOP-F9UMPJU/INFO/locust.main: Starting web interface at http://localhost:8089 (accepting connections from all network interfaces)
[2025-01-23 01:09:55,434] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2025-01-23 01:09:59,517] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: ("checkout": 1) (1 total users)
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2025-01-22T19:40:06Z
[2025-01-23 01:10:06,902] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
Type      Name      # reqs      # fails      Avg      Min      Max      Med      req/s      failures/s
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET      /checkout      3      0(0.00%)      2051      2041      2063      2041      0.29      0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      3      0(0.00%)      2051      2041      2063      2041      0.29      0.00
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
2041      2063      2041      0.29      0.00

Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%      99.99%      100%      # reqs
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
GET      /checkout      2000      2000      2100      2100      2100      2100      2100      2100      2100      2100      2100      3
-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated      2000      2000      2100      2100      2100      2100      2100      2100      2100      2100      2100      3

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust>
```

[illegible]

```

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> locust -f get-cart-locustfile.py
[2025-01-23 01:16:19,252] DESKTOP-F9UMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 01:16:19,253] DESKTOP-F9UMPJU/INFO/locust.main: Starting web interface at http://localhost:8089 (accepting connections from all
network interfaces)
[2025-01-23 01:16:31,670] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2025-01-23 01:16:35,739] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: {'add_to_cart': 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2025-01-22T19:46:43Z
[2025-01-23 01:16:43,556] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)

Type      Name      # reqs      # fails      Avg      Min      Max      Med      req/s      failures/s-----|-----
-|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
1          0(0.00%) | 4056      4056      4056      4056 | 0.12      0.00-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
Aggregated                                     1          0(0.00%) | 4056
4056      4056      4056 | 0.12      0.00
Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%      99.99%      100% # reqs
GET        /cart      4100      4100      4100      4100      4100      4100      4100      4100      4100      4100      4100 1
Aggregated 4100      4100      4100      4100      4100      4100      4100      4100      4100      4100      4100 1

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust>

```

### Optimized code

```

19 def get_cart(username: str) -> list:
20     cart_details = dao.get_cart(username)
21     if cart_details is None:
22         return []
23
24     items = [item for cart_detail in cart_details for item in json.loads(cart_detail['contents'])]
25
26     # Retrieve all products in a batch if supported
27     return [products.get_product(i) for i in items]
28
29 # PES2UG22CS556

```

## SS7 – After optimizing the /cart route

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> locust -f get-cart-locustfile.py
[2025-01-23 01:19:26,165] DESKTOP-F9LUMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 01:19:26,167] DESKTOP-F9LUMPJU/INFO/locust.main: Starting web interface at http://localhost:8089 (accepting connections from all network interfaces)
[2025-01-23 01:19:43,524] DESKTOP-F9LUMPJU/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2025-01-23 01:19:47,596] DESKTOP-F9LUMPJU/INFO/locust.runners: All users spawned: {"add_to_cart": 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument
KeyboardInterrupt
2025-01-22T19:49:56Z
[2025-01-23 01:19:56,580] DESKTOP-F9LUMPJU/INFO/locust.main: Shutting down (exit code 0)

Type      Name      # reqs      # fails      Avg      Min      Max      Med      req/s      failures/s
-----
GET        /cart      2            0(0.00%)     4062     4051     4072     4072     0.16      0.00
-----
Aggregated 2            0(0.00%)     4062     4051     4072     4072     0.16      0.00
-----

Response time percentiles (approximated)
Type      Name      50%      66%      75%      80%      90%      95%      98%      99%      99.9%  99.99%  100% # reqs
-----
GET        /cart      4100     4100     4100     4100     4100     4100     4100     4100     4100     4100     4100  2
-----
Aggregated 4100     4100     4100     4100     4100     4100     4100     4100     4100     4100     4100  2
-----

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> 
```

The screenshot shows the Locust web interface. The top navigation bar is green with the Locust logo on the left and buttons for EDIT, STOP, and RESET on the right. The main content area has a green header with the following information: HOST: http://localhost:5000, STATUS: RUNNING, USERS: 1, RPS: 0, FAILURES: 0%. Below the header, there are tabs for STATISTICS, CHARTS, FAILURES, EXCEPTIONS, CURRENT RATIO, DOWNLOAD DATA, and LOGS. The CURRENT RATIO tab is selected. Below the tabs, there is a table with 13 columns: 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 table contains two rows: one for the /cart endpoint and one for the Aggregated row.

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	/cart	1	0	4072.96	4100	4100	4072.96	4073	4073	1467	0	0
	Aggregated	1	0	4072.96	4100	4100	4072.96	4073	4073	1467	0	0

## SS8 – Before optimizing the /browse route

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> locust -f browse-locustfile.py
[2025-01-23 01:26:30,492] DESKTOP-F9UMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 01:26:30,493] DESKTOP-F9UMPJU/INFO/locust.main: Starting web interface at http://localhost:8089 (accepting connections from all network interfaces)
[2025-01-23 01:26:49,149] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2025-01-23 01:26:49,151] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: {"browse": 1} (1 total users)
Traceback (most recent call last):
  File "c:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffi\loop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument

KeyboardInterrupt
2025-01-22T19:56:58Z
[2025-01-23 01:26:58,640] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)

Type      Name      # reqs      # fails      Avg      Min      Max      Med      req/s      failures/s
-----
GET      /browse      4      0(0.00%)      2035      2029      2050      2029      0.49      0.00
Aggregated      4      0(0.00%)      2035      2029      2050      2029      0.49      0.00

Response time percentiles (approximated)
Type      Name      %      100% # reqs      50%      66%      75%      80%      90%      95%      98%      99%      99.9%      99.99
-----
GET      /browse      0      2100      4      2000      2000      2100      2100      2100      2100      2100      2100      210
Aggregated      0      2100      4      2000      2000      2100      2100      2100      2100      2100      2100      210

PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust>
```

LOCUST		HOST	STATUS	USERS	RPS	FAILURES						
		http://localhost:5000	RUNNING	1	0	0%						
		<div>EDITSTOPRESET</div>										
<div>STATISTICSCHARTSFAILURESEXCEPTIONSCURRENT RATIODOWNLOAD DATALOGS</div>												
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	/browse	2	0	2032.8	2100	2100	2041.58	2033	2050	9534	0	0
	Aggregated	2	0	2032.8	2100	2100	2041.58	2033	2050	9534	0	0

## Optimized code

```
def list_products() -> list[Product]:
    products = dao.list_products()
    return [Product.load(product) for product in dao.list_products()]

# PES2UG22CS556
```

## SS9 – After optimizing the /browse route

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust> python -f browse-locustfile.py
[2025-01-23 01:28:14,607] DESKTOP-F9UMPJU/INFO/locust.main: Starting Locust 2.32.6
[2025-01-23 01:28:14,608] DESKTOP-F9UMPJU/INFO/locust.main: Starting web interface at http://localhost:8089 (accepting connections from all network interfaces)
[2025-01-23 01:28:26,169] DESKTOP-F9UMPJU/INFO/locust.runners: Ramping to 1 users at a rate of 1.00 per second
[2025-01-23 01:28:26,175] DESKTOP-F9UMPJU/INFO/locust.runners: All users spawned: {'browse': 1} (1 total users)
Traceback (most recent call last):
  File "C:\Users\SIRI\AppData\Local\Programs\Python\Python311\Lib\site-packages\gevent\_ffiloop.py", line 270, in python_check_callback
    def python_check_callback(self, watcher_ptr): # pylint:disable=unused-argument
KeyboardInterrupt
2025-01-22T19:58:31Z
[2025-01-23 01:28:31,678] DESKTOP-F9UMPJU/INFO/locust.main: Shutting down (exit code 0)
```

Type	Name		# reqs	# fails	Avg	Min	Max	Med	req/s	failures/s
	/browse	2	0(0.00%)	2043	2035	2051	2035	0.49	0.00	
	Aggregated								2	0(0.00)

(%) | 2043    2035    2051    2035    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	/browse	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2
	Aggregated	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2100	2

```
PS D:\Semester6\CC\Lab\Lab3\PES2UG22CS556\locust>
```

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	/browse	1	0	2035.42	2000	2000	2035.42	2035	2035	9534	0	0
	Aggregated	1	0	2035.42	2000	2000	2035.42	2035	2035	9534	0	0