

GREEN-CART

- Sustainable Actions for a Better Tomorrow

What is Green-Cart?



- GreenCart is a sustainable shopping platform that helps customers make eco-friendly choices by showing clear eco-ratings, carbon footprint insights, and sustainability metrics for every product. It benefits shoppers by promoting transparency and greener living, while helping retailers boost trust and sales through real-time performance tracking.



Vision

A world where every purchase supports a greener planet, driving conscious consumerism and sustainable growth for future generations.

Our Vision and Mission

Mission

To empower consumers and retailers with transparent sustainability insights, making eco-friendly shopping simple, convenient, and impactful.



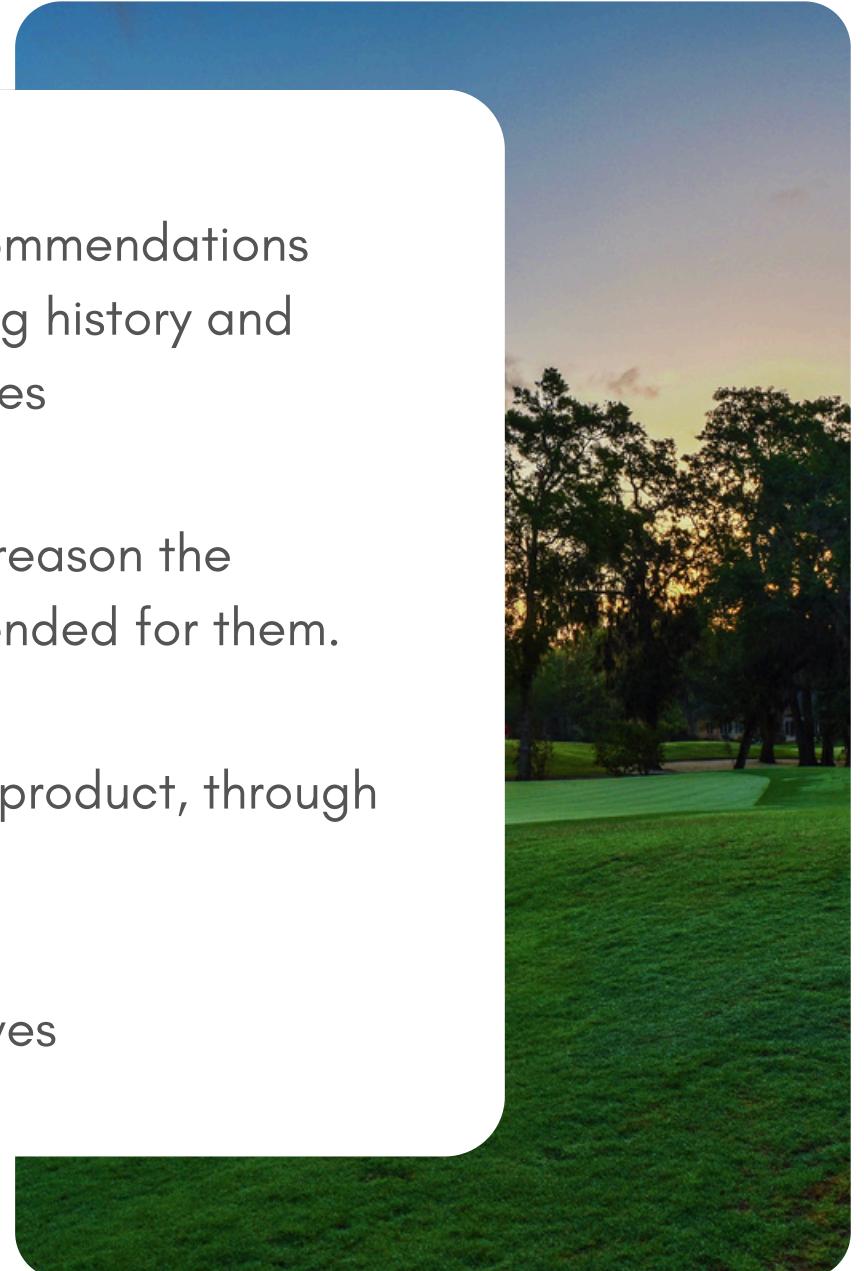
Wow factors of Green-Cart

Recommendation System

GreenCart helps you discover the right products for your lifestyle by offering personalized, eco-conscious suggestions tailored to your shopping habits.



- Get personalised recommendations based of your shopping history and sustainability preferences
- Gives the customer a reason the product was recommended for them.
- Further breakdown of product, through sustainability analysis.
- Recommend alternatives



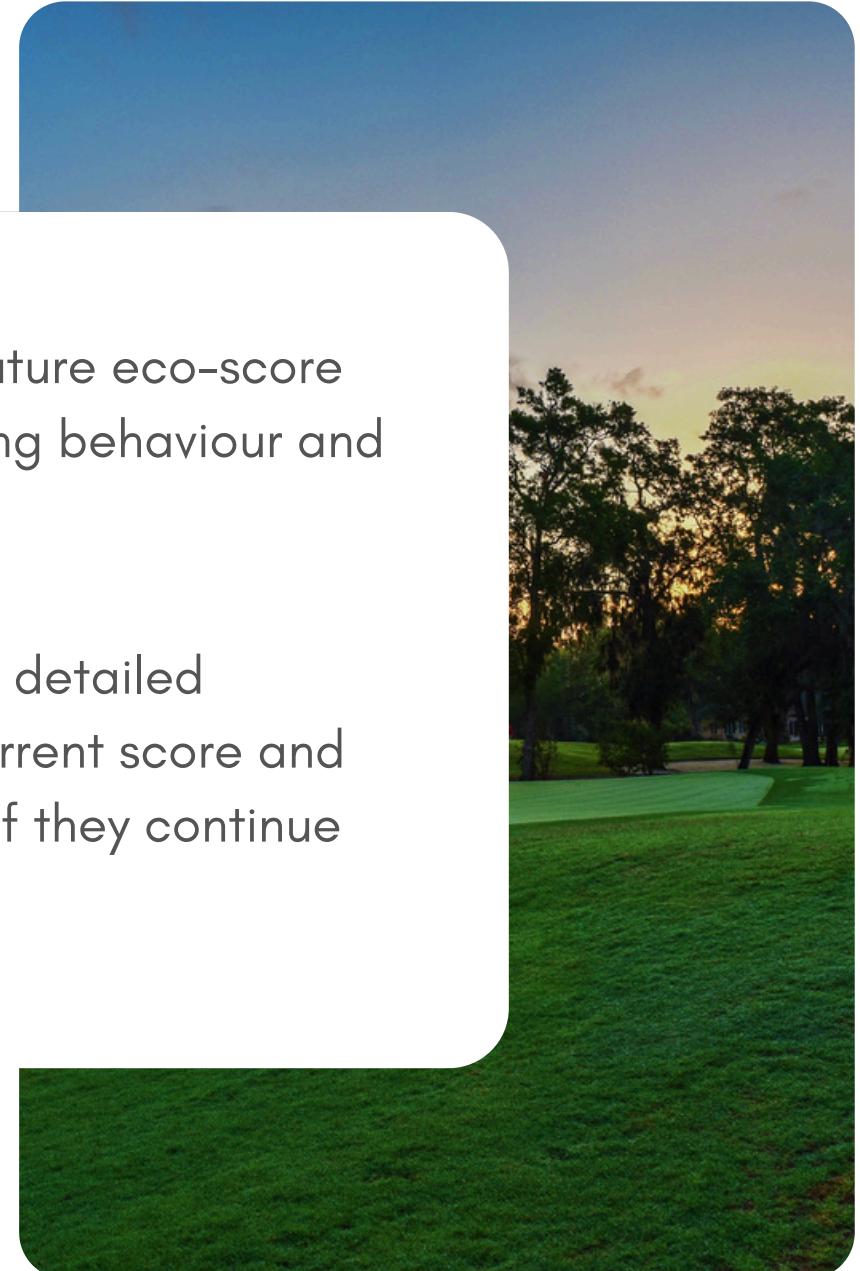
Wow factors of Green-Cart

Forecasting

Plan ahead with insights into your future eco-impact — GreenCart predicts how your shopping choices today shape your sustainability score tomorrow.



- Get an idea of your future eco-score based on your shopping behaviour and purchases.
- Shows the customer a detailed breakdown of their current score and their predicted score if they continue their habits.



LIVE-DEMO



Scan Me Please :)

Diagrams:

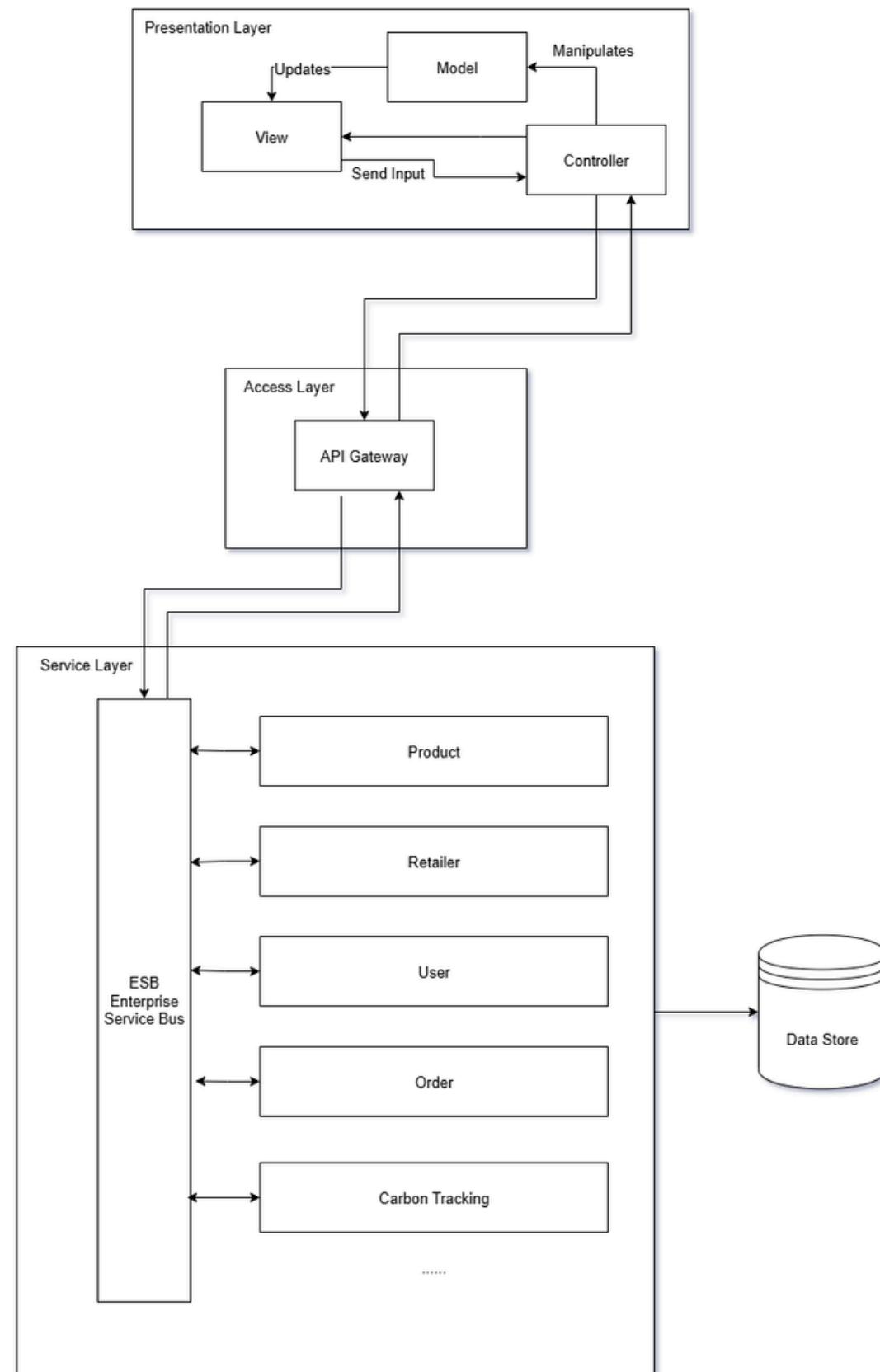
Architectural Diagram

Layered Design – divided into three main layers (Presentation, Access, and Service) to ensure modularity and separation of concerns.

MVC Pattern – The View, Model, and Controller work together to handle user input, update data, and present results.

Service-Oriented – Organized into independent services – enabling scalability and flexibility.

Data Store – All services connect to a shared data store, ensuring consistent and reliable data management.



Diagrams:

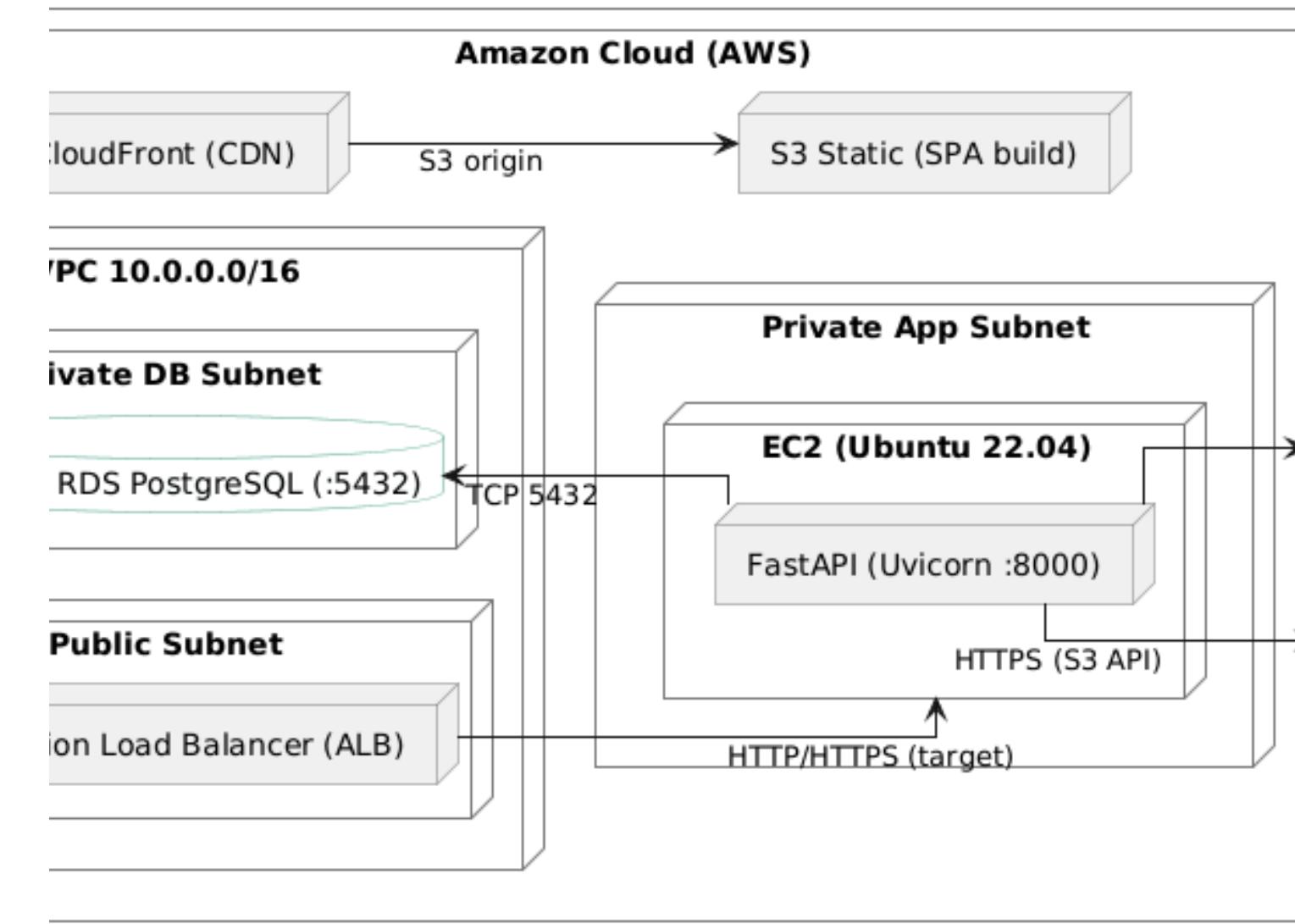
Deployment Model

Content Delivery – CloudFront CDN provides global content distribution with S3 static hosting for optimized frontend performance and reduced latency

Load Balancing – Application Load Balancer in public subnet distributes traffic across application instances for high availability

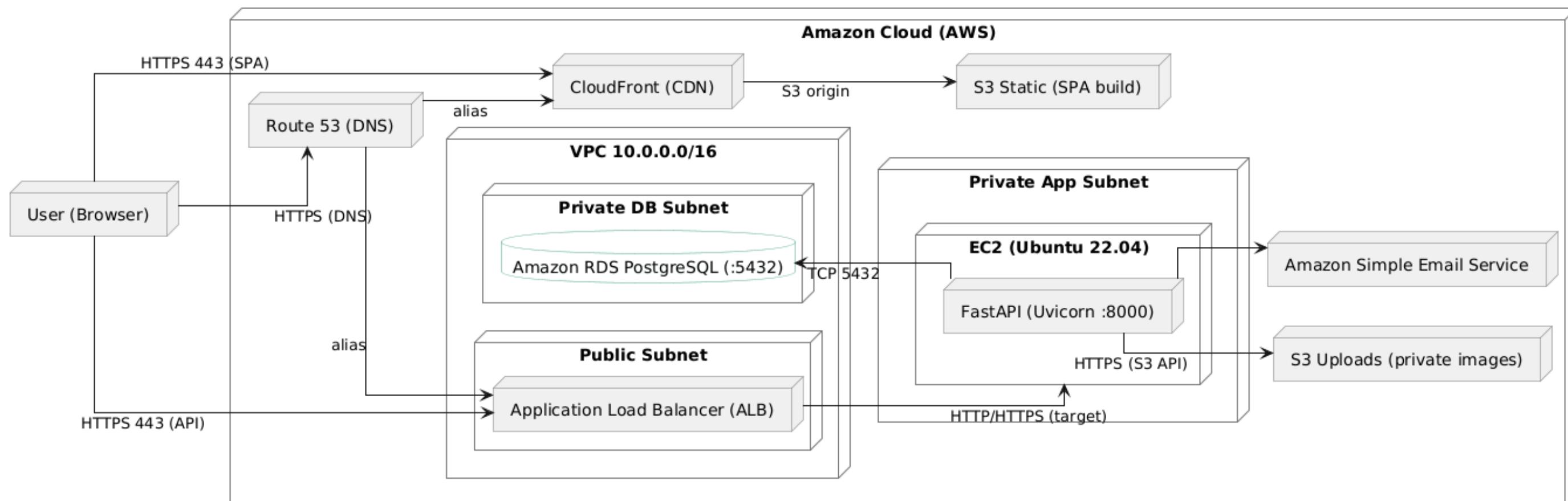
Scalable Backend – FastAPI application on Ubuntu EC2 instance handles business logic with secure database connections via private networking (port 5432)

Integrated Services – Complete ecosystem includes email notifications (SES), image storage (S3), and DNS routing (Route 53) for full application functionality



Diagrams:

Deployment Model





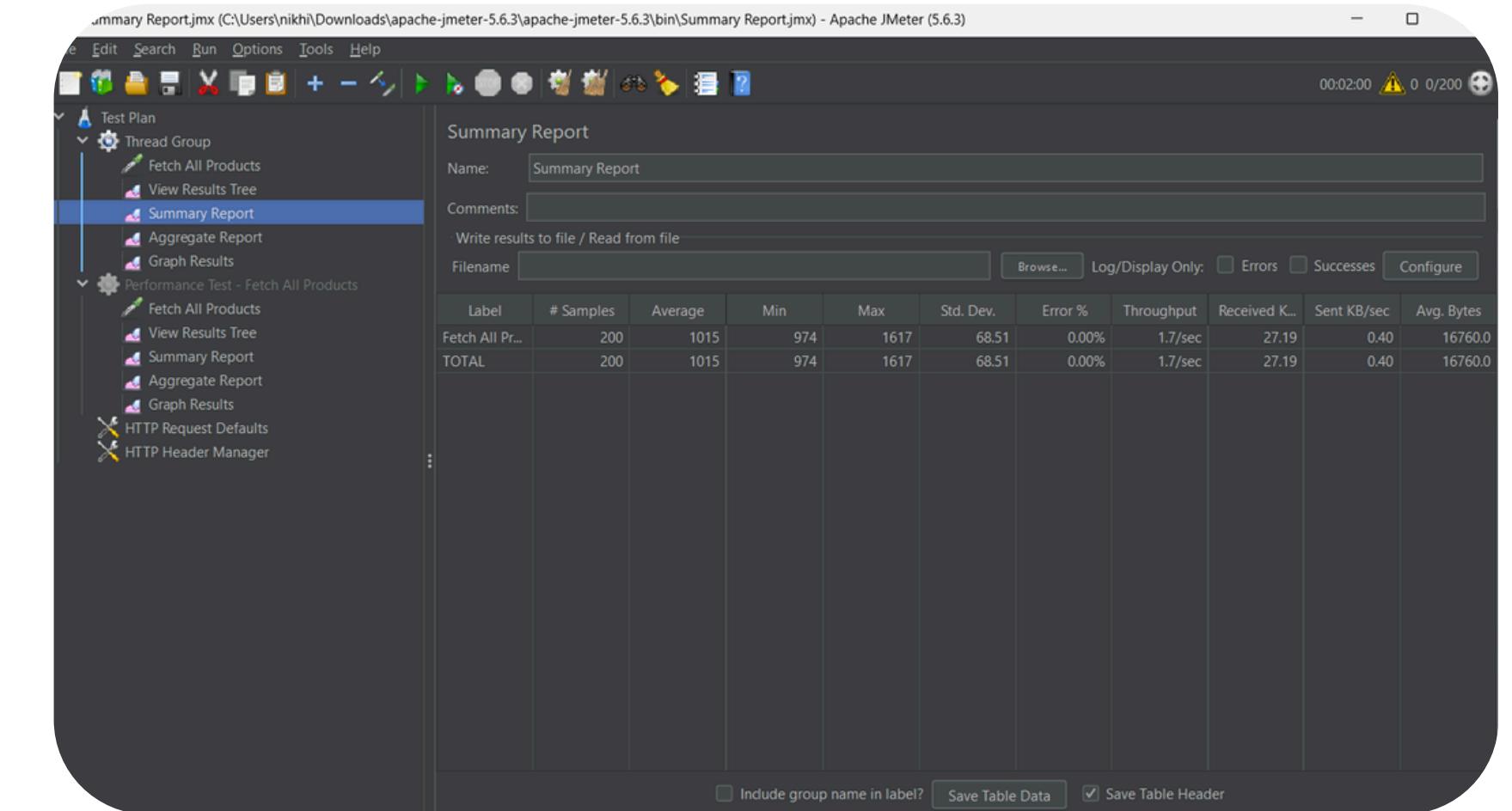
Testing: Scalability

Load Capacity - Successfully handled 200 concurrent requests on Fetch All Products endpoint

Response Performance - Average 1015ms response time (974ms min, 1617ms max)

Reliability - 0% error rate - all 200 requests processed successfully

Throughput - Achieved 1.7 requests/second with steady 27.19 KB/sec data transfer



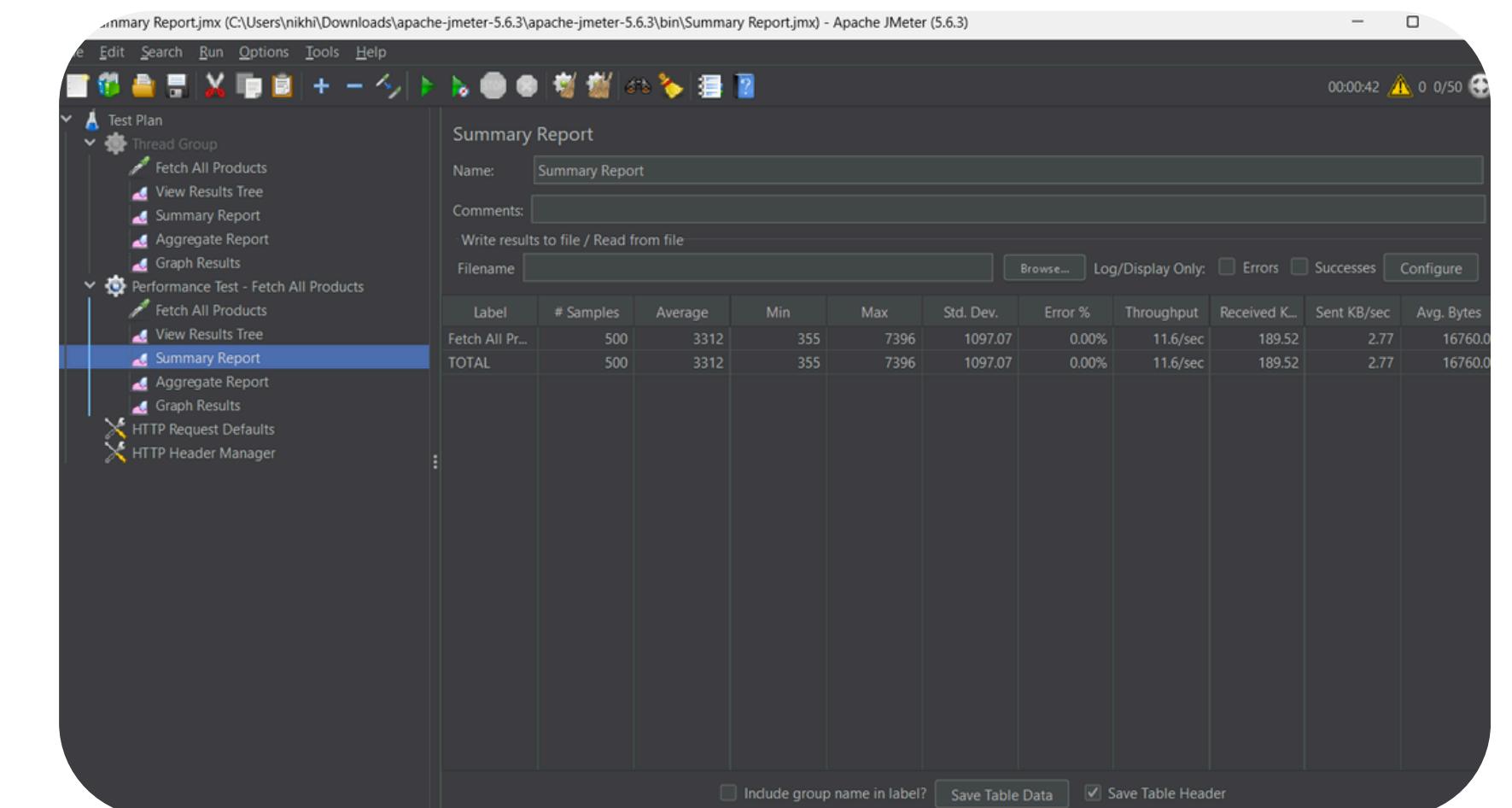
Testing: Performance

Test Load - 50 concurrent users, 10 requests each (500 total samples)

Response Times - Average 3312ms (355ms min, 7396ms max) - exceeded 1.5s target threshold

Throughput - Achieved 11.6 requests/second with 189.52 KB/sec data transfer

Optimization - Performance exceeds target, indicating overall system efficiency





Unit Testing:

```
84 unit-tests/test_user.py::TestUserBusinessLogic::test_phone_number_validation PASSED [ 93%]
85 unit-tests/test_user.py::TestUserBusinessLogic::test_email_validation_regex PASSED [ 94%]
86 unit-tests/test_user.py::TestUserBusinessLogic::test_user_profile_completeness PASSED [ 94%]
87 unit-tests/test_user.py::TestUserDataValidation::test_uuid_generation_and_validation PASSED [ 95%]
88 unit-tests/test_user.py::TestUserDataValidation::test_password_strength_validation PASSED [ 96%]
89 unit-tests/test_user.py::TestUserDataValidation::test_date_validation PASSED [ 96%]
90 unit-tests/test_user.py::TestUserServiceMocks::test_create_user_service_mock PASSED [ 97%]
91 unit-tests/test_user.py::TestUserServiceMocks::test_get_user_by_email_mock PASSED [ 98%]
92 unit-tests/test_user.py::TestUserUtilityFunctions::test_sanitize_user_input PASSED [ 98%]
93 unit-tests/test_user.py::TestUserUtilityFunctions::test_format_phone_number PASSED [ 99%]
94 unit-tests/test_user.py::TestUserUtilityFunctions::test_mask_sensitive_data PASSED [100%]

95
96 ===== warnings summary =====
97 venv/lib/python3.13/site-packages/pydantic/_internal/_config.py:373
98     /home/runner/work/Green-Cart/Green-Cart/venv/lib/python3.13/site-packages/pydantic/_internal/_config.py:373: UserWarning: Valid config keys have changed in V2:
99     * 'schema_extra' has been renamed to 'json_schema_extra'
100    warnings.warn(message, UserWarning)

101 venv/lib/python3.13/site-packages/pydantic/_internal/_config.py:373
102     /home/runner/work/Green-Cart/Green-Cart/venv/lib/python3.13/site-packages/pydantic/_internal/_config.py:373: UserWarning: Valid config keys have changed in V2:
103     * 'orm_mode' has been renamed to 'from_attributes'
104    warnings.warn(message, UserWarning)

105
106 -- Docs: https://docs.pytest.org/en/stable/how-to/capture-warnings.html
107 ===== 155 passed, 2 warnings in 1.32s =====
108 Stopping Uvicorn server...
109 INFO: Shutting down
110 INFO: Waiting for application shutdown.
111 INFO: Application shutdown complete.
112 INFO: Finished server process [2275]
```

Integration Testing:

```
184 integration-tests/test_sustainability.py::TestSustainabilityValidation::test_sustainability_invalid_product_id_type PASSED [ 86%]
185 integration-tests/test_sustainability.py::TestSustainabilityValidation::test_sustainability_invalid_type_format PASSED [ 86%]
186 integration-tests/test_sustainability.py::TestSustainabilityValidation::test_sustainability_negative_product_id PASSED [ 87%]
187 integration-tests/test_sustainability.py::TestSustainabilityValidation::test_sustainability_zero_product_id PASSED [ 87%]
188 integration-tests/test_sustainability.py::TestSustainabilityPerformance::test_sustainability_large_number_of_types PASSED [ 88%]
189 integration-tests/test_sustainability.py::TestSustainabilityPerformance::test_sustainability_concurrent_requests PASSED [ 89%]
190 integration-tests/test_sustainability.py::test_fetch_sustainability_ratings PASSED [ 89%]
191 integration-tests/test_users.py::TestUserIntegration::test_01_user_signup_success PASSED [ 90%]
192 integration-tests/test_users.py::TestUserIntegration::test_02_user_signup_duplicate_email PASSED [ 90%]
193 integration-tests/test_users.py::TestUserIntegration::test_03_user_signin_success PASSED [ 91%]
194 integration-tests/test_users.py::TestUserIntegration::test_04_user_signin_wrong_password PASSED [ 91%]
195 integration-tests/test_users.py::TestUserIntegration::test_05_user_signin_nonexistent_email PASSED [ 92%]
196 integration-tests/test_users.py::TestUserIntegration::test_06_get_user_information PASSED [ 92%]
197 integration-tests/test_users.py::TestUserIntegration::test_07_get_user_information_invalid_id PASSED [ 93%]
198 integration-tests/test_users.py::TestUserIntegration::test_08_set_user_information PASSED [ 93%]
199 integration-tests/test_users.py::TestUserIntegration::test_09_user_address_operations PASSED [ 94%]
200 integration-tests/test_users.py::TestUserValidation::test_signup_invalid_email PASSED [ 94%]
201 integration-tests/test_users.py::TestUserValidation::test_signup_missing_fields PASSED [ 95%]
202 integration-tests/test_users.py::TestUserValidation::test_signup_empty_password PASSED [ 95%]
203 integration-tests/test_users.py::TestUserValidation::test_signup_short_password PASSED [ 96%]
204 integration-tests/test_users.py::TestUserValidation::test_signin_invalid_email_format PASSED [ 96%]
205 integration-tests/test_users.py::TestUserValidation::test_signin_empty_credentials PASSED [ 97%]
206 integration-tests/test_users.py::TestUserSecurity::test_password_not_returned_in_response PASSED [ 97%]
207 integration-tests/test_users.py::TestUserSecurity::test_user_id_format PASSED [ 98%]
208 integration-tests/test_users.py::test_signup_status_code PASSED [ 98%]
209 integration-tests/test_users.py::test_signin_status_code PASSED [ 99%]
210 integration-tests/test_users.py::test_user_validation PASSED [100%]
211
212 ===== 191 passed in 17.67s =====
```



Testing: Usability

Overall Score - 8.4/10 average usability score - exceeds 7/10 benchmark

Task Completion - 100% success rate - all participants completed assigned user journeys

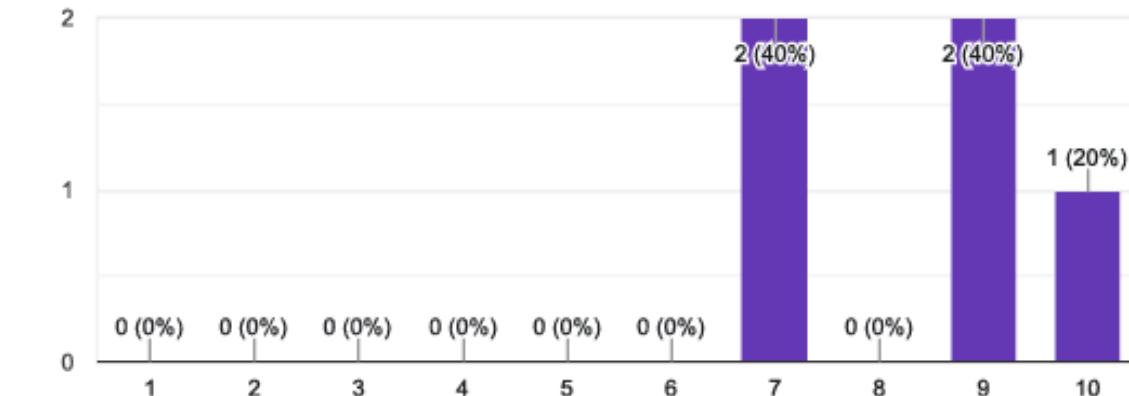
Top Performers - Adding to cart (9/10) and registration/login (8.5/10) rated highest

User Journey Coverage - Tested registration, login, product search, viewing details, cart, and checkout

Browse Products

How easy was it to view and navigate through the product listings?

5 responses

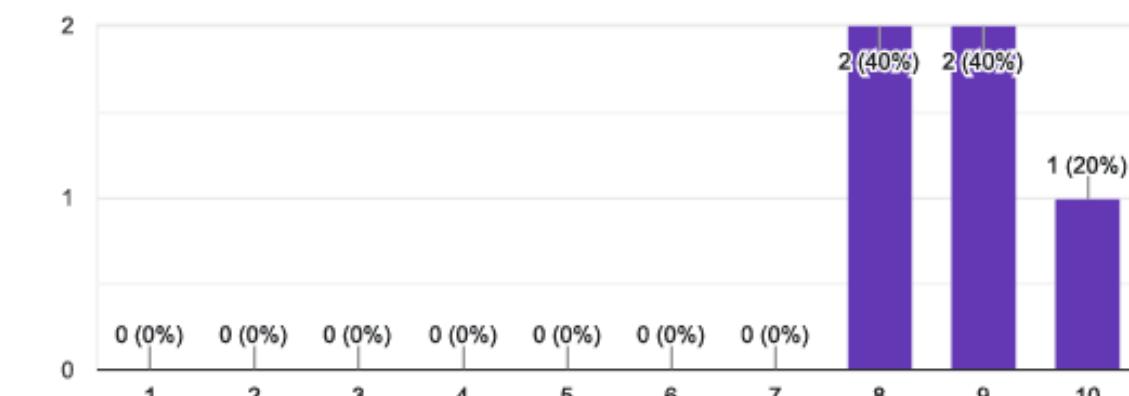


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Search for a Product

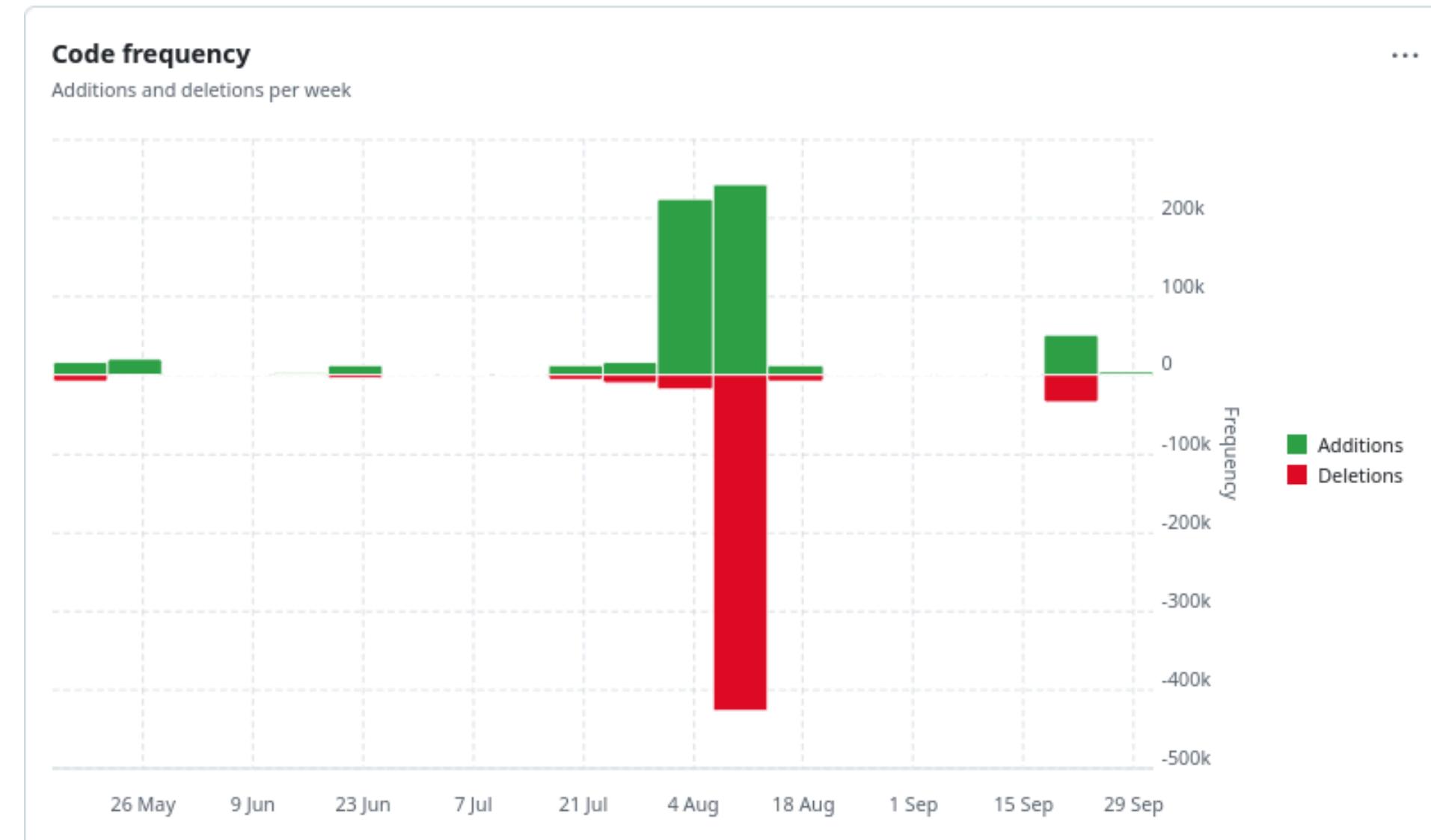
How easy was it to find a product using the search function (e.g., search for "lego")?

5 responses



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Team Management



Major Development Sprint:

- Significant coding activity occurred in mid-August
- over 200k lines of code added
- indicating a major feature implementation

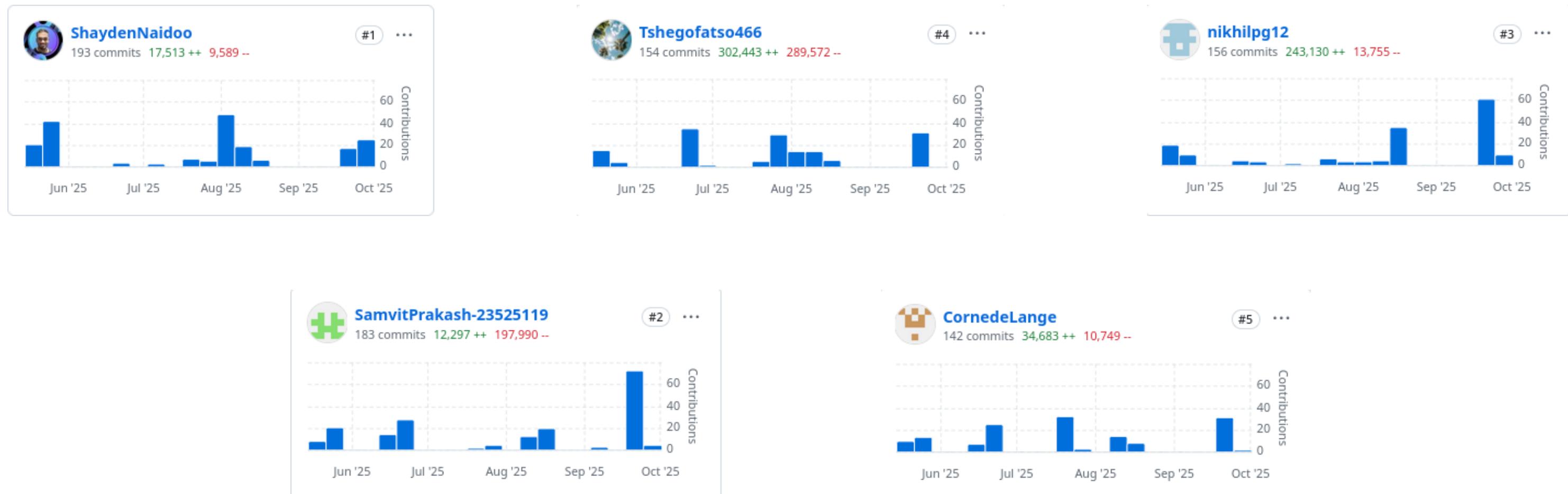
Consistent Maintenance:

- Regular small additions throughout May-July and September
- ongoing maintenance, bug fixes, and minor feature development

Project Maturation:

- Recent activity (September)
- shows stabilized development with moderate additions and minimal deletions
- indicating the project completion and maintenance phase

Project Management: GitHub Contributions



Project Management: GitHub Actions

Actions Performance Metrics

Showing data from 01/09/2024 to 37 minutes ago

Period: Last year ▾

Avg job run time
48s

Average run time of jobs in this organization for last year

Avg job queue time
5s

Average queue time of jobs in this organization for last year

Job failure rate
26%

Failure rate across jobs in this organization for last year

Failed job usage
393

Total minutes used across failed jobs in this organization for last year

Actions Performance Metrics:

- **Automated Quality Control:** 26% failure rate shows the CI/CD pipeline is effectively catching issues and preventing problematic code from reaching production
- **Efficient Processing:** Average job run time of 48s with only 5s queue time shows good pipeline performance when jobs do execute successfully

Actions Usage Metrics

Showing data from 01/09/2024 to 36 minutes ago

Period: Last year ▾

Total minutes
1,475

Total minutes across all workflows in this organization for last year

Total job runs
1,020

Total job runs across all workflows in this organization for last year

Actions Usage Metrics:

- **Active Development:** 1,020 total job runs over the year demonstrates consistent CI/CD usage and active development workflow
- **Resource Investment:** 1,475 total minutes (approximately 24.5 hours) represents substantial automated testing and deployment activity across the project lifecycle

Meet the Team



○ Nikhil Govender

- Oversee project timeline, milestones, and deliverable deadlines.
- Assign tasks, manage workloads, and ensure team members have necessary resources and support



○ Shayden Naidoo

- Set up and maintain test environments, servers, and cloud resources for testing.
- Analyze system bottlenecks identified during testing and implement infrastructure improvements



○ Samvit Prakash

- Configure monitoring tools to track system performance, error rates, and resource utilization across the project.
- Troubleshoot and resolve infrastructure issues that arise during the project.



○ Tshegofatso Mahlase

- Build and maintain user interface components for registration, login, product search, features
- Implement, transformation, and loading processes for Administration



○ Corne de Lange

- Ensure consistent functionality and appearance across different browsers and devices
- Implement design improvements based on usability feedback.

Thank You!