DESIGN

SENG 401 - L01

Group: 18

Date: 2025-03-21

Team Members

Hanna Cho

Back-End Dev

BSc. Software Engineering

30179494

hanna.cho@ucalgary.ca

Ramisa Islam

Back-End Dev

BSc. Software Engineering

30170297

ramisa.islam@ucalgary.ca

Nic Boilard

Front-End Dev

BSc. Software Engineering

30111842

nicole.boiard@ucalgary.ca

Sarah Yip

Front-End Dev

BSc. Software Eng. | Minor: Aerospace Eng.

30174831

sarah.yip2@ucalgary.ca

Oliver Molina

Back-End Dev

BSc. Software Eng. | Minor: Mechatronics Eng.

30114995

oliver.molina@ucalgary.ca

Sofia Tapias Montaña

Front-End Dev

BSc. Software Engineering

30171767

sofia.topiasmontana@ucalgary.ca

TABLE OF CONTENTS

TABLE OF FIGURES

1 Architecture: Layered

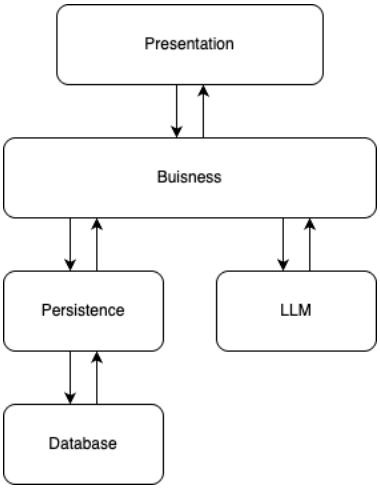

Figure 1: D-002 Layered Architecture Diagram

1.1 Presentation Later

(1) The front end handles user interactions and presents the application's UI.

(2) Communicates with the backend via APIs.

(3) Technologies: React for dynamic user interfaces.

1.2 Business Layer

(1) Processes business logic and handles requests from the front end.

(2) Manages data flow between the presentation layer and database layer.

(3) Manages data flow between the presentation layer and the LLM layer.

1.3 Persistence Layer

(1) Manages data flow between the business layer and the database layer.

1.4 Database Layer

(1) Stores and retrieves persistent data for the application.

(2) Technologies: PostgreSQL for relational data management.

1.5 LLM Layer

(1) Processes data input by the user and returns an output.

(2) Technologies: Gemini-2.0-flash

2 Application of SOLID Principles

2.1 Single Responsibility Principles (SRP)

(1) Each class and component will have a single responsibility, ensuring better maintainability and separation of concerns.

(a) The User class will handle user-related attributes and profile management, while the UserAuthentication class will handle authentication logic.

2.2 Open/Closed Principle (OCP)

(1) Classes will be open for extension but closed for modification, ensuring new functionality can be added without altering existing code.

(a) New types of users (e.g., AdminUser and GuestUser) will be implemented by extending the User base class. This will ensure that UserService interacts with the User class through an abstract interface rather than modifying its logic for each new type.

2.3 Dependency Inversion

(1) High-level modules should not depend on low-level modules; both should depend on abstraction.

(a) The database connection will be managed through abstraction, ensuring the application is not tightly coupled to a specific database implementation. A singleton instance will maintain a single database connection throughout the application, reducing redundant connections and improving efficiency.

(b) LLM integration uses abstraction (a wrapper) instead of directly coupling to the LLM. The wrapper is initiated using a Builder Pattern, allowing flexible configuration while maintaining separation between the application and external dependencies.

3 UML Diagrams

3.1 Sequence Diagrams

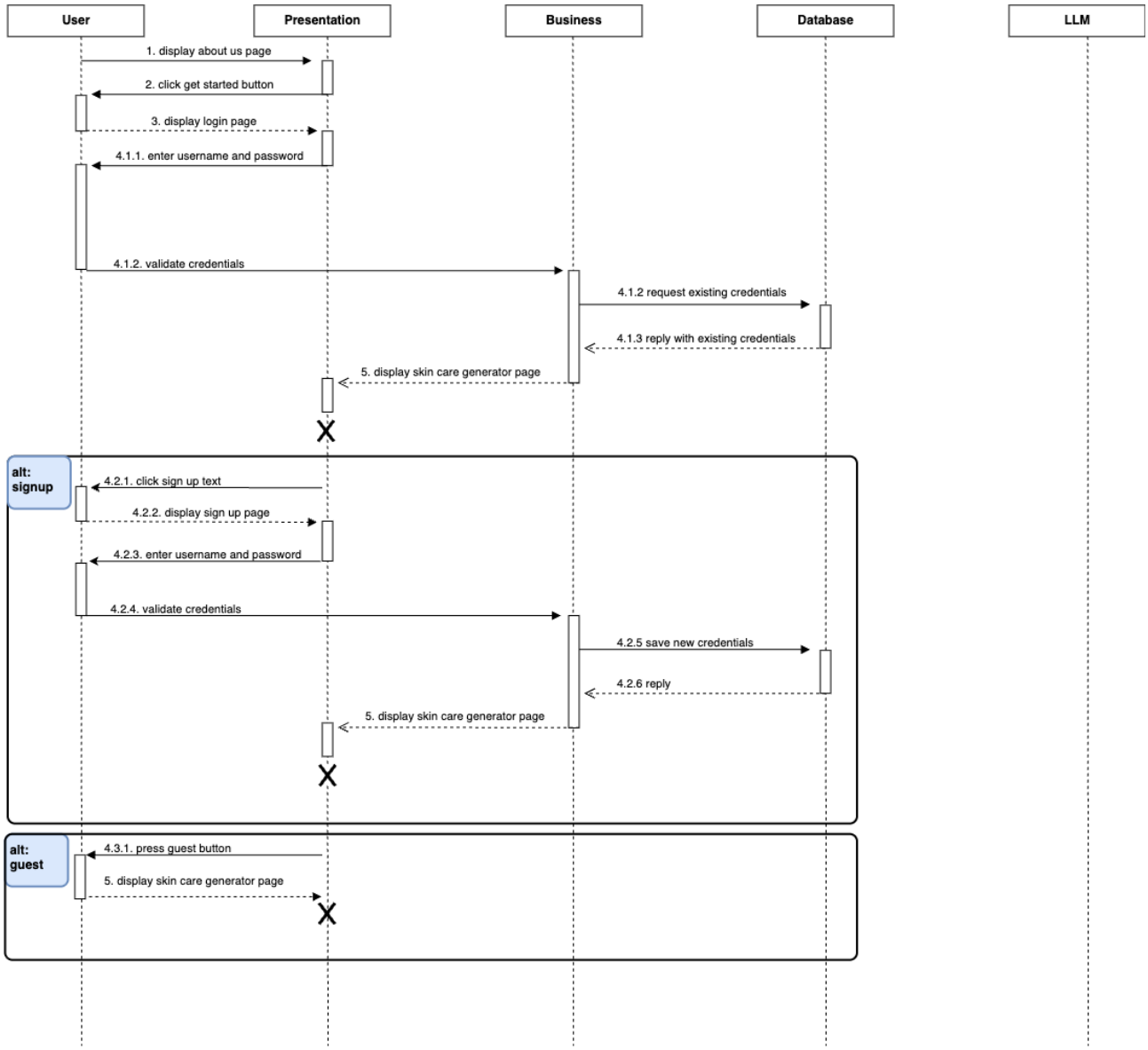

Figure 2: D-003 Credentials Sequence Diagram

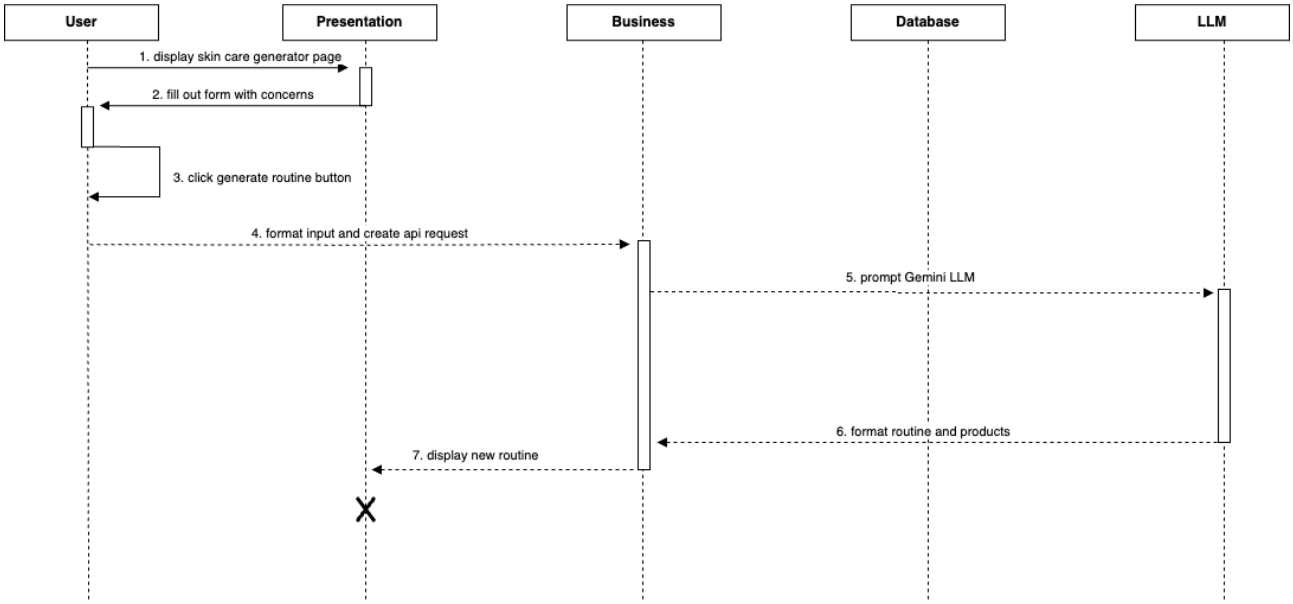

Figure 3: D-004 Use Generator Sequence Diagram

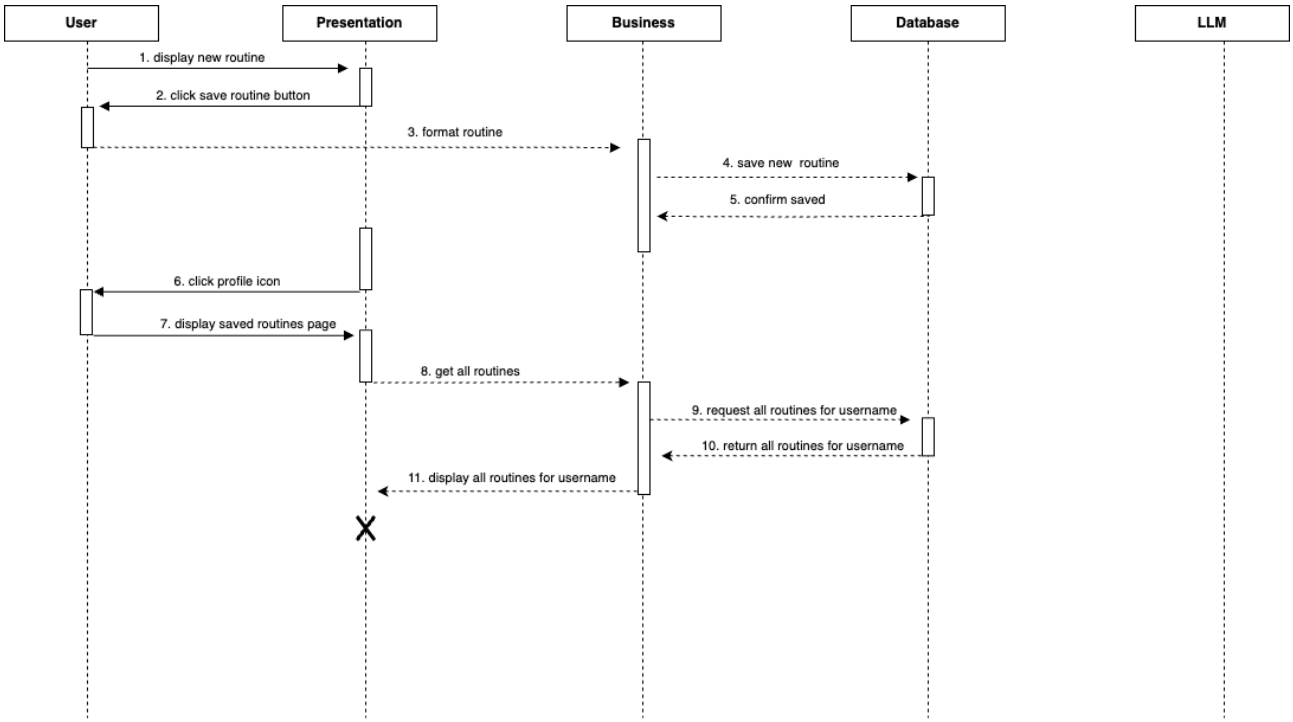

Figure 4: D-005 Save Routines Sequence Diagram

3.2 Activity Diagrams

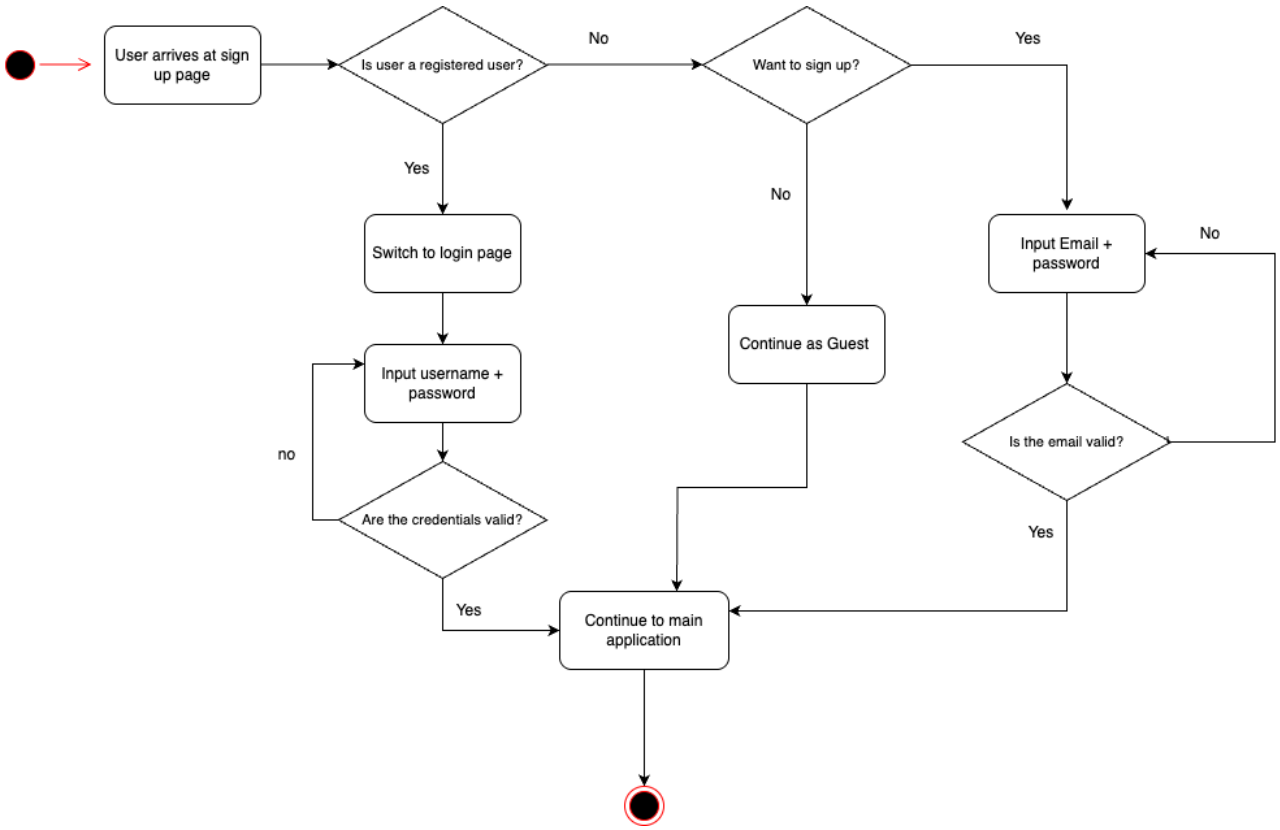

Figure 5: D-006 Become Registered User System Activity Diagram

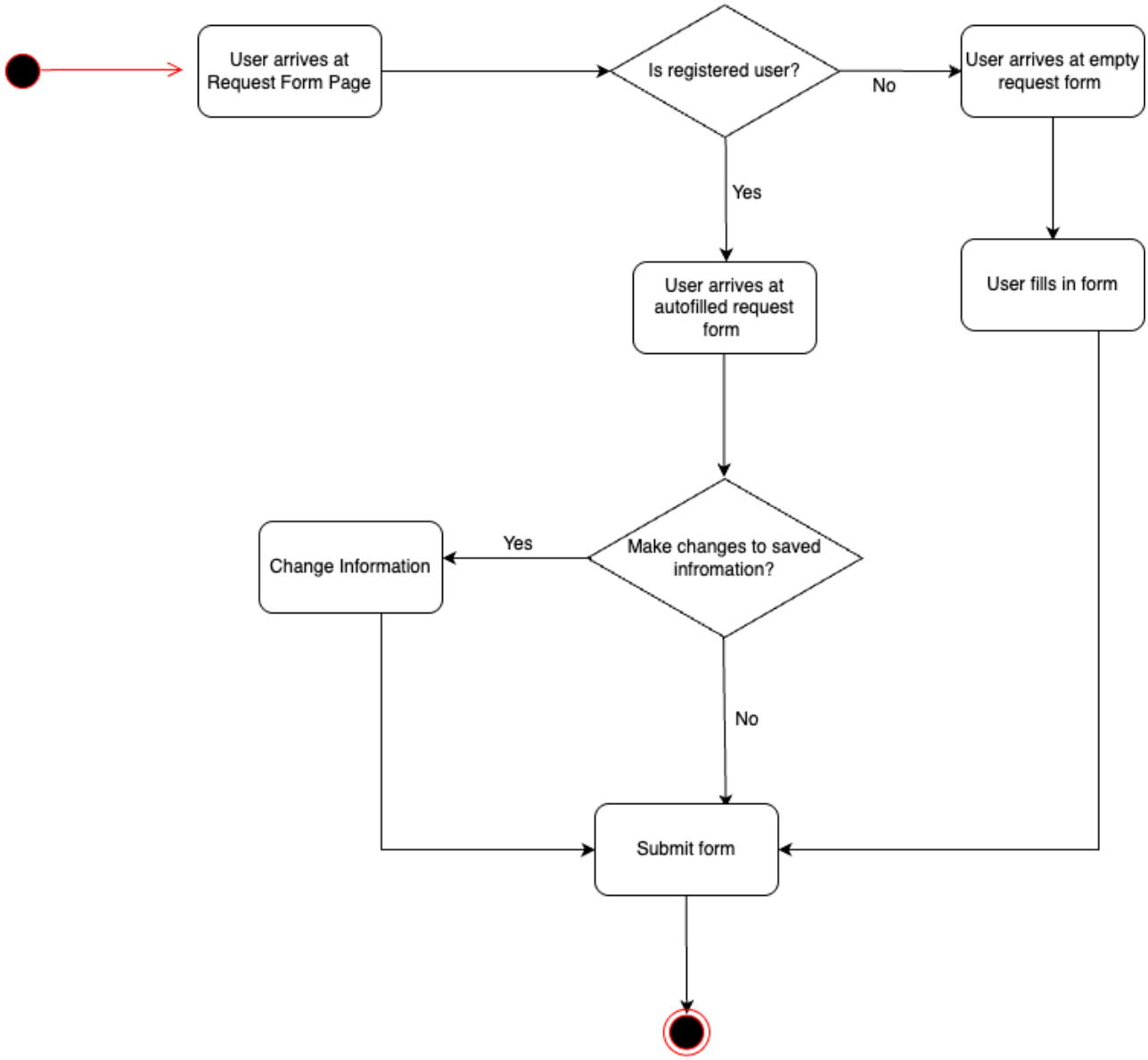

Figure 6: D-007 Submit Form System Activity Diagram

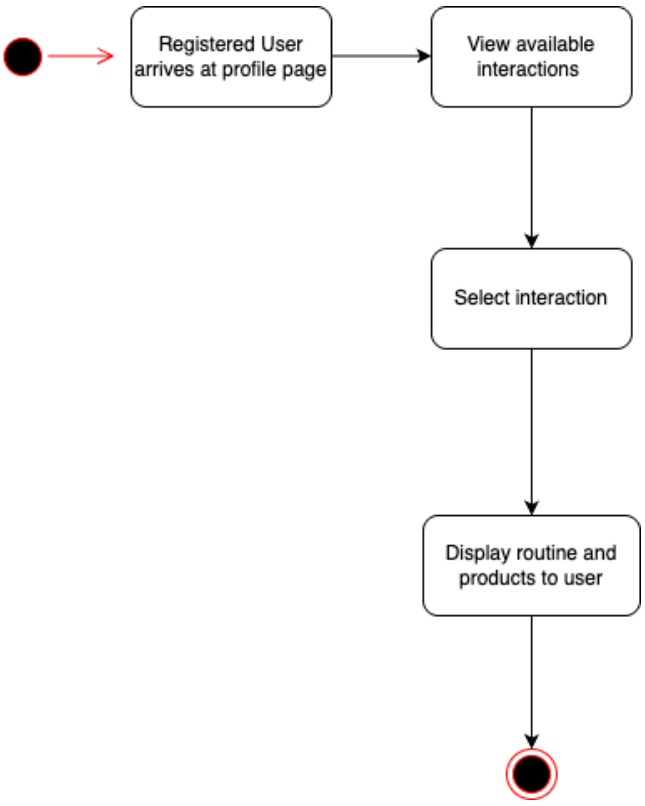

Figure 7: D-008 View Saved Routine System Activity Diagram

3.3 Component Diagram

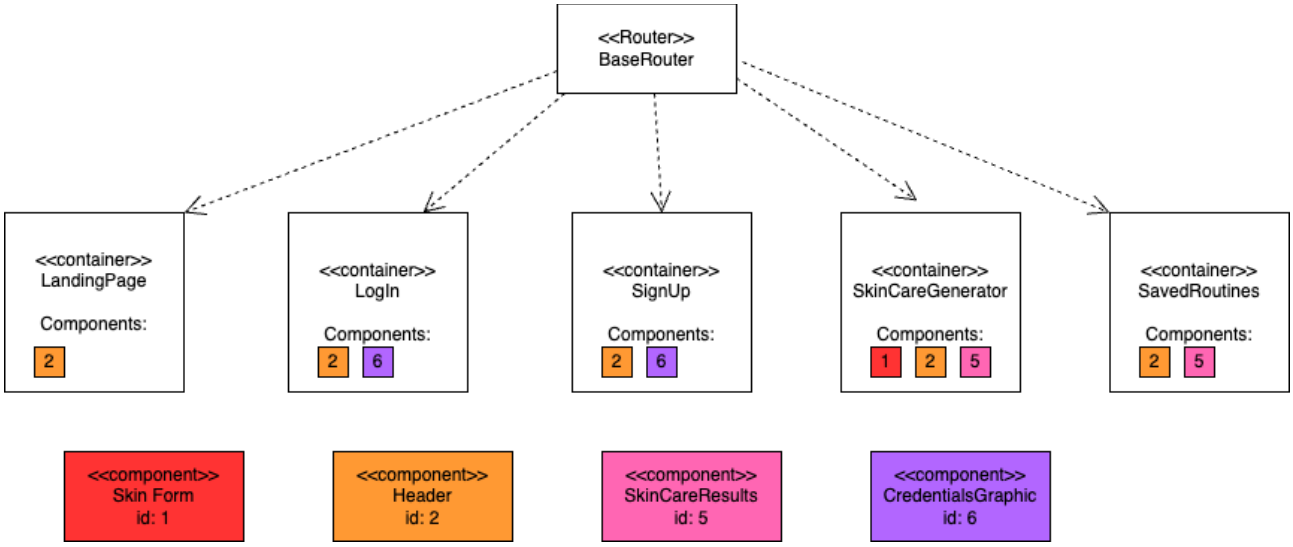

Figure 8: D-009 Component Diagram

3.4 Relational Model Diagram

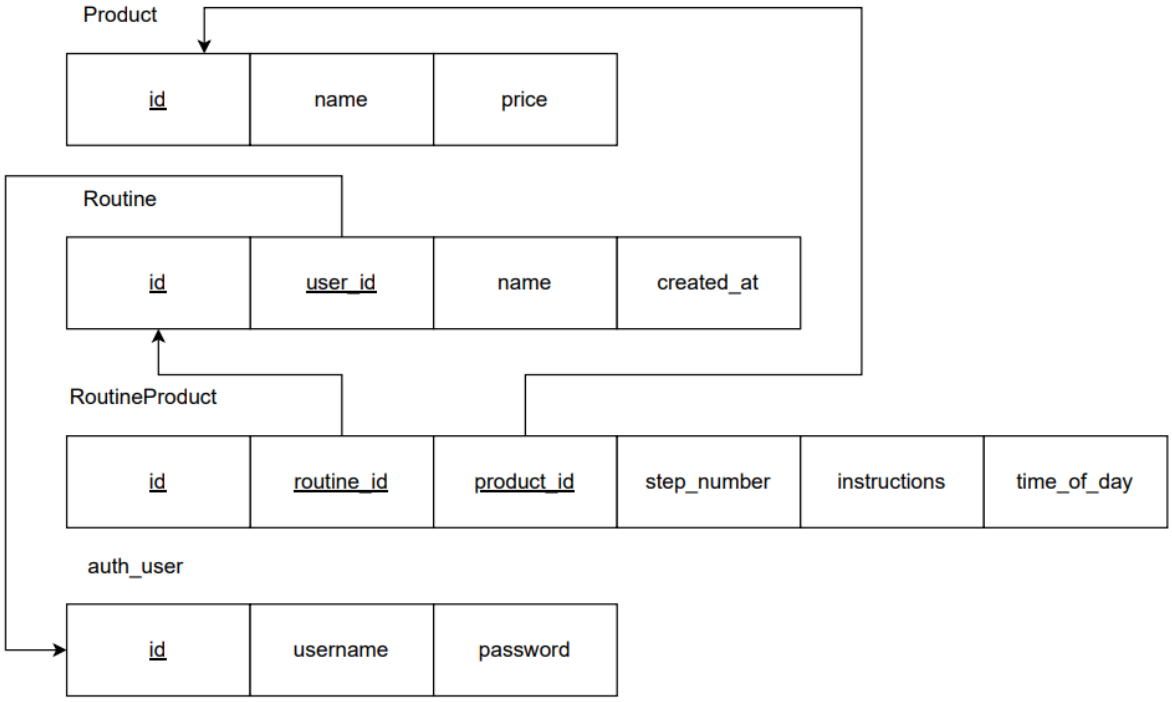

Figure 9: D-010 Relational Model Diagram

4 Layout Design

4.1 Landing Page

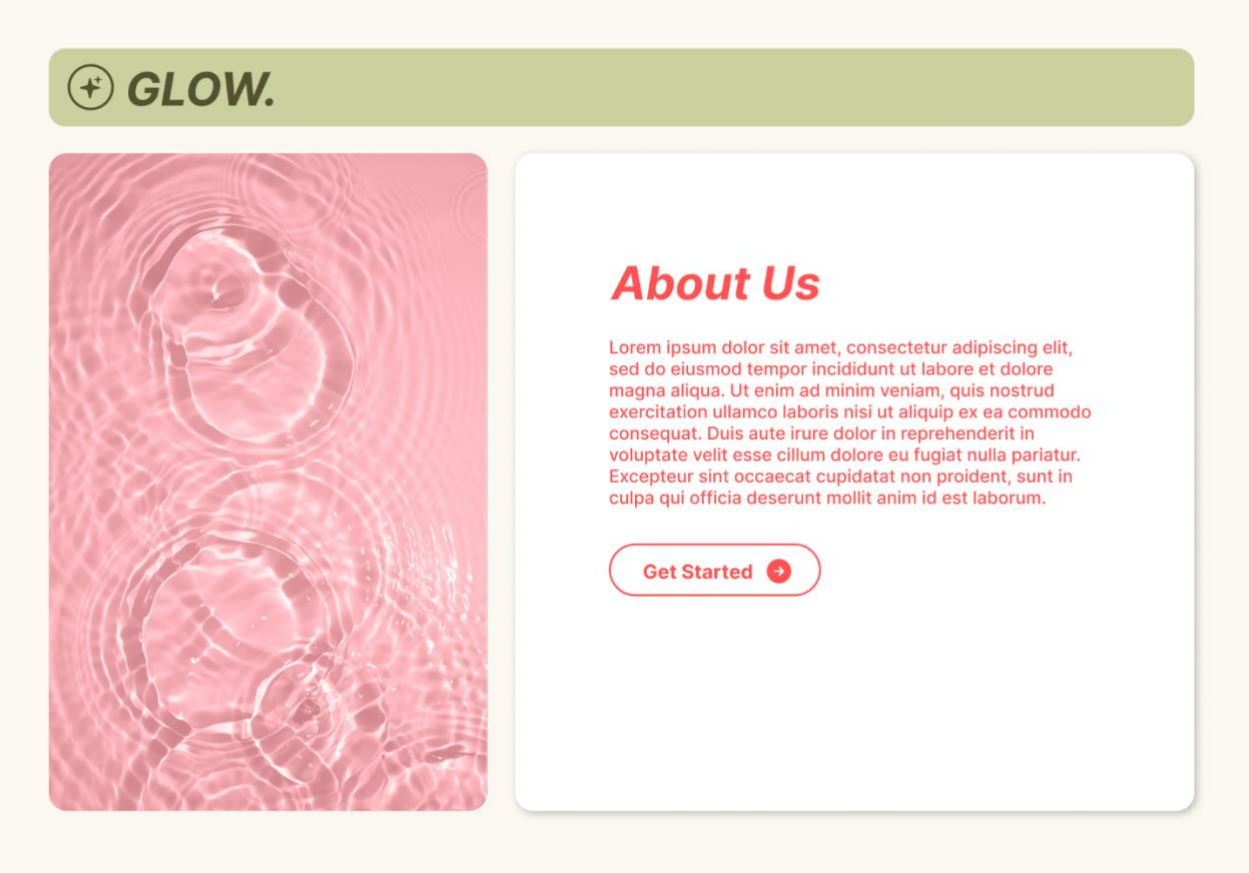

Figure 10: L-001 Landing Page (Desktop)

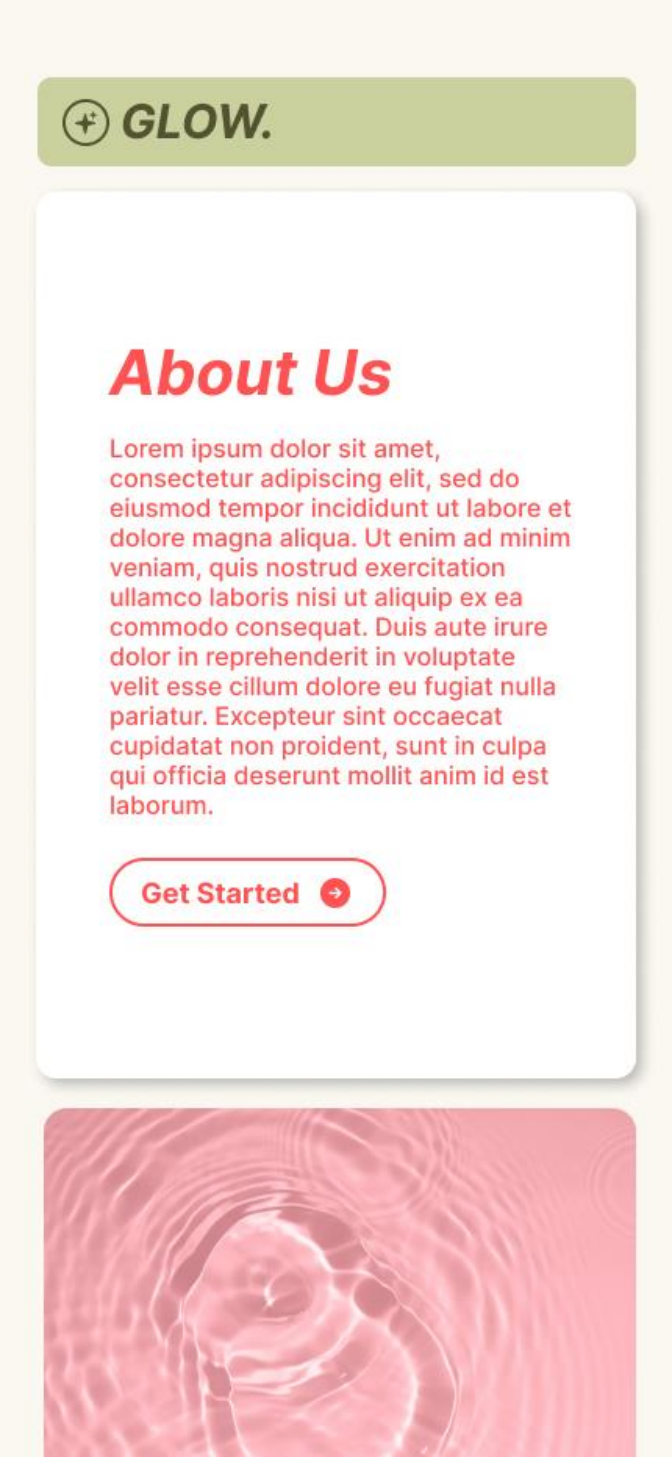

Figure 11: L-002 Landing Page (Mobile)

4.2 Registration Page

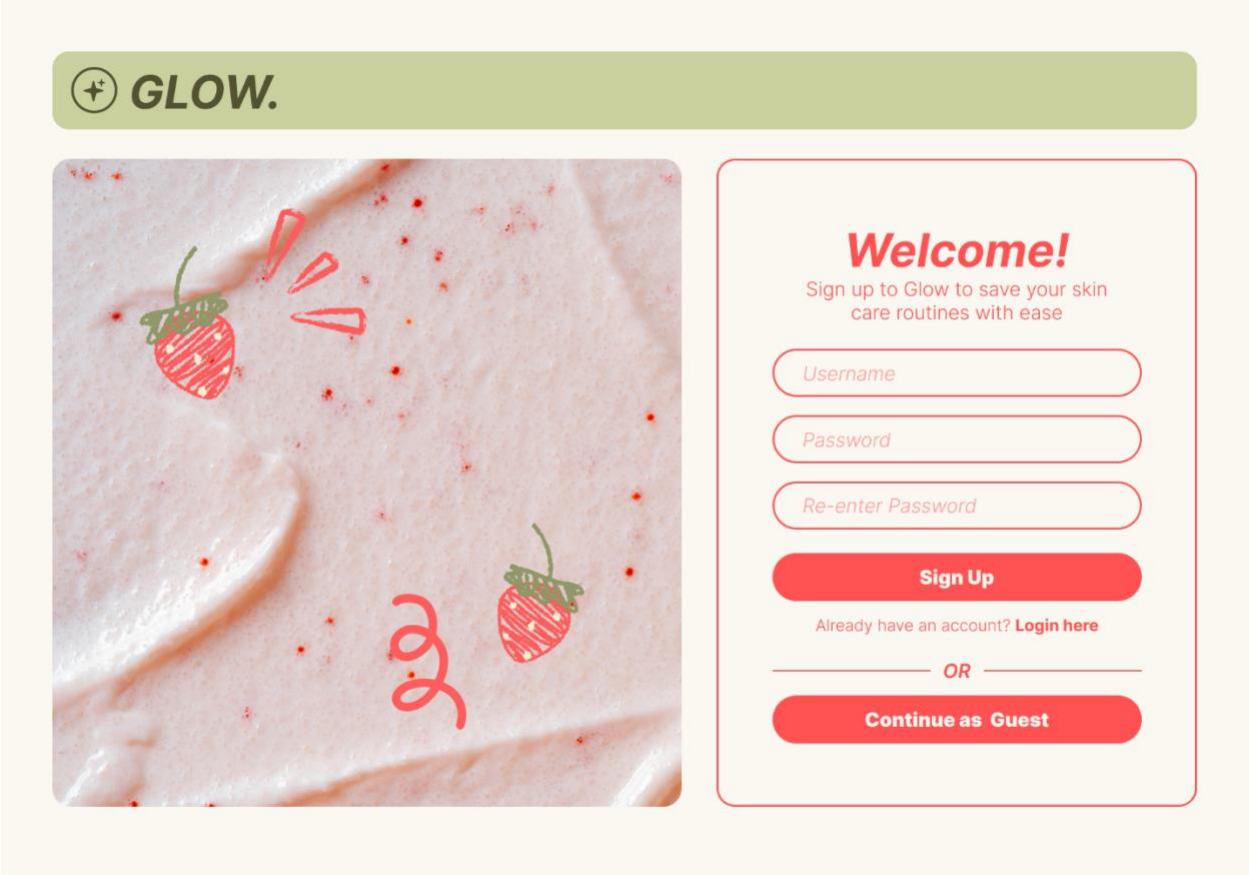

Figure 12: L-003 Registration Page (Desktop)

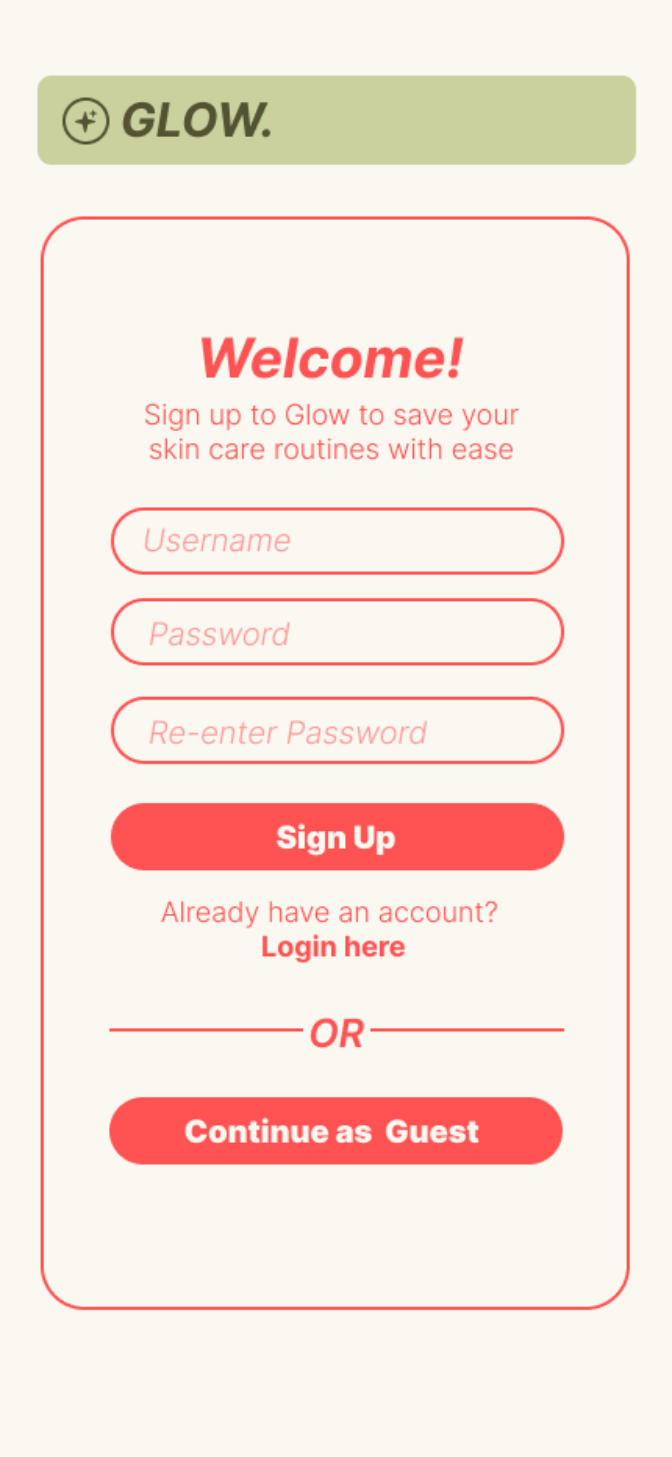

Figure 13: L-004 Registration Page (Mobile)

4.3 Login Page

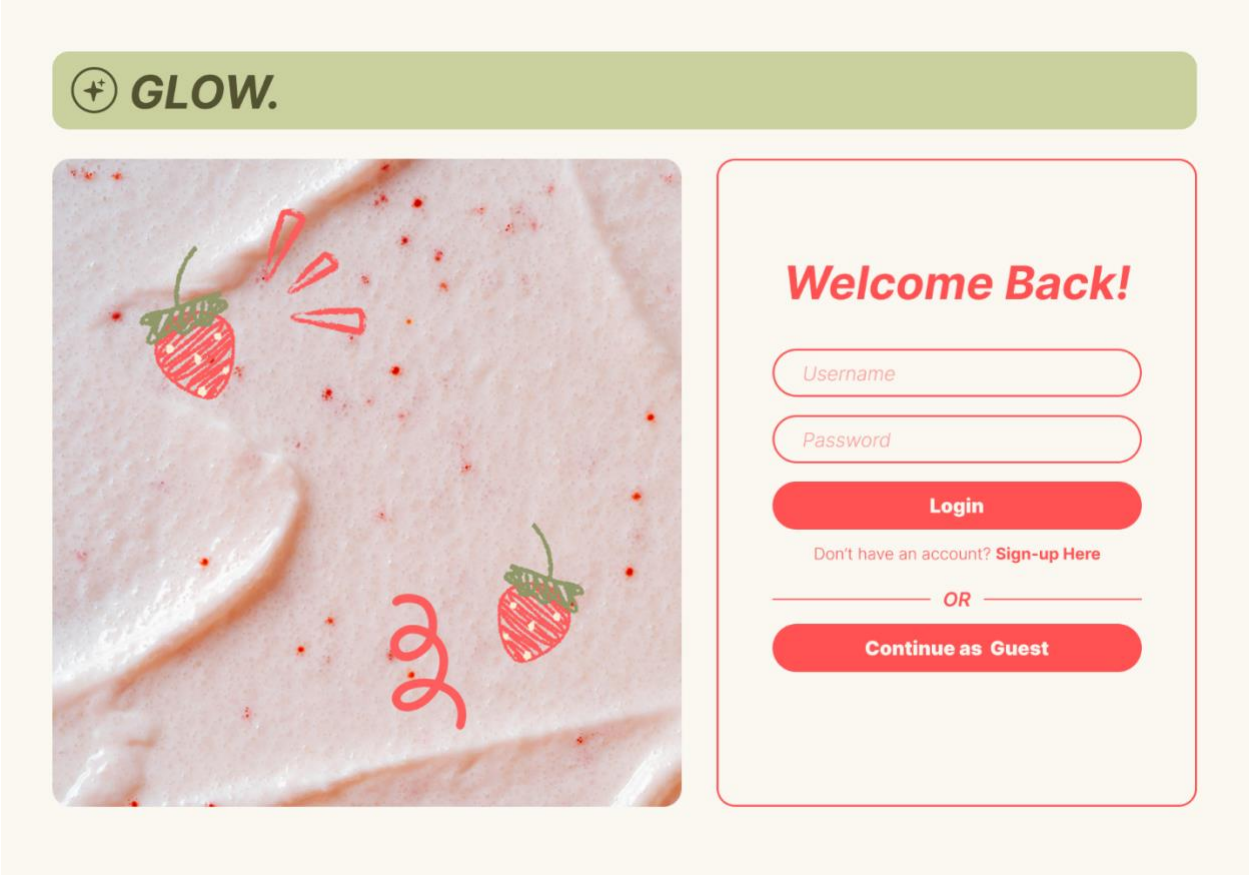

Figure 14: L-005 Login Page (Desktop)

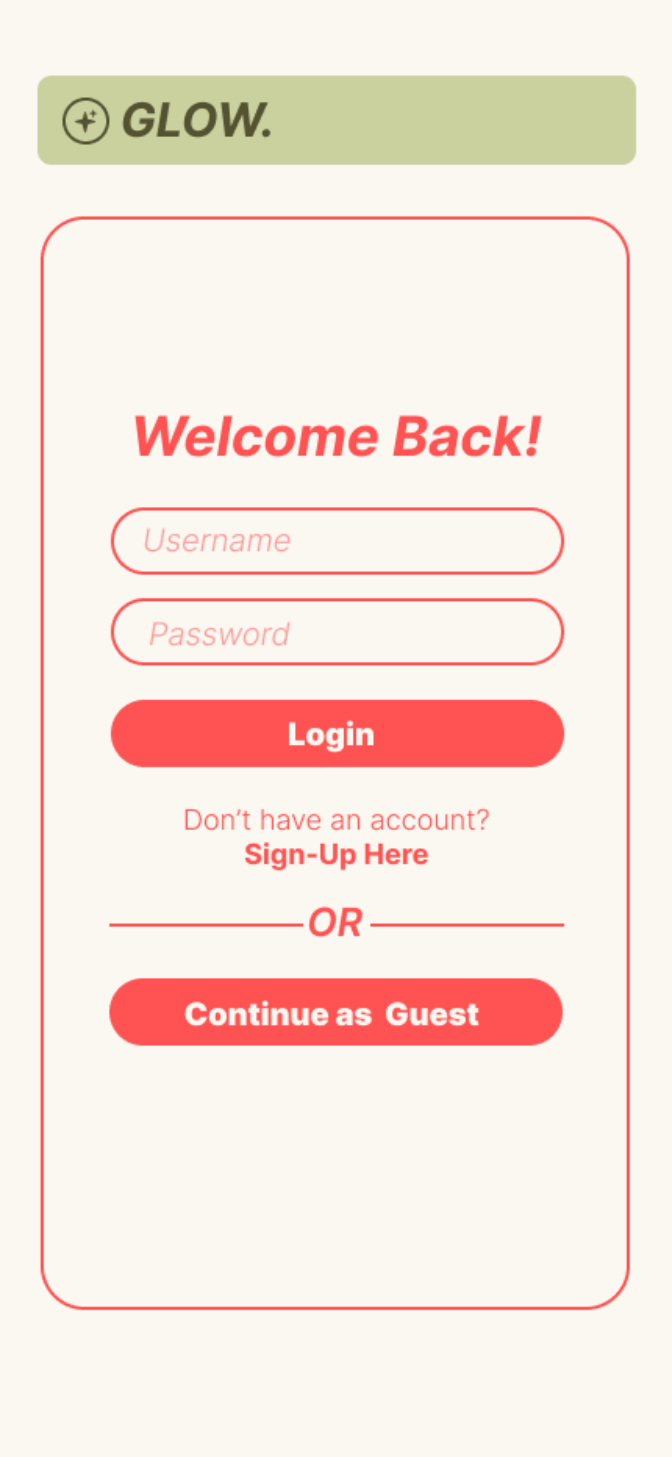

Figure 15: L-006 Login Page (Mobile)

4.4 Profile

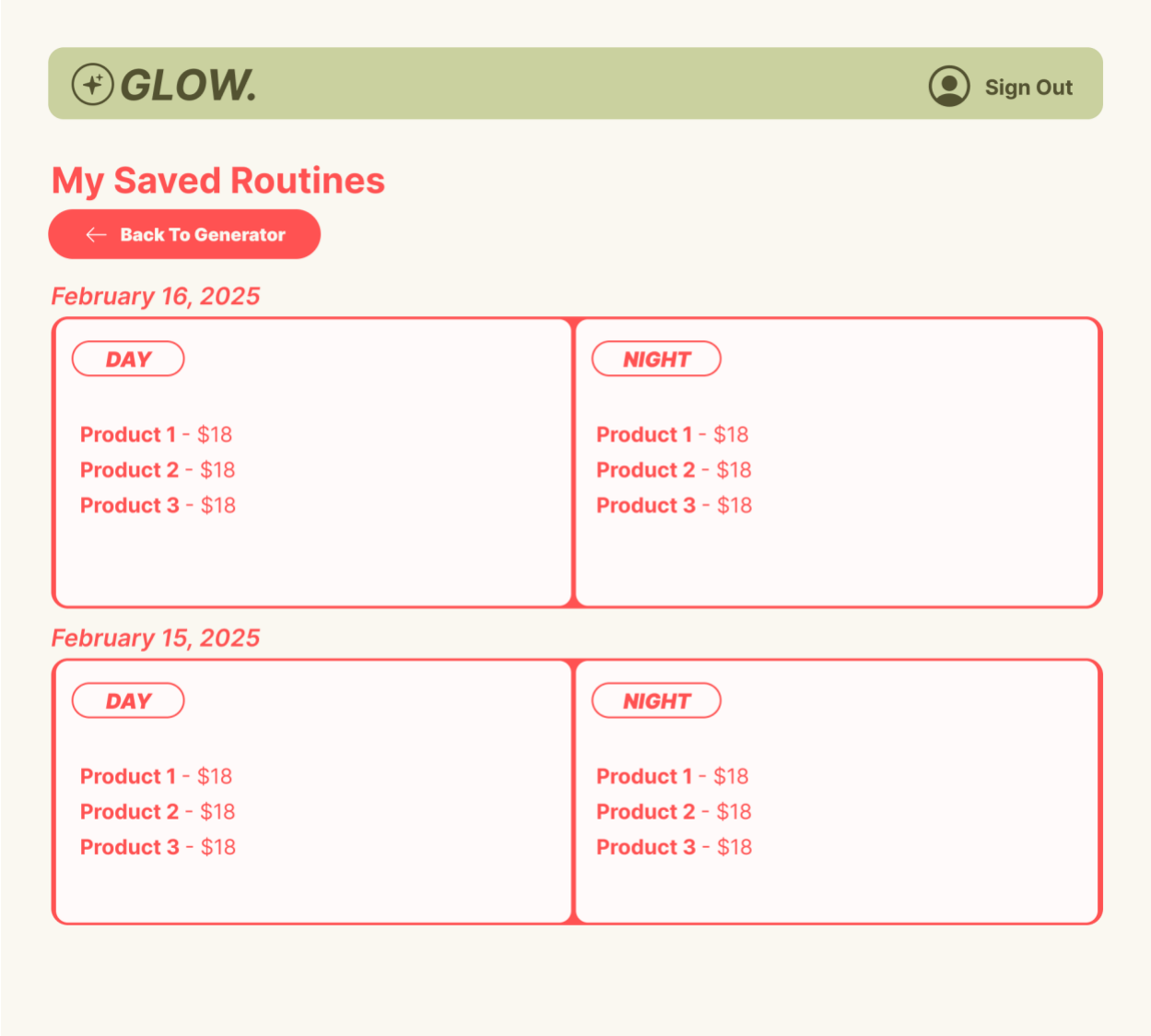

Figure 16: L-007 User Profile (Desktop)

Figure 17: L-008 User Profile (Mobile)

4.5 Routine Submission Form

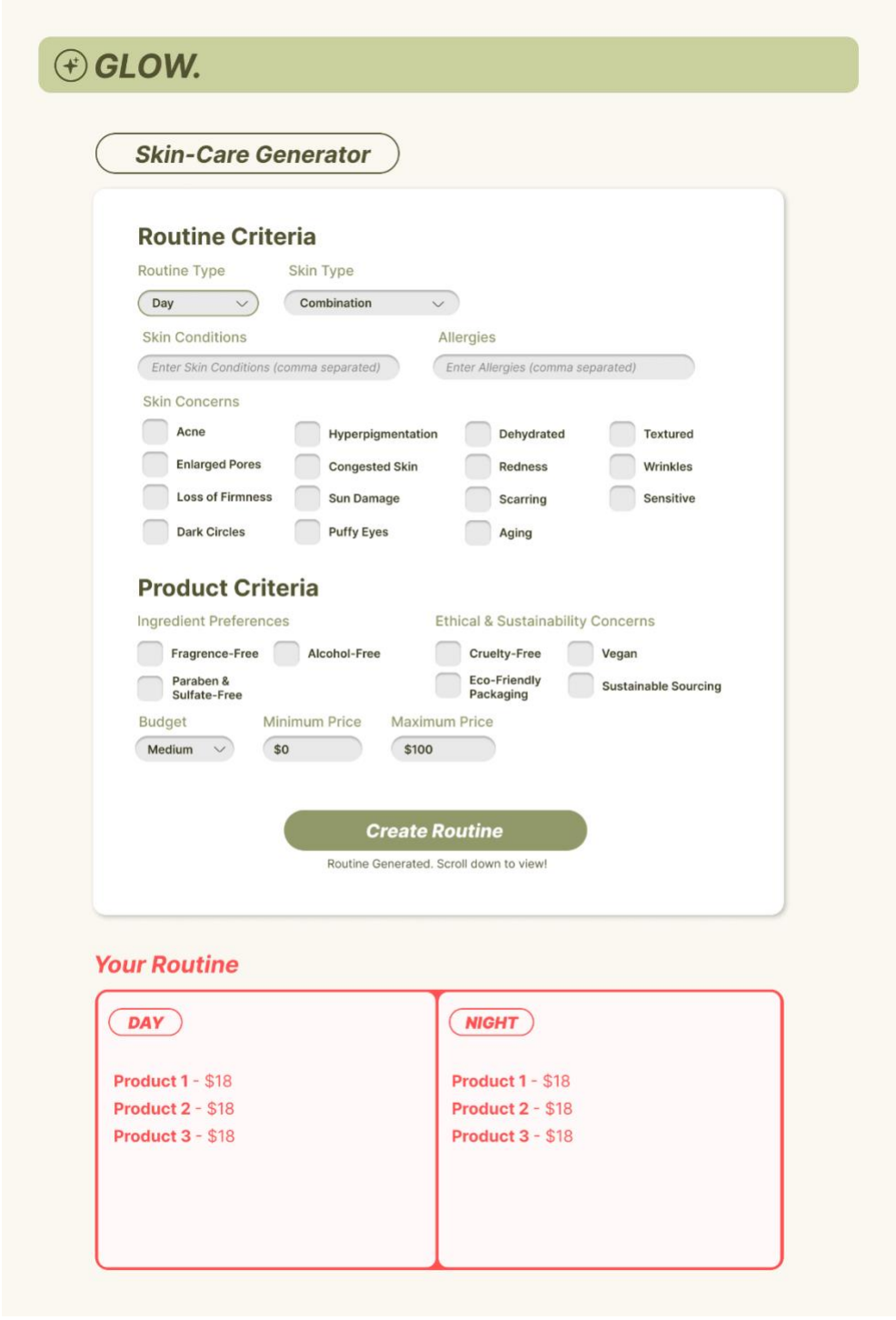

Figure 18: L-009 Routine Submission Form Guests (Desktop)

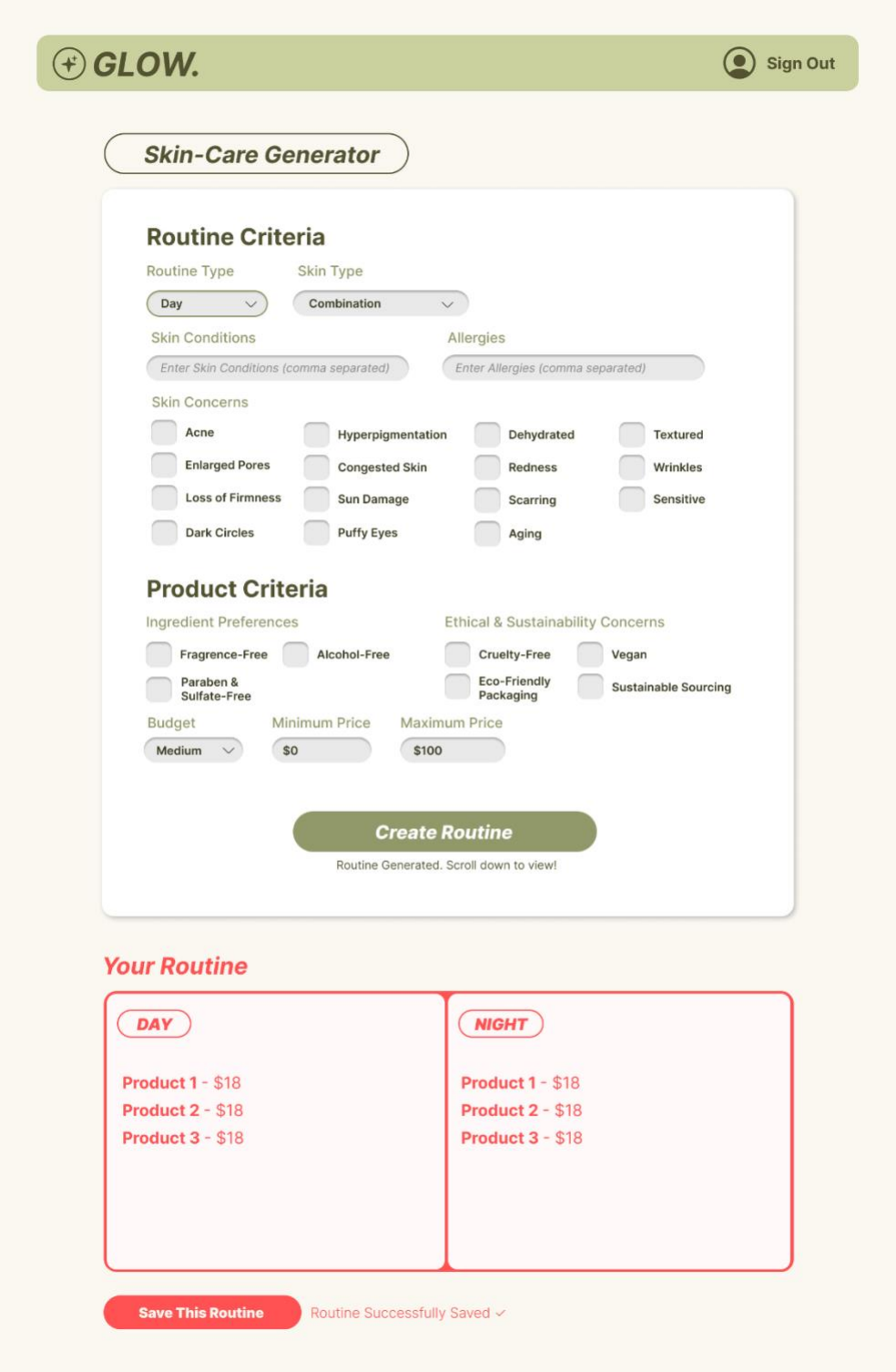

Figure 19: L-010 Routine Submission Form Users (Desktop)

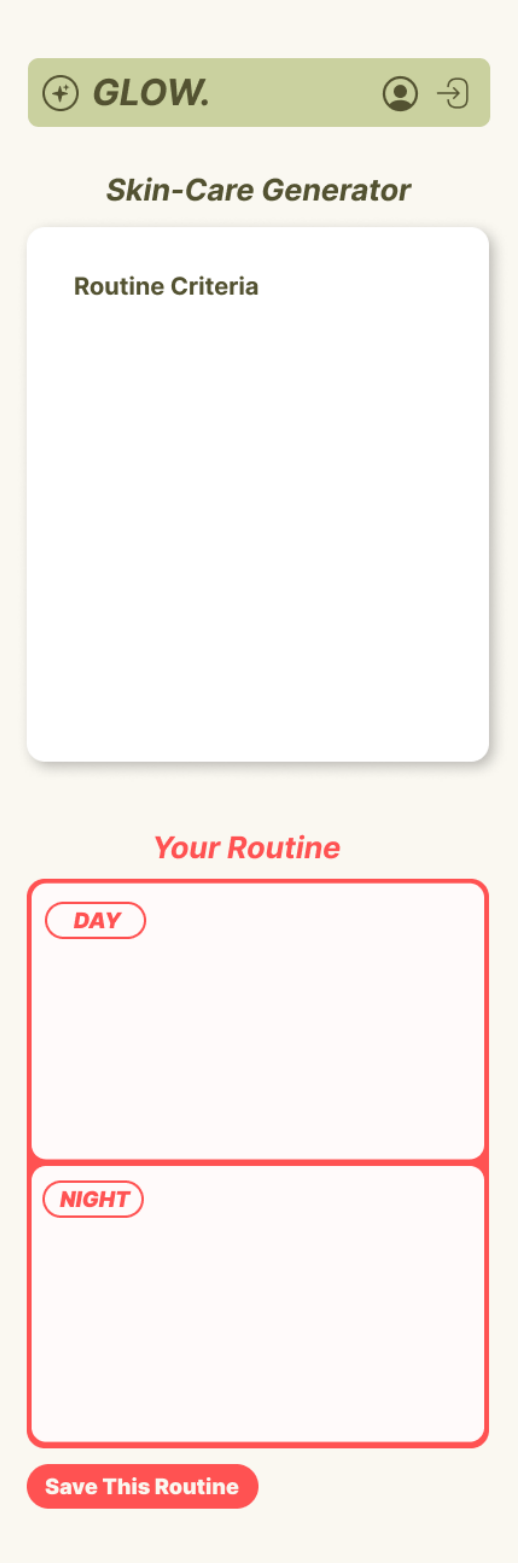

Figure 20: L011 Routine Submission Form (Mobile)