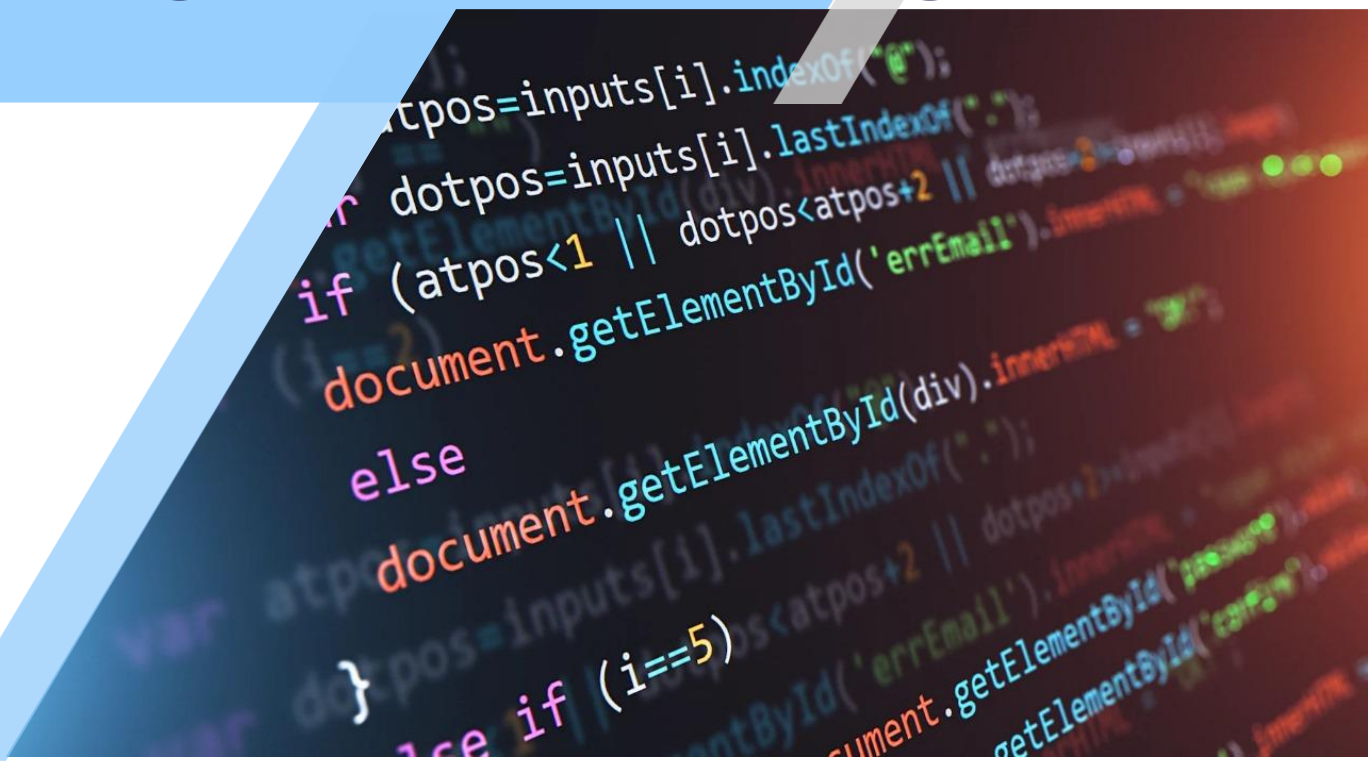
Development of Enterprise Applications

Development of an E-Commerce Application using Java Technologies



Group Project

NSBM GREEN UNIVERSITY TOWN

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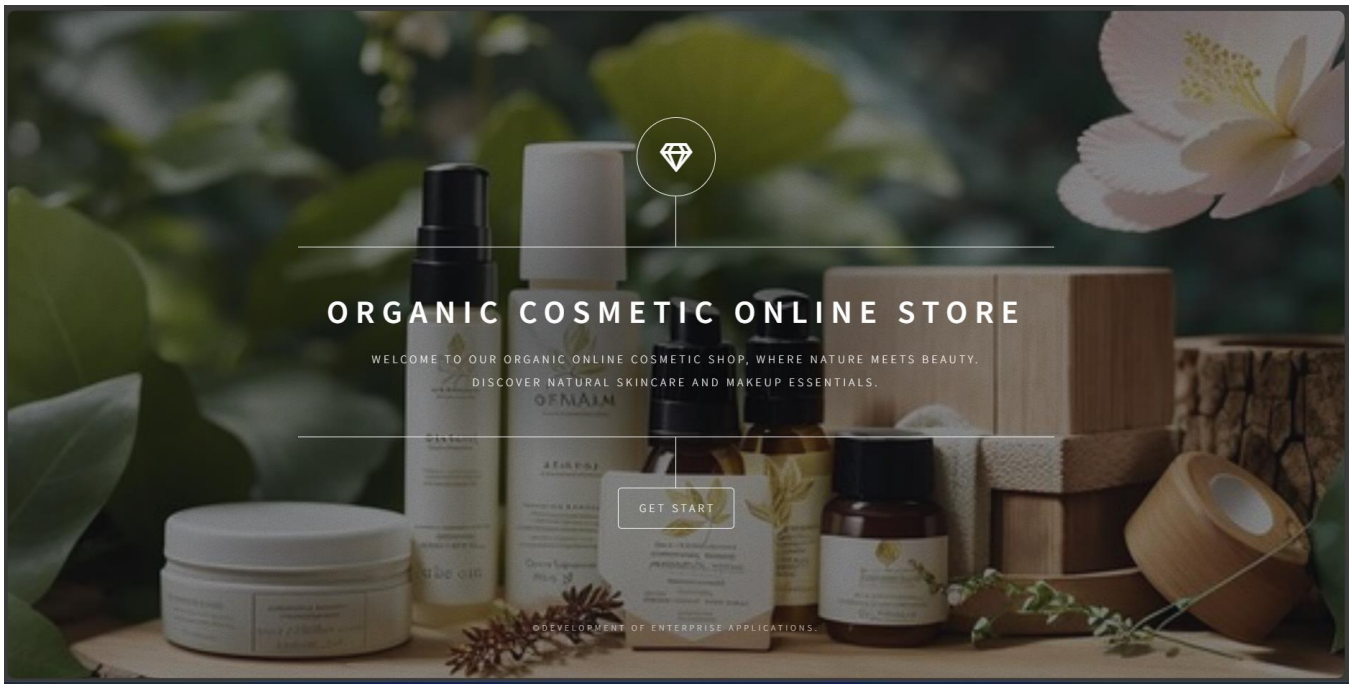
INTRODUCTION

Overview

In an era where consumers increasingly prioritize sustainability, health, and environmental consciousness, the demand for organic cosmetics has surged. Recognizing this trend, our team embarked on the development of an e-commerce application tailored specifically for organic cosmetics enthusiasts. This report presents an overview of our journey in conceptualizing, designing, and implementing a user-friendly platform that not only showcases the benefits of organic beauty products but also offers a seamless shopping experience for conscientious consumers.

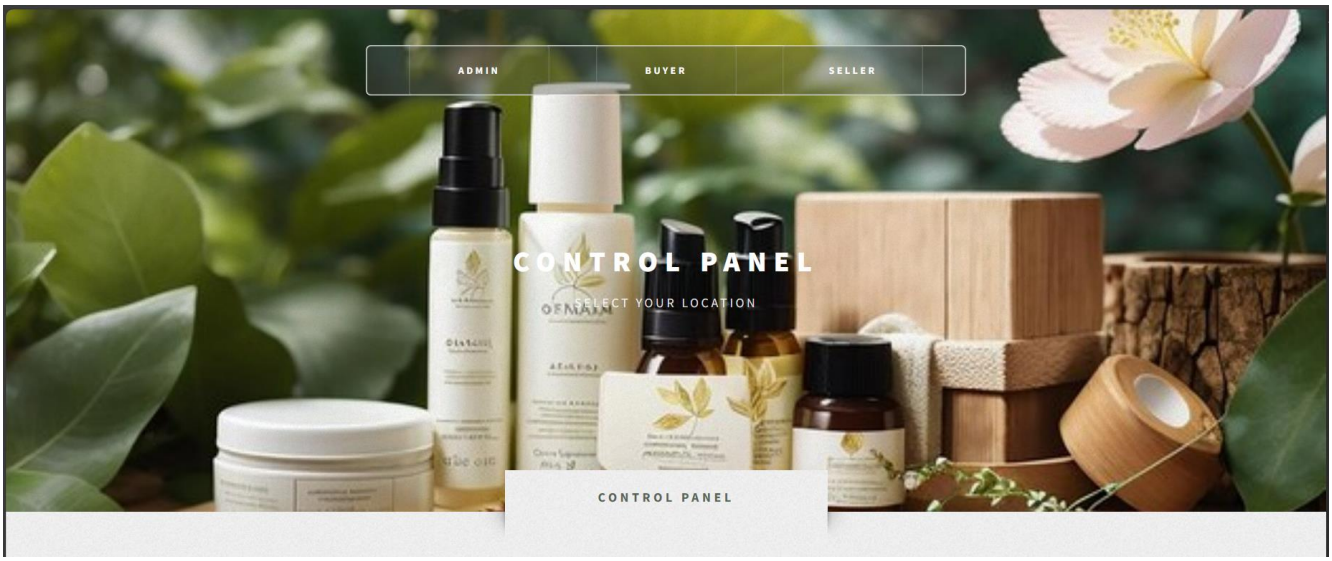


The beauty industry is changing as consumers favor natural and organic cosmetics. With a rise in awareness of synthetic chemicals' risks, demand for organic skincare, haircare, and makeup is growing. Our e-commerce platform meets this demand with a curated selection of high-quality organic cosmetics, catering to health-conscious individuals.

Our e-commerce platform offers convenient access to organic cosmetics, prioritizing user-friendly shopping and seamless checkout. This report shares insights on our journey towards promoting a healthier, sustainable beauty approach.

PROJECT DESCRIPTION

Our project is dedicated to crafting an e-commerce platform tailored to the organic cosmetics market. With a strong emphasis on natural beauty solutions, users can navigate through a curated selection of skincare, haircare, and makeup products sourced from reputable brands. Core functionalities include user authentication for personalized experiences, a comprehensive product catalog showcasing organic options, and a streamlined shopping cart system facilitating effortless purchases.

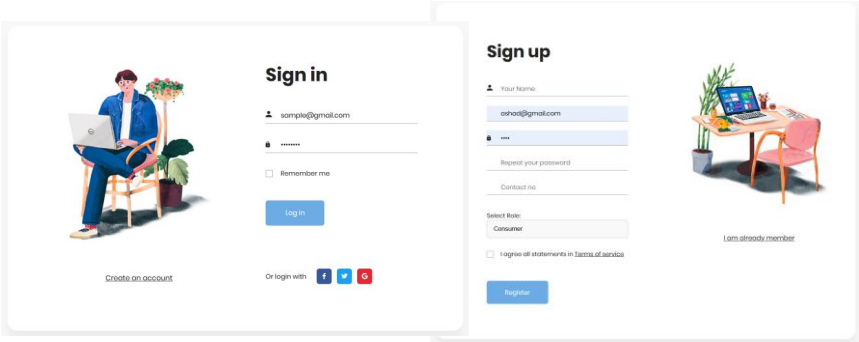


Admins are empowered with robust inventory management tools, enabling them to efficiently oversee product availability and track orders. Leveraging Java technologies such as JSP, Servlets, and JDBC, our platform prioritizes security and reliability to ensure a seamless user experience. By combining convenience with conscious consumerism, our project aims to meet the evolving needs of health-conscious individuals seeking safe and sustainable beauty alternatives.

KEY FEATURES

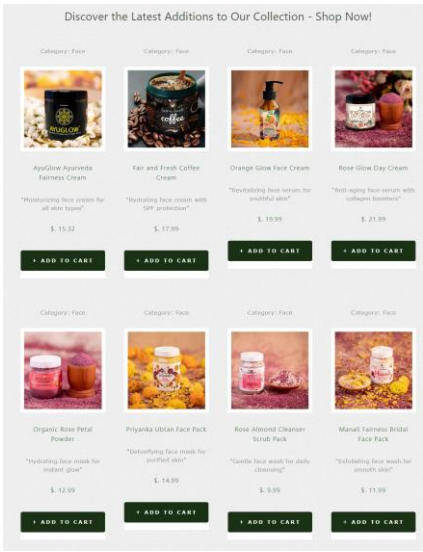
User Authentication:

User Authentication verifies user identity, granting access to the platform securely. It ensures that only authorized individuals can utilize personalized features and protects sensitive data, bolstering platform security and user trust.



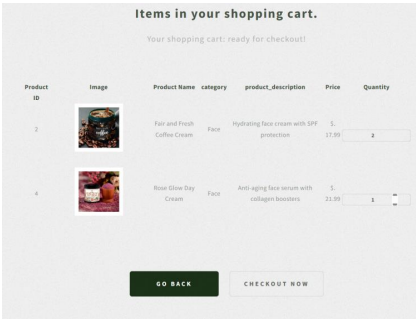
Product Catalog:

The Product Catalog displays organic skincare, haircare, and makeup products with descriptions and prices. It simplifies browsing and aids in informed purchasing decisions, serving as the digital storefront of the platform.



Shopping Cart:

The Shopping Cart enables users to gather and organize selected items for purchase. It streamlines the checkout process by offering a convenient interface for reviewing and adjusting product selections before completing the transaction.

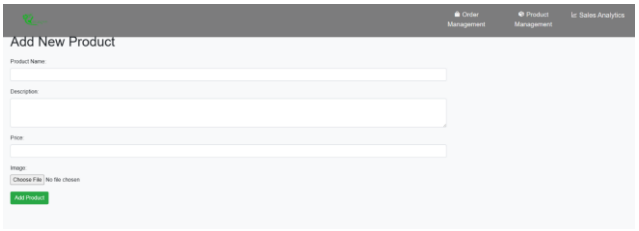


KEY FEATURES

Admin Interface

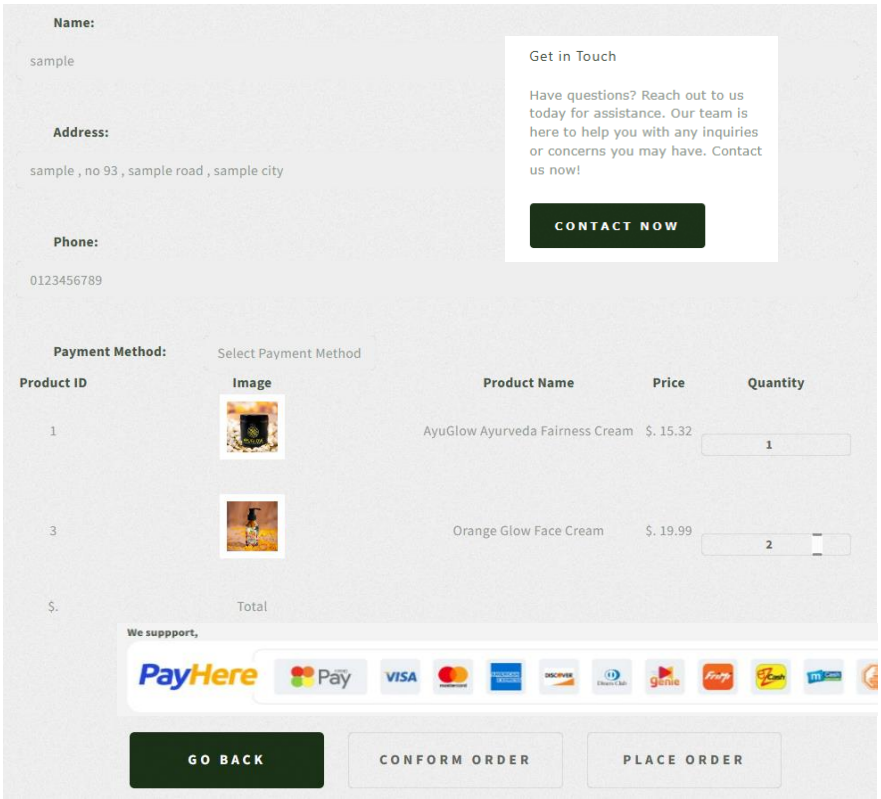
The Admin Interface offers administrators control over product inventory, orders, and user management. It simplifies tasks like adding or updating products and monitoring sales, ensuring efficient platform administration.

Orgenic Skin Care Products



Checkout Process:

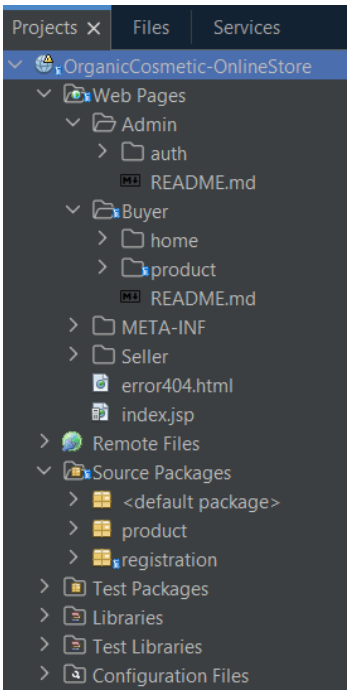
The Checkout Process finalizes purchases with order confirmation, payment, and user data collection. It ensures a smooth and secure transaction experience for seamless buying.



Technical Requirements

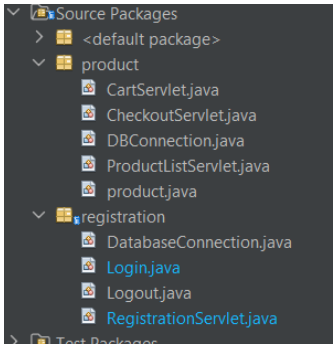
Version Control

Version Control tracks and manages changes to the project's codebase, enabling collaboration and ensuring code Integrity



Frontend

.The Frontend is the user interface of the e-commerce application, providing a visually appealing and intuitive experience for browsing products and completing purchases.

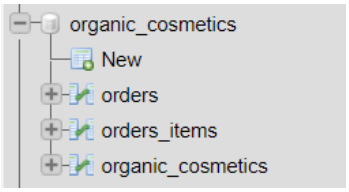


Backend

The Backend manages the behind-the-scenes functionality of the e-commerce platform, handling data processing, user authentication, and business operations.

Database:

The Database stores essential data like user information, product details, and order records, facilitating smooth operation of the e-commerce platform.



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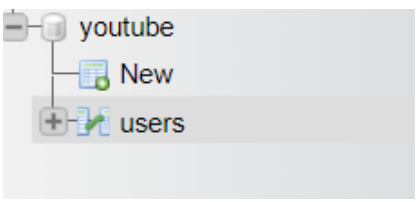
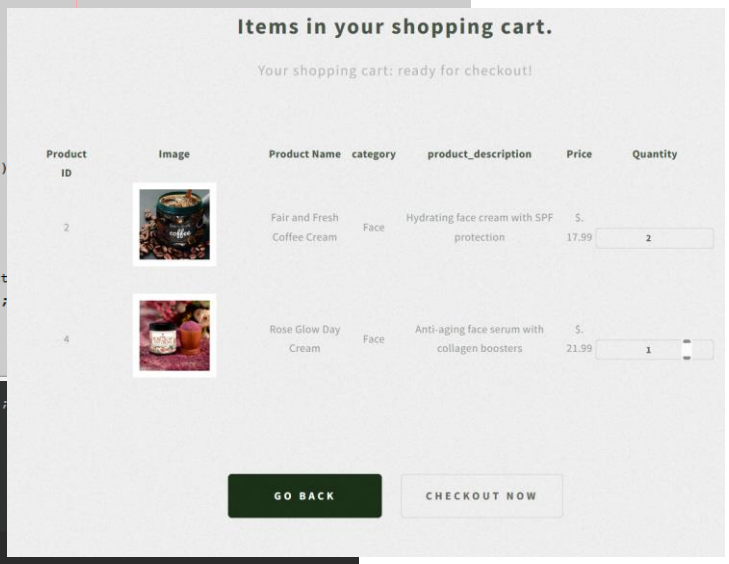


EXAMPLE PAGES

Cart servlet , Cart.jsp & UI

```
@Override
protected void doGet(HttpServletRequest request, HttpServletResponse response) throws ServletException, IOException {
    String action = request.getParameter("action");
    HttpSession session = request.getSession();

    if (action != null && action.equalsIgnoreCase("add")) {
        int productId = Integer.parseInt(request.getParameter("id"));
        addToCart(session, productId);
        response.sendRedirect("Buyer/product/productlist.jsp");
    } else if (action != null && action.equalsIgnoreCase("view")) {
        List<Integer> cart = (List<Integer>) session.getAttribute("cart");
        System.out.println("Cart contents: " + cart);

        List<product> cartProducts = getCartProducts(session);
        request.setAttribute("products", cartProducts);
        RequestDispatcher dispatcher = request.getRequestDispatcher("Buyer/product/cart.jsp");
        dispatcher.forward(request, response);
    }
}

private void addToCart(HttpSession session, int productId) {
    List<Integer> cart = (List<Integer>) session.getAttribute("cart");
    if (cart == null) {
        cart = new ArrayList<>();
        session.setAttribute("cart", cart);
    }
    cart.add(productId);
}

private List<product> getCartProducts(HttpSession session) {
    List<Integer> cart = (List<Integer>) session.getAttribute("cart");
    List<product> products = new ArrayList<>();
    if (cart != null) {
        DBConnection dbConnection = new DBConnection();
        for (int productId : cart) {
            System.out.println("Fetching product with ID: " + product
            product product = dbConnection.getProductById(productId);
            if (product != null) {
                products.add(product);
            }
```

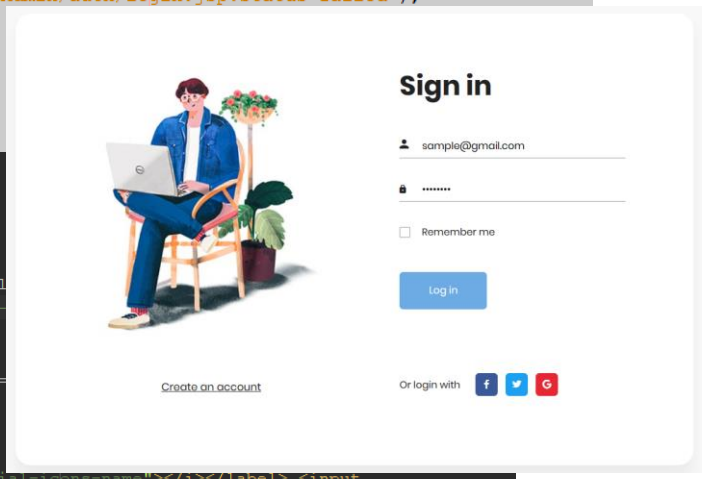



```
    List<product> products = (List<product>) request.getAttribute("products");
    if (products != null) {
        System.out.println("Products in cart: " + products.size());
    } else {
        System.out.println("No products in cart");
    }
%>
<table>
            <tr>
                <th><h2>Product ID<h2></th>
                <th><h2>Image<h2></th>
                <th><h2>Product Name<h2></th>
                <th><h2>category<h2></th>

                <th><h2>product_description<h2></th>
                <th><h2>Price<h2></th>
                <th><h2>Quantity<h2></th>
            </tr>
        <div class="col-6 col-12-medium">

            <c:forEach items="${products}" var="product">

                        <tr>
                                    <td style="vertical-align: middle"><p> ${product.getId()} </p></td>

                                    <td style="vertical-align: middle"><p> ${product.getName()} </p></td>
                                    <td style="vertical-align: middle"><p> ${product.getCategory()} </p></td>
                                    <td style="vertical-align: middle"><p> ${product.getDescription()} </p></td>
                                    <td style="vertical-align: middle"><p>$. ${product.getPrice()} </p></td>
```

EXAMPLE PAGES

Login.jsp , login servlet & U

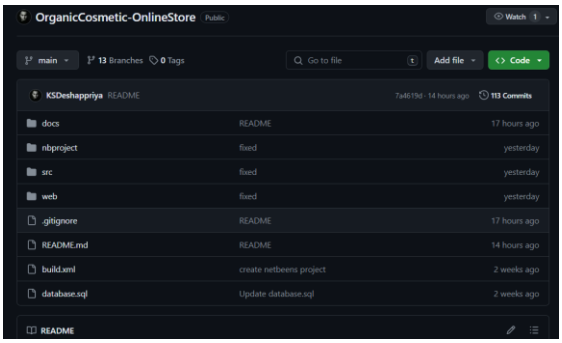
```
protected void doPost(HttpServletRequest request, HttpServletResponse response)
        throws ServletException, IOException {
    String uemail = request.getParameter("username");
    String upwd = request.getParameter("password");

    try {
    Class.forName("com.mysql.cj.jdbc.Driver");
    Connection con = DriverManager.getConnection("jdbc:mysql://localhost:3306/youtube?useSSL=false", "root", "");
    PreparedStatement pst = con.prepareStatement("SELECT * FROM users WHERE uemail = ? AND upwd = ?");
    pst.setString(1, uemail);
    pst.setString(2, upwd);

        ResultSet rs = pst.executeQuery();
        if (rs.next()) {
            HttpSession session = request.getSession();
            session.setAttribute("name", rs.getString("uname"));
            response.sendRedirect(request.getContextPath() + "/index.jsp");
        } else {
            response.sendRedirect(request.getContextPath() + "/Admin/auth/login.jsp?status=failed");
        }
    } catch (SQLException | ClassNotFoundException ex) {
        ex.printStackTrace();
    }
}
```

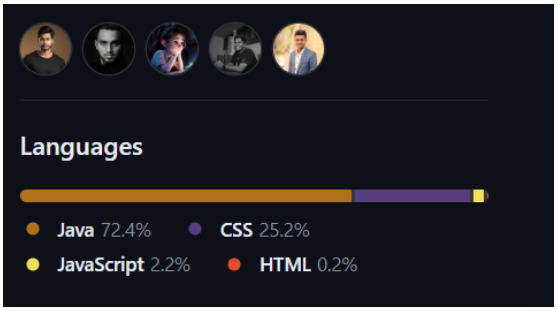


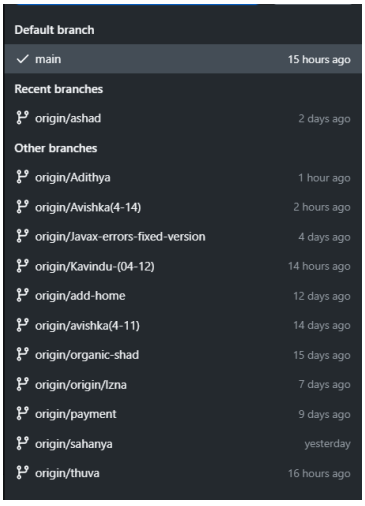

```
<!-- Sing in  Form -->
<section class="sign-in">
    <div class="container">
        <div class="signin-content">
            <div class="signin-image">
                <figure>  <img src="images/signin-image.jpg" al
                <a href="registration.jsp" class="signup-image-
            <div class="signin-form">
                <h2 class="form-title">Sign in</h2>
                <form method="post" action="../../Login" class=
                      id="login-form">
                    <div class="form-group">
                        <label for="username"><i
                                class="zmdi zmdi-account material-icons-name"></i></label> <input
                            type="text" name="username" id="username"
                            placeholder="Your Name" /> </div>
                    <div class="form-group">
                        <label for="password"><i class="zmdi zmdi-lock"></i></label> <input
                            type="password" name="password" id="password"
                            placeholder="Password" />  </div>
                    <div class="form-group">
                        <input type="checkbox" name="remember-me" id="remember-me"
                            class="agree-term" /> <label for="remember-me"
                            class="label-agree-term"><span><span></span></span>Remember me</label> </div>
                    <div class="form-group form-button">
                        <input type="submit" name="signin" id="signin"
                            class="form-submit" value="Log in" />  </div>
                </form>
                <div class="social-login">
                    <span class="social-label">Or login with</span>
                    <ul class="socials">
                        <li><a href="#"><i class="display-flex-center zmdi zmdi-facebook"></i></a></li>
                        <li><a href="#"><i class="display-flex-center zmdi zmdi-twitter"></i></a></li>
                        <li><a href="#"><i class="display-flex-center zmdi zmdi-google"></i></a></li>   </ul>
                </div>
            </div>  </div>
    </div>
</section>
</div>
```

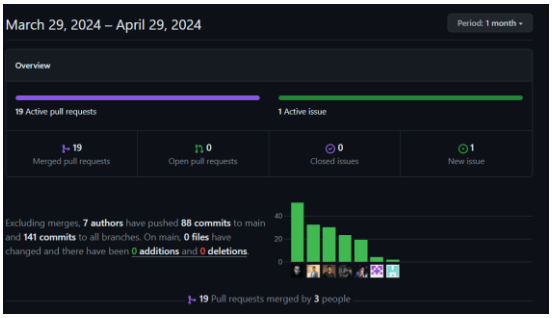
GITHUB WORKFLOW

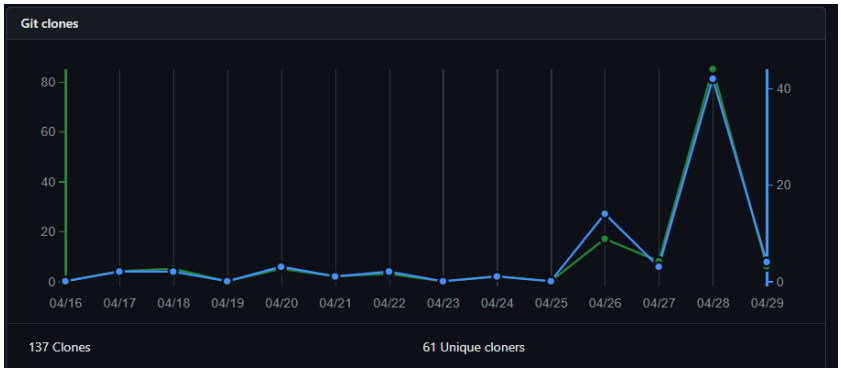
The GitHub workload process for our project has been robust and dynamic, reflecting the collaborative efforts of our team members. With a total of 15 branches, excluding merge commits, our project repository has seen significant development activity. A diverse group of nine authors has collectively contributed over 88 commits to the main branch, underscoring the collaborative nature of our development process. Additionally, across all branches, our team has pushed a total of 148+ commits, indicating the breadth and depth of our project's evolution. Furthermore, the effective use of pull requests has facilitated seamless integration of new features and enhancements, with a total of 19 pull requests merged by three individuals. This collaborative workflow demonstrates our team's commitment to transparency, accountability, and efficient project management on GitHub.











WORKLOAD MATRIX

L.A.D.K.S.Deshappriya(28246) http://github.com/KSDeshappriya

Kavindu took charge of overseeing the administrative aspects of our project, demonstrating strong leadership skills and attention to detail. His primary responsibilities included managing the overall progress of the project, conducting comprehensive project reviews to ensure adherence to requirements and quality standards, and addressing any errors or issues that arose during development. Kavindu also played a crucial role in facilitating collaboration among team members, overseeing the merging of code branches, and resolving conflicts to maintain a cohesive and functional codebase. His dedication to project management and problem-solving greatly contributed to the successful completion of our e-commerce application.

S.I.M.Ashad(28387) http://github.com/SimShad

Ashad played a pivotal role in shaping the user experience of our e-commerce application, focusing on the buyer's journey from start to finish. He took the lead in designing and implementing key front-end components, including the start page, home page, product list page (product list.jsp), and shopping cart page (cart.jsp). Ashad's expertise in front-end development and user interface design ensured that these pages were intuitive, visually appealing, and optimized for user engagement. Additionally, Ashad was responsible for establishing database connectivity through CartServlet and ProductListServlet, enabling seamless interaction between the front-end and backend components of our application. His contributions were instrumental in creating a cohesive and functional platform for users to explore products, add them to their carts, and proceed through the checkout process.

G.Thuvaragan(28965) http://github.com/gthuva

Thuvaragan played a crucial role in ensuring the responsiveness, visual appeal, and functionality of our e-commerce application. Leveraging his expertise in HTML, CSS, and frontend development, he focused on creating a seamless user experience by implementing responsive design principles across various pages. His contributions were particularly notable in crafting the checkout page's footer and integrating payment options, where he collaborated closely with Ashad to ensure a consistent and user-friendly interface for users during the checkout process. Thuvaragan's attention to detail and commitment to user-centric design significantly enhanced the overall quality of our application.

WORKLOAD MATRIX

M.R.R.Atheeb(28436) https://github.com/RayeezulAtheeb

Atheeb collaborated closely with Thuvaragan to develop the checkout page, a critical component of our e-commerce application. Leveraging his skills in front-end development and user experience design, Atheeb worked alongside Thuvaragan to ensure the checkout page's responsiveness, functionality, and visual appeal. Together, they implemented key features such as order confirmation, user data collection, and payment processing, creating a seamless and intuitive checkout experience for our users. Atheeb's attention to detail and collaborative approach were essential in integrating his expertise with Thuvaragan's to deliver a checkout page that met both technical requirements and user expectations.

W.M.A.Praveen(28165) http://github.com/WMAPraveen

Avishka took on the responsibility of developing the seller interface and managing product-related functionalities, demonstrating proficiency in backend development. As the lead backend developer, Avishka designed and implemented the seller interface, providing sellers with the tools they needed to manage their products efficiently. He focused on creating a user-friendly dashboard where sellers could add, update, or delete products, as well as view sales analytics, and manage inventory. Avishka's expertise in backend technologies such as Servlets and Java classes allowed him to establish robust functionality for product management, ensuring smooth communication between the frontend and backend components of our e-commerce application. His contributions were instrumental in empowering sellers to effectively showcase and manage their products on our platform.

R.W.A.A.N.N.Weerakodi(28171) http://github.com/ANNWeerakkodi

Adithya collaborated closely with Avishka and Thilina to develop the seller interface and handle order management functionalities, showcasing strong teamwork and backend development skills. His primary focus was on the backend implementation of order management features, ensuring that sellers could efficiently process and manage orders placed on the platform. Adithya worked closely with Avishka to integrate order management functionality seamlessly into the seller interface, allowing sellers to view, process, and fulfill orders with ease. His contributions were instrumental in enhancing the functionality and usability of the seller interface, enabling sellers to effectively manage their products and orders within our e-commerce application.

WORKLOAD MATRIX

W.R.Thilina Dilshan(30539) http://github.com/wrtdilshan

Thilina collaborated with Avishka and Adithya on backend development, focusing on seller management, sales analysis, and order management. They contributed to the seller interface, enabling efficient product and order management for sellers. Additionally, Thilina implemented sales analysis features to provide valuable insights for sellers. Their expertise ensured a seamless user experience and smooth integration of backend components into our e-commerce platform.

R.P.Nisandi Sahanya Rajapaksha(29342) https://github.com/nisandi

Sahanya collaborated closely with Thuvaragan on developing the checkout and payment processes, crucial components of our e-commerce application. Leveraging their combined expertise in frontend development, they focused on creating a seamless and secure user experience for completing transactions. Sahanya contributed to refining the checkout flow and implementing payment functionality, ensuring that users could easily and securely make purchases on our platform. Their collaboration played a vital role in delivering a user-friendly and efficient checkout and payment experience for our customers.

I.F.Izna(29667) https://github.com/Iznaism/Izna-Idris

Izna partnered with Ashad to focus on the buyer experience and backend development. Their collaboration involved creating and managing the product database, including adding data to it and implementing dynamic content changes in buyer JSP pages. Additionally, Izna provided crucial support in coding buyer servlets, ensuring smooth functionality between the front end and backend. Their contributions extended to thorough documentation, capturing the project's progress and challenges. Izna's versatility and dedication significantly enriched both the technical and documentation aspects of our e-commerce application.

K.B. Thisala Maduwinda Kumara (28385) https://github.com/thisala2000

Thisala collaborated with Avishka to develop the seller interface, focusing on enhancing the user experience for sellers interacting with our e-commerce platform. Leveraging their combined skills in frontend and backend development, Thisala contributed to designing and implementing features that empowered sellers to manage their products effectively. They worked closely with Avishka to ensure that the seller interface was intuitive, efficient, and aligned with the needs of sellers. Thisala's attention to detail and dedication to user-centric design were essential in creating a seamless experience for sellers, allowing them to showcase their products, track inventory, and manage orders effortlessly. Their collaboration with Avishka played a crucial role in delivering a robust seller interface that met the needs of our e-commerce platform.

CHALLENGES FACED

Technical Chalanges - Features Bugs

Throughout the development process, our team encountered a multitude of challenges spanning from server connectivity issues to database connection errors and compilation problems. One of the major hurdles was the recurrent MySQL connection error, impeding the retrieval and setting of data crucial for the application's functionality. Additionally, crashes and errors in server environments like Tomcat and Glassfish further hindered progress. Troubles with resource collections and missing product resources compounded our difficulties, leading to invalid code errors and merge complications on GitHub. Furthermore, navigating repository and branch cloning and merging processes posed additional obstacles, while library file crashes compounded technical woes. Addressing these challenges required concerted efforts, extensive debugging, and collaborative problem-solving to ensure the successful resolution of each issue and the continued progress of our project.

How we solved it

In overcoming the myriad challenges encountered during our project development, our team adopted a systematic approach focused on collaboration, research, and problem-solving. We tackled server connectivity issues by meticulously reviewing network configurations and server settings, ensuring seamless communication between client and server. To address recurring MySQL connection errors, we conducted thorough database troubleshooting, examining SQL queries and connection parameters to pinpoint and rectify issues promptly. Crashes and errors in server environments were mitigated through careful examination of server logs and configuration files, followed by targeted adjustments and updates. Resource collection and missing product resource errors were resolved through diligent resource management and verification processes, ensuring all necessary files were properly sourced and integrated into the project. Additionally, we leveraged version control systems like Git to track and manage code changes effectively, facilitating smoother collaboration and resolution of merger conflicts. Through proactive communication, diligent research, and collaborative problem-solving, our team successfully navigated these challenges, ultimately ensuring the continued progress and success of our e-commerce project.

CHALLENGES FACED

Coordination and Communication Challenges

Coordination and communication challenges presented significant hurdles throughout our project development, requiring proactive measures and effective strategies to overcome. The distributed nature of our team, compounded by varying schedules and time zones, necessitated clear and consistent communication channels. To address this, we established regular team meetings and utilized communication platforms like Slack and Discord to facilitate real-time collaboration and information sharing. Additionally, we implemented project management tools, deadlines, and progress, ensuring alignment and accountability across all team members. Despite the inherent complexities of remote collaboration, our team's commitment to open communication, active participation, and adaptability enabled us to navigate these challenges successfully, fostering a cohesive and productive working environment conducive to project success.

The experience we gained!

Throughout the development of our e-commerce application, we gained invaluable experience that enriched our understanding of software engineering principles, teamwork dynamics, and problem-solving strategies. Collaborating on a real-world project provided hands-on experience in applying theoretical knowledge to practical scenarios, enhancing our proficiency in Java technologies such as JSP, Servlets, and JDBC. Moreover, navigating challenges like server connectivity issues, database errors, and coordination hurdles honed our troubleshooting skills and resilience in the face of adversity. Importantly, working in a diverse team fostered communication and collaboration skills, teaching us the importance of clear communication, active listening, and mutual respect in achieving common goals. Overall, the experience garnered from this project not only deepened our technical expertise but also equipped us with invaluable soft skills essential for success in future endeavors.

ACKNOWLEDGMENT

We would like to express our sincere gratitude to Dr. Chaminda Wijesinghe, our esteemed lecturer for the Development of Enterprise Applications (DEA) module, for his invaluable guidance, support, and mentorship throughout this project. Dr. Wijesinghe's expertise, dedication, and passion for teaching have been instrumental in shaping our understanding of Java technologies and their practical applications in developing enterprise-grade solutions.

We extend our heartfelt thanks to Dr. Wijesinghe for designing a comprehensive curriculum that provided us with the theoretical foundation and practical skills necessary to undertake this real-world project. His insightful lectures, challenging assignments, and constructive feedback have played a pivotal role in our learning journey, enabling us to tackle complex problems and develop innovative solutions.

Additionally, we would like to express our appreciation to instructors and teaching assistants for their assistance and support during the course. Their contributions have enriched our learning experience and facilitated our progress in mastering the concepts and techniques essential for building enterprise applications.

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FUTURE IMPLEMENTATION

As we look towards the future, our Organic Cosmetics web application holds tremendous potential for further growth and refinement. One key area for future implementation involves enhancing the user interface (UI) and user experience (UX) to ensure a seamless and intuitive browsing and shopping experience for our users. Additionally, we plan to incorporate a sort list option, enabling users to easily filter and organize products based on their preferences.

Security remains paramount, and we are committed to implementing robust measures to safeguard user data and transactions, further bolstering user trust and confidence in our platform. Furthermore, we aim to introduce an option for managing customer user interfaces, allowing businesses to tailor their interactions and offerings to individual customer needs and preferences. Implementing a search option will enable users to quickly find specific products, enhancing convenience and efficiency.

Finally, incorporating a review option will empower users to share their feedback and experiences, fostering a sense of community and trust among our user base. Through these future implementations, we are dedicated to continually enhancing the functionality, usability, and security of our Organic Cosmetics web application, ensuring it remains at the forefront of the organic beauty industry.

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