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Advanced Projects - III
ECE-GY 9941

Advanced Project - III

ShopXperience

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1. Problem Statement:

The surge in online shopping necessitates sophisticated E-commerce platforms that prioritize user experience. A comprehensive, user-friendly, and secure E-commerce solution is essential, offering efficient product search, detailed product views, dynamic cart management, and a seamless checkout process for both guests and logged in users. This is crucial for building and maintaining user trust and satisfaction in the midst of a competitive online marketplace.

2. Description:

ShopXperience endeavors to redefine the online shopping experience by seamlessly integrating user-centric designs with a rich array of advanced functionalities. Our primary aim is to enhance the user's journey through modern technology while ensuring a seamless and secure platform experience. Embracing a hands-on approach to learning, the objective is to develop an eCommerce application equipped with intricate features such as keyword and category-based product searches, comprehensive product presentations, both frontend and backend pagination, and a versatile shopping cart. This will be complemented by a RESTful API facilitating streamlined product CRUD operations. Additionally, our platform will feature a comprehensive checkout process—from user-friendly form designs to robust database storage—as well as a suite of user management tools to ensure secure communication and order tracking.

3. Design:

The ShopXperience platform is designed to include:

1. Home Page: Showcasing featured products tailored to individual user preferences.
2. Product Details: Providing comprehensive product information to empower user decision-making.
3. Shopping Cart: Offering a user-friendly interface for hassle-free item management.
4. Checkout Process: Ensuring a smooth and secure transaction flow.

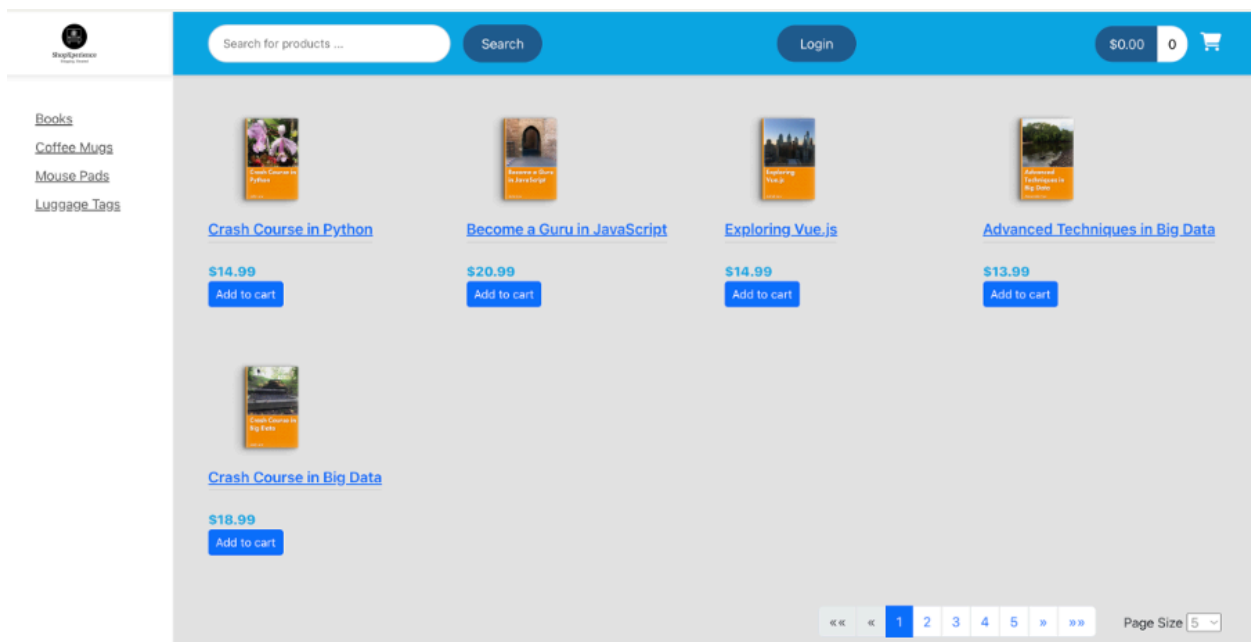
The strategy involves creating a comprehensive eCommerce application that delivers an intuitive and secure platform for users to search, explore, and purchase products. Utilizing a three-tier architecture for modularity, scalability, and maintainability, the platform will feature enhanced

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search capabilities, detailed product views, efficient pagination, a dynamic shopping cart, robust backend support through a REST API, user authentication, and seamless order checkout. The project harnesses the capabilities of HTML, CSS, Bootstrap, Angular for frontend development, Java Spring Boot for backend functionality, and MySQL for database management. Through this carefully selected technology stack, our aim is to provide users with a smooth, efficient, and secure shopping experience.

4. Project Features:

1. Products View: The Products View serves as the central platform for users to explore ShopXperience's extensive range of items. It showcases various product categories, including Books, Coffee Mugs, Mouse Pads, and Luggage Tags, ensuring a diverse selection to cater to different tastes. Through a user-friendly pagination system, users can effortlessly navigate through the catalog, with each page displaying a manageable number of products. Additionally, the Search component enhances the browsing experience by enabling users to search for specific items based on keywords, providing relevant results in real-time.



- Product Category: ShopXperience offers a wide array of product categories to suit the preferences of its users. From literature enthusiasts seeking the latest bestsellers to coffee



lovers in search of unique mugs, and professionals looking for ergonomic mouse pads, to travelers needing personalized luggage tags, there's something for everyone. Each category is thoughtfully curated to ensure a comprehensive selection of high-quality products, enhancing the shopping experience for users across different interests.

- Pagination: The pagination feature in ShopXperience's Products View plays a crucial role in enhancing usability and navigation. By breaking down the product listings into manageable pages, users can easily browse through the catalog without feeling overwhelmed. With intuitive navigation controls, users can move between pages seamlessly, exploring the extensive range of products at their own pace. Whether users are browsing casually or searching for specific items, pagination ensures a smooth and enjoyable browsing experience.
- Search component: ShopXperience's Search component offers users a powerful tool to find exactly what they're looking for. By entering keywords related to their desired products, users can initiate a search that retrieves relevant results in real-time. The search functionality is designed to be intuitive and user-friendly, providing suggestions and autocomplete options to help users refine their search queries. With its robust algorithm, the Search component ensures that users can quickly locate their desired items, streamlining the shopping process and enhancing overall satisfaction.

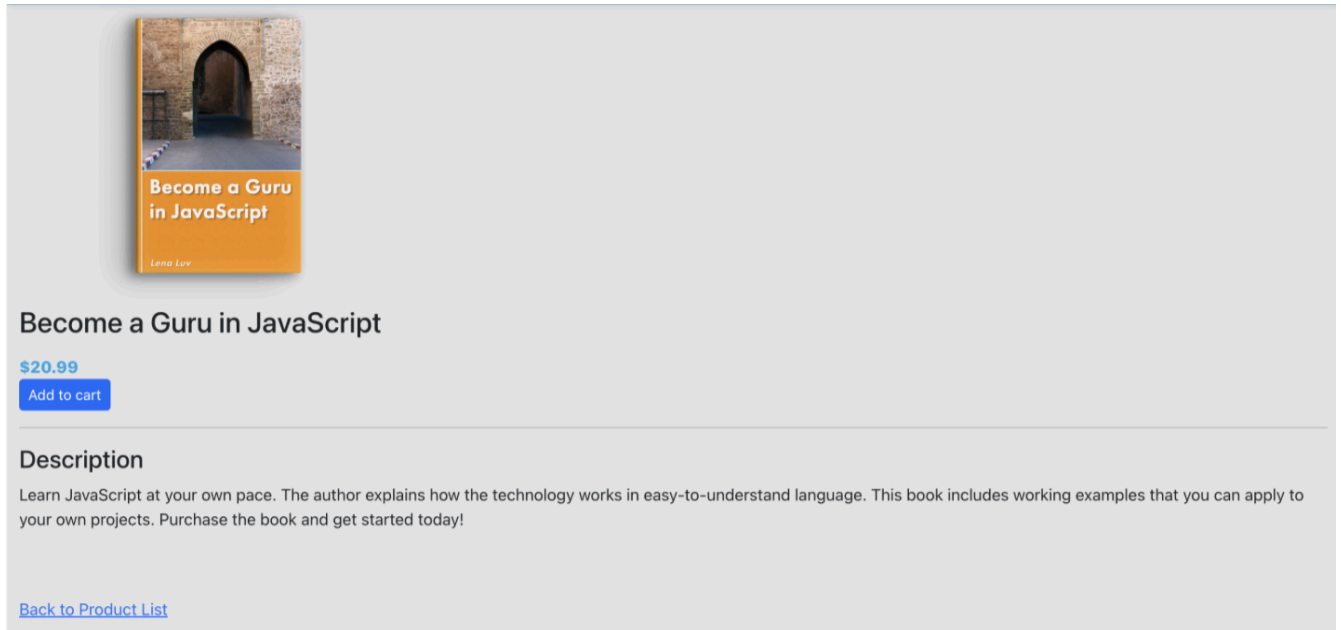
2. Product Details View: Here, the users encounter a wealth of information crucial for making informed purchasing decisions. Alongside essential details like product title and price, users are presented with a comprehensive description that delves into the product's features, specifications, and benefits. This detailed overview empowers users to fully understand the product's value proposition and suitability to their needs.

Furthermore, it offers a seamless user experience by providing easy navigation options back to the product list page. This ensures that users can effortlessly transition between browsing different products and exploring their detailed descriptions. By combining essential product information with intuitive navigation features, ShopXperience enhances user engagement and satisfaction, ultimately facilitating a more informed and enjoyable shopping experience.

Overall, the Product Details View in ShopXperience offers users crucial information for informed purchases. It includes the product title, price, and a comprehensive description of features and benefits. With seamless navigation back to the product list page, users can effortlessly explore different products. This integration of essential information and intuitive

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navigation enhances user engagement, providing a more informed and enjoyable shopping experience.




3. Dynamic Cart Management: The shopping cart functionality within ShopXperience is designed to offer users a dynamic and intuitive experience. Users have the flexibility to adjust item quantities directly within the cart, whether they wish to increase or decrease the number of items. Additionally, users can remove items entirely from the cart with ease, providing full control over their shopping selections.

One of the key features of dynamic cart management is its ability to update in real-time. Any modifications made to item quantities instantly reflect changes in the total quantity, subtotal price, and overall total price. This ensures that users have a clear understanding of their shopping cart contents and associated costs at all times.

Furthermore, ShopXperience prioritizes usability by implementing user-friendly interfaces and intuitive controls within the shopping cart. Whether users are browsing on desktop or mobile devices, the cart management functionalities remain accessible and easy to use.

Overall, dynamic cart management enhances the shopping experience by empowering users to customize their orders according to their preferences while providing transparent and up-to-date information on pricing and quantities. This feature contributes to a seamless and satisfying shopping journey for users on the ShopXperience platform.

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Product Image	Product Detail	
	Crash Course in Python \$14.99	Quantity: <div><div>+</div><div>2</div><div>-</div></div> <div>Remove</div> <div>Subtotal: \$29.98</div>
		Total Quantity: 2
		Shipping: FREE
		Total Price: \$29.98
		<div>Checkout</div>

4. Checkout Form: The checkout process is designed to streamline the ordering experience while ensuring accuracy and security. The comprehensive checkout form spans multiple sections, encompassing vital information necessary for completing the purchase. Users begin by entering their customer details, providing essential information such as name, email address, and contact number. Following this, they proceed to input their shipping address, ensuring that the ordered items reach them promptly and accurately. The form also includes a section for entering billing address details, allowing users to specify separate shipping and billing addresses if needed.

Furthermore, the checkout form prompts users to input their credit card information securely, facilitating a smooth and secure payment process. ShopXperience integrates validations for each corresponding field within the form, ensuring that users provide accurate and complete information before proceeding. Once all required information is entered and validated, users can review their order summary before finalizing the purchase. Upon successful placement of the order, users receive a confirmation alert containing the order tracking number, providing reassurance and transparency regarding the status of their order.

To enhance user experience, ShopXperience seamlessly redirects users back to the products page after completing the checkout process. This ensures continuity in the browsing experience, allowing users to continue exploring the platform or make additional purchases if desired.



5. User Authentication and Authorization: In an effort to enhance security and personalize the shopping experience, ShopXperience has implemented user authentication and authorization features using the Okta Identity and Access Management (IAM) service.

With user authentication, registered users are provided with secure login/logout functionality. This allows them to access their accounts and personalize their shopping experience with saved preferences, order history, and more. By leveraging Okta's robust authentication mechanisms, ShopXperience ensures that user credentials are securely managed and authenticated.

Additionally, user authorization functionalities have been implemented to control access to different parts of the application. Registered users have the privilege to place orders and access features exclusive to authenticated users, while guests can also place orders without the need for an account. This flexibility caters to various user preferences and accommodates both returning customers and new visitors. As ShopXperience utilizes the Okta free tier account, manual addition of users to the application can be done through the Okta developer account portal. This allows for seamless user management, enabling administrators to add, modify, or remove user accounts as needed.



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The image shows a login form for ShopXperience. At the top is the ShopXperience logo, which consists of a black circle containing a white icon of a shopping cart with a globe inside. Below the logo is the text "ShopXperience" and "Shopping. Elevated". The form is titled "Sign In". It has two input fields: "Username" and "Password". Below the "Password" field is a checkbox labeled "Remember me". At the bottom of the form is a blue button labeled "Sign In". Below the button is a link that says "Need help signing in?".

Sample user credentials:

Username: adijj332@gmail.com

Password: ShopX2024

6. User Orders View: ShopXperience offers a dedicated Orders page exclusively for logged-in users, providing a convenient platform to access and review details of their previous orders.

Upon accessing the Orders page, users are presented with a comprehensive overview of their order history. Each order entry includes essential information such as order ID, date of purchase, items ordered, total price, and current status. This detailed summary enables users to track their past purchases and monitor the progress of their orders.



Since the data is stored in the local database, initially, the Orders page may display no orders when tested. However, once a user logs in and places an order, the system generates an entry in their local database. This ensures that the user can view their order on the Orders page, facilitating transparency and accountability in their shopping experience.

Your Orders

Order Tracking Number	Total Price	Total Quantity	Date
997d0c26-dd36-43b8-ba6b-cbbd699a1a60	\$37.98	2	Apr 28, 2024, 8:12:49 PM
40ee25ee-ebfb-418b-89b5-62318d79af50	\$35.98	2	Apr 28, 2024, 8:11:19 PM
e52c2e7c-1f99-40ff-b66e-fbc330dcc71f	\$35.98	2	Apr 28, 2024, 8:08:06 PM
ab0f77dd-0f4f-40cf-b912-419737e5cf43	\$37.98	2	Apr 28, 2024, 8:06:49 PM
58d64ff1-4f45-4582-9a21-703d49dc44a5	\$61.96	4	Apr 28, 2024, 8:05:33 PM
57059d77-476e-464d-9ee9-d691fda692a2	\$58.97	3	Apr 28, 2024, 7:46:50 PM

7. Enhanced HTTPS Security: ShopXperience prioritizes the security of user data and interactions by implementing the HTTPS protocol across the platform. HTTPS (Hypertext Transfer Protocol Secure) ensures a secure communication channel between the user's browser and the server, encrypting data transmitted over the network.

By utilizing HTTPS, ShopXperience safeguards sensitive information exchanged between users and the platform, including login credentials, payment details, and personal information. This encryption prevents unauthorized access and interception of data by malicious third parties, enhancing the overall security posture of the system.

Additionally, HTTPS provides authentication, verifying the identity of the server to ensure users are communicating with the legitimate ShopXperience platform and not an impostor. This helps mitigate the risk of man-in-the-middle attacks and phishing attempts, further bolstering user trust and confidence in the platform.

5. Project Installation and Execution:

A short tutorial on installing Angular: <https://kinsta.com/knowledgebase/install-angular/>

1. Node.js Installation: Before using npm (Node Package Manager), ensure Node.js is installed on your system. Visit the official Node.js website at <https://nodejs.org/> and download the LTS (Long-Term Support) version suitable for your operating system.



Once downloaded, verify the installation by opening a terminal or command prompt and running the following commands:

```
node -v
```

```
npm -v
```

These commands will display the installed Node.js version and npm version respectively, confirming a successful installation.

2. Angular CLI: Angular (Command Line Interface) is required to run the frontend of the application. Install Angular CLI globally using npm by running the following command:

```
Install: npm install -g @angular/cli
```

Once installed, verify the installation by running the following command:

```
Verify installation: ng --version
```

This command will display the installed Angular CLI version along with other relevant details.

3. Enabling Self-Signed Certificates: To allow the use of self-signed certificates, follow these steps:

- Open Google Chrome and navigate to **chrome://flags/** in the address bar.
- Search for "**#allow-insecure-localhost**" in the search bar on the flags page.
- Enable the flag by clicking on the "Enable" button next to it.
- Relaunch Chrome to apply the changes. This enables Chrome to accept self-signed certificates for localhost URLs.

Note: After completing the project evaluation, it's recommended to disable the "**#allow-insecure-localhost**" flag and relaunch Chrome to revert back to the original browser settings for security reasons.



4. Project Setup and Execution: Pull the code from the provided github repository and follow the instructions provided in the accompanying video "Project Configuration and Execution.mp4". Install the necessary components, including database scripts, frontend, and backend, as demonstrated in the video. Once installed, run the frontend by accessing the browser with the following URL:

URL: <https://localhost:4200>

This URL will launch the ShopXperience application frontend in the browser, allowing you to interact with the application.

6. Technologies utilized:

HTML, CSS and Bootstrap:

Delving deeper into the frontend technologies utilized in the ShopXperience project, HTML, CSS, and Bootstrap formed the cornerstone of crafting visually appealing, responsive, and user-friendly interfaces. HTML, the backbone of web development, provided the structural foundation for presenting content within the application. Through the use of semantic HTML elements, such as <header>, <nav>, <section>, and <footer>, the layout of the application was organized in a logical and accessible manner. HTML facilitated the creation of various components, including navigation menus, product listings, forms, and interactive elements, ensuring seamless navigation and content consumption for users.

Complementing HTML, CSS played a pivotal role in styling and enhancing the visual presentation of the application. Leveraging CSS selectors, properties, and media queries, intricate design specifications were translated into captivating visual elements, encompassing aspects such as color schemes, typography, layout positioning, and animation effects. CSS enabled the customization of each component's appearance, ensuring consistency and aesthetic appeal across different device resolutions and screen sizes.

Furthermore, Bootstrap emerged as a powerful front-end framework, offering a comprehensive suite of pre-designed components, utilities, and responsive grid systems. By leveraging Bootstrap's extensive library of CSS classes and JavaScript plugins, the development process was accelerated, allowing for rapid prototyping and streamlined development of responsive layouts. Bootstrap's grid system facilitated the creation of fluid and adaptive designs, ensuring

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seamless compatibility across a diverse range of devices and screen sizes, from desktops to smartphones.

Moreover, Bootstrap's component library provided a plethora of reusable UI elements, including buttons, forms, cards, modals, and navigation bars, enabling developers to construct visually cohesive and feature-rich interfaces with minimal effort. Additionally, Bootstrap's built-in responsiveness ensured that the application's layout adapted seamlessly to various viewport sizes, enhancing accessibility and usability for users across different devices and platforms.

Angular and TypeScript:

The emergence of Angular and TypeScript brought about a significant evolution in frontend development practices. These technologies became the cornerstone for building dynamic and adaptable user interfaces, laying the groundwork for translating design concepts into immersive digital experiences. Through the utilization of components, directives, and services, I adeptly transformed abstract ideas into tangible frontend solutions.

My proficiency in TypeScript flourished as I harnessed its capabilities to streamline code organization, enabling seamless integration between frontend and backend systems. This synchronization played a pivotal role in enhancing the overall user journey. A central focus of my efforts revolved around managing backend API requests and orchestrating frontend UI components to respond harmoniously to these interactions. This holistic approach not only showcased my technical acumen but also contributed to the development of agile and engaging web applications.

Java and Spring Boot:

Exploring backend development became accessible by leveraging the robust capabilities of Java and Spring Boot frameworks. These technologies provided a solid foundation for building resilient backend systems, allowing for the application of object-oriented programming principles to develop modular and scalable components. My role primarily involved designing and implementing RESTful APIs, emphasizing the significance of Java and Spring Boot in establishing seamless communication channels between the frontend and backend layers. This cohesive integration not only facilitated data exchange but also ensured consistency and reliability across the application architecture. By harnessing the power of Java and Spring Boot, I was able to create a cohesive and efficient backend infrastructure that supported the overall functionality and performance of the application.



POSTMAN:



Postman is an essential tool for API development, offering a user-friendly interface for testing, debugging, and documenting APIs. It enables developers to craft and execute HTTP requests effortlessly, organize requests into collections for efficient management, and automate testing with robust scripting capabilities. Postman facilitates collaboration through cloud-based features, allowing teams to share collections, monitor API performance, and generate interactive documentation. Overall, Postman streamlines the API development process, ensuring reliability, efficiency, and collaboration throughout the lifecycle.

MySQL:

Delving deeper into the MySQL database aspect of the project, it served as the central repository for storing and managing various types of data critical to the application's functionality. MySQL, renowned for its reliability, scalability, and performance, provided a robust foundation for efficiently handling data storage and retrieval tasks. In the context of ShopXperience, MySQL was instrumental in storing diverse datasets such as user profiles, order items, order information, customer details and transaction records.

Furthermore, the order information table recorded crucial details pertaining to each transaction, including the items purchased, quantities, total prices, and associated user identifiers. This facilitated order tracking, inventory management, and sales analytics, providing valuable insights into user preferences and purchase behaviors. MySQL's robust features, such as transactions, indexes, and foreign key constraints, enhanced data consistency, performance, and security across the application. Additionally, its compatibility with various programming languages and frameworks simplified integration with the backend logic implemented in Java and Spring Boot.

7. Resources:

1. How to run the code:  Project Configuration and Execution.mp4
2. Project Demo:  Advanced Project Demo.mp4
3. Github Repository:

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8. References:

1. Angular Documentation: Official documentation with guides, tutorials, and API references. <https://angular.io/docs>
2. Angular University: Platform offering courses and articles on Angular development. <https://angular-university.io/>
3. Spring Boot Documentation: Official documentation with guides and tutorials. <https://docs.spring.io/spring-boot/docs/current/reference/html/>
4. Spring Framework Reference Documentation: Detailed guides and API references. <https://docs.spring.io/spring-framework/docs/current/reference/html/>
5. MySQL Documentation: Official documentation with guides and tutorials. <https://dev.mysql.com/doc/>
6. Learning MySQL by Bill Marken and Robin Oppenheimer: Beginner-friendly introduction to MySQL.