TASK 07P

Project Proposal

SWE30010 - Managing IT Projects

Class: Fri 08:00 DT7.2 **- Tutor:** Pham Thi Kim Dung

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Project Proposal[1] : *Let's Shop E-commerce Website*

Synopsis

Let's Shop: Powering Your Tech Dreams in Hanoi's Heart

Hanoi's vibrant streets are filled with digital energy, and its residents seek a seamless way to embrace the latest technologies. Let's Shop steps into the market, a tailor-made e-commerce platform catering specifically to local demand.
Local Gems, Global Choices: Leaving generic products behind, Let's Shop features a diverse selection of electronics, reflecting Hanoi's uniqueness. We handpick international household names and local favourites, from smartphones to home appliances.
Effortless Shopping: Our user-friendly website prioritises simplicity, guiding customers through a smooth shopping experience. Customers can easily browse, compare, and add items to their carts. Secure payment gateways guarantee peace of mind at checkout.
Convenience Delivered: We know our customers' time is precious. They can track their order every step of the way and choose between speedy home delivery or convenient store pickup for added flexibility.
Data-Driven Decisions: Let's Shop goes beyond simple selling. Our integrated analytics dashboards reveal valuable insights into customer trends and preferences, allowing us to constantly refine and personalise their shopping journey.
Beyond Products: We foster a vibrant community with product ratings and reviews, encouraging customers to share their experiences and make informed purchasing decisions.
Fostering Hanoi's Core: While Let's Shop strives to be a comprehensive solution, some aspects fall outside our current focus. We currently facilitate online transactions, leaving inventory management to individual sellers. International shipping and a mobile app are yet to be options but remain future possibilities.
Let's Shop is more than just an online store; it bridges local needs with global possibilities. We aim to become the ultimate destination for Hanoi residents seeking a convenient, reliable, personalised electronics shopping experience.

Background

The rise of digital technology has transformed the retail landscape worldwide, and Vietnam is no exception. In Hanoi, the capital city known for its bustling markets and vibrant commerce, there is a growing demand for a localised online platform that caters to the electronics market.

The proposed project aims to develop an e-commerce website dedicated to selling electronics specifically for the residents of Hanoi. This platform will provide a wide range of electronic products and cater to local needs and preferences.

Scope

Objectives

The primary objective of this project is to develop a user-friendly e-commerce website dedicated to selling electronics to the residents of Hanoi. The platform will be designed to cater to the specific needs and preferences of the local market, offering a wide range of electronic products from both international and local brands.
Specifications

- **User Roles**: The website will have two roles: Customer and Admin. The Admin Panel will be separated from the customer's user interface.
- **User Experience**: Provide an intuitive user interface that ensures the shopping experience and simple navigation.
- **Product Range**: Offers a wide range of electronic products from both global and local brands.
- **Product Placement**: Items added to the cart can be checked out and create orders.
- **Secure Payment**: Integrate safe payment gateways from established third-party providers.

[1] This document is by no means a “full project proposal”. It has been simplified and customized for the purposes of SWE30010 teaching. The full project proposal includes many other sections which have not been discussed during the first few weeks of SWE30010 teaching.

- **Order Delivery**: Monitor the order status and email the user of changes.
- **Data Analytics**: Integrate statistic charts and graphs into the admin panel, providing insightful information about the customer's trends and pain points.
- **User Group**: Customise the product offerings to the local market in Hanoi, Vietnam and provide a 'store pickup' option for customers who prefer to collect their purchases from a physical location.
- **Ratings and review**: Upon receiving the order, the customers can provide feedback through ratings and reviews for each purchased product.

Out of scope

While we aim to provide a comprehensive e-commerce solution, certain aspects are beyond this project's scope:

- We will not be managing the physical inventory of products. The platform will serve as a medium for online transactions, and the responsibility of inventory management lies with the respective sellers.
- The platform will not offer international shipping. At this stage, the service is localised to Hanoi.
- We will not be developing a mobile application for the platform. The focus is creating a responsive website that works well on various devices.

Stakeholders

1. **Customers**: End-users using the e-commerce platform to browse, shop, and make purchases. Their satisfaction and feedback are crucial for the success of the project.
2. **Business Analysts**: The individuals or groups responsible for the overall strategy, vision, and success of the e-commerce business.
3. **Development Team**: Developers, designers, and technical staff responsible for creating and maintaining the e-commerce website. Their expertise and efforts directly impact the quality and functionality of the platform.
4. **Product Manager**: The individual responsible for defining the features, priorities, and overall direction of the e-commerce platform. They act as a bridge between the business and development teams.
5. **Sellers**: Individuals responsible for selling products through the e-commerce platform. They may provide insights into customer needs and preferences.
6. **IT Infrastructure Team**: Individuals responsible for managing the e-commerce platform's technical infrastructure. They ensure that the website is reliable, scalable, and secure.
7. **Third-Party Service Providers**: Companies or individuals providing payment processing, shipping, or analytics services. Their integration with the e-commerce platform is crucial for overall functionality.
8. **Investors/Financial Stakeholders**: Individuals or entities providing financial support or investment for the project. They are interested in the project's success for a return on investment.

Others:

- **Marketing Team**: Professionals responsible for promoting and advertising the e-commerce website. They are interested in features that can enhance marketability and user engagement.
- **Customer Support/Service**: Teams handling customer inquiries, complaints, and support. They are directly interested in the platform's usability and functionality, as it affects customer satisfaction.
- **Legal and Compliance Teams**: Professionals responsible for ensuring the e-commerce platform complies with relevant laws and regulations. They may be concerned with privacy, data protection, and consumer rights issues.

Deliverables and schedule

Initial Release Schedule

Initial Release Schedule of the Product backlog items

No.	Item	Dependencies	Business Value (1 least – 10 most)	Release Schedule (Sprint 1 | 2 | 3 | …)
F1	Design database schema	None	7	Sprint 1
F2	Create modules and set up the environment (OutSystems)	F1	8	Sprint 1

F3	Set up user roles, develop user registration and log in authentication	F2	9	Sprint 1
F4	Develop admin screens for product, category, and order monitoring	F2	8	Sprint 1
F5	Develop user screens for product browsing and filtering, shopping cart, and order placement	F2	9	Sprint 2
F6	Integrate secure payment for transaction	F2	10	Sprint 2
F7	Create Admin dashboard with data analytics providing customer insights and trends	F5	8	Sprint 3
F8	Develop customer ratings and reviews for purchased items	F6	7	Sprint 3
F9	Integrate Customer Relationship Management with Salesforce and Make.com	F7	9	Sprint 4
F10	Finish documentation: readme, basic design, detail design, etc.	F8	9	Sprint 5
F11	Deploy app into production	F6, F7, F8	10	Sprint 6
F12	Monitor app performance, gather feedback and reviews for future improvements	F11	9	Sprint 7

Figure 1: Backlog items and release schedules

Deliverables

- Online electronic store website (fully functional application)
- Source code (all binaries, config files)
- Social media page
- Comprehensive admin manual (online & downloadable)
- Detailed system training program for admin
- Ongoing maintenance and support

Schedule

Sprint 1: February 26 – March 11

Sprint 2: March 12 – April 5

Sprint 3: April 6 – May 3

Sprint 4: May 4 – May 31

Sprint 5: June 1 – June 28

Sprint 6: June 29 – July 26

Sprint 7: July 27 – August 23

Note: The project will follow a 2-week sprint schedule.

Solution Direction

We propose using OutSystems, a low-code web and mobile application development platform for this project. Some alternative tech stacks that can be used are LAMP, MERN, WordPress, and Shopify.

Tech stack	Description	Reason for discard
MERN	Stands for MongoDB, Express.js, React.js, Node.js, is a popular choice for building web applications using JavaScript.	1. Not as secure as other stacks like LAMP, which can be a concern for e-commerce websites that handle sensitive customer information. 2. Not the best choice for large-scale e-commerce websites that require high levels of scalability.
LAMP	Stands for Linux, Apache, MySQL, PHP, is a popular choice for building web applications using PHP.	1. Can be slow and inefficient when handling large amounts of data, which can be a concern for e-commerce websites that handle many transactions. 2. Not be the best choice for e-commerce websites that require high levels of security, as it is more vulnerable to attacks than other stacks like MEAN or MERN
WordPress	A popular content management system that can be used to build e-commerce websites.	1. Not be the best choice for e-commerce websites that require high levels of scalability and security. 2. Can be slow and inefficient when handling large amounts of data, which can be a concern for e-commerce websites that handle many transactions. 3. Is more vulnerable to attacks than other stacks like MEAN or MERN.
Shopify	A popular e-commerce platform that provides a range of features and functionalities.	1. Not the best choice for e-commerce websites that require high levels of customisation and flexibility. Shopify is a closed platform that limits the ability to customise the website beyond the available templates and themes. 2. Shopify charges a transaction fee for each sale made through the platform, which can concern businesses that handle many transactions.

Figure 2: Alternative tech stack explanation and reason for discarding

OutSystems, on the other hand, provides a low-code platform that can help businesses achieve faster development time, higher productivity, better performance, easier maintenance, and scalability. Here is how OutSystems fits in a KoST analysis of our Let's Shop E-commerce Website project:

Criteria	Analysis
Knowledge	1. **Problem domain**: Retail industry, electronic products that the store sells. This would include knowledge of the target audience, the products, and the competition. 2. **Solution domain**: Knowledge of e-commerce platforms, web development, and digital marketing.
Skills	1. **Experience**: This project will significantly benefit web development, e-commerce platforms, and digital marketing. 2. **Other skills**: Other skills that would be useful include knowledge of user experience design, search engine optimisation, and content creation.
Technology	1. **Existing solutions**: Many solutions exist for e-commerce websites, including Shopify,

	WooCommerce, Magento, and BigCommerce. These platforms provide a range of features and functionalities that can be customised to meet the business's specific needs. 2. **OutSystems**: OutSystems is a low-code platform that enables rapid application development and delivery. It provides a visual development environment that allows developers to build applications without writing code. OutSystems can help businesses achieve faster development time, higher productivity, better performance, easier maintenance, and scalability.

Figure 3: KoST analysis for the project

OutSystems is a low-code platform that can develop custom applications quickly and efficiently. It offers a range of pre-built templates and accelerators that can be customised to meet your specific needs and requirements. OutSystems provides a wide range of features, making it an ideal choice for developing a highly scalable e-commerce website that sells electronic products from a local retail store in Hanoi. Here are some reasons why:

- **Rapid development**: With OutSystems, you can create custom apps more quickly and effectively, which will shorten the time it takes for your e-commerce website to go live.
- **Scalability**: OutSystems' high scalability design enables you to add new features and functionalities as your company grows.
- **Customizability**: OutSystems offers a selection of accelerators and pre-built templates that can be altered to satisfy your unique specifications.
- **Integration**: OutSystems makes combining your e-commerce website with your current data sources and systems simple by integrating with various platforms and systems.
- **Security**: To guarantee that your e-commerce website is safe and secure from online attacks, OutSystems offers strong security measures.

In summary, OutSystems is an ideal choice for developing a highly scalable e-commerce website that sells electronic products from a local retail store in Hanoi. Its rapid development, scalability, customizability, integration, and security features make it a powerful platform for building custom applications.

High-level design

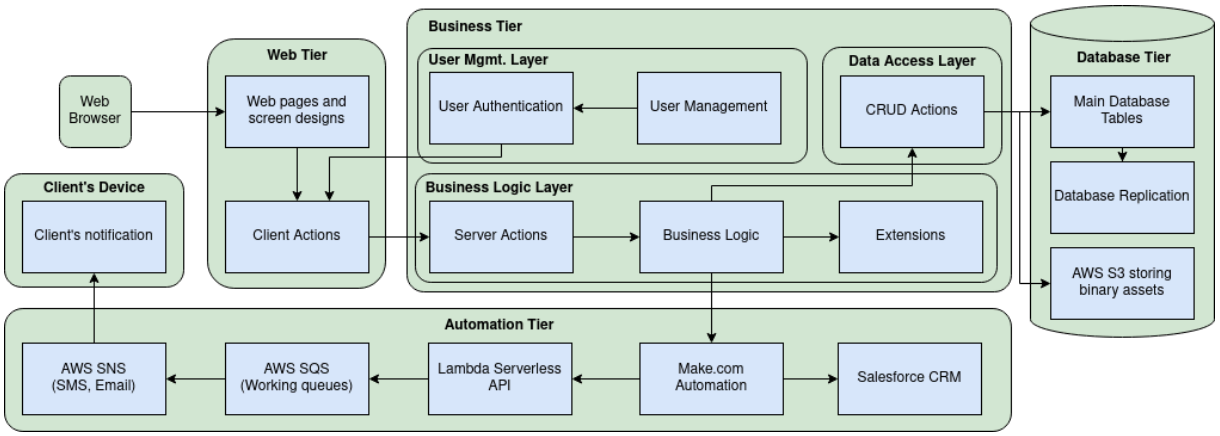

Figure 4: High-level Design Architecture Diagram

The high-level architecture diagram provides a bird's-eye view of the proposed system, illustrating the components' interactions. Let's Shop E-commerce Website will follow a 4-tier architecture design:

1. **Web Tier**: Includes the UI components of the project.
    a. Web pages and screen designs: Include the project's interface, the client interface for shopping and order placement and the admin interface for order management and data analytics.
    b. Client Actions: These are the screen-level functions in OutSystems used to handle client-side events and screen interactions.

2. **Business Tier**: Includes the server action and serves as a bridge for the client to handle multiple services and access the Data and Automation Tier.
    a. **Business Logic Layer**: Handles the core business logic.
        i. Server Actions: runs on the server side. It contains server-side logic and can perform. Server actions are typically used to implement business logic and are called from client, screen, or server actions.
        ii. Business Logic: Deals with different services, including data retrieval, manipulation, input/output with Excel and CSV files, emailing, customer service automation, and validation tasks.
        iii. Extensions: We will use extension assets primarily for input handling, Excel input/output, and PDF compilation.
    b. **Data Access Layer**: Directly interacts with the database for data retrieval and manipulations.
        i. CRUD Actions: Create, Reade, Update, and Delete actions to records stored in the database tables.
    c. **User Management Layer**
        i. User Authentication: Using OTP mechanism and session for granting user access.
        ii. User Management: Manage how different roles can interact with the system, following the least-privilege principle for various roles.
3. **Database Tier**: Stores critical system data.
    a. Database Tables: Relational database table with schema storing product details, orders, user accounts, and asset references in AWS S3.
    b. AWS S3: Stores binary assets of the system, including images, videos, and imported Excel files.
    c. Database Replication: These are copied and maintained database objects, such as tables, in multiple database environments. It improves data availability and provides redundancy to protect against data loss.
4. **Automation Tier**: Includes external services the system interacts with for customer management.
    a. Make.com: Automation platform, serves as a skeleton to trigger other services, handles input/output and provides easy integration with the OutSystems platform.
    b. Salesforce CRM: A service for managing and maintaining customer relationship management.
    c. Lambda Function: Serverless API to handle SNS messaging.
    d. AWS SQS: message queuing to decouple and scale our serverless API.
    e. AWS SNS: managed messaging service for communication, allowing sending SMS and email directly to users for order confirmation, OTP, and campaign advertisement.

Quality Management

In this project's context, quality refers to the degree to which the "Let's Shop" E-commerce Website meets specified requirements and customer expectations. We will use the ISO/IEC 25010 software quality model to measure the website's quality. This model emphasises 08 quality aspects: Functional Suitability, Performance Efficiency, Compatibility, Usability, Reliability, Security, Maintainability and Portability. By following these quality metrics and standards, our goal is to surpass our customers' expectations by providing a user-friendly, efficient, and trustworthy online shopping experience for the users.

Definition of Done

As part of this project, we need to establish the "Definition of Done", which outlines the criteria to be met to consider the website development completed. These conditions could include the following:

1. All planned features, as detailed in the project scope, have been implemented and tested.

- Detailed Feature Implementation: All items of the backlog’s sprint 1 must be fully developed, integrated, and functioning as per the specifications in the project scope within 2 working weeks.
- Comprehensive Testing: This could include unit testing, integration testing, system testing, usability testing, and acceptance testing. A feature is tested only if it has passed all relevant test cases without critical bugs.

2. Fully Functional Website with High Usability Score:

- Fully Functional and Zero Critical Bugs: This ensures that the website provides all intended services without critical disruptions. In e-commerce, functionalities like product display, cart management, checkout processes, and payment integrations are vital. Ensuring zero critical bugs is crucial for customer trust and retention.
- High Usability Score: A high usability score is key in e-commerce platforms. It reflects ease of use, user satisfaction, and accessibility. A score of at least 80 in popular usability tests like the System Usability Scale (SUS) indicates a very high standard, aligning with industry best practices. It ensures the website is functional and user-friendly, crucial for maintaining a low bounce rate and ensuring repeat customers.

3. Comprehensive Testing with High Test Coverage:

- Passing Unit, Integration, and System Tests: This multi-level testing approach ensures that both individual components (unit tests) and their interactions (integration tests) work correctly and that the system as a whole (system tests) meets the requirements. This comprehensive testing is essential for identifying and fixing bugs early in development.
- Test Coverage of at least 90%: Indicating the software's reliability and maintainability. A 90% threshold ensures that most of the code is tested, which helps identify potential faults. This level of coverage is ambitious yet achievable, striking a balance between thorough testing and practical constraints like time and resources.

4. Responsiveness with Top Browsers and Devices in Vietnam:

- Responsiveness: This ensures that the website provides an optimal viewing experience—easy reading and navigation with minimum resizing, panning, and scrolling—across various devices. The website should maintain a consistent and user-friendly layout across various screen resolutions, ranging from 320 pixels (mobile) to 1920 pixels (desktop). Given the increasing use of mobile devices for online shopping, this is critical for reaching a wider audience.

5. The website is secure, with no known security vulnerabilities, and complies with all data protection regulations. A secure and compliant website is crucial for building customer trust and protecting against cyber threats:

- Customer Trust: A secure website builds customer trust. When customers know their personal and financial information is protected, they are more likely to feel confident transacting on the site.
- Protection against cyber threats: E-commerce websites are attractive targets for cybercriminals seeking to exploit vulnerabilities and gain unauthorised access to customer data or financial information. Having a secure website and regularly addressing potential vulnerabilities reduces the risk of data breaches and cyber-attacks.

6. The website's documentation is comprehensive, covering all features, and up to date, revised within the last 2 weeks. Having comprehensive and up-to-date documentation is a foundational element that supports the ongoing success and sustainability of the proposed website:

- Maintenance and Troubleshooting: Up-to-date documentation is crucial for maintaining and troubleshooting the website. It provides a reference for developers to understand how different components work, making it easier to identify and resolve issues, bugs, or errors that may arise during maintenance or updates.
- Scalability and Future Development: As the e-commerce website evolves, new features may be added, and existing ones may be modified. Comprehensive and up-to-date documentation ensures developers have the information they need to integrate new features seamlessly and understand how changes may impact existing functionality.

The documentation needs to be revised within the last 2 weeks, which is the minimum time required to keep all the data and features up-to-date and to resolve any issues or bugs that may appear during the development.

7. The stakeholders have reviewed and approved the website, with at least 90% expressing satisfaction in post-project evaluation:

- Stakeholder Alignment: Ensuring that stakeholders review and approve the website helps to align the development team's efforts with the expectations and requirements of key stakeholders. This promotes a shared understanding of the project goals and objectives.
- Project Success Metrics: Meeting or exceeding the 90% satisfaction threshold is a tangible success metric for the project. It demonstrates that the development team has delivered a product that aligns with stakeholder expectations and contributes to the overall success of the e-commerce initiative.

The stakeholder review and approval requirement with a high satisfaction rate is integral to ensuring project success, aligning with stakeholder expectations, and validating that the website effectively meets the business's and its users' needs.

Quality Requirements

The ISO/IEC 25010 model divides software quality into eight main characteristics, each with sub-characteristics. Here are the characteristics and possible sub-characteristics relevant to the “Let's Shop E-commerce Website”:

1. **Functional Suitability**
   - **Functional Completeness**: Every feature specified in Sprint 1 is successfully implemented by the project deployment deadline for testing. Other add-on features should cover 80% of the total requirements. Ensuring that a significant portion of functionalities is implemented in the first sprint demonstrates progress and helps detect any errors or requirement misunderstandings early.
   - **Functional Correctness**: Within the first month of operation, the website’s functions (like payment processing and user registration) work accurately with an error rate of less than 5%. Critical errors should stop the transactions immediately and redirect users to the beginning phase of the process.
   - **Functional Appropriateness**: Target a score of 4 out of 5 in early user satisfaction testing or feedback on the appropriateness of functions. This assesses whether the functions are suitable for the intended tasks and are user-friendly.
2. **Performance Efficiency**
   - **Time behaviour**: After launch as production at the end of sprint 4th, the website should load rapidly, with an average load time of less than 5 seconds. Loading the homepage's product or checkout pages takes under 5 seconds during peak traffic. Ensuring that users do not experience delays when browsing the website can lead to frustration and potential loss of sales.
   - **Resource utilisation**: When under peak load, such as a sale event, the website should use system resources efficiently, with CPU usage not exceeding 70% and memory usage below 80% of capacity, ensuring that the server is not overloaded and the site remains responsive during traffic spikes and is cost-effective.
   - **Capacity**: The website should handle at least 1,000 simultaneous users. Ensuring the website can handle many users is vital for e-commerce success, especially during sales or promotional events.
3. **Compatibility**
   - **Compatibility:** Catering to the top 5 browsers and devices in Vietnam is a strategic approach to ensure the website performs well for your primary market's most commonly used technologies. It covers most of our potential user base while being a realistic goal for our development team. The website should be compatible with the latest versions of Chrome, Safari, Firefox, Edge, Opera, and popular mobile devices, including iPhone, Samsung, Xiaomi, etc. No significant feature loss or degradation in user experience on browsers and devices should be detected.
   - **Mobile optimisation:** The website should be optimised for mobile devices with smaller screens to ensure the content is easily readable and accessible.
   - **Fast loading:** The website should be designed to load quickly, especially on mobile devices, to ensure users can access the content without delay.
4. **Usability**
   - **Understandability:** Within the 1st week of launch, at least 90% of test users should be able to navigate and use the website without assistance, indicating that the website’s design and layout are intuitive and

the content is clear and easy to understand. This includes locating products, adding them to the cart and checking out without problems.

- **Learnability:** At least 80% of test users could finish a purchase within 15 minutes of their first visit, demonstrating that new users should be able to navigate the website and efficiently complete the essential tasks. This includes creating an account, searching for products, adding a product to a cart, entering payment details, and confirming the purchase.

5. **Reliability**
   - **Maturity:** Within the first month of operation, the website should be stable and reliable, with a bug rate of less than 3%.
   - **Availability:** Within the first month of operation, the website should work normally with many users. The website can handle 5000 users at the same time.
   - **Fault tolerance:** Within the first month of operation, the website should be able to handle errors gracefully and not crash due to them. The website will return a warning in 90% of cases of errors and continue to work without stopping. After a year, it is expected to have MTBF >= 10000 hours.
   - **Recoverability:** Within the first month of operation, the website should be able to cancel a transaction if errors occur. The website will redirect users to the first step of the transaction and cancel the process if it is not completed in up to 120 seconds, which means users will not lose their money even if there are errors while conducting payment. This must work with 95% of cases of errors.
6. **Security**
   - **Confidentiality:** The website should recognise which accounts are “Admin” with an accuracy of 98%. Only individuals with “Admin” accounts can access the website's data.
   - **Integrity:** The website must crash immediately in 10 out of 10 cases of illegal actions like unauthorised access to data.
   - **Non-repudiation:** The website will ask users to provide their citizen ID each time they make a transaction. These IDs will be recorded and prevented from being used again by other users. This also prevents users from repudiating the payment if they have made orders.
   - **Accountability:** The website will record the IP addresses used to conduct illegal actions. These IP addresses are expected to have a 97% chance of being banned if used again.
   - **Authenticity:** The website will ask users to complete a CAPTCHA test before finalising the transactions. The website should cancel transactions in 10 out of 10 cases of failing the test.
7. **Maintainability**
   - **Modularity:** The codebase should be organised into independent and interchangeable modules. Each module should encapsulate a specific functionality, making it easier to understand, maintain, and update. For example, the website can have separate modules for user authentication, product catalogue, shopping cart, and payment processing.
   - **Reusability:** The website's standard functionalities, like user authentication or payment processing, should be designed as reusable modules. This ensures that future updates or new features can leverage existing, well-tested components.
   - **Analyzability:** When a new issue is reported, the code and structure should be organised and commented on within a working day. This ensures developers can quickly comprehend the existing code, facilitating efficient bug analysis and fixing. Additionally, testing documentation and bug fixing should be completed within a half-working day each, allowing for a swift resolution of reported issues.
   - **Modifiability:** Our goal for the website’s modifiability is to enable updates and new features to be added in a two-week sprint. The approval process involves requirement analysis and design approaches. For large-impact change requests, development time is allocated up to one week, followed by a second week for testing, bug fixing, and deployment. This structured approach ensures that modifications are well-planned, developed, and validated before being released to the production environment.
   - **Testability:** This is crucial for ensuring that changes can be thoroughly tested to identify and fix potential issues. For our e-commerce website, the two-week sprint includes a dedicated week for testing on the Test Environment, bug fixing, and deployment within three working days. This ensures adequate time for comprehensive testing, including unit testing, integration testing, and user acceptance testing. The structured testing process contributes to the overall maintainability by catching and addressing issues before they reach the production environment.
8. **Portability**

- **Adaptability:** Our website should operate smoothly on various devices and browsers in the first month. At least 95% of its functionality should be accessible on Vietnam's top 5 devices and browsers. Leveraging OutSystems' integrated functions for responsive design is crucial for achieving adaptability. Core features like shopping carts and order management will be prioritised for all users, progressively enhancing others on high-performing devices. Fast loading, under 2 seconds on 4G, with smooth interactions and optimised touch controls for mobiles are specified to ensure a seamless user experience across diverse platforms.
- **Installability:** The installation process should be well-documented, providing clear instructions to facilitate deployment. Compatibility checks ensure the website can be seamlessly installed across various hosting environments. Automation of the installation process, where feasible, will be considered to enhance efficiency and minimise potential issues during deployment.
- **Replaceability:** Our website's design approach involves creating a modular system with clear interfaces. This facilitates the smooth replacement of components, such as payment gateways or third-party integrations, when necessary. The emphasis is on standardised protocols and APIs, enabling efficient and seamless replacements or upgrades without causing disruptions to the website's overall functionality.

Resources

Provide a summary of the team members and their roles.

1. Luong Trac Duc Anh (Leader) - Product Owner
2. Nguyen Minh Nghia - Data Engineer + DevOps Engineer
3. Nguyen Cong Anh - Frontend Engineer
4. Nguyen Gia Minh - Backend Engineer
5. Nguyen Anh Duc - Scrum Master
6. Dinh Tran Dat - Business Analyst + Tester

Approval Signatures:

Project Team

	Name of student	Student Id	Signature
1	Trac Duc Anh Luong	103488117	Trac Duc Anh Luong
2	Tran Dat Dinh	103487143	Tran Dat Dinh
3	Cong Anh Nguyen	103792960	Cong Anh Nguyen
4	Gia Minh Nguyen	103487156	Gia Minh Nguyen
5	Anh Duc Nguyen	103488489	Anh Duc Nguyen
6	Minh Nghia Nguyen	103806269	Minh Nghia Nguyen

Project Sponsor [Your Tutor]

Tutor's name (on behalf of the client)	Signature:
Pham Thi Kim Dung