TASK 04P

Solution Direction and Design

SWE30010 - Managing IT Projects

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

GROUP 1: The Beavers

Trac Duc Anh Luong - 103488117

Minh Nghia Nguyen - 103806269

Gia Minh Nguyen - 103487156

Cong Anh Nguyen - 103792960

Tran Dat Dinh - 103487143

Anh Duc Nguyen - 103488489

Project Proposal[1] **:** *Let's Shop Ecommerce Website*

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 1: 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,

[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.

	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 2: 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

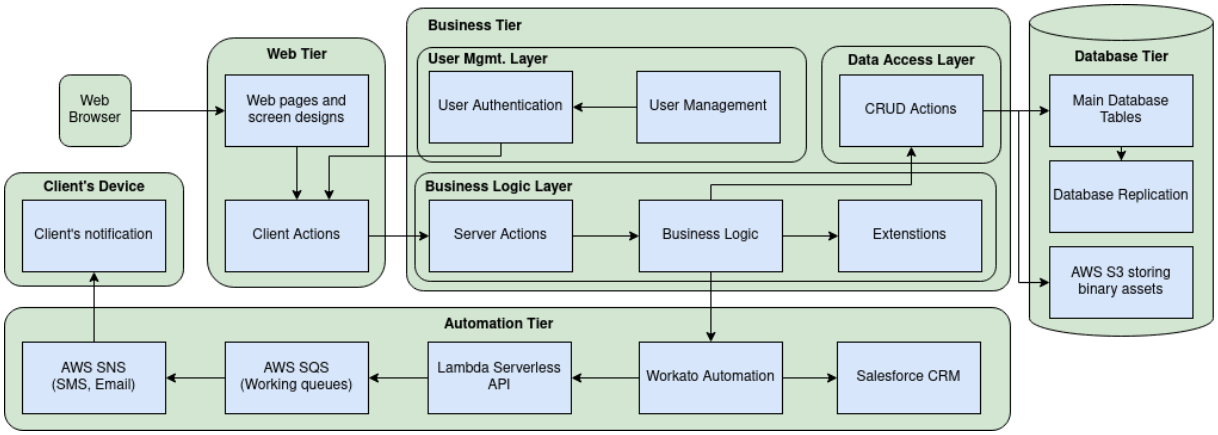

Figure 3: High-level Design Architecture Diagram

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. Workato: 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.

TEAM'S RESPONSES TO THE TASK

Team Member	Option	Detail Notes
Trac Duc Anh Luong	Agree	The Solution Direction is detailed, with alternative considerations and project analysis with the KoST model. The high-level design separated a complex system into 4 tiers, with logical interactions between each tiers and their components.
	Disagree	In the high-level design, the SMTP server can be removed as AWS SNS can send SMS and email.
Minh Nghia Nguyen	Agree	Duc Anh's proposed solution architecture was imposing. It wasn't just a typical design but a well-thought-out plan that perfectly fit the client's needs.
	Disagree	The low-code and cloud platform may cost significant operating expenses. The design architecture still needs adjustments on the "SMTP server" component and the database tier.
Cong Anh Nguyen	Agree	Impressive Solution Direction and very detailed High-Level Design.
	Disagree	The low-code and cloud platforms can be costly. The "SMTP server" component needs some adjustments.
Gia Minh Nguyen	Agree	Both architectural designs are well-structured. Though the similarity between both designs is high, each has uniqueness. Combining these two solutions will produce a perfect design for our project.
	Disagree	The low-code approach minimises the complexity of coding by hand, but developing an e-commerce platform using OutSystems requires a high budget and may limit the ability to customise.

Dat Tran Dinh	Agree	The solution direction is straightforward and well-written; the architectural design of the two proposed solutions is at a high level, with a well-elaborated and detailed description of how the system works. We can combine both solutions since they are similar to have a more complete architectural design.
	Disagree	When built initially, the approved solution's (low-code and automation) price could go beyond the budget if not carefully calculated, and the customisation ability is more limited compared to the high-code platform.
Anh Duc Nguyen	Agree	The proposed solution direction is clear and well-justified. The alternatives are carefully considered in terms of pros and cons, and it is clear why the OutSystems platform was chosen. The architectural design is detailed as it illustrates how the 4 tiers interact and what technology/cloud services are utilised in each tier. The combined version of the 2 proposed solutions is the most optimal for the project regarding development time, security or maintenance.
	Disagree	The low-code solution may have many advantages for both the development team and the customer. Still, there is a concern about cost efficiency as the project's budget is finite. This concern should be discussed again among the team and the customer.

Figure 4: Team's responses to the task

MINUTES OF MEETING

Location: Room 7.2 Duy Tan, Hanoi

Time: Start at: *8:30, 19/1/2024* - End at: *9:10, 19/1/2024*

Attendees:

1. Trac Duc Anh Luong (Product Owner)
2. Nguyen Minh Nghia (Scrum Master)
3. Nguyen Gia Minh (Scrum Team Member)
4. Nguyen Anh Duc (Scrum Team Member)
5. Dinh Tran Dat (Scrum Team Member)
6. Nguyen Cong Anh (Scrum Team Member)

Notes:

- Backlog revision
- Leader proposes the solution direction using OutSystems
- Haven't set the AWS account -> Leave demo for Workato later
- Remove "SMTP server"
- Combine 2 design solution diagrams
- Teacher raised the concern of the project's cost when using AWS

Materials:

- Duc Anh's solution directions
- Nghia's solution directions
- Duc's solution directions

Decisions:

1. Choose OutSystems as the solution
2. Merge 2 High-Level diagrams into a final solution
3. Remove the “SMTP server” component when designing the final solution
4. Update flow in the diagram to make it more transparent for scrum team members to understand

Tasks:

No.	Task Name	PIC(*)	Due
1	Design database schema	Trac Duc Anh Luong	19/01/2024
2	Merge 2 solution and create a final design solution	Nguyen Minh Nghia	19/01/2024
3	Complete the final solution and submit	Trac Duc Anh Luong	19/01/2024
4	Research alternative tech stacks	Nguyen Gia Minh	19/01/2024
5	Analyze OutSystems platform based on KoST analysis technique	Tran Dat Dinh	19/01/2024
6	Demonstrate benefits of OutSystems platform	Nguyen Cong Anh	19/01/2024
7	Propose the cost projection for implementing the design	Nguyen Anh Duc	19/01/2024

(*) PIC = Person in charge