



Project Final Report

05/09/2020

Project: Yeshili Reflective Materials

Team: 5 Seconds of Spring

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Executive Summary

“The customer is the source of the enterprise’s wealth” (quoted from Yeshili’s official website). As a first-class global reflective materials supplier, Yeshili Reflective Material Co, Ltd adheres to the concept that to grow with customers can have a win-win result. Managing customer relationships is challenging for Yeshili in an expanding business. We want to build a web-based customer information system for the company to improve its customer experience. Right now Yeshili still accepts orders from clients in a face-to-face way. Customers can only check their order status by phone calls and track shipments on the website of ZTO Express. The information system we designed will address these issues with functions that facilitate quick contact, account management, online purchasing, and order tracking.

We have proceeded with the outsourcing approach of system development based on the feasibility study. The initial schedule of developing the system takes 66 days, in which 12 days at the planning stage, 8 days at analysis, 12 days at design, 31 days at implementation, and 3 days at close-out.

At the system analysis phase, we have gathered information from interviews, observation, and document analysis. The main takeaway is to understand how Yeshili’s existing system works, which provides a real-world context. Based on the facts collected, we have mapped out data flow diagrams to describe the outputs and inputs of each entity and the process itself. The entities involved include customer, company employee, warehouse, and carrier. The general processes in the level 0 diagram consist of reaching contact, managing customer accounts, and managing order. The ER diagram shows the relationship between Yeshili’s entities in the database. And the process data flow diagram visually distinguishes job sharing and responsibilities for sub-processes of the company’s business process.

Moving to the implementation phase, we have designed the user interface, conforming to Yeshili’s business requirements. The user interface has detailed the home page, product pages, check out page, contact page, account sign-up and login pages, order details page, etc.. The design and setup of the user interface aim to be visually appealing to customers. We also have made a test plan including types that have been subdivided into unit testing, functional integration test, system test, and user acceptance test. And Our implementation plan lasts a whole month in January 2021, in which all implementation procedures are scheduled specifically.



Creating a web-based customer information system will be a decisive step for Yeshili to take in the long run. With the system on hand, Yeshili will create values for its clients and itself consistently.

Statement of Work

1. Background

1.1 Introduction

Yeshili Reflective Material Co, Ltd is a Chinese reflective material manufacturer who also does international business. Their main products include the reflective film for road traffic safety and reflective cloth for personal safety protection. Thus, they are the supplier of the commercial product. The way they do business is in the business-to-business model in a traditional way.

1.2 Purpose of Project

With the business-to-business model, Yeshili doesn't have to face millions of customers every day. The way they communicate with their clients is usually by phone or face meeting. For clients, they don't have an information system to check all the historical orders they have, and it is also inconvenient for them to track a certain order on the way. Also, as the business grows larger, more clients and orders will come in, giving employees a hard time recording and accessing historical records. Therefore, it's necessary to develop an information system for customers of Yeshili to save all their records and easily access them by logging into their accounts.

This information system is designed to reduce the labor-consuming and time-costing. With this system, clients of Yeshili would not have to review much paperwork to locate some historical records. For example, if a customer wants to repurchase a specific product that was bought two years ago, he or she can just login and search records instead of going over all previous paperwork or contacting Yeshili to find it.



1.3 Scope of Project

1.3.1 Scope

The scope of the project is to have a web-based customer system so that customers can easily contact the company, have their order information recorded, and track the order online.

1.3.2 Functions

Contact Tool:

- Introduce a link that leads customers to the email window to contact the company
- Add an instant messaging tool on the website, allowing customers to talk with the company's representatives directly during work hours

Right now Yeshili just puts the phone number and the email address on the website. It is not convenient for customers to contact the firm if they have some questions while browsing the website. This function will definitely contribute to a better communication between Yeshili and its customers.

Account Management:

- Customers can register with email addresses or cell phone numbers on the website.
- Customer information must include full names, addresses, email addresses, phone numbers, and related industries.
- Prioritize customers by annual trade volume online and offline

This function helps collect all customers' personal information and their order information. The firm can send advertisements and promotions to customers via message or email. By prioritizing customers, the firm can figure out critical customers and maintain a good relationship with them. Also, this function will provide data for the firm to analyze the trade volume of each product and make next year's business plan.

Online Purchasing:

- Allow customers to make a purchase in a small amount online
- Allow customers to check the order status after placing orders
- Allow customers to track orders after they are shipped
- Allow customers to comment after orders are completed



Now the firm offers one-to-one service to each customer. For each order, customers need to visit the firm in person or make a phone call with sales. It's time consuming for sales to double-check the order information with customers. Then sales will send the order to the related department for processing. If customers want to check their order status, they must call the sales to get the tracking number. And to track the package, customers need to turn to the official website of the express company to search for their packages. The online purchasing function will create a significantly easier shopping experience for customers: customers can place orders quickly and track their orders easily. Besides, it helps save lots of human resources and reduces processing time for each order. Even new customers who have no idea about the quality of products can benefit from checking other customers' comments.

Integration

- Partner with ZTO express company for order shipping and returning
- Partner with a local bank: customers have special discounts if they pay with a local bank account, and the local bank will charge fewer service fees.

2. Project Feasibility Study

As the first stage of the system development cycle, the feasibility analysis aims to identify any critical issues that relate to the success of the project. Yeshili evaluates two options of system development: in-house or outsourcing. The viability of each option is discussed in the following three areas: technical feasibility, organizational feasibility, and economic feasibility.

2.1 Technical Feasibility

The technical feasibility assesses the validity of Yeshili's technology assumptions, architecture, and design of the system. Three sources of technical risk and their risk levels between in-house and outsourcing are identified as follows:

2.1.1 Familiarity with Business

An in-house IT team is more familiar with the business application area so that the system developed will be better at meeting business requirements. The outside IT peopl

e, however, can only obtain insights into the business from insiders, which will introduce additional risks such as miscommunication.

2.1.2 Familiarity with Technology

The in-house IT team is new to developing a web-based customer system so that they may have a limited range of expertise and technology concerning account management, order tracking, and etc.. An outside IT team with rich experience in developing customer systems is more desirable to mitigate the risk of insufficient technical expertise.

2.1.3 Compatibility

The compatibility is defined as the degree of integration required. The customer system is new to Yeshili but requires a high level of integration with the logistics company and the local bank. Compared with the outsourcer, the in-house team may be less skilled to achieve this goal.

Given three aspects of technical feasibility explained above, outsourcing to a professional IT firm is a more viable option for Yeshili.

	In-House	Outsourcing 
Familiarity with Business	High	Medium
Familiarity with Technology	Medium	High
Compatibility	Medium	High

Table 1 – The summary of the technical feasibility

2.2 Organizational Feasibility

The organizational feasibility assesses Yeshili's project from the aspect of strategic alignment and effect on stakeholders.

2.2.1 Strategic Alignment

Building a web-based customer system aligns with one of Yeshili's core values, which is "creating value wholeheartedly for the customers". This alignment will be the engine that boosts Yeshili in the right direction strategically.

2.2.2 Effects on Stakeholder Groups

Yeshili's project will impose positive effects on all stakeholder groups. The system owner, Yeshili, will benefit from better knowledge of customers and thus better customer retention. The system users (i.e. customers) will enjoy a more pleasant experience doing business with Yeshili such as speedier communication through instant-messaging tools.

After evaluating the organizational feasibility, Yeshili could proceed with the project with much confidence.

2.3 Economic Feasibility

2.3.1 Costs

	In-House	Outsourcing
Development team salaries	✓	
Consultant fees		✓
Office space and equipment	✓	
Data conversion and storage costs	✓	✓
System upgrades	✓	✓
Software licensing fees	✓	✓

Figure 1 Cost Estimation

Considering the costs, if Yeshili builds its own IT team, it will have to pay the team, provide office space and equipment for them. Another choice is to outsource the wo

rk to a technology consulting company, which will incur consultant fees. Both methods need to account for data conversion and storage costs. system upgrades and software l licensing fees.

2.3.2 Benefits

	In-House	Outsourcing
Increased sales	✓	✓
Reductions in inventory	✓	✓
Improved customer service	✓	✓
Increased brand recognition	✓	✓

Figure 2 Benefit Estimation

As for the benefits, since both alternatives build the same functional system for customers to place and track orders, they have the same benefits of increasing sales, reducing inventories, improving customer service and brand recognition.

2.3.3 NPV Result

	Year 0	Year 1	Year 2	Year 3	Total
Total Benefits		1,000,000	2,000,000	2,500,000	5,500,000
Present value of benefits		909,091	1,652,893	1,878,287	4,440,271
Total Costs	150,000	150,000	10,000	10,000	320,000
Present value of costs	150,000	136,364	8,264	7,513	302,141
At 10% RATE of return					
NPV		4,138,130			

Figure 3 NPV – In-House Case

For the in-house alternative, the total benefits from sales and brand recognition increase, inventory reduction and customer service improvement are ¥1 million in the first year, ¥2 millions in the second year and ¥2.5 millions in the third year. At a 10%

rate of return, the present value of benefits is around ¥4.4 millions. The total cost of building an IT team is ¥3.2 millions with a discounted total value of ¥3 millions. By deducting the costs from the benefits, we reach that the NPV of the in-house is ¥4.1 millions.

	Year 0	Year 1	Year 2	Year 3	Total
Total Benefits		1,000,000	2,000,000	2,500,000	5,500,000
Present value of benefits		909,091	1,652,893	1,878,287	4,440,271
Total Costs	200,000	100,000	100,000	100,000	500,000
Present value of costs	200,000	90,909	82,645	75,131	448,685
At 10% RATE of return					
NPV	3,991,586				

Figure 4 NPV – Outsourcing Case

For the outsourcing alternative, the total benefits are the same as the in-house because of the same functional system. At a 10% rate of return, the present value of benefits is around ¥4.4 millions. The total cost of outsourcing is ¥ 5 millions with a discounted total value of ¥4.5 millions. By deducting the costs from the benefits, we reach that the NPV of the outsourcing case is ¥4 millions. Because the NPV of the in-house is ¥0.1 million greater than that of the outsourcing, we recommend the company to build its own IT team in the economic feasibility analysis.

Overall, based on the feasibility study, we suggest Yeshili choose the outsourcing alternative as the economic benefit (¥0.1 million) of the in-house is insubstantial compared with the great system functionality brought by the outsourcing.

3. Location

In the era of big data, there is a lot of information that needs to be saved, especially for business purposes. A database is necessary that enables companies to store, organize, operate, and retrieve data collected in daily business processes. More importantly, companies should be able to reliably retrieve that information from their databases, analyze the potential outcomes, and then use the result to help make business decisions.



We will build our own database to store the data instead of choosing a cloud service. After the outsourcing company develops the system, we will hire and train specialized staff, like SQL programmers, on how to keep the data secure and storage system stable.

Cloud service has advantages like no need for own equipment, software licenses, database developers, IT crew to maintain the system, and payments of the power bill for servers, etc. However, the biggest problem is the loss of control. The companies do not have direct access to the server, so they can not directly monitor the security of these servers and the sensitive data. Protecting customers' personal data is one of the core values of the company. In case the cloud system fails, the personal information leakage may result in identity theft, which will undermine the company's credibility. Besides, there is the problem of the cost of scale: once a company reaches a certain size, it will become more economical to build its own database. Also, considering that our company operates in China, we believe no capable companies can provide reliable and mature cloud services in the market.

4. Schedule

		WBS Parent	WBS	Name	Duration	Predecessors
1			1	<input type="checkbox"/> Yeshili Reflective Materials Information System	66 days	
2		Yeshili Reflective Mater...	1.1	<input type="checkbox"/> Planning	12 days	
3		Planning	1.1.1	<input type="checkbox"/> The Initial Meeting	1 day	
4		The Initial Meeting	1.1.1.1	Project Sponsor	1 day	
5		The Initial Meeting	1.1.1.2	Clarify the Business Need	1 day	
6		The Initial Meeting	1.1.1.3	Business Requirements	1 day	
7		The Initial Meeting	1.1.1.4	Business Value	1 day	
8		The Initial Meeting	1.1.1.5	Special Constraints	1 day	
9		Planning	1.1.2	<input type="checkbox"/> Feasibility Analysis	4 days	3
10		Feasibility Analysis	1.1.2.1	Technical Feasibility	3 days	3
11		Feasibility Analysis	1.1.2.2	Economical Feasibility	3 days	3
12		Feasibility Analysis	1.1.2.3	Operational Feasibility	3 days	3
13		Feasibility Analysis	1.1.3	<input type="checkbox"/> The 2nd Meeting	1 day	10;11;12
14		The 2nd Meeting	1.1.3.1	Determine the Blueprint	1 day	
15		Planning	1.1.4	<input type="checkbox"/> Project Setup	7 days	13
16		Project Setup	1.1.4.1	Project Scope	1 day	13
17		Project Setup	1.1.4.2	Budget Estimate	3 days	16
18		Project Setup	1.1.4.3	Projected Benefit	3 days	16
19		Project Setup	1.1.4.4	Structure of the Plan	3 days	16
20		Project Setup	1.1.4.5	Team Forming	2 days	19
21		Project Setup	1.1.5	<input type="checkbox"/> The 3rd Meeting	1 day	20
22		The 3rd Meeting	1.1.5.1	Staff Planning	1 day	
23		Yeshili Reflective Mater...	1.2	<input type="checkbox"/> Analysis	8 days	22
24		Analysis	1.2.1	<input type="checkbox"/> Identifying	3 days	
25		Identifying	1.2.1.1	Gather Information from Different Departments	2 days	
26		Identifying	1.2.1.2	List Business Needs and Requirements	1 day	25
27		Analysis	1.2.2	<input type="checkbox"/> Develop an Analysis strategy	5 days	26
28		Develop an Analysis strategy	1.2.2.1	Find the Problem of Existing System	1 day	
29		Develop an Analysis strategy	1.2.2.2	New features Decision	1 day	28
30		Develop an Analysis str...	1.2.3	<input type="checkbox"/> Create Use Cases	3 days	29
31		Create Use Cases	1.2.3.1	Determine the Processes	1 day	
32		Create Use Cases	1.2.3.2	Access the Data	1 day	
33		Create Use Cases	1.2.3.3	Trial Application	2 days	32
34		Yeshili Reflective Mater...	1.3	<input type="checkbox"/> Design	12 days	33
35		Design	1.3.1	<input type="checkbox"/> System Design	12 days	
36		System Design	1.3.1.1	Hardware	3 days	
37		System Design	1.3.1.2	Software	5 days	
38		System Design	1.3.1.3	Interface	5 days	
39		System Design	1.3.1.4	Database and Files Format	1 day	36;37;38
40		System Design	1.3.2	Physical data model	3 days	39
41		System Design	1.3.3	Physical process model	3 days	40
42		Yeshili Reflective Mater...	1.4	<input type="checkbox"/> Implementation	31 days	41
43		Implementation	1.4.1	Develop System	20 days	
44		Implementation	1.4.2	Testing	3 days	43
45		Implementation	1.4.3	Install System	2 days	44
46		Implementation	1.4.4	Training	5 days	45
47		Implementation	1.4.5	Post implementation	1 day	46
48		Yeshili Reflective Materials I...	1.5	Project Close-Out	3 days	47

5. Conclusion



In a way of outsourcing, Yeshili can efficiently and successfully build a web-based customer system to facilitate customer account management, online purchasing, and order tracking. Moreover, a self-developed database is most applicable to the current situation and best for long-term benefits. The detailed project schedule guarantees that every prerequisite is settled and the system can launch on time. We believe Yeshili's system project can be executed smoothly if it follows the working suggestions listed above.



System Analysis Phase

Facts finding

- The company currently uses the Kingdee K3 system as an ERP system. But the company doesn't have a customer system for customer management and online purchasing.
- The firm offers one-to-one service to each customer. Customers must come to the company in person to place orders and sign contracts.
- All orders will be delivered by express.
- Customers need to call their sales to check their orders and tracking numbers.
- The existing system only records the name and contacts of each customer.
- The existing system only records information of each order but doesn't summarize annual trade volume for each customer.

Information Gathering Techniques

Interviews

We had telephone interviews with a salesman and three customers of Yeshili Company. This is the most critical way for us to gather useful information. For all interviews, we adopted open-ended questions. The Interview with the salesman provided us with the details of the order process and customer management. Additionally, he talked about the disadvantages of the current system, which helps us to improve the existing system. Through interviews with customers, customers evaluated their customer experience and gave some suggestions about it.

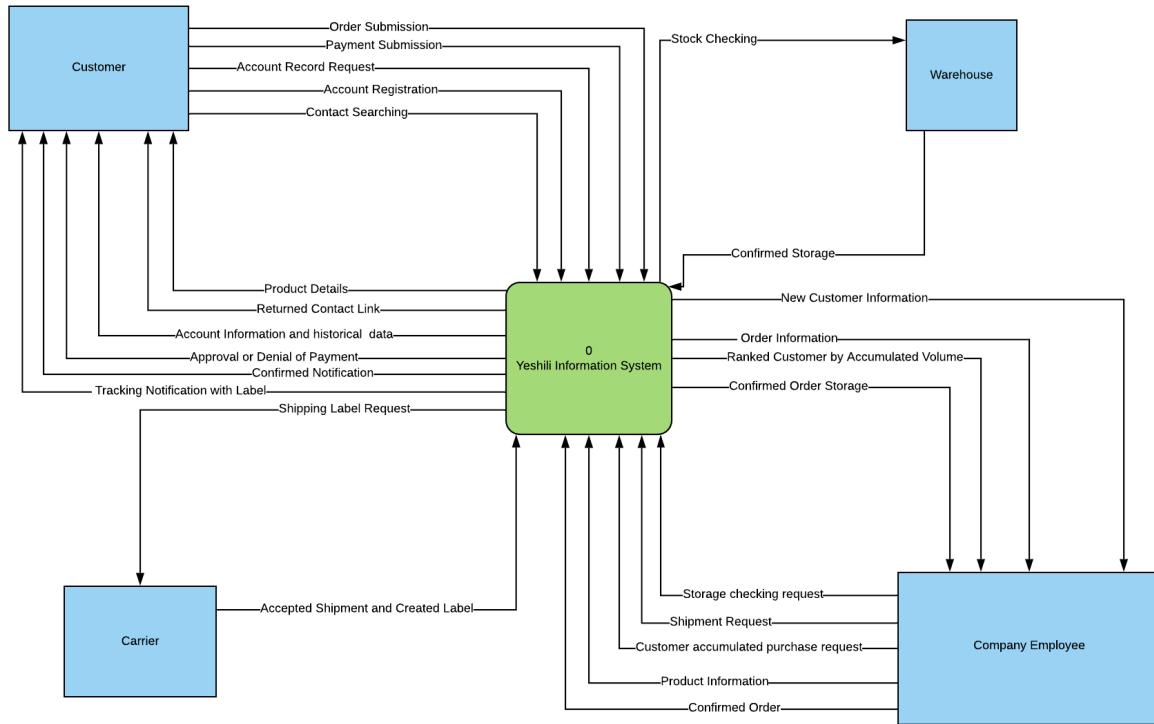
Observation

We observed how sales operate on the Kingdee K3 system, thus we can see exactly what is being done. Also in this way, we can know about all the functions and interface of the current system.

Document analysis

We collected more specific facts about the current system by browsing the official website of Kingdee K3 and reading professional analysis from system analysts.

Context Diagram



External entity:

Customer: this external entity represents a customer comes into Yeshili's customer system for product or service

Company Employee: this external entity represents employees in the field who process certain work

Warehouse: this external entity represents the company's warehouse which is for the product storage, and the company can check the storage for the product with the warehouse.

Carrier: this external entity represents the carrier that is responsible for the product shipment after the customer made the purchase online

The Yeshili Customer System is a system designed for Yeshili's customers to make the basic requirements for general business cases.

System input:

From Customer:

- Contact searching
- Account registration

- 
- Account record request
 - Payment submission
 - Order Submission

From Company Employee:

- Product information
- Storage checking request
- Confirmed order
- Customer accumulated purchase request
- Shipment request

From Warehouse:

- Confirmed storage

From Carrier:

- Accepted shipment and created the label

System output:

To Customer:

- Returned Contact Link
- Product Details
- Account information and historical records
- Approval or denial of the payment
- Confirmed notification (for the confirmed order)
- Tracking notification with label

To Company Employee:

- New customer information
- Order information
- Confirmed order storage
- Ranked customer by accumulated volume (this is for prioritizing the customer)

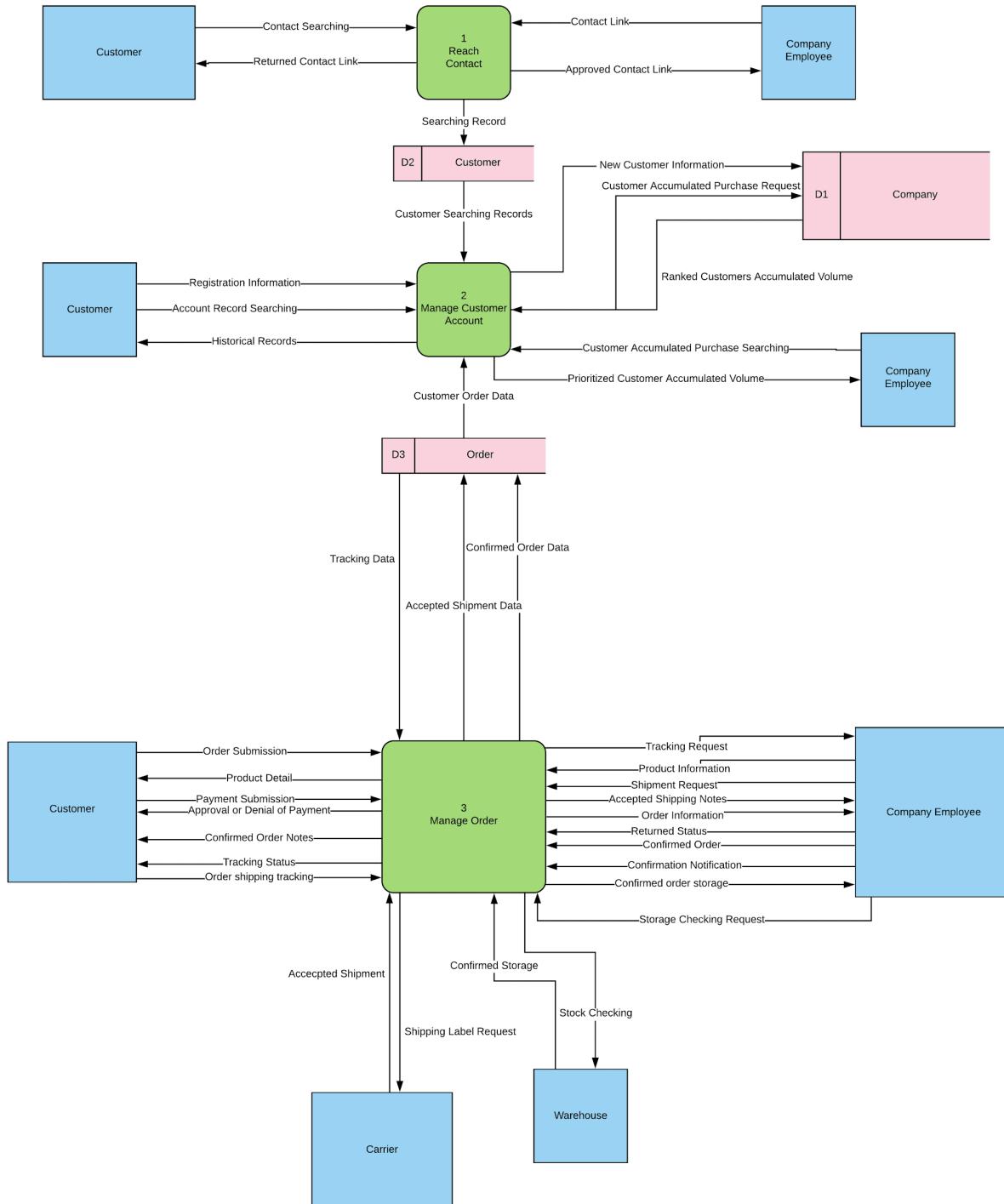
To Warehouse:

- Stock checking

To Carrier:

- Shipping label request

Level 0 Diagram



The four entities described in the Context Diagram Description are retained in the Level 0 Diagram. However, the system shown previously is now expanded and includes 3 processes and 3 data stores.

Data Stores:

Company (D1): This data store stores registration information on the customer (including their full names, addresses, email addresses, phone numbers, and related industries) and registered customers' trade volume that is used to segment the customer group.

Customer (D2): This data store stores information about each contact between the customer and the company employee. The subject and details of the inquiry from the customer are recorded to assist future contact and improve customer service.

Order (D3): This data store stores the order information that the customer placed online. It includes a summary of the order (including order date, product names, and order quantity) plus the associated tracking information.

Processes:

1. **Reach Contact:** This process builds a direct bridge between the customer and the company employee. It includes receiving contact requests from the customer, adding the subject and details of requests to the Customer data store, reaching available employees, and returning contact links to the customer and the employee.

Process Inputs:

From Customer:

- Contact Searching

From Company Employee:

- Contact Link

Process Outputs:

To Customer:

- Returned Contact Link

To Company Employee:

- Approved Contact Link

To Customer (data store):

- Searching Record

2. **Manage Customer Account:** This process manages the first step of the customer transaction. It includes capturing the registration information from the customer, adding this information to the Company data store, returning account records to the customer, and retrieving prioritized accumulated trade volume to the employee.



Process Inputs:

From Customer:

- Registration Information
- Account Record Searching

From Company Employee:

- Customer Accumulated Purchase Searching

From Customer (data store):

- Customer Searching Records

From Company (data store):

- Ranked Customer Accumulated Volume

From Order (data store):

- Customer Order Data

Process Outputs:

To Customer:

- Historical Records

To Company Employee:

- Prioritized Customer Accumulated Volume

To Company (data store):

- New Customer Information
- Customer Accumulated Purchase Request

3. **Manage Order:** This process is used for customers to track orders and for the company employee to process orders. It also includes the interaction with the carrier regarding the shipment and with the warehouse regarding the stock checking.

Process Inputs:

From Customer:

- Order Submission
- Payment Submission
- Order Shipping Tracking

From Company Employee:

- Product Information
- Shipment Request
- Returned Status
- Confirmed Order
- Confirmation Notification

- 
- Storage Checking Request

From Carrier:

- Accepted Shipment

From Warehouse:

- Confirmed Storage

From Order (data store):

- Tracking Data

Process Outputs:

To Customer:

- Product Detail
- Approval or Denial of Payment
- Confirmed Order Notes
- Tracking Status

To Company Employee:

- Tracking Request
- Accepted Shipping Notes
- Order Information
- Confirmed Order Storage

To Carrier:

- Shipping Label Request

To Warehouse:

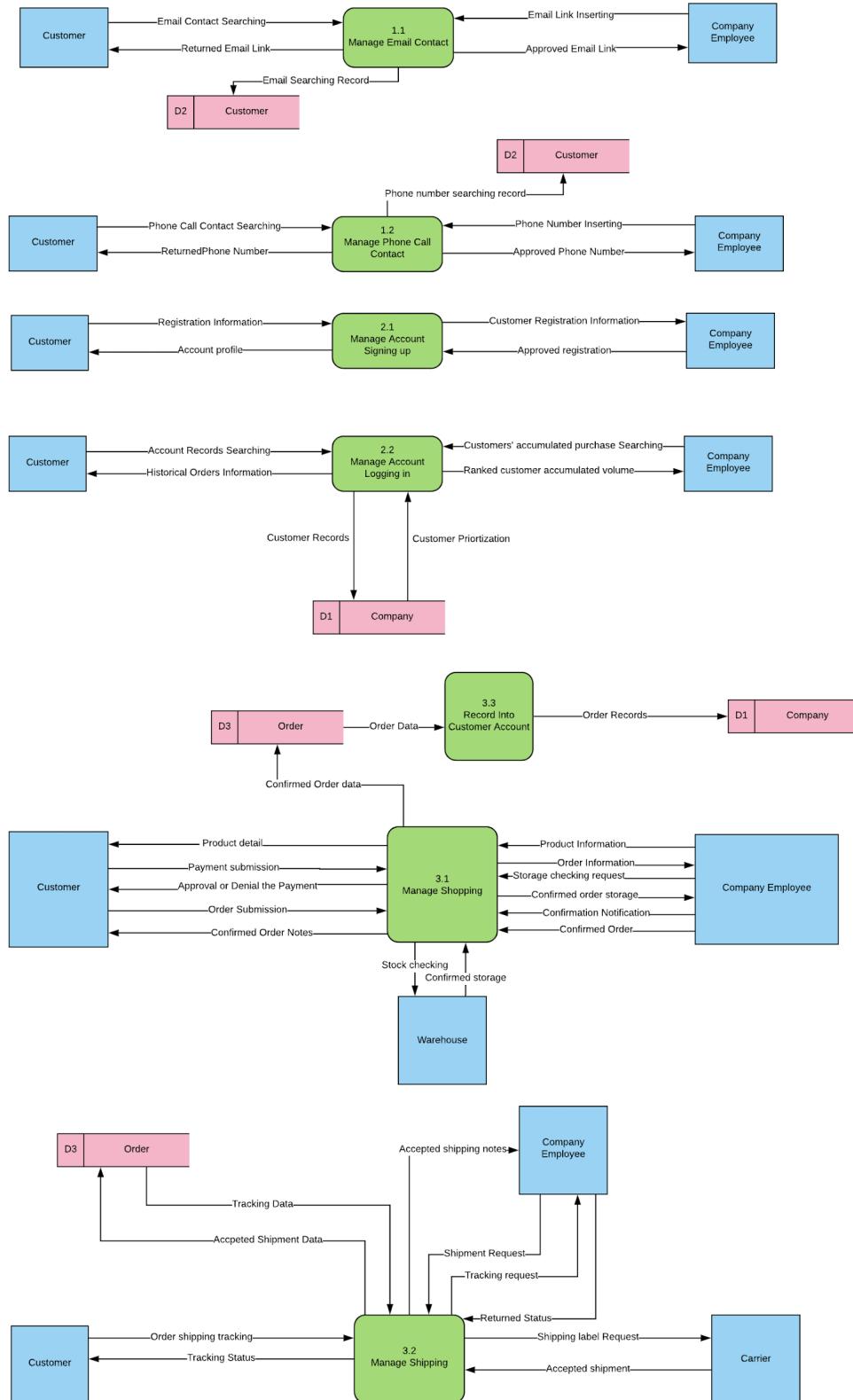
- Stock Checking

To Order (data store):

- Accepted Shipment Data
- Confirmed Order Data



Level 1 Diagram





This diagram depicts the level 0 diagram into detailed processes.

Process 1.1 Manage Email Contact

This process is responsible for customers who want to use email to contact the company for their business. And the company should offer an email link so that the customer just needs one-click to get access to write an email.

Process Inputs:

From Customer:

- Email contact searching (split from “search contact” in level 0)

From Company Employee:

- Email link inserting (split from “insert contact link” in level 1)

Process Outputs:

To Customer:

- Returned email link (customer can just one-click the link)

To Company Employee:

- Approved Email link

To Customer Datastore:

- Email Searching Record

Process 1.2 Manage Phone Call Contact

This process is responsible for customers who want to contact the company via phone call. And we assume not all the customers are able to call the company from their computer, so the phone number can just write on the webpage instead of using a link.

Process Inputs:

From Customer:

- Phone call contact searching (split from “search contact” in level 0)

From Company Employee:

- Phone number inserting (split from “insert contact link” in level 1)

Process Outputs:

To Customer:

- Returned phone number

To Company Employee:

- Approved phone number

To Customer Datastore:

- Phone number searching record

Process 2.1 Manage Account Signing up

This process is responsible for customers who are new to the system and have to register an account to save their future records. In this process, they need to fill the basic information.

Process Inputs:

From Customer:

- Registration information

From Company Employee:

- Approved registration

Process Outputs:

To Company Employee:

- Customer Registration Information

To Customer:

- Account profile

Process 2.2 Manage Account Log In

This process is responsible for current customers who want to log into their accounts to check their previous orders' information so that they can find certain types of material that they want to re-purchase easily. Also, the company employees are able to prioritize existing customers based on their accumulated purchased volume.

Process Inputs:

From Customer:

- Account records searching

From Company Employee:

- Customers' accumulated purchase searching

From Company Data Store:

- Customer Prioritization

Process Outputs:

To Customer:

- Historical Order information

To Company Employee:

- Ranked customer's accumulated volume

To Company Data Store:

- Customer records

Process 3.1 Manage Shopping

This process is responsible for customer shopping and making their orders online. So customers should be able to search the product and make a payment.

Process Inputs:*From Customer:*

- Payment submission
- Order submission

From Company Employee:

- Product information
- Confirmed order
- Confirmation Notification
- Storage checking request

From Warehouse:

- Confirmed storage

Process Outputs:*To Customer:*

- Product detail
- Approval or denial of the payment
- Confirmed order notes

To Company Employee:

- Order information
- Confirmed order storage

To Warehouse:

- Stock checking

To Order Data Store:

- Confirmed Order data

Process 3.2 Manage Shipping

This process is responsible for the order shipment process, so the carrier will need to get the request from the system to ship the order to the customer, and after the carrier confirms the request, the system would send a notification like an email or text message to customers so they can track their orders.

Process Inputs:*From Carrier:*

- Accepted the shipment

From Order Data Store:

- Tracking data

From Customer:

- Order shipping tracking

From Company Employee:

- 
- Shipment request
 - Returned status

Process Outputs:

To Customer:

- Tracking status

To Carrier:

- Shipping label request

To Order Data Store:

- Accepted Shipment data

To Company Employee:

- Tracking request
- Accepted shipping notes

Process 3.3 Record Into Customer Account

This process is responsible for the confirmed order information get backed up in the customer's account which would move to the company data store.

Process Input:

From Order Data Store:

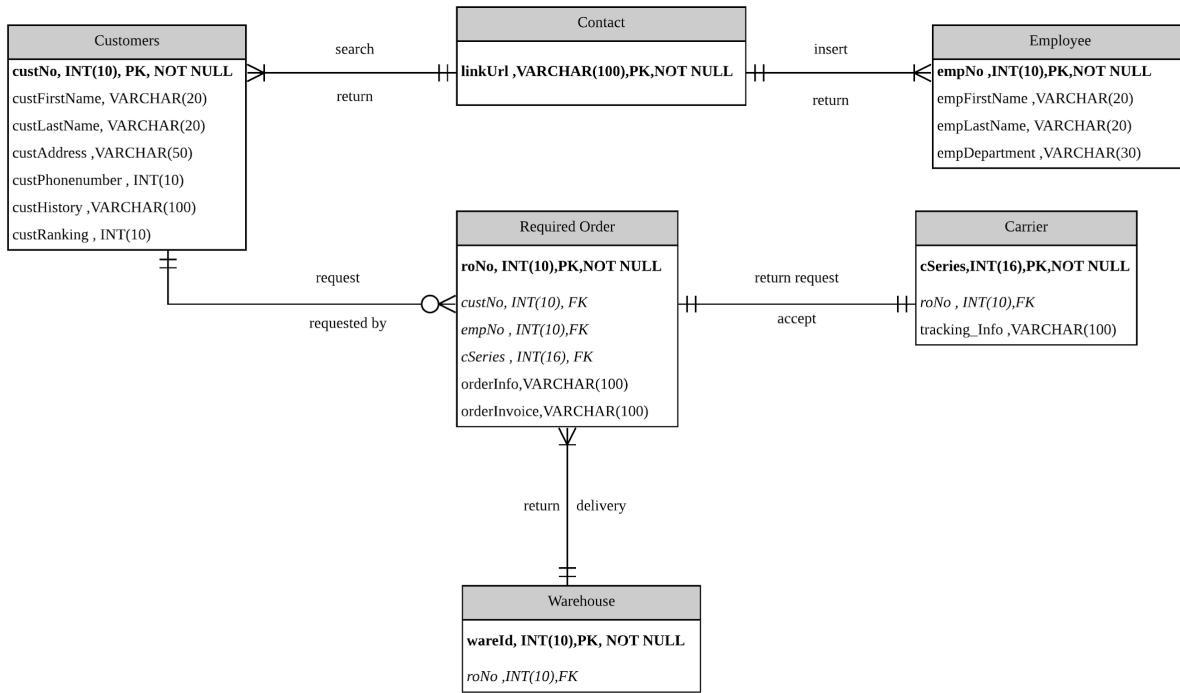
- Order Data

Process Output:

To Company Data Store:

- Order Records

ERD



Identify the entities

For our case of Yeshili, we have six entities shown in the ERD diagram. To serve the order system, we need the entities of Customers, Contact, Employee, Required Orders, Carrier and Warehouse.

Identify the relationships

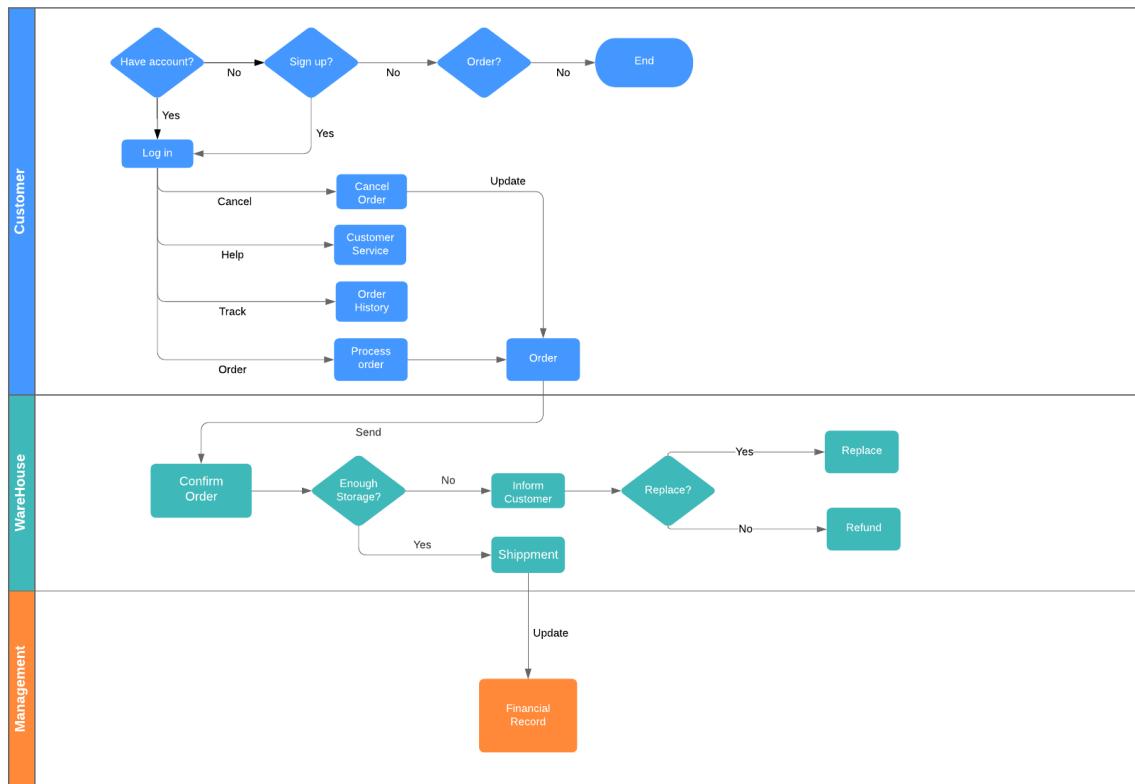
Our entities are pairwise related. Customers request and receive the contact link from the URL stored in the Contact entity. Employees edit and receive the contact link from URL stored in Contact entity. Customers place an order and it is stored in the Required Order entity. They can also check their orders and the Required Order entity will return the order information to them. Carriers receive the order information from the Required Order entity and create tracking orders for each order. Finally, the Required Order entity sends the order information to the Warehouse entity and the Warehouse entity will prepare and check the products according to the order information.

Describe the relationship

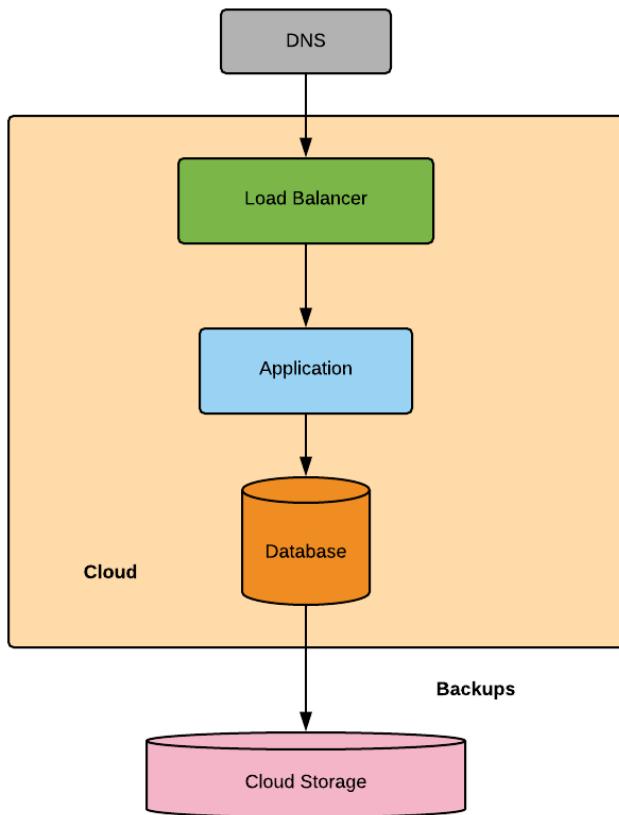
The contact information can be requested by one and more customers while customers can only find one contact link. Only one employee has the permission to edit the contact information and the information can be requested by one and more employees. Customer

rs can have 0 or more orders, but one order can only refer to one customer. Similarly, one and only one order is referred to one and only one carrier and warehouse because in our case, Yeshili only cooperates with a single carrier and products of an order are only picked from one warehouse. One warehouse can take up on several orders.

Process Data Flow Diagram



Design Architecture



We choose the single site cloud architecture for our system. The reason is that our company is a business to business commerce, we don't have a large quantity of orders flows. In most cases, clients would order a large quantity of products in a single order. Thus, to control the spending and make things easy, we choose the single site cloud architecture. Our clients from any country can visit our website to make orders, and our server is located in Taizhou, China. A Chinese cloud service company Lanlin would take the work of cloud storage.

Implementation Details

Development Tasks

In the process of development, there are many tasks we need to face. The first thing is we need to decide what kind of User Interface we would like to build, and since the company does have its website with some basic information, we want to make a new we



bsite which is a combination of previous information and new functions. The second thing is listing out all the business requirements. As this User Interface is mainly focusing on the company's clients, the requirement is providing more convenience in contacting, making orders, and tracking etc.. For each of the requirements, identify the related functions we should contain in the UI and breakdown the steps they should go through in operating. After identifying the works we have to finish, the last task is to assign each team member their work, like who is responsible for the design, who should take care of the test part, who needs to take control of the whole process, etc.

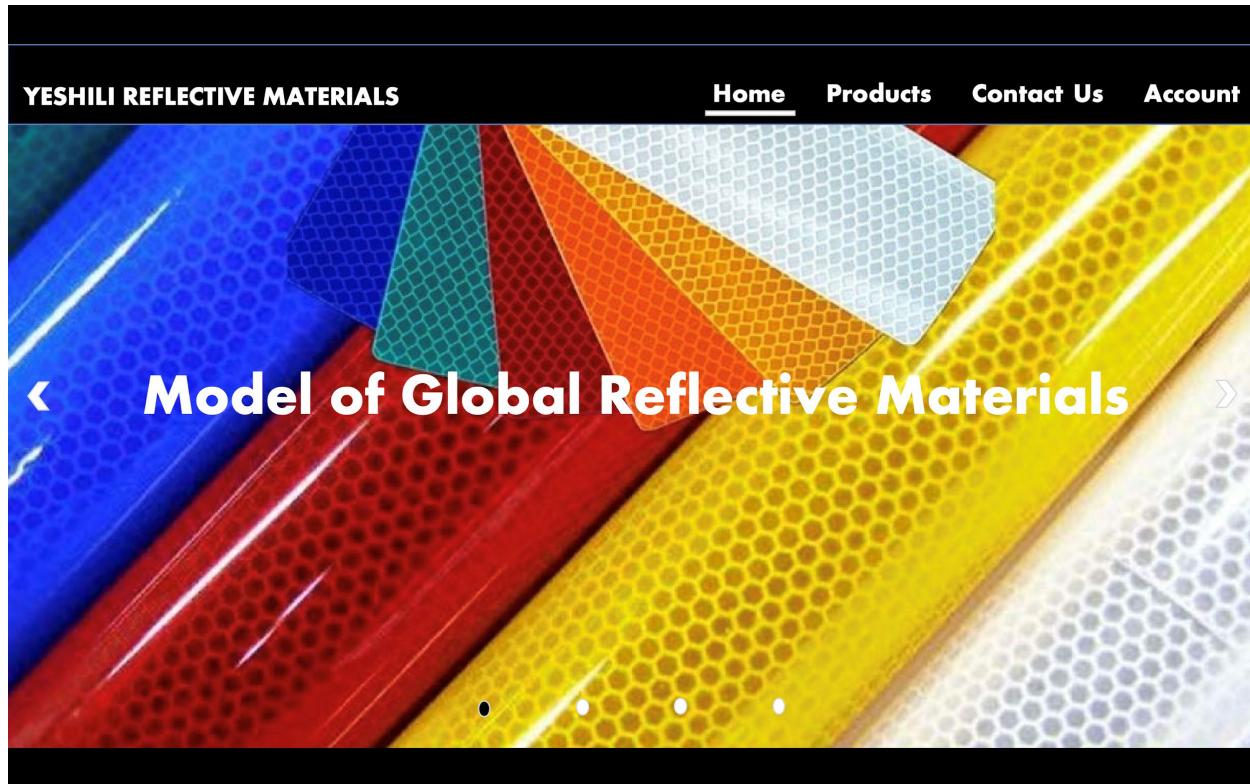
UI tasks in detail and what are they

As the development tasks are confirmed, we need to go to the next step which is identifying the UI tasks. First of all, we need to list out the functions we've recognized in the development process. We have to make an arrangement of these functions to ensure when users visit the website, all the process is reasonable. Then, we need to choose the style of the website. The basic requirement of the design is clean as we don't want to mess all the functions up. In addition, we have to integrate all the sections together, the format of all sections should be in a consistent format.

UI Screenshot

After figuring out our tasks, we created several pages of design demo for our User Interface which meets the requirements we set earlier.

Home page



Product main categories

YESHILI REFLECTIVE MATERIALS

Home **Products** Contact Us Account



0 • 0 0

Sub-categories

YESHILI REFLECTIVE MATERIALS

Home **Products** Contact Us Account

REFLECTIVE CLOTH

PROCESS CUSTOM

GENERAL SAFETY FIELD

NON-FLAME RETARDANT SERIES

THERMAL TRANSFER

SPECIAL OCCUPATION SAFETY

FLAME RETARDANT SERIES

Product lists in the sub-category

YESHILI REFLECTIVE MATERIALS

[Home](#) [Products](#) [Contact Us](#) [Account](#)

THERMAL TRANSFER



Product details

YESHILI REFLECTIVE MATERIALS

[Home](#) [Products](#) [Contact Us](#) [Account](#)

CART 1

THERMAL TRANSFER > YSL800



[YSL800](#)

\$18.00

- Application: typically used in various anti-counterfeiting trademarks and various color reflective printing transfer marks.
- Easy to use.
- Good effect.

QTY

[ADD TO CART](#)



Cart

YOUR CART

PRODUCT	QTY	PRICE
YSL800	100	\$1800

Subtotal:	\$1800
Shipping & Handling:	\$200
Tax:	\$180
Total:	\$2180

[CHECK OUT](#)

Check out

CHECK OUT

1. Shipping Address**2. Billing Address****3. Payment Method****4. Review Order**

Please review your order information before placing order.

Subtotal:	\$1800
Shipping & Handling:	\$200
Tax:	\$180
Total:	\$2180

[SUBMIT ORDER](#)

Contact us

YESHILI REFLECTIVE MATERIALS

[Home](#) [Products](#) [Contact Us](#) [Account](#)

CALL US

Zhejiang Yeshili Reflective Materials Co.,Ltd:
0576-88201076

Reflective Film Hotline:
0576-87726971

Reflective Cloth Hotline:
0576-82205396

EMAIL US

Zhejiang Yeshili Reflective Materials Co.,Ltd:
ysl@chinayeshili.com

Reflective Film Hotline:
yxlxiang@163.com

Reflective Cloth Hotline:
xiefg_ysl@126.com



Account login or sign in

YESHILI REFLECTIVE MATERIALS

[Home](#) [Products](#) [Contact Us](#) [Account](#)

LOG IN

USERNAME

PASSWORD

SIGN IN

Don't have an account?
Create one!



[REGISTER ACCOUNT](#)



Account sign up

The registration form is titled "CREATE ACCOUNT". It contains fields for First Name, Last Name, Phone Number, Street Address, City, Province / State, Country, Zipcode, Enter Email Address, Enter Password, and Re-Enter Password. A large "REGISTER" button is centered at the bottom.

FIRST NAME	LAST NAME	PHONE NUMBER		
<input type="text"/>	<input type="text"/>	<input type="text"/>		
STREET ADDRESS	CITY	PROVINCE / STATE	COUNTRY	ZIPCODE
<input type="text"/>				
ENTER EMAIL ADDRESS	ENTER PASSWORD	RE-ENTER PASSWORD		
<input type="text"/>	<input type="text"/>	<input type="text"/>		
REGISTER				

Inside account

The dashboard includes a sidebar with "Account Information", "Previous Orders", and "Saved Addresses". The main area displays "PREVIOUS ORDERS" with two entries:

Order #	Date	Status	Details	Tracking
YSL7878667	April 16, 2020	In progress	View Details	Tracking
YSL7877899	October 5, 2019	Finished	View Details	Tracking

Order detail

YESHILI REFLECTIVE MATERIALS

Home Products Contact Us Account

ORDER DETAIL

Order # YSL7878667

April 16, 2020	Ship to Austin Lee 2910 W 6 th Ave, Eugene, OR 97402, US 541-889-4354	Billing Austin Lee 2910 W 6 th Ave, Eugene, OR 97402, US 541-889-4354 austinglee@gvail.com xxxx-xxxx-xxxx-3868
Status In Process		
Shipping Method DHL Standard		
Delivery by May 30, 2020		Tracking

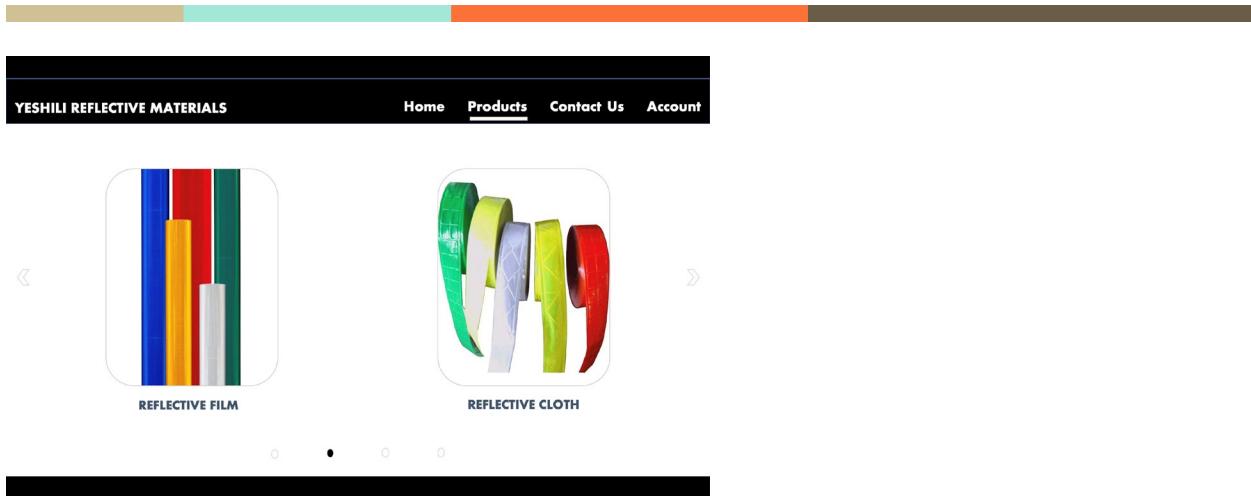
Product	Price	Qty	Amount
YSL800	\$18	100	\$1800

Documentation -- Tutorial

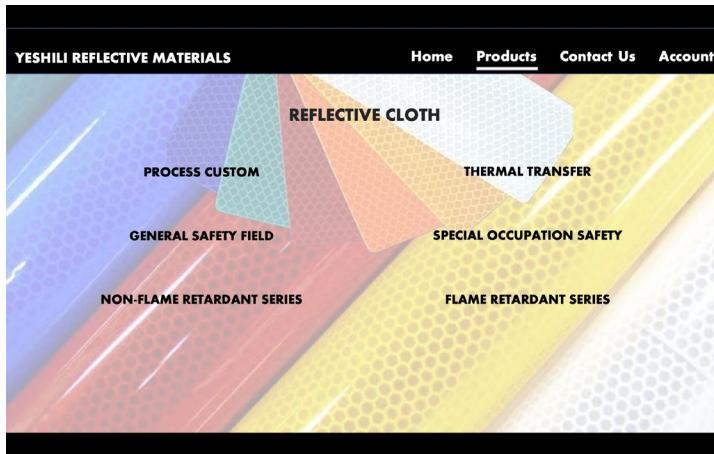
Home Click the “>” sign to switch to the next section on the right side, for example, at this page, click “>” would lead to the main page of “Products”. Click the “<” sign would let the page go to the one on the left. Another way of changing the section is by directly clicking the section name on the top.



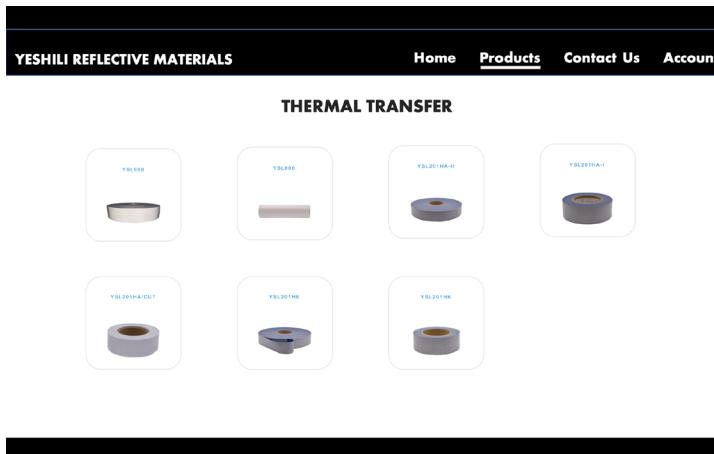
Products Click on either the picture icon or the text of category to get into the page of the sub-category list.



Sub-Category Click the text of the particular product type to get access to the page of product lists.

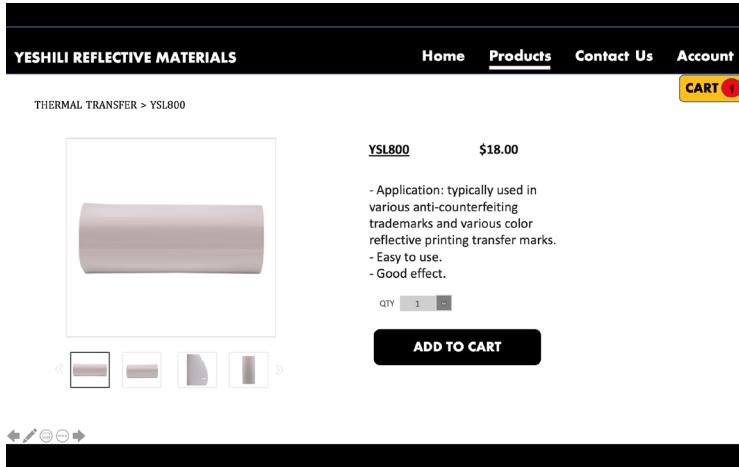


Product List Click the icon of the product to get more details of that product.

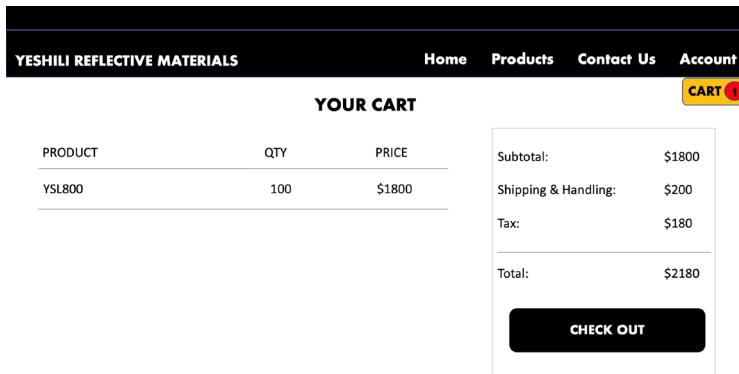


Product Detail Click the “<” or “>” to view other pictures of the products. Type in the number of quantities or click on the dropdown button to select the quantity. Click the “add to cart” button to add the selected amount of products into the cart.

Then, the yellow “cart” icon will pop up. Click the “cart” icon to view the cart, and click the text of the product type on the upper left of the page to go back to the product list page.



Cart Click the “check out” button once you confirm the information. The next step is logging into your account. We’ll talk about it later.



Check out After logging into the account, enter the information of your shipping address, billing address, payment method in order, then, do a final review of your order. Click the “Submit Order” button to place the order.

The screenshot shows the 'Check Out' page. At the top, there's a navigation bar with links for Home, Products, Contact Us, and Account. A yellow 'CART' button with a red notification badge is also present. Below the navigation, the word 'CHECK OUT' is centered. To the left, there are four numbered steps: 1. Shipping Address, 2. Billing Address, 3. Payment Method, and 4. Review Order. Step 4 includes a note: 'Please review your order information before placing order.' To the right, there's a summary table with the following data:

Subtotal:	\$1800
Shipping & Handling:	\$200
Tax:	\$180
Total:	\$2180

A large black 'SUBMIT ORDER' button is at the bottom of the form.

Contact Us Click on the email address would open another tab for sending an email to the receiver from your default email account in the browser.

The screenshot shows the 'Contact Us' section. At the top, there's a navigation bar with links for Home, Products, Contact Us (underlined), and Account. Below the navigation, there are two sections: 'CALL US' and 'EMAIL US'. The 'CALL US' section lists phone numbers for Zhejiang Yeshili Reflective Materials Co.,Ltd: 0576-88201076 and Reflective Film Hotline: 0576-87726971. The 'EMAIL US' section lists email addresses for Zhejiang Yeshili Reflective Materials Co.,Ltd: ysl@chinaveshili.com and Reflective Film Hotline: yslxiang@163.com. There are also 'Reflective Cloth Hotline' entries: 0576-82205396 and xiefg_ysl@126.com. Navigation arrows (left and right) are positioned above and below the contact information.

Account Enter the username and password to get access to your account profile. If you are making an order, it would lead you to the check out page which is mentioned earlier. Click the “Register Account” button if you don’t have the account and want to create one.

The screenshot shows the 'Log In' and 'Sign In' sections. At the top, there's a navigation bar with links for Home, Products, Contact Us, and Account. Below the navigation, there are two columns separated by a vertical line. The left column is for 'LOG IN' and contains fields for 'USERNAME' and 'PASSWORD'. The right column is for 'SIGN IN' and contains a link 'Don't have an account? Create one!' and a 'REGISTER ACCOUNT' button. Navigation arrows (left and right) are positioned above and below the login forms.

Account Sign up Enter the related information in each blank box and click the “Register” button once you’re done.

The screenshot shows a registration form titled "CREATE ACCOUNT". It includes fields for First Name, Last Name, Phone Number, Street Address, City, Province / State, Country, Zipcode, Email Address, Password, and Re-enter Password. A "REGISTER" button is at the bottom.

First Name	Last Name	Phone Number
<input type="text"/>	<input type="text"/>	<input type="text"/>

Street Address	City	Province / State	Country	Zipcode
<input type="text"/>				

Enter Email Address	Enter Password	Re-enter Password
<input type="text"/>	<input type="text"/>	<input type="text"/>

REGISTER

Inside Account Click on each section on the left to see the information. Click on the “Previous Order” to see the order list on the right. The gray button means the information is not available yet like the tracking information. Once it is available, it would turn to the color of black. Click on the “View Details” button to see the page of the order detail. Click on the “Tracking” to open another tab for the tracking information page from the third-party carrier.

The screenshot shows a sidebar with "Account Information", "Previous Orders", and "Saved Addresses". The main area displays a table of previous orders with columns for Order #, Date, Status, Details, and Tracking. The "Tracking" button for the first order is gray, while for the second, it has turned black.

PREVIOUS ORDERS				
Order #	Date	Status	Details	Tracking
YSL7878667	April 16, 2020	In progress	View Details	Tracking
YSL7877899	October 5, 2019	Finished	View Details	Tracking

Order Detail Click the “Tracking” button once it turns to black and it would open a another tab for the tracking information page from the third-party carrier.



YESHILI REFLECTIVE MATERIALS

Home Products Contact Us Account

ORDER DETAIL

Order # YSL7878667

April 16, 2020 **Ship to**
Status In Process Austin Lee
 2910 W 6th Ave, Eugene, OR 97402, US

Shipping Method DHL Standard
Delivery by May 30, 2020

Billing
Austin Lee
2910 W 6th Ave, Eugene, OR 97402, US
541-889-4354
austinkleee@yvail.com
xxxx-xxxx-xxxx-3868

Tracking

Product	Price	Qty	Amount
YSL800	\$18	100	\$1800

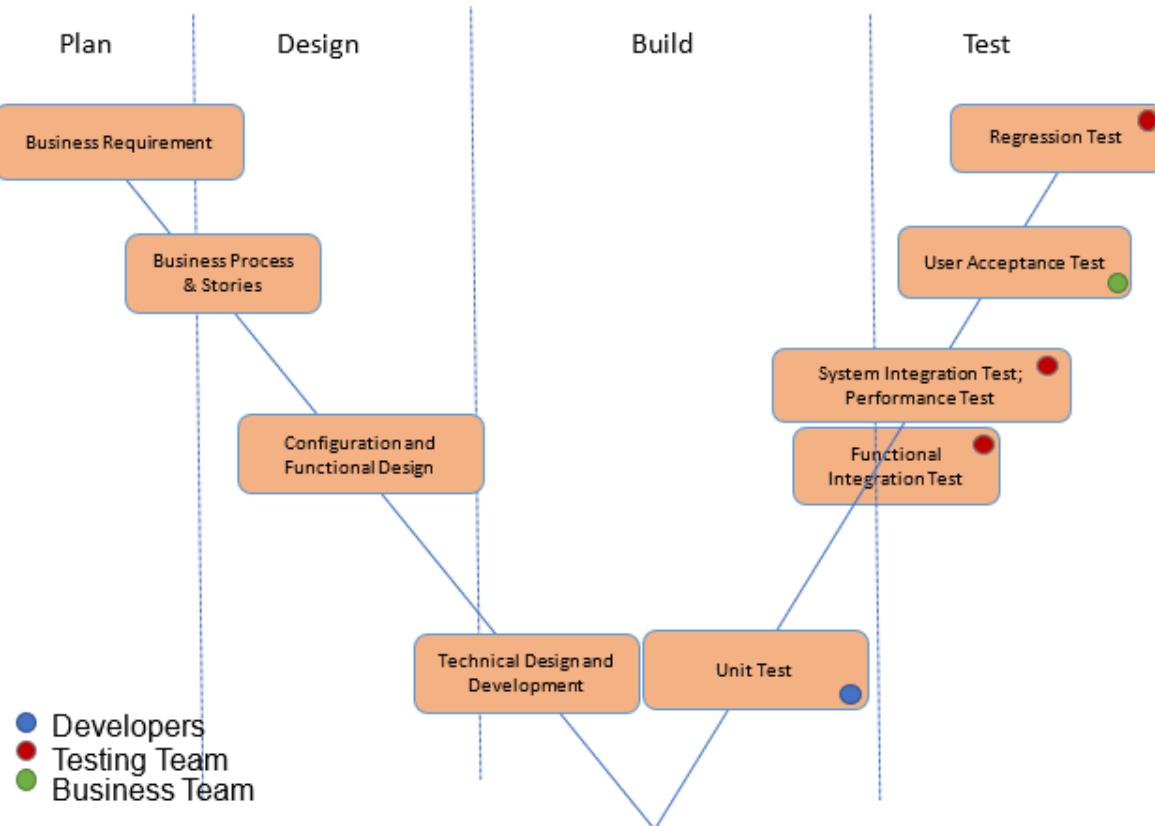


Test Plans

1. Revision History

Version No.	Date	Description of Change	Revised By (Sign Here)

2. Test Responsibilities



3. Test Types

3.1 Unit Testing

Purpose	This preliminary test is performed by the development team for testing of individual configuration, custom programs and/or technical services to ensure that they function according to the detailed technical specification. Unit test should test all possible flows. It should include both positive tests and negative tests.
Development Phase	Development and Testing
Test Scope	All configurations, code validation, memory testing, integration, code complexity, etc.
Test Environment	Development Environment
Test Data	Manual data created by developers
Interface Requirements	NA
Role	Developer

3.2 Functional Integration Test

Purpose	Functional test validates that full operability of interconnected functions, methods or objects within a functional area. It happens after or in parallel with the development phase as and when all components for a specific flow are complete.
Development Phase	Development and Testing
Test Scope	All functional tests, requirement using test design techniques
Test Environment	QA Environment
Test Data	Manual data created by Test team

Interface Requirements	Interface connectivity required for impacted systems
Role	QA Team
Content	<ul style="list-style-type: none"> ● Ensure all functions can work well separately. ● Ensure all functions are integrated well. ● Ensure any activity in any function will update the database immediately.

3.3 System Test

Purpose	Security role-based authorization test is performed to ensure that all the security profiles and roles are being implemented as designed. Security profile is designed and built based on the job role of the end users. Security roles are assigned at the business transaction level.
Test Scope	<ul style="list-style-type: none"> ● Full End to end business process ● Performance Testing ● Regression ● Interface testing with interfacing systems ● Security role-based authorization testing ● End to End scenarios executed with user id
Development Phase	Development and Testing
Test Environment	QA Environment or Pre-Prod
Test Data	Data from company's current system
Interface Requirements	Interface connectivity required for all interfacing systems
Role	QA Team

Content	<ul style="list-style-type: none"> ● Ensure that user has access to the required transactions to perform their job ● Ensure that accesses to critical system administration transactions are controlled. ● Ensure that only authorized people have the right to view the information on screens and reports. ● Ensure that the system can work well from placing an order to finishing an order.
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3.4 User Acceptance Test

Purpose	User acceptance test is performed by business users. The users test the complete, end-to-end business processes to verify that the implemented solution performs the intended functions and satisfies the business requirements.
Development Phase	Final Prep or Implementation
Test Scope	UAT Full Regression
Test Environment	Pre-Prod or Implementation
Test Data	Data from company's current system
Interface Requirements	Interface connectivity required for all interfacing systems
Role	Process Team & Business Users
Content	<ul style="list-style-type: none"> ● Ensure that all links on the website work well. ● Ensure that customers register/login accounts and create profiles successfully. ● Ensure that customers can place orders online. ● Ensure that customers can track their order. ● Ensure that employees have access to certain information.

- 
- Ensure that employees can update order status.

Implementation Plan

Task Name	Owner	Date	Status	Remarks
Development Activities	IT Manager/Development Team Leader		In Preparation	Manager is hiring talents for this part.
Database	Development Team Leader	1/1/2021		
Database	Development Team Leader	1/2/2021		
Database	Development Team Leader	1/3/2021		
Database	Development Team Leader	1/4/2021		
Database	Development Team Leader	1/5/2021		
Database	Development Team Leader	1/6/2021		
Database	Development Team Leader	1/7/2021		
UI	Development Team Leader	1/8/2021		
UI	Development Team Leader	1/9/2021		
UI	Development Team Leader	1/10/2021		
Integrations	IT Manager/Development Team Leader	1/11/2021		
Integrations	IT Manager/Development Team Leader	1/12/2021		
Integrations	IT Manager/Development Team Leader	1/13/2021		
Integrations	IT Manager/Development Team Leader	1/14/2021		
Integrations	IT Manager/Development Team Leader	1/15/2021		
Reports	IT Manager	1/16/2021		
Reports	IT Manager	1/17/2021		
Reports	IT Manager	1/18/2021		
Reports	IT Manager	1/19/2021		
Reports	IT Manager	1/20/2021		
Testing Activities	IT Manager/Testing Team Leader		Ready	Outsource
Testing Planning	Testing Team Leader	1/21/2021		
Unit Testing	Testing Team Leader	1/22/2021		
Integration Testing	Testing Team Leader	1/23/2021		
Stress Testing	Testing Team Leader	1/23/2021		
Data Migration Plan	IT Manager	1/24/2021		
Documentation Prep	Business Analyst		In Preparation	Manager is hiring talents for this part.
Developer Documentation	Business Analyst	1/24/2021		
User documentation	Business Analyst	1/25/2021		
Training	Data Scientist		In Preparation	Manager is hiring talents for this part.
Training Planning	Data Scientist	1/25/2021		
User training development	Data Scientist	1/26/2021		
User training review	Data Scientist	1/26/2021		
User training rollout	Data Scientist	1/26/2021		
Rollout	System Analyst/ Project Manager		In Preparation	Manager is hiring talents for this part.
Architecture planning	System Analyst	1/27/2021		
Infrastructure Prep	System Analyst	1/27/2021		
License structure	System Analyst	1/27/2021		
Deployment	System Analyst	1/27/2021		
Data Migration steps	System Analyst	1/27/2021		
User set up	System Analyst	1/28/2021		
User training	System Analyst	1/28/2021		
Pilot Rollout Plan/Phase Rollout plan	System Analyst	1/29/2021		
Rollback steps	System Analyst	1/29/2021		
Day 0 Deployment	Project Manager	1/29/2021		
Support set up	Project Manager	1/30/2021		
Week 1 support plan	Project Manager	1/31/2021		
Week 1 daily review meeting	Project Manager	1/31/2021		
Post rollout	Project Manager	1/31/2021		



Lessons Learned

Knowledge Sharing in a Team

When assigning tasks, each member had their job and responsibilities. In the entire process, we shared knowledge in the team. Communication within the group was crucial. When anyone in the team had confusion or met a problem, we never hesitated to ask others for help. Group members discussed and answered each other's questions. It allowed us to solve the problem efficiently and improve team cohesion. A good team can encourage people to ask for help without feeling shamed.

Work Closely with the Client

Different from the previous projects, this time, we were supposed to provide a better information system for a real company. A successful project required close contact between the two parties. Thanks to the fact that one of our team members has a friend who is working for the company, we were able to hold a bi-weekly online meeting with the relevant employees from the beginning. At the meetings, we reported on our progress, they gave comments and offered further information we needed. The sessions helped us communicate efficiently and accomplish tasks better.

Set Deadline for Each Task

People say that due dates increase productivity. However, it cannot guarantee the quality of work, especially when our project ran through the entire semester. We only had two checkpoints. Sticking to the plan is very important because the time is so long that we may lose track of time. To complete the tasks with higher quality, we divided the tasks into even smaller parts. A soft deadline, which can be flexible and be modified, is set for each small task. We scheduled a day or two to review what we had done before moved to the next phase to allow for delays or last-minute changes.

Need of specific expertise

When we designed the system and user interfaces, sometimes we needed specific knowledge related to the retail or reflective material industry. The support and assistance



of Yeshili employees were essential. Industry-specific expertise made our project go smoothly.