IST 654

Smart Inventory management for Shipping Container Company

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I. PROJECT PROPOSAL

Business Case

The value of global sea borne container trade is estimated to be valued at 12 Trillion U.S. dollars in 2017. The largest shipping and freight forwarding company in the world is Maersk Line, with an approximate revenue of $40.3 Billion. Around 76% of U.S. exports by tonnage is carried out by water transportation. These figures clearly indicate that the global container shipping industry has a huge revenue base.

Shipping lines have put in place complex business systems to manage inventory. Inventory planning in container ships becomes extremely important to successfully achieve revenue targets and volume targets. Shipping lines are investing in high end technological systems to manage inventory for container ships.

Current Business Systems Scenario

A container ship is split into slots or compartments called bays. The inventory planning systems help facilitate online booking of container slots using front end application systems. The price for booking inventory slots is updated dynamically and is driven by "Demand-Supply" model. Planning systems showcase available slots with details of ship voyage, container tracking, booking costs, and delivery time.

Problems with Existing Inventory Planning System for Container Ships

The advent of technological sophistication has led to real-time implementation of inventory management. However, the first big problem which container shipping lines continue to face is unoccupied inventory. The next problem shipping lines face is to efficiently utilize inventory slots for higher revenues and greater profitability. And third problem which shipping lines face is that current inventory management systems are not intelligent, in a way that it does not have capabilities to make automatic and logical decisions to successfully fill up inventory slots on its own based on past and pre-defined business parameters.

New Business System We Propose to Offset This Problem

We propose to implement a system which is "Intelligent". The system is integrated with database repositories which maintains information on real time inventory booking requests to effective manage demand and supply, and establish dynamic pricing. It accounts for higher revenue and greater profitability by making smart suggestions, using best combination of container size and container volume to optimize container ship capacity, often measured in twenty feet container unit (TEU).

The system also evolves by using past information and pre-defined business parameters, to effectively predict which logistics carriers have the highest probability to take up unoccupied inventory and automatically connects with logistics carriers to check for booking requests.

It also makes effective utilization of unoccupied inventory by looking up for empty containers and/or operational materials which could be placed to fill-up available unoccupied inventory and bring about operational efficiency. The system is also connected with existing port systems to track on-loading and off-loading of containers.

The system will also have an in-built intelligence to prioritize logistics carries which may pay lower price for inventory, but have fixed contractual agreements, to reduce risk of leaving inventory unoccupied. It may also give preference to logistics carriers which have a long-term business relationship with the shipping carrier, by assigning priority weights which is based on pre-defined business parameters.

The system also provides a mobile interface to check inventory prices, booking requests, vessel travel status, container placement tracking, and voyage tracking.

Business Research and Knowledge Base of Team Members

The team has connected with business leaders in the shipping and logistics industry to gather inputs and understand challenges and opportunities currently existing in the industry. The team plans to come up with technological solution to a business problem, by setting up a new business system. We have a team of three members who have experience in technology, business, consulting, and analytics. The team members have problem solving experience and knowledge of integrated system development and design.

II. FEASIBILTY REPORT

Technical Feasibility Analysis

The intelligent inventory planning system is feasible technically, although there is some risk.

The company's risk regarding familiarity with the intelligent inventory planning application is moderately high.

The end users of inventory planning systems are business users. They are not familiar with high end predictive systems for business decision making. The inventory planning department has little experience with an intelligent system which automatically lists out inventory filling options. The department has strong knowledge of the company's existing inventory management system, but it has not worked with systems which work at an enterprise level. Current inventory planning systems do not have data which comes from operations database. The new system will have provisions to fill unoccupied slots with empty containers. Business users will have to be made familiar about the successful use of this module. There are numerous ways to evaluate inventory planning and this make it challenging for the system to come up with the most optimum solution considering varying parameters. The technical system need to accommodate fluctuations in crude oil prices and dynamic trading rates for decision making. This comes out to be like a significant challenge for effective implementation.

The company's risk regarding familiarity with the technology is moderately low

The business users have knowledge of the current inventory planning system and the databases and Internet technology it uses. The IT department has no direct knowledge of the technology required to perform high end real time analytics and decision making. The current team of analysts are well versed with latest industry trends. Thus, with proper training we could have systems users well trained with the new system. We also have a team of experts and consultants which are readily available to provide help in this area.

The system will also be deployed on the mobile platform. The new system will have a mobile interface which will provide availability of storage space, pricing plans for customers, etc. The deployment will require expertise in mobile domain and setting-up of critical mobile infrastructure. Mobile security will also be an area of focus and this could lead to risk exposure.

The Project size is considered medium risk

The project team will likely consist of a team of 25 people working full time on project deployment. The team will also consist of an additional team of 10 members who will work as consultants and provide expert advice. High involvement of top management, and business users will be required. Project timelines must be strictly followed, and scope creep must be avoided.

The new system has a good compatibility with the existing system

The new advanced system is an enhancement to the old system being used. With advanced functionality, the new system will piggyback on data from the old system, and hence needs to be compatible with it.

The databases from the old system will need to be structured and migrated into the new platform. All records of customers, sales, invoices, inventory, etc., will be used to enable the functionalities of the new system.

Economic Feasibility Analysis

A cost–benefit analysis was performed; see below spreadsheet for details. Conservative estimates show that there is a good chance of significantly enhancing the company's bottom line. The total benefits from the implementation of a new system design shows an estimated average annual growth rate of 6.6%, YOY. The five-year trend shows approximately $46.5 million in increased profits.

As shipping industry deals with international markets, global economic conditions will play a significantly influence company revenues. Another important fact to consider is the impact of crude oil prices on company business. Crude oil prices are extremely dynamic and can significantly impact company performance.

The intangible costs and benefits include, better establishment of relationship between vessel carrier and logistics companies, increase in operational efficiency, and a significant reduction in inventory planning and fulfillment.

Cost Benefit Analysis

Figures in Millions of $	2017	2018	2019	2020	Total
Benefits					
Increased sales from optimized inventory allocation	$ 4.00	$ 7.00	$ 11.00	$ 14.00	$ 36.00
Increased sales from unoccupied inventory utilization	$ 1.00	$ 4.00	$ 6.00	$ 8.00	$ 19.00
Increased sales by loading empty containers for transportation	$ 0.30	$ 2.00	$ 2.50	$ 3.30	$ 8.10
Total Benefits	$ 5.30	$ 13.00	$ 19.50	$ 25.30	$ 63.10
Development Costs					
Infrastructure costs for Intelligent Enterprise software system	$ 1.10	$ -	$ -	$ -	$ 1.10
Development costs for Intelligent Enterprise software system	$ 1.00	$ -	$ -	$ -	$ 1.00
5 Server costs	$ 0.70	$ -	$ -	$ -	$ 0.70
Deployment of cloud management system and database set-up	$ 0.60	$ -	$ -	$ -	$ 0.60
Consultation fees	$ 0.50	$ -	$ -	$ -	$ 0.50
Development training	$ 0.30	$ -	$ -	$ -	$ 0.30
Total Development Costs	$ 4.20	$ -	$ -	$ -	$ 4.20
Operational Costs					
Software upgrades	$ 1.50	$ 1.50	$ 1.80	$ 2.00	$ 6.80
Server Maintainance costs	$ 0.20	$ 0.20	$ 0.40	$ 0.60	$ 1.40
Software licenses	$ 0.60	$ 0.60	$ 0.70	$ 0.70	$ 2.60
User Training	$ 0.35	$ 0.35	$ 0.45	$ 0.45	$ 1.60
Total Operational Costs	$ 2.65	$ 2.65	$ 3.35	$ 3.75	$ 12.40
Total Costs	$ 6.85	$ 2.65	$ 3.35	$ 3.75	$ 16.60
Total Benefits- Total Costs	**$ (1.55)**	**$ 10.35**	**$ 16.15**	**$ 21.55**	**$ 46.50**

Organizational Feasibility Analysis

Management Approval and Stakeholder Involvement:

From an organizational perspective, this project is low-risk. The top executives of the company have a strong interest in the project, and the project champion, the CIO, is a respected and knowledgeable top management executive. The users of the system, internet users, and in-store kiosk users, are expected to appreciate the project. The whole team has a clear understanding of the project and have performed comprehensive research in this field. The people involved have faith in this product.

The project has also been evaluated from an organizational culture standpoint, the system which is being planned to get built, is kept simplified and is within the knowledge scope of the user team for effective usage.

The project plan has evolved by gathering relevant expertise from top management in the shipping and logistics industry. Business cases from reputed available journals have also been referred to help align with organizational cultural objectives. Stakeholders will be involved in every phase of the deployment phase to help gather acceptance and support for final project execution. Logistics carries will be continually kept in the loop, and updated about the project execution timelines. Logistics carries will be review pilot phase, to gather feedback. In general, the project does not have any obvious disadvantages from on organizational standpoint.

Organizational Competence:

We have real time online tool to facilitate remote work. Weekly meetings are planned to ensure proper communications at various stages of project deployment.

We have an inclusive work policy to ensure everyone finishes work on time. The project will be divided into phases. Software development lifecycle will follow both waterfall and agile methodology. The internal team members will have clear roles defined and inputs from everyone associated with the project will be taken. The project will be opening to adopt to dynamic requirements during deployment phase. Logistics carries, and shipping companies have voiced their support for the implementation of an Intelligent Inventory Management system.

Resources:

The project has been allocated working space to conduct meetings and brainstorming. Reliable suppliers and partners have been identified in the product chain. Experienced professionals who have worked on similar deployment projects across different industries have been approached to follow best practices for project implementation. Project has put up a plan in place to hire people with spiralizer skill-set in inventory planning, artificial intelligence, and systems integration.

III. REQUIREMENTS

Functional Requirements

1. Requirement of an Intelligent System for Slot Booking:

In the legacy software, storage slots must be allotted for containers on a first-come-first-serve basis and the system must allow optimum usage of storage space. The new intelligent system must keep a track of available storage slots and contact appropriate customers who would be willing to book slots at added incentives like reduced costs. This model is required to generate revenue from storage slots that would otherwise have gone empty and would not have fetched any profit.

2. Identification of Best -Fit Customers:

The new application must employ data mining and machine learning algorithms to develop a system that will track customers, their likelihood of booking a slot, and then develop a suitable plan for them.

3. Contract-Based Bookings:

Based on the identification made by the new system, customer-specific contracts must be recommended that will offer benefits like priority booking, personal assistance, reduced pricing, etc., to all customers.

4. Mobile Interface:

With the advent of technology and demand of businesses to have information available at the touch of their fingers, a mobile interface is a must. The new system must implement a mobile interface that will provide availability of storage space, pricing plans for customers, etc.

5. Compatibility:

The new, advanced system is an enhancement to the old system being used. With advanced functionality, the new system must piggyback on data from the old system, and hence must be compatible with it.

The databases from the old system must be structured and data migration must be implemented into the new platform. All records of customers, sales, invoices, inventory, etc., must be used to enable the functionalities of the new system.

6. Real Time Inventory Management Methodology:

The system must allocate inventory slots based on “demand and supply” model and by using smart decisions based on various predefined business parameters.

Non-Functional Requirements

1. There should be more than one level of access to the system.

Two users/actors are involved in this system, they are the staff of cargo ship companies who oversee inventory management and the customers who are in the negotiation.

The staff of cargo Ship Company can access the system to view, update, delete inventory records and make matches with the external needs, tracking the transportation information on real time. The customer could only create their new needs for matches and review the details of history orders.

2. There should be more than one platform for use.

Despite the basic PC platform for formal work, there will be mobile platform for the client to make request and track orders more conveniently.

3. The system must be very secure and strict access control must be maintained.

For internal use, it requires not only the login identification but also special VPN verification to acquire the full rights of managing the system.

For external use, it will give the clients individual account which can be used to finish specific business activities, confidential information about other customers must not be leaked. There should be a back-up private cloud platform in case of emergency. We cannot predict what can happen in the use of system, the backup platform can help reduce the risks of losing important data, and private cloud will be safer than the public cloud applications and help save money from a long-term standpoint.

4. There must be reliable hardware for huge data storage and strategy process.

The data in the system will require massive storage systems. The storage space is extremely critical. Thus, the database must be scalable and increased periodically.

5. There must be advanced software like embedded BI tools, GIS support for assistance.

The intelligent strategy analysis will ask for processors and algorithms with high configuration like the deep learning, data mining to realize the prediction, match tests and sentimental analysis. GIS support will combine the geographic data and the tools above to reflect the real-time tracking information and predict the date of arriving.

6. The system is relatively low-cost to implementation and maintain.

The entire system is not very complex so it’s easy to do cost control, the initial edition is supposed to be briefly effective to decrease the maintenance.

7. The system must be well aligned with company risk culture, risk tolerance, and infrastructure to manage risk. It must have systematic procedures to identify risk and perform effective risk management and risk mitigation.

8. Perfect integration of cargo ship schedule, customer request, and existing port system.

9. New system design, business process diagrams, and data-flow diagrams must be properly represented and documented for system administrators.

10. The bid process must be fair, and system must be complaint to adhere to maximum and minimum threshold for price bid.

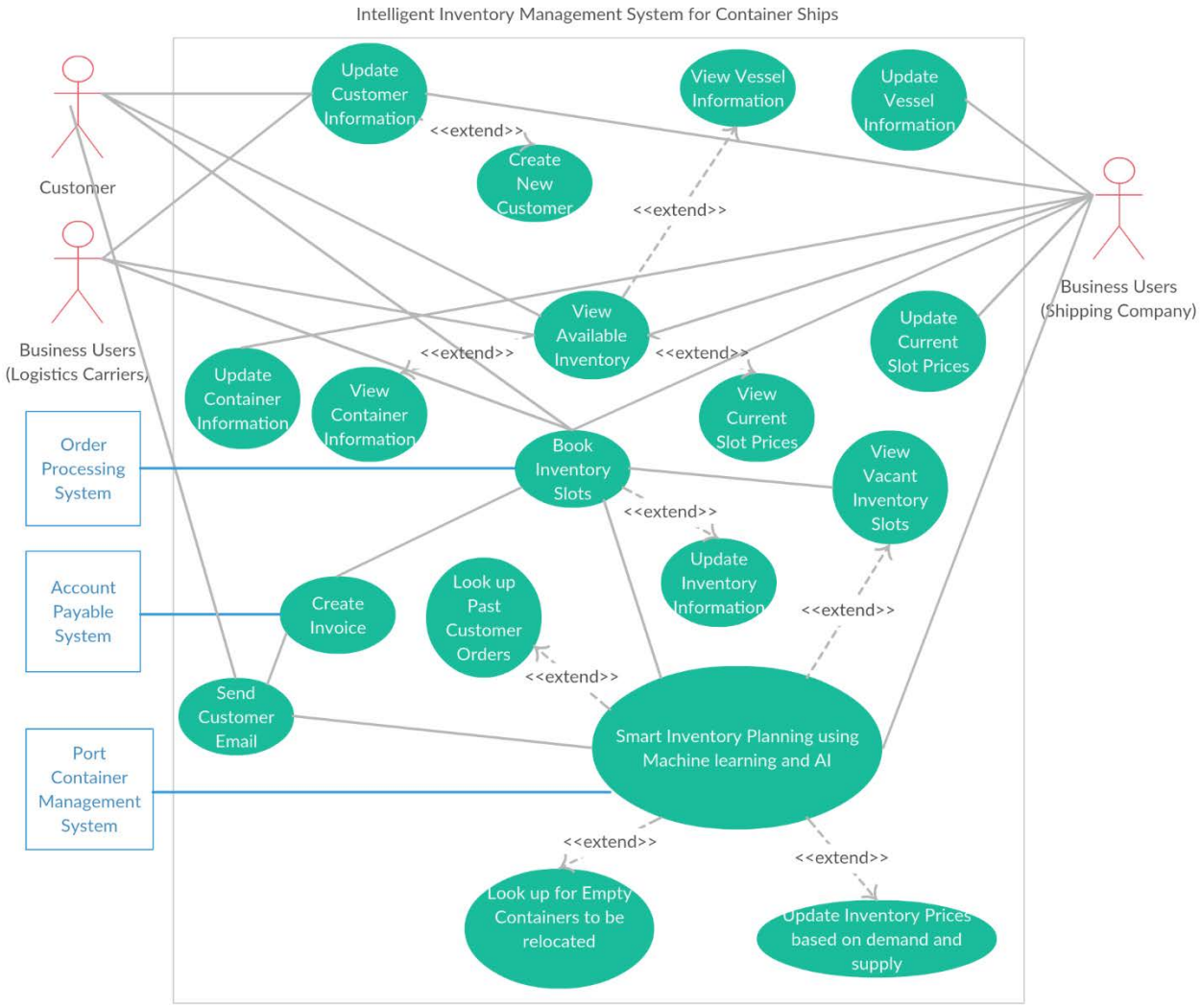
11. The system must be able to efficiently handle real time traffic and establish dynamic real- time pricing based on “demand-supply” model and pre-defined business logic parameters.

12. The billing system must be reliable and adhere to tax compliance for all markets in which it operates.

13. The system must be user friendly and must have operational instructions for training.

IV. USE CASE

Use Case Diagram



Use Case Glossary

Use-case glossary		
Use-case Name	**Use-case Description**	**Participating Actors and Roles**
Create new customer	This use-case describes the event of creating new customer account with relative information	Customer
Update customer information	This use-case describes the event of updating the customer account with new information	Customers, shipping company
Update Vessel Information	This use-case describes the event of updating recent vessel information	Shipping Company
View Vessel Information	This use-case describes the event of viewing the information of vessel conditions(vacant/full/arranged)	Customers, shipping company, logistics carriers
View Available inventory	This use-case describes the event of viewing the available inventory information	Customers, shipping company, logistics carriers
View Container Information	This use-case describes the event of viewing the information of container conditions(vacant/full/arranged)	Shipping Company
Update Container Information	This use-case describes the event of updating the information of containers	Shipping Company
Update Current Slot Prices	This use-case describes the event of updating the slot prices	Shipping Company
View Current Slot Prices	This use-case describes the event of viewing current own slot prices	Shipping Company
Book Inventory Slots	This use-case describes the event of booking the inventory slots for new order	Customers, shipping company, logistics carriers
Smart Inventory Planning using Machine learning and AI	This use-case describes the event of planning inventory with Artificial intelligence and machine learning	Shipping Company
View Vacant Inventory Slots	This use-case describes the event of viewing the vacant inventory slots	Shipping Company
Update Inventory Information	This use-case describes the event of updating the information of inventory	Shipping Company
Update Inventory Prices based on demand and supply	This use-case describes the event of updating the prices of inventory based on the variable demand and supply	Shipping Company
Look for Empty Containers to be relocated	This use-case describes the event of relocating the empty containers	Shipping Company
Look up Past Customer orders	This use-case describes the event of looking up/ tracking past orders	Shipping Company

Send customer email	This use-case describes the event of sending billing email to the customers	Shipping Company
Create Invoice	This use-case describes the event of creating invoice for the customers	Shipping Company

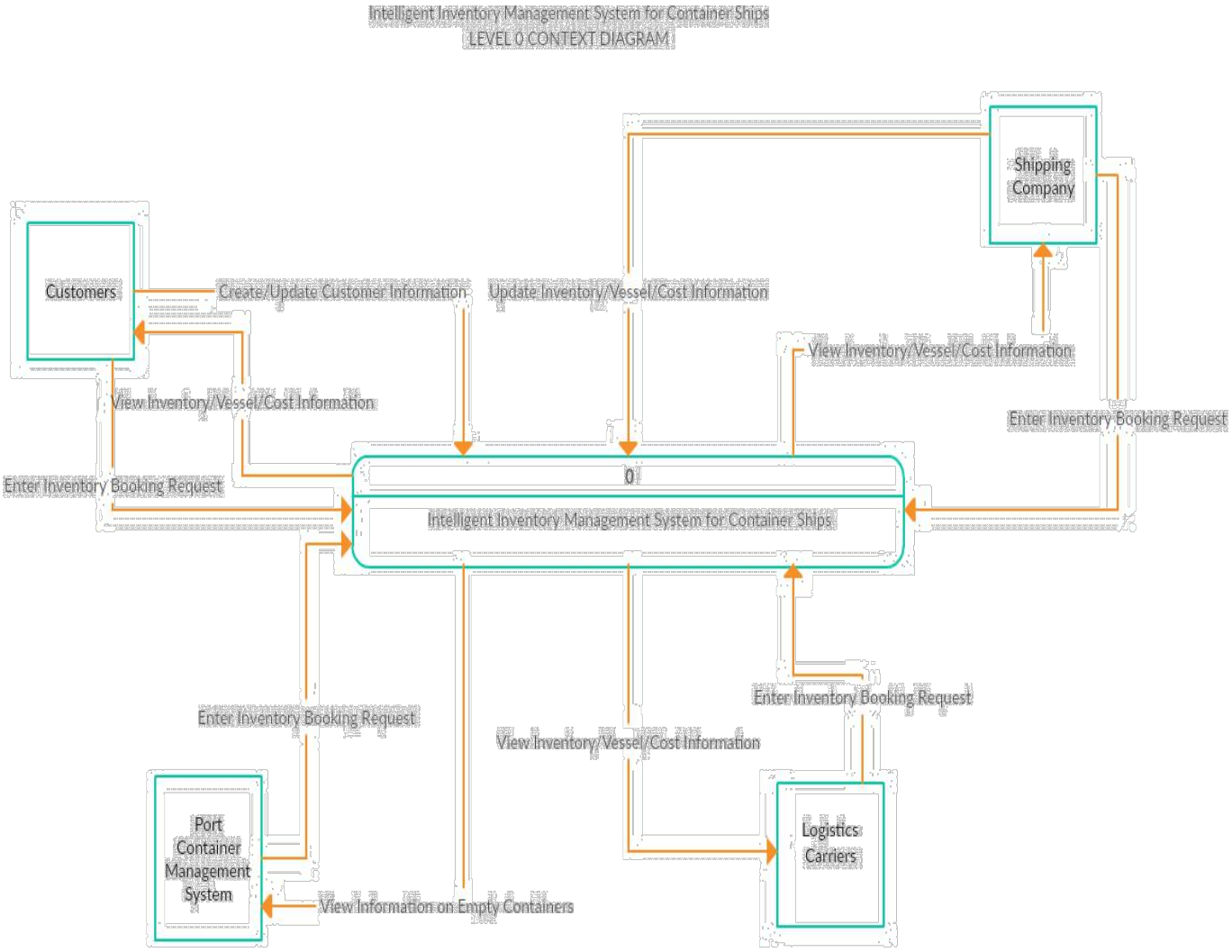
Use Case Narrative

<table>
<tr><td>Use-Case Name:</td><td>Smart Inventory Management</td><td rowspan="4">Use-Case Type
Business Requirement= YES</td></tr>
<tr><td>Use-Case ID:</td><td>IPC v001</td></tr>
<tr><td>Priority:</td><td>High</td></tr>
<tr><td>Source:</td><td></td></tr>
<tr><td>Primary Business Actor:</td><td colspan="2">Maersk Smart System</td></tr>
<tr><td>Other Participating Actors:</td><td colspan="2">Vendor Inventory System, Customer, Port Management System</td></tr>
<tr><td>Other Interested Stakeholders:</td><td colspan="2">Maersk Executive Board: These are the people who are responsible for the functioning of the system</td></tr>
<tr><td>Description:</td><td colspan="2">The use case describes the event of loading of shipments in container units in case the containers are not completely filled.
The system consists of a smart inventory planner which uses past and pre-defined parameters to effectively predict which vendor has the highest probability to take up unoccupied inventory.</td></tr>
<tr><td>Precondition:</td><td colspan="2">Vendors and customer information have already been logged into the system.</td></tr>
<tr><td>Trigger:</td><td colspan="2">The use case is triggered when the container unit in the shipment is not completely filled a few days before the date of departure.</td></tr>
<tr><td rowspan="2">Typical Course of Events:</td><td>Actor Action</td><td>System Response</td></tr>
<tr><td>Step1: The user checks unallocated units in the shipment</td><td>Step2: The system detects that the container units are not completely occupied.
Step3: The system collects customer information and vendor information.
Step4: The system analyses the data and finds the vendors with highest probability to fulfil the requirement.
Step5: The system connects with the vendors and checks if they want to occupy the units.
Step7:The system takes orders from the vendors and occupies the container unit</td></tr>
</table>

Alternate Course:	**Alt-Step2:** The system finds out that all the container units are occupied in the system **Alt-Step7:** If the container units are still unoccupied then Maersk will occupy the system for operational purposes
Conclusion:	The Use-Case ends when all the container units are filed in the shipment.
Post condition:	This data is then sent to the database so that the system can use informed decision in future situations.
Business Rules:	**1:** The shipments must abide by the rules for transportation of goods for the destination country **2:** Vendors should be authorized by the government **3.** Customer should have a valid national ID number
Implementation, Constraints and Specification:	**1.** A customer can be registered only once in the system **2**. Maersk has a GUI to access the system **3.** GUI should be user-friendly so that the concerned authorities can use the system with minimal interference **4.** There should be a backup plan in case of failure
Assumptions:	The officials already know how to operate the system.
Open Issues:	N/A

V. DATA FLOW DIAGRAM

LEVEL 0 CONTEXT DIAGRAM



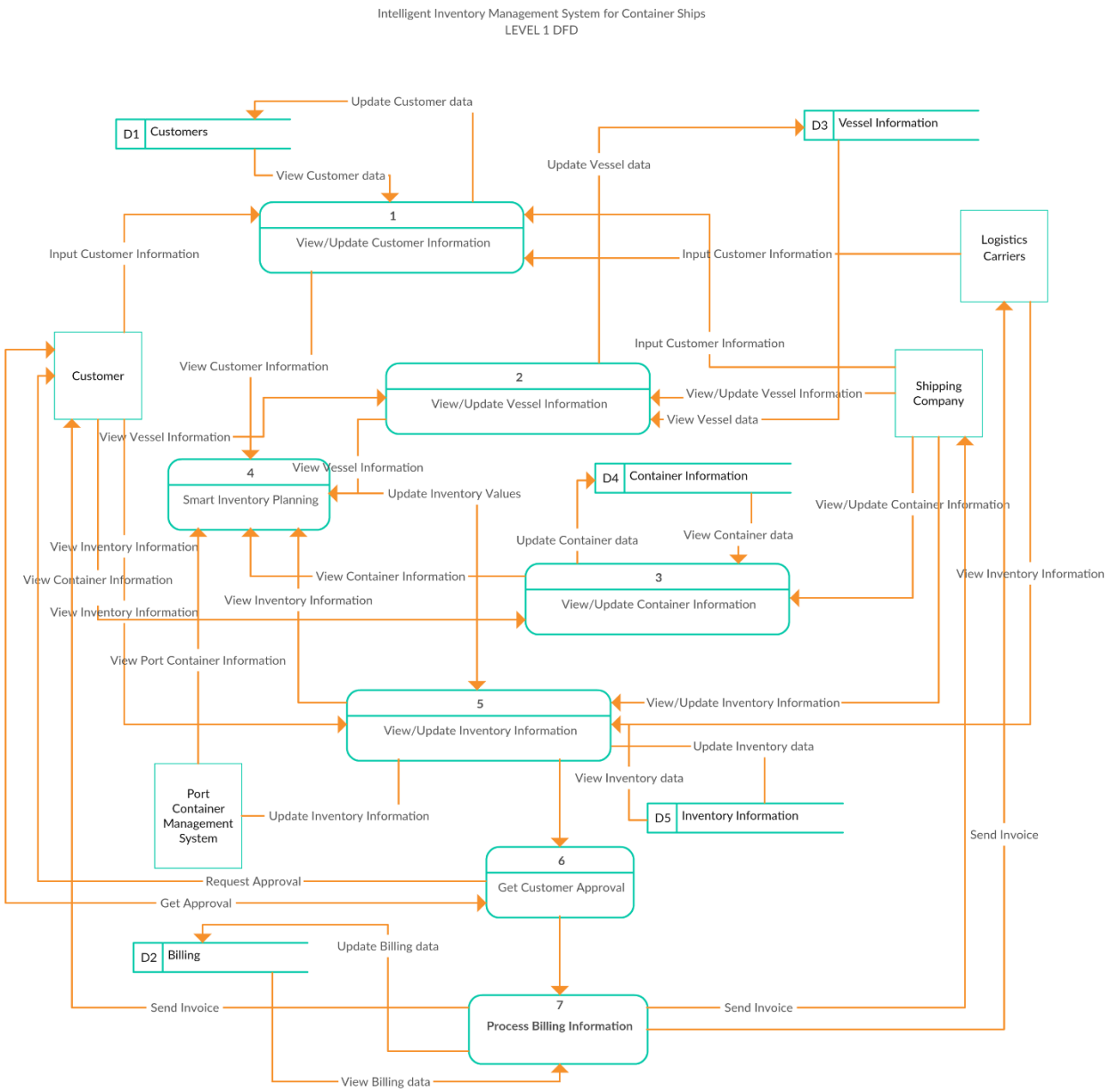
The customer entity interacts with the smart inventory management system. Customers can create or update personal information into the inventory management system. Customers can also enter inventory booking request into the system.

The shipping company interacts with the inventory management system. It can view as well as update the vessel, inventory and cost information that is available in the database of the inventory system.

Logistics carriers can enter inventory booking request into the inventory system and can thus interact with it directly. In case there are still slots available in the shipping containers, the port container management system can book slots for sending operational units to a different location.

The smart inventory management system interacts with each and every entity. It can view the inventory, vessel, cost information of the slots booked by either customers, shipping company or the logistics carriers. Also it interacts with the Port Container Management system and checks the number of slots that have been unoccupied.

LEVEL 1 CONTEXT DIAGRAM



The customer can view or update personal information. This information gets stored into the customer database. The customer can also view the inventory information. This information gets updated when the customer books a slot in the container unit. The View/Update Customer Information also consists of information from logistics carriers at the time of booking a slot. Shipping companies also can view the same information and update them.

Customer, Logistic carriers and the shipping company can view or update the vessel information. The vessel information is stored in the vessel database gets updated about the destination of the vessel, the duration it will take for the vessel to reach the destination etc. This information is also passed on to the smart inventory planning and the inventory management entity.

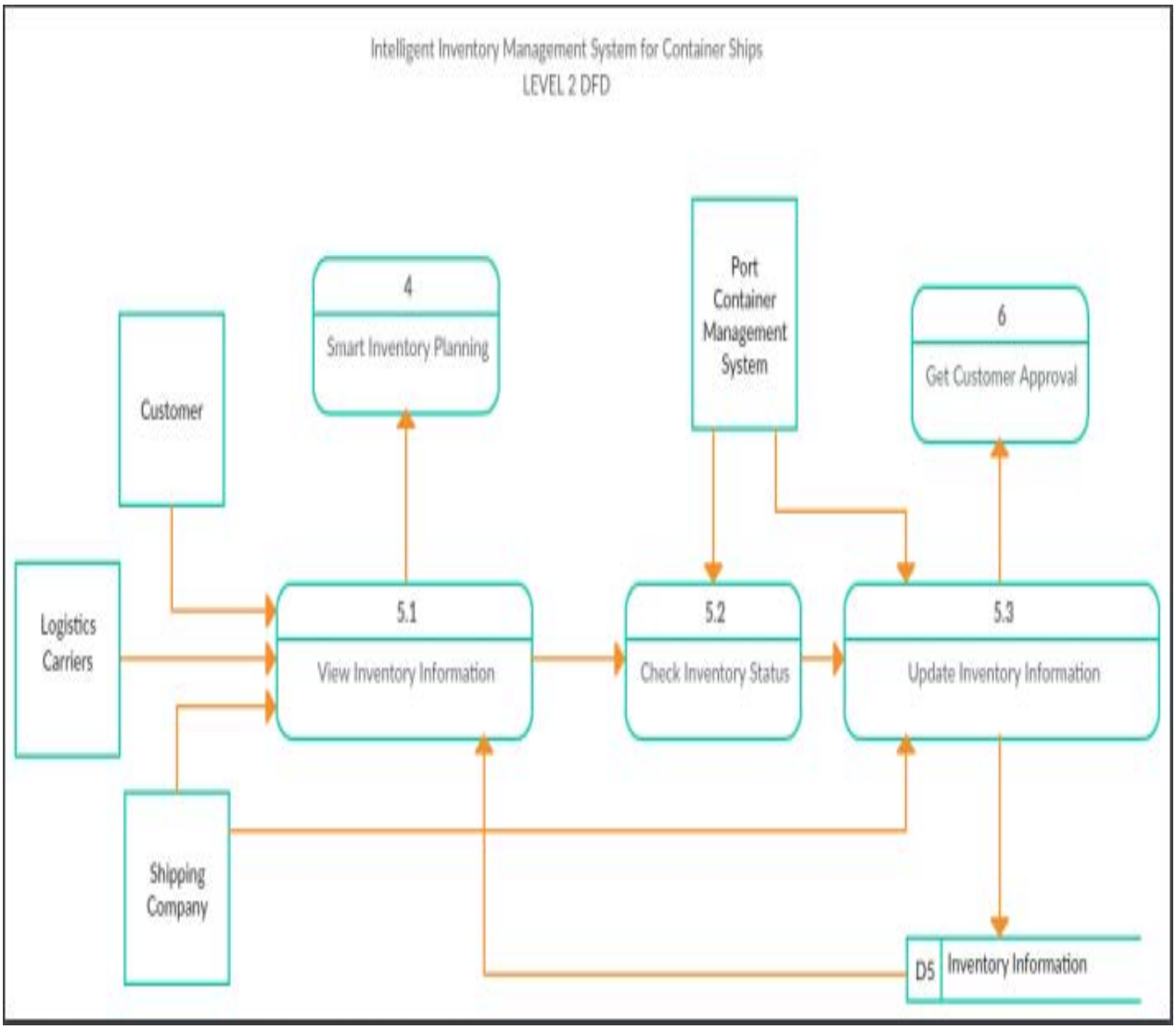
The Container information entity is used to view or update the container information. The shipping company, logistic carrier and the customer can view the container information. The container information includes the slots available in the container, the total storage space of the container etc. This information is updated into the container information database.

The smart inventory planning entity is used to strategically fill the vacancy in the container units before the vessels are about to depart. The entity interacts with all the different entities and gets as much information as it can to make informed business decisions. It views customer information, inventory information, container information, port container information, vessel information. It then updates the inventory values into the inventory information entity.

The inventory information entity is used to view the information regarding inventories and can be view by customer, logistics carrier, shipping company and the port container management system. This information is also stored in the inventory information database

The Get Customer Approval entity is used to take information from the inventory system to request for approval from the customer. Once the request is approved, the system will move to the next entity to process the billing information and then send it out to the customer. Also this information is updated into the billing database.

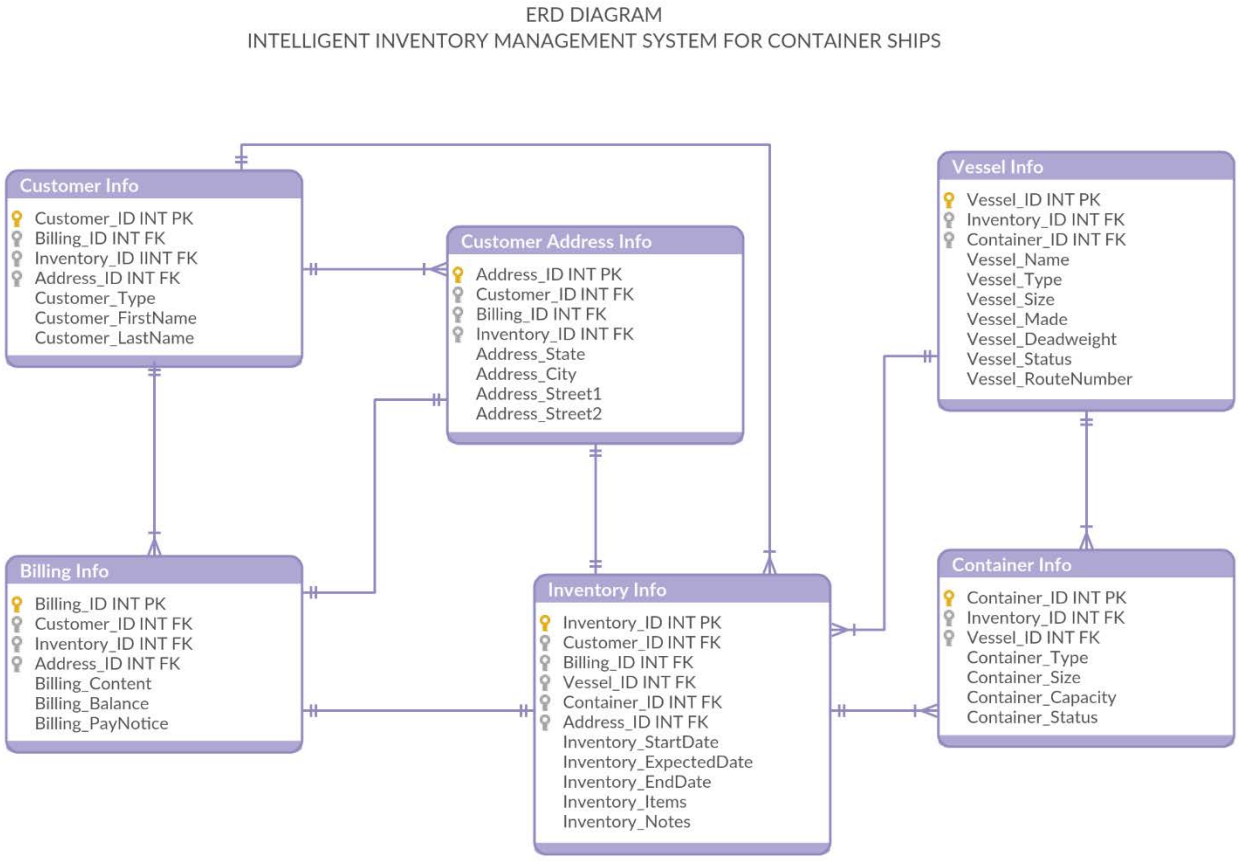
LEVEL 2 CONTEXT DIAGRAM



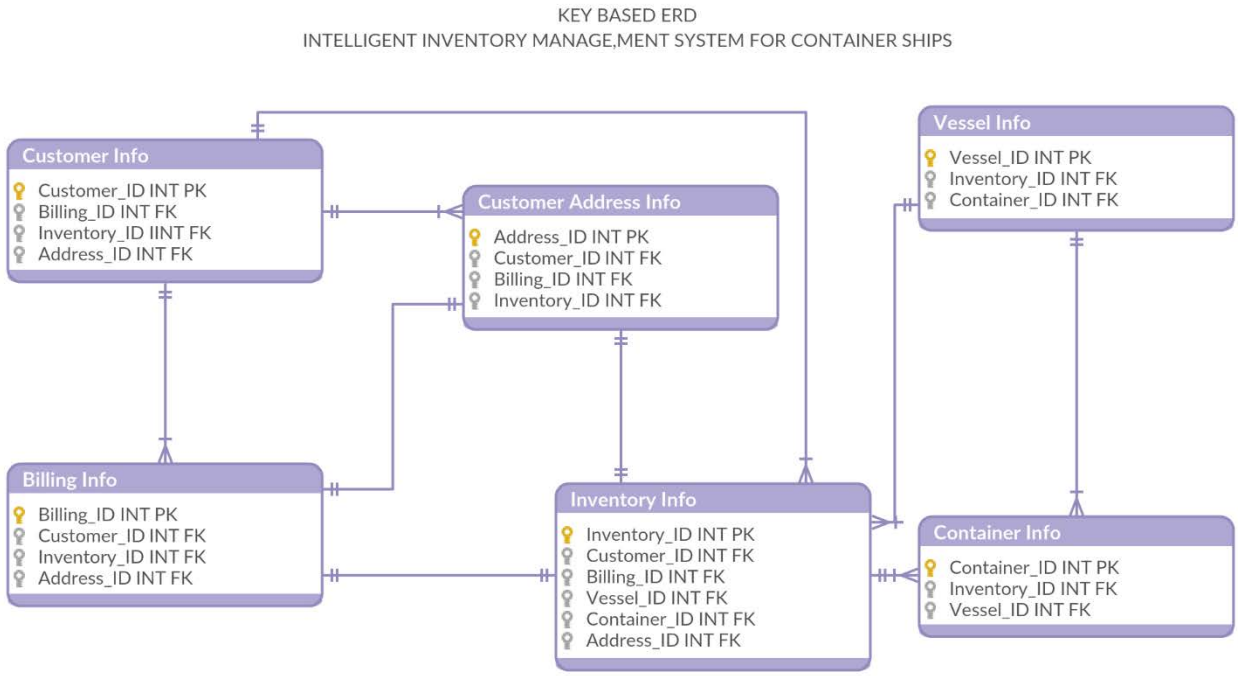
The level 2 diagram is a representation of the inventory information entity. The customer, logistic carrier and the shipping company interact with it by viewing the inventory data. This data is read by the smart inventory planning entity. The Port Container Management System can also check the inventory status. The shipping company can update the inventory information and move to the next entity to get customer approval. This information is then updated into the inventory database.

VI. ENTITY RELATIONSHIP DIAGRAM

ERD DIAGRAM

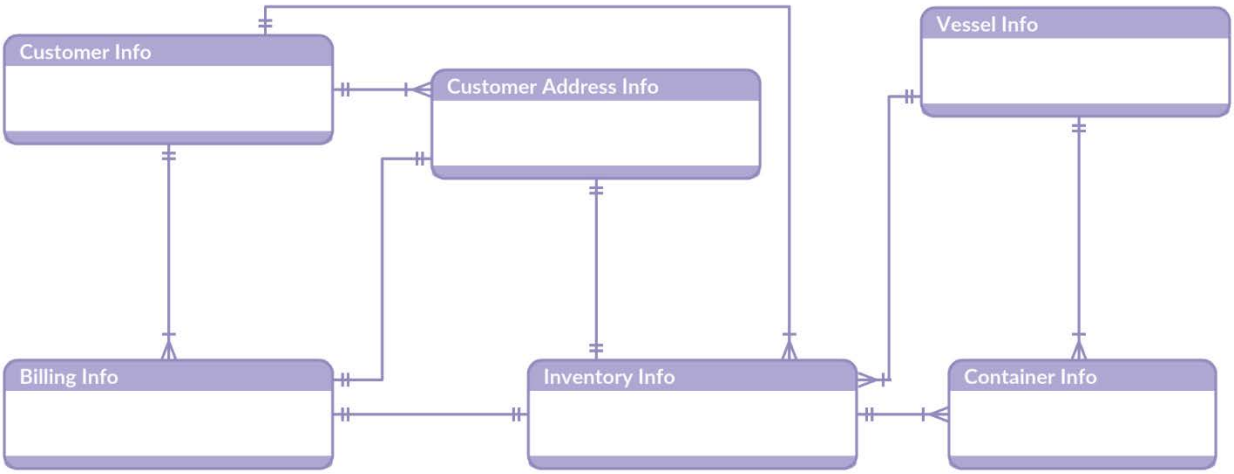


KEY-BASED ERD



VALUE BASED ERD

CONTEXT BASED ERD
INTELLIGENT INVENTORY MANAGE,MENT SYSTEM FOR CONTAINER SHIPS



VII. Implementation Plan

LIFE-CYCLE

There are various life-cycle approaches defined and designed which is used to deploy during the software development life cycle. Some of these are Waterfall Model, Waterfall model, incremental model, V-model, iterative model, RAD model, Agile model, Spiral model, Prototype model etc. The model that we are choosing for implementing the project is the Agile model.

AGILE MODEL

The Agile model is an incremental model i.e. the project keeps incrementing after every cycle. Each development cycle in the Agile methodology is called as a sprint. The sprint cycle for our project would be a tenure of 4 weeks. After every sprint the shipping company would be reviewing the system progress and suggest new requirement if any. The reason why we chose the agile model is because of the changing nature of the requirement list. Also, such methodology helps the shipping company be actively engaged in the progress of the project. The various areas of this methodology are: Planning, Requirements Analysis, Design, Coding and Testing.

In the planning phase we have created a project vision, form SCRUM team, identify the level of the project, set deadlines etc. Identifying the problem with the current system is the main agenda of this phase. After the team has been formed, we interacted with the board member of the shipping company to identify these parameters.

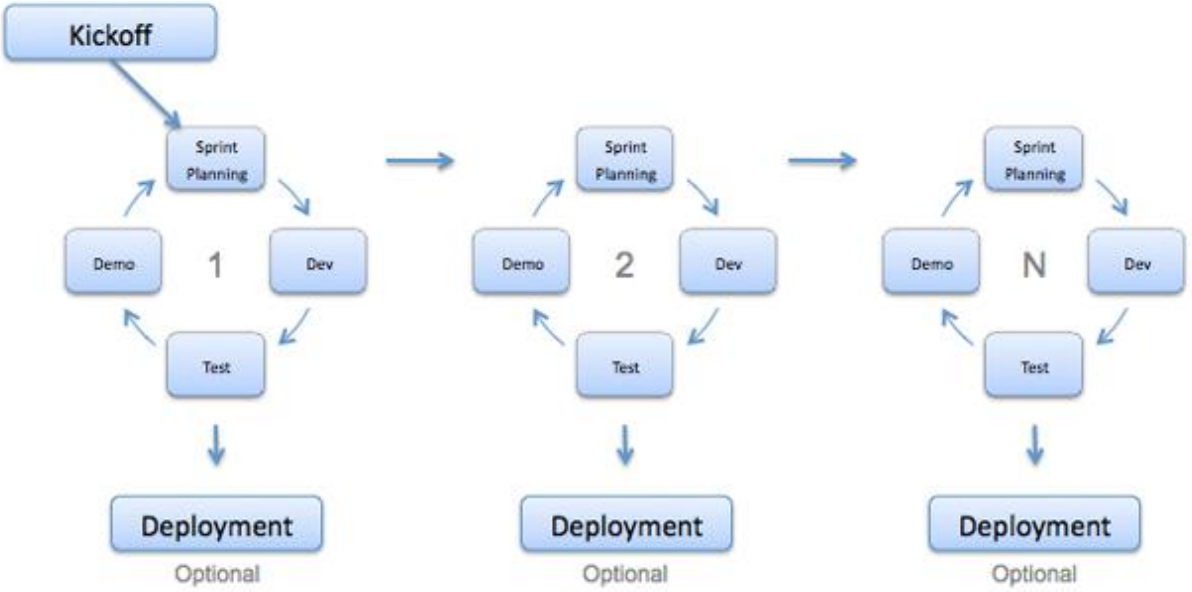
The requirement analysis phase consisted of gathering information regarding the project. We conducted feasibility analysis to check the technical, economic and organizational feasibility of the project. We will meet the various logistic carriers and the shipping company to gain more insights with respect to creating the smart inventory system and how will it affect the different business areas of their organization.

The designing phase consists of the various documentation required to build the project. We created a Use-Case diagram, Data Flow Diagram, Entity-Relationship Diagram to generate various relationship between entities like the logistic carriers, shipping company and the smart inventory system. This provides a foundation for building the project. Building the User interface for the system so that it can be presented before the board members.

The coding phase is where the actual coding of the project takes place. In this phase we are going to code the entire system for the organization. The smart inventory management system falls in the domain of machine learning and artificial intelligence and thus will require a lot of data and time for its completion. The new system should also be able to piggyback the data from the previous database and incorporate it with the new system.

Once the project has been coded, the project is tested if there are any faults. The various testing techniques used in this phase are Unit testing, Component Testing, Integration testing. The project is also tested with the end user to check if there are any error in the project. The project will be tested with various logistic carriers and people from the shipping company to test the system across various platforms and along different sets of people who will be using this system.

These stages keep on iterating as new requirements are identified at the end of each scrum and will be integrated to form the final product approved by the board members of the shipping company.



The various advantages of using this type of methodology are:

- Board member satisfaction by rapid, continuous delivery of useful software.
- Working software is delivered frequently as we are meeting the board members frequently at the end of each sprint.
- Late requirements can be implemented easily, and company satisfaction is guaranteed.
- New changes can be implemented at very little cost because of the frequency of new increments that are produced.

The various disadvantages of using this type of methodology are:

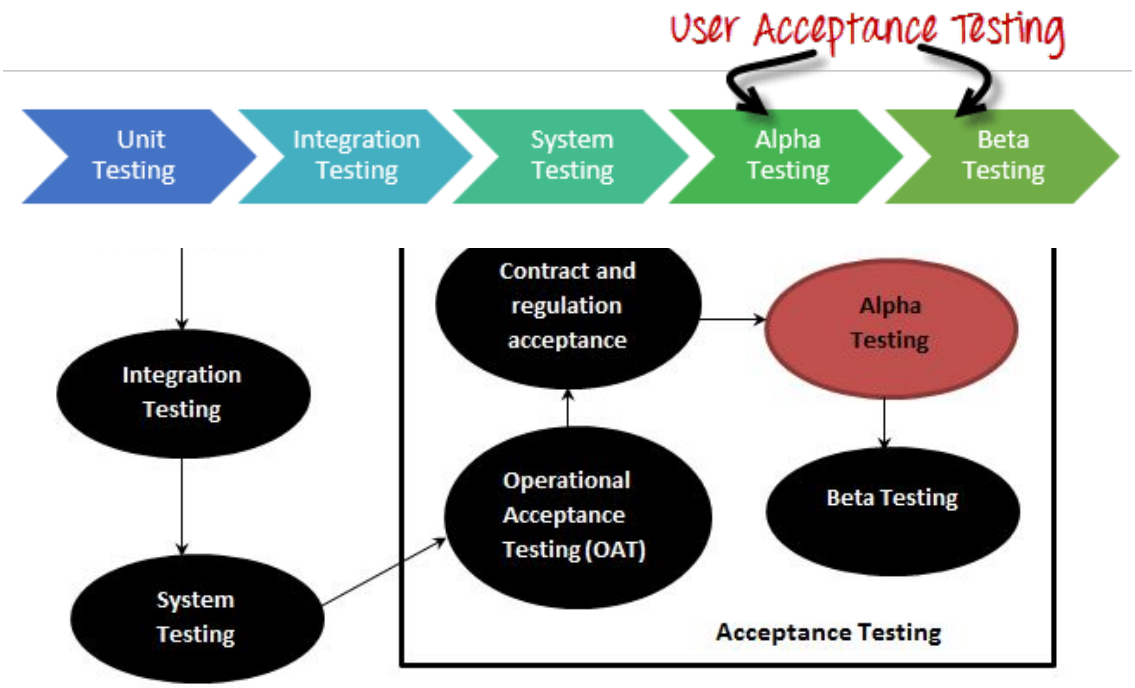
- In case of some software deliverables, especially identifying the parameters for smart inventory management, it is difficult to assess the effort required at the beginning of the software development life cycle.
- The project can be easily taken off track if the board members are not sure of the outcome.

Testing

Testing is necessary in the implementation of IIMS system. It can help debug and find the possible errors in the development of system, which ensures the quality of system, and make it better user experience in the next steps, so it's essential to decide the release of the software or system.

For the testing method or process, we'd like to use the alpha-beta testing, which means the first alpha phase includes unit testing, component testing, integration testing and system testing. Unit testing is done by the developers about the individual functionality or procedure, component testing is finished by testers to find bugs of each component, and integration testing will be finished by a specific integration tester to see if different modules integration can work, which may go through a bottom-up or top-up approach.

The alpha testing mainly covers testing internal and help refine the system from the technical point, while beta testing can be considered "pre-release" testing next, which is to get the system into the hands of a select client group and get feedback about user experience. After finishing beta testing, the IT specialists can finalize the amelioration of system, which makes the system.



Training

To make the system more acceptable by both the clients and internal employees, there is a need to develop a complete training plan for this system. Given the working situation this system would be and the ease of this system, the first shipping companies and client users may not be a large amount so the initial training plan should be a release of training guide and a limited training for the company administrators and customer service.

This guide will be two editions, one for the client users, this edition should be as readable as it can so the client could immediately know what this system serve and how to use this system; The other edition is for the company internal, this edition should cover all the functions of this product and can be a good teaching materials in the coaching part.

For the training of customer service team, we vendor supplier would provide professional system experts to give lessons on the beginning of implementation, they will not only teach the company administrators the simple operations, but also answer some frequently asked questions and how to do debug on their own.

Support & Maintenance

As a system which is designed to meet the long-term needs of shipping companies, there will be perfect support and maintenance plan for it. In customer service center, the client can find our IT support, helpdesk and other staff who could help optimize the user experience.

There will be monthly system inspections to make sure the system can execute in a high efficiency as well as a system update half a year with new features, which make this system always keep in pace with the frontier technology, usually the testing or updating work will be scheduled in advance to reduce the inconvenience which may be brought about. The technical support will also update the user guide with the system so that the client's time will be saved.

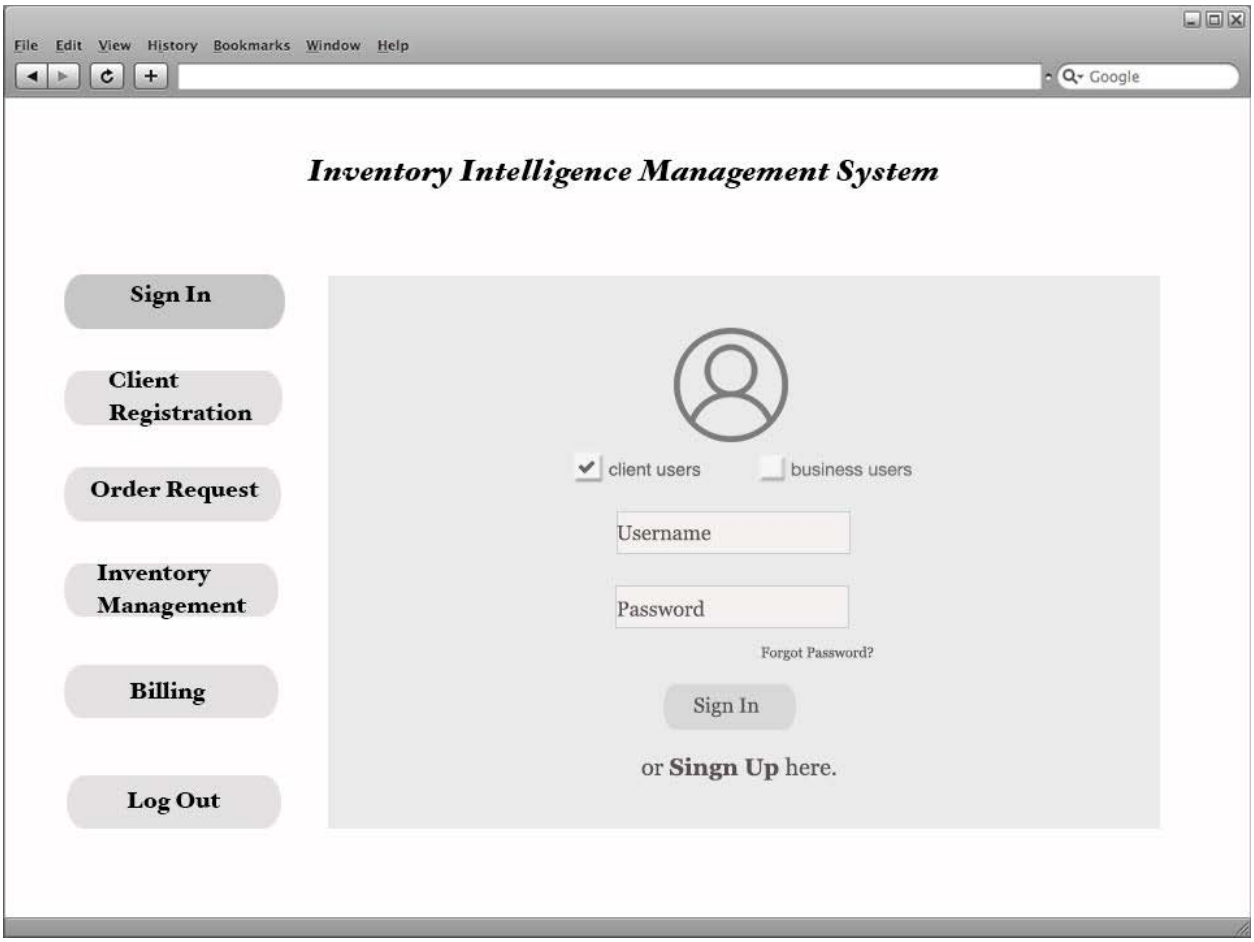
In addition, the customer can ask for help from the IT help desk if they come across some problems in using this system, the service hour is 24/7, there'll always someone be available for the questions, the customer service team are well trained and work well with system engineers, and all feedbacks to be conveyed to the IT specialists for refine.

There can also be unexpected disaster or hacker attacks so we develop solid firewalls and complex process to enter internal database, despite the cloud backup, we also have local backup database for client information, and the risk of system crash has been decreased to the minimum.

VIII. USER INTERFACE

INPUTS:

Sign-in page



Both the internal administrators and the client users could access the system and operate on the functions on the main page.

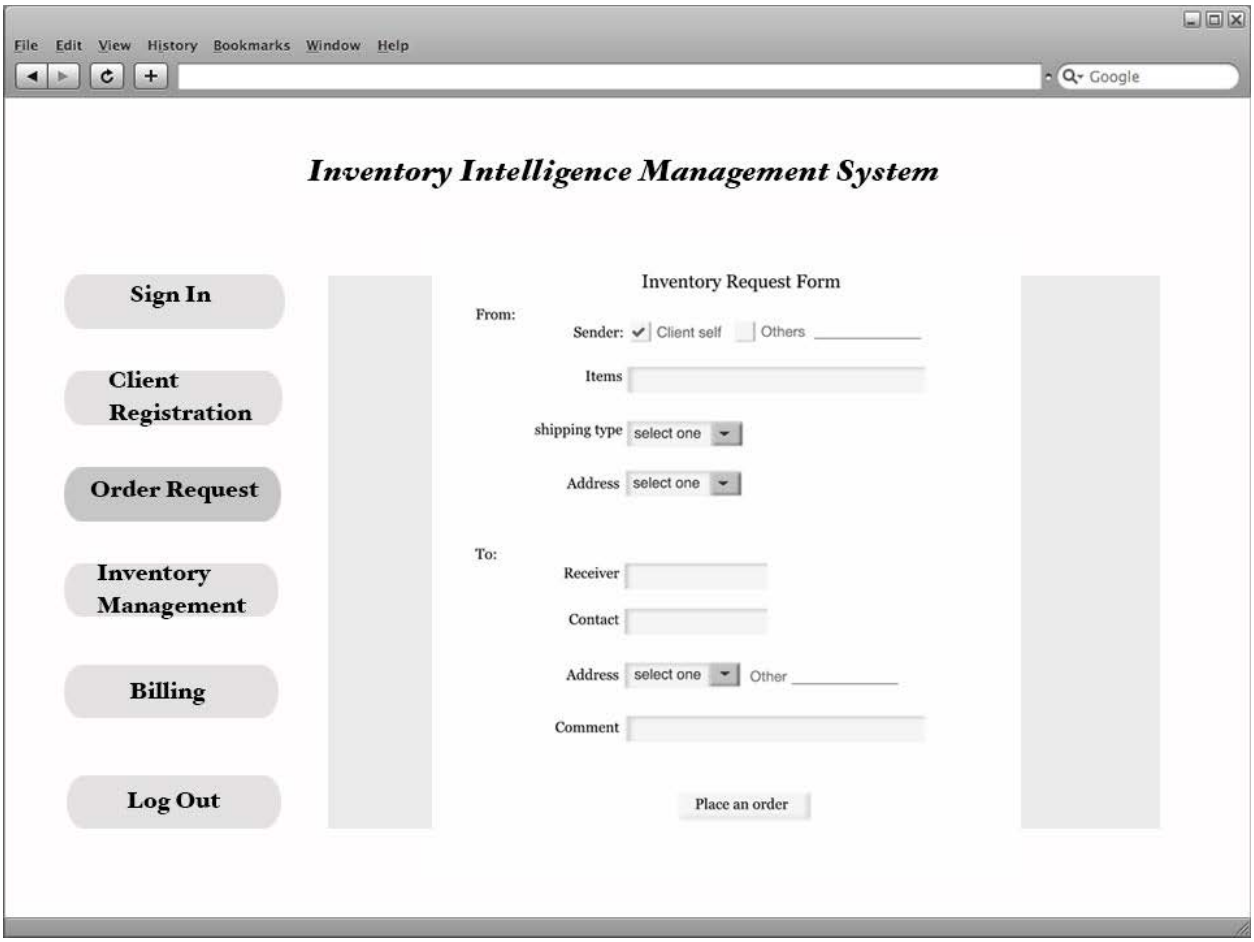
- Only the users with ID and password have the right to this system.
- There are “Sign in”, “Client registration”, “Order request”, “Inventory management”, “Billing, “Log out” in the side menu list.
- The “Sign in” button is linked with the logon page. When clicked, the logon page will present on the right side.
- In the “Sign in” page, there are two check box for choosing user type.
- In the “Sign in” page, the username and password should be texted in the textbox, there is a “sign in” button for finish.
- If the user forgets the password, there is a link for finding the password under the textboxes.
- If the user is new to this system, one can sign up a new account through the bold “sign up” in the bottom of page, and it will go to the “Client registration” page.

Client registration page

The new user need to fill in the basic personal information in this page, and all the fields are necessary for submission.

- When the “Client Registration” is clicked or the bold “Sign up” on the sign in page is clicked, the process of registration begins.
- There will be automatically generated user ID number on the right top corner once the page presents.
- The user should fill in his first name and last name as what it is on the passport.
- For the country and state, they are designed as dropdown list and the user could choose from it.
- In the city and zip code field, the user should type in the city and zip code which belongs to the state just chosen. There are two more long text boxes below for details.
- The user should also choose the trade type in the dropdown list for further convenience.
- After finishing the information update, click “submit” on the bottom, and there is also a quick order place entry for the new client.

Order request page – new request

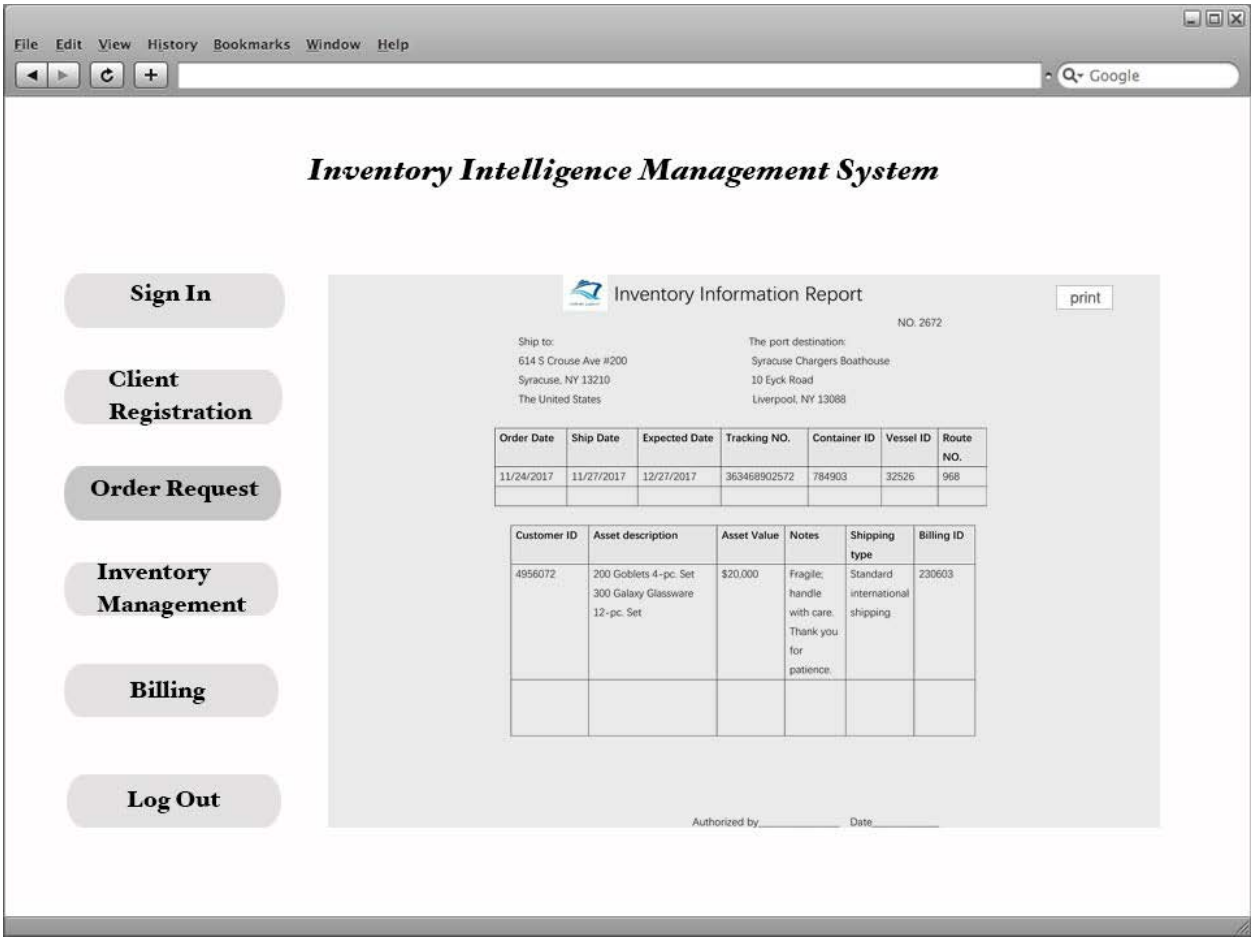


The “Order request” is designed for placing an order for the customer, which usually includes the most basic order information like the information of senders and receivers.

- Once “order request” button clicked, the request form will be presented on the right side.
- In the sender information part, the user could choose if it’s himself or the others to initiate the order through the checkbox, then write down the details of items below in the textbox, for the dropdown list of shipping types, there’ll be standard, rush shipping, for the dropdown list of address, the user can choose any address he ever stored in the personal information.
- In the receiver information part, the user will fill in the receiver’s exact full name, contact numbers, address details, and some other extra comments in the textbox.
- After finishing the mandatory fields, the user can click “place an order” button then close this part.

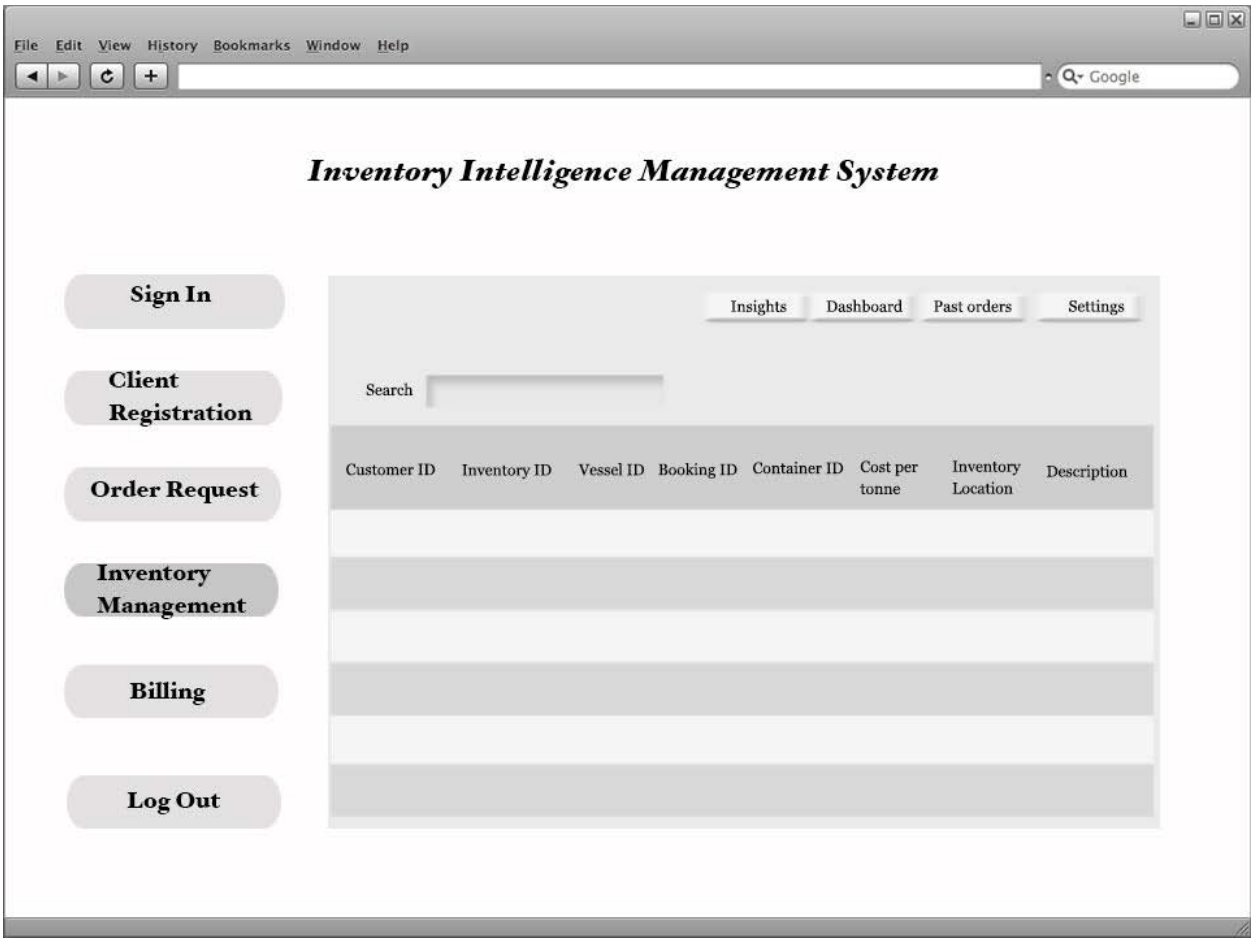
Output

Order request page – inventory report



The inventory report is the output of the placed order, which would present all the information of inventory, which means the data in it has been done through the smart inventory management, including the order date, shipping date, the expected delivery date, tracking number, container ID number, vessel ID number, route ID of the vessel, customer ID number, asset description, asset value, notes, shipping type, billing ID number. The report ID number is automatically generated in this page, and there is a print button for printing this report from system.

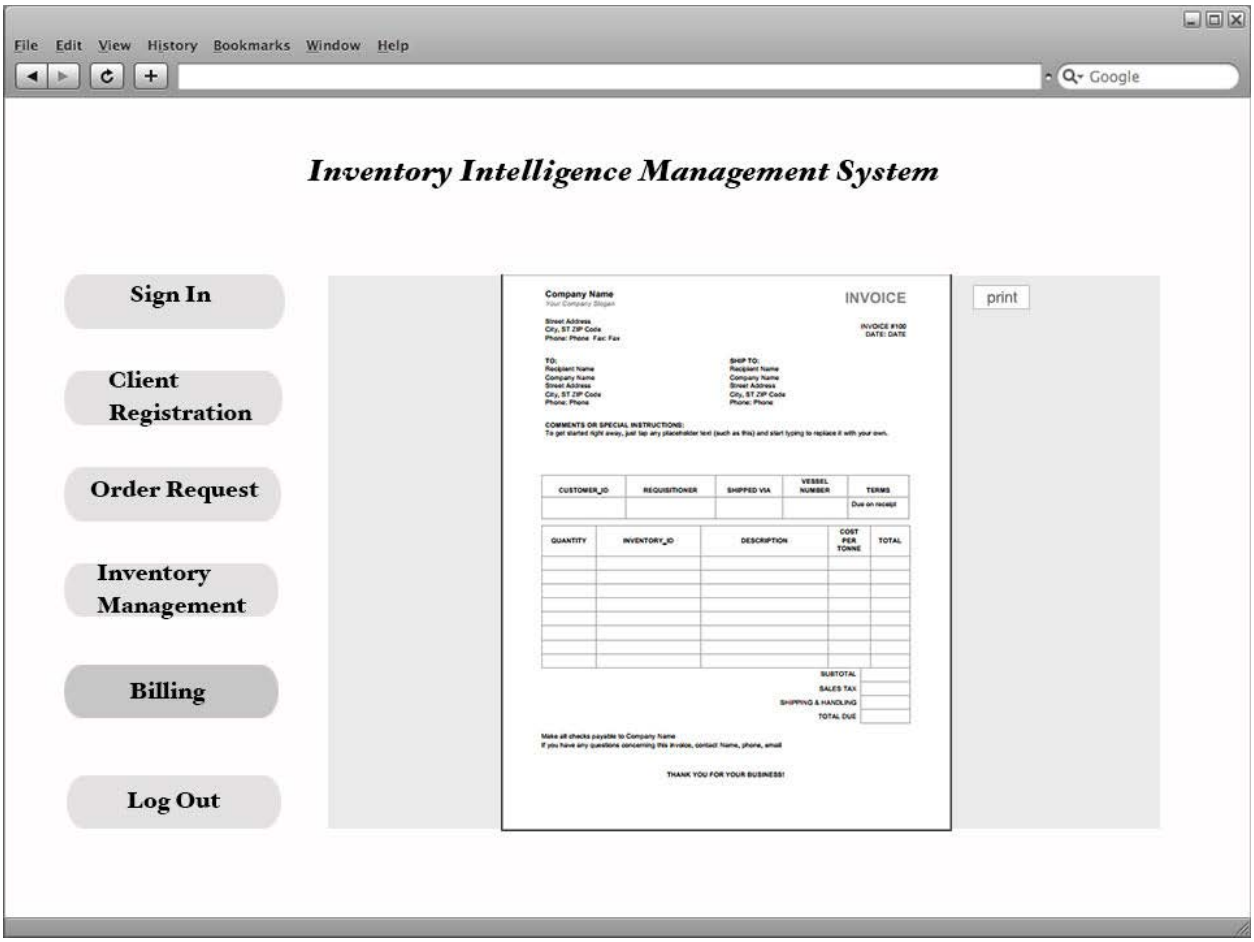
Inventory management page



The “Inventory management” section can present all the recent inventory for the internal administrators, and it’s also convenient for the search with specific criteria, usually it can only be accessed by internal users but the client users.

- There will be several segmented functions on the right top like “Insights”, ‘Past orders”, “dashboard” and “settings”.
- In the “search” textbox, the user could type in the criteria and get the search result in the below form.
- In the result form, it will show each customer ID, Inventory ID, vessel ID, booking ID, container ID, cost per ton, inventory location and description for each inventory/ order. The list view will be detailed and easy to manage for the general administration.

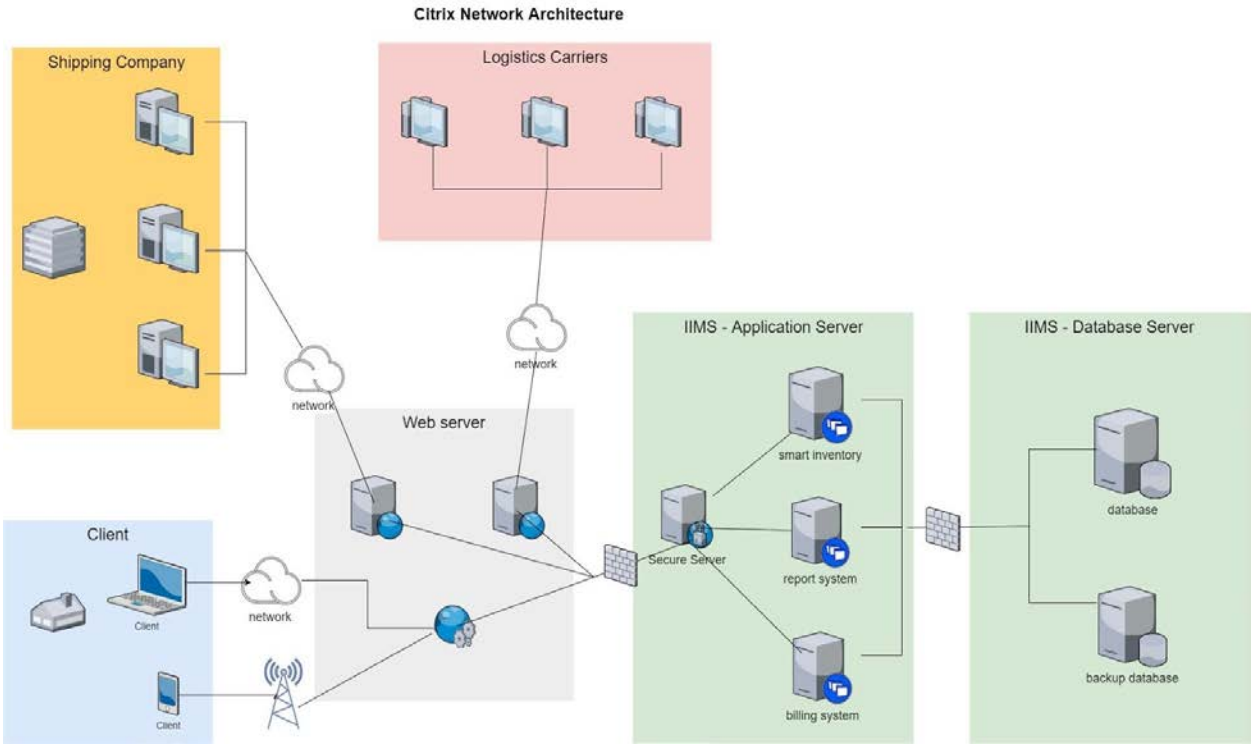
Billing page



The billing page is also the output of this system. It's derived from the customer order history and detailed order information, which is used for billing invoice for confirmation.

- The report presents both the receiver's exact address and the shipping dock destination address on the first part.
- In the next part, there are two forms, the first one includes customer ID, shipping status, vessel ID and so on. The second one includes quantity, inventory ID, description, cost per tonne, subtotal amount, tax, shipping fees and total dues.
- This is also a white button on the right top to print this report easily.

IX. PROJECT ARCHITECTURE



The entire system revolves around the intelligent system. The system gets triggered when there is a slot available in the shipping containers. The system contacts other entities like logistics carriers, other clients and potential customers.

Each and every entity like shipping company, Logistics Carriers or a client can send out request for filling out these containers with their own business devices which can be either through their own cell phones or their computers. These devices are all connect through the network to be web servers which are located at remote places. Firewall are set up between the web servers and the application layer for taking security measures.

The application layer consists of smart inventory management system, reporting system and billing system. These systems interact with the clients with the help of web servers. Billing information and reports are sent out to the shipping company through this network.

All the data will be then moved the database so that it can be easily available to the shipping company and an additional backup database has been set up for data recovery in case the primary database fails to perform.