WEB-BASED SEAMAN MANNING ETHIOPIAN SHIPPING LINES

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Abstract

*The purpose of this Project was to solve practical problems of Seaman Manning Department of the Ethiopian Shipping Lines Company by developing user friendly software database which is web-based seaman system. In the Company, there was difficulty in accessing easily pieces of information on its seamen in the vessels. To this end, the Project generally made the ESL services more satisfactory to seaman than the previous times which, in turn to its customers. Specifically, the research-based Project also aimed at (a) assessing and analyzing the existing system to investigate and to identify the problems with the ESL; (b) observing the benefits of implementing web-based seaman manning system in the ESL; (c) developing software to process the activities of recording seaman data; (d) eliminating the burden of paper usage as much as possible in the Company; (e) simplifying searching for documents; and (f) providing reliable, timely and accurate information about the seaman corresponding body (such as Manning Officer for Administration HRM report). Data were collected using interviews using interview guide, survey using standard questionnaire and direct observation using observation checklist methods. The team members used Object Oriented System Analysis and Design (OOSAD) technique and the tools, such as the Argo UML, Microsoft Project, Microsoft Project and Microsoft Office. In the process of finding problems of the existing system, the team used **PIECE (Performance, Information, Economics, Control, Services)**. Practices, like passport book issuance, seaman book issuance, medical certificate validation, vaccination card issuance, coordinating visa issuance activities and seaman reporting should be preserved from the existing system On the other hand, there are alternative options to address problems of the existing system. These are: (a) to examine our options we will perform **SWOT (Strength, Weakness, Opportunities, Threat)** analysis technique; (b) there are generally two options **off-the-shelf** and **custom** soft wares. In addition to examining general software category, the team also identified the following three types of database development approaches: standalone database, distributed database approach, and centralized database approach. The Project team proposed a web-based seaman manning system by developing user friendly software and database to improve the problems mentioned above. There are functional and non-functional requirements of the proposed system. The functional requirements include: (a) validate user which are users should have user name and password; users can be an*

administrator; seaman; manning officer; HRMA Manager; evaluator (i.e. HRM Division Head, Technical Manager, Training Officer, and Captain); the system prompts the user to enter password and user name; and (b) If they are correct, the system will display the required page else it prompts the user to reenter his correct identity. The non-functional requirements include: (a) The system should be operational for 24 hours per day; (b) For most queries, the system should generate report in short period of time; (c) virus protection facilities; and (d) efficient backup every week. In addition to these, the proposed system has documentation, user interface and performance. Regarding exception and error handling, the Project devised portability, reusability and maintainability. As to essential modeling, administrator, captain, fleet manger, HRMS, and technician were identified as major actors. The use cases identified are: (a) Login; (b) Register new employee; (c) Search seaman information; (d) Register new staff; (e) Follow up employee; (f) Recommendation; and (g) Technical Issue. The design deliverables include: class type architecture, controller classes of the system and business classes of the system in design. In addition, the five-layer class-type architecture for the design of the object-oriented software which include: user interface layer, controller/process layer, business/domain layer, persistence layer, and system layer was employed. In conclusion, designing seaman manning system helps the ESL Company to ease its burden and lessen the cost by facilitating manning order report generation and by avoiding some of the problems which are related to the above activities. Finally, it is recommended that the HRM Division of the Company should utilize the benefits of web-based information technology system and should implement this Project to solve its problems faced on this particular area. The ESL should also extend the Project by adding its some other uncovered tasks.

Introduction

Ethiopian Shipping Lines (ESL) was founded in 1964 and started its operation with three newly built ships (two general cargos and one tanker).in 1966. The Head Office is located near the Ethiopian Railway Station in Kirkos Sub-City. Currently, this Company possesses 10 ships (vessels), tries to facilitate and to promote the country's import and export trade by way of rendering efficient, competitive and reliable liner and tramp maritime transport services in the international and the neighboring countries. ESL holds practically monopolistic rights to the country's import and export business and is a major customer in Djibouti.

The specific objectives of Ethiopian Shipping Lines are: (a) to create a conductive incentive structure for trade; (b) to improve market access for the Ethiopian's export and import; (c) to reduce poverty through trade, particularly export and import growth; (d) to improve trade facilitation service and, thus, removing "at the border" and "behind the border" constraints; (e) to build the capacity of trade support institutions; and (f) to establish an inland dry port.

Statement of the Problem

As one had noticed above among the tasks of the Company, the Research Project team members selected its Seaman Manning Department. This Department is one of the Offices in which critical tasks are being performed as the study Organization is a shipping Company. The Project team observed various problems that have faced on the system. The team tried to figure out the following major problems: It is difficult to get information easily.

The employees of the ESL mostly spent their time on manual routine tasks. Consequently, they are not able to see the future. There is no full centralized data for the Company's workers who are working on those ships.

In ESL, getting information on document expiry date of those employees before the deadline ends is difficult. Therefore, it is difficult to perform annual leave calculation and to judge reporting date for next assignment. It is also difficult to get filtered data which hold pieces of information on personal educational level, vessel assignment, seaman personal information, and assessment information.

Here one may raise the question: Why did the team members come up with this Research Project? Nowadays, as there are many shipping lines in the world; the Ethiopian Shipping Lines should be competent enough and has to solve its

seamen's management problems. Thus, this Project is a must to carry out as it may enable the ESL to satisfy seamen's needs and to get effective and efficient services to be delivered for the Company's workers.

Objectives of the Project

The general objective of this project was to make the ESL services more satisfactory to seaman than the previous times which, in turn its customers. To this end, the Project intended to propose web-based seaman system by developing user friendly software end data base. Specifically, the Research-based Project aimed at (a) assessing and analyzing the existing system to investigate and to identify the problems with the ESL; (b) observing the benefits of implementing web-based seaman manning system in the ESL; (c) developing software to process the activities of recording seaman data; (d) eliminating the burden of paper usage as much as possible in the Company; (e) simplifying searching for documents; and (f) providing reliable, timely and accurate information about the seaman corresponding body (such as Manning Officer for Administration HRM report).

Feasible Study

This study focused on economic feasibility in terms of tangible and intangible benefits, technical feasibility, operational feasibility, and schedule feasibility.

Economic Feasibility

Some of the benefits and costs that are believe to appear in the short and long run. Benefits are further divided into tangible and intangible benefits. The tangible benefits include: cost reduction and/or avoidance; error reduction; increase the speed of activities; increase flexibility; generate more income by using available human resource efficiently; and improvement of management

planning and control. The intangible benefits, in contrast, are: providing more timely information than before; faster decision making; and better human resource management.

Technical Feasibility

Usually, the response to whether or not a particular technology is available and capable of meeting the users' request is "yes," and then the question becomes an economic one.

Operational Feasibility

The proposed system was operationally feasible because the Project had been proposed based on the need assessment of the client company to improve the existing system. It was based on the preliminary requirement investigation undertaken by the Project team. Therefore, the new system would solve the business problems and satisfy the client's expectations of the ESL.

Schedule Feasibility

Since the team members specified the scope of the Project by considering the time line given to accomplish it, the number of the team members, their background experience; the Project was accomplished in the given timeframe.

Project Plan

As it is an ICT Project, all business-oriented projects should show the estimated cost of the proposed project to be developed.

Risk, Assumptions and Constraints

Analysis of risks enables the team to expect what might go wrong in the Project. The following are some of the potential risks identified, with their

description, impact and plan to control the risks. These include requirements, acceptance, scope, etc.

Regarding assumptions in the proposed Project, the team members would be available when required, the client or users were assumed to be available for interaction as required for the Project, materials and equipment required can be delivered on schedule, deliverables would be revised and approved within a specified time, and sufficient information was available for estimating the cost of the Project.

As to the assumed constraints, the burden was high to each team member because the team members were pursuing their studies in the Extension Programme of the University College. In addition, they had no experience in project management. Some of the necessary materials may not be sufficiently available in Addis Ababa.

There is also limitation cost for transportation, photocopy, print, and other miscellaneous costs. Business rule and regulation of the organization may limit the information needed to develop the project.

Team Organization and Communication Plan

The team members contacted at least two hours per day and three days per week one another for the purpose of the Project. The team members contacted with the concerned body of the Ethiopian shipping Lines accordingly.

Team Organization

This software engineering team had no permanent leader. Rather, task coordinators were appointed for short durations and then replaced by other who may coordinate different tasks in the Project. Decision on problems faced and

approaches to the actual Projects' undertakings were made based on group based consensus. Moreover, communications among team members were horizontal.

Scope and Limitations of the Project

Even though the ESL had a number of systems, and subsystems that needed close analysis and improvement, the scope of this Project was delimited to developing efficient and effective seaman manning system for the Ethiopian Shipping Company.

With regard to limitations of the Project, it did not include systems in other Departments under the auspices of the Shipping Lines due to the shortage of time, resources, lack of practically tested knowledge and need to be specific for taking on the Project properly and to complete it on time

The significance of the proposed system started from addressing the basic issues of information management by providing the following features: (a) proper organization and handling of data/records in the ESL; (b) providing scalability while programs can be prepared to handle vast number of records; (c) being advantageous to have access and exchange records in a short period of time with more simplicity; (d) improving the performance of employees by way of providing the tools that would enable the efficient management of information; (e) covering the way for more timely and dependable reporting; and (f) being useful for the provisions of consistent or customized information depending on need.

Beneficiary and Expected Benefits of the Project

The Projects would bring mainly four benefits to the Company. The major benefits included: cost reduction, error reduction, increased flexibility, improved speed of action, improve organization planning, and increase accuracy.

The customers of the Ethiopian Shipping Lines would indirectly get faster services. In addition, the Project team members would get more experience and practical opportunity to implement what they had been taught in classrooms for three or four years.

The Project is believed to have some benefits to other students who are interested to work on this area after its completion because the Project document could serve as a reference material.

Some of the expected benefits were avoiding the slow mechanism of the ESL, the seaman web-based system reduced the cost of handling paperwork with record keeping, simple to obtain data on seaman data, creating an efficient and reliable report which would help for effective decision making in the Company, and decreasing time consumption.

Methodology and Tools of the Project

Data collection methods used in the Project had to do with the requirement identification which was generated using the common fact finding techniques, like interviews using interview guide, survey using standard questionnaire and direct observation using observation checklist.

System Development Methods

The team members preferred object-oriented system development approach in the system developed to other types of approach. The selected method was best suited for this Project due to the following reasons: increased maintainability, increased reusability, increased quality, increased scalability, and increased the chance of the Project being successful.

The stages in the system development lifecycle approach are analysis, design, implementation and testing methodology as outlined below.

Analysis methodology is a thorough analysis which has been made on the problems of the existing system, objectives to be attained by developing the system is identified, and feasibility of each alternative solution has provided. *Design methodology* refers to the logical and physical design specification for the solution proposed in the system study stage is produced. Once the system design, ***implementation methodology*** is completed and agreed upon, the next stage is to write the codes as outlined in the system design, and ***testing methodology*** is used to make sure the system performs properly from both the technical and operational viewpoint.

Tools and Techniques

As mentioned above, the techniques used to develop a system is Object Oriented System Analysis and Design (OOSAD) technique. Concerning the tools used, the team members employed the different development environment or programming tools during the phases of system development life cycle. The tools are classified as follows:

During the analysis and design phase of the systems developments life cycle, the Argo UML, Microsoft Project, Microsoft Project and Microsoft Office tools are applied.

Argo UML was used to draw UML diagrams, such as use case diagrams, class diagram, sequence diagrams, activity diagrams, and others. **Microsoft Project** was used to draw Gantt chart that assists in setting out the time schedule for our project. **Microsoft office** tools were used in the process of documenting our system.

In Implementation and coding, the Project team members used the following list of front end developing tools: HTML (Hyper Text Mark up Language), Client Side Script (Java Script and Ajax), Cascading Style Sheet (CSS), Designing, Macromedia Dream Weaver, and Macromedia Flash.

The following lists of backend developing tools were also used to design the system: MySQL Supports standard SQL and MySQL compiles on a number of platforms.

Intermediate was used to intermediately facilitate the collaboration among the front and back end of the system.

PHP (Hypertext Pre-Processor)

PHP runs on different platforms (windows, Linux, Unix, etc.). PHP is also compatible with almost all servers used today (like Apache). PHP is easy to learn and runs efficiently on the serve side.

Before the actual implementation of the new system developed into operation, the Project team had performed a test on the system using the following test levels: Unit testing System testing and Performance User Acceptance test.

Object Oriented Analysis

In order to describe the existing system, let us focus on its major function that include: checking passport validation, checking Seaman Book validation, checking Vaccination Card validation, checking whether a seaman is ready or not for assignment, preparing a list of ready seamen for assignment, checking Medical Certificate Validation, taking Crew List from Vessel Mail, accepting Technical Department Recommendation, accepting Training Officer Recommendation, granting leave for a seaman, accept HRM Division Head Recommendation, and approving the Proposed Manning List.

Report Generated by the Existing System

Currently, the Seaman Manning Section generates reports, such as: *Crew List Report* which is *a*lmost every day to know who is currently on vessel, *Performance Report* which is used to compare competitive seamen during manning, *Seaman on Leave Report*, *Ready Seamen Report* in order to be sure that all seamen are ready for assignment during performing manning, *Preparing Status of Every Seaman, and Educational Qualification Report*.

In the existing system, the following forms and different documents were used: applicant's personal data form, Seaman leave statement form, pay sheet form, and planning for manning form fleet position

The Business Rules and Identification include: (a) BR1: Fleet Competence Guide; (b) BR2: Valid Passport; (c) BR3: Entry Visa; (d) BR4: Valid Vaccination card; (e) BR 5: Valid Seaman Book; (f) BR 6: On Voyage stay; (g) BR 7: Re-embarking a seaman on the same vessel; (h) BR 8: Reporting; (i) BR 9: Vessel Rule; and (j) BR 10: Leave Calculation.

Analysis of the Existing System

In the process of finding problems of the existing system, the team used **PIECE (Performance**, **Information**, **Economics**, **Control**, **Services**) framework as a main tool. Efforts and materials required for the tasks were excessive. During the recording process, materials were often wasted because of redundant input of information or erroneous data.

The existing system faced challenges in providing the required service due to provision uncoordinated manning data to the concerned body, and inaccurate planning schedule as most scheduling inputs are not documented but rather held in the mind of the manning officer or HRM Section Head.

Practices to be preserved from the Existing System

Some of the activities will not be changed in the new system. The reason of preserving those activities is it's already solved in the manual system or can not be further solved. These activities are: passport book issuance, seaman book issuance, medical certificate validation, vaccination card issuance, coordinating visa issuance activities and seaman reporting.

On the other hand, there are alternative options to address problems of the existing system. These are: (a) to examine our options we will perform **SWOT (Strength, Weakness, Opportunities, Threat)** analysis technique; (b) there are generally two options *off-the-shelf* and *custom* soft wares. In addition to examining general software category, the team also identified the following three types of database development approaches: standalone database, distributed database approach, and centralized database approach.

Option Analysis and the proposed new System

The Project team tried to analyze the advantages and disadvantages of off the shelf and custom software. In addition to software categories, they saw which database approach was applicable for the Organization under study. The team had analyzed the advantages and the disadvantages, custom software, centralized database approach and proposed system were preferred to other software categories.

The Project team proposed a web-based seaman manning system by developing user friendly software and database to improve the problems mentioned above. There are functional and non-functional requirements of the proposed system. The functional requirements include: (a) validate user which are users should have user name and password; users can be an administrator; seaman; manning officer; HRMA Manager; evaluator (i.e. HRM Division Head, Technical Manager, Training Officer, and Captain); the system prompts the user to enter password and user name; and (b) If they are correct, the system will display the required page else it prompts the user to reenter his correct identity.

The system records information about seaman's personal information, re-leave, current status of the seaman, work experience, education, address, etc. The system prepares crew list for a vessel, such as the system takes employees whose status is on voyage, and the system displays upon user query.

The system takes Technical Department, HRM Division Head, and Training Officer's recommendation. The system also prepares input for planning list for selecting seaman who can be assigned.

Non-functional requirements include: (a) The system should be operational for 24 hours per day; (b) For most queries, the system should generate report in

short period of time; (c) virus protection facilities; and (d) efficient backup every week. In addition to these, the proposed system has documentation, user interface and performance. Regarding exception and error handling, the Project devised portability, reusability and maintainability.

As to essential modeling, the Project team identified the following actors are: administrator, captain, fleet manger, HRMS, and technician. The use cases identified are: (a) Login; (b) Register new employee; (c) Search seaman information; (d) Register new staff; (e) Follow up employee; (f) Recommendation; and (g) Technical Issue.

Design deliverables include: class type architecture, controller classes of the system and business classes of the system in design. Here, the Project team members were using the five-layer class-type architecture for the design of the object-oriented software. Five-layer class type architecture include: (a) user interface layer; (b) controller/process layer; (c) business/domain layer; (d) persistence layer; and (e) system layer.

Table 1. User Interface Classes of the System in Design

S. No.	Class Name
1	Administrator Page
2	Address Page
3	Education Page
4	Personal Information Page
5	Main menu Page
6	System Login Page
7	Recommendation

Table 2. Controller Classes of the System

S. No.	Class Name
1	Address_Controller
2	Education_Controller
3	Seaman_Controller
4	Document_Controller
5	Relieve_Controller
6	Vessel_Controller

Table 3. Business Classes of the System in Design

S. No.	Class Name
1	Employee
2	Experience
3	Education
4	Vessel
5	Document

Concerning persistence layer, its goal is to reduce the maintenance effort that is required whenever changes are made to a database. This layer is presented as follows:

Table 4. Persistence Class of the System in Design

S. No.	Name
1	Data_Manager

Class diagram documentation consists of Account Class, Address Class, Document Class, Education Class, Employee Class and. Vessel Class. Testing procedures include Black Box Testing, This method of testing attempts to find errors in the following categories: (a) incorrect or missing functions; (b) interface errors; (c) errors in data structures (or external database access); and (d) initialization and termination errors. White Box Testing, on the other hand, include: (a) syntax errors; (b) runtime errors; and (c) logical error.

The system in the Project developed include: hardware and software acquisition. Hardware acquisition**: -** one computer with the minimum specification of processor type Intel Pentium IV, processor speed 2.66 MHZ and above, memory 1GB DDR SDRAM, hard disk 80 GB and above, input devices (such as keyboard and mouse supporting Microsoft windows OS), high-speed printer (HP classes), secured network line, and battery (UPS) to have uninterruptible power supply. The software acquisition further consists of the following Operating systems are recommended: Windows 2000/XP, Apache Server, Web Browser and MySQL server.

Conclusion and Recommendation

Conclusion

Designing seaman manning system helps the Ethiopian Shipping Lines to ease its burden and lessen the cost. It facilitates activities, such as manning order report generation, and avoids some of the problems which are related to the above activities.

In order to solve different problems existed the team has tried to propose a solution that reduce at least the existing problems as well as model the proposed system using different tools and methodologies. The team members believe that the different tools and techniques have helped a lot in capturing real user's requirements, as well as model the right system for the users' day-to -day transactions.

Recommendation

As stated in this Project, there are a number of problems regarding Seaman Manning. The performance of the HRM Division can be influenced by the manual handling system. In order to improve this problem and increase its

performance in an efficient way, it is recommended for the HRM Division to utilize the benefits of information technology, i.e. web-based information system. The members of the Project team are highly pleased as if it were effective in solving one of the problems of the Ethiopian Shipping Lines Company. Finally, the student researchers recommend that the Ethiopian Shipping Lines should implement this Project to solve problems faced on this particular area and to extend the Project by adding its some other uncovered tasks.