Vessel Fixation

For

Ramco Systems Pvt.Ltd

P- 1115

Project Report

Submitted in partial fulfillment of the requirements for the award of the degree of

M.Sc Applied Science (Software Engineering)
Bharathiar University,
Coimbatore.

Submitted By

SARAVANA KUMAR A.L
REG.NO. 9937S0089

Guided By

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Mr. P.K.Jayaprakash, M.C.A. (Internal Guide)

DEPARTMENT OF COMPUTER SCIENCE AND ENGINEERING

Kumaraguru College of Technology

COIMBATORE – 641 006

CERTIFICATE

This is to certify that this project work entitled

"Vessel Fixation"

Submitted to

Kumaraguru College of Technology

In partial fulfillment of the requirements for the award of the degree

Of

M.Sc. APPLIED SCIENCE (Software Engineering)

The record work done by

SARAVANA KUMAR A.L
REG.NO. 9937S0089

During his period of study in the Department of Computer Science and Engineering, Kumaraguru College of Technology, Coimbatore – 641 006, under my supervision and guidance and this project work has not formed the basis for the award of any guidance and this project work has not formed the basis for the award of any degree/ Diploma/ Associate ship/ Followed or similar title to any candidate of any university.

Professor and Head

Staff-in-charge

Submitted for University Examinations held on 30/03/04

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16th Feb 2004

The Head of the Department
Kumaraguru College of Technology
Chinna Vedampatti
Coimbatore
Tamil Nadu

Dear Sir,

This is to certify that **Mr A L Saravana Kumar**, final year student of M Sc., (Software Engineering) of your esteemed institution, has successfully completed the project titled **"Vessel Fixation"** at Ramco Systems, Chennai under the guidance of Ms V Vijayalakshmi, Systems Analyst between **November 2003 and February 2004**.

We wish him all the best in his professional endeavours.

Thank You.

for **Ramco Systems Ltd.,**

G K Kalidasan
Head – Corporate HR

DECLARATION

I hereby declare that the project work entitled

"Vessel Fixation"

Done at

Ramco Systems Pvt.Ltd

Submitted to

Kumaraguru College of Technology

In partial fulfillment of the requirements for the award of the degree

M.Sc. APPLIED SCIENCE (Software Engineering)

Is a report of work done by me during my period of study in Kumaraguru College of Technology, Coimbatore – 641 006

Under the supervision of
Mr. K.R.Baskaran
Assistant Professor, Dept of Computer science & Engineering,
Kumaraguru College of Technology, Coimbatore.

Place : Coimbatore
Date : 30/03/04

Signature of the Candidate
(Saravana Kumar A.L)

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Mr. K.R.Baskaran,
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CONTENTS

SYNOPSIS

The project fully goes through the various process that are undertaken to manage the organization and a detail study is done from the data acquired and information gathered. The system is being developed as per the demand of the organization and end user requirement needs.

This project entitled "Vessel Fixation" is developed using SQL server as back end and Ramco Virtual Works (RVW) as front end. The system helps to manage all documents related to transport like loading and unloading. The system can handle all process that to be managed by the company like

- Shipping Indent
- Doc Type
- Port Master
- Branch Detail
- Vessel Fixation

The system is designed to overcome the problem in the organization without giving rise to ambiguity. The system is designed to operate in a healthy computer environment with the system being user friendly and guiding the user at each step.

INTRODUCTION

1.1 PROJECT OVERVIEW

This project has been developed for the transport corporation. This system facilitates storage, retrieval, processing and reporting of all related data for transporting.

The main activity of the company is to collect all the details of transporting from the all other branches and have to prepare an effective travel report such that the ship does not travel empty. They have to check for unloads and what they can load from that doc.

The process involved in this activity is collecting the information from the doc, ship, and branches. Based on the details collected the report is prepared. Based on the report the loading and unloading activities are carried on.

The overview of the project is

- System study of the requirements.
- Reference of the studies made.
- Rough design of the system.
- Testing of the design through the operation.
- Making the necessary changes.
- Obtaining the final design.
- Coding the project.
- Testing the system.
- Implementing the system.
- Documenting the project.

1.2 ORGANIZATION PROFILE

Ramco Systems started out in 1989 as a division of Ramco Industries Ltd, part of the 60 year old Ramco Group – one of India's strongest and most respected business groups. Ramco Systems was spun off an independent company in April 1999. Today, Ramco Systems employs over 1300 software professionals and business analysts operating out of a 120,000 square feet technology center in India and subsidiary companies in USA, Europe and Asia.

Key facts

- Global sales & income (FY 2002-2003) = US$ 39.42 million (up 75% over previous year).
- 19 offices in 7 countries
- Over 650 customer locations and 11,000 users
- Over 2400 person years of development experience
- Over 1000 person years of implementation experience
- 22 partners worldwide

OUR MISSION

"We will provide agile business solutions through superior engineering and best-in-class people."

Ramco Systems is one of the very few software companies in India that have developed, implemented and marketed its own software products in the global market. Ramco started out as an ERP product company and has since evolved into an enterprise solutions provider with a portfolio of products and services targeted at the c-commerce (collaborative commerce) market. Today, Ramco solutions run at over 650 customer locations worldwide at companies like Intel, Swatch, NEC, Indian Airlines and Hyundai.

QUALITY

Ramco Systems software development practices are ISO 9001 certified by KPMG and Y2K certified by ITAA (Information Technology Association of America). Ramco applications are certified for use in Switzerland by Ernst & Young. We are a Microsoft solution provider, and are ranked among the Top 100 software companies in surveys by leading trade publications like *Manufacturing Systems, Computers Today, Dataquest,* and *START.*

TECHNOLOGY

Recently, Ramco has developed a breakthrough application development framework called Ramco VirtualWorks™ - a new component based platform that dramatically improves the way software is developed and deployed. Ramco VirtualWorks powerfully enables both Ramco applications and external applications to run seamlessly across technology and organizational barriers to enable true collaborative commerce.

Ramco VirtualWorks™ is a component-based enterprise application framework for rapidly developing, deploying, and maintaining medium to large-scale multi-tier applications. It is a powerful system that can impact every area of application development – new application development, time consuming integration of legacy systems, upgrading existing applications for e-business, etc.

Ramco VirtualWorks™ enables winning business-IS alliances by providing a robust information system that eliminates the disconnect between corporate and technical managements. CIO's can now conceptualize and deliver more, enabling CEO's to better realize the organizational vision.

Ramco VirtualWorks™ powerfully combines standard software development practices and methodologies with a high-performance technology framework.

Quality is ensured through a built-in quality system that addresses the needs of both generic and customized applications.

Investment protection is guaranteed through a business process behavior repository that abstracts business logic and data information.

Rapid application development is ensured through code generators.

Ramco VirtualWorks™ enables a business for the Internet through three kinds of solutions that integrate the world of client server and Internet computing:

- Integrate/ upgrade legacy applications to handle the e-business requirements.
- Develop ground up applications that can adapt and scale up with the changing business requirements.
- Develop new applications that enhance existing systems and provide an integrated back office support

Ramco VirtualWorks™ uses the 'Business Process Component' approach, a solution that satisfies all of the above criteria and presents a sophisticated software component technology for development, deployment and interpretability. The biggest benefit of this approach is that new features can be plugged in, existing features can be removed, upgraded independently, or replaced with alternatives. By providing Business Process Componentization, Ramco VirtualWorks™ provides much-needed agility in enterprise applications.

Ramco VirtualWorks™ is a virtual enterprise platform for designing, developing and deploying enterprise applications that precisely fills this gap between business requirements and technology architectures and empowers you with several critical capabilities:

- Build completely new solutions from ground up.
- Develop systems that can continuously be adapted, changed and configured in accordance with ever-changing business needs.
- Handle large IT projects across their entire life cycle, involving consulting and SDLC stages.
- Employ sound software engineering practices to deliver predictable systems.
- Develop quality applications for the estimated time and cost.

Very importantly, Ramco VirtualWorks™ will not disturb existing systems. The data requirements can be met through two approaches – service integration and data integration.

Ramco VirtualWorks™ enables businesses integrate and extend existing investments in computing hardware and software, allowing them to 'build out' rather than replace their legacy systems and other third party applications.

PRODUCTS & SERVICES

Enterprise applications	**Services**
Enterprise Resource Planning	Projects & Consulting
Enterprise Asset Management	Customer Relationship Management
Human Resource Management	(CRM)
Corporate Solutions	Networking
	Network security
	Modeling & simulations
	Real time solutions
	Professional services

RAMCO EAM FOR AVIATION

Ramco EAM for Aviation is a maintenance centric enterprise software solution that has been designed taking into consideration exacting demands of aircraft operation and maintenance requirements. Ramco EAM for aviation consists of seamlessly integrated and self-consistent modules covering every area of enterprise management for the fixed wing aircraft and helicopter maintenance industry, ranging from Aircraft maintenance, Logistics to Human Resource management and Financials.

The solution is built on an innovative, state of the art technology architecture that supports client server and web transactions, as well as e-business and mobile computing capabilities. In-built flexibility and extendibility tools facilitate solution customization at the customer's end without requiring extensive technical skills.

ENTERPRISE RESOURCE PLANNING

The core business functionality in Ramco e. Applications is spread over 35 core modules arranged in nine application groups that cover all functional areas of enterprise management. These applications combine with complementary solutions to deliver focused, industry specific ERP solutions in two areas - discrete manufacturing and process manufacturing. Both solutions are enabled for Internet, e-commerce and EDI.

RAMCO PROCESS MANUFACTURING SOLUTION

A comprehensive ERP solution that addresses all the major issues in process manufacturing ranging from shelf life management, recipe management, and potency and assay of raw materials to attribute and lot tracking, capacity

planning, preventive maintenance schedules, and activity-based costing. *Who can benefit* - Chemicals, Metals, Food & Beverages, and Textiles industries.

RAMCO DISCRETE MANUFACTURING SOLUTION

Equips discrete manufacturing industries with the ability to respond rapidly to customer requirements. Manages all the processes from purchasing, material management, and production to order delivery. Helps identify problem areas, reduce waste and inefficiency, and attain higher productivity levels. *Who can benefit* - Industrial equipment manufacturing, Component manufacturing, Casting/Stamping/ Forging and similar made-to-stock and made-to-order manufacturing environments with some configure-to-order requirements.

RAMCO HUMAN RESOURCES MANAGEMENT

Because people are your business...

Human resources management has changed dramatically from back room data gathering and wage administration to a strategic function for attracting and nurturing intellectual capital. Yesterday's HR tools are inadequate for such a role. Ramco Systems offers Ramco Human Resources Management Solution (HRMS) -- a comprehensive human resources solution that helps you:

- Reengineer administrative transaction services to enable HR shift to strategic services
- Improve service delivery and reduce costs
- Empower employees
- Retain key competency through total compensation management
- Develop new and seasoned talent
- Enhance job and decision-making processes

The powerful functional capabilities in Ramco HRMS are distributed across six applications modules -- Personnel, Payroll, Training, Benefits, Self Service, and HR Analyst -- that address the complete need hierarchy of your employees

RAMCO ENTERPRISE ASSET (EAM) MANAGEMENT SOLUTIONS

The business environment for asset intensive enterprises is very challenging today - the regulatory environment is changing, new capacity addition is expensive, output demand is fluctuating, and customers expect service at Internet speed.

This is where Ramco Enterprise Asset (EAM) Management solutions help. Ramco EAM solutions - part of the Ramco e. ApplicationsTM family of enterprise solutions - are designed on the basis of two critical principles:

- The enterprise solution needs of maintenance intensive industries are distinct and different from the enterprise solution needs of manufacturing centric industries.
- In today's Internet economy, organizations must use IS solutions to transit from conventional 'brick and mortar' business models to information age business models that will enable them to stay agile and respond effectively to higher customer expectations.

Ramco EAM solutions comprehensively cover operations, maintenance, logistics, HR and financials to mobile computing and e-commerce capabilities.

E-COMMERCE SOLUTIONS

give your business the Net advantage

Ramco e. ApplicationsTM provide back-office support to a wide range of e-commerce solutions through specialized Internet-enabled products that work in a user-friendly browser environment. In addition, Ramco e. ApplicationsTM come equipped with *Ramco Internet Gateway*, a Rapid Application Development tool to Internet-enable existing Ramco application transactions. The Ramco Internet Gateway gives you the flexibility to Internet-enable transactions that are key to *your* organization

NETWORKING

Successful companies worldwide depend on networks to implement their business strategies. Applications are driven by business needs, and the length, breadth and depth of the networking are contoured on the demands of applications and the data that run over it. Every organization has a variety of applications: from E-mail to ERP, from modeling to multimedia, each requiring its own level of consistency, redundancy and performance, thus making the challenge of designing a network greater.

At Ramco Systems, we understand that networking is much more than connecting hardware using cables and connectors. We believe in networking applications, not hardware. We bring you the knowledge and expertise gained from the design and implementation of the network fabric. Ramco Systems Enterprise Networking Solutions division provides Network and System Integration solutions and professional services.

Ramco ENS has rich experience in LAN/WAN design, integration, and troubleshooting, monitoring, performance management and network security solutions. Ramco Systems ENS provides and integrates the functional building

blocks that network applications. With networks evolving in size and complexity, Network Management and Network performance is a key part of Ramco's strategy.

Ramco Systems ENS has alliances with the leaders in the enterprise networking market to provide best of breed solutions.

CUSTOMER RELATIONSHIP MANAGEMENT (CRM)

Today, more and more organizations are realizing that a customer-centric operation is no longer an optional differentiator, but it is a key to remaining in business. Organizations have begun to realize that any advantage based on product or service innovation is short-lived; instead, forging long-term relationships with customers is key to stability and gaining a competitive edge in an increasingly dynamic market.
Taking a strategic view of Customer Relationship Management (CRM) has become a critical factor in determining the success or failure of an organization. Every organization's long-term success depends on a new customer focus: the superior management of the processes associated with identifying, attracting, and retaining profitable customers

CRM solutions have been designed to help organizations in their quest to serve their customers better. CRM solutions focus on automating and improving business processes, in front-office areas such as sales, marketing, customer service and support. CRM implementations aim to provide organizational effectiveness by reducing sales cycles and selling costs, identifying markets and channels for expansion, and improving customer value, satisfaction, profitability, and retention.

CUSTOMERS

Ramco enterprise solutions run at over 1000 customer locations worldwide. Ramco systems integration customers include the largest corporations in India. Software professionals from Ramco consulting services are associated with on-site and off- shore development projects at companies in North America, Europe and Asia ranging from Fortune 500 corporations to Internet startups. Ramco real time solutions are implemented at several process plants in India.

REPRESENTATIVE CUSTOMER LIST (PARTIAL)

Enterprise solutions	*Systems integration*	*Real time solutions*	*Projects & Consulting*
Sunkist Growers, USA	ABB	Grasim Industries	Fortune 500 companies
Columbia Helicopters, USA	Indian Oil	Dalmia Cements	Mid market companies
Swatch AG, Switzerland	Citibank	Zuari Cements	Internet startups
Migros, Switzerland	Siemens	Shree Cements	
Radisson, UK	Coca Cola		
Intel, Malaysia, Philippines	Mitsui		
Faber Medi Serve, Malaysia	Madura Coats		
Numaligarh Refineries, India	Oil & Natural Gas Commission		
ICICI, India	National thermal Power Corporation		

SYSTEM STUDY

AND

ANALYSIS

2.1 REQUIREMENT SPECIFICATION

Requirement Specifications for a component must have been completed.

The Requirement Specifications for a Component is complete when the following things have been specified completely.

- Activities
- Tasks
- Business Rules
- Errors
- PLBOs
- Required Glossary for all the above

2.2 REQUIREMENTS OF NEW SYSTEM

The new system should overcome the limitations of the existing system. It should provide better options for better data reporting and data comparisons. The system should be secure, faster, error free, and interactive. Thus main requirements identified are

GOOD INTERACTION WITH THE USER

The new system should be capable of good interaction with the user. Errors and warning messages should be clearly displayed. The system should be menu driven. In case of item selection, a list can be provided for selection. Thus error in entries could be reduced and foreign key reference can be maintained without cross checking.

CENTRALIZED DATABASE

A database management system should be introduced by which storage and retrieval of data becomes easy. Large amount of data can be managed, data integrity can be ensured and data redundancy could be avoided.

SECURITY

Since the storage data includes many details, there should be some level of security for the system. Software's in a multi-user environment should use some level of security.

PROVISION FOR QUICK REPORT GENERATION

There should be provision for quick report generation. Graphs and charts can be introduced for better data representation.

2.3 PROPOSED SYSTEM

The new system enjoys lot more sophistication. Care has been taken to make it user friendly as possible. Data storage has been centralized. Concept database have been introduced. The system is menu driven providing the user options for selecting appropriate form for processing. The system is designed in such a way as to gain maximum software support.

Unauthorized entry into the system is prevented by passwords and login facilities, database security as well as application security is provided.

Data entry is made through user-friendly input screen. On data entry, validations are done on restrict duplicate and erroneous data.

Error message is been attached for all the forms.


PROGRAMMING
ENVIRONMENT

3.1 HARDWARE CONFIGURATION

RM Server

Machine	:	Compaq Proliant with Intel Pentium III
Clock Speed	:	800 MHz
RAM	:	4 GB
Hard Disk Space	:	80 GB

Application Server

Machine	:	Compaq Proliant with Intel Pentium III
Clock Speed	:	800 MHz
RAM	:	128 MB
Hard Disk Space	:	20 GB

Client

Machine	:	Acer Pentium MMX
Clock Speed	:	300 MHz
RAM	:	128 MB
Hard Disk Space	:	4 GB

3.2 SOFTWARE CONFIGURATION

Operating System	:	Windows NT Server Windows NT Workstation
Database	:	Oracle 9i
Business Logic	:	COM (Active X Dlls) Microsoft Transaction Server
Presentation	:	RVW, Active -X, DHTML, ASP
Tools & Utilities	:	ERWIN 3.5.2, Microsoft Excel

SYSTEM DESIGN

AND

DEVELOPMENT

4.1 DATABASE DESIGN

The term "DATABASE" is used to refer to any data available for information processing or retrieval operations, the term implies a particular structuring of the data, both conceptually and in physical storage.

The data records are physically organized and stored so as to promote share ability, availability, and integrity. The database approach is made operational by a database management system or DBMS or RDBMS, a software system, which performs the functions of defining, creating, revising, and controlling the database. It provides facilities for retrieving data, generating reports, revising data definitions, updating data and building applications.

NORMALIZATION

One of the issues in database design is achieving a well- defined model of data to avoid update anomalies. Normal forms and normalization rules aid this. The normal forms are easily understood in terms of relational database design. The relational database model describes the database as tables or relations. Each relation consists of row's (called tables) representing entities and columns representing attributes. Normalization is used to determine how to cluster data items.

Normalization is the process of refining the data model. Through normalization, a collection of data in a record structure is replaced by successive record structures that are simpler and flexible to manage.

The reason why normalization is to be carried out is:

- To structure the data so that any pertinent relationships between entities can be represented.
- To permit simple retrieval of data in response to query and report requests.
- To simplify the maintenance of the data through updates, insertions and deletions.
- To reduce the need to restructure or reorganize data when new application requirements arise.

Hence from the conceptual data model to the physical database, the data structures have to go through a set of steps, namely the three steps of normalization that improve the quality of design of application.

FIRST NORMAL FORM

First normal form is achieved when all repeating groups are removed so that a record is of fixed length. A structure is in the First normal form if there are no elements or group of elements that repeat for a single occurrence of the entity represented by that structure. By removing a repetitive group, we get an additional record structure. This creates the need for identifying a key field for the group for the group of elements making the additional record structure. This creates the need for identifying a key field for the group of elements making the additional structure. This is necessary, so that the original record and the new records are interrelated by a common data item.

SECOND NORMAL FORM

Second normal form is achieved when a record is in first normal form and each element in the structure is fully dependent on the primary key. The analysis is conducted on structures that have combination keys – whether the full combined key derives non-key elements or is it derived from part of it.

The steps that transform first normal form structures to structures in second normal form

- Remove data elements that depend on part of the key.
- Treat partially dependent elements as separate structure.
- Identify key for this structure.

THIRD NORMAL FORM

A structure is in the third normal form if the values of its non-key elements are not dependent on any other non-key elements. It is verified whether there are any elements whose values can be calculated or derived from other data elements. If such elements exist, then a decision can be made regarding the utility of retaining that element.

The steps that transform the second normal form to third normal form are:

- Remove data elements that
- Depend on other non-key elements
- Can be calculated or derived through logic
- Interdependent elements are treated as separate structures.
- Decisions were made while deleting computable elements.

4.2 DESIGN METHODOLOGY

SPD

Solution Perspective Document (SPD) is prepared and owned by the Requirements group. This document is normally prepared for those components whose functionality is complex and has various alternative solutions from which a particular solution has been suggested. This document would provide information such as scope of research, market/customer profile, background for the situation, proposed solution, impact of the solution, known limitations and assumptions / references if any. This document can facilitate better understanding by the design engineer.

BRD

Business Requirements Document (BRD) is prepared and owned by the Requirements group. This document is prepared for every component. This document provides the Requirements Group view of the customer's requirement. This document provides the following information.

- Business component's brief functionality and the business context
- Diagram indicating the input information flow from various components to the component for which BRD is being made and the output components for which information is being supplied
- Information required from other components
- Information provided to other components
- Process context and the optional preceding and succeeding processes if any.
- Component functionality in depth.
- Document flow and applicable statuses.
- Posting details to other components.
- References such as RPA reference, SPD reference, etc.,

Activity

An action performed by a user on a document

PLBO

The user interface through which the user interacts with the system is referred to as a Presentation Layer Builder Object (PLBO). A PLBO could be associated with more than one activity. However an activity can have only one PLBO associated with it.

Task

Various steps are required to perform an activity. Each such step is referred to as a task. These tasks could have a predefined a sequence in which they have to be executed.

BR

The business condition with the lowest granularity, which has to be met by a user to complete a task, is a Business Rule (BR). The failure of such a business condition could result in an error, which may or may not be severe enough to stop the processing of the task.

Business Term

A Business Term is a significant name or term in a Process Component. The description of the business term explains the meaning of the business term. The business term also has information such as data type, length and precision associated with it.

Synonym

A business term is referred to by one or more aliases. Such aliases are synonyms.

Business Object

Every component contains one or more Business Documents, which implement the component's functionality. These Business Documents transform from one state to another in the life cycle of the component. A Business Document contains a hierarchical data model and is termed as a Business Object.

For example, for an activity Add Purchase Order, the Business Object would be Purchase Order and its hierarchical data model could be as follows:

Purchase Order
Item List
Schedule
TCD

Concept

A concept is a physical representation of a persistent cohesive set of business terms. In the RDBMS terminology a concept can be translated into a Table or a View. A concept has a set of attributes derived from business terms with their logical names derived from the synonyms.

Logical Segment

The business terms used in a business object could be logically grouped to provide / receive data from the operations on the business object. Each such logical group is a Logical Segment. A Business object consists of one or more

logical segments. The decision of what constitutes a logical segment is based on the data requirements of the various tasks acting on the business object.

Logical Segments are also referred to as BO Segments.

Method

A set of Business Rules (BRs) is grouped into a method. A method is the lowest block in the functional model of a component. A method may or may not interact with the persistent data (Resource Manager). Such a method can access the persistent data through a stored procedure.

Service

A component is designed to support its defined activities. The tasks defined for the activities of a component will be analyzed, normalized and converted into services. Services are invoked either by the Presentation Layer or by other Services. Services receive and return Marshal Transaction Document (MTD). Services are implemented by Business Rule methods that act on Business Objects.

PRE-REQUISITES FOR COMMENCING ANALYSIS

Requirement Specifications for a component must have been completed.

The Requirement Specifications for a Component is complete when the following things have been specified completely.

- Activities
- Tasks
- Business Rules
- Errors
- PLBOs
- Required Glossary for all the above

Analysis deliverables

Analysis of the requirements of a component consists of studying the requirements for the component from the various inputs provided by Requirements. This step is aimed at arriving at a set of documents that would convey the Designer's proposed approach towards satisfying the requirements. This stage will also serve as input to further detailed design.

The following are the deliverables from this stage:

- Logical Model
- Service Specifications
- Control Event Response

4.3 STEPS IN ANALYSIS

Identify Business Objects

Scan the BRD for the various Business Documents that are owned by the component. This information is mandatory for the designer to understand the data hierarchy between various data elements of the component.

Identify Concepts

Each Business Object identified can be further expanded to represent the document structure. The first level structure could be arrived at by scanning through the business rules and listing down the various synonyms used. Group the list arrived into cohesive group identifying a particular instance of repeatable data in the Business Object. The data that required to be accessed need not be a part of the document structure. In such a case a psuedo concept can be created which could be implemented as an interface table or a view during the design phase.

Identify Concept Relationships and Cardinality

Construct the Business Object hierarchy by establishing relationships between concepts. This could be achieved by identifying the primary keys for each concept. Identifying foreign keys could help in arriving at relationship between concepts.

Prepare Logical Model

Create an Empty Entity Relationship diagram using ERWin. Add the concepts identified to the diagram. Depict the relationships that have been identified between the concepts.

Identify Concept Physical Properties

For each attribute scan through the business term definitions and identify physical properties such as data type, size, precision, etc.. Identify the physical name for each of the attributes. This name will be identified based on the naming convention standards. The concept would be deployed with the User Defined Data types identified for the Business Term.

Identify Component Interaction

Analyze the BRD to identify information on the various interactions between the component and external components. This has to be identified at Component – BO – Concept – Data Item level. This is required to identify the component boundary and any requirement for data replication for reasons of coupling, performance and availability.

Identifying Methods and Services

A Component must be designed to support its defined Activities. The tasks and the associated Business Rules defined for the activities of the Component have to be analyzed, normalized and converted into services and methods.

Identify Services

In the Requirements stage, Tasks defined for a Activity are classified into Initialize, Presentational, Link, Help, Fetch and Submit. Under each Task, Business Rules are defined and classified as either UI Rule or a Service.

All the Tasks that have Service type of Rules will be the candidates for Service during the Design Stage. Fetch/Validate and Submit tasks will generally invoke services.

If a Service is used by another service then this service would be an Integration Service.
Tasks that are similar in functionality or have a substantial overlap of the behavior as well as their data set can be implemented through the same service. Hence there may not be 1-1 mapping between Tasks of the Requirement Model and Services of the Design Model.

A Service can be executed synchronously or asynchronously. Fetch type services are always synchronous, since those Services return results and the caller has to receive and interpret the response. Update services may be asynchronous, if they do not return any result.

Services that access data can be classified into two types – those that access online data and those that access Offline data.

The following are the thumb rules that would identify what becomes a Service:

- Every task that contains business rules, which are of type NON UI, would be a Service.
- Any BR or a set of BRs that access Services provided by other components will in turn become a Service.
- Any data updating across component boundary would be implemented through a service.

Identify Methods

Every rule or a set of sequentially cohesive rules within a service and acting on the same set of Business Objects will become a method.

Methods may or may not access the persistent data in the database. If they access the database, then they are implemented internally by means of SQL statements or Stored Procedures.

Method could be either a method implemented through a stored procedure or an UI method implemented primarily for performing UI actions such as enabling/disabling of controls, setting of default values for combo boxes, etc.

Identify Control Event Service Mapping

The tasks of the type 'Presentational' defined in the Requirements stage will be modeled as PLBO events in the Analysis stage. The responses for an event or a task are defined in the requirements stage as Business Rules, which are either UI Rules or Services. UI Rules are those that will affect the UI behavior such as disabling of controls. Such a task will result in execution of a service from the Presentation Layer. Hence the Event or Task Response could be of two types: a UI state setting on the PLBO or execution of a specific service.

Apart from this, an Event can also result in the execution of a developer-specified logic (called a User Method) in the Presentation Layer. On the occurrence of the defined event, the framework runtime will execute the method hooked to the Event.

In this stage of the process, the designer will state the following Information:

- Activity
  - Task
    - Control Event Service Executed
      (Can be UI or Service or one of each)

PRE-REQUISITES FOR COMMENCING DESIGN

Analysis for the component must have been completed and reviewed.

During the analysis phase, certain review points would have been made to the Requirements Engineer. These review points should be settled and their effect analyzed again before proceeding with design.

Since the Analysis deliverables are the starting point for the detailed design, the analysis should have been frozen before attempting on a detailed design.

The following are the inputs required for the Design Phase from the Analysis Phase.

- Logical Model
- Service Specifications
- Control Event Response

In addition, the following information from the Requirements would be required

- Errors
- PLBOs
- Required Glossary

The Service Specifications generated in the analysis phase will be a crucial input, as it will contain the Activity-Task-BR references, the action to be performed and the names of methods and services. From this point in time reference to Requirements document for Activity / Task / BR will be only for clarifications, if necessary.

4.4 DESIGN DELIVERABLES

The design phase involves in converting the analysis results on to design specifications for further implementation by the Design Implementer.

On completion of this phase of Design, specifications on the following Design Implementer:

- Concepts
- Services
- Business Rule Objects
- Methods
- Error Repository setup and Error Handling

STEPS IN DESIGN

Designing Component's Data Model

Refine Concepts

The concepts identified during the analysis phase will have the crucial information that is directly reflected from the Business Rules. There could be additional attributes that will have to be added to the concepts for the implementation of the business rules. These may not be visible to the component user in explicit terms. In addition, since concepts refer to physical model there could be additional attributes (columns in tables) that need to stored for design considerations such as Audit Trail, Concurrency, Performance, etc,.

Some processing in the component would require temporary store during processing. These may not get reflected during the analysis phase. Such concepts also get added during this phase.

Every such concept that could be referred by other components directly will have to be published. This will provide the designer a provision to store intermediate data for further processing without exposing the same for other components.

DESIGNING COMPONENT INTERFACES

Define Services

The services identified in the analysis stage will be the best starting point for this activity. Every such identified service will be further explained. The additional information that are provided would include enhanced documentation that would be useful for the Design Implementer, Segment definition for the service that would facilitate any manipulation of data.

Identify Business Rule Objects

Business Rules are implemented as procedures or functions that take input data, perform the defined processing and return output data. The individual functions written to implement the various Business Rules of a Component will be packaged as a Business Rule Object (BRO).

BRO is a software executable that contains the various Business Rules of a Component, implemented as individual functions.

It is normal practice to group Fetch type of Business Rules in one BRO and all other Business Rules in another BRO. The rationale behind this is that frequently used Business Rules according to the context would get grouped in a single BRO thereby enabling faster response and better deployment.

A BRO is associated with each Design Business Rule (Method) to enable grouping of Methods into a BRO.

Define Methods

Design Business Rules (Methods) are derived from the Task Business Rules that are identified at Requirement Stage. Though the Task Business Rules are atomic in nature (generally), the Design business rules would be a grouping of such Task Business Rules with certain predefined criteria. These Methods would have been identified during the Analysis Phase.

In this phase, the main intention would be to provide the method specification to enable the Design Implementer to implement the functionality as required by the Task Business Rules.

To facilitate this information such as Method Type, Method Attribute, Stored Procedure Name (if applicable), BRO Name and the Method Documentation would be gathered.
In addition, the Method Parameters that are required to satisfy the various Task Business Rules covered by the Method are also identified.

Setup Error Repository

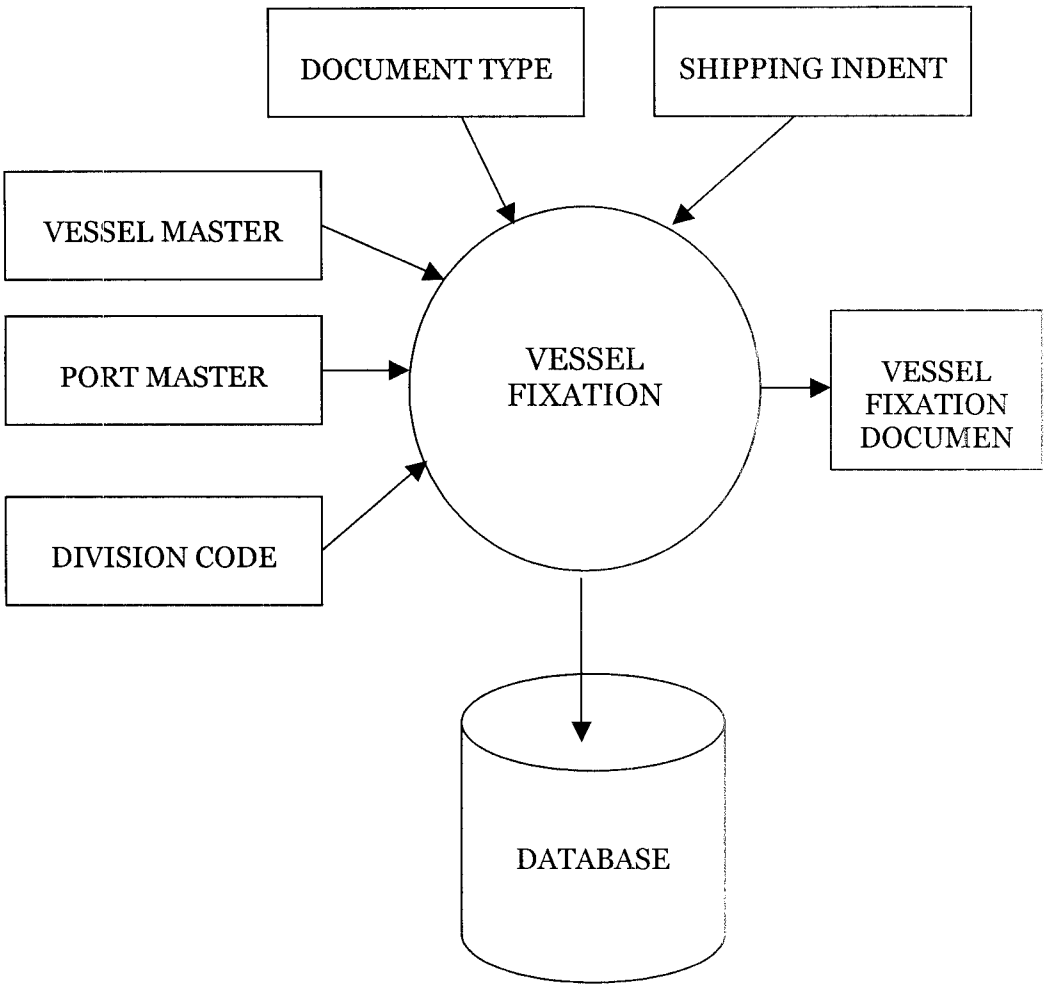
A Design Business Rule will have one or more Errors associated with it. Just as the logic for Design Business Rule is inherited from the Specifications for the Task Business Rules, the Errors are also inherited from the Task Business Rules.

An Error Code identifies an Error. It has a Message and default Severity. It also optionally has placeholders for embedding the actual application data at runtime.

A Business Rule may encounter many situations where it has to raise an Error. The Error can be raised from within the Stored Procedure (or the SQL Statement) that the Business Rule wraps or can be raised by the Business Rule directly. In either case, at runtime the error code would be translated into a language dependent Message text and will be returned to the Service.

4.5 DATA FLOW DIAGRAM

Context Diagram



SYSTEM IMPLEMENTATION AND TESTING

5.1 SYSTEM IMPLEMENTATION

Implementation is the stage when theoretical design is turned in to a working model. This stage is considered as a critical stage in achieving a successful new system. It involves careful planning, investigation of the current system and its constraints on implementation, design of methods to achieve change over, training of user staff and evaluation of change over methods.

The processes conducted during the implementation stage are,

- Testing of developed modules with sample data.
- Correction of errors.
- Testing the system to meet user requirements.
- New files with actual data had been created.
- Changes were made according to users suggestions.
- Changes were made according to user's suggestions.

Users were given training for the new system.

5.1.1 MAINTAIN VESSEL MASTER

Business Functionality Description:

This is a master screen that captures the details about various Vessels.

Implementation:

The Shipping division to maintain the capacity and other specifications relating to the various vessels uses this screen. Commodities division can view this screen.

5.1.2 VESSEL FIXATION ENTRY

Business Functionality Description:

Based on the Shipping Indent given by the Commodities division, Shipping Division goes ahead and fixes the vessel for transporting the cargo.

Implementation:

The Shipping Division uses this screen to provide the details of the vessel, Demurrage rate, Dispatch rate, Details of Insurance, Freight and other Commission details

5.2 TESTING

The important step in the development process of a system is testing the application to check it whether it is running properly and efficiently. Since this application is a real time system, the ideal test data should also be of real time.

5.2.1. TESTING STRATEGIES

Verification

Verification refers to the set of activities that ensure that the software correctly implements a specific function, imposed at the start of that phase. Testing activity focuses on verifying the correct implementation of business requirement and customer requirement.

Validation

Validation refers to the set of activities that ensure the software that has been built is traceable to customer requirements. Validation includes activities like Code-walkthrough to ensure that the software conforms to set standards.

Software Testing

Software Testing is a systematic activity aimed to uncover errors in a software program with respect to its specification to fulfill stated requirements.

Unit Testing

Unit testing refers to the testing of individual software units or related units, where a unit is the smallest functional part of an application. Unit testing makes heavy use of White box testing techniques along with Black box techniques.

In our environment, a typical screen and its associated components make a unit. White box testing measures like code-walkthroughs, control flow graphing are used extensively at this level apart from functional testing efforts like messages, boundary values etc,.

Integration Testing

Integration testing refers to the testing in which software units of an application are combined and tested for evaluating the interaction between them. Black box test case design are most prevalent during integration, though white box testing techniques like Control flow graphing and Execution tracing are also carried out.

Inter module and inter product integration issues are the prime focus areas here. We concentrate on the application's business rules and ensure they are validated across different modules.

System Testing

Testing conducted on a complete, integrated system to evaluate the system's compliance with its specified requirements. Software once validated for meeting functional requirements must be verified for proper interface with other system elements like hardware, databases and people. System Testing verifies that all these system elements mesh properly and the software achieves overall function / performance.

We carry out Product audit and acceptance, performance testing as a part of system testing.

5.2.2. TESTING TYPES

Structural Testing : White Box Testing

Those testing techniques, which involve understanding of the control structure of software components and their procedural design, form a part of Structured Testing. Code-walkthroughs of front-end and back-end code come under this type of testing.

- Branch Testing

  Testing designed to execute each outcome of each decision point in a program.

- Control Flow Graphing

  A technique to generate the graphical representation of the sequence in which operations are performed during the execution of a program.

- Basis Path Testing

  This is a white box control structure testing technique that enables the definition of "basis set" of execution paths. Test cases derived to exercise the "basis set" ensure that every statement in the program is executed at least once during testing.

- Condition Testing

  This is a white box control structure testing technique that exercises the testing of each logical condition contained in a program.

- Data Flow Testing

  This is a white box control structure testing technique that aims at generating test cases to satisfy the execution control of program depending upon the data values and sequences of operation.

Functional Testing : Black Box Testing

Those testing methods that need functional understanding of 'what' a software unit is supposed to perform rather than 'how' forms a part of Functional Testing.

Business rule validations through sample data in a test sequence come under this type of testing.

- Back-to-back testing

  Testing in which two or more variants of a program are executed with the same inputs, the outputs are compared and errors analyzed in case of discrepancies.

- Bottom-up Testing

  A type of integration testing that begins with construction and testing of atomic modules and moves up to integrate and test the entire application.

- Top-down Testing

  A type of integration testing that employs depth-first integration or breadth first integration to start with the controlling module of the application and integrate tests the rest of the modules. This testing

employs test drivers and stubs for testing and relies on Regression Testing to ensure testing completion.

- Regression Testing

Regression Testing refers to the selective re-testing of a system or component to verify that modifications have not caused unintended effects and the system component still conforms to the specified requirements.

- Stress Testing

Stress testing is a type of system testing that aims at confronting the system with varied levels of abnormal situations in terms of consumption of computer resources like quantity, frequency or volume.

- Performance Testing

Performance testing is a type of system testing that aims to determine whether a system meets the performance requirements within the physical limitation of the computing environment of the system.

Components of Testing Procedure

- Test

An activity in which a component is executed under specified conditions, the results are observed or recorded and evaluated with the expected outcome or target.

- Test Bed

An environment containing the simulators, tools and other support elements needed to conduct a test.

- Test Plan

Test Plan refers to the document that plans for testing of a system or component under various criterions of the testing strategy and procedures.

- Test Case

A document that specifies the test inputs, execution conditions, and predicted results for an item to be tested with respect to the testing criteria.

- Test Criteria

Refers to the major focus areas of testing for a given test strategy. The test Criteria relies heavily on the appropriate testing technique adopted.

- Test Log

Refers to a chronological record of all relevant statistics about the execution of a test.

6. CONCLUSION

To achieve higher and higher speed and ultimately the speed of light has always been the aim of those in information technology. Faster microchips, better algorithms, newer and faster methods keep cropping up now and then. Keeping this in mind this software has been developed. The sole aim is to ease the burden on the user and enable the user to perform complex search queries in little time.

Benefits

The system entitled "Vessel Fixation" is an application that can be used for fixing the ships to transport cargoes. It is user friendly and requires no training to be able to be used. It presents a very friendly user interface. The forms have been designed in such a way that there is minimum direct input and more of choice input. Some of the features include

- Increase the productive of the Organization
- Increase the efficiency of the department
- Various options such as Help, Links etc.
- The speed of execution of the system is much faster due to use of COM method.
- Searching, viewing and locating the records are faster due to the use of Query objects of the ADO.
- Automatic retrieval and display of values have minimized the data entry into the system wherever possible. Help Call have also been provided for this purpose.
- At a time more than one record can be deleted by selecting the checkbox.

7. ENHANCEMENTS

Good software must be able to incorporate future modifications and enhancements. Throughout the maintenance phase changes keep cropping up and the system must be able to adjust itself to the changing situations. The system has been developed keeping this in mind. The system has been so developed that change in configuration leaves minimum impact on the performance. The application has been developed such that newer methods can be just added without affecting the other methods.

The application has been coded in a manner that any future enhancements to be made can be incorporated without much effort.

8. REFERENCE

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   "Database System Concepts"
   3rd edition, McGraw Hill Co. Inc.

2. Active Server Page - Unleashed

3. Microsoft SQL Server 7.0 - Manual

4. Mastering Visual Basic 6.0

5. W3schools.com - December 2003

APPENDICES

TABLE STRUCTURE

Table Name : Vessel Master
Primary Key : Vessel Code

Field Name	Data Type	Size
Vessel Code	Character	20
Vessel Name	Character	20
Flag	Character	10
Class	Character	10
Derrick Capacity	Character	10
Crane Capacity	Character	10
Draft	Character	10
Beam	Character	10
Year of Built	Number	10
No of Decks	Number	10
No of Hatches	Number	10
No of Cranes	Number	10
No of Holds	Number	10

Table Name : Vessel Fixation Details

Primary Key : Port Code

Field Name	Data Type	Size
Vessel Fixation No	Character	20
Port Type	Character	20
Port Code	Character	20
Vessel Code	Character	20
Rate in MT Per Day	Character	20
Disp Rate Per Day	Character	20
Demr Rate Per Day	Character	20
Currency	Number	15,2

Table Name : Fin Quick Code

Primary Key : Component Id

Field Name	Data Type	Size
Component Id	Character	20
Parameter Type	Character	12
Parameter Category	Character	32
Parameter Code	Character	36
Parameter text	Character	250
Language Id	Number	10
Sequence No	Number	10
Created By	Character	30
Modified By	Character	30
Created Date	Date	
Modified Date	Date	