Cargo Management System

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1. INTRODUCTION

Cargo Manager is a comprehensive cargo management module, designed for addressing the areas of General cargo, Bulk cargo operations. All the aspects of cargo like documentation handling, movement, and storage are addressed in this module.

Key Features Include

- General Cargo Booking (Manifestation of cargo)
- Storing of Cargo (actual cargo weight, volume etc. are recorded)
- Generating the gate pass for bringing the cargo into the warehouse
- Marking the truck exit
- Delivery order for rejected or damaged cargo
- Generating gate pass for redelivery of cargo
- House keeping movements for maintenance i.e., moving the cargo from one place to another
- Extensive report and querying facilities
- Creation of master like cargo agents, commodity master.

Managing The Data

The fundamental building blocks to cargo revenue maximization begin with sufficient, reliable and accessible data. Full air waybill capture is a good starting point. The waybill history should be stored in an accessible format in a database that can be updated daily.

The real challenge is not just to capture the complete life cycle of a shipment from original booking through to invoicing, but to do so in a dynamic and timely way. With new developments in data handling and communications, it is now possible to build a data warehouse that receives seamless, real time updates from reservation systems and with minimal changes to existing systems.

Unconstrained Demand

Shipment dimensions cannot be given accurately at the time the booking request is made. Often the actual dimensions received at tender do not anyway become part of any permanent record. Since flights will reach their volume limitations before they hit weight limits on some sectors, some heuristic calculation, such as a density code, is needed to forecast likely volumes. The first step is to use historic data to gauge the total market demand regardless of the airline's available capacity. This unconstrained demand is set for each product type by origin and destination (O&D), day of week, time of day.

Most cargo customers, unlike passengers, are more concerned with speed and reliability than with routings. That gives the cargo carrier an opportunity to route shipments away from congested bottlenecks and give a better spread of revenues across the network.

For example, a booking request comes through the reservation center to ship between a hub airport and major destination. The route is consistently oversold, so the bid rate is high. The router will evaluate alternative feasible routes which meet both the shipper's requirements and the carrier's business rules.

Removing The Politics

Effectively, the cargo revenue optimization system will allow decisions to be taken that make optimal use of another, then the choice will not be made. There will be times when the users override the system's decisions, but overall it provides the basis for objective network-wide decision-making, taking away the guesswork and the politics.

Tools

You can use Oracle as back-end database and VB.NET / Java to develop the project.

2. DESIGN PRINCIPLES & EXPLANATION

2.1. MODULES

Data Requirements

- **Packing Options**
- **Cargo Summary Screen.**

2.2. MODULE DESCRIPTIOIN

Data Requirements

CARGOMANAGER requires as input details of the cargo items forming the load and of the available container / containers (or truck, trailer, frame pallet etc.) which might be used for the load. Much of this information relates to dimensions and weights, and additional information can optionally be provided on the characteristics of each cargo item type (fragility, layering constraints etc).

This input can be carried out in two ways:

Direct screen data entry uses a set of windows screens linked to CARGOMANAGER database files (for user specified container and product information), to provide for input of information with the minimum of effort.

Alternatively, as described later, it is possible to **link CARGOMANAGER to other systems** (say an AS400 data entry system) so that data already held in other systems can provide full or partial input into the software.

Direct Screen Entry.

CARGOMANAGER requires user entry of container and product dimensions, together with information on weight and orientation constraints. In-built database facilities for up to 50 containers and 4000 products are provided so that input into these screens can be carried out with minimal effort. If information for a particular product code is already held in the 4000 product database then this is automatically entered into the appropriate fields.

In addition, placement and priority information can be provided for each item in the consignment. This allows CARGOMANAGER to deal with the realities of the loading bay - heavy and fragile cargo, items which will arrive late, multi-drop consignments and 'filler' items which are loaded last to fill any remaining space.

The values entered above have a very significant impact on the quality of the loading arrangements achieved. Before specifying the orientation, heavy, fragile and number of layers values at a value OTHER THAN their defaults the points detailed should be considered

Also, when loading a single product into a container / pallet, you will be presented with the dialogue . One of three options may be selected.

The first of these will attempt to pack as much of the cargo using any of the packing methods available to CARGOMANAGER. This may be a loading from the floor or from the end of the container. The second and third options are self explanatory and the one most appropriate to the practical circumstances should be selected.

Once input is complete, a summary of input information is provided (which might result in a user deciding to return to add items to the consignment), before the (optional) saving of the data file, and the subsequent packing of the cargo is carried out.

Input Data Summary

Once input is complete a summary of the input data is provided (which might result in a user deciding to return to add items to the consignment or change the initial container size selected). Alternatively the cargo can then be packed into one (or multiple) containers with a 'click of the mouse', **or** the efficiency of loading the cargo into **any / all** of the user defined container / trailer sizes held by system can be carried out in matter of seconds.

If data entry is complete, the consignments details can be saved to disk for subsequent recall and modification, before the packing of the container(s) is carried out. The user can at this stage select whether the given load should be packed into a single container or if a multiple container loading is required.

PACKING OPTIONS.

In order to meet the needs of a specific application some degree of 'tailoring' may be required. The Packing Options screen provides this facility. It should be noted that changes to these values are unlikely to be required on a regular basis, and once set they may well not require any subsequent change.

Following the display of the Summary of Input Data you may select to pack immediately the specified cargo or alternatively select **Options** to display the Packing Options Screen. The Options screen allows you to control the way in which packing is carried out. If you choose to move

directly to Packing then the previous (or Default) option settings remain unchanged.

The settings on this screen are very important in obtaining solutions appropriate to your needs and the description below of the parameters and their effect should be read with some care. Once set they may well not require any subsequent change.

During the packing some of the important things are to be noted such as:

- Apply priorities as a strict ranking?
- Restrict packing to Columns?
- Partially remove constraints on heavy/fragile items?
- Should the drawing produced be sectional?
- Should packing be layered from the floor up?
- Attempt layered solutions when leveling?
- Once a complete packing has been achieved CARGOMANAGER still continues to perform calculations for some time.
- The cargo has to be dropped off at a number of points en route and the loading arrangement used should accommodate this.
- Priority Values for Multi-drop loads.

THE CALCULATION PHASE.

Once data entry is complete the Calculation Phase of **CARGOMANAGER** will then commence.

CARGOMANAGER makes use of a wide range of methods so as to obtain a cargo packing which makes maximum use of the volume of the container. If the cargo CAN be fitted then the length of the container used is minimized, if it cannot then the arrangement which

maximizes the volume packed is selected. If the packing is constrained by weight then appropriate messages will be output on both screen and printer and the weight of cargo packed will be restricted so as to meet the stated weight constraint.

The calculations are carried out in a number of distinct stages and during each stage a very large number of possible packing arrangements are investigated. As each stage progresses the screen display shows the rate of computational progress

As outlined above there may well be situations where a **CARGOMANAGER** user wishes to restrict the number of calculations carried out - either because a solution has already been found, or because of time constraints. In doing so, the best solution found up to the point when the button was selected will be retained as the 'best' solution. If the problem is easily soluble then calculation time is likely to be fairly small, especially if the Packing Options for 'Complexity' and 'Effort once packed' have been set appropriately. This latter parameter will also, in these instances, avoid any need to utilize the Break Early button. Once calculations are complete the solution which provides the best volume utilization (subject to weight constraints) is saved

Select **Continue** to display the results in tabular form

Alternatively, having manually entered details of one or more cargo items into the input screen of **CARGOMANAGER** the **Item Base** option is available (on the Cargo Summary Screen). This option saves all Case Information associated with the current problem into the database, updating any existing records with the new data. During data entry, after entry of each product description (i.e. Case code/description), **CARGOMANAGER** will normally search the database for a product match. If one is found then the details of

product size, orientation and layer constraints will be automatically entered on the data screen and the cursor positioned ready for the user to enter the quantity to be packed. The automatic database check can be switched off if required.

Prompted for a Cargo Description - which can be any text description that describes the consignment - you are then presented with the Container.

Cargo Summary Screen.

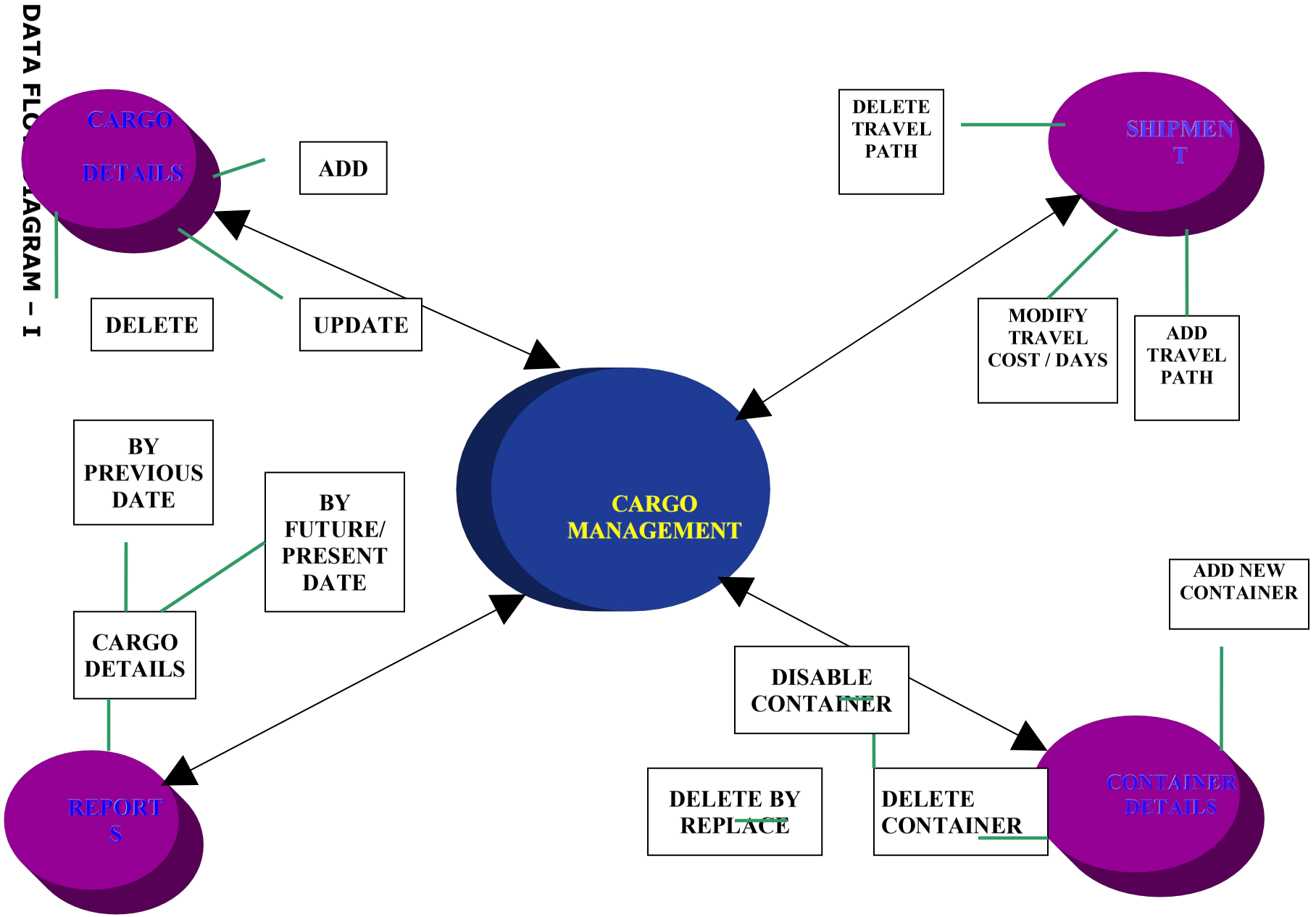
On this screen, in addition to the 'Back', 'BestCont', 'MultiCont' and 'PackCalc' options there is the 'Options' button. This allows users to tailor the packing rules used by **CARGOMANAGER** to suit their particular loading environment

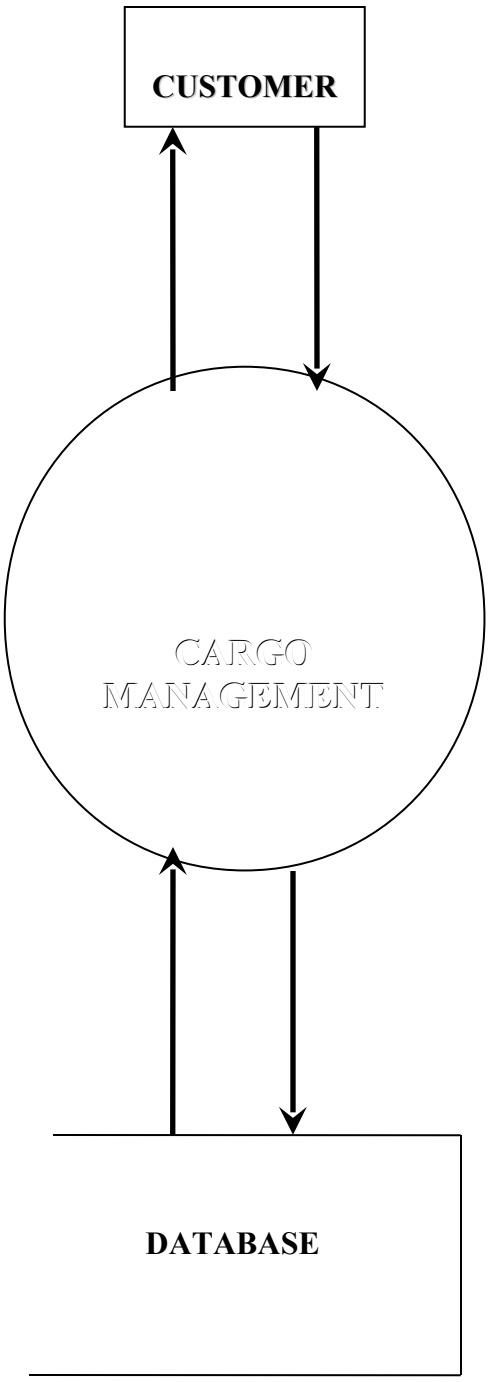
As described on screen BestCont enables loading comparisons to be obtained for loading single container loads and MultiCont deals with multiple container packing using multiple identical containers of one or more sizes

If you wish at some future time to re-run **CARGOMANAGER** using the same consignment data, perhaps changing slightly the quantities or dimensions then you now have the opportunity to write details of the Container and Cargo to disk for possible future recall.

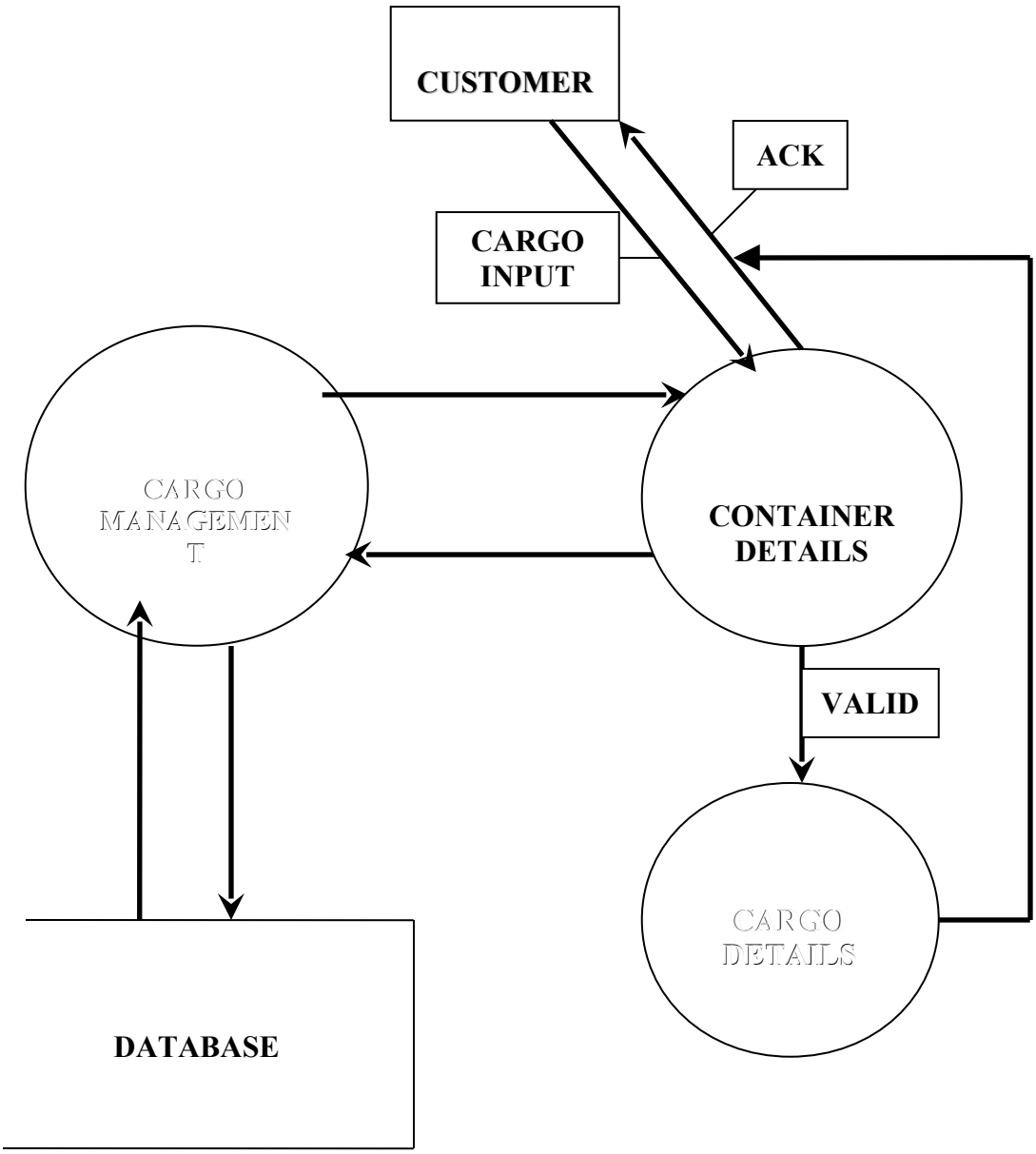
3. PROJECT DICTIONARY 3.1. DATAFLOW DIAGRAMS

DATA FLOW DIAGRAM – I

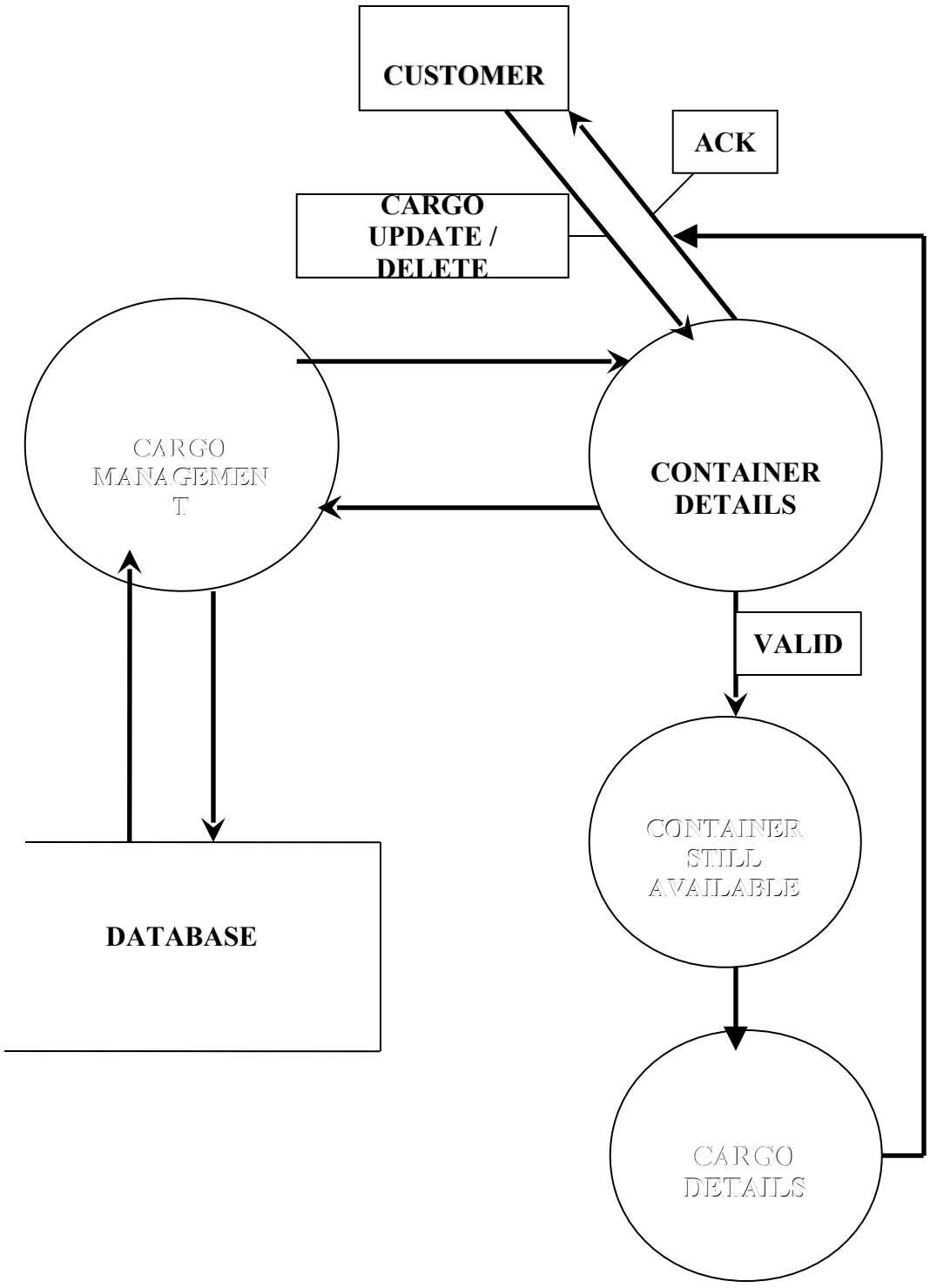




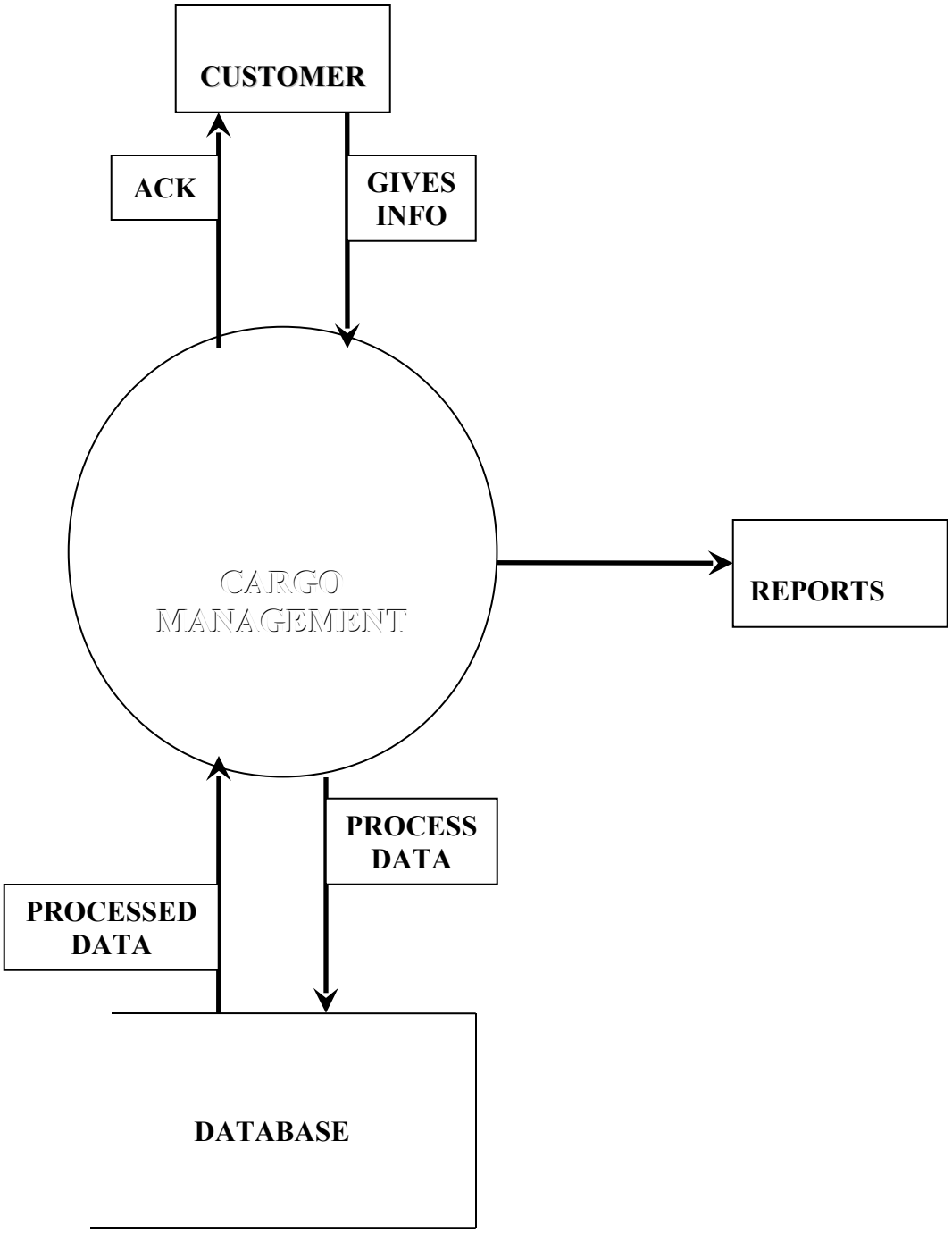
(2.) DATA FLOW DIAGRAM – II FOR CARGO INPUT


CUSTOMER
ACK
CARGO INPUT
CARGO MANAGEMENT
CONTAINER DETAILS
VALID
CARGO DETAILS
DATABASE

(3.) DATA FLOW DIAGRAM FOR CARGO UPDATE / DELETE

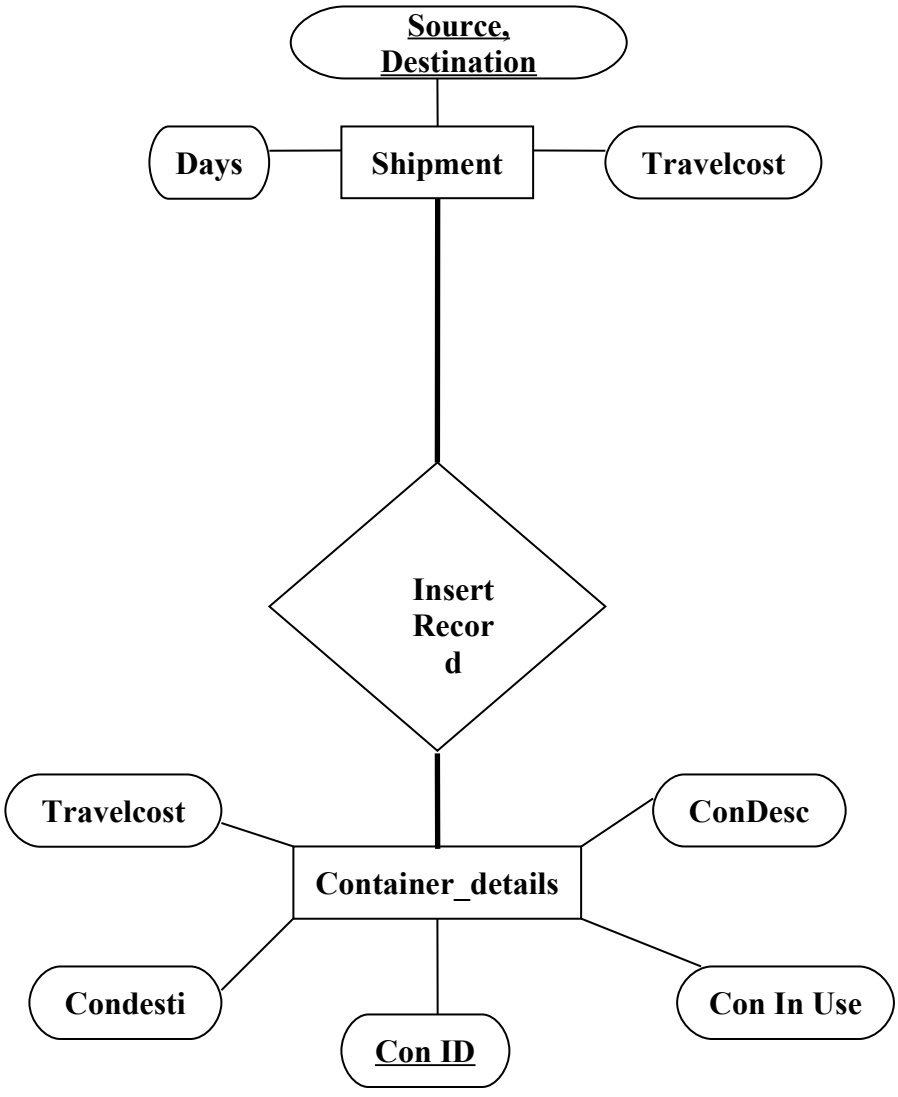


(4) DATA FLOW DIAGRAM FOR REPORTS

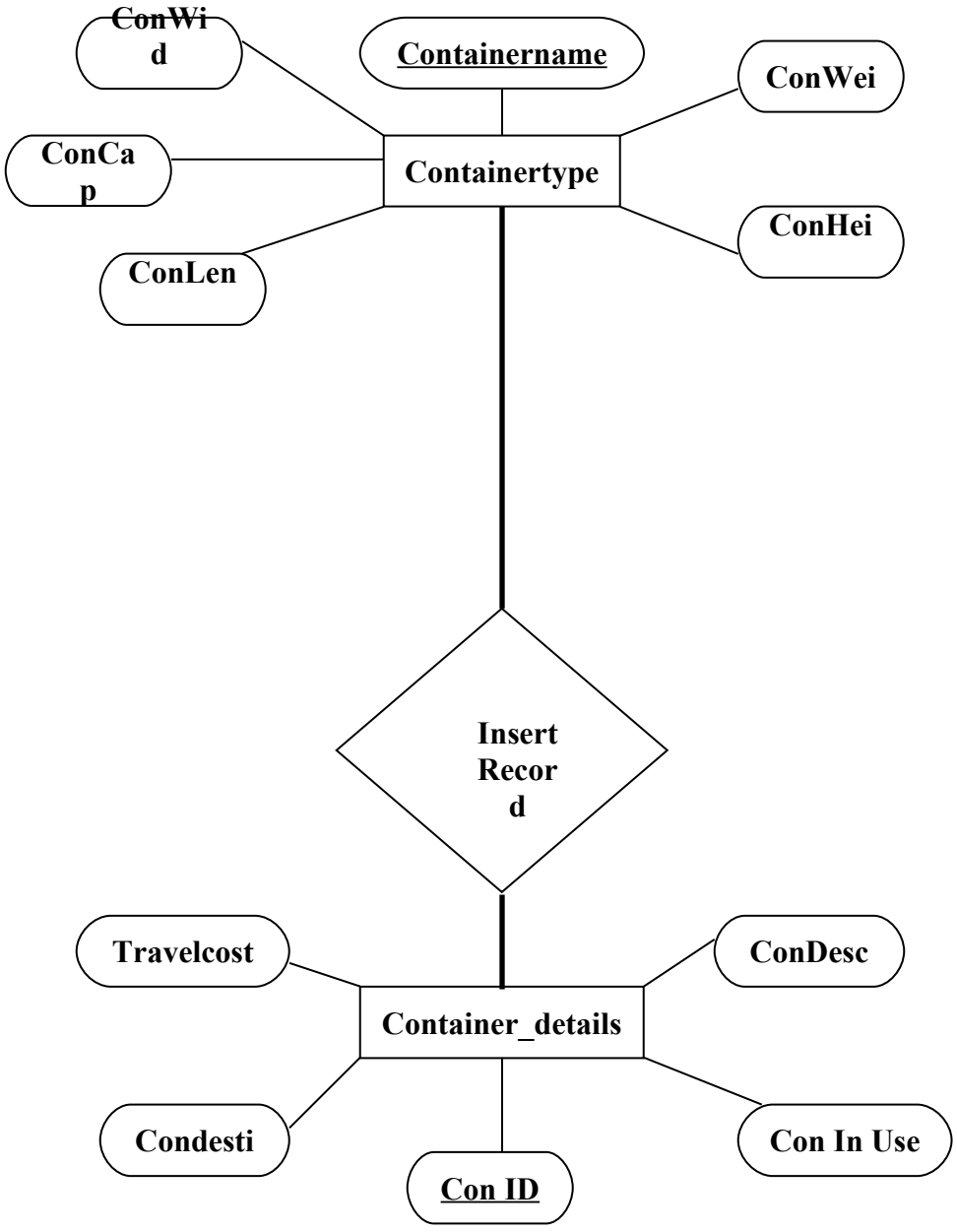

CUSTOMER
ACK
GIVES INFO
CARGO MANAGEMENT
REPORTS
PROCESS DATA
PROCESSED DATA
DATABASE

4.2. E-R DIAGRAMS

E-R Fig – I



E-R Fig – II

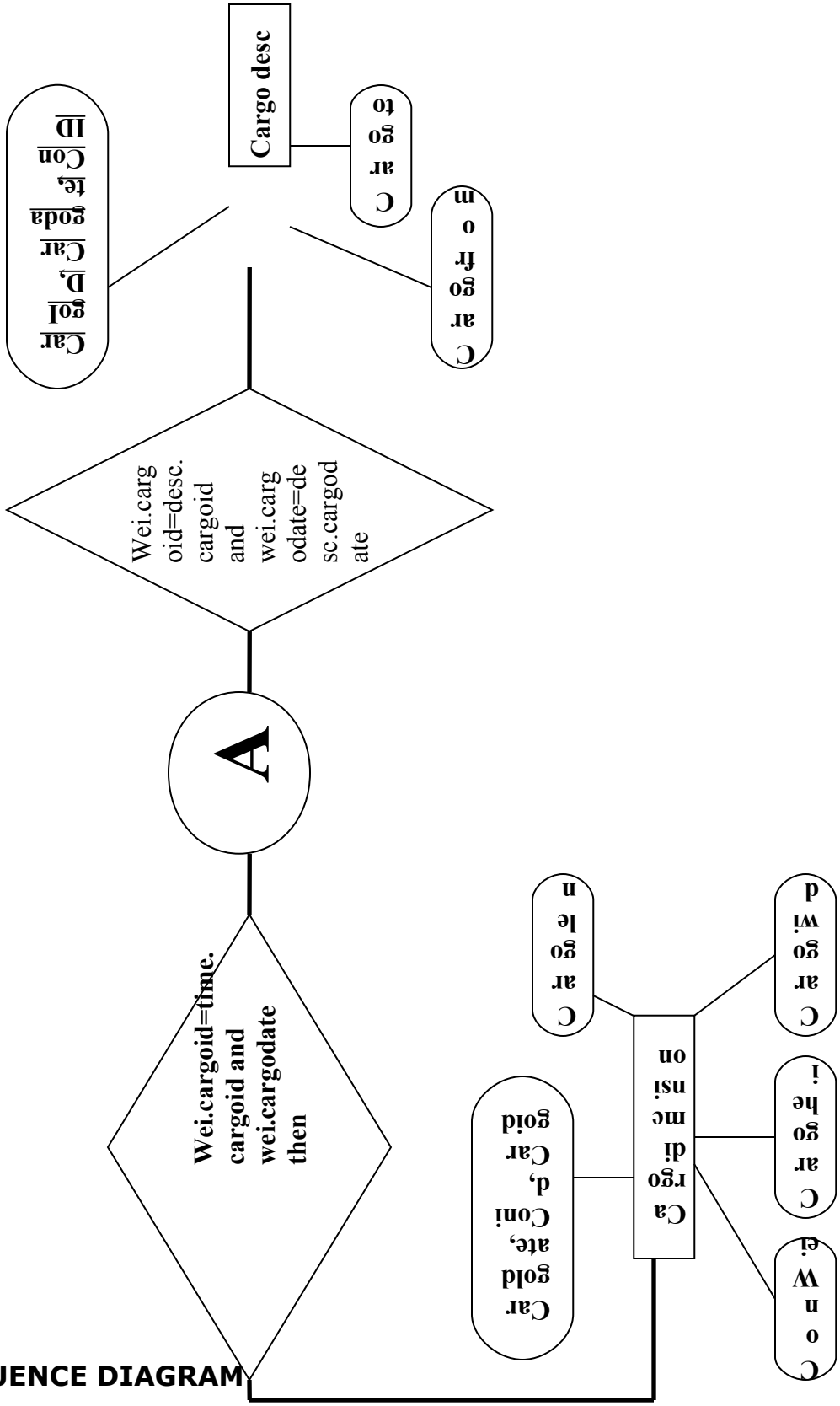

ConWid
Containername
ConWei
ConCap
Containertype
ConHei
ConLen
Insert Record
Travelcost
ConDesc
Container_details
Condesti
Con In Use
Con ID

E-R Fig – III

Note: - The above figure is a weak entity set. Some of its attributes in conjunction With Primary Key of another Entity

E-R Fig – IV

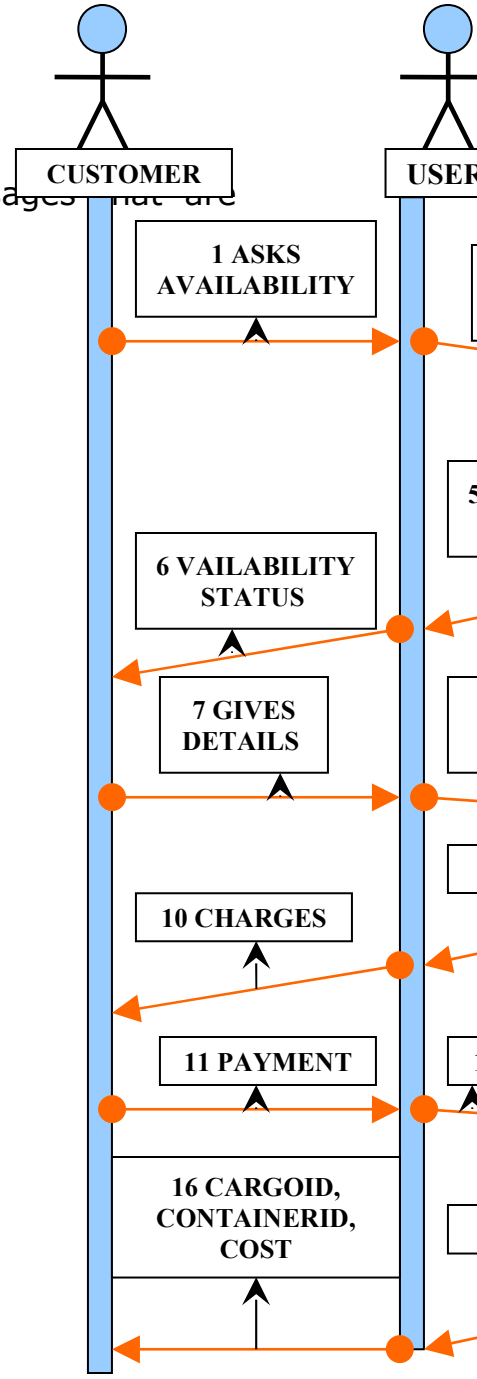
Con_
Space
(Space)
Con_id
Con_Name
Con_Source
Con_Weight
Cargo Weight
(We
Cargo_ID
Cargo_Name
Cargo_Source
Cargo_Weight
Cargo_Code
Cargo_Type
Con_ID
Con_Code
Con_Name
Con_Source
Con_Weight
Con_Type



SEQUENCE DIAGRAM

A Sequence diagram is a model that describes how groups of objects collaborate in some behavior over time and capturing the behavior of a

single use case. It shows the objects and the messages that are passed between these objects in the use case.



4.3. DATA DICTIONARY

- **SHIPMENT TABLE**

SOURCE: - The place from where the cargo has to leave from.

DESTINATION: - The place where the cargo has to reach.

TRAVELCOST: - Calculating or computing the cost of the journey of the cargo from source to destination.

DAYS: - Number of days of journey.

- **CONTAINER TYPE TABLE**

CONTAINERNAME: - Name of the container in which goods are carried.

CONTAINERLEN: - Length of the container.

CONTAINERWID: - Width of the container.

CONTAINERHEI: - Height of the container.

CONTAINERWEIGHT: - Weight of the container.

CONTAINERCAP: - Capacity of the container.

- **CONTAINER DETAILS TABLE**

CONTAINERID: - Identification number of the container In which the goods are carried.
CONTAINERDESC: - Description of the container.
CONTAINERSOURCE: - Starting point of the container is the container source.
CONTAINERDESTINATION: - To which place has the container reached, is the container destination.

- **CONTAINER SPACE TABLE**

CONTAINERFROM: - Is similar to CONTAINERSOURCE.

CONTAINERTO: - Is similar to CONTAINERDESTINATION.

CONAVAILABLE: - The availability date of the container.

CONSPACE: - The space in the container.

- **CARGO DESCRIPTION TABLE**

CARGODATE: - On which date the cargo has to leave from source and reach the Destination.

CARGOID: - Identification number of the cargo.

CARGODESC: - Description of the cargo.

CARGOFROM: - Starting point of the cargo or from where the cargo is coming from is CARGOFROM.

CARGOTO: - To which place the cargo has to reach, is The CARGOTO.

- **CARGODIMEN TABLE**

CARGOLEN: - Length of the cargo.

CARGOWID: - Width of the cargo.

CARGOHEI: - Height of the cargo.

CARGOWEI: - Weight of the cargo.

CARGOQUA: - Quantity of the cargo.

- **CARGOWEIGHT TABLE**

CARGONETWEI: - Net weight of the cargo.

CARGONETCAP: - Net capacity of the cargo.

CARGONETCOST: - Net cost / Total cost for the cargo.

- SHIPMENT TABLE

FIELDS	DATATYPES	CONSTRAINTS
SOURCE	nchar(20)	Composite

DESTINATION	nchar(20)	Primary Key
TRAVELCOST	decimal(10,3)	
DAYS	tinyint	

- CONTAINER TYPE TABLE

FIELDS	DATATYPES	CONSTRAINTS
CONTAINERNAME	nchar(15)	Primary Key
CONTAINERLEN	decimal(18,3)	
CONTAINERWID	decimal(18,3)	
CONTAINERHEI	decimal(18,3)	
CONTAINERWEIGHT	decimal(15,2)	
CONTAINERCAP	decimal(23,3)	

***NOTE: - Here in the above Table there is no window form its built directly.**

- CONTAINER DETAILS TABLE

FIELDS	DATATYPES	CONSTRAINTS
CONTAINERID	char(7)	Primary Key
CONTAINERDESC	nchar(15)	Foreign Key
CONTAINERSOURCE	nchar(20)	Foreign Key
CONTAINERDESTINATION	nchar(20)	Foreign Key

- CONTAINER SPACE TABLE

FIELDS	DATATYPES	CONSTRAINTS
CONTAINERID	char(7)	Foreign Key
CONTAINERDESC	nchar(15)	Foreign Key
CONTAINERFROM	nchar(20)	
CONTAINERTO	nchar(20)	
CONAVAILABLE	datetime	default getdate()
CONSPACE	decimal(23,3)	

- CARGODESC TABLE

FIELDS	DATATYPES	CONSTRAINTS

CARGODATE	datetime	Composite Primary Key
CONTAINERID	nchar(15)	
CARGOID	char(8)	
CARGODESC	nchar(15)	
CARGOFROM	nchar(20)	
CARGOTO	nchar(20)	

***NOTE: - Here in the above Table we have Foreign Key but then used it directly from the front end.**

- CARGODIMEN TABLE

FIELDS	DATATYPES	CONSTRAINTS
CARGODATE	datetime	Composite Primary Key
CONTAINERID	nchar(15)	
CARGOID	char(8)	
CARGOLEN	decimal(18,3)	
CARGOWID	decimal(18,3)	
CARGOHEI	decimal(18,3)	
CARGOWEI	decimal(18,3)	
CARGOQUA	Smallint	

- CARGOWEIGHT TABLE

FIELDS	DATATYPES	CONSTRAINTS
CARGODATE	datetime	Composite Primary Key
CONTAINERID	nchar(7)	
CARGOID	Char(8)	
CARGONETWEI	decimal(15,2)	
CARGONETCAP	decimal(18,3)	
CARGONETCOST	decimal(15,2)	
CUSTOMERNAME	nchar(20)	
CUSTOMERADD	nchar(30)	

***NOTE: - Here the above three Tables will be filled when cargo is entered on the present day or after**

- LEFTCARGODESC TABLE

FIELDS	DATATYPES	CONSTRAINTS
CARGODATE	datetime	
CONTAINERID	nchar(7)	
CARGOID	Char(8)	
CARGODESC	nchar(17)	
CARGOFROM	nchar(20)	
CARGOTO	nchar(20)	

- LASTCARGODIMEN TABLE

FIELDS	DATATYPES	CONSTRAINTS
CARGODATE	datetime	
CONTAINERID	nchar(7)	
CARGOID	Char(8)	
CARGODESC	nchar(17)	
CARGOFROM	nchar(20)	
CARGOTO	nchar(20)	

- LASTCARGOWEIGHT TABLE

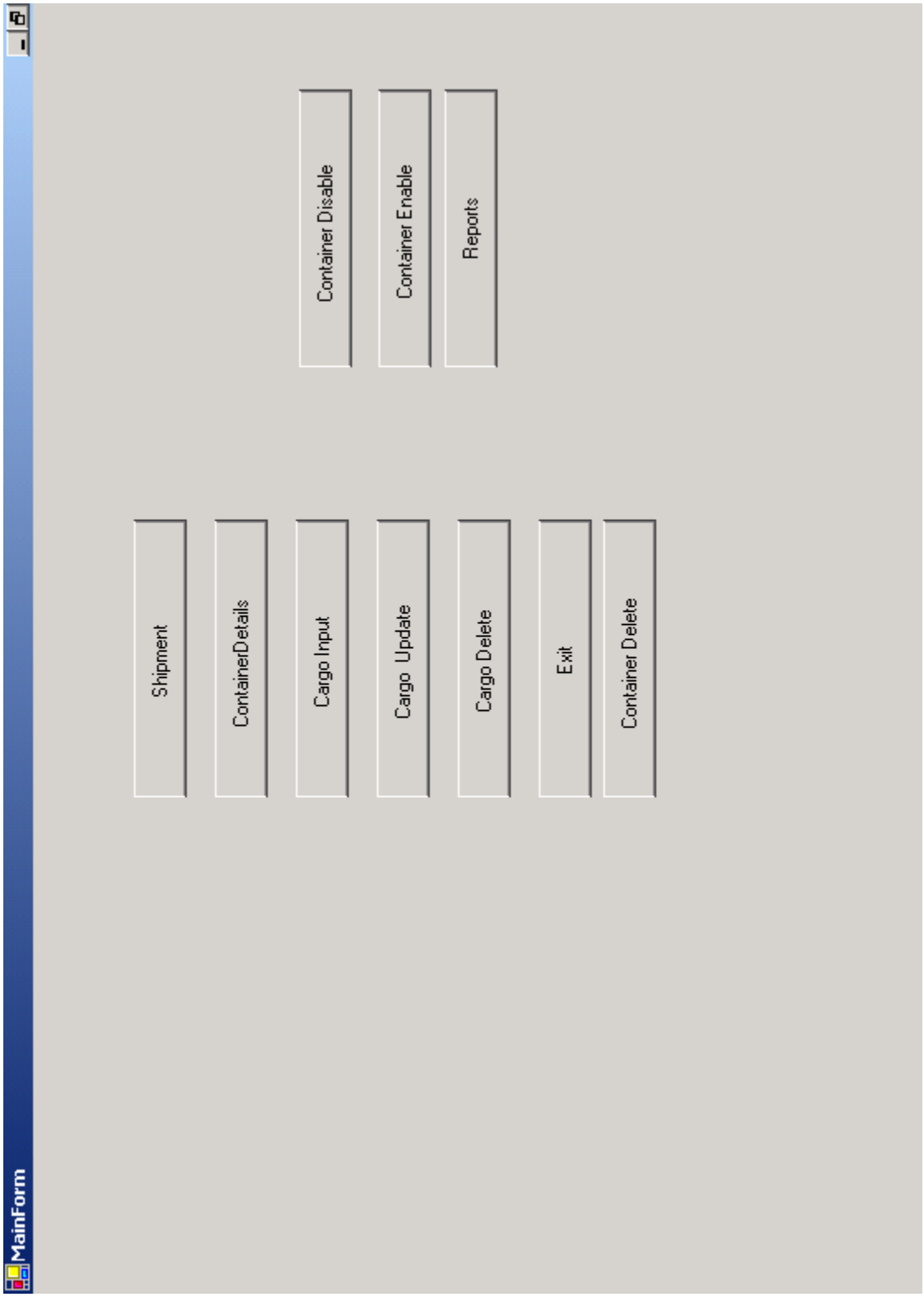
FIELDS	DATATYPES	CONSTRAINTS
CARGODATE	datetime	
CONTAINERID	nchar(7)	
CARGOID	Char(8)	
CARGONETWEI	decimal(15,2)	
CARGONETCAP	decimal(18,3)	
CARGONETCOST	decimal(15,2)	

***NOTE: - Here in the above three Tables no Constraints are defined.**

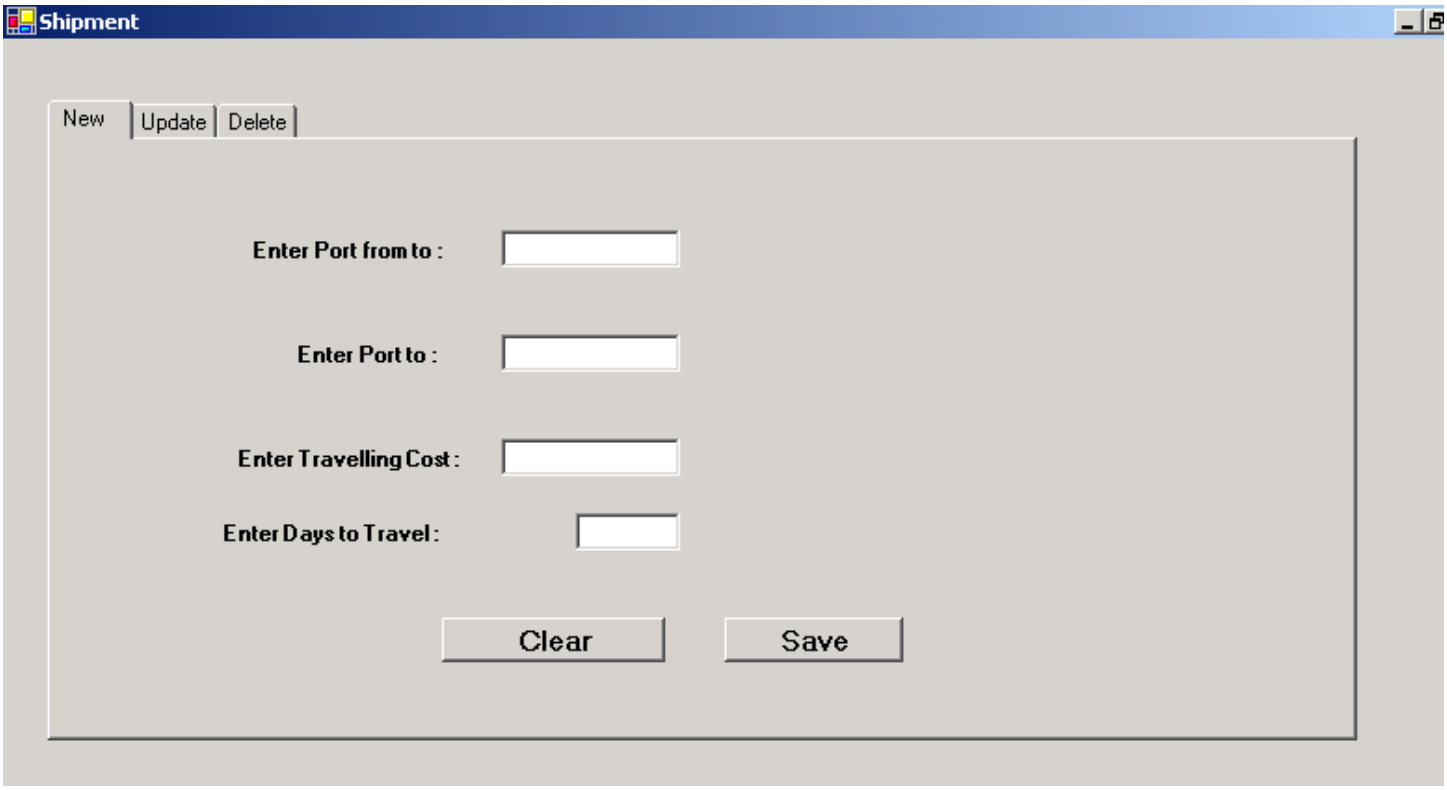
5. FORMS & REPORTS

5.1. I/O SAMPLES

Main Form That is viewed First



Shipment Form



Container Details Form

Container Enable Form

ContainerDetails :

Container Type : 20 ft Open Top

Container ID : Ope03

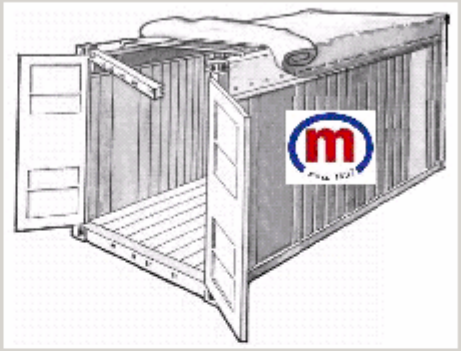
Container Length 5889 mm

Container Width 2346 mm

Container Height 2345 mm

Container Weight 28120 kgs

Container Cubic Capacity 32397567.93 m3



Container Source : Vishakapatnam

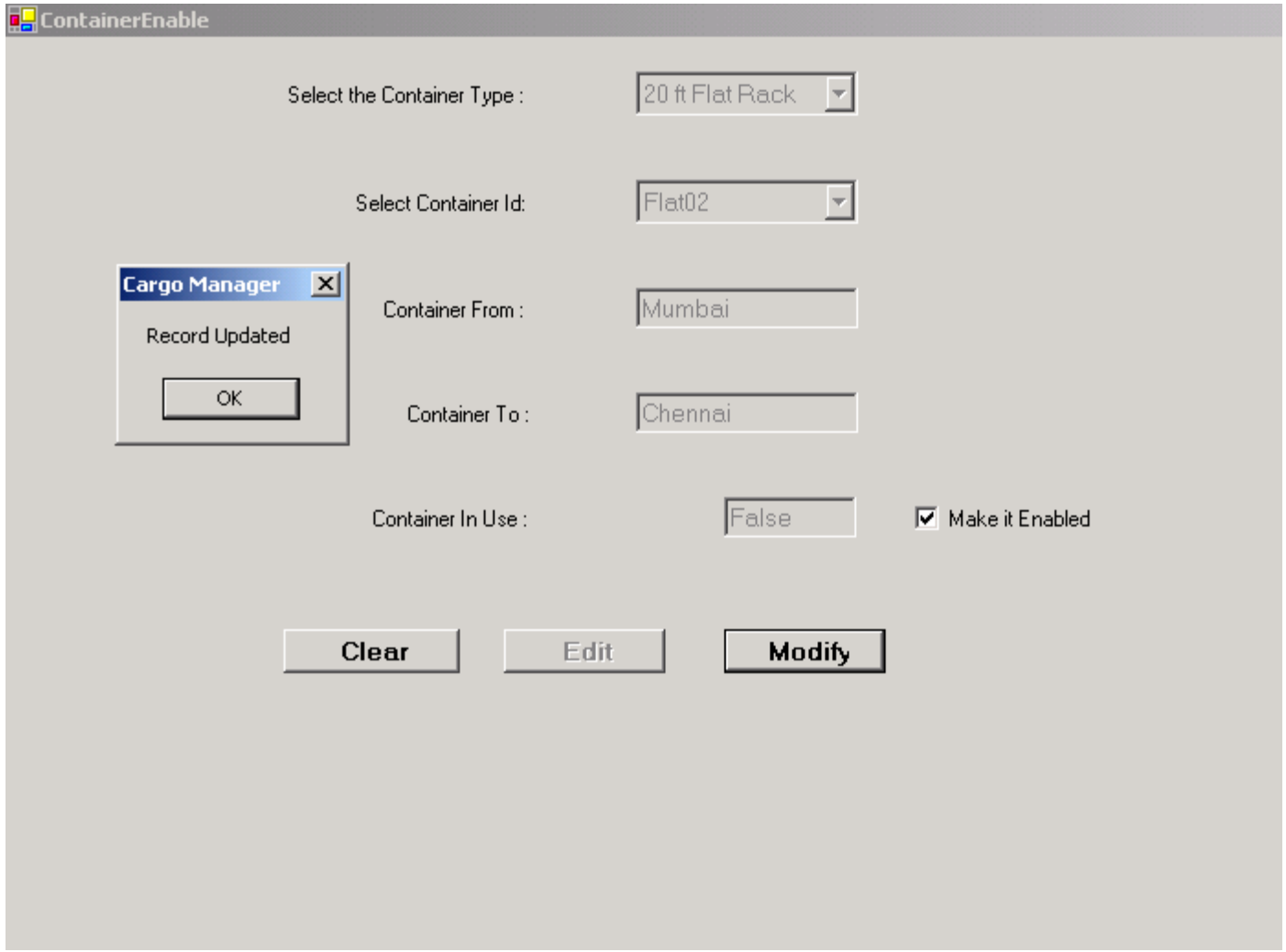
Container Destination : Chennai

Cargo Manager

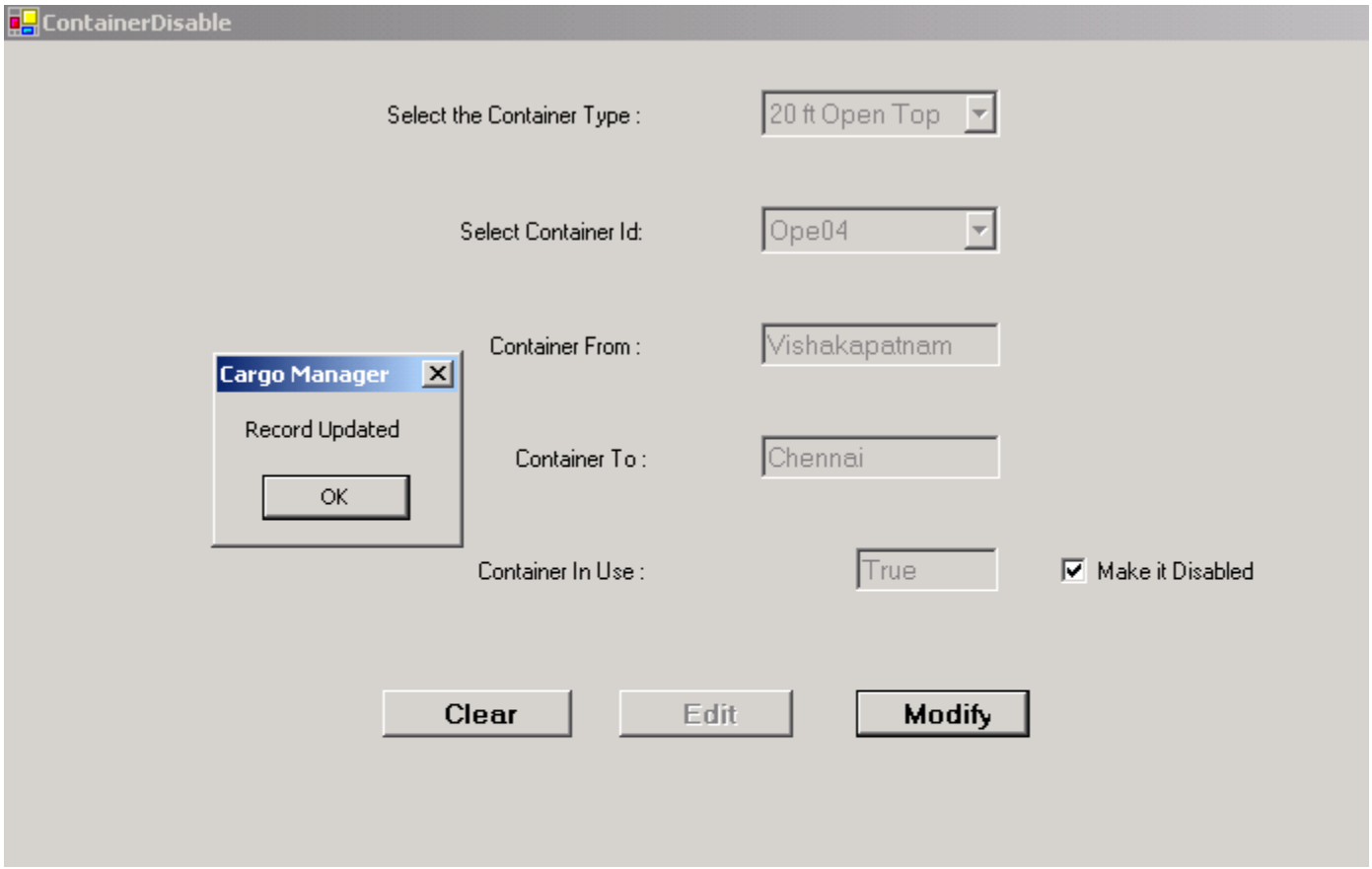
Record Inserted

OK

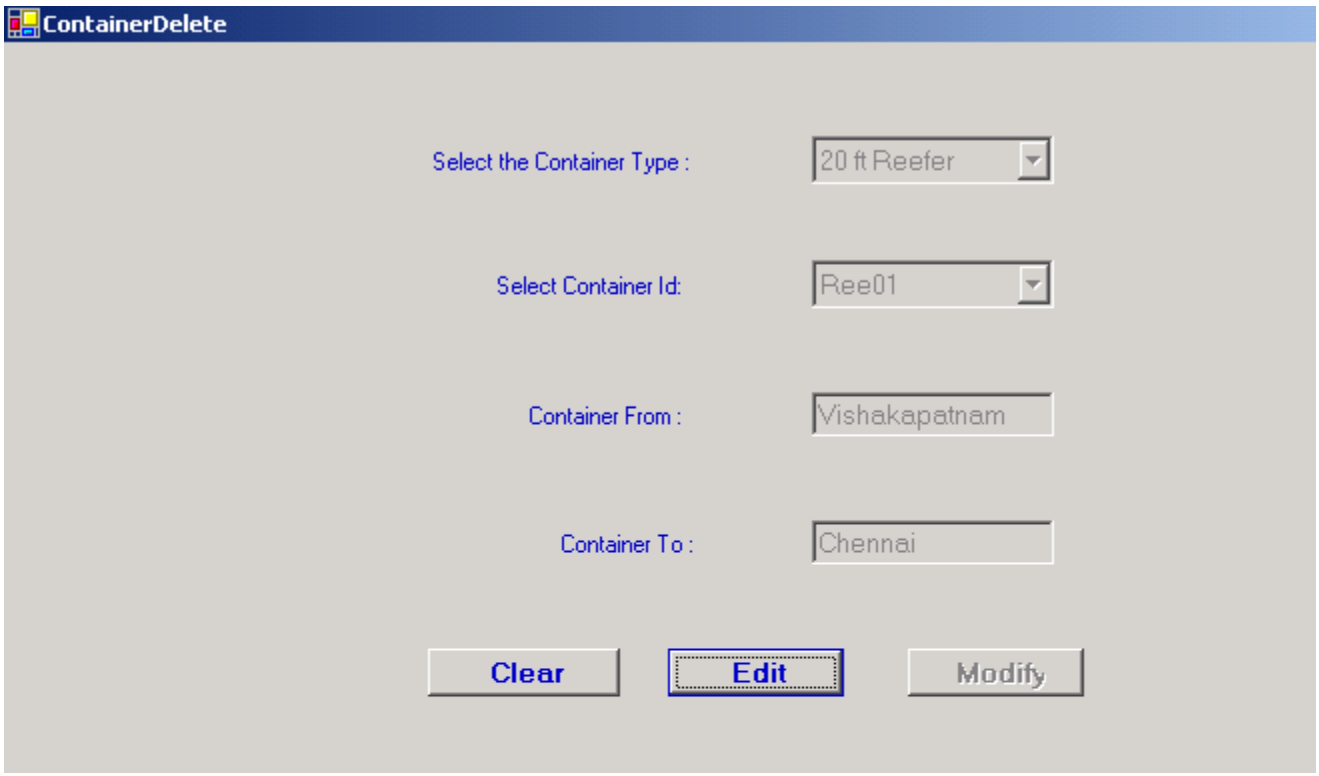
Clear Cancel Save


ContainerEnable
Select the Container Type :
20 ft Flat Rack
Select Container Id:
Flat02
Cargo Manager
Record Updated
OK
Container From :
Mumbai
Container To :
Chennai
Container In Use :
False
Make it Enabled
Clear
Edit
Modify

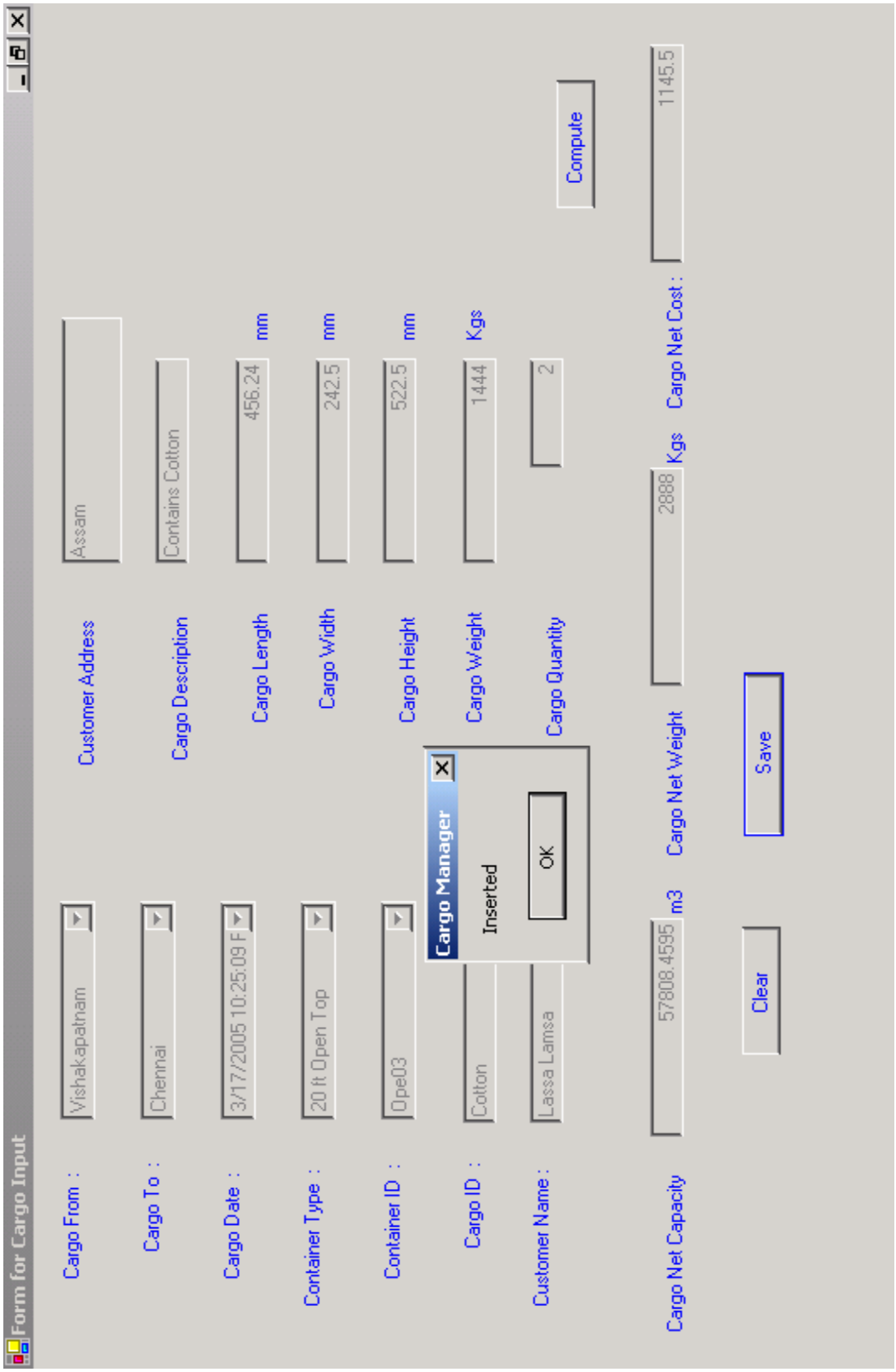
Container Disable Form:



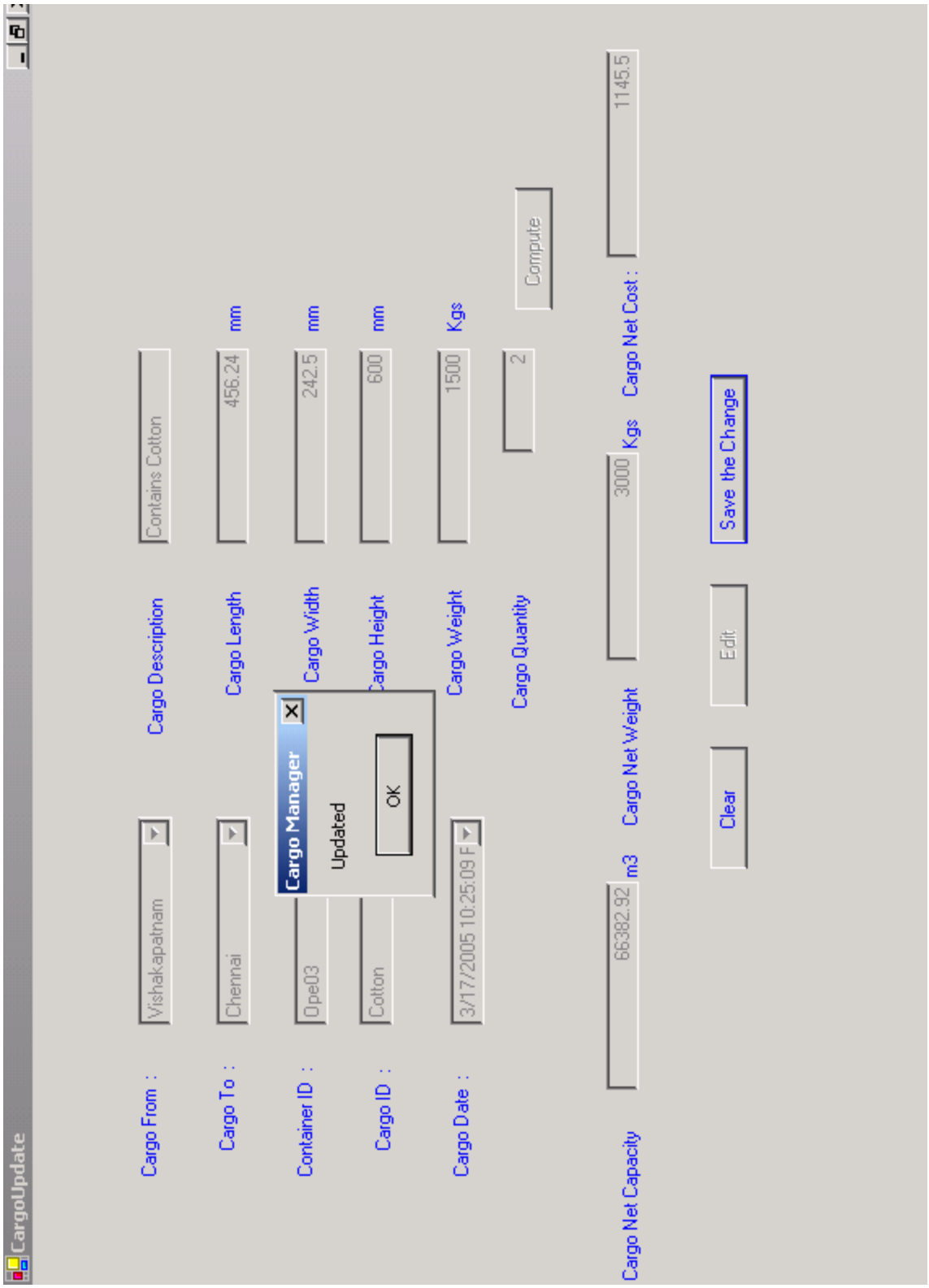
Container Delete Form


ContainerDelete
Select the Container Type :
20 ft Reefer
Select Container Id:
Ree01
Container From :
Vishakapatnam
Container To :
Chennai
Clear
Edit
Modify

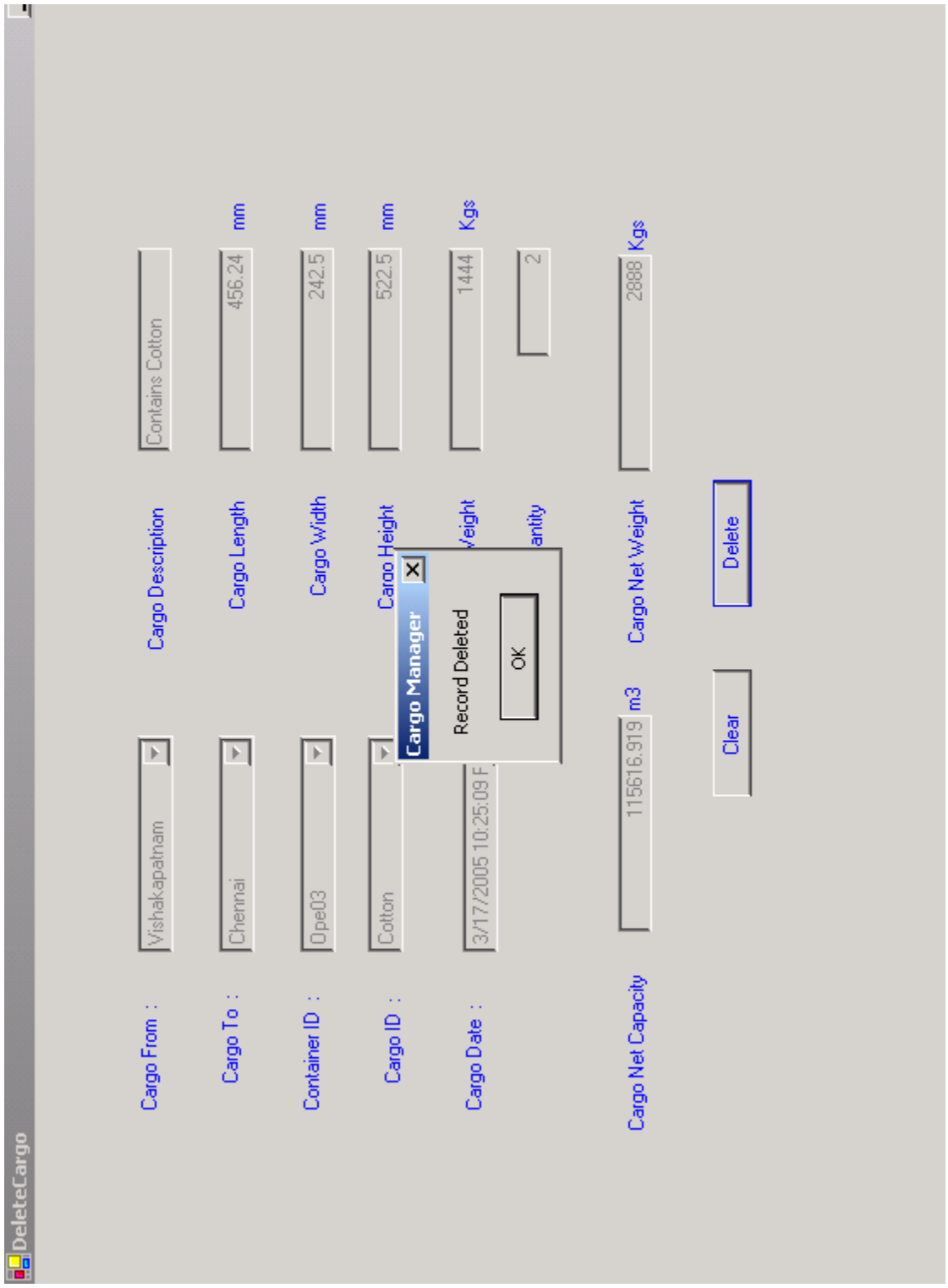
Cargo Input Details Form



Cargo Update Form

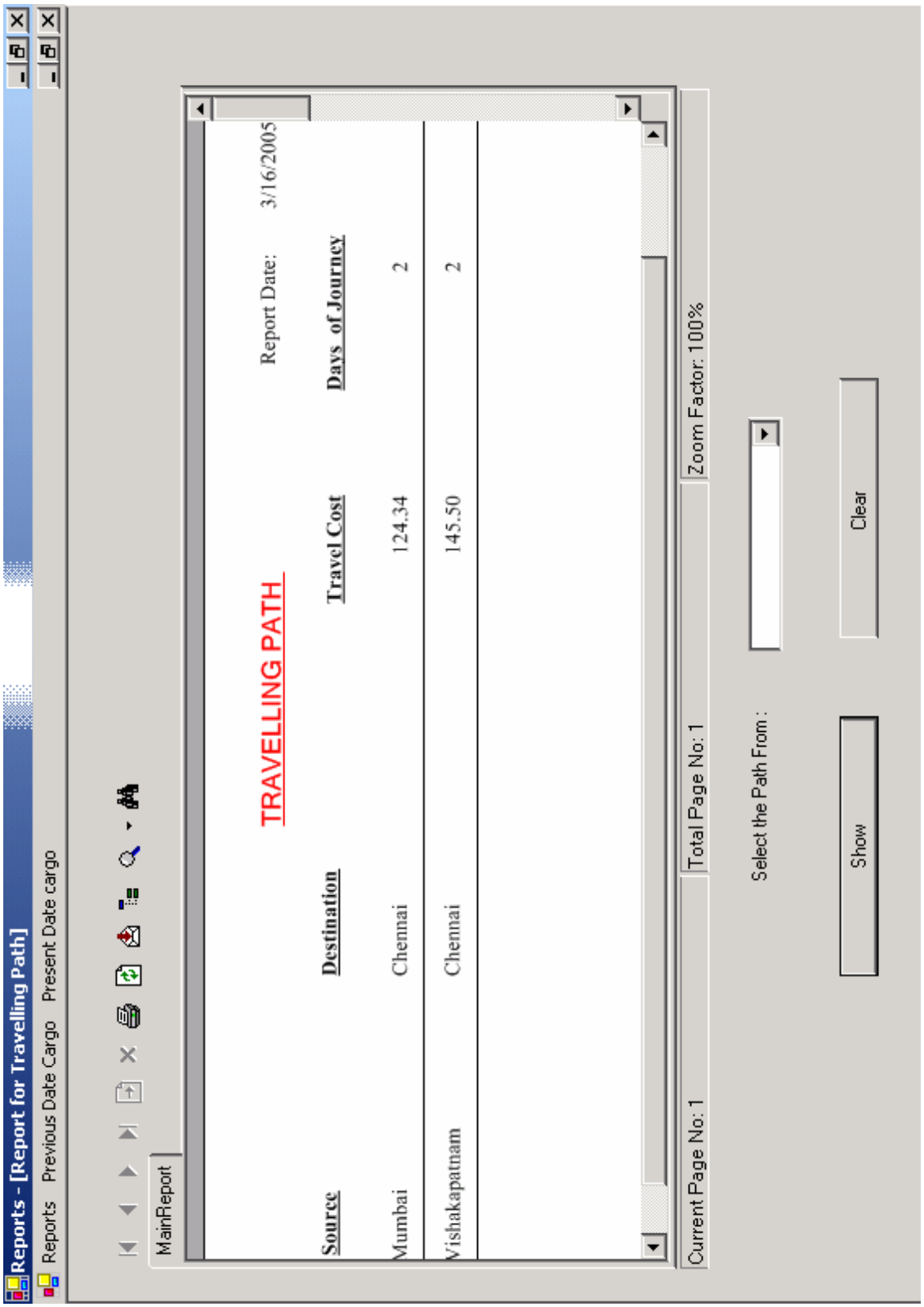


Cargo Delete Form

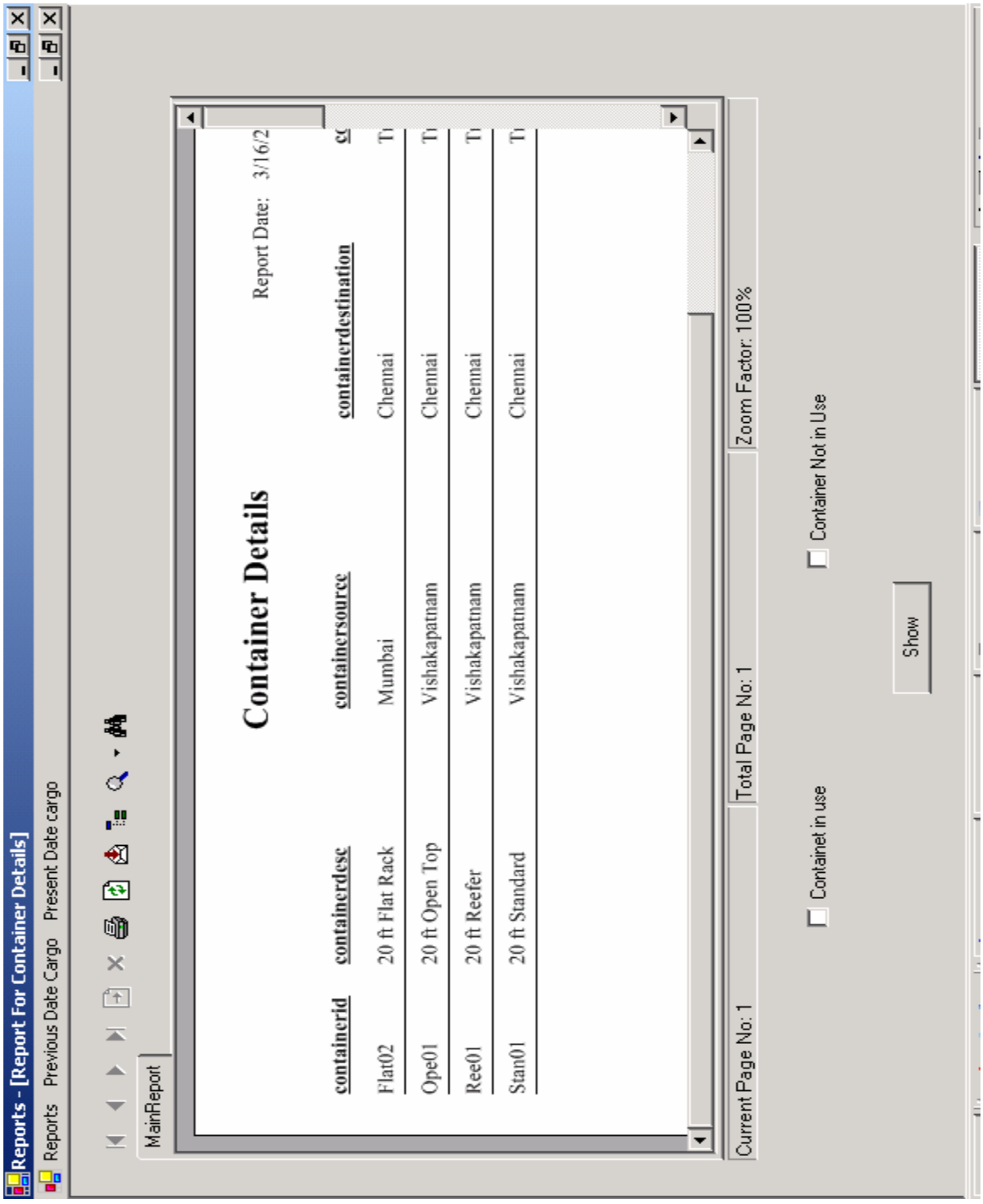


This is the Main Reports Form .This is an MDI Form..
From This Only All the forms will be called.

Now this is the report for the Traveling Path. i.e the shipment table report

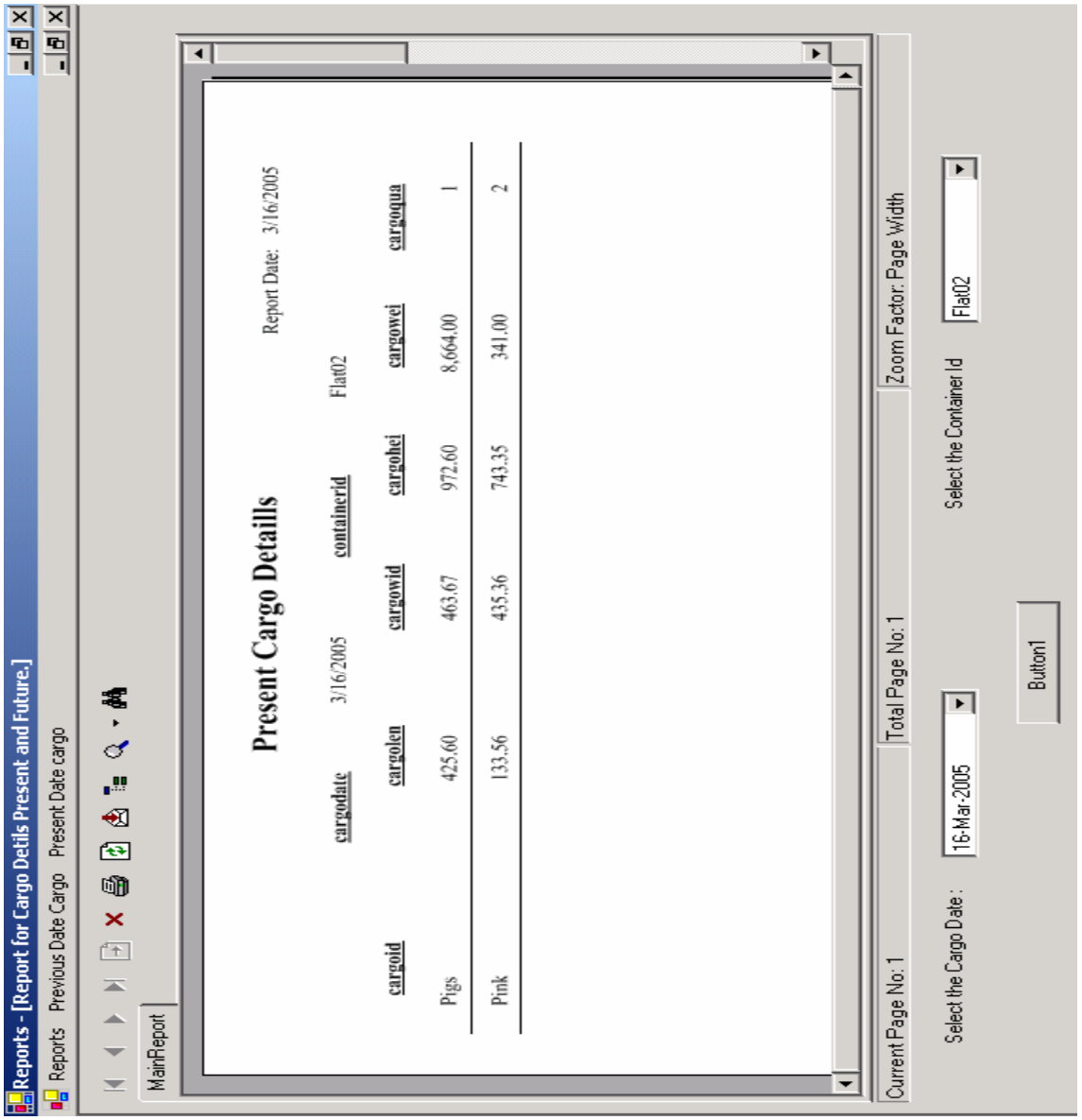


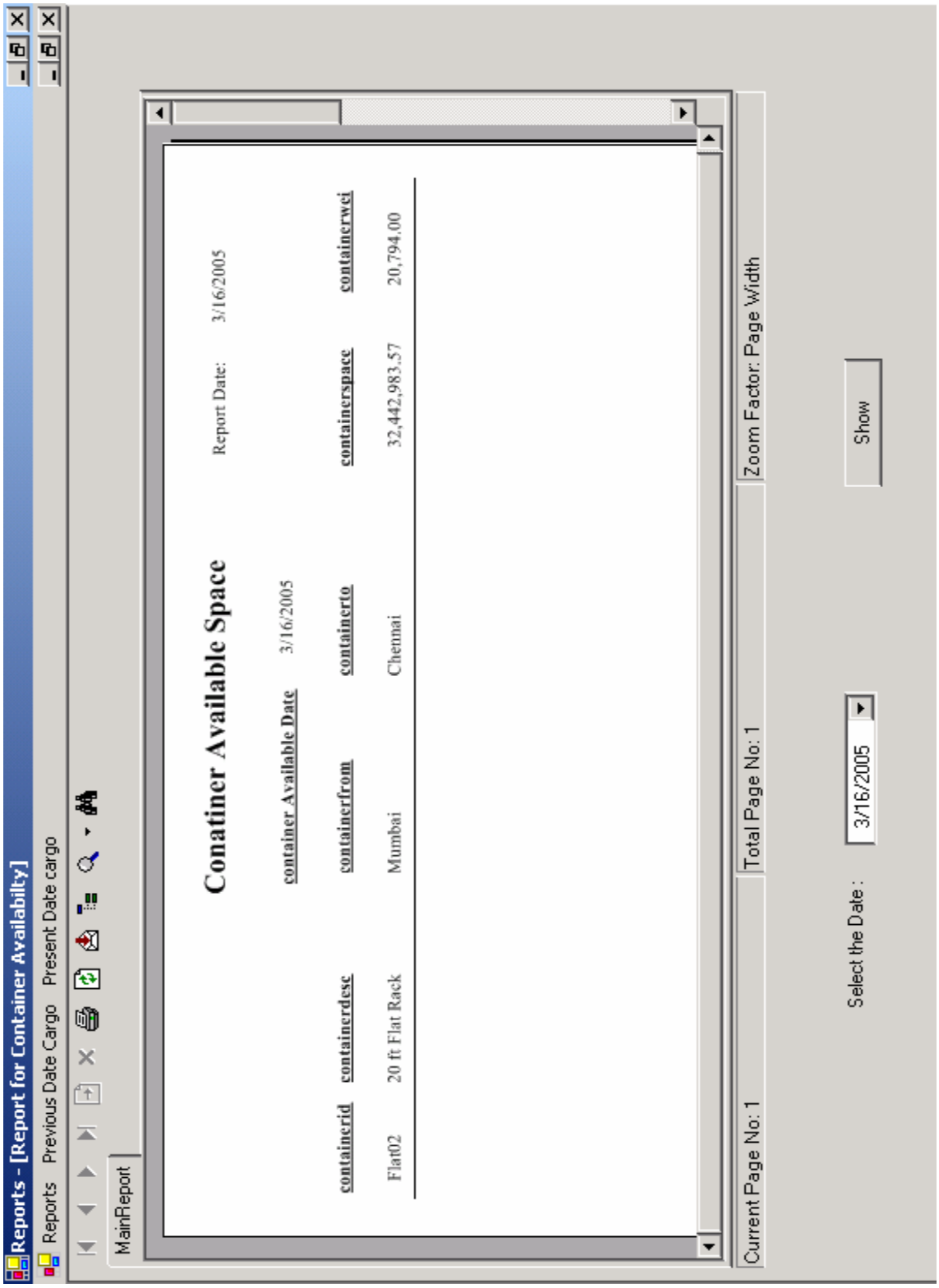
Now this is the Report For Container Details i.e show the containers that r available and which r not .



Now this is the report stating the container availability on a particular date.
i.e. it is the container_space table report

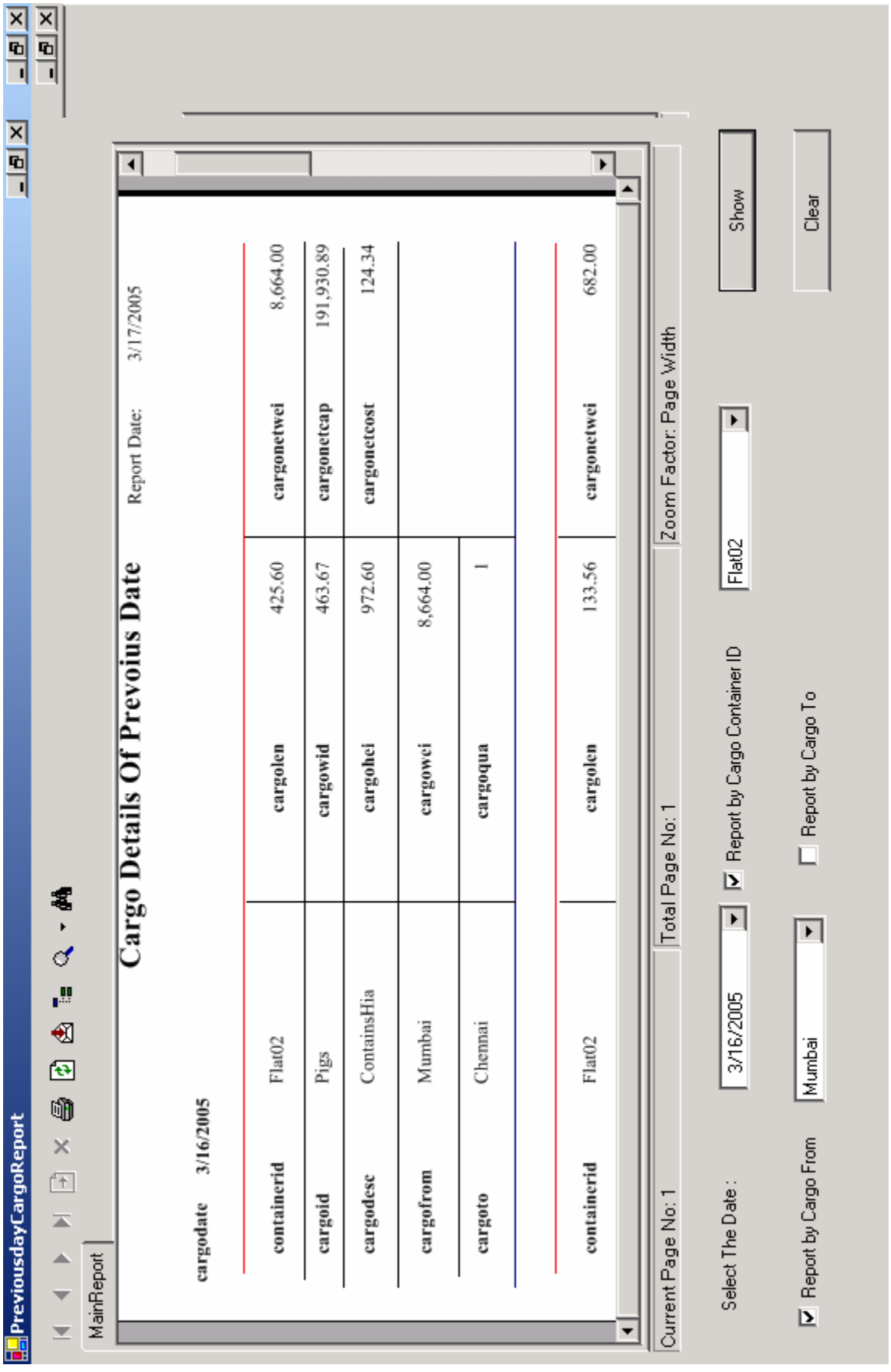
Now this the Report for Present or future date Cargo details this is the mixing of
Cargodesc and Cargodimen tables





Now this is the Report for Past Cargo Details i.e the cargo which has left

Form the leftcargodesc and lastcargodimen



BIBILOGRAPHY

- SQL SERVER 2000 PROFESSIONAL.

- VB.NET 2003 PROFESSIONAL.(2004 Edition)
  -Bill Evjen, Billy Hollis, Rockford Lhotka,
  Tim McCarthy, Jonathan Pinnock,
  Rama Ramachandran, Bill Sheldon.