THE AMERICAN SHORTLINE DATABASE SYSTEM:
A Technical Report on Phase I Development

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INTRODUCTION

Since 1980, over 200 new local or regional railroads have been established in the United States, mostly through the sale of light-density lines by Class I (revenues over 250 million dollars) carriers. Today, short-line and regional carriers operate over 40,000 miles of railroad, providing rail service to many small communities and rural areas. In spite of the growing importance and contribution of this sector of the railroad industry, little available information describes its contributions and operational characteristics. No standard data collection and reporting systems exist for Class II (revenues between 20 to 250 million dollars) and Class III (revenues less than 20 million dollars) railroads, such as those that exist for Class I carriers. The lack of an industry database creates several voids and problems. The Short Line Railroad Database (SLRD) seeks to address some of the problems by creating, managing, and generating reports, thus presenting a first overview of the industry and record of its contributions.

Motivations and Objectives

Several factors promote the need for a comprehensive database of the short line railroad industry. Some of the key factors are

- Groups and individuals wishing to promote this sector of the industry to Congress, the states, and the public have little or no detailed data to describe the essential role and contribution of local and regional railroads to the transportation industry.
- Firms within this sector of the industry have little information by which to comparatively evaluate their financial and operating performances. Thus, they are unable to establish the performance benchmarks which are widely used in other industries.
- Financiers have limited information about the industry with which to establish their performance benchmark and perform financial investment analysis.
- Potential suppliers find cannot target needs within the industry and tailor their products accordingly.
- The lack of an industry database impedes state and federal transportation agencies in their efforts to understand the industry and to make important investment, promotional, and policy decisions.
- The Federal Railway Administration and the state Department of Transportation's safety monitoring activities are limited by lack of detailed operating information.

The objective of the Short Line Railroad Database (SLRD) system is to provide a partial, if not a complete solution. It attempts to set up a framework for establishing and maintaining a standard database for Class II and Class III railroads that would serve as a Personal Computer (PC) data system with features for querying the stored information, and generating summary statistics that reflect the state of this section of the railroad industry. Thus, the reason for developing the SLRD system as a program is threefold. First, no comprehensive database is available today that contains detailed information on the short line railroad industry. Second, the system is expected to function as a separate stand-alone software package independent of any tools required to access the database as is the case with commercially available database packages. Third, by creating a program, user interface design can be tailored for and governed by the nature of the data and the types of facilities that are specific to this application.

Major Design Features of the System

The SLRD system provides facilities to enter and store data into a database, selectively view the stored data in the database, stratify the database, modify the database, and generate reports for the summary statistics of the short-line railroad industry. A data entry program, DENTRY, was also developed as part of the system to facilitate the entering of each railroad's data into an electronic format for inclusion into the central SLRD database.

The major developmental focus of this work was to develop a graphical oriented database system on Microsoft Windows 3.1, since the MS-Windows environment provides facilities for building good user interfaces. The information to be stored in the SLRD database is detailed; hence, a strong user interface was required to both enter and display data. The most important design features of this system were the emphasis placed on user interaction, developing a windows-based graphical user interface, and creating a database with facilities for querying and extracting information in an organized manner. This process was also aided by designing the database into tables containing related data.

The database and the graphical user interface were created on an integrated application platform using Visual Basic for Windows Professional Edition 3.0. Visual Basic for Windows has a built-in native MS-Access database engine which provides many of the capabilities of the MS-Access database package. The database engine has powerful and good design tools and excellent querying facilities. Unlike other databases, where tables don't need to be keyed before being joined, the Access engine enforces stringent rules regarding joins. It also has a rich set of macros that can be attached to buttons and its own programming language.

A big advantage of the MS- Access database format is that it can be used through Visual Basic for Windows. Visual Basic provides all the facilities for opening a database, mapping the structure of a database, creating a database, modifying the structure of a database, and managing a database, as part of the application development. The MS-Acess engine databases are manipulated directly by Visual Basic and can be created or manipulated with Visual Basic or Microsoft Access. This is the Visual Basic native format and provides the most flexibility and speed in a Visual Basic application.

Visual Basic has a rich environment for graphical user interface development. The development of the SLRD and DENTRY user interfaces emphasized the rapid prototype method and took advantage of the prototyping capabilities of Visual Basic.

SOFTWARE COMPONENTS

There are two major components to the American Shortline Railroad Database System (SLRD). The first is a centralized database program resident at the database administrator's site while the second component is a data entry software program, designed to be used by the participating railroads at their place of business. The railroads forward the data file from the data entry software to the database administrator for inclusion into the centralized database. Together, these programs provide facilities for data acquisition and data management inside a database framework. The separate components are described below.

SLRD Data Base

The database system developed in this work is characterized by a Graphical User Interface (GUI) that facilitates the use of the various features of the system. The database has been implemented in MS-Access, a format that is supported by popular commercial versions of desktop database packages. This will help the database to be ported to other applications in the future if needed. The system works as an event-driven system, which waits for commands from the user, immediately responds to the given commands, and gives the user a feeling that he/she is in control of the system, not vice versa. A description of the major features of the system follows.

GUI and System Features

The GUI helps one to use the system in a thorough and complete manner. The system works as an event-driven system, which waits for commands from the user, immediately responds to the given commands, and gives the user a feeling that he/she is in control of the system, not vice versa. The system starts running with the display of the top level Multiple Document Interface (MDI) form (dialog box). This form contains a menu bar with the following options: File, Database Operations, Reports, About, Window, and Exit. Each option indicates its function and intuitively presents a logical grouping for a set of available actions that may be under it. These options present various dialog boxes containing textual information along with command options, data, and other related information. The text in the dialog boxes indicates the actions available to the user and gives an idea on the processing he or she can expect on selecting a particular command. Nonessential commands that do not pertain to the particular state in which the user is are grayed out and disabled. A description of each of the commands follows.

File

The File menu selection opens up a subset of command options for performing file level operations on the database. These commands are listed below.

Browse

Browse allows the user to look at any railroad's record in the database but does not allow the user to make any changes to the database. This command immediately prompts the user for the location of the database to view or browse and then displays a complete list of railroads in a listbox. All the railroads present in the database are presented in this list box by name. A railroad is chosen for browsing by double clicking on its name. Once a railroad is selected, the railroad's annual profile is displayed in the data entry format. At this point the user may view any of the various data categories available in the annual profile. The user exits from browse by clicking on the exit command button.

Append

The append operation provides a facility for electronically adding railroads to the database. This command is used to add railroads to the database as they are received in electronic format (the SLRDBASE.MDB file on floppy disk) from participating railroads. Append first asks the user for the drive that contains the railroad's floppy disk. After the proper drive is selected, append reads the floppy drive and appends the railroad's database to the central database in the SLRD database system. The user is informed of a successful append operation.

Save

The save command saves the database or database record. It will not be available unless it is necessary within the context of the program.

Printer Setup

Printer Setup allows the user to access the Window's Print Manager facility. This facility provides many options for selecting, configuring, and accessing the local printer.

Print

This command provides the user with the capacity to print out an individual railroad's record in the database. Upon activating this command, the user is presented with a list box containing all railroad

in the database. After a railroad is selected, the user is presented another list box containing the various printing options. The user may print the entire record of the selected railroad or the user may chose to print one of the various data categories of the annual profile. The print requests are sent to the local printer via a Crystal Reports print module and the Window's print manager.

Database Operations

This menu item allows a user to access all the database operations available in the system. Selecting this menu item invokes a dialog box with a list of database management functions. The functions available in the system are to add, delete, and edit records.

Add Railroad

The Add Railroad command is used to add information on a new railroad into the central database. This command invokes the various forms or dialog boxes of the data entry software which the user can use to enter the record. A series of dialog boxes which have related data elements grouped together in a particular dialog box are displayed. The main form (dialog box) prompts the user to enter the most basic information, i.e., the name of the railroad, the principal owner of the railroad, and the year for which the rest of the data is relevant. Once this is done, the user can enter different groups of data in any order. Data elements are displayed with labels and corresponding text boxes to receive user input.

The user can return to the main form by using the Main Menu command button available on all forms. The Clear command can be used to clear all the text boxes for the data elements and to fill in new data. An advantage of entering data through forms is that incomplete data can be entered and saved so that the particular record can be edited at some later stage. The user has flexibility in entering data. Once the available data has been entered, the record is written into the database using the Save command button present on the main form (dialog box). This commits the data to the database. An attempt to exit without saving will prompt the user to save the record first. The Edit command is not available to the user at this time, since the action is the registration of a new entity in the database, and modifying an

existing entry or duplicate entries is not permitted. Editing facilities are provided separately for modification of existing records.

Edit Railroad

The Edit Railroad command also displays the records of the database in a list box by railroad name. Selecting a railroad will invoke an action similar to that of adding a railroad, except that the existing record on the railroad is displayed on the forms. The user can then update the different groups of data elements and use the save command on the main form to update the record. An attempt to exit out of the form will remind the user to update the record first.

Delete Railroad(s)

The Delete Railroad(s) command is used to delete one or all railroad records from the database. If the user decides to delete all railroads from the database, the program will seek confirmation of this action before performing this operation. There is no program recovery from this database operation. If the user decides to delete a single railroad, the program will display a list of railroads for deletion by name. Once a railroad has been selected, the user is prompted for confirmation on his action since this is non-recoverable action on the database. On being granted permission for the operation, the record is removed from the database, and the new state of the database is reflected on the list box.

Reports

This menu item presents a sub menu of report possibilities. The report formats are predesigned but, in most reports, the user controls what railroads or what data items may be included in the report. The reports are summarized below.

Industry Summary

This report generates summary statistics on the entire central database. All participating railroads will be included in a report that provides a complete look, in summation, of the annual data profile. The user is presented with the options of selecting the entire database or various data categories

of the profile to display. The program displays the report on the screen in a Crystal Reports window which allows the user to view and print the report.

Stratify

The stratify command provides the user with the capability designing a report based upon the stratification of various variable chosen by the user. The report presents a series of summary statistics calculated by the program. The program generates summary statistics for various data elements, essentially a mathematical operation across all the records in the database. It performs statistical analysis on the data and computes the result of related variables. All the records in the database meeting the condition of the stratification variables are read for their data element values. The results of the computations and the values of statistical variables are presented in a dialog box. A printing facility is provided to obtain a hard copy of the report. .The stratification variables and their possible values are:

Type of Railroad
Regional
Local-Linehaul
S&T
Port RR

Region
Southern
Southwestern
Pacific
Eastern

Type of Variable
Total Carloads
Density
Revenue-Ton Miles
Revenue

Miles of Road The Type of Variable stratification variables can be used across the values present for these variables in the database in conjunction with the other stratification variables selected (Railroad Type and/or Region). After one of these Type of Variables variable is selected, the program calculates the existing ranges of these variables in conjunction with the other values for any other

stratification values. These ranges are presented to the user as possible values for stratification. After the user makes his selection the program displays the result in a Crystal Reports window allowing the user to view and print the report.

Standard

The standard report may be viewed on the screen or sent to the local printer. This report currently displays a report very similar to the stratification report with the exception that it is industry wide.

About

The About facility displays information about the system and the program. It displays the version and other related information of the system and provides a brief description of the program.

Window

The Window facility can used to arrange the different dialog boxes or windows in predefined patterns on the screen. This is performed with the Arrange Icons menu item. The Arrange Icons function is used to arrange those windows which have been minimized. It arranges all the icons representing the windows in a neat horizontal row at the bottom of the screen. Additionally, the Show Key Locks function displays the status of the Num Lock, Scroll Lock, Insert, and Caps Lock keys.

Exit

This menu item has two functions. The Exit Program function closes the main program form, terminates the program, and returns to the MS-Windows Program Manager. The Exit Windows function terminates the program and goes to the DOS prompt.

Hardware Requirements

The system should be run on an IBM-PC compatible that is capable of running MS-Windows 3.1. The system will require a microcomputer with a 80486 processor and 2MB or more of RAM. The system also requires a mouse for fast and smooth operation. A hard disk 40 MB with 5-6 MB of free

space is a minimum requirement for installing the system. A color monitor is needed to realize the full potential of the graphical user interface. A printer is required to obtain hard copy outputs of reports and results of queries. The development environment required a similar system, but additional memory is recommended for a shorter development cycle.

Software Requirements

The software requirements defined the choice of the target operating system versions and the availability of software tools to build the system. The Short Line Railroad Database system requires the MS-DOS operating system version 5.0 or later and MS-Windows 3.1 or later. The development environment required Visual Basic for Windows and MS-Access 1.0 or 1.1. Visual Basic provided the facilities for the programmer to create, compile, link, run, and debug the Windows application without leaving the Windows environment. The Visual Basic programming system allowed creation of attractive and useful applications that fully exploit the graphical user interface (GUI). Using Visual Basic, powerful, full-featured applications can be developed to exploit key features of Microsoft Windows, including multiple-document interface (MDI), object linking and embedding (OLE), dynamic data exchange (DDE), graphics, and more. The finished application is a true .EXE file that uses a run-time DLL that can be freely used on any hardware (that conforms to the hardware specification). The system also precludes the user from making any changes to the program or to the structure of the database.

Functional Description

The SLRD system is divided into many functional parts. This section presents a description of the different functions implemented in the system. Each function is explained, its role described with respect to the structure of the system, and the interplay among the different functions and other system elements discussed.

The Top level MDI form is invoked when the system is started by the user from the MS-Windows Program Manager. The MDI Form presents a set of actions available to the user. The user's

selection is interpreted, and the appropriate module is initiated.

The Graphical User Interface (GUI)

The GUI Module is responsible for providing a mechanism to receive input and for displaying information obtained from the execution of other modules. It presents various methods to the user for receiving commands. User input obtained through different methods presented in dialog boxes (command buttons, options buttons, or typed text) are read and passed to the corresponding module. The GUI module displays the results obtained by the actions of the other modules and data obtained from reading the database.

The GUI supports keyboard and mouse access. All standard features available in MS-Windows applications are provided. This includes re-sizable and moveable windows, common dialog boxes, scroll bars, and menu bars for item selection. Since the GUI serves as the window into the database, it presents data in different formats, either a record at a time or as a collection of records in a table.

The GUI acts as a supervisor for all the other functions. Through the GUI, the user can access the facilities of the system. It receives input from the user and directs the execution of the other functions. The DBMS functions for adding, deleting, and updating are made available to the user when he/she selects the appropriate command from the menu. The Report Generator is also executed through the GUI.

The Database Management System (DBMS)

The DBMS is responsible for managing the data inside the database. It provides features for adding, deleting, and updating records in the database. Adding records to the database can be made by either entering data through a set of dialog boxes (forms) or by merging data from another data file into the database. Records can be updated. Once a record is selected, the existing information stored in the record is displayed on forms. This data can be changed and updated in the database. Records can be deleted by selecting them from a list box, which has a listing of records based on their railroad name field. The GUI Module seeks confirmation from the user for this non-recoverable action; and, based on

this, the Database module takes the appropriate action.

The Report Generator (RG)

The Report Generator is responsible for the calculation and generation of summary statistics of the entire database. It reads all the information in the database and passes on the results of the summary statistics to the GUI Module. The GUI Module displays the results in a window. Facilities are also provided to obtain a hard copy output of the contents displayed on the window.

The Browse Module

This module displays a list of railroads stored in the database. Once a railroad is selected, it extracts the appropriate record from the database. The GUI module presents the results of this action on different forms.

Functional Decomposition of the System

A Data Flow Diagram (DFD) is a graphical technique that depicts information flow and the transformations that are applied as the data moves from input to output. The DFD may be used to represent a system or software at any level of abstraction displaying the models of the information and functional domains. The DFD's for the system are displayed in Figure 1 through Figure 4.

An Entity-Relationship (ER) model sets out data entities and relationships among these entities. Entities can have attributes as can relationships. Figure 5 represents the ER diagram for the short-line railroad database.

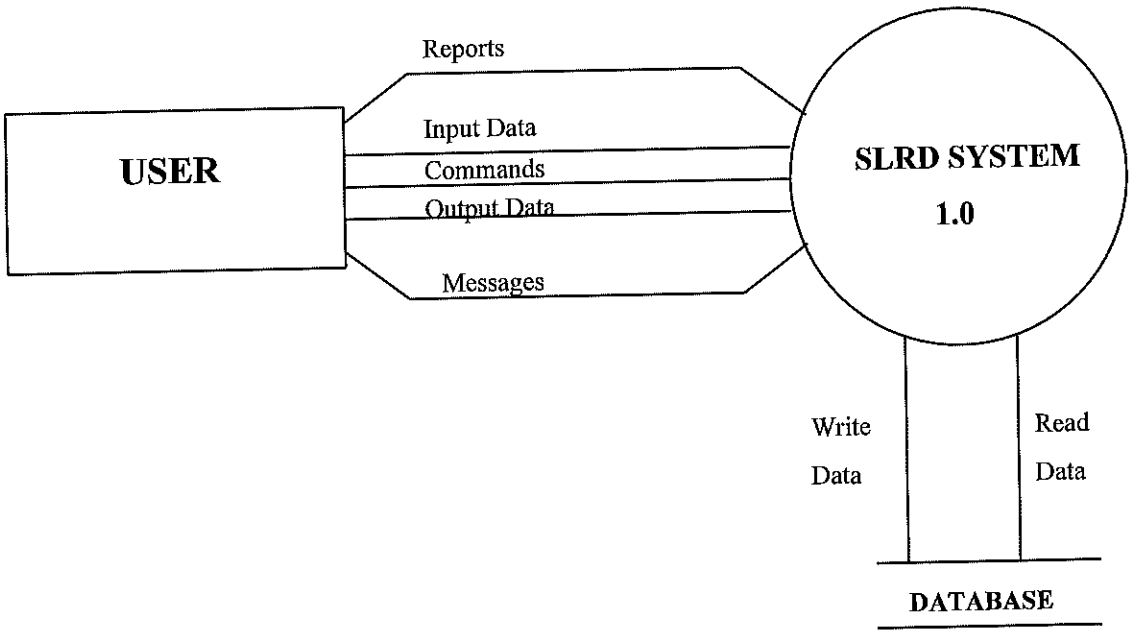


Figure 1. Level 1 DFD Context Diagram for SLRD

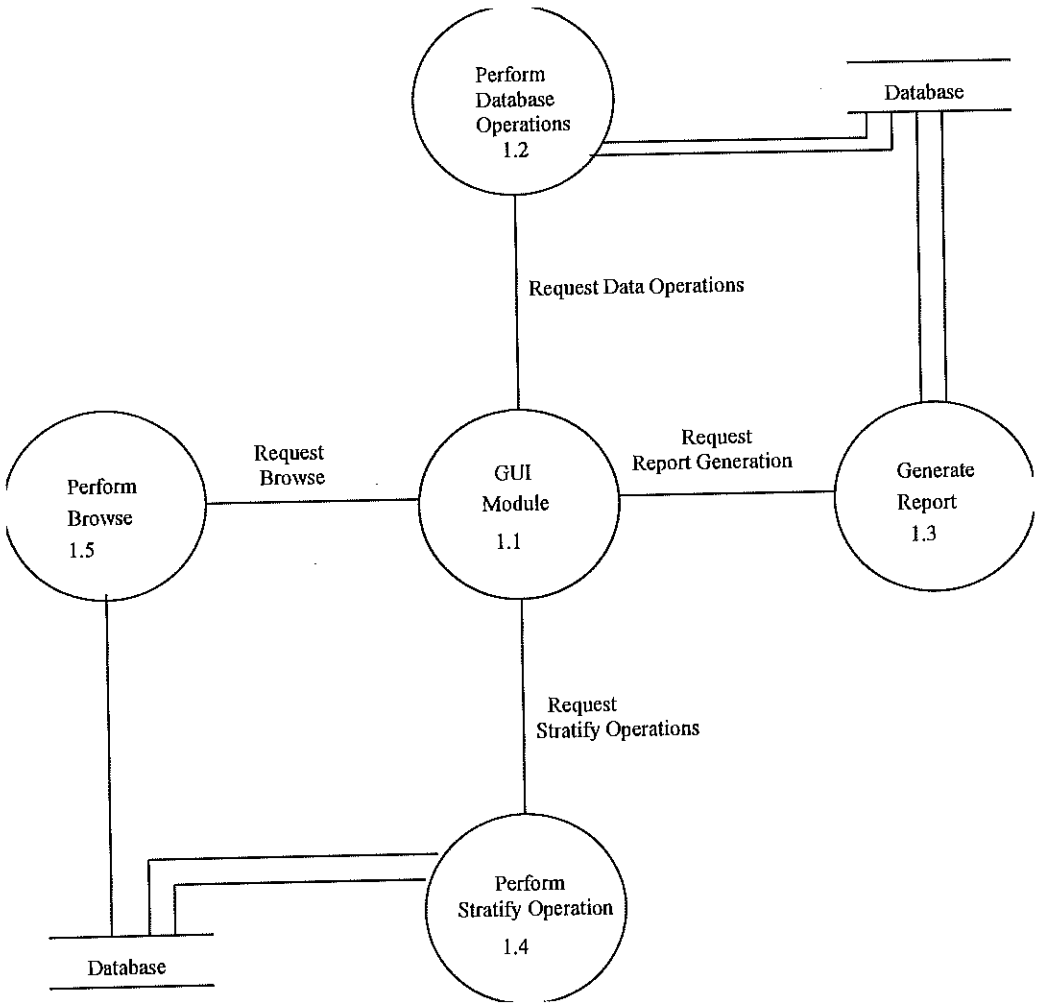


Figure 2. Level 2 Data Flow Diagram for SLRD

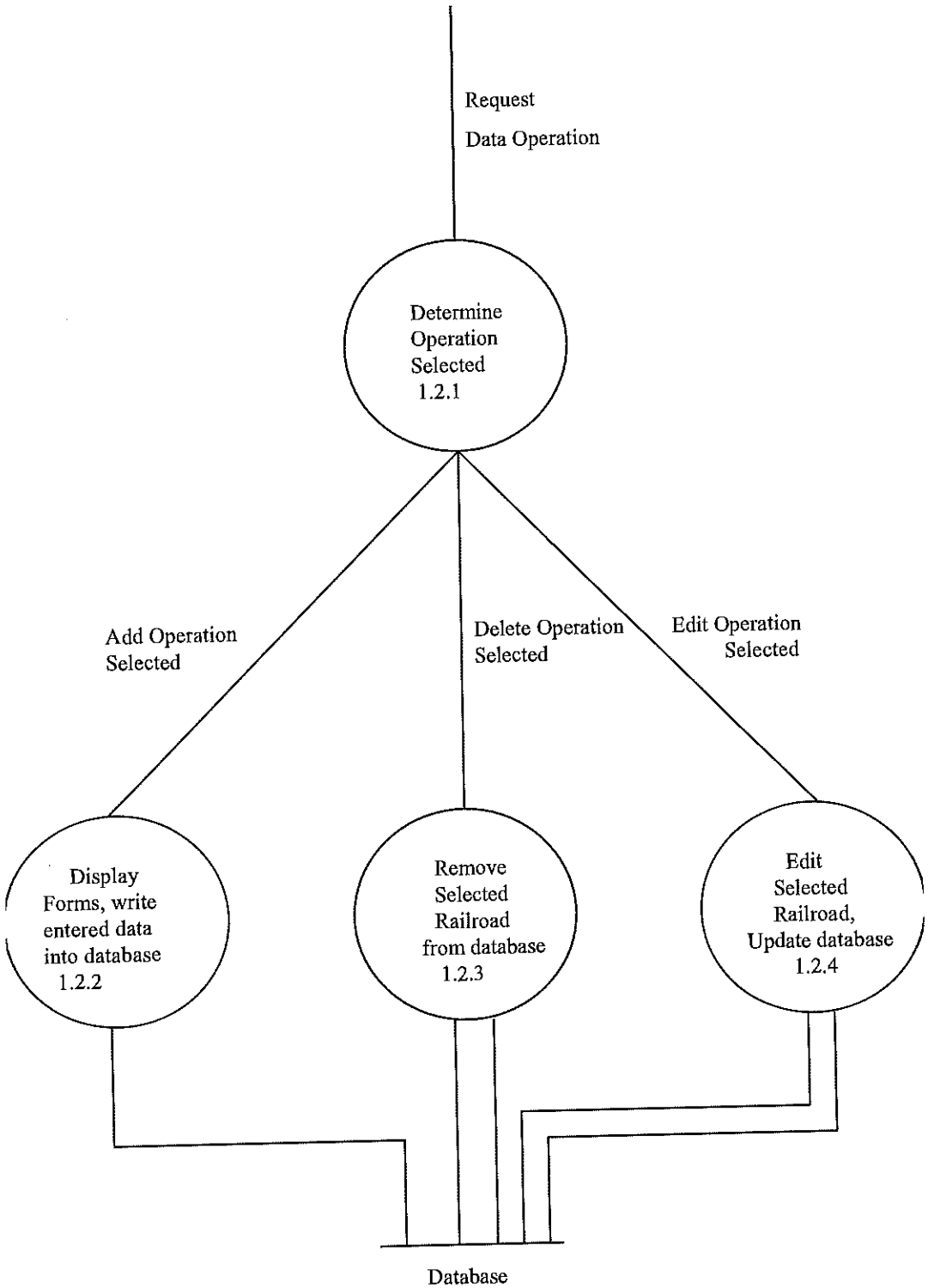


Figure 3. Level 3 Data Flow Diagram for Database Operations

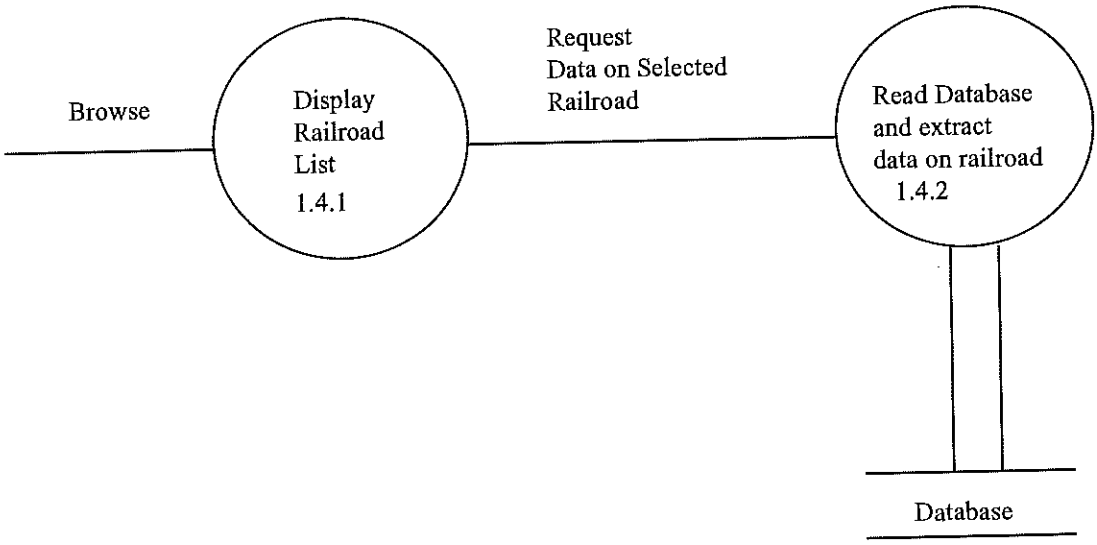


Figure 4. Level 2 Data Flow Diagram for Browse

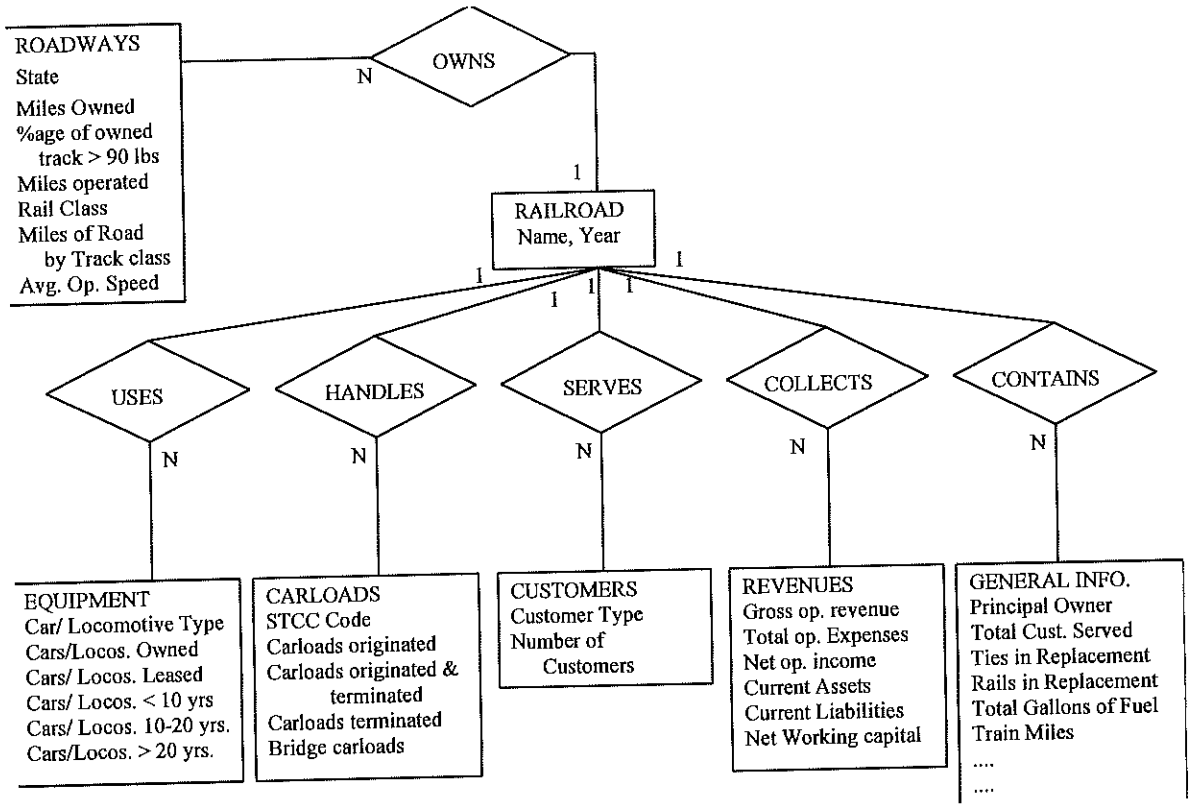


Figure 5 ER Schema Diagram for SLRD

DENTRY

DENTRY is the data entry software program developed to facilitate the inclusion of a railroad's Annual Data Profile into the central database. The program presents the user with a computerized version of the annual survey through a series of forms and windows identical to the paper survey. DENTRY allows the user to enter the data on these forms and saves the annual profile to a floppy disk. The floppy disk is forwarded to the database administrator for incorporation into the central database. A more complete description and technical outline of DENTRY is found in appendix C.

INITIAL RESPONSE AND FUTURE ENHANCEMENTS

Industry Participation

The Annual Data Profile survey was well received by the Short Line industry. About 475 paper and electronic data surveys were sent out to the industry. Two hundred and thirty one (231) responses were received for an excellent response rate of approximately forty eight (48) percent. Fifty-eight (58) railroads responded electronically, 25 percent of all responses. Additional railroads worked on the survey but did not send in a completed response.

The survey prompted various inquires from the industry and the FRA concerning the database. The FRA request was for information on the percent of projected capital investment for next five year period to be funded internally, and for the number of railroads and the number of customers.. The individual railroad queries from the industry were received by the American Short Line Association and included questions about hourly annual compensation for non-contract employees and hourly compensation rate for all employees. Two of the inquires about compensation requested information broken down by job title or position. The survey did not ask for wage information at this level of detail so the responses to these questions used the contract and/or non-contract employee information contained in the database.

Comments

The response from the industry about the survey itself was generally positive. Many comments, by phone and otherwise, were received stressing the importance and the potential of the Annual Data Profile. Many comments were also received with suggestions for improving the survey and the data entry software. The major suggestions for improvement included some form of help on the terms and data elements in the survey and adding a print facility in the data entry software. The format of the financial data category was also a major concern and an area for suggested improvement. Comments from the industry included:

- Help on the data elements would be useful.
- A print facility in DENTRY would be very useful.
- Income statement is not the same as their accounting system. Hasn't used this form since 1980.
- Add Train Crew Size data element.
- Listing the number of customers by commodity group overstates the number of our customers. Our railroad serve customers who handle more than one of commodity groups listed.
- Change the data entry software to allow for more accurate figures in the miles of rail laid in replacement figures.
- Add a commodity code for Coke. It is one of the primary commodities carried by our railroads.
- Allow negative numbers in the data entry software.
- Make the items from the income statement more flexible. Suggest adding Rents, Railway Tax Accruals, and having repair billings for Way and Structures and Equipment on separate lines.
- Items from the balance sheet section difficult to interpret. More clear if you ask for Non-Current Liabilities instead of Long Term Debt. May also want to ask for Other Non-Current Liabilities.

- Source and Application of Funds vague.
- Software needs refinement in handling projected five year capital improvements.
- Employee and Benefit data not flexible to handle our situation.
- Using the software to complete the survey is a good idea. However, problems in the software made it difficult and time-consuming to use.
- Doesn't like so many messages from the software program.
- Only sending inventory because only in business since June.
- How do we handle Miles of Road where we have trackage rights over state-owned road?
- How do you define contract and non-contract employees?
- What are the definitions for train miles, revenue ton-miles, and total man-hours worked.
- What is S&T?

The written comments from the survey include:

- Please define your terms specifically, such as: "Equipment", "Road", and "RR Expense Line Items. Need SPCC's printed on Page 5. Your information will be much better if you be specific instead of leaving interpretation to everyone who completes the survey.
- It would be beneficial to include a section on employee and executive compensation. This is an area that I hear a lot of shortlines inquire about and know several that pay fees for wage and benefit summaries from outside sources.
- Difficult to give you accurate figures with our companies "inter-meshing" as they do.
- This is a privately held corporation and financial in formation is confidential.
- Parts of format are awkward and difficult to analyze. See my notes and corrections. No provision for operated, not owned. (Part II.) Units for Rails laid in replacement?
- <Respondents railroad> is a new railroad - tried to make best guess on #'s.
- <Respondents railroad> acquired its railroad October 1, 1993 and as such has little data to report.
- This railroad has been under-utilized for a decade and any historical data would be meaningless.

- <Respondents railroad> is a public, non-profit rail authority. All services are contracted by the Authority and its administrative personnel are loaned to it by the City government. The Authority's operations are funded by special appropriations to it by the City and County governments.
- Several questions were not asked such as: Number of connecting carriers-8, Number of interchange points-12, computer capabilities (no. of workstations)-14, (network)-yes.
- Better explanation of information necessary.
- We would be interested in any information that could be provided back to the railroad to use for industry comparisons.
- I felt the questionnaire was easier to work with than the diskettes and may be less expensive also.
- Sorry, unable to provide much in the way of financial data.
- Comments for pages 7,8. I'm sorry I have no answers for these pages - they aren't available to me. For the most part, any expenditures are not from capital plans and repairs etc. are made on an "As needed basis" until such time as income improves. We are subject to state assistance, but thus far, no programs or plans are in place or pending.
- Have spent money in state and local grant funds to rehabilitate the RR over the past ten years.
- Please share survey results with us.
- Page 1 - "Total Customers Served" is 148, not 180 as the program calculates. Some customers handle commodities in more than one commodity group. Page 6 - Idling policy is to shut locomotives down manually if temperature is above 40 degrees, and units are expected to sit idle for one hour or more.
- Average length of haul. (Carload) *Intermodal is 464 miles. 401(K) Plan. Employer Percentage Match to 401(k) Plan. * 50% up to max of 4%.
- First, total customers served is off due to the fact one customer may receive or ship different commodity groups. You might wast to include an other category under type of health plans. An example that <Respondents railroad> has is a short term disability policy, which is not included in the surveys dollar amounts. It would also be nice to have a print option in the DENTRY module. So railroads could print a hard copy.

FUTURE RE-DESIGN OF SURVEY AND DATA BASE

High Level System Enhancements

Refinement of the Data Elements

In response to the first year of the annual data profile, the set of data elements should be refined. Comments and suggestions from the survey participants and the users of the data set should be incorporated into a revised data set. Particular attention should be given to the financial data and the employee and benefit categories. Several individual data elements need more consideration, such as the customers served and the rails laid in replacement, and the units involved in responding to various data elements need revision and clarification.

A Glossary of Terms and Context Sensitive Help for Data Entry

This would provide the user with help regarding the meaning of the data elements and what the ASLRA is expecting for data. Most of the questions regarding the survey, both the paper and electronic versions, concerned the interpretation of the data elements.

Advanced Query Functionality for the Central Database

This would provide the user with a more complete query system. The system should be able to respond to various types of queries. Currently, the system can respond to a set of predefined queries. While this set covers the major data elements, further development of a query mechanism would enhance the usefulness of the central database.

Report Generation from User-Specific Queries

This would allow the user the option of printing a report of their query. This enhancement is dependent upon the preceding enhancement.

DOS Version

A DOS version of DENTRY would encourage more railroads to respond to the survey electronically.

Electronic Transfer of Annual Profiles

This enhancement would provide an electronic means for transmitting the data profile to the central database.

Added DENTRY functionality including a print procedure

Various enhancements to the data entry program can be developed, including the addition of a print procedure as requested by many users.

Database Structure Refinement

Refinement of the underlying structure of the database. This will provide greater performance, greater database integrity, and will be easier to maintain at software and database levels.

SPECIFIC PROGRAM IMPROVEMENTS

DENTRY

Printing and Printer Management

An enhanced version of the program should include a facility to print the database. In addition, the Windows print manager could be invoked by the user allowing them to manage the printer while in the program.

File Management

There is no comprehensive file management facility in DENTRY. The program allows the user to copy the database to 'A' drive and 'B' drive but not to 'C' drive. It is advisable to allow the user to copy the program in any directory of his choice in the 'C' drive and other logical hard disk drives. The database also cannot be renamed and hence a highly desirable .Bak extension is not possible.

Aesthetics

DENTRY can be standardized to more closely look like other Windows database applications. The program would then under go a change in the menu and the form structures. Additionally, graphics and animation can be used to enhance the aesthetics of the software.

Data Management

All the textboxes can be made to universally to accept a wide range of appropriate data. The size of the database can be reduced by some efficient architectural changes thereby reducing the space requirements of the database.

Program Redesign

A refinement of the program design such that the program uses fewer system resources. In addition, features such as backing up the database in the event of an operating system failure and a DOS exit and return from within the program could be added.

The Central Database

File Management

This program is basically a file and data manager. The user should be able to view all the directories, file structures, and the system directory and the system files. All the drives in the system should be accessible to the user, allowing the user to view, edit, delete, print, copy and search the database from all the drives. The program itself should be able to migrate anywhere in the system, instead of being static in 'Wash' directory. The same holds true for the database.

Printer Management

The printer and the windows setup should be made available to the user.

Database Management

Intelligent algorithms and data awareness could added to the program capabilities. This could include a stratification algorithm.

Queries

There can be improvements to the query system. A QBE customized grid, which is more user friendly, could be developed allowing for a broader range of queries.

Remote Data Receiver

Remote data could be received and appended to the central database. A comprehensive electronic mailing capability could also be developed.

Reports

Reports, at both the standard and stratification levels, can be enhanced in numerous ways. For example, for a range of 'Total Carloads ' and 'Region' , one may want the number of railroads , or name of railroads or just the rail type or all of these. The stratification procedure can be developed into a powerful module based on the existing one. Reports could also be generated from user-specific queries.

Miscellaneous

The output from any of the function stated above can be sent to the printer, windows or other applications like MsWord, MsExcel or Lotus 1-2-3. The program can be modified to interface with most other standard applications in the Windows environment. Status bar, Tool bar and Tool Box can be designed and standardized to the program.

PROGRAM TECHNICAL NOTES

This section presents technical programming notes on data entry software and the central database software. These notes examine issues more closely related to the computer programming aspect of the project and may include the discussion of various alternatives to these issues.

DENTRY

DENTRY is conventionally designed software, containing forms for the data entry sections and validation check code for validating the data. The most important program code lies in the base file called modulell.bas. This module contains all the global declarations and definitions of all the variables used to hold the data and dynasets, as well as snapshots. The db variable is declared in the global function 'open dbase'. There are also global functions defined in the module in order maintain the modularity of the software. Lengthy and logically related lines of code have been grouped into various functions, the global of which are declared in the base file.

Top level.frm is the MDI form which contains all the forms in the project. The most important of these subsidiary forms is 'Main menu; called frmDes2.frm at the DOS level. This form presents the main menu of the survey. It contains some text objects as well as most important option buttons which invoke the individual data entry forms. These forms are available in the directory 'DENTRY'. All through the software these forms are transient, i.e. loaded and unloaded on request. None of these forms are memory resident. The code contained in these forms is pretty straight forward and there should not be any problem understanding the code in the individual form events.

The most important form event chosen in all the forms in both DENTRY and the central software is the 'lost focus ' event. Also, the 'change' event is used where dynamic arithmetic is used. The following is a listing of the concise code used in the forms:

- 'Lost Focus or Change ' event: Used in almost all the forms. The code is basically validation and input code.
- Command Buttons: Every command button has some code associated with it. The code is either individual to the command button or is a function call from 'module11.base'. The command buttons use the 'click' event all the time while the option buttons use the 'double click' event all the time.

- Load and Unload' event: Load and unload events are all associated with appropriate code. 'DENTRY' has inefficient code in these aspects, where there is a lot of scope for improvement.

Database Procedure

'Dynasets' and 'Snapshots' are used to reflect the underlying database and they are jetted or mapped in and from memory. The dynasets and snapshots are declared and defined in the .base file. Separate routines are created to save, retrieve, and update the data. One possibility for enhanced program modularity is to make these routines a part of the 'toplevel.frm'. Error routines are also partly present in the .base file and are fairly simple routines. The database can be manipulated by the above mentioned functions in the .base file only, not otherwise. The database manipulation code accounts for 80 % of the code in the 'DENTRY' software, hence one should take seriously any consideration of database redesign.

'Drive' Manipulation

The drive commands in the manual (Appendix C) may prove helpful in understanding the code for the 'Save as' command. This command,' save the railroad to a: or b:', compacts the database while saving the railroad database record to another drive. The 'DB' variable attached to the physical database is manipulated by the program code to perform these operations. Further refinement of this function should consider providing a file box and enhancing this module in terms of providing the option of being able to save the database in any directory in any drive in the file box.

'Browse/Open Operations'

These operations read the individual data fields from the disk. These values from these data fields are then assigned to Visual Basic variables, all of which are declared in the .base file. The .base file is absolutely responsible for any declarations or misdeclarations of these variables. The variables are then used to display the data in the text boxes in the appropriate forms. While

'Browse' does not allow saving, 'open' does. This is just a matter of enabling and disabling the 'save' and 'save as' command buttons.

SLRD Central Database

The central database is, comparatively, a very large software program, but uses the same .mdb file as that of the DENTRY. In DENTRY however, each client initially has an empty mdb. Both mdb's are called 'Slrdbase.mdb' and are essentially the same, the difference being the presence or absence of data.

The central database has a main menu called 'Toplevel.frm' at the DOS level and 'Startup.frm' at Visual Basic level. This form is the most important form in the project and is an MDI form. The menu commands are nested commands unlike DENTRY where the menu commands are in a single level. The nestings are logically grouped. These groupings can be changed with respect to the code associated with it. It is important that in any reversions when the groupings change, the code associated should also change/move . Before dealing with the details, a general profile of the central database is provided below.

The central database had undergone numerous changes previously. The requirement specifications are not clear even to date as the data elements and data organization are still subject to change or refinement. An informal requirement spec (theory) would be

Overview:

Software (Central Database).
Client: Washington FRA, American Shortline Railroad Association.
Purpose: Data entry, analysis, documentation, querying and data storage.
User interface: Window's based Graphical User Interface.
Features: Data print preview, stratification, and Win API.
Software: VB 3.0, MS Access, Crystal Reports.

A main concern of the software was memory and disk space management. This was achieved by using fewer global variables, redefining arrays, using the twips mode for the forms

rather than the pixel mode, unloading forms whenever not used and by compacting the database. The concern about the time taken for the individual functions to be processed were largely alleviated but not eradicated. There is tremendous scope for improvement. The use of graphics is kept at the minimum. There are more near segment calls than far segment calls. Error management is largely effective and some system errors can be handled. There exists the occurrence of some system errors which prove fatal to the program.

A further comment; the central database is still subject to change and any database redesign will constitute re - engineering of the software. The customer - developer nexus so important for requirement elicitation has been a challenge to maintain with many layers of individuals and committees involved in the data element selection and requirement process.

The central database groups the following functions:

1) Browse, Save, Print, Print SetUp, Append under File Operations.
2) Delete, Edit and Add Railroads as Data Operations.
3) Industry summary, standard and stratification reports under reports
4) Window and Exit functions.

The file organization of central database is as follows:

1) Base files : Module11.base , Global.bas
2) frm files : All the form files. Individual forms are created and are all present in 'Wash' directory.
4) rpt files : These are the report files. The report files have been designed in Crystal reports. These are called using the Crystal VBX. A new design to refer to them in the project through the print engine is in progress.
5) D11's : User, lib.kernel d11's , CRPE.DLL.
6) Database : Slrdbase.mdb. This is present in the 'Wash' directory.

All the files, except for the D11's, should be present in the 'WASH' directory. The wash directory will contain all these files. The files should also be saved in the directory after any changes have been made.

Module11.base is the most important global file in the system. This file starts with the declarations of window APIs and the declarations of all the variables used in these APIs. Then

the global flags are declared. These flags are used as status indicators. The names of these variables do not always confirm with their purpose. All the Visual Basic variables declarations follow. These variables are also declared in 'DENTRY'. Likewise, all the database declarations, such as the snapshots and dynaset declarations, are also in the same file.

The most important different procedures are also defined in Module11.base. These procedures are used repeatedly all through the project. Functions like 'Generate_Report_Information' are used to generate standard reports. 'Copy_Display_Information' is used to copy field values from the database to Visual Basic variables.

The Global .Base files contain some calls to the 'Print Engine' of Crystal Reports. The print engine commands are used to refer to functions declared in 'CRPE.DLL'. The required variables are declared in Global.Bas. It is recommended that these declarations be done in module11.base, because Global.Bas contains lots of unwanted declarations and hence wastes space. As well, the print functionality for both 'DENTRY' and 'Central Database' is undergoing further refinement.

Some individual functions of the Central Database include:

- 'Browse' : Used to browse the railroad data. The design is very 'Similar' to the 'Browse' facility in DENTRY.
- 'Append' : Appends the railroads from an external drive to the 'Central Database'. When this function is activated a form appears to the user. The form is called frmAppend.frm and presents a combo box. The user selects the required drive form which the data is to be appended to the master file in the 'C:/wash'. The names of the files in both the drives at the DOS level is Slrdbase.mdb. Multiple railroads can be appended but duplicate railroads are not appended. The operation can be stopped prematurely by the user. Method: The fields from the database to be appended are copied into Visual Basic Variables. These, in turn, are copied in to the master database file into their respective fields. The presence of multiple railroads is detected. If there are any multiple railroads in the source files then the operation is repeated until all the railroads are copied.

Algorithm :

1) Check the drive. If error go to error handler.
2) Check for the file 'Slrdbase.mdb' in the source drive. If absent go to error handler.
3) Check for multiple railroads.
4) Take the first railroad. Check if the railroad is already present in the master database file. If present the go to the next railroad or if there is only one railroad then abort else
    i) Copy the field values to Visual Basic variables using 'Copy_Display_Information'.
    ii) Copy these values back to the master database file by using 'Save' function.
5) Check for abort command (".") by the user. If pressed abort and give abort message else go to step 4.

Comments: Enhancements to Append can be made such as checking for the file from the source drive in all the directories. Currently append only checks for the file in only the root directory.

- 'Save Function': Saves the current railroad in the master database file in "C:/WASH". This function is activated only if the user is in the Edit a railroad mode or Open a railroad mode. It should be deactivated during all other modes of the Central Database.
  Method: 'Save_Tables' and 'Update_Dynasets' are two different functions declared in module11.base. Save_Tables is used for saving a new railroad while Update_Dynasets is used for already existing railroads. These functions are used to implement save. Flags are used to find out whether its a new railroad or an already existing railroad in the Database.
  Comments: Any changes in the master database file reflect significantly on 'Save_Tables' and 'Update_Dynasets' functions. The developer must be very careful with any changes. These functions use also relatively complex algorithms.

- Printer Setup: This is 'Shell' to printman.Exe. This a print manager file and all the functions of print manager are stored in this file. The exe file is present in "C:\Windows\System" or alternatively search for "C:\Windows". The windows of printman.exe is memory resident. Hence the software disables the windows after they are used. Any change to the printer settings are reflected in system.ini files and thereby, the user should be notified.

- Print : This function is used for printing the survey. This function is the same for both 'DENTRY' and the Central Database.

The data operations of the central database are discussed below. The three data operations are:

1) Edit a Railroad
2) Add a Railroad

3) Delete Railroad(s)

Data operations modify the state of the database; i.e. every instance of Slrdbase.mdb is changed. 3D-Paneled forms were used for these operations while the rest of the functions in the project do not provide any 3d - paneled forms. These data operations were initially viewed as very important functions in the software so they initially received different treatment. The operatioins are explained in detail below.

- Edit a Railroad: Edits an already existing railroad in the database.

  All the parameters of the railroad can be changed. This means that even the railroad name can be changed. This gives scope to the user to rename an existing railroad and , significantly, can result in duplicate railroads in the database. Currently, the software does not prevent this.

  The Save button of the file menu is active during this operation. The invoking of the save command invokes the 'Update_Dynasets' procedure in module11.base. The railroad is copied into the Visual Basic variables, the changes are made and these changes are copied in to the database when save button is activated.

  Comments : If the user wants to quit the package before he had saved his changes to the disk the 'Exit' function should detect this and prompt the user to save all changes. This facility is present the DENTRY.
  The other data operation commands,'Delete a railroad' and 'Add a railroad', are disabled during the Edit operation. Other main menu commands are disabled to prevent any confusion about those commands and the context in which they should be used. However, this results in reduced flexibility to the user.

- Add a Railroad : This function basically provides most of the DENTRY software in one command. As usual the save command is enabled in the file menu.
  'Save _Tables' of module11.base is used to save the railroad data to the database. All other aspects of 'Edit a railroad' are applicable to 'Add a railroad'.
  Comments: Again the user is not prompted to save data before quitting the package. The wisdom of disabling other functions and commands while in 'Add a railroad' mode should be reconsidered.

- Delete a Railroad: This menu item offers two sub-menus,' Delete selective railroads' and 'Delete all the railroads'.
  a) Delete selective railroads : Railroads selected by the user are deleted.
  When this function is activated a form appears listing the railroad names currently in the database. The user can delete a particular railroad by double clicking on the railroad name, thus deleting all the data pertaining to the railroad and also not deleting duplicate copies of the same railroad.

For example, suppose there are four duplicate railroads in the database. The database is not legally supposed to have a duplicate railroad but the system is such that there is a strong possibility of a duplicate railroad. In such a case, the railroad name has to be double clicked four times to delete all the references to that railroad.

Algorithm :

1) Obtain the ID of the railroad selected from railroad names table.
2) Check if there are any duplicate copies.
3) If there are any duplicates, go to 4 else 4a.
4) Select the railroad
4a)Select the first railroad.
5) Delete all the references to the ID from all the tables/dynasets.snapshots.
6)If there are duplicate copies notify the user that one of them is deleted.
7)End.

b)Delete All railroads :Delete all the data in the database.

Method : Delete all the tables in the database.

The remaining functions of the central database are:

- Window menu: The window menu can be designed further depending upon possible data elements change to the system and the final configuration of the software. In particular, the keyboard locks is worth mentioning. The key.vbx file of the standard visual basic library is included. The user has the facility to manipulate the lock keys and at the same time the lock - key status is shown on the screen. The menu option for the show key lock status is a checked menu option.

- Reports : There are two types of reports :
  1) Standard reports.
  2) Stratification reports.

  Standard reports : The base report design is in crystal reports. The name of the rpt file is newrep1.rpt. This rpt file is in the c:\wash directory. Newrep1.rpt is the standard report template also used for the stratification reports.

  The standard reports use the procedure ' Generate_Report_Information' from the Module11.base file. The algorithm this follows is :

  1) Create a report dynaset on report base table.
  2) Use the existing dynasets to copy the required field values in to Visual Basic variables. Note the these variables are declared in the starting of the module.
  3) Calculate the fields required using these variables.
  4) Copy these field values into the appropriate fields in the report dynaset.
  5)Save the dynaset
  6)Connect these values to the standard report template in the newrep1.rpt file.
  7)Print them or Display them on the screen with the print preview.

The standard report calls the Crystal.vbx for the print preview and the printing process. The process of either printing or viewing is a matter of manipulating the VBX properties of newrep1.rpt file. Also the number of copies for printing is determined by setting the number of copies property of the rpt file.

- Stratification : This function uses the Access Engine SQL : The JET engine SQL is designed to act on Dynasets and Snapshots. Dynasets and Snapshots are similar to views in SQL. However, these views are not created by SQL but by 'Create Dynaset' and 'Create Snapshot' methods.

  There are serious limitations to JET SQL . It supports only a small subset of functions supported by the full ANSI implementation of SQL. This is the biggest drawback and hence was a setback to the design. Please refer to programming features book no. 2 for further information.

  Stratification Details : Two forms are used in this process. One of them gives the user variables on which the user wishes to stratify. The second one provides the range of the chosen variables. In this first form we display combo boxes for three different categories.

  1) The railroad type
  2) The region

  3) Variables like density , total number of carloads etc which can be both existentially and universally quantified over an user provided range.

  Railroad Type: The user has four choices. Once a choice has been made, all the dynasets containing relevant data are pruned to produce the same number of dynasets containing the data pertaining to the chosen railroad type. These dynasets are further pruned in the process to provide us the final stratified result.

  Step 1 : Activate the dynasets
  Step 2 : Take input from the user (Choose the railroad type on which to be stratified)
  Step 3 : Use SQL to select the appropriate railroads satisfying the condition. (If the range produces empty tuples display the appropriate message)
  Step 4 : Use these Dynasets for further pruning.

  Railroad Region : This level of stratification can be challenging to perform.. The reason is that in the database there is a permanent base table to store the regions. This region look-up table assigns each railroad to a region. A problem may arise when the user types in the railroad in a different way. There can be numerous ways to provide a railroad name, for example, with one capital starting letter, or any arbitrary letter in between being a capital, with hyphens or commas in between and so on. One suggestion to avoiding this problem is to standardize the notation. The following means can be provided for standardizing

the naming notation :

1) Allow only capital letters. If small case letters are provided then convert them to the upper case letter.
2)Do not allow any spaces between letters, but, of course, the words should be allowed spaces.
3)Do not allow any special characters in a name although the situation justifies the usage of such characters.
4)An even stricter rule is not to allow spaces in railroad names. However, the package should allow the user to indicate a space with the help of a special character. This would encourage the user to be cautious while entering the railroad names and hence provide correct railroad names.

The above suggestion may help alleviate the naming problem. The problem being faced is that the stratification results involving the regions do not become accurate because of the matching problem.

The dynasets pruned from the previous stage are taken as input to this stage and further pruned. To understand the process:

Step 1: The user selects the railroad type on which to stratify. For example, suppose the user has chosen local - linehaul.
Step 2 : Using SQL, all railroads belonging to the local -linehaul would be selected. This selection would be done in the railroad names table.
Step 3: We have chosen all the railroads belonging to local - line haul in the railroad names table but what about pruning the data in other related dynasets? This is also done by the SQL statements. It should be noted that the 'Filter' statement is used to prune the data which ideologically is similar to pruning the dynasets using the SQL.
Step 4 : These filtered dynasets are used at the next stage of the next level pruning.

In this case let us considered we have active dynasets all containing data of local - linehaul railroads. Now at the region level if the user choose the pacific region, at the end of this stage the dynasets active should contain data belonging to railroads of the local - linehaul in the pacific region.

Variables : Variables such as density and revenue are quantified variables. They are expressed in a range. There are two forms (Interactive) in the stratification process which interact with the user. At the first form level the broad categories are chose. At the second form level the ranges are chosen.

An example of this stratification would be if the user wanted to know the statistics about all the railroads belonging to the local - linehaul railroad type and the pacific region with revenue between 2 and 3 million dollars. At the second program level we have pruned the railroads that belong to the local - linehaul and the pacific region stratification categories. The user is still in the initial form and chooses the revenue variable. When the user chooses this variable and presses the OK button the following actions are

performed:

1) The usual validity check (Input) is performed.

2) The pruned dynasets are checked to the lower and upper ranges with respect to revenue. There can be some confusion as to whether the database or the pruned dynasets be checked for the ranges. For example, the pruned dynaset may have a railroad which has 5 million dollars in revenue and which is the least revenue railroad in the dynaset , while a railroad in the database may have a revenue of only two hundred thousand dollars. So there can be confusion as to which ranges to be displayed to the user.

3) The form is displayed with the appropriate ranges. The ranges are displayed both in the textboxes, which are editable, and the labels above the textboxes. The labels are not editable and hence the display stays as long as the user stays in the second form.

- Ranges: Once the appropriate ranges are selected, the dynasets are further pruned. 'StratVar' Fields in each table are used for this purpose. These ranges are checked for their syntactic validity and then stored as 'Stratvar' fields in all the tables for further final level pruning.

- Finale: The filtered dynasets are then given as arguments to the Generate_Report_Information module in the module11.base file. The stratification report also uses the standard report template and hence uses the same rpt file. However, the stratification report is displayed on the screen before it can be sent to the printer.

- Logo : The logo for this software is the Bltrain.bmp. This is used in all the reports generated by the software. The logo also appears in pseudo animated form during start up. The logo is moved along with the forms in a diagonal direction. Two timers are used. One timer is used to display the logo for specific period of time and the other to coordinate the movement of the train with respect to the form containing it. Further refinement can be done to the start up procedure.

APPENDIX A

SLRD System
Visual Basic Master Project File (*.MAK)

Visual Basic MAK File for SLRD System

TOPLEVEL.FRM
C:\WINDOWS\SYSTEM\GRID.VBX
C:\WINDOWS\SYSTEM\MSOLE2.VBX
C:\WINDOWS\SYSTEM\CMDIALOG.VBX
C:\WINDOWS\SYSTEM\CRYSTAL.VBX
C:\WINDOWS\SYSTEM\GAUGE.VBX
C:\WINDOWS\SYSTEM\GRAPH.VBX
C:\WINDOWS\SYSTEM\KEYSTAT.VBX
C:\WINDOWS\SYSTEM\THREED.VBX
C:\VB\CONSTANT.TXT
C:\VB\DATACONS.TXT
MODULE11.BAS
C:\WINDOWS\SYSTEM\SPIN.VBX
FRMSTRAT.FRM
FRMDES2.FRM
DATAOPER.FRM
FRMAOS.FRM
FRMAOS1.FRM
FRMCS.FRM
SAVEAS.FRM
FORMM.FRM
FRMEBD.FRM
FRMEQUIP.FRM
FRMOPS4.FRM
FRMPS.FRM
FRMRTS.FRM
RNAMES.FRM
DEL_ITEM.FRM
EDITITEM.FRM
FRMREP.FRM
FRMFD.FRM
FRMPHELP.FRM
FRMFD2.FRM
FRMAPPEN.FRM
FRMAB.FRM
FRMDATAP.FRM
FRMSELEC.FRM
FRMSHELP.FRM
FRMST2.FRM
BROWSE_D.FRM
FRMDELET.FRM
ProjWinSize=152,394,228,488
ProjWinShow=2
IconForm="frmStart"
Title="START"
ExeName="START.EXE"

APPENDIX B

SLRD System
Database Technical Specification

Database Tables in the SLRD System Database

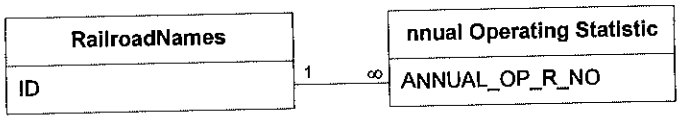
The SLRD system database is in the Microsoft Access database format (*.mdb) and consists of the following tables.

Annual Operating Statistics
Annual_total
Auxiliary Financial Information
Base Financial Information
Benefit Plans Information
Capital Investment Information
Customer Information
Employee Information
Equip Total
Equipment Information
FRA Total
FRA-Track Class Information
GENPROF
Passenger Services Information
Port Customers Information
RailroadNames
Ravi
Report Table
Roadway Information
Temp

The major reference table is the RailroadName table. This table is the focal point for all of the relationships in the database. Detailed descriptions of the individual tables follow.

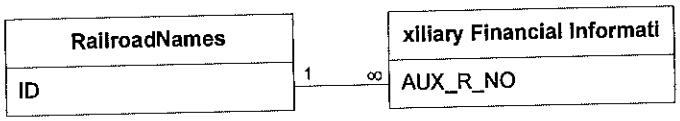
Relationships

Reference



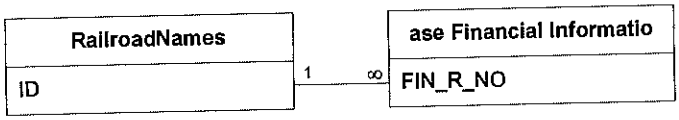
Attributes: One to Many, Not Enforced

Reference_Auxiliary Financial Information



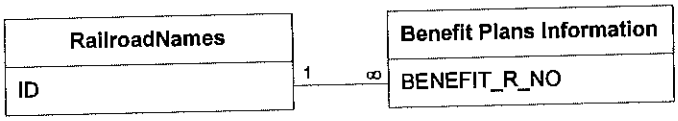
Attributes: One to Many, Not Enforced

Reference_Base Financial Information



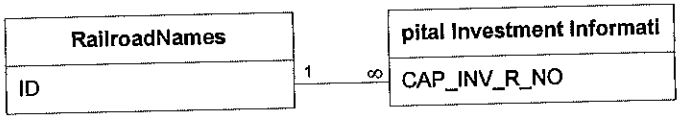
Attributes: One to Many, Not Enforced

Reference_Benefit Plans Information



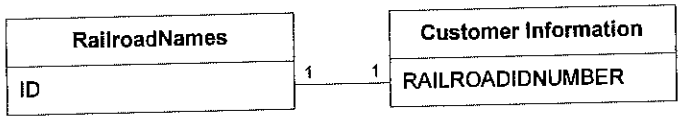
Attributes: One to Many, Not Enforced

Reference_Capital Investment Information



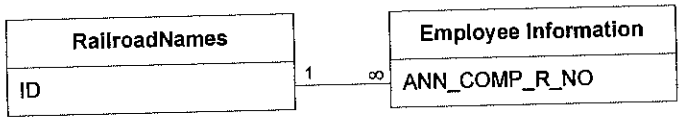
Attributes: One to Many, Not Enforced

Reference_Customer Information



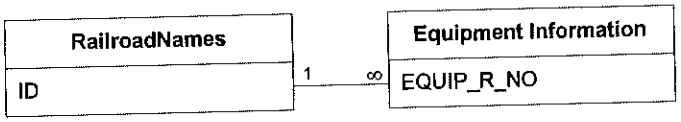
Attributes: One to One, Not Enforced

Reference_Employee Information



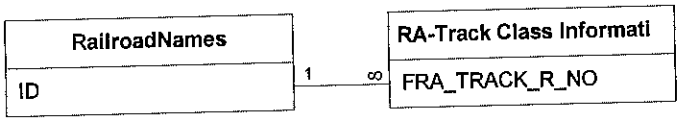
Attributes: One to Many, Not Enforced

Reference_Equipment Information



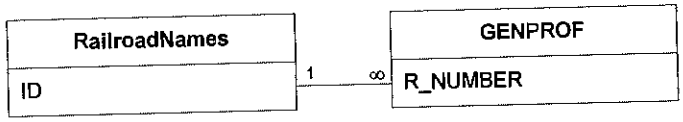
Attributes: One to Many, Not Enforced

Reference_FRA-Track Class Information



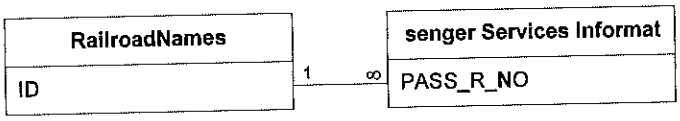
Attributes: One to Many, Not Enforced

Reference_GENPROF



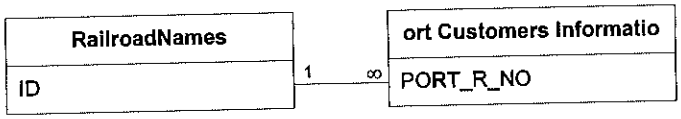
Attributes: One to Many, Not Enforced

Reference_Passenger Services Information



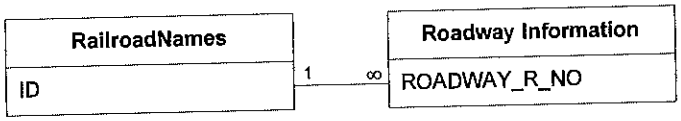
Attributes: One to Many, Not Enforced

Reference_Port Customers Information



Attributes: One to Many, Not Enforced

Reference_Roadway Information



Attributes: One to Many, Not Enforced

Properties

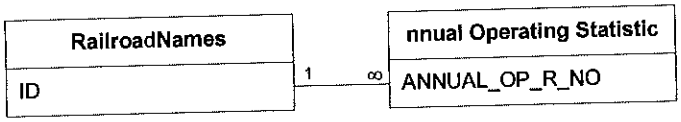
Date Created:	8/19/93 3:15:51 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:49 AM	Record Count:	3220

Columns

Name	Type	Size
ID	Number (Long)	4
ANNUAL_OP_R_NO	Number (Long)	4
STCC_CODE	Text	100
CAR_ORG_TERM_ON_LINE	Number (Long)	4
INTRLND_CARS_ORG	Number (Long)	4
INTRLND_CARS_TERM	Number (Long)	4
BRIDGE_CARS	Number (Long)	4
TOTAL_CARS	Number (Double)	8
Tempo	Number (Long)	4
ID1	Number (Integer)	2

Relationships

Reference



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
ANNUAL_OP_R_NO	1
Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	ANNUAL_OP_R_NO
Primary:	No
Required:	No
Unique:	No
Fields:	ANNUAL_OP_R_NO, Ascending
PrimaryKey	1
Clustered:	No
Distinct Count:	3220
Foreign:	No

Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

Date Created:	9/20/94 10:31:54 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:49 AM	Record Count:	14

Columns

Name	Type	Size
TOT_CUST_SERVED	Number (Double)	8
STCC_CODE	Text	50
CAR_ORG_TERM_ON_LINE	Number (Double)	8
INTRLND_CARS_ORG	Number (Double)	8
INTRLND_CARS_TERM	Number (Double)	8
BRIDGE_CARS	Number (Double)	8

Table Indexes

Name	Number of Fields
TOT_CUST_SERVED	1

Clustered:	No
Distinct Count:	1
Foreign:	No
Ignore Nulls:	No
Name:	TOT_CUST_SERVED
Primary:	No
Required:	No
Unique:	No
Fields:	TOT_CUST_SERVED, Ascending

Properties

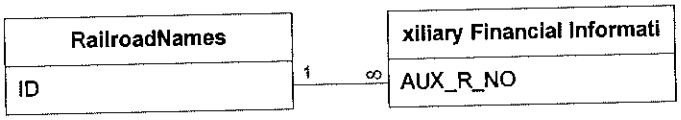
Date Created:	8/19/93 2:05:00 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:50 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
AUX_R_NO	Number (Long)	4
FREIGHT	Currency	8
OTHER_OP_REV	Currency	8
WAY	Currency	8
BRIDGES	Currency	8
WAYS_AND_STRCT_TOT	Currency	8
FREIGHT_CARS	Currency	8
LOCOMOTIVES	Currency	8
OTHER_EQUIP_EXP	Currency	8
TOT_EQUIP_EXP	Currency	8
TRANSPORTATION	Currency	8
GEN_AND_ADMIN	Currency	8
OTH_OPER_EXP	Currency	8
CAP_ROAD_EXP	Currency	8
CAP_EQUIP_EXP	Currency	8
CAP_OTHER_EXP	Currency	8
Tempo	Number (Long)	4

Relationships

Reference_Auxiliary Financial Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey

Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

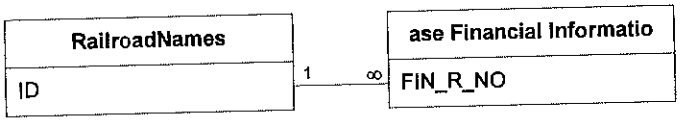
Date Created:	8/19/93 1:34:18 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:50 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
FIN_R_NO	Number (Long)	4
GROSS_RAIL_OP_REV	Number (Double)	8
TOTAL_RAIL_OP_EXP	Currency	8
NET_RAIL_OP_INCOME	Currency	8
CURRENT_ASSETS	Currency	8
CURRENT_LIABILITY	Currency	8
NET_WORK_CAPITAL	Currency	8
CONTRIB_TO_CAPITAL	Currency	8
TOTAL_ASSETS	Currency	8
LONG_TERM_DEBT	Currency	8
STOCK_HLDRS_EQUITY	Currency	8
TOTAL_CAPITAL_EXP	Currency	8
DEP_AMORT_AND_RET	Currency	8
EXPENSE	Currency	8
Temp	Number (Long)	4
Tempo	Number (Long)	4

Relationships

Reference_Base Financial Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes

Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

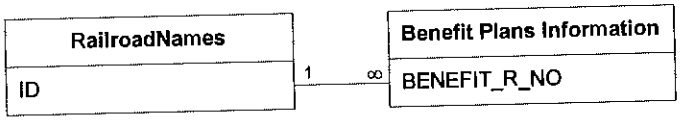
Date Created:	8/19/93 3:55:54 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:50 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
BENEFIT_R_NO	Number (Long)	4
MEDICAL_PLAN	Number (Double)	8
MED_EMP_CONTRIB	Number (Double)	8
DENTAL_PLAN	Number (Double)	8
DEN_EMP_CONTRIB	Number (Double)	8
LIFE_INSURANCE_PLAN	Number (Double)	8
LIFE_EMP_CONTRIB	Number (Double)	8
PROFIT_SHARE_PLAN	Text	1
PROFIT_EMP_CONTRIB	Number (Double)	8
BENEFIT_ANN_SUB_TOT	Number (Double)	8
401K_PLAN	Text	1
401K_EMP_CONTRIB	Number (Double)	8
PENSION_PLAN	Number (Double)	8
PENSION_EMP_CONTRIB	Number (Double)	8
RETIRE_ANN_SUB_TOT	Number (Double)	8
FAMILY_BENEFIT1	Number (Double)	8
FAMILY_BENEFIT2	Number (Double)	8
FAMILY_BENEFIT3	Number (Double)	8
Kplan1	Number (Double)	8
Kplan2	Number (Double)	8
Kplan3	Number (Double)	8
Tempo	Number (Long)	4

Relationships

Reference_Benefit Plans Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

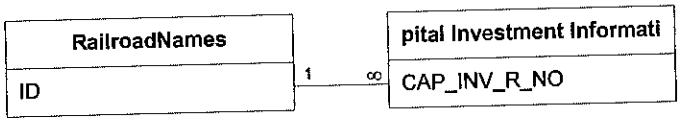
Date Created:	8/19/93 2:41:09 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:51 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
CAP_INV_R_NO	Number (Long)	4
ROAD_INVEST	Number (Double)	8
ROAD_FUND_INTERNALLY	Number (Integer)	2
EQUIP_INVEST	Number (Double)	8
EQUIP_FUND_INTERNALLY	Number (Integer)	2
OTHER_INVEST	Number (Double)	8
OTHER_FUND_INTERNALLY	Number (Integer)	2
Tempo	Number (Double)	8

Relationships

Reference_Capital Investment Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

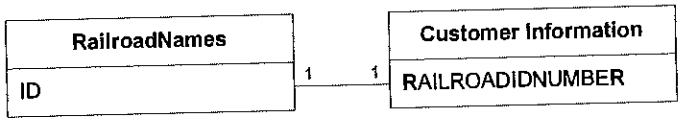
Date Created:	8/19/93 3:21:53 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:51 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
RAILROADIDNUMBER	Number (Long)	4
COAL	Number (Long)	4
FARM_PRODUCTS	Number (Long)	4
CHEMICAL_AND_ALLIED_PRODUCTS	Number (Long)	4
FOOD_AND_KINDRED_PRODUCTS	Number (Long)	4
NON-METALLIC_MINERALS	Number (Long)	4
TRANSPORTATION_EQUIPMENT	Number (Long)	4
LUMBER_AND_WOOD_PRODUCTS	Number (Long)	4
PULP_PAPER_AND_ALLIED_PRODUCTS	Number (Long)	4
STONE_CLAY_AND_GLASS_PRODUCTS	Number (Long)	4
METALLIC_ORES	Number (Long)	4
PRIMARY_METAL_PRODUCTS	Number (Long)	4
WASTE_AND_SCRAP_MATERIAL	Number (Long)	4
OTHERS	Number (Long)	4
TOTAL_CUSTOMERS	Number (Double)	8
PETROLEUM_PRODUCTS	Number (Long)	4
Tempo	Number (Long)	4

Relationships

Reference_Customer Information



Attributes: One to One, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey

Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending
RAILROADIDNUMBER	1
Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	RAILROADIDNUMBER
Primary:	No
Required:	No
Unique:	Yes
Fields:	RAILROADIDNUMBER, Ascending

Properties

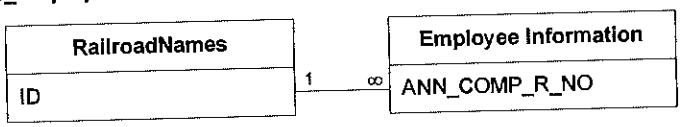
Date Created:	8/19/93 3:44:17 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:51 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
ANN_COMP_R_NO	Number (Long)	4
TOT_CONTRACT_EMP	Number (Double)	8
TOT_NO_CONTRACT_EMP	Number (Double)	8
TOT_MAN_HOURS_WRKD	Number (Double)	8
TOT_ANN_COMP_PAID	Number (Double)	8
Tempo	Number (Long)	4

Relationships

Reference_Employee Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

Date Created:	9/20/94 10:38:22 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:52 AM	Record Count:	9

Columns

Name	Type	Size
EQUIP_R_NO	Number (Long)	4
CAR_LOCO_NAME	Text	50
UNITS_OWN_LSS_10_YRS	Number (Double)	8
UNITS_OWN_10_TO_20_YRS	Number (Double)	8
UNITS_OWN_GTR_20_YRS	Number (Double)	8
UNITS_LEASED	Number (Double)	8
UNITS_OWNED	Number (Double)	8

Table Indexes

Name	Number of Fields
EQUIP_R_NO	1

Clustered:	No
Distinct Count:	9
Foreign:	No
Ignore Nulls:	No
Name:	EQUIP_R_NO
Primary:	No
Required:	No
Unique:	No
Fields:	EQUIP_R_NO, Ascending

Properties

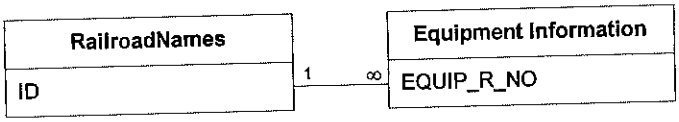
Date Created:	8/19/93 3:06:51 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:52 AM	Record Count:	2079

Columns

Name	Type	Size
ID	Number (Long)	4
EQUIP_R_NO	Number (Long)	4
CAR_LOCO_NAME	Text	50
UNITS_OWN_LSS_10_YRS	Number (Long)	4
UNITS_OWN_10_TO_20_YRS	Number (Long)	4
UNITS_OWN_GTR_20_YRS	Number (Long)	4
UNITS_LEASED	Number (Long)	4
UNITS_OWNED	Number (Long)	4
Tempo	Number (Double)	8
ID1	Number (Integer)	2

Relationships

Reference_Equipment Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
EQUIP_R_NO	1
Clustered:	No
Distinct Count:	231
Foreign:	No
Ignore Nulls:	No
Name:	EQUIP_R_NO
Primary:	No
Required:	No
Unique:	No
Fields:	EQUIP_R_NO, Ascending
PrimaryKey	1
Clustered:	No
Distinct Count:	2079
Foreign:	No

Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

Date Created:	9/20/94 10:34:18 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:52 AM	Record Count:	5

Columns

Name	Type	Size
FRA_TRACK_R_NO	Text	10
MILES_OF_ROAD	Number (Double)	8
AVG_OP_SPEED	Number (Double)	8

Properties

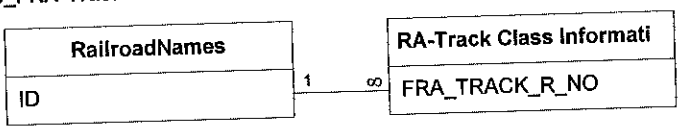
Date Created:	8/19/93 2:58:51 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:52 AM	Record Count:	1155

Columns

Name	Type	Size
ID	Number (Long)	4
FRA_TRACK_R_NO	Number (Long)	4
MILES_OF_ROAD	Number (Double)	8
AVG_OP_SPEED	Number (Double)	8
CONCRETE	Number (Double)	8
STEEL	Number (Double)	8
WOOD	Number (Double)	8
COMBINATION	Number (Double)	8
NEWTIES	Number (Double)	8
USEDTIES	Number (Double)	8
90POUNDSGREATER	Number (Double)	8
90POUNDSLESSER	Number (Double)	8
GREATERADDITIONAL	Number (Double)	8
LESSERADDITIONAL	Number (Double)	8
PUBLIC	Number (Double)	8
PRIVATE	Number (Double)	8
TOTAL	Number (Double)	8
TOTAL_MILES	Number (Long)	4
Tempo	Number (Double)	8
DENSITY	Text	50
Caption	Number (Integer)	2
ID1		

Relationships

Reference_FRA-Track Class Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
FRA_TRACK_R_NO	1
Clustered:	No

Distinct Count:	231
Foreign:	No
Ignore Nulls:	No
Name:	FRA_TRACK_R_NO
Primary:	No
Required:	No
Unique:	No
Fields:	FRA_TRACK_R_NO, Ascending

PrimaryKey 1

Clustered:	No
Distinct Count:	1155
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

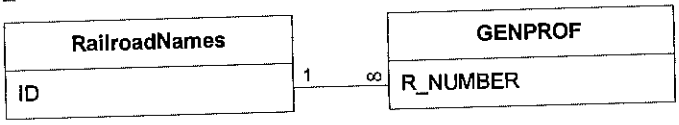
Date Created:	8/19/93 10:41:44 AM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:52 AM	Record Count:	231

Columns

Name	Type	Size
ID	Number (Long)	4
R_NUMBER	Number (Long)	4
TOT_CUST_SERVE	Number (Long)	4
TOTAL_GALS_FUEL	Number (Double)	8
AVG_COST_PER_GAL	Number (Double)	8
TRAIN_MILES	Number (Double)	8
LOCO_MILES	Number (Double)	8
REVENUE_TON_MILES	Number (Double)	8
AVG_LENGTH_OF_HAUL	Number (Double)	8
IDLING_POLICY	Text	1
AVG_REV_PER_CARLOAD	Number (Double)	8
REVENUE_TON_MILE	Number (Double)	8
Tempo	Number (Double)	8

Relationships

Reference_GENPROF



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	231
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

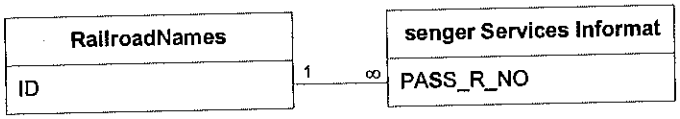
Date Created:	8/19/93 4:06:16 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:53 AM	Record Count:	231

Columns

Name	Type	Size
ID	Number (Long)	4
PASS_R_NO	Number (Long)	4
PASS_SERVICES	Text	1
SEASONAL_EX	Text	1
DINNER_TRAIN	Text	1
OTHER	Text	1
ANN_REV_FROM_SERV	Currency	8
TOT_REV_PASS	Currency	8
Tempo	Number (Double)	8
Var1	Text	50
Var2	Text	50
Var3	Text	50
Range1	Number (Double)	8
Range2	Number (Double)	8
n	Number (Integer)	2

Relationships

Reference_Passenger Services Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	231
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes

Fields: ID, Ascending

Properties

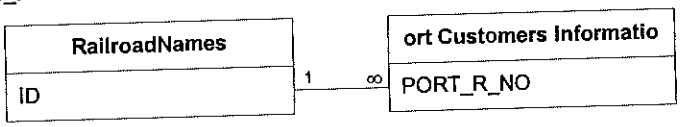
Date Created:	8/19/93 3:27:57 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:53 AM	Record Count:	231

Columns

Name	Type	Size
ID	Number (Long)	4
PORT_R_NO	Number (Long)	4
BREAKBULK	Number (Long)	4
CONTAINER	Number (Long)	4
GRAIN	Number (Long)	4
COAL	Number (Long)	4
DRY_BULK	Number (Long)	4
PETROLEUM	Number (Long)	4
LIQUID_BULK	Number (Long)	4
Tempo	Number (Double)	8

Relationships

Reference_Port Customers Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	231
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

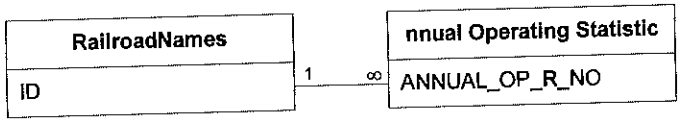
Date Created:	8/31/93 2:06:14 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:53 AM	Record Count:	230

Columns

Name	Type	Size
ID	Number (Long)	4
RAIL_NAME	Text	100
R_OWNER	Text	50
R_YEAR	Number (Integer)	2
RAILTYPE	Text	100
CONTACTPERSON	Text	50
REGION	Text	100
Tempo	Number (Double)	8

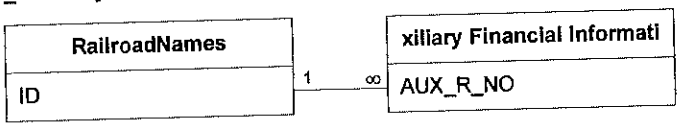
Relationships

Reference



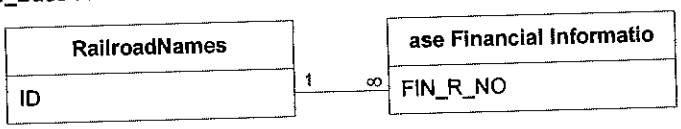
Attributes: One to Many, Not Enforced

Reference_Auxiliary Financial Information



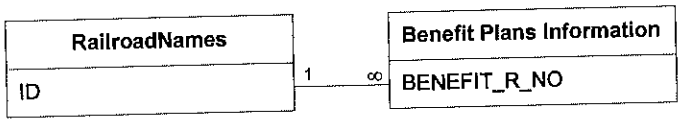
Attributes: One to Many, Not Enforced

Reference_Base Financial Information



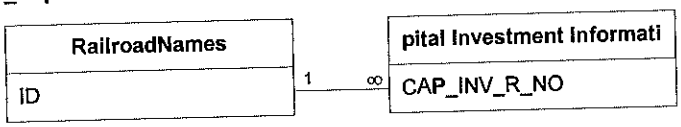
Attributes: One to Many, Not Enforced

Reference_Benefit Plans Information



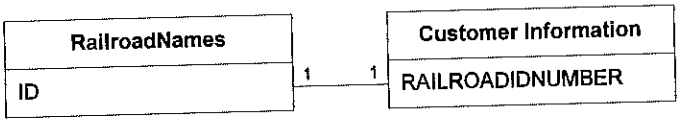
Attributes: One to Many, Not Enforced

Reference_Capital Investment Information



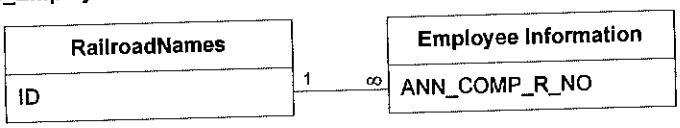
Attributes: One to Many, Not Enforced

Reference_Customer Information



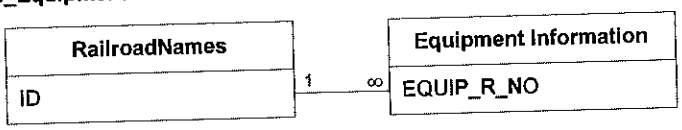
Attributes: One to One, Not Enforced

Reference_Employee Information



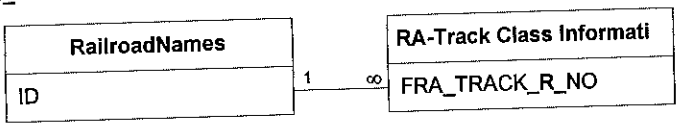
Attributes: One to Many, Not Enforced

Reference_Equipment Information



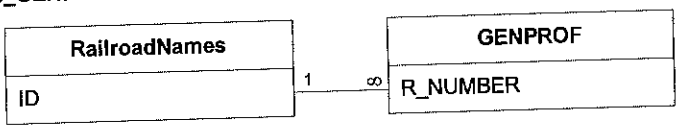
Attributes: One to Many, Not Enforced

Reference_FRA-Track Class Information



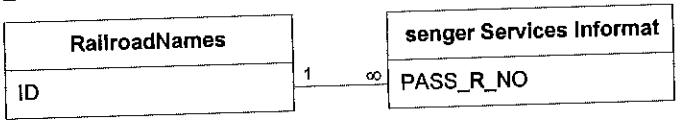
Attributes: One to Many, Not Enforced

Reference_GENPROF



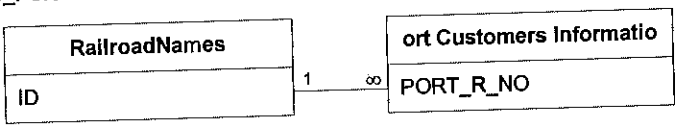
Attributes: One to Many, Not Enforced

Reference_Passenger Services Information



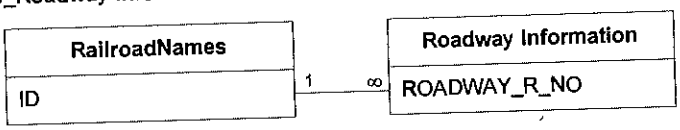
Attributes: One to Many, Not Enforced

Reference_Port Customers Information



Attributes: One to Many, Not Enforced

Reference_Roadway Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
CONTACTPERSON	1
Clustered:	No

Distinct Count:	179
Foreign:	No
Ignore Nulls:	No
Name:	CONTACTPERSON
Primary:	No
Required:	No
Unique:	No
Fields:	CONTACTPERSON, Ascending

PrimaryKey
1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

R_OWNER
1

Clustered:	No
Distinct Count:	155
Foreign:	No
Ignore Nulls:	No
Name:	R_OWNER
Primary:	No
Required:	No
Unique:	No
Fields:	R_OWNER, Ascending

R_YEAR
1

Clustered:	No
Distinct Count:	12
Foreign:	No
Ignore Nulls:	No
Name:	R_YEAR
Primary:	No
Required:	No
Unique:	No
Fields:	R_YEAR, Ascending

Rail Name Index
1

Clustered:	No
Distinct Count:	230
Foreign:	No
Ignore Nulls:	No
Name:	Rail Name Index
Primary:	No
Required:	No
Unique:	No
Fields:	RAIL_NAME, Ascending

Properties

Date Created:	8/13/94 1:36:59 AM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:53 AM	Record Count:	376

Columns

Name	Type	Size
ID	Number (Long)	4
ABBR	Text	10
RRNAME	Text	100
REGION	Text	50

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	376
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

Date Created:	10/20/93 8:23:52 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:54 AM	Record Count:	1

Columns

Name	Type	Size
ID	Number (Long)	4
Total Railroads	Number (Integer)	2
Total Customers	Number (Double)	8
Sum of Bridges	Number (Double)	8
Sum of Used Ties in Replacement	Number (Double)	8
Sum of New Ties in Replacement	Number (Double)	8
Sum of Replace Gtr 90 lbs	Number (Double)	8
Sum of Replace Less 90 lbs	Number (Double)	8
Sum of Add Trks Gtr 90 lbs	Number (Double)	8
Sum of Add Trks Less 90 lbs	Number (Double)	8
Sum of Total Gals of Fuel	Number (Double)	8
Sum of Train Miles	Number (Double)	8
Sum of Locomotive Miles	Number (Double)	8
Sum of Revenue Ton Miles	Number (Double)	8
Mean of Miles	Number (Double)	8
Sum of Miles	Number (Double)	8
Sum of Car Units Owned	Number (Double)	8
Sum of Car Units Leased	Number (Double)	8
Sum of Car Units Own Less 10 Years	Number (Double)	8
Sum of Car Units Own 10 to 20 Years	Number (Double)	8
Sum of Car Units Own Gtr 20 Years	Number (Double)	8
Percent of Car Units Own Less 10 Years	Number (Double)	8
Percent of Car Units Own 10 to 20 Years	Number (Double)	8
Percent of Car Units Own Gtr 20 Years	Number (Double)	8
Sum of Loco Units Owned	Number (Double)	8
Sum of Loco Units Leased	Number (Double)	8
Sum of Loco Units Own Less 10 Years	Number (Double)	8
Sum of Loco Units Own 10 to 20 Years	Number (Double)	8
Sum of Loco Units Own Gtr 20 Years	Number (Double)	8
Percent of Loco Units Own Less 10 Years	Number (Double)	8
Percent of Loco Units Own 10 to 20 Years	Number (Double)	8
Percent of Loco Units Own Gtr 20 Years	Number (Double)	8
Sum of Car Org Term Online	Number (Double)	8
Sum of Intrlnd Cars Org	Number (Double)	8
Sum of Intrlnd Cars Term	Number (Double)	8
Sum of Bridge Cars	Number (Double)	8
Total Cars	Number (Double)	8
Train Miles per Car	Number (Double)	8
Locomotive Miles per Car	Number (Double)	8
Revenue Ton Miles per Car	Number (Double)	8

Gallons per Revenue Ton Miles	Number (Double)	8
Sum of Gross Rail Operatin Revenue	Currency	8
Sum of Total Rail Op Expenses	Currency	8
Sum of Net Rail Op Income	Currency	8
Total Employer Contribution	Currency	8
Sum of Total Man Hours	Number (Double)	8
Sum of Total Ann Comp Paid	Currency	8
Sum of Ann Revenue from Serv	Currency	8
Sum of Total Revenue from Pass	Currency	8
Weigthed Average of Avg Length of Haul	Number (Double)	8
Weighted Average of Cost per Gallon	Currency	8
NAME	Text	50
NAMEID	Number (Integer)	2

Table Indexes

Name	Number of Fields
NAMEID	1
Clustered:	No
Distinct Count:	1
Foreign:	No
Ignore Nulls:	No
Name:	NAMEID
Primary:	No
Required:	No
Unique:	No
Fields:	NAMEID, Ascending
PrimaryKey	1
Clustered:	No
Distinct Count:	1
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending

Properties

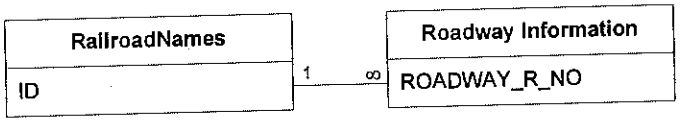
Date Created:	8/19/93 2:48:46 PM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:54 AM	Record Count:	1872

Columns

Name	Type	Size
ID	Number (Long)	4
ROADWAY_R_NO	Number (Long)	4
STATE_ID	Text	2
MILES_OWNED	Number (Double)	8
PER_OWN_GTR_90_LBS	Number (Double)	8
MILES_OPERATED	Number (Double)	8
Tempo	Number (Long)	4

Relationships

Reference_Roadway Information



Attributes: One to Many, Not Enforced

Table Indexes

Name	Number of Fields
PrimaryKey	1
Clustered:	No
Distinct Count:	1872
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	ID, Ascending
ROADWAY_R_NO	1
Clustered:	No
Distinct Count:	234
Foreign:	No
Ignore Nulls:	No
Name:	ROADWAY_R_NO
Primary:	No

Required:	No
Unique:	No
Fields:	ROADWAY_R_NO, Ascending

Properties

Date Created:	8/15/94 2:09:10 AM	Def. Updatable:	Yes
Last Updated:	12/20/94 9:42:54 AM	Record Count:	3

Columns

Name	Type	Size
RAIL_NAME	Text	50
REGION	Text	50
ID1	Number (Long)	4
STRATVAR	Number (Long)	4
c	Number (Long)	4

Table Indexes

Name	Number of Fields
PrimaryKey	1

Clustered:	No
Distinct Count:	3
Foreign:	No
Ignore Nulls:	No
Name:	PrimaryKey
Primary:	Yes
Required:	Yes
Unique:	Yes
Fields:	c, Ascending

APPENDIX C

1993 DENTRY
Data Entry Software
Documentation

ASLRA
Software Installation and User's Guide
for

DENTRY

The Annual Data Profile
Data Entry Software
Version 1.0

April 1994

Developed by the
Upper Great Plains Transportation Institute
North Dakota State University
Fargo, North Dakota

I. Introduction

DENTRY is a data entry program to facilitate the data gathering requirements of the American Shortline Railroad Association Annual Industry Profile. It is a Windows-based program that provides the user with a series of data input screens allowing users to efficiently fill out the annual data profile for their railroad. The program has Windows functionality and creates an electronic database file containing the annual data profile, which is forwarded by the user to the appropriate database manager. After inputting the data, the user copies the database onto a floppy disk and sends the disk to the database manager. A floppy disk mailer has been included in this release to facilitate sending in the electronic database file.

II. Installation

The program is installed by performing the following steps:

1. Start Microsoft Windows
2. Insert the Annual Data Profile disk in drive A: or B:.
3. From the Program Manager, select the File menu and choose Run.
4. Type A:\setup and press enter.
5. Follow the setup instructions including setting up C:\Dentry as the program directory.

The setup procedure will install DENTRY on your hard drive in the directory C:\Dentry.

The hardware requirements for DENTRY are a 386 computer with 5 MB of hard drive space. A 486 computer running Windows 3.1 is recommended.

The program was developed to meet the mach32 display device driver in the Windows setup. If other display device drivers are used in the Windows setup, the program screens may not fill the maximum Windows display area.

III. Running the Program

General Instructions

The program is a Windows program. It utilizes the mouse or the keyboard to choose menu options, data entry input boxes, and command buttons. The user may click the mouse on the desired function or input box to activate that event. Alternately, the keyboard can be used to choose program functions or to navigate data input boxes. The tab and enter keys can be used to move around a data input screen. The user needs to type in the data and may use the mouse or tab key to move to other input boxes on the data input screen.

Starting the Program

The program is started by clicking on the DENTRY icon in the DENTRY program group. The introduction screen first appears; the user needs to click on the CONTINUE command button to get to the main program menu screen. There are two parts to the program, 1) the main program and 2) the data entry module.

Main Program

The main program screen appears with a menu bar at the top of the screen. The menu selections control the main program and are:

Data Entry

This program menu option activates the data entry portion of the program. Selecting this option presents the user with the main menu screen of the data entry module.

Open

Open can be used to open an existing data record in the program's database. The data record appears in the selection box as a railroad name and may be opened by double clicking on the railroad name.

About

About contains a brief description of the DENTRY program.

Window

The user can arrange the windows on the screen with the options presented in the Windows submenu.

Save

Save writes the current data in the data input screens to the Short-Line Railroad (SLRD) database. The database name on the user's hard drive is C:\Dentry\slrdbase.mdb. Save is activated after a data entry screen has been opened. The Save command button performs the same operation and is active under the same conditions.

Save As

This main program menu option allows the user to copy the database to a floppy disk in drive A: or B:. This option is useful in making a copy of the database on floppy disk to send to the database administrator. The database file is first saved to the hard drive and then to a floppy disk in the selected floppy drive (A: or B:).

Exit

The Exit menu command exits the program.

These main program menu options are highlighted when they are available and are generally available during the entire program.

Data Entry Module

There is a series of command buttons used by the main menu screen of the data entry module. A brief description follows:

Save

The Save command button appears only on the main menu screen of the data entry program and saves the database to the database file C:\Dentry\slrdbase.mdb. The user will be informed of a successful Save operation.

Clear

This command button on the main menu of the data entry program clears or erases all entered data on ALL data entry screens or forms. The user will be prompted before Clear erases all the data entry screens.

Exit

The Exit command button on the main menu screen of the data entry module exits the data entry module only.

There is a series of command buttons used by the data entry input screens. A brief description follows:

Main Menu

This command button returns the user to the main menu of the data entry module.

Clear

The Clear command button on each data entry input screen clears or erases the data entered on just that form or screen.

Next

Next takes the user to the next data entry screen if there is another input screen in that data category.

Previous

Previous returns the user to the previously used screen in the data category.

IV. Data Entry

The data entry module has two major sections. The first is the main menu screen asking the user to provide basic railroad identification information and displaying a selection of data categories. The second section is the data input screens which are accessed by making a selection under the data categories. These two sections are described below.

Main Menu Screen

Basic Railroad Identification Information

The user must enter all the required basic railroad identification information on the main menu screen of the data entry program. This information must be entered before any other data is accepted by the program. The identification information required is:

Railroad Name: Please enter the official Railroad Name.
Principal Owner: Please enter the name of the Railroad's Principal Owner.
Year: Please enter the year of the data. If the data is for 1992, please enter 1992.
Railroad Type: Select a railroad type from the list box. The user may click on the arrow to select a railroad type. Clicking on a selection chooses that railroad type.

Data Categories

The user enters the railroad's annual data profile in the data categories. There are several categories of data displayed and the user selects a data category to activate the data input screens.

The data categories are:

Number of Customers Served. The user is asked to supply the number of customers served by commodity group.

Inventory of Roadway, Track, and Structures. In this category the user supplies information concerning the railroad's roadway and other physical structures.

Equipment Inventory. The equipment inventory sections asks the user to enter data on the equipment used by the railroad.

Annual Operating Statistics. The user is asked to supply carload statistics for their annual operations and to supply other operational data.

Financial Data. This section prompts the user to enter financial information about the railroad. It is broken down into several categories.

Employee and Benefit Data. This category asks the user for employee related information.

Passenger Services. The final data category questions the user about passenger services.

Data Input Screens

The data input screens contain a series of input boxes where the user enters the appropriate data. Moving among the input boxes may be done by using the mouse, the tab key, or the enter key. Data is entered with the keyboard and is accepted by the input box after the mouse cursor is moved from the input box or the tab or enter key is pressed. Data may always be saved by using the Save option on the main program menu bar. There are built-in data type checks throughout the program to prevent the user from entering inappropriate types of data. All data must be entered with the enter key or the mouse cursor must be moved from the input box in order to enter the data into the database.

V. Instructions for Sending in Data

1. Use the SAVE AS option on the main program menu bar to copy the database to a floppy disk in drive A: or B:. The floppy will contain a file called slrdbase.mdb. This file should be sent to the database administrator. The database is compacted and encrypted with the Save As command.

2. Use Windows or DOS to copy the database to a floppy disk. The database is named slrdbase.mdb and is in the C:\DENTRY directory. The complete path name and filename is C:\DENTRY\slrdbase.mdb. After completing the data entry program the user must copy this file to a floppy disk and send it to the database manager.

VI. Example of a User Inputting Data

1. Start the program by clicking on the DENTRY icon in the DENTRY program group.
2. Click on the CONTINUE command button of the introduction screen.
3. If the user has already inputted and saved some data, the OPEN menu selection may be used to recall the previously entered data. If this is a new data input record, click on DATA ENTRY to start the data entry module.
4. Enter the required basic railroad identification information.
5. Choose a data category to input data.
6. Repeat step 5 until all data is entered.
7. Save the data with the SAVE menu selection or the SAVE command button.
8. The user may use the SAVE_AS menu selection to make a copy of the database on a floppy disk for sending to the database administrator. Alternatively, a Windows or DOS operation may be used to make a floppy disk copy of the database.
9. Exit the data entry module and/or the program.
10. Send the database on the floppy disk to the database administrator.

APPENDIX D

SLRD System
1993 Annual Data Profile
Railroad Survey

AMERICAN SHORT-LINE RAILROAD ASSOCIATION

CLASS II AND CLASS III RAILROAD

ANNUAL DATA PROFILE (1993)

CONTENTS

PART I. Customer Profile

Railroad Name _____

Railroad Type (Regional/Local - Line-haul/S&T/Port RR) _____

Name of Principal Owner _____

Contact Person _____

Customers Served

Commodity Group

Coal	_____
Farm Products	_____
Chemicals and allied products	_____
Food and kindred products	_____
Non-metallic minerals	_____
Transportation equipment	_____
Lumber and wood products	_____
Pulp, paper and allied products	_____
Petroleum products	_____
Stone, clay and glass products	_____
Metallic ores	_____
Primary metal products	_____
Waste and scrap material	_____
Other	_____

Total Customers Served _____

PART II. Inventory of Roadway, Track, and Structures

Miles of Road Owned and Operated, by State			
State	Miles Owned	Route Miles Owned with 90 Pound Rail or Greater	Miles Operated

Miles of Road, By FRA Track Class		
Class	Miles of Road	Average Operating Speed
1		
2		
3		
4		
Excepted		

Number of Bridges

- Concrete _____
- Steel _____
- Wood _____
- Combination _____

Ties Laid in Replacement

- New ties _____
- Used ties _____

Rails Laid in Replacement

- 90 Pounds or Greater _____
- Less than 90 Pounds _____

Additional miles of rail laid in new lines or extensions

- 90 Pounds or Greater _____
- Less than 90 Pounds _____

Number of Highway Grade Crossings

- Public _____
- Private _____
- Automatic Warning Devices _____

PART III. Equipment Inventory

Freight Cars Owned and Leased					
Car Type	Total Units Owned	Total Units Leased	Units <10 Years Old	Units 10-20 Years Old	Units >20 Years Old
Box Cars					
Gondolas					
Covered Hoppers					
Open Top Hoppers					
Flat Cars					
All Others					

Locomotives Owned And Leased, by Age and Horsepower					
Locomotive Type	Total Units Owned	Total Units Leased	Units <10 Years Old	Units 10-20 Years Old	Units >20 Years Old
Less than 1000 HP					
1000 - 2500 HP					
Greater than 2500 HP					

PART IV. Annual Operating Statistics

Carloads Handled by Commodity Code				
Commodity Code	Carloads Originated and Terminated on-line (local)	Interline Carloads Originated	Interline Carloads Terminated	Bridge Carloads
Coal				
Farm Products				
Chemicals and allied products				
Food and kindred products				
Non-metallic minerals				
Transportation equipment				
Lumber and wood products				
Pulp, paper and allied products				
Petroleum products				
Stone, clay and glass products				
Metallic ores				
Primary metal products				
Waste and scrap material				
Other				

S & T Railroads

Number of carloads handled _____

Annual Line-Haul Operating Statistics

Train Miles _____

Locomotive Miles _____

Average Length of Haul _____

Average Revenue per Carload _____

Revenue Ton-Miles _____

Annual Fuel Consumption and Locomotive Idling Policy

Total Gallons of Locomotive Diesel Fuel Consumed _____

Average Cost per Gallon ($) _____

Do you have an idling policy that shuts down locomotive units after three consecutive hours (or less) of idling time (Yes or No)? _____

PART V. Financial Data

Items From Income Statement

Gross Railway Operating Revenue

Freight _____

Other _____

Total: Gross Railway Operating Revenue _____

Railway Operating Expenses

Way and Structures

Way _____

Bridges _____

Total: Way and Structures _____

Equipment _____

Freight Cars _____

Locomotives _____

Other _____

Total: Equipment _____

Transportation _____

General & Admin. _____

Other _____

Total: Railway Operating Expenses _____

Net Railway Operating Income _____

Capital Expenditures

Road _____

Equipment _____

Other _____

Items From Balance Sheet

Current Assets _____

Current Liabilities _____

Net Working Capital _____

State and Federal Grants/Loans _____

Total Assets _____

Long-Term Debt _____

Stockholders Equity _____

Source and Application of Funds

Capital Expenditures _____

Depreciation/Amortization and Retirement _____

Expense _____

Projected Capital Investment for Next Five Year Period

Type of Investment	Projected Five-Year Investment	Percentage Funded Internally from Cash Flow
Equipment		
Road		
Other		

PART VI. Employee and Benefit Data

Employees, Hours of Service, and Annual Compensation

Total Employees (end of 1993)

Contract _____

Non-Contract _____

Total Man-Hours Worked _____

Total Annual Compensation Paid _____

Health/Pension/Benefit Plans

Type of Health Plans	Percentage of Employer Contribution		Total Annual Employer Contribution
	Single	Family	
Medical			
Dental			
Life Insurance			
Annual Cost (Subtotal)			

Type of Pension Plans	Provided by Company (Y or N)	Total Annual Employer Contribution
Profit Sharing		
Supplemental Pension (other than RR retirement)		
Annual Cost (Subtotal)		

401(K) Plan

Employer percentage match _____

Total annual employer contribution _____

Total annual cost of health/pension/benefit plans _____

PART VII. PASSENGER SERVICES

Do you operate passenger or excursion train service (Yes or No)? _____

Type of services

Seasonal excursion _____

Dinner train _____

Other _____

Annual Revenues from Services _____

Total (Annual) Revenue Passengers _____

PART VIII. COMMENTS AND RECOMMENDATIONS