IMPLEMENTATION OF DELIVERY CHALLAN GENERATION SYSTEM IN SAP

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A PROJECT REPORT

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Department of Computer Applications

BONAFIDE CERTIFICATE

Certified that this project report titled **IMPLEMENTATION OF DELIVERY CHALLAN GENERATION SYSTEM IN SAP** is the bonafide work of **Mr. J.Devanand (Reg.No: 71204621007)** who carried out the research under my supervision. Certified further, that to the best of my knowledge the work reported herein does not form part of any other project report or dissertation on the basis of which a degree or award was conferred on an earlier occasion on this or any other candidate.
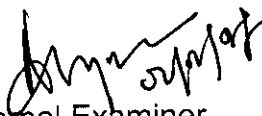
Project Guide

Head of Department

Submitted for the University Examination held on

_____2ⁿᵈ July 2007_____

Internal Examiner

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PROJECT COMPLETION CERTIFICATE
To Whomsoever It May Concern

We are pleased to issue this certificate in the process of operationalising our "Industry- Institute Interaction Synergy" drive.

Name	:	J. Devanand [Reg# 04 MCA 07]
Institution	:	Kumaraguru College of Technology, Coimbatore
Qualification	:	M C A
Project Title	:	"Implementation Of Delivery Challan System in SAP - MM Module"
Project Duration	:	Dec'06 to May'07
Department	:	Information Systems
Performance/ Conduct	:	Good

For Pricol Limited,

Chhaya 3|5
Sr. Officer - HR

ABSTRACT

The success of any organization in the market place depends on proper material management. This material management plays a key role in any organizations functions. Materials management concerns the flow of inventory to, within and from an organization. It seeks a balance between shortages and excesses under conditions of uncertainty of materials in an organization. Effective management of materials is crucial to the performance of an organization.

The **DELIVERY CHALLAN GENERATION SYSTEM** is proposed to be developed in SAP and to be integrated into the organization's ERP. This system replaces the legacy system that is in existence in the organization.

This **Implementation Of delivery challan generation system in SAP** unifies the process of generation of both returnable and Non-returnable delivery challan. It records the data in the SAP repository for the use by the management. This system can be accessed from the SAP server through out the organization and even at all its plants that are hosted at various geographical locations.

The goods inward and goods receipts scenario of the organizations is well analyzed and the application is developed to match the requirements of the management and the users.

ACKNOWLEDGEMENT

The satisfaction that accompanies the successful completion of any task would be incomplete without mentioning the names of people who made it possible, whose constant guidance and encouragement crowns all efforts with success.

I convey my earnest thanks to **Mr.A.Muthukumar Muthukumar MSc., MCA., M.Phil., Assistant Professor, Kumaraguru College of technology** for her invaluable guidance, support and suggestions throughout the course of this project work.

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Last but not the least, I am grateful to my parents and friends for their constant support and encouragement.

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LIST OF ABBREVIATIONS

DC	-	DELIVERY CHALLAN
RDC	-	RETURNABLE DELIVERY CHALLAN
NRDC	-	NON RETURNABLE DELIVERY CHALLAN
NO	-	NUMBER
DEPT	-	DEPARTMENT
RTN	-	RETURN
CTRL	-	CONTROL
MST	-	MASTER
TRANS	-	TRANSACTION
ERP	-	ENTERPRISE RESOURCE PLANNING
GUI	-	GRAPHIC USER INTERFACE
ABAP	-	ADVANCED BUSINESS APPLICATION PROGRAMMING

CHAPTER 1
INTRODUCTION

1.1. PROJECT OVERVIEW:

This Project Implementation of the Delivery challan system in SAP is used for material management at Pricol Ltd. The major function of the system is to generate Delivery challan, track, record inward of every item or product.

The goods that are sent to vendors or to other plant or to customers shall be accompanied by a document called Delivery Challan of the sender/consignor. It's mandatory for the sender to mention in the challan the purpose for which the goods are returned to the assessor's factory. These Delivery challan are supposed to be inspected by the sales tax personnel during the transit of the goods. It's illegal to send goods by any means of transit with out a challan for the sender. These Delivery challan are the main source of Tax or Duty information for the government.

This project involves generation of two types of delivery challan.

- Returnable DC
- Non- Returnable DC

1.1.1. Returnable Delivery Challan

This type of the Delivery Challan is used for goods that will be received back by the company. The process involves

- Discussion
- On Loan Basis
- Repairs
- Trial
- Testing
- Calibration

- Job work
- Production Facility

1.1.2. Non Returnable Delivery Challan

This type of the DC is used for goods that are sent out of the company and will not be returned to the company.

- consumables
- Trial
- sample
- Discussion
- Party's Material(non-chargeable)
- Rejection From store/live STK
- Building constructions
- Maintenance
- Rejections Returned (G1)
- Production Facility

The development of the system can be segmented into 5 modules

- Analysis and Requirements gathering
- Database Design
- Batch data communication
- Dialog Programming
- Reporting

1.2 COMPANY PROFILE – PRICOL LIMITED

1.2.1 Corporate Information

Pricol Limited was established in 1972 at Coimbatore, TamilNadu, India, and commenced manufacturing operations in 1975 in the precision engineering field of Automotive Instruments. Today, Pricol is the market leader enjoying 53% of the Automotive Instruments market share.

Plant II at Gurgaon near New Delhi, India, was established in 1988 to cater to the needs of the OEM customers in North India. Plant III and Plant IV were established at Coimbatore, TamilNadu, India, in 1999 for rationalizing Pricol's manufacturing activities.
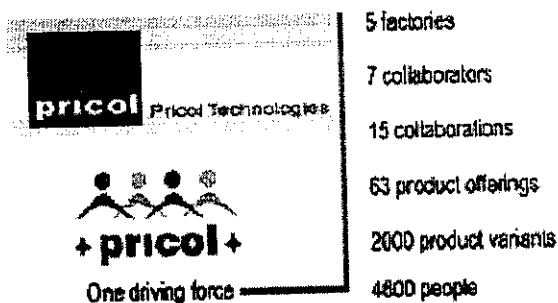
Fig 1.1: Pricol at present

1.2.2 Foreign Collaboration

In 1997, Pricol joined hands with DENSO Corporation, Japan, a US $ 17.7 billion Auto Ancillary company to chalk out its growth and future. Denso Corporation, Japan is the Joint Venture Partner with Pricol and has invested 12.5% in the equity capital of Pricol.

1.2.3 R & D

Priçol spends, on an average, 3% of its turnover on research and

16949 since August 2004. Pricol has initiated Total Quality Management (TQM), Total Productive Manufacturing (TPM), Supply Chain Management (SCM), Enterprise Resource Planning (SAP R3 ERP), Collaborative Product Commerce (CPC - Windchill) to render faster and efficient service to customers.

1.2.5 Product Range

- Automotive Dashboard Instruments and Accessories for two-wheelers, three-wheelers, four-wheelers, commercial vehicles, tractors, earth-moving equipments and industrial applications.
- Instrument Clusters, Programmable Electronic Speedometers and Tachometers, Mechanical Speedometers, Mechanical and Electrical Pressure Gauges, Mechanical and Electrical Temperature Gauges, Ammeters, Battery Condition Indicators, Voltmeters, Fuel Gauges, Electronic RPM Meters, Mechanical RPM Meters, Electronic Hour Meters, Combination Meters, Oil Level Gauges, Quartz Hour Counters, Quartz Clocks, Warning Lamps, etc.
- Speedometer Cables.
- Switches and Sensors such as Speed Sensors, Pressure Sensors, Temperature Sensors, Fuel Level Sensors, Pressure Switches, Oil Level Switches.
- Four-wheeler items such as Wind Shield Washer Motor Kits, Cigarette Lighters, Heater Ventilation Air Condition Control Units, Idle Speed Control Valves.
- Two-wheeler items such as Handle Bar Switches, Auto Decompression Units, Chain Tensioner Assemblies, Auto Fuel Cocks, Gears & Pinions, Hub Drives.
- Oil Pumps for two-wheelers and industrial engines.
- Disc Brakes for two-wheelers.
- Electronic Textile Counters and Controls, Fare Meters, Engine Monitoring Systems, Data Acquisition and Control Systems.
- Electronic Road Speed Limiters for Commercial Vehicles.

1.2.6 Leading Customers

TABLE 1.1: LIST OF LEADING CUSTOMERS, FOREIGN COLLABORATORS AND THEIR PRODUCTS

Customer	Foreign Collaborator	Products Manufactured
Ashok Leyland Ltd.	IVECO FIAT SPA, Italy	Commercial Vehicles & Engines
Bajaj Auto Ltd.	Kawasaki Heavy Industries Ltd., Japan	Motorcycles, Scooters, Mopeds & Three-Wheeler
Denso Haryana Pvt. Ltd.	Denso Corporation, Japan (Parent Company)	Multi Point Fuel Injection Systems
Eicher Motors Ltd.	--	HCVs & LCVs
General Motors India Pvt. Ltd.	General Motors Corporation, USA	Cars & MUVs
Hero Honda Motors Ltd.	Honda Motor Co. Ltd., Japan	Motorcycles
Honda Motorcycle & Scooter India (Pvt.) Ltd.	Honda Motor Co. Ltd., Japan (Parent Company)	Motorcycles & Scooters
LML Ltd.	Daelim Motor Company, South Korea	Motorcycles & Scooters
Maruti Udyog Ltd.	Suzuki Motor Corporation, Japan	Passenger Cars, MUVs & MPVs
Mahindra & Mahindra Ltd. (Automotive Division)	--	LCVs, MPVs, MUVs, MPVs, Jeeps, LCVs & Three-Wheelers
Mahindra & Mahindra Ltd. (Tractor Division)	--	Tractors
Tata Motors Ltd.	--	HCVs, MCVs, LCVs, MPVs, MUVs, SUVs & Passenger Cars
Toyota Kirloskar Motor Pvt. Ltd.	Toyota Motor Corporation, Japan	MPVs
Yamaha Motor India (Pvt.) Ltd.	Yamaha Motor Co. Ltd., Japan	Motorcycles

CHAPTER 2

SYSTEM STUDY AND ANALYSIS

2.1   MATERIAL MANAGEMENT SCENARIO

Materials management concerns the flow of inventory to, within and from an organization. It seeks a balance between shortages and excesses under conditions of uncertainty of materials in an organization. Effective management of materials is crucial to the performance of an organization. More over materials cots are usually a firm's largest expenditure .Operating with fewer inventories offers a firm a competitive advantage on the other hand an organization operating with improper material management will suffer heavy losses.

In short material management can be defined as Direction and control of those aspects of logistics which deal with material, including the functions of identification, cataloging, standardization, requirements determination, procurement, inspection, quality control, packaging, storage, distribution, disposal, maintenance, mobilization planning, industrial readiness planning, and item management classification; encompasses materiel control, inventory control, inventory management, and supply management.

SAP MM (Materials Management) is a module of the SAP Enterprise Resource Planning (ERP) package that is used for Procurement Handling and Inventory Management.

Delivery Challan system (Goods Receipt & Issue) is a part of the Material Management. It is a proof for flow of materials in & out of the organization.

The Delivery Challan system (Goods Receipt & Issue) comes under the inventory management of the SAP MM module.

The figure below diagrammatically depicts the position of Delivery Challan system in the SAP MM module.

Overview of Materials Management Module In SAP

BASIC DATA	PURCHASING	

● Material
  Special stock
  Batch
	● Purchase requisition
	  ◆ MRP
	  ◆ Direct requisition
	  ◆ Release procedures
		SD

● Vendor/one-time
  customer
	● RFQ/Quotation
	  ◆ Material/service
	  ◆ Price comparisons
		PP
		PM

● Purchasing info record		

Purchasing information system — Vendor evaluation

BASIC DATA
- ● Material
  Special stock
  Batch
- ● Vendor/one-time customer
- ● Purchasing info record
- ● Service specifications
- ● Workflow
- ● Optical archive
- ● Texts
  Mail
  Communication
- ● Classification
- ● Documents
- ● Conditions

PURCHASING
- ● Purchase requisition
  - ◆ MRP
  - ◆ Direct requisition
  - ◆ Release procedures
- ● RFQ/Quotation
  - ◆ Material/service
  - ◆ Price comparisons
- ● Purchasing
  - ◆ Purchase orders
  - ◆ Outline agreements
  - ◆ Scheduling agreements

INVENTORY MANAGEMENT
  ➤◆ Goods receipt/issue (DC)
  - ◆ Transfer posting
  - ◆ Quantities and values
  - ◆ Physical inventory

INVOICE VERIFICATION
  - ◆ Check and post
  - ◆ Price update

SD
PP
PM
QM
FI
AM
CO
PS

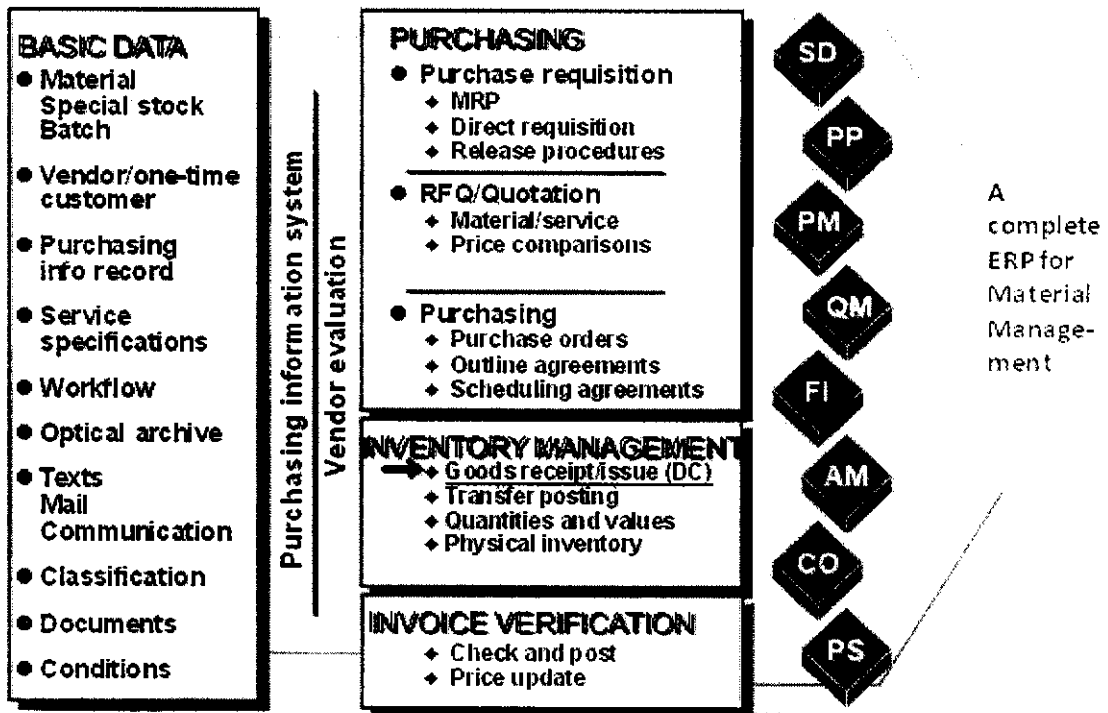A complete ERP for Material Management

FIGURE 2.1: OVERVIEW OF MATERIAL MANAGEMENT MODULE IN SAP

2.2 EXISTING SYSTEM

The existing system that is currently being run in Pricol Ltd is designed in COBOL & UNIX. It was implemented in the year 1996.It is operated throughout Pricol Ltd at various departments. On average nearly 100-150 DCs are generated daily. This is the first computerized system and is in existence for a very long period. It has been successfully run by the organization for several years. The need for the change in the system is because of Implementation of SAP throughout PRICOL ltd. The Management has planned to implement SAP in the organization which has driven all legacy systems to be converted into SAP.

The identified drawbacks of the existing system are,

- The RDC & NRDC are maintained as a separate system.
- Many practices that were during the deployment of the current system are not in practiced now. Example, earlier a memo must be created in order to generate a DC, but it's not the case now.
- Unable to integrate with other systems in the organization.
- one single ERP with all internal systems connected together is not available
- Different systems have to be used at different plant locations.
- Character interface
- Manual update is done in records for material inward.
- Updated long back.
- Backup of data into external storage at regular intervals.
- Poor reporting.

In the near future the company is planning to implement the SAP completely with all its local vendors and suppliers connected. In that case the

existing system will be of no use. So it's necessary to develop the system in SAP.

The existing system accessed via the telnet through out the company.

```
 Telnet - 90.0.0.45                                              [_][□][X]
 Connect Edit Terminal Help
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x              ( Without involving further operations )                      x
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x                                                                            x
x                                                                            x
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x      l       Main Menu       k                                            x
x      x                       x                                            x
x      x                       x                                            x
x      x Entry                 x                                            x
x      x Queries               x                                            x
x      x Tool DC Updation      x                                            x
x      x About this system     x                                            x
x      x Quit                  x      lssssssssssssssssssssssssssk           x
x      mssssssssssssssssssssssssj      xUse arrow keys to navigatex          x
x                                      xand press  ENTER to selectx          x
x                                      x   or press TAB to quit   x          x
x                                      mssssssssssssssssssssssssssj           x
x                                                                            x
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xMoves to entry submenu ....                                                 x
msssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssssj
```

FIGURE 2.2: LEGACY SYSTEM INITIAL SCREEN

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 Telnet - 90.0.0.45                                              [_][□][X]
 Connect Edit Terminal Help
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Staff Responsible: 1263        Name :MURALI G.                 Dept :     PS1
Memo reference    : GURUDATT.P  Date :22/01/2007
Packing  Details : LOOSE
Despatch Details : PARTY'S REP.
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SnxItem Description           xUomx    Dc.qtyxCummRetQtyx   Bal.qtyxCur.RetQty
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01xAC7013     FIXTURE FOR LEVERxNOSx    1.000x       x    1.000x     1.000
  x                             x   x       x       x       x
  x                             x   x       x       x       x
  x                             x   x       x       x       x
  x                             x   x       x       x       x
ssusssssssssssssssssssssssssssssssussssussssssssssssusssssssssssusssssssssssussssssssss
Remarks :  FOR CHECKING & RETURN.
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                    Are You Sure (Y/N)              Y
```

2.2.1 Problem Identification

Even though SAP is being implemented in the whole of Pricol, there are some departments that still maintain the legacy system. Delivery challan generation system is one among them. Because of this, there is a difficulty in interfacing it with the organization's ERP package.

2.2.2 Project Objective

The objective of this project is to develop an application in SAP for generating Delivery challan and integrate it with the other SAP applications and to form a single ERP.

2.2.3 Importance of Project

- Relieves the administration burden.
- Stores data that can be retrieved for future analysis with out duplication.
- Effective reporting
- Provides decision-makers with up-to date, complete and reliable Material Movement information.

2.2.4 Scope

- To utilize the resources in an effective manner.
- Minimize the wastage of time.
- To avoid the duplication of inputs.
- Effectively utilize the available SAP resources.
- To prepare transaction screens to integrate into SAP.
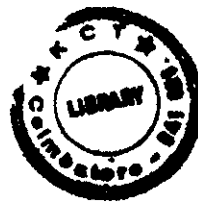
2.3 PROPOSED SYSTEM

The proposed system is developed in SAP – ABAP. It would serve as a part of the organization's ERP. So it can work as an integrated system serving all of the major business processes, which helps ensure consistent data across all your functional departments.

Using a single ERP would give an effective blend of resource planning, customer relationship management, partner relationship management, supply chain management, and online analysis processing. This gives you the ability to make qualified business decisions based on a seamless, 360-degree view of your business, customers and vendors.

It gives you the ability to save time and money across your entire enterprise. By maintaining single ERP software you need only input customer, vendor, and order data once and then share it across your functional departments. You can automate inventory and warehouse procedures as well as billing and accounting procedures. You can use application to create reports and analyze enterprise trends quickly and easily, allowing you to respond quickly to shifts in the market, so no synchronization or extra integration work is required.

One of the reasons businesses look into a complete ERP installation is that their enterprise is experiencing difficulty in integrating the information they have stored in widely diverse applications that can't "talk" to one another. Departments within a company may even use different programs to perform the same functions. When you install a complete ERP application you solve many of your information integration problems.

So by integrating the Delivery challan generation system with the organizations ERP package you have better data quality, since information need only be entered once to be available to the entire company. You are also able to easily run reports using enterprise-wide data, allowing you to quickly see trends developing within specific organizations or across your entire company

2.4 SYSTEM ANALYSIS

2.4.1 REQUIREMENTS GATHERING PHASE

2.4.1.1Result of requirement gathering phase:

It is identified that the requirements for the proposed system to be developed in SAP is similar to the existing system.

A case study conducted at some sites in the Organization. Based on the overall study it is identified that the proposed system to be developed is SAP must bind with these requirements,

Table 2.1 Overview of Management and User requirements

From	Requirements
Management	• GUI similar to the existing system. • Navigation similar to the existing system.
Users / Staff	• Single system for RDC & NRDC • Normalization of database • Extending the DC No size to fit future requirements

2.4.2 Sample case studies

Case study 1:

Location	:	STORES DEPARTMENT
Date	:	25 Jan 2007
Staff	:	S.VISWANATHAN
Suggestions	:	similar to the Existing system
Errors & Corrections	:	pin number not printed in proper location

Case study 2:

Location	:	Mechanical Engineering department
Date	:	25 Jan 2007
Staff	:	Mr.Deivakumar
Suggestions	:	similar to existing system

CHAPTER 3
DEVELOPMENT SCENARIO

3.1 INTRODUCTION TO ERP

ERP is a package with the techniques and concepts for the integrated management of business as a whole, for effective use of management resources, to improve the efficiency of an enterprise. Initially, ERP was targeted for manufacturing industry mainly for planning and managing core business like production and financial market. As the growth and merits of ERP package, ERP software was designed for basic process of a company from manufacturing to small shops with a target of integrating information across the company.

"Enterprise Resource Planning (ERP), is a software driven business management system which integrates all facets of the business, including planning, manufacturing, sales, and marketing".

The different types of ERP are SAP, BAAN, JD Edwards, Oracle Financials, Siebel, and PeopleSoft. Among all the ERP's most of the companies implemented or trying to implement SAP because of number of advantages aver other ERP packages.

3.1.1 Evolution of ERP

The history of ERP can be traced back to the 1960's, when the focus of systems was mainly towards inventory control. Most of the systems software was designed to handle inventory based in traditional inventory concepts. The 1970's witnessed a shift of focus towards MRP (Material Requirement Planning). This system helped in translating the master production schedule into requirements for individual units like sub assemblies, components and other raw material planning and procurement. This system was involved mainly in planning the raw material requirements.

Then, in 1980's came the concept of MRP-II i.e., the Manufacturing Resource Planning which involved optimizing the entire plant production process. Though MRP-II, in the beginning was an extension of MRP to include shop floor and distribution management activities, during later years, MRP-II was further extended to include areas like Finance, Human Resource, Engineering, Project Management etc. This gave birth to ERP (Enterprise Resource Planning) which covered the cross-functional coordination and integration in support of the production process. The ERP as compared to its ancestors included the entire range of a company's activities.

ERP addresses both system requirements and technology aspects including client/server distributed architecture, RDBMS, object oriented programming etc.

3.1.2 Evaluation Criteria

Some important points to be kept in mind while evaluating ERP software include:

- Functional fit with the Company's business processes

- Degree of integration between the various components of the ERP

- Flexibility and scalability

- User friendliness

- Ease of implementation

- Technology - client/server capabilities, database independence, security

- Availability of regular upgrades

- Amount of customization required

• Reputation and sustainability of the ERP vendor

• Total costs, including cost of license, training, implementation, maintenance,   customization and hardware requirements.

3.2 OVERVIEW OF SAP

SAP is an enterprise resource planning (ERP) software product capable of integrating multiple business applications, with each application representing a specific business area. These applications update and process transactions in real time mode. It has the ability to be configured to meets the needs of the business.

SAP is the name of the company founded in 1972 under the German name (Systems, Applications, and Products in Data Processing) is the leading ERP (Enterprise Resource Planning) software package.

SAP R/3 is a third generation set of highly integrated software modules that performs common business function based on multinational leading practice. It takes care of any enterprise however diverse in operation, spread over the world. It is a   3-tier architecture system as shown in the Figure 3.1 and it works on the client-server model.
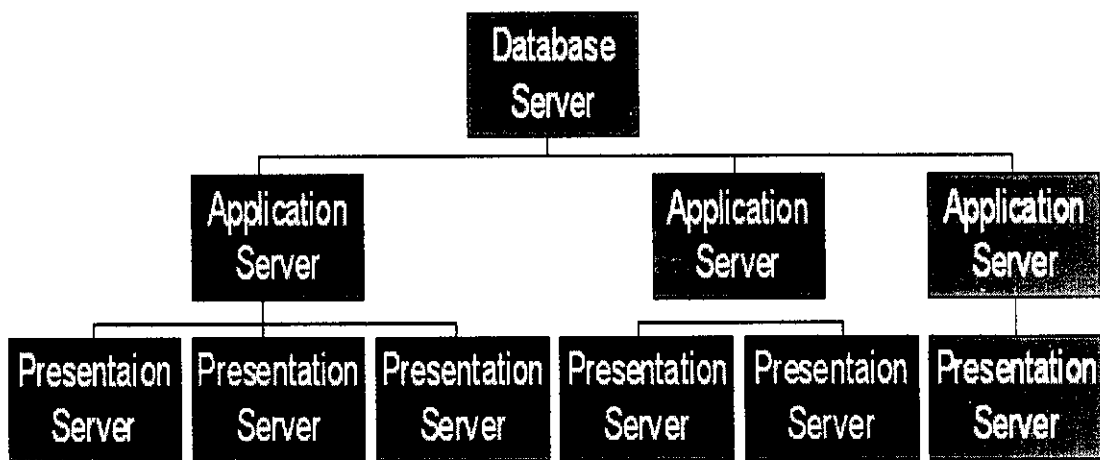
FIGURE 3.1: SAP R/3 ARCHITECTURE

Database Server   :   Stores Database.

Application Server   :   Contains Software for Running the Application Logic.

Presentation Server :   Graphical User Interface

In R/3 system all the three servers like presentation, application server and database server are located at different system. The application layer of an R/3 System is made up of the application servers and the message server. Application programs in an R/3 System are run on application servers. The application servers communicate with the presentation components, the database, and also with each other, using the message server. All the data are stored in a centralized server. This server is called database server.

The advantage of having 3 tiers or 3 layered Architecture is to reduce traffic on the Database Server. Based on the required degree of distribution, you can combine two servers or all three servers in the same machine (Stand alone).

3.2.1 SAP R/3 Structure

- Application Layer for Standard and new applications.
- Middle ware Layer also called as R/3 Basis.
- Operating System, Database

TABLE 3.1 SAP R/3 STRUCTURE DETAILS

O.S	Database	GUI	Protocols
NT	Oracle	Win 3.1	TCP/IP
Unix	Ingress	NT, 95	CPC
AS/400	Informix, DB/2		

The different types of data are specified as Meta Data: Data that describes the structure of data or MetaObjects is called Metadata. Master Data: Master data is data that remains unchanged over a long period of time. It contains information that is always needed in the same way. With master data you are dealing with attributes, texts or hierarchies. Transaction data: Data relating to the day-to-day transactions.

3.2.2 Functional Modules

SAP is categorized into 3 core functional areas which is common to any type of industry:

- Logistics
  - Sales and Distribution (SD)
  - Material Management (MM)
  - Warehouse Management (WM)
  - Production Planning (PP)
  - General Logistics (LO)
  - Quality Management (QM)

- Financial
  - Financial Accounting (FI)
  - Controlling (CO)
  - Enterprise Controlling (EC)
  - Investment Management (IM)
  - Treasury (TR)

- Human Resources
  - Personnel Administration (PA)
  - Personnel Development (PD)

3.2.3 Technical Module

ABAP/4 stands for Advanced Business Application Programming is the

called transactions that make up the SAP application. It is an event driven language. It is the Central part of Middle ware layer that eliminates dependencies from Hardware, Operating Systems or database management systems. ABAP programs are interpreted not complied.

3.3 THE ABAP LANGUAGE

- **Advanced Business Application Programming**
- Developed by SAP for the interactive development of application programs
- 4th Generation Language (with some OO features)
- Main uses for ABAP programs include
  - creation of new reports
  - development of new user dialog programs (transactions)
  - customization of R/3 to meet individual client needs

3.3.1 Objectives

To introduce
- the ABAP integrated development environment
- the two main ABAP application types
  - reporting
  - dialog programming

3.3.2 ABAP Workbench Purpose & Function

- SAP's Integrated Graphical Programming Development Environment:
  - Used to create/change ABAP application programs
  - Each ABAP application program is either a report or a transaction:
    1. Reports are applications that retrieve and display information from database with little or no user interaction
    2. Transactions accepts inputs/data from users and then perform one or more relevant actions, usually involving updating databases

- The Workbench can be used to
  - write ABAP code
  - design dialogs/screens with a graphical editor
  - create menus with a menu editor
  - debug an application
  - test an application for efficiency
  - control access to objects under development
  - create new or access predefined database information
- Comprises the following tools
  - The Object Navigator (Repository Browser)
  - the ABAP Language
    - ❖ the Screen and Menu Painters
  - the Repository Information System
  - the Data Modeler
  - various test and analysis tools
  - the ABAP Query
  - the Workbench Organizer

ABAP/4 Dictionary

Object Browser

ABAP/4 Editor

ABAP/4

Function Library

Transactions

Menu Painter

Translation menu

Screen Painter
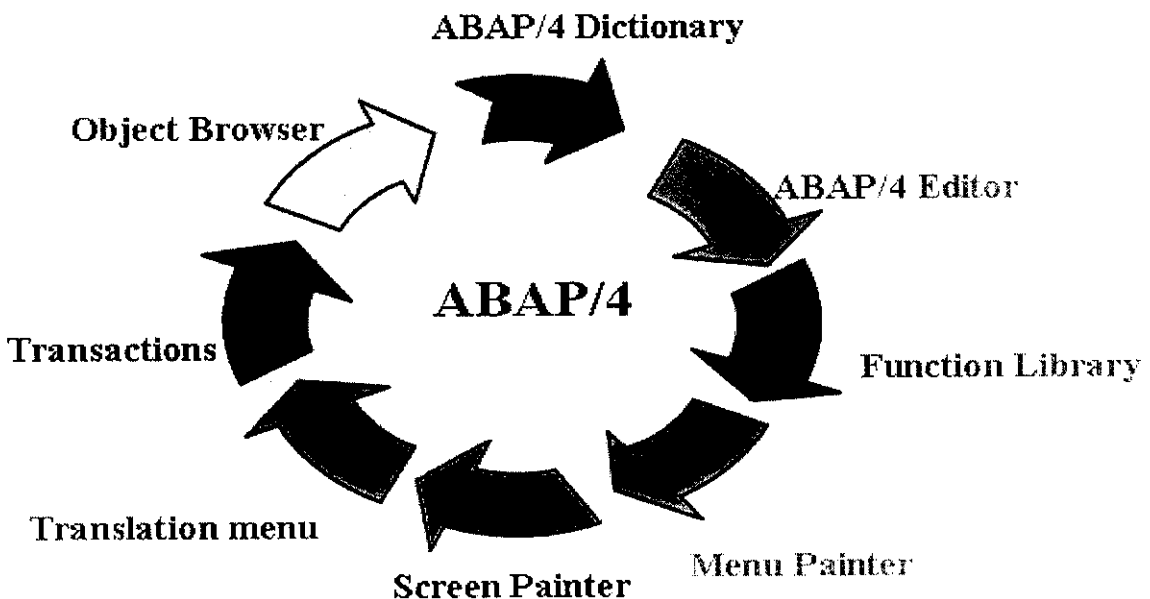
Application Modules are all written in ABAP/4, which is interpreted by Basis executables, which in turn, run on the operating system. The sole purpose of an R/3 system is to provide a suite of tightly integrated, large-scale business applications. R/3 is the system in which ABAP/4 programs will run. Figure 3.2 shows the architecture of ABAP Workbench.

3.3.3 OBJECT NAVIGATOR (The Repository Browser)

- central tool for organizing and managing your personal development objects
- used to navigate through development object lists
    - Where development objects are the components used to construct an application
- automatically calls other workbench tools
    - if you create a new data definition the browser calls the Data Dictionary, and then returns to the browser after the definition is created
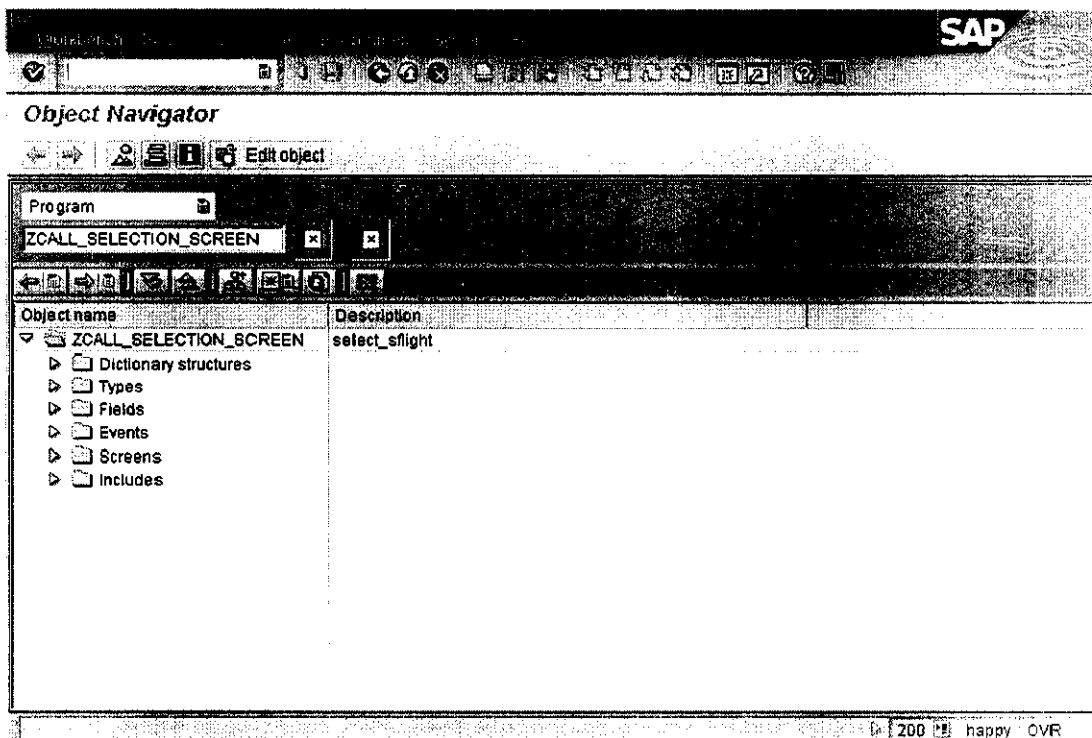
FIGURE 3.2: REPOSITORY BROWSER

3.3.4 DIALOG PROGRAMMING

- Dialog Programs (*Transactions*) are used for both reading and changing the database
- Main Components of a Dialog Program are
  - screen & menus (as shown in Figure 3.6)
  - processing logic defined in an ABAP program (*module pool*)
  - for each screen, interaction and control flow from one module to another is defined in DYNPRO (Figure 3.5)
  - data structures defined in the ABAP dictionary
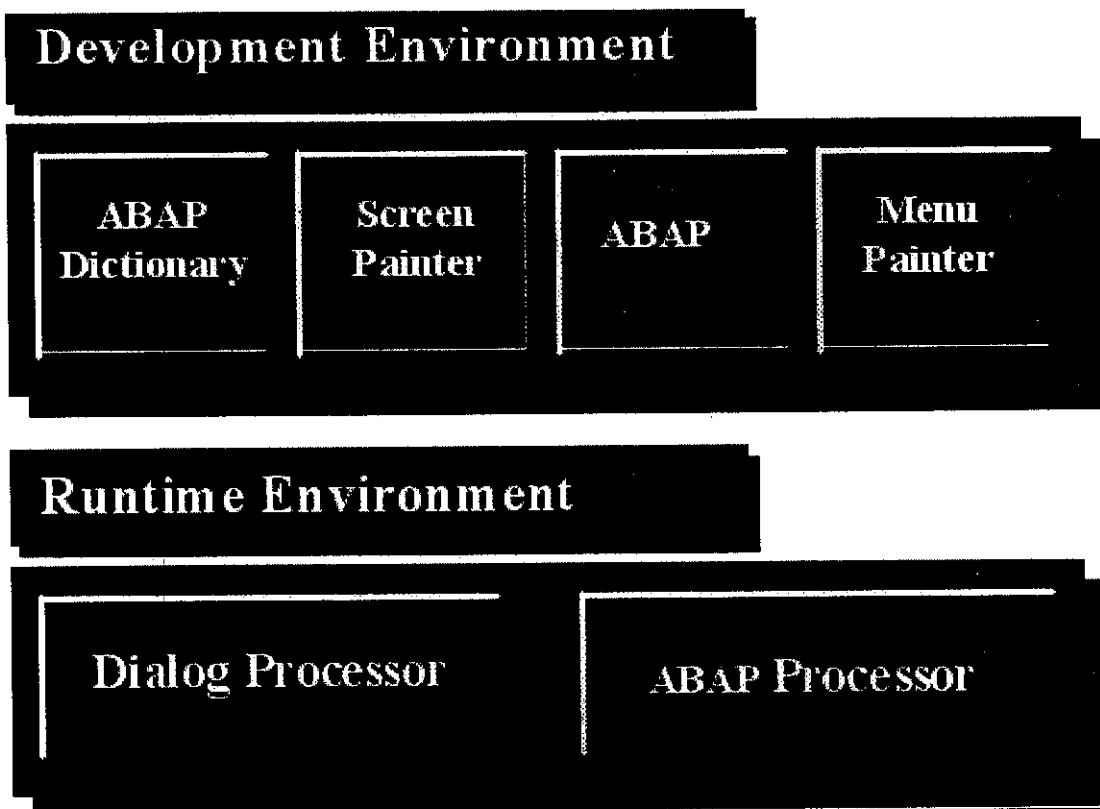
FIGURE 3.3: BLOCK DIAGRAM

Figure 3.4 gives the block diagram of Development environment and Runtime environment of ABAP in SAP R/3 Systems.

Dialog Programming - Overview
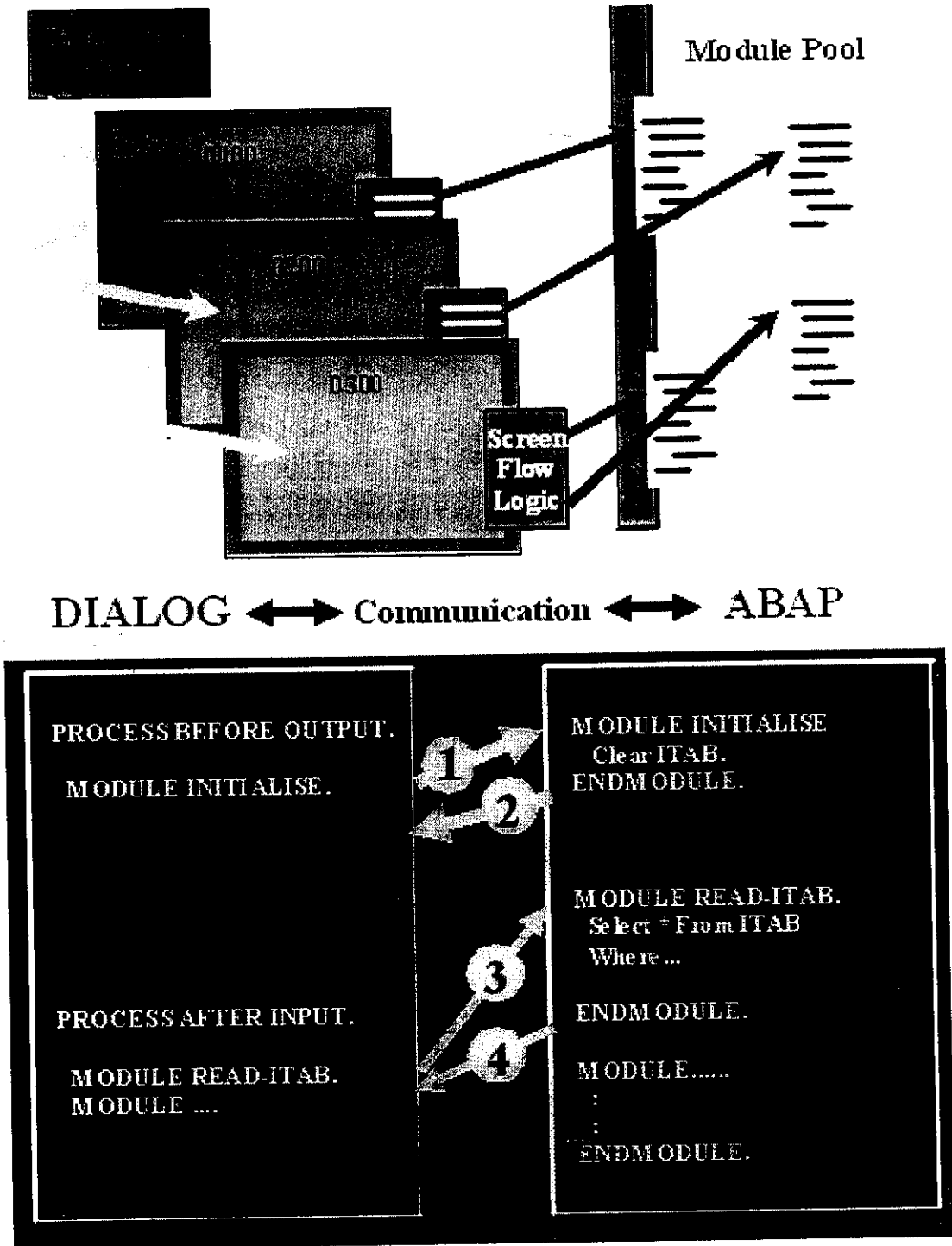
FIGURE 3.4: DIALOGUE PROGRAMMING

3.3.5 ABAP/4 DICTIONARY

The ABAP/4 Dictionary is the central facility in the system where you can create and maintain data declarations, tables, structures and aggregated objects. Since it is integrated into the ABAP/4 Development Workbench as an active component, any change made in the ABAP/4 Dictionary takes immediate effect in programs affected.

3.3.6 ABAP EDITOR
Editor is used to hold or develop the complete definition of the structure SCREEN, refer to the online documentation on Table, Structure, or View in the ABAP Editor.

3.3.7 MENU PAINTER

It is used to create Menus that control elements which allow the user to choose functions to be processed by an application program. Menus can also contain submenus. The 'System' and 'Help' menus are present on every screen in the R/3 System. They always have identical functions and cannot be changed or hidden.
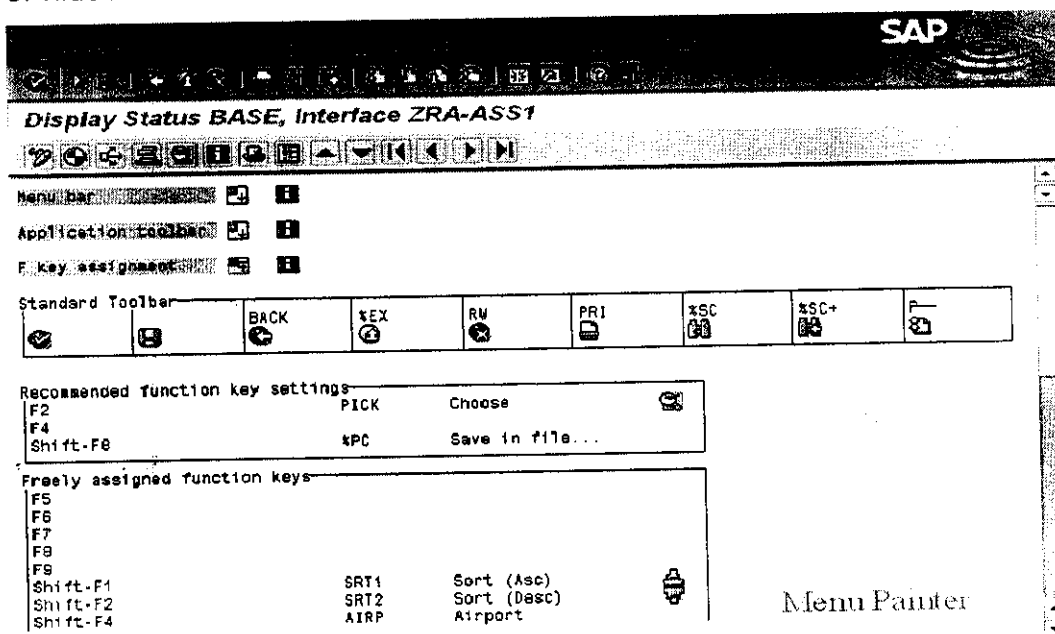
Menu Painter

FIGURE 3.5: MENU PAINTER

3.3.8 SCREEN PAINTER

The Screen Painter allows you to create user-friendly screens complete with pushbuttons, graphical elements, and table controls. Creating screens via the SAP Screen Painter is made possible by Transaction Programming. In Transaction (interchangeable with "Dialog") Programming, screens are merely static objects generated not by ABAP code, but rather through graphical design. The screens you design can be called from any ABAP program.
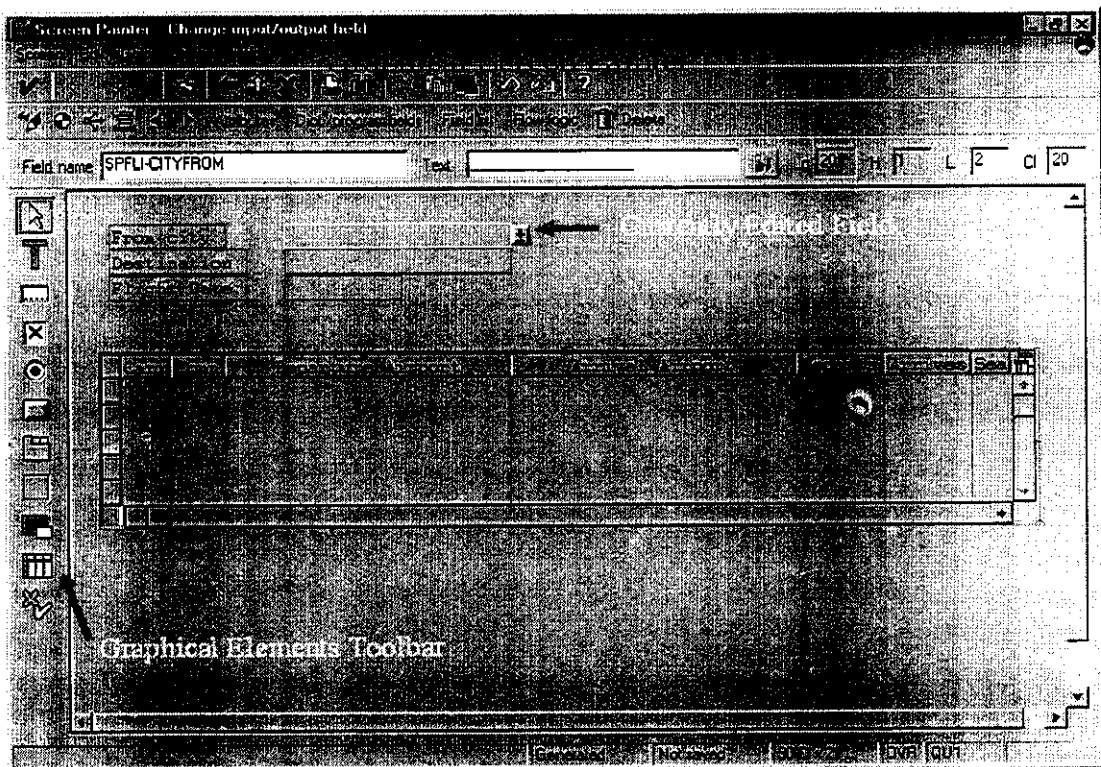

FIGURE 3.6: SCREEN PROGRAMMING

3.3.9 TRANSLATION MENU

The translation menu is used to navigate between different applications in the SAP development and user environment.

3.3.10 TRANSACTIONS

A transaction code is an alphanumeric code, essentially a shortcut, that takes you directly to the screen for the task you want to perform. For example, to display an initial screen of the delivery challan system you can key in "ZDC" in the command field and then press Enter. T-codes save a considerable amount of time otherwise spent navigating the menu system.

CHAPTER 4

SYSTEM DESIGN AND DEVELOPMENT

4.1 USE CASE SCENARIO

Use cases, stated simply, allow description of sequences of events that, taken together, lead to a system doing something useful. Each use case provides one or more scenarios that convey how the system should interact with the users called actors to achieve a specific business goal or function.

Use case actors may be end users or other systems. Use cases typically avoid technical jargon, preferring instead the language of the end user or domain expert. Use cases are often co-authored by business analysts and end users. Use cases are separate and distinct from UML use case diagrams, which allow one to abstractly work with groups of use cases.

Actor   System

Enter Transaction code(ZDC)

Call
Operation

Show initial screen

Select user choice from menu (DC
generation or report generation)

Process
choice

Show respective screen

Enter Employee Number

Authorize

Display DC choice based on employee
eligibility

Select from choice

Call
respective
screens

Show Screen based on choice

Enter Details

Validate
Entry

Ask for confirmation

Confirm Data

Figure 4.1: Use case scenario

4.2 USECASE DIAGRAM
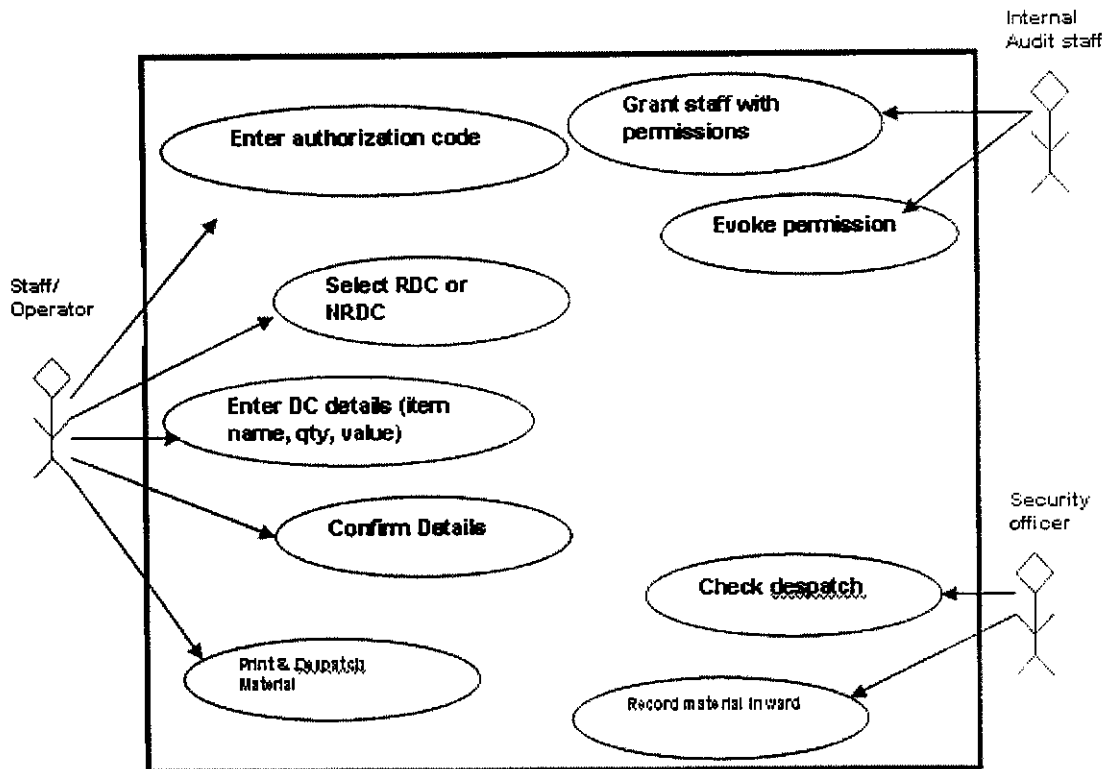
Figure 4.2: Use Case Diagram

Table 4.1: Descriptions of element in use case

Actor	Description
staff / operator	person who is authorized to generate DC
Security	Gate security officer.
Internal audit staff	to grant & evoke DC generation permissions

4.3 ELEMENTS OF DESIGN

System Design is the most creative and challenging phase in the development of a software system. Design implies to a description of the final system and the process by which it is developed. The first step is to determine what input data is needed for the system and then to design a database that will meet the requirements of the proposed system. The next step is to determine what outputs are needed from the system and the format of the output to be produced.

During the design of the proposed system some areas where attention is required are:

- What are the inputs required and the outputs produced?
- How should the data be organized?
- What will be the processes involved in the system?
- How should the screen look?

The steps carried out in the design phase are as follows:

- Modular Design
- Input Design
- Output Design
- Database Design

4.3.1 MODULAR DESIGN

It is always difficult for any System Development team to grasp a system without breaking it into several smaller systems. These smaller systems will be a part of the original system yet they will be independent in the sense that they will incorporate within them the major functionalities of the proposed system.

A software system is always divided into several subsystems which make it easier to develop and perform tests on the whole system. The subsystems are

known as the modules and the process of dividing an entire system into subsystems is known as Decomposition.

The modules identified for the proposed Delivery Challan generation system are as below:

- Internal Audit Entry module
- RDC entry module
- NRDC entry module
- Date extension module
- Material Return module
- Other Transactions
- Reporting module

4.3.1.1 Internal audit entry module

Internal auditing is a management-oriented discipline that has evolved rapidly since World War II. Once a function primarily concerned with financial and accounting matters, internal auditing now addresses the entire range of operating activities and performs a correspondingly wide variety of assurance and consulting services in organization.

The Institute of Internal Auditors (IIA) definition of internal auditing is as follows:

"Internal auditing is an independent, objective assurance, and consulting activity designed to add value and improve an organization's operations. It helps an organization accomplish its objectives by bringing systematic, disciplined approach to evaluate and improve the effectiveness of risk management, control, and governance processes".

In this project the permission for the staff or operator to generate RDC or NRDC is given by the Internal Audit team. So it's necessary to develop a module to facilitate the activities of the internal audit team with respect to DC

4.3.1.2 RDC Entry & NRDC Entry module

These are the two identical and major modules that are involved in the system.

- They get data the necessary data from user to generate the DC.
- Generate the DC number automatically and also see that it's unique.
- Get items details.
- Check for basic organization constraints. Example: The expected return date for a RDC should not extend 60 days.
- Store the generated DC.
- Print the DC in required format.
- The RDC or NRDC number is automatically generated. The last generated number is stored in the zctrl_mst (control master table) table, during the DC generation process, the generated key is retrieved from the table and a new key is calculated by adding 1 to it.
- Provisions are provided for the user to search for the vendor code by name or vendor code or location.
- Provisions are provided for the user to search for the staff code by name or staff code or department.
- If the item that is being sent involves duty to be paid, then the duty check box in the screen is checked.
- If the item is a capital item or a tool, then the capital check box or the item check box is checked respectively.
- The quantity field is linked with the Volume of Measurement data domain of SAP.
- The process code that has to be entered is selected from the table zprs_mst. This table contains the process codes of all operations that are carried out on an item.

4.3.1.3 Date Extension Module

This module is responsible in extending the expected-date of a RDC.

In this module the user keys in a RDC number to which he has to extend the date. After the RDC number is entered, the system checks for its correctness, once it is found to be a correct RDC number, the user is allowed to enter the SNO of the item.

After the serial number of the item is entered, the description, quantity, pervious date are displayed for users reference.

The user then keys in the extended date in the provision given below, when the user hits the "extend date" button the entry for the this process is made in two tables,

- The zdctrans table is altered with the new date
- An entry is made with the zdc_date_ext table.

The Basic constraints that are to be noted are,

- Validate and verify a RDC number
- A RDC's "expected-date" can be extended only once.
- It should not exceed 60 days.

In this process, provisions are given to the user to search for the RDC number to which he wishes to extend the date. Once the RDC number is given, then the user is given choice to enter only to serial number that belongs to that particular RDC.

4.3.1.4 Material Return Module

This module is used to make a return entry in the system. The major activities in this module are,

- Generate a return entry number for the staff responsible to acknowledge.
- Records goods inward.
- Closing a DC.
- Items that have gone out in a single DC can return at various intervals. All these incoming items details are entered into the system.
- Once the cumulative count of the items reaches the number if items that are sent, then the DC are marked closed.

4.3.1.5 Other Transactions Module

Various other miscellaneous transactions are grouped together in this module. It involves small transactions like,

- **Login entry**
  This module is responsible for the providing access to the system. The user who wishes to generate a DC is asked for a userid and password. Once the user id and the password are found to be right then the user is allowed entry into the system.
  In this organization a single userid and password is being used which is change very rarely, so there is no need for a separate table to store these values. The userid and password are checked in program code itself.
- **Cancellation of DC.**
  A DC can be cancelled for any reasons in the organization. Provisions are given in this system to cancel the DC. In case of cancellation, the entry in the table is not removed, instead a flag field in the zdcheader table is given a value 1. The DC number is also not deleted.
- **Staff code & Vendor Code Search**
  Provisions are given in the system for the user to search for existing

while generation of DC, then he can make use of the search functionality. For Example, keying in the vendor code range or partial name or location etc can search a vendor details. This functionality is same for code search.

Other search functions include

- **DC number search**

  The user can know about the existing DC numbers by pressing F4 in the DC number entry text field or the arrow key given next to the text field.

- **Date search**

  The user can search for a date by making use of the calendar utility that is provided with every date field entry text field

4.3.1.6 Reporting Module

These are the reports that where identified during the analysis phase of the project.

- DC number - Display reports based on the given DC number
- Date wise
  - Date to date – display DCs that are generated within the particular given dates.
  - Particular day – DCs that are generated in a particular Day
- Department wise – display DCs that are generated within a particular department
- Staff wise – DCs that are generated by a particular Staff
- Vendor wise - DCs that are generated to a particular given vendor
- Date extension query – DCs to which are Date-Extended

4.3.1.7 Pending reports:

- Department wise pending – DCs that are pending in a given Department
- Date wise pending –DCs that are pending in a given date or a given period
- Date wise return
- Return query
- RDC pending – vendor wise DCs pending repot
- RDC pending – staff wise DCs reports

The front-end screens are provided to format and dynamically select the necessary report. These screens get values from user and provide report for the user. The other reports for which the screens are not designed i.e. reports, which are not needed by management at all times can be taken by help of the database query functionality given by SAP.

The screen shots of the front-end design are given in the appendix.

4.3.2 INPUT DESIGN

The input design is the process of converting the user-oriented inputs into computer-based format. The goal of designing input data is to make sure that the automation is easy, logical and free from errors.

The input design requirements such as user friendliness, consistent format and interactive dialogue, which provide users with timely help and correct messages, are given high priority.

Identified Input data for DC generation

Authenticated data

- Vendor code, details
- Staff responsible details
- Department code, details

User entered data

- Packing details
- Dispatch details
- Plant id
- Gate no
- Gate date

Item particular data

- Sno
- Item
- Description
- Qty
- Volume of measure (VOM)
- Process
- Expected return date
- Duty information, Etc

4.3.3 OUTPUT DESIGN

The output of the system is the printed DC and all necessary reports. All reports that are mentioned in the Reporting module serve the management by providing necessary information.

The reports can be broadly classified in the following categories

- Date wise reports
- Staff wise reports
- Department wise reports
- Plant wise reports

4.3.3.1 Sample reporting screens

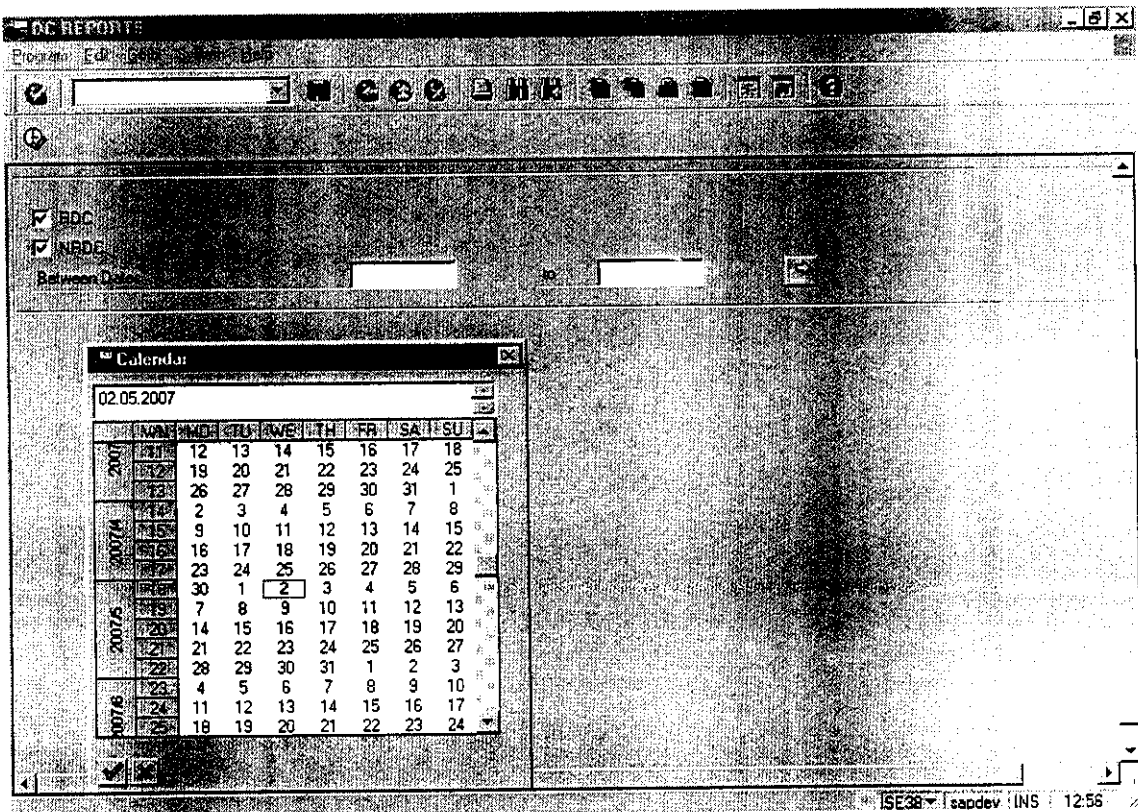1. Date wise reports – To display All the RDC & NRDC between two dates.

Figure 4.1 Sample reports Date wise report

2. Department wise report – to display the generated DCs from a particular department.
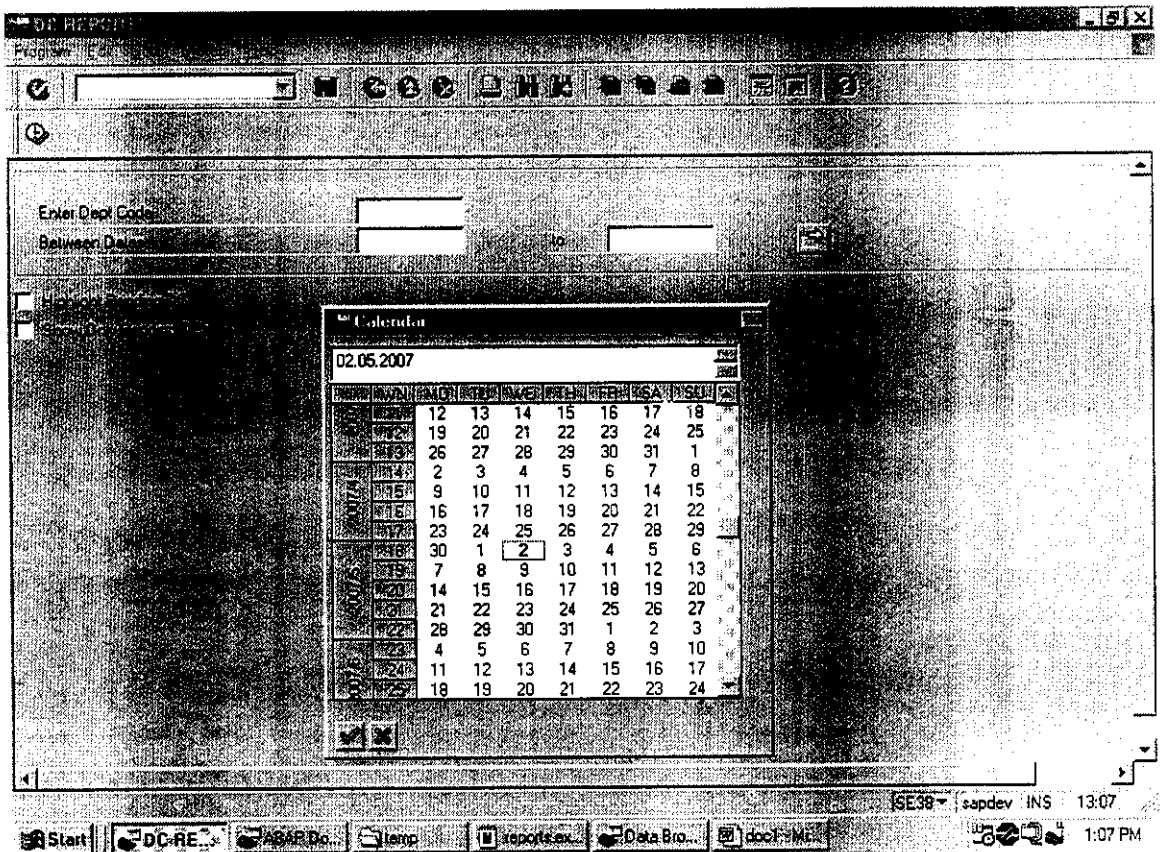
Figure 4.2 Sample reports Department Wise report

4.3.4 DATABASE DESIGN

Table 4.2   :   zdcheader

Description :   To store the header part information of a RDC or NDC

Fieldname	Datatype	Size	Description
Dc_key	Int4	10	Dckey. Ex N2007000001,R0700001
Dc_date	Dats	8	Date field
Dept_code	Char	10	Department code from department master system table
LifNR	Char	10	Vendor code from vendor master system table.Table name:lfa1
Memo_ref	Char	10	Memo reference * Unidentified
Memo_date	Dats	8	Memo date * Unidentified
Packing_details	Char	20	Packing details
Despatch_details	Char	30	Despatch details
Remarks	Char	60	Other remarks
PSPAR			Staff code from employee master system table. Table name :PA0002
Staff_name			Staff name
Raised_by			* Unidentified
Raised_by_name			Name of the person by whom the DC is raised
Raised_by_s_o			Flag to denote staff or operator
Gcs			* Unidentified
Plantid			DC received plant id
Gate_no			DC received gate CTRL No
Gate_date	Dats	8	DC received gate CTRL Date
Sent_time	Tims	6	Time at which the DC was sent at gate
Printed_flag	Int1	3	number of times the DC was printed
Part2sl	Int2	6	* Unidentified
Sent_time	Tims	6	Time at which the DC was sent at gate
Capt_flag	Char	1	To indicate capital item
Tool_flag	Char	1	To indicate that the item is a tool
All_item_received_flag	Char	1	To indicate that the DC is closed
Del_flag	Char	1	Flag to denote cancellation

Table 4.3   :   zdctrans

Description   :   To store the information related to items in RDC or NDC

Fieldname	Data type	Size	Description
Dc_key	Int4	10	Dckey. Ex N0700001,R0700001
Dc_sno	Int1	3	Serial number of items in a DC
Dc_date	Dats	8	Date field
Description	Char	30	Disc of item
Qty			Quantity
Uom			Unit of measurement
Process_code			Process code of the item
Reason_code			Reason for sending the material
Rate_per_item	Curr		Rate per item
Store_rate_per_item	Curr		Rate per item as entered in stores
Details	Char	60	Other details in DC
Debitnote_no	Int2	6	Debit note number if any
Debit_date	Dats	8	Debit note date if any
Duty_percentage			Percentage of duty of the item
Part2sl			* Unidentified
Duty_flag			Flag to denote duty
Expected_date	Dats		Exported return date
Last_rtn_docno	Int		Last return document number
Rtn_doc_date	Dats	8	Return document date
Party_dcno	Int4	10	DC number of party during return
Party_dc_date	Dats	8	Party DC date
Cum_recd_qty			Received quantity
Goods_condition	Char	50	Condition of the goods
Cons_gr	Char	6	* Unidentified
Rdc_For_ack_qty			* Unidentified
Ack_staff			Name of staff who acknowledge
Ack_date	Dats	8	Acknowledge date
Ack_time			Acknowledge time
Ack_remarks	Char	50	Acknowledge remarks
Receiver_cd			Receives code
Receiver_qty			Receives quantity
Received_date	Dats	8	Received date
Remark	Char	20	Remarks if any
Sec_rqty			* Unidentified

Table 4.4   :   zdate_ext_mst

Description   :   Date extension table

Fieldname	Data type	Size	Description
Dc_key	Int4	10	Dckey. Ex N0700001,R0700001
Dc_sno	Int1	3	Serial number of items in a DC
Previous_date	Dats	8	Previous date of DC
Extended_date	Dats	8	Extended date

Table 4.5   :   zctrl_mst

Description   :   Control master table

Fieldname	Data type	Size	Description
Ctrl_key	Char	2	Key field for crtl_mst
Last_dc_key	Int4	10	Last DC key generated.

Table 4.6   :   PA0002

Description   :   Employee Master System table

Fieldname	Data type	Size	Description
PSPAR			Staff code
Flag1	Char	1	To denote authorization to generate DC
VORS2			Unused field in Employee master. Used here to store password.

Table 4.7   :   zrtn_mst

Description   :   Return master table

Fieldname	Data type	Size	Description
Dc_key	Int4	10	DC Key
Dc_slno	Int1	3	DC serial number
Rtn_date	Dats	8	Item return date
Recd_qty			Received return quantity
Party_dc_no			Party DC number
Party_dc_date	Dats	8	Party DC date
Remarks	Char	50	Remarks
Cons_gr	Char	6	* Unidentified
Rtn_ack_date	Dats	8	Return Acknowledge date

CHAPTER 5

TESTING AND SYSTEM IMPLEMENTATION

5.1 OVERVIEW

SAP Implementation is the whole of processes that defines a complete method to implement SAP software in an organization. The SAP implementation method described in this entry is a generic method and not a specific implementation method as such. It is based on best practices and case studies from various literature sources and presents a collection of processes and products that make up a complete implementation method to allow any organization to plan and execute the implementation of SAP (ERP) software.

The implementation of SAP software, such as SAP R/3 is almost always a massive operation that brings a lot of changes in the organization. The whole process can take up to several years. Virtually every person in the organization is involved, whether they are part of the SAP technical support organization (TSO) or the actual end-users of the SAP software. The resulting changes that the implementation of SAP generates are intended to reach high level goals, such as improved communication and increased return on information (as people will work with the same information). It is therefore very important that the implementation process is planned and executed with the usage of a solid method.

5.2 TESTING OVERVIEW

Testing is very important before going live with any system. Before going live with an SAP system, it is vital do to many different kinds of testing, since there is often a large, complex infrastructure of hardware and software involved. Both requirements as well as quality parameters are to be tested. Important types of testing are:

5.2.1 Functional Testing

To test using functional use cases, i.e. a set of conditions or variables under which a tester will determine if a certain business process works.

5.2.2 Integration Testing

Integration testing tests the process of integrating the various modules to form the completed system. Integration starts with a set of units each individually tested in isolation and ends when the entire application has been built. Integration testing verifies that the combined units function together correctly. It facilitates in finding problem that occur at interface or communication between the individual parts.

5.2.3 System Testing

System testing is actually a serious of different tests, whose primary purpose is to fully exercise the computer-based system. This helps in verifying that all the system elements have been properly integrated and perform the allocated functions. It verifies the entire product after having integrated all software and hardware components, and validates it according to the original project requirement. The system testing takes into consideration the hardware, and the software. That is, RAS should be able to be run on the specified hardware for variety of cases.

5.2.4 Stress Testing

Another vital preparation activity before going live with SAP is systems and stress testing. This means planning, scripting, executing and monitoring system and stress tests, to see if the expectations of the end users, defined in service level agreements, will be met. This can be done with SAP's standard application benchmarks, to benchmark the organization's configurations against

configurations that have been tested by SAP's hardware technology partners. Again, a test plan should be created at first.

5.2.5 Prepare For Cutover

The final phase before going live with SAP is often referred to as the cutover phase, which is the process of transitioning from one system to a new one. The organization needs to plan, prepare and execute the cutover, by creating a cutover plan that describes all cutover tasks that have to be performed before the actual go-live. Examples of cutover tasks are:

- Review and update all systems-related operations procedures like backup policies and system monitoring
- Assign ownership of SAP's functional processes to individuals
- Let SAP AG do a GoingLive check, to get their blessing to go live with the system
- Lock down the system, i.e. do not make any more changes to the SAP system

5.2.6 Go Live

All of the previously described phases all lead towards this final moment: the go-live. Go-live means to turn on the SAP system for the end-users and to obtain feedback on the solution and to monitor the solution. It is also the moment where product software adoption comes into play.
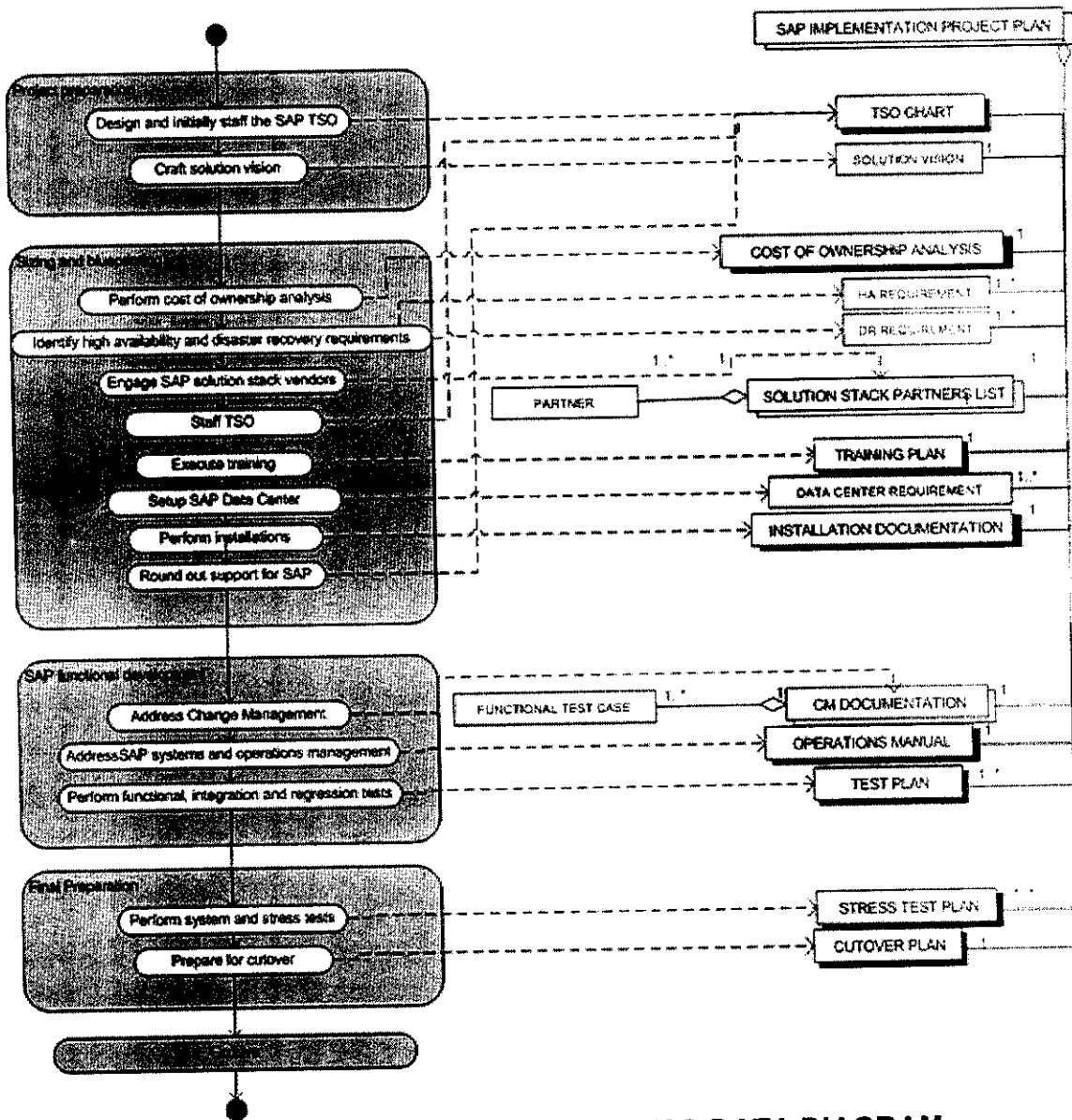
FIGURE 5.1: SAP IMPLEMENTATION PROCESS-DATA DIAGRAM

The data table below provides a summary of all the concepts addressed in the process-data diagram.

Table 5.1   :   Process Diagram terminology

Concept	Definition
CHANGE MANAGEMENT	Activities involved in (1) defining and installing new values, attitudes, norms, and behaviors within an organization that support new ways of doing work and overcome resistance to change; (2) building consensus among customers and stakeholders on specific changes designed to better meet their needs; and (3) planning, testing, and implementing all aspects of the transition from one organizational structure or business process to another
CHANGE MANAGEMENT DOCUMENTATION	All documentation that is required and being delivered whilst performing change management, e.g. the functional test cases and all the other documents a new end-user of SAP requires and the various tools and approaches used to manage change by the TSO. (Anderson, 2003)
COST OF OWNERSHIP ANALYSIS	Determination of where and when the costs are inquired within the context of the SAP solution stack and ongoing operations. The analysis addresses all internal and external costs, both one-time as well as recurring (Anderson, 2003)
CUTOVER	The process of transitioning from one system to a new one (Anderson, 2003)
CUTOVER PLAN	All documentation related to planning, preparing and executing cutover, describing how to lock down the system from a technical change management perspective, preparing the TSO for its new role and rolling out the SAP graphical user interface to all future end users. (Anderson, 2003)
DATA CENTER	A data center is a facility used for housing a large amount of electronic equipment, typically computers and communications equipment.
DATA CENTER REQUIREMENT	A requirement for the SAP data center, i.e. a physical requirement like power requirements, a rack requirement, a network infrastructure requirement or a requirement to the network server. (Anderson, 2003)

Table 5.1 continued

DISASTER RECOVERY (DR) REQUIREMENT	Requirement that focuses on downtime that lasts many hours to days or even weeks (Anderson, 2003)
FUNCTIONAL TEST CASE	A set of conditions or variables under which a tester will determine if a certain business process works (www.wikipedia.org)
HIGH AVAILABILITY (HA) REQUIREMENT	Requirements that describes the amount of time that the system needs to be available to satisfy the needs of the users. (Anderson, 2003)
INSTALLATION DOCUMENTATION	All documentation related to the installation of an end-to-end SAP solution (Anderson, 2003)
OPERATIONS MANUAL	The collection of current state system documentation, day-to-day and other regularly scheduled operations tasks, various installation and operations checklists and how-to process documents. (Anderson, 2003)
SAP	SAP AG is the name of the biggest European software company. The head office is in Walldorf, Germany. SAP was founded in 1972 as Systemanalyse und Programmentwicklung ("Systems Analysis and Product") by five former IBM employees in Mannheim, Germany. (www.wikipedia.org)
SAP IMPLEMENTATION PROJECT PLAN	A comprehensive project plan that contains all products that are delivered whilst performing an SAP implementation project (Anderson, 2003)
SOLUTION STACK	Set of software subsystems or components needed to deliver a fully functional solution, e.g. a product or service. (www.wikipedia.org)
SOLUTION STACK PARTNERS LIST	A list of all vendors that deliver the products that make up the SAP solution stack (Anderson, 2003)
SOLUTION VISION	A vision of the future-state of the SAP solution (Anderson, 2003)
STRESS TEST PLAN	A test plan that is focused at determining the stability of a given system or entity. It involves testing beyond normal operational capacity, often to a breaking point, in order to observe the results. (www.wikipedia.org)
TEST PLAN	A detail of how the test will proceed, who will do the testing, what will be tested, in how much time the test will take place, and to what quality level the test will be performed. (IEEE 829)
TRAINING	The acquisition of knowledge, skills, and attitudes as a result of the teaching of vocational or practical skills and knowledge that relates to specific useful skills (www.wikipedia.org)

Table 5.1 continued

TRAINING PLAN	Consisting of training units, a training plan is the result of hierarchical decompositions of a training goal, tailored according to the learning preferences and prior knowledge of the trainee. A plan is the means by which the trainee satisfies the goal. (www.ece.eps.hw.ac.uk/)
TSO	Technical Support Organization. The people that are committed to implementation and management of SAP. (Anderson, 2003)
TSO CHART	A chart that depicts the structure of the TSO.

APPENDIX
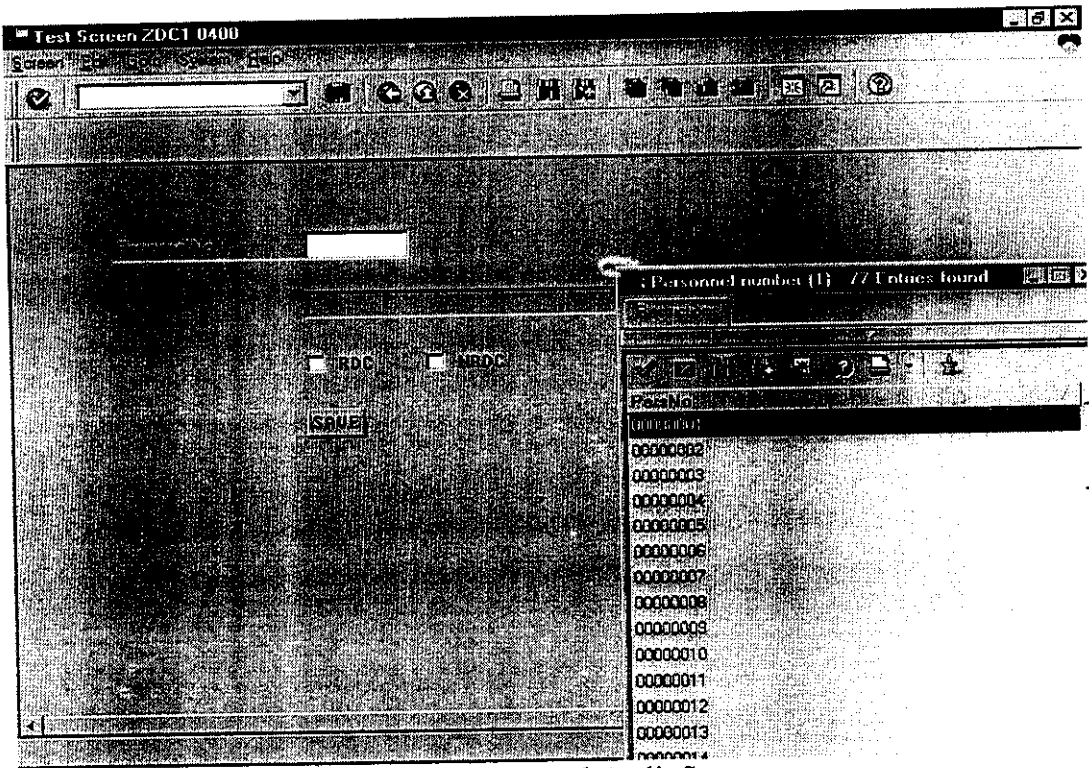
figure A.1 : Internal Audit Screen.
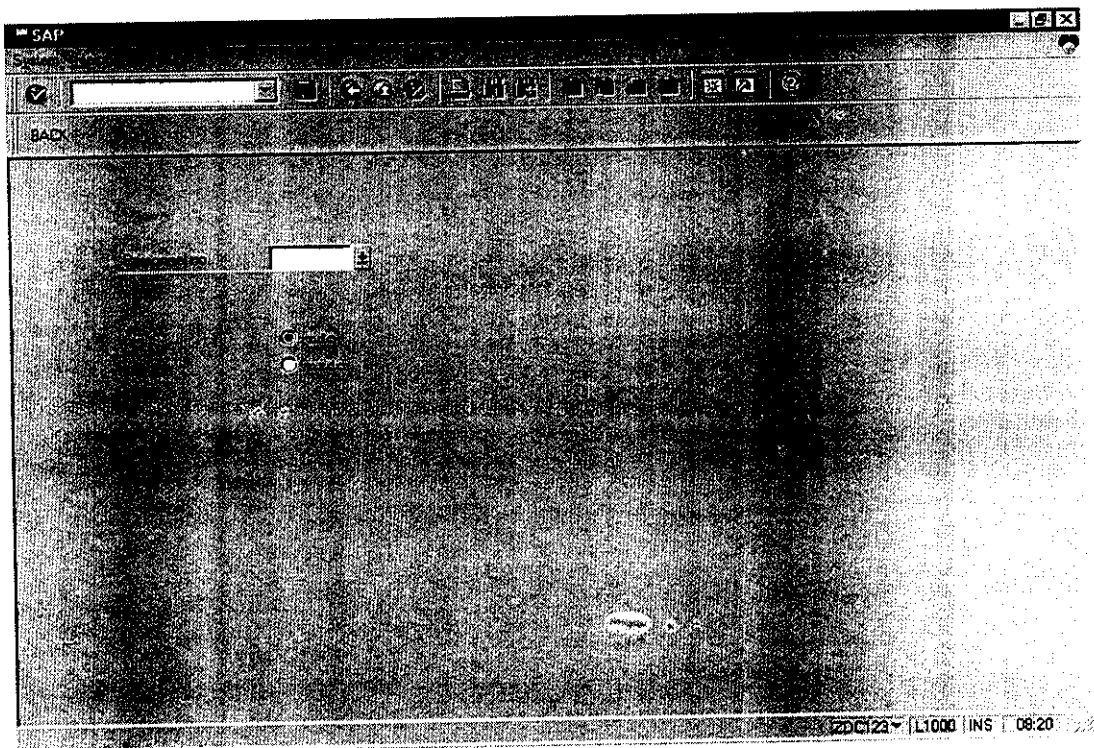
figure A.2 : Entry Screen
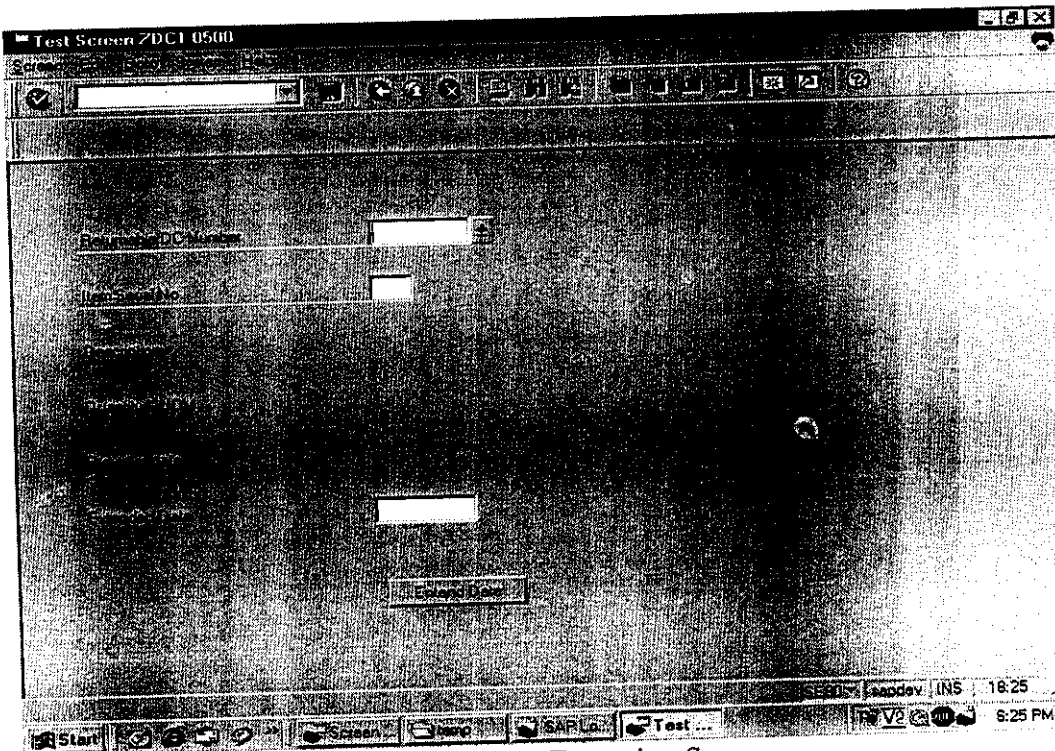
figure A.3 : Date Extension Screen
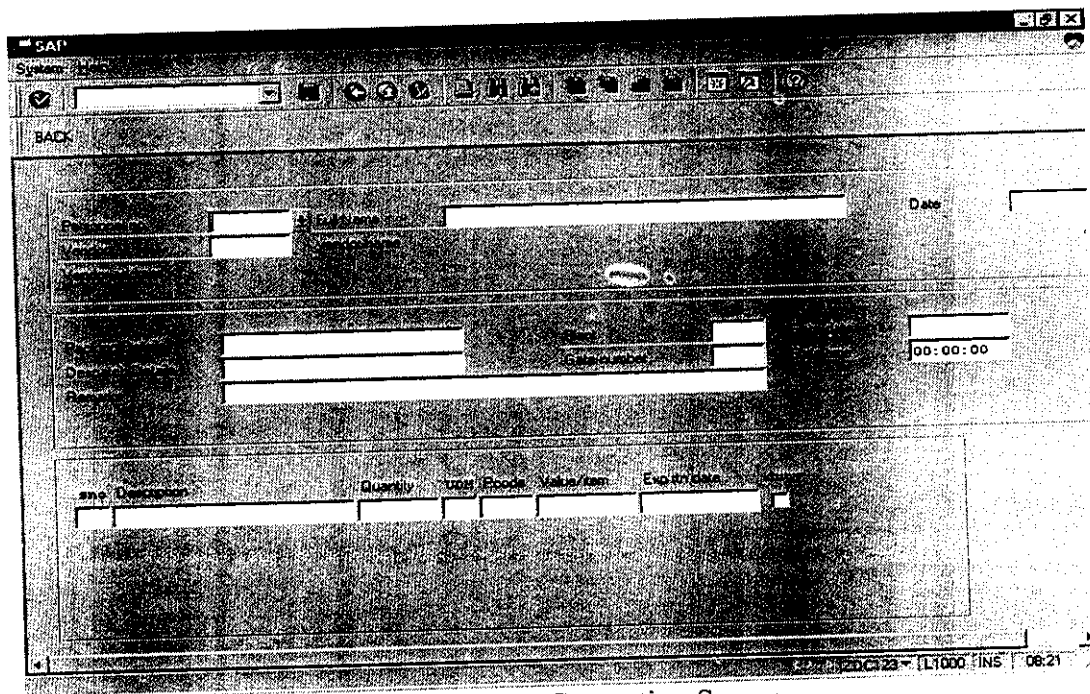
figure A.4 :DC Generation Screen
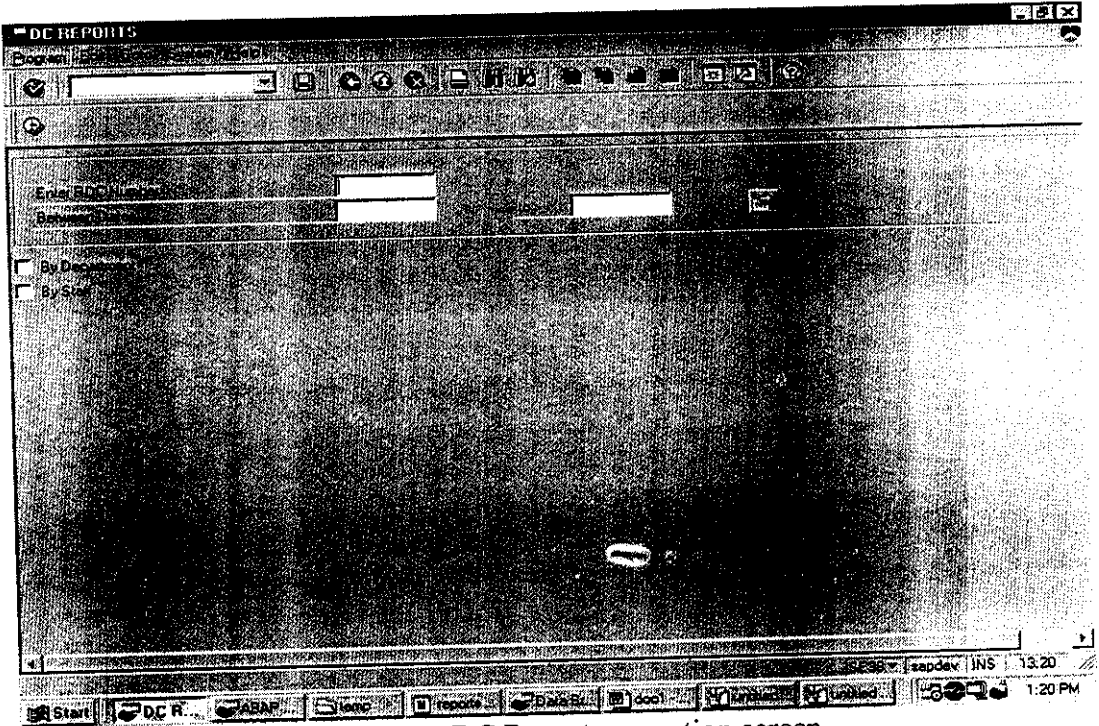
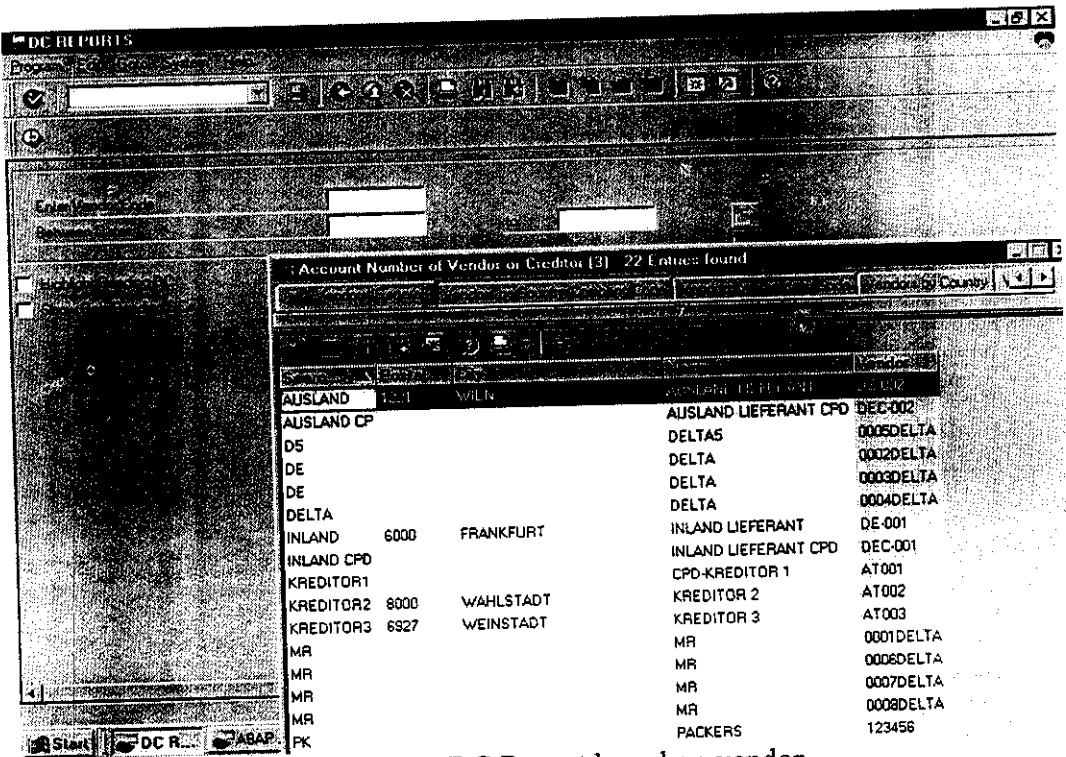figure A.5 : DC Report generation screen
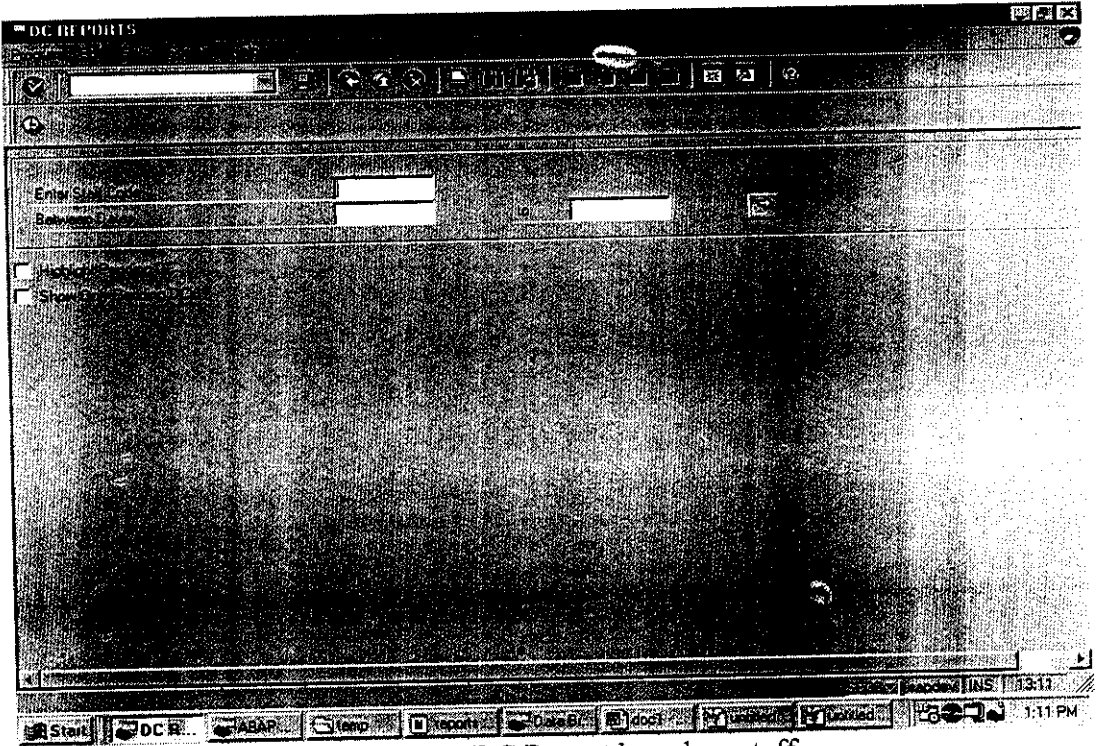

figure A.6 : DC Report based on vendor
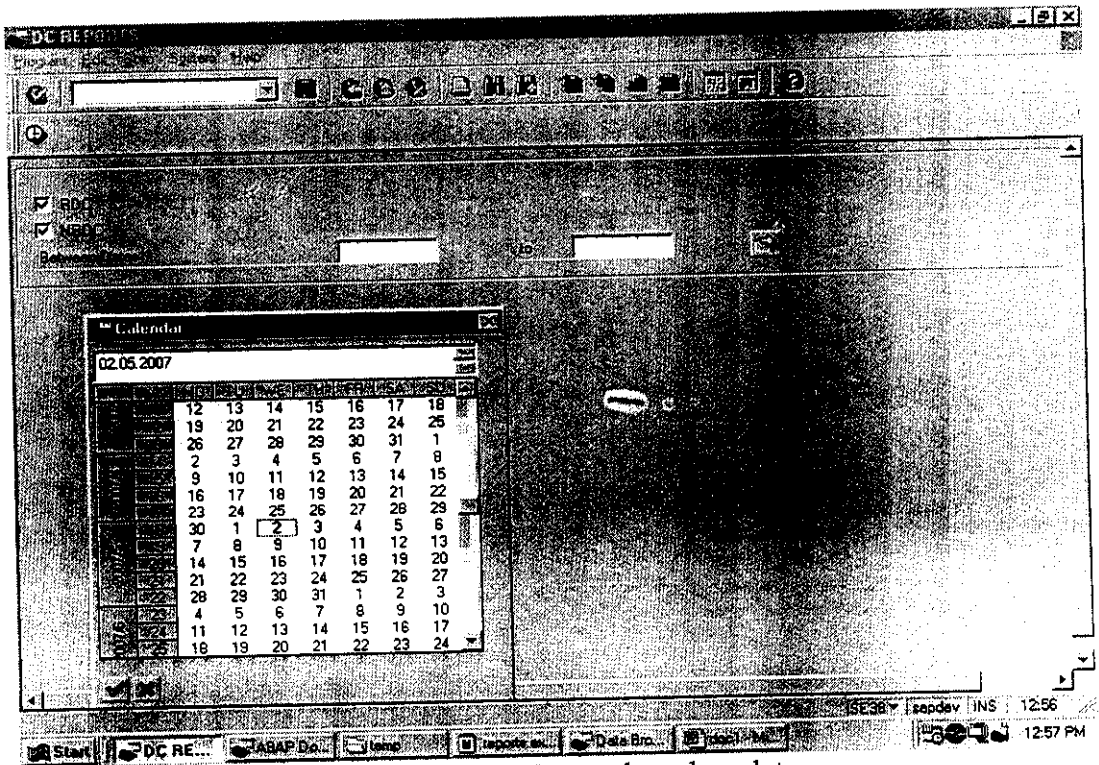
figure A.7 : DC Report based on staff

figure A.8 : DC Report based on date

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