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ACCOUNTS SYSTEM

FOR

NATIONAL AGRICULTURE RESEARCH CENTRE

ISLAMABAD.

BY

RASHID BUTT

A project report submitted to
Quaid-i-Azam University, Islamabad.

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requirements for M.Sc. degree in
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DEPARTMENT OF COMPUTER SCIENCE
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ISLAMABAD

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FINAL APPROVAL

This is to certify that we have read the report submitted by **Rashid Butt** and it is our judgement that this report is of sufficient standard to warrant its acceptance by Quaid-i-Azam University, Islamabad, for the degree of master in Computer Science.

COMMITTEE:

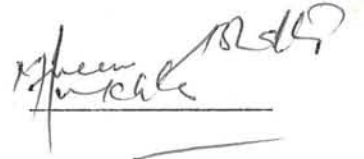
1. External Examiner

Dr. Akmal Jahanzab
National Institute of Electronics
Islamabad.



2. Supervisor

Mr. Naeem Akhtar Bhatti
Assistant Professor
Department of Computer Science
Quaid-i-Azam University
Islamabad.



3. Chairman

Prof. Masud Ahmad Malik
Department of Computer Science
Quaid-i-azam University
Islamabad.



IN
THE NAME OF
ALLAH
THE MOST GRACIOUS
THE MOST MERCIFUL

Project Title : **Accounts System**

Organization : National Agriculture Research Centre

Undertaken By : Rashid Butt

Supervised By : Mr. Naeem Akhtar Bhatti
Assistant Professor
Department of Computer Science
Q.A.U. Islamabad.

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To
All Those
For Whom I Care

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Rashid Butt
Islamabad.

The system described in this dissertation is **Accounts System** for **National Agriculture Research Centre**, which provides correct, reliable and efficient information to the organization for decision making and forecasting. The system provides efficient means of data storage as well as retrieval.

The system deals with the sanctioned amounts of different types of projects which is disbursed to each project's account head and bank balances of different accounts. It also manages the deposited as well as withdrawn amounts from these projects. Different types of on-line queries and printed reports, which are required by the management about these projects, are also generated by the system. The system also provides a user friendly environment for insertion, deletion and modification of data. With the implementation of this system, most of the problems faced by the organization, will be solved.

This project report is concerned with the design and implementation of **Accounts System for National Agriculture Research Centre**. The entire work has been presented in seven chapters followed by some appendices and a bibliography.

Chapter 1 gives an introduction to **National Agriculture Research Centre**.

Chapter 2 describes the existing system of accounts / ledger section.

Chapter 3 states the proposed system and its objectives.

Chapter 4 consists of inputs, outputs and file designing of the proposed system.

Chapter 5 includes the procedures for system development.

Chapter 6 covers system implementation techniques, system testing and evaluation.

Chapter 7 is the user's guide.

Appendices include System Chart, Extended Bachman diagram, chart of accounts, currently running programs, ERD, some sample reports and some source documents.

Bibliography is given at the end.

CHAPTER 1 INTRODUCTION TO THE ORGANIZATION

1.1	Introduction	01
1.2	Objectives	02
1.3	The organization at a Glance	03
1.3.1	Organization Chart	03
1.3.2	Structure	03
1.4	Facilities	05
1.4.1	Building	05
1.4.2	Research Thrusts	05
1.4.3	Scientific Information Unit	06
1.4.3.1	Documentation Centre	06
1.4.4	Library	07
1.4.5	Training Institute	07
1.4.6	Hostels	07
1.5	Administrative Services	08
1.5.1	Budget and Finance Section	08
1.5.2	Accounts Section	08

CHAPTER 2 THE EXISTING SYSTEM

2.1	Introduction	11
2.2	Working of Accounts Department	11
2.3	Programs / Projects	12
2.3.1	Non-development Programs	12
2.3.2	Development Program	12
2.3.3	Miscellaneous Programs	12
2.4	Bank Accounts	13
2.5	Account Heads	13
2.6	Account Codes	14
2.7	Vouchers	14
2.8	Books	17
2.9	Drawbacks	19

CHAPTER 3 THE PROPOSED SYSTEM

3.1	Introduction	21
3.2	Project Objectives	21
3.3	The Proposed System	22
3.3.1	Specifications of the Inputs	22
3.3.1.1	Constant Inputs	22
3.3.1.2	Variable Inputs	23
3.3.1.3	Conditional Inputs	23
3.4	Software Tool For Development	23
3.5	Hardware Considerations	24

CHAPTER 4 SYSTEM DESIGN

4.1	Introduction	25
4.2	Logical Database Design Phase	25
4.2.1	Output Design	25
4.2.1.1	Screen Outputs (Queries)	26
4.2.1.2	Printed Outputs (Reports)	27
4.2.2	Input Design	28
4.2.2.1	Code Design	28
4.2.2.2	Screen Design	28
4.2.3	Password	29
4.2.4	Validation Checks	29
4.3	Physical Database Design	29
4.3.1	Structure of Database Files	30

CHAPTER 5 SYSTEM DEVELOPMENT

5.1	Introduction	40
5.2	Development Phase	40
5.3	Development Approaches	40

TABLE OF CONTENTS

5.3.1	Top Down Approach	41
5.3.2	Bottom Up Approach	41
5.3.3	Inside Out Approach	41
5.3.4	Mixed Approach	41
5.4	Database Development	42
5.5	System Components	42
5.5.1	Main Module	42
5.5.2	Data Entry Module	43
5.5.2.1	Project Codes	43
5.5.2.2	Account Codes	44
5.5.2.3	Payment Vouchers	46
5.5.2.4	Receipt Voucher	46
5.5.2.5	Journal Voucher	46
5.5.3	Report Module	47
5.5.4	Query Module	47
5.5.5	Utilities Module	47
5.5.6	System Parameters Module	47

CHAPTER 6 SYSTEM IMPLEMENTATION AND EVALUATION

6.1	Introduction	49
6.2	System Implementation	49
6.2.1	System Testing	49
6.2.2	System Conversion	50
6.3	System Evaluation	52
6.3.1	Merits	52
6.3.2	Demerits	53
6.3.3	Conclusion	54

CHAPTER 7 USER'S GUIDE

7.1	Introduction	55
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7.2	Getting Started	55
7.2.1	Data Entry	56
7.2.2	Reports	60
7.2.3	Queries	62
7.2.4	Utilities	63
7.2.5	System Parameters	64
7.2.6	Exit	65
7.3	Hot Keys	65

APPENDICES

Contains

- Chart of account.
- Currently running programs.
- ERD, Extended Bachman Diagram and system chart.
- Some sample reports.
- Some source documents.

BIBLIOGRAPHY

Contains list of books referenced during the project.

CHAPTER 1
INTRODUCTION
TO
THE ORGANIZATION

Confidence is the first step on the road of success.

1.1 INTRODUCTION

National Agriculture Research Centre (NARC) is the premier research establishment designed to conduct research in the areas of national importance. Although the establishment of NARC was initiated in 1975, but its physical infrastructure was formally inaugurated in March, 1984 through the co-operation of the Government of Pakistan and the United States of America. The requisite capital and research facilities to carry out the chartered activities have been considerably developed at the centre. NARC campus comprises of 13 institutes and many other research activities in different disciplines of agriculture i.e. Animal Sciences, Crop Sciences, Social Sciences, Natural sciences, Pest Management, Ecotoxicology, Tissueculture, Floriculture, Plant Genetics, Audio Visual Communication Unit, Mountains and Desert Research Cell, Green Houses and Mills etc. The experimental area has been precision-leveled, laboratories are adequately equipped and the training institute has become fully operational.

The component institute of NARC on crops, animal sciences, natural sciences, natural resources and farm machinery have also been strengthened and the Centre is now set to play its due role in the national agriculture research system. Besides conducting and supporting agriculture research in the areas of national importance, NARC has several important facilities for all the scientists working in such disciplines in the country. In particular, it maintains a gene bank containing large number of local and exotic varieties and strains of various crops, which are utilized for the development of high yielding crop varieties. It has computer-based data processing facility, a well maintained agriculture library, documentation centre and a centralized facility for instrumentation and maintenance of laboratory equipment. The centre organizes national and international seminars and conferences on different aspects of agriculture research. It also has a training institute, which frequently organizes training courses for agricultural scientists and extension workers in collaboration with national and international institutes and agencies to keep them abreast with the latest knowledge on different aspects of agricultural production.

1.2 OBJECTIVES

- 1) **T**he major goal of NARC is to conduct research in the areas of national importance where such research is not currently being undertaken or is seriously inadequate.
- 2) **T**o develop the national plant introduction and genetic resources program and provide excellent laboratory research facilities in particular disciplines of plant and animal science, plant protection, food technology, soil science, water resources and farm mechanization.
- 3) **T**o support provincial institutions by conducting fundamental research and to provide certain facilities for all the scientists to solve complex problems for which their respective institution may not be adequately equipped.
- 4) **T**o collaborate with national and international research organizations pursuing similar lines of inquiry and strengthen linkages with appropriate international organizations to expand the NARC database and through collaborative research projects, develop research excellence to materialize useful technology.
- 5) **T**o assist research institutions in program assessment of research needs and comparative problems as well as analyze the needs for improved research conceptualization and opportunities for policy action.
- 6) **T**o emphasize on systematic farming approach where the production technology would be available for various agricultural commodities which will be synthesized into integrated systems that focus on agricultural problems of barani areas.
- 7) **T**o develop a training unit and to organize seminars, technical conferences and

training course for national staff engaged in agricultural research, planning and development and to improve regional competence in the inter-disciplinary systems approach for research and development.

- 8) **T**o develop other facilities at NARC that include reference library, a centralized information service that encourages cooperation and communication among domestic, regional and international institutions to provide the latest research information to all scientists associated with these areas of interest in the country.
- 9) **T**o define alternative research strategies from the viewpoint of their implications for food and fiber production, food production processes and the role of technological change in the agriculture as they relate to low income group, international food trade and food security.
- 10) **T**o publish and distribute the results obtained from research programs and carry out what may be necessary to promote the immediate and efficient application of results emerging from research for local and international community.

1.3 THE ORGANIZATION AT A GLANCE

NARC consists of many different units which works jointly for its strengthening. In the following sections these units are described briefly.

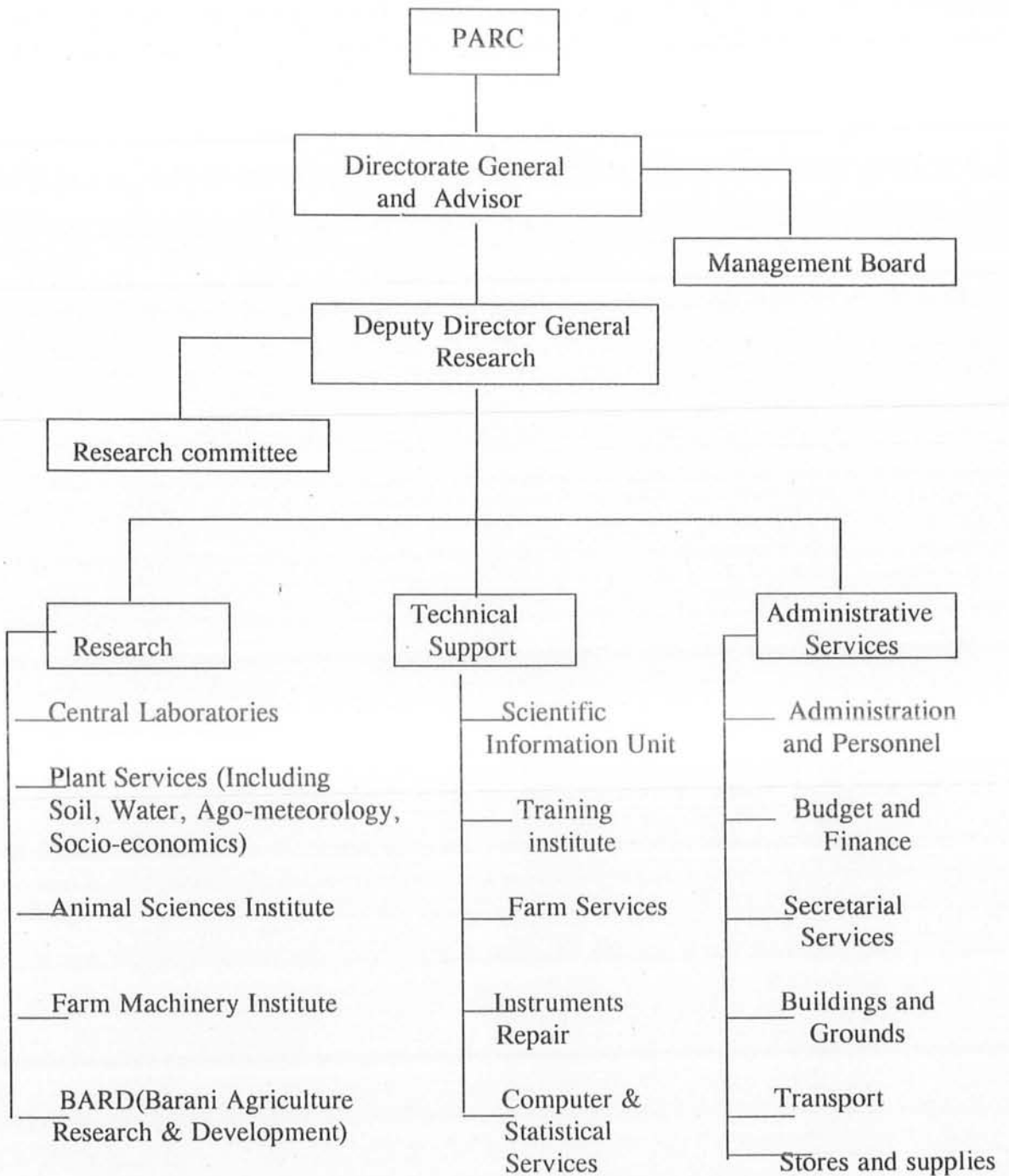
1.3.1 ORGANIZATION CHART

The organization chart is shown on the next page.

1.3.2 STRUCTURE

The NARC activities are broadly organized in the following three categories.

- 1) Research
- 2) Technical support services
- 3) Administrative services



To undertake research there are central laboratories: three component institutes on crops, animal sciences and farm machinery, and strong groups on natural resources and social sciences. The technical support services include scientific information unit, training farm services, instrument repair and computerized data base facilities. The administrative services deal with matters relating to the personnel and secretarial services, stores and supplies and transport and finances.

The NARC is headed by a Director General who is assisted by the Management Board in deciding the major policy issues and a research committee to assist him in managing the research activities. In the execution of his responsibilities he is assisted by a Deputy Director General (research).

1.4 FACILITIES

NARC provides number of facilities, out of these some are described here :

1.4.1 BUILDING

NARC has total land area of approximately 565 hectares which is located near Rawal Lake, six kilometers South East of Islamabad, along the National Park road. Physical facilities in terms of research area, laboratories, farm houses, library, documentation centre, auditorium, workshops, stores, hostels, cafeteria etc., exist at NARC. In addition to the main complex, crop farm centre, animal sciences institute, farm machinery institute and a training institute exist there.

1.4.2 RESEARCH THRUSTS

- 1) Productivity optimization, sustainability and horticulture crops through improved varietal development and production management.
- 2) Improved farming system for selected barani area.
- 3) Profitability analysis of crop livestock enterprises particularly fodder and forage systems and domestic resources costs of major crop and livestock products.

- 4) Integrated pest management and post harvest technology.
- 5) Bio-technology applied to selected traditional crop and animal improvement projects.
- 6) Impact studies on biological, socio-economic and institutional factors which constrain crop yields and sustained productivity.

1.4.3 SCIENTIFIC INFORMATION UNIT

Scientific information unit is divided into many different cells to accomplish its task, which are:

1.4.3.1 DOCUMENTATION CENTRE

- 1) **P**Primary object is to establish close liaison with international agriculture databases and information handling agencies like Agricultural Information Society (AGRIS), Food Agency Organization (FAO), UK, ASLIB, NFIS of ESCAP and PHIS of Kanas State University. The Directorate is also functioning as national node for SAARC Agricultural Information Centre (SAIC).
- 2) It creates and maintains the following bibliographic databases :
 - (a) Pakistan Agriculture Database containing about 10,000 documents published on various aspects of Pakistan's agriculture within the country as well as abroad.
 - (b) On-line Public Access System (OPAS) based on NARC library holdings.
 - (c) AGRISRET database containing information about specialized bibliographies procured from different international databases.
 - (d) Computerized Document Delivery System.
 - (e) Specialized Selective Dissemination of Information (SDI) at individual level on library card format.
- 3) Selective dissemination of Information based on searching of recent additions in the databases has been provided to 253 scientists. Presently, the directorate is running 35 interest profiles which are likely to increase to 115 in near future.

- 4) About 335 specialized bibliographies were procured and compiled during the last three years using different major international databases.

1.4.4 LIBRARY

Timely availability of literature plays a predominant role in research and development activities. About 80% of the library budget is allotted for the procurement of international periodicals of well repute. NARC collection includes :

1. About 30,000 books and documents.
2. About 571 periodicals of which 110 are subscribed and the rest are mutually exchanged.
3. A collection of about 500 micro films.

1.4.5 TRAINING INSTITUTE

Since its establishment in 1983, the institute has organized 138 training programs till December 1988, and trained 3752 participants in agriculture and its related disciplines. Initially, the activities of the institute were restricted to local programs but subsequently these were expanded to offer courses in collaboration with international agencies like CIMMYT, FAO, USAID and CIDA. The institute is in a position to plan, design and organize training keeping in view the present day international needs as well as the requirements of the friendly countries.

1.4.6 HOSTELS

There are two types of hostels in the National Agriculture Research Centre .

- a) I-Hostel
- b) J-Hostel

A short description of each type of hostel is given below.

a) I-HOSTEL

This is an ordinary hostel consisting of 80 rooms in which 40 rooms are bi-seatry beds and the remaining 40 are cubicals. This hostel is not well furnished and is used for the lower staff of the NARC. It is also allotted to walk-in guests.

b) J-HOSTEL

This hostel also consists of 80 rooms in which 40 rooms are bi-seatry and 40 are cubical. This is well furnished with facility of air-conditioning. The rates of this hostel are higher than I-hostel. This hostel is for VIPs and higher authorities of the organization.

1.5 ADMINISTRATIVE SERVICES

To provide the administrative and management services several sections have been built, and each section is allotted a particular task. The writer is not interested in describing all of them. Some sections related to the undertaken project are :

- a) Budget and finance section
- b) Accounts section

1.5.1 BUDGET AND FINANCE SECTION

The budget section makes the whole budget of the NARC by considering the current year's expenditures and estimates expenses of the coming year. For this purpose, the program incharge of every program is consulted. The financial year of NARC starts from 1st of July and comes to an end on 30th of June, so every program related to research or development is budgeted every year by this section. After finalizing, the budget is sent to Pakistan Agriculture Research Centre (PARC) for approval, and after auditing, the budget is sanctioned and released on quarterly basis. The subsections of budget and finance section then come into action.

1.5.2 ACCOUNTS SECTION

The accounts section of NARC has following subsections.

- a) Salary Section
- b) Drawing and Disbursement Section (DDO)
- c) Audit Section
- d) Ledger Section

a) SALARY SECTION

This section prepares the salary slip of each employee in NARC and a monthly report about the salaries, which is sent to the ledger section.

b) DDO SECTION

The sanctioned budget, first, is divided to each program and then each head, by DDO section. Here again, the program incharge is consulted for this purpose. Payments and receipts are made against head wise and program wise. Before making the payment, the DDO section checks whether this payment is valid or not. Valid means the concerning head contains so much amount or not. If these conditions are fulfilled then this payment is forwarded to the audit section.

c) AUDIT SECTION

The requested payment which is forwarded by DDO section are again checked by audit section, objections are made in the following cases.

- Payment is not related to concerning head.
- Supporting documents are not enough for payment.

d) LEDGER SECTION

This subsection of the accounts section is responsible for maintaining accounts (payable or receivable) for NARC. After auditing, the vouchers are sent in this section and it issues the cheques for the payments. Some programs also produce some income for NARC, this income is received in terms of receipt voucher by this section.

Information of payment and receipts are recorded here in different books, program wise and head wise. At the end of each month an expenditure statement is prepared, each program wise, for getting an idea about the balances of different programs. A trial balance is made time to time. At the end of every financial year an annual balance sheet is prepared .

CHAPTER 2

THE EXISTING SYSTEM

If you judge the people you have no time to love them.

2.1 INTRODUCTION

Program or system study can be responsive only if problem is properly understood. Errors in understanding lead to design errors and to an inappropriate solution. Thus, clarification and analysis of the existing system's working is the developer's first and perhaps the most important step and a thorough study of the existing system is necessary to design a new system which is more efficient, flawless and reliable. This study helps to identify the specifications of the new system and drawbacks of the existing system. Descriptions of the detailed system study and its deficiencies are given in the following sections. These deficiencies enable one to suggest the improvements in the existing system.

2.2 WORKING OF ACCOUNTS DEPARTMENT

The accounts department of NARC has been working manually since its inception. The major work is record keeping and updating of huge books for data entry and reports. There are basically two types of accounts.

- **Accounts Payable**
- **Accounts Receivable**

These accounts are maintained in the following way

- **Financial Accounting**
- **Fixed Assets Accounting**
- **Inventory Accounting**
- **Purchases**

Through accounts payable, all transactions which are related to different programs' heads in terms of payments are made in the form of bank cheques, while other type of accounts are concerned with the receipts from the different programs' heads, received in the form of cheques, i.e. all receipts are made through cheques also, in the NARC bank. The bank issues a receipt which is sent to the ledger section of accounts department.

2.3 PROGRAMS / PROJECTS

NARC mainly deals with three type of programs / projects.

- Non-Development
- Development
- Miscellaneous

2.3.1 NON-DEVELOPMENT PROGRAMS

There are approximately 89 currently running non-development programs. These are actually those programs which are of regular nature and their budget may be increased or decreased but these programs never come to an end for instance wheat, maize, administration and general services etc.

2.3.2 DEVELOPMENT PROGRAMS

There are approximately 31 development programs, these programs are of non permanent nature, and their duration may be one or two years.

2.3.3 MISCELLANEOUS PROGRAMS

These programs are not directly concerned with NARC development or non-development programs but are offered by some other organization for research work to NARC. These are considered to be miscellaneous.

There is a director / program incharge of every program irrespective of its type, who is responsible for all activities of the program. The number of programs are not fixed, it varies from time to time. The Government of Pakistan allocates a budget for every program (Development, Non-development) and for some miscellaneous programs at the beginning of every financial year, which is started from 1st of July. This allocation of budget is made in different releases (installments) on quarterly basis. Director of each program estimates expenditures of the program for the whole year and this estimated budget is sent to PARC.

In PARC, the auditing on budget is done and then the first release is made. In case of non-development programs, release is for all programs. For instance the first installment for non-development programs is about 10 million. This amount is then further distributed according to the budget in all programs. Whereas in case of development, the budget is released for individual program. As already stated that Government of Pakistan is also responsible for the budget of some miscellaneous programs, so these programs are run by our Government while other miscellaneous programs are sponsored by respective organizations.

2.4 BANK ACCOUNTS

There is only one bank in NARC, but this bank contains many accounts of NARC. All the development and non-development programs are budgeted under same bank-account no. i.e. all the development and non-development programs have their same bank-account No. but all miscellaneous programs have different bank-account Nos. There are approximately 18 bank-account Nos. currently used.

044-9 (Non-development)

045-8 (Development)

The following are for miscellaneous programs.

043-0 , 046-7, 057-3 , 059-1 , 064-4 , 082-2

100-0, 113-5 , 0189-0, 0178-0, 0178-7 , 098-4

0180-3, 0175-0, 0174-0 , 0307-0

The budget comes in these bank-account-nos. every year in different releases and all the expenditures are manipulated under these bank-accounts throughout the year. All receipts from different program' heads are recorded in a separate book under the same account no.

2.5 ACCOUNT HEADS

The whole budget of the program, irrespective of its type, is consumed under the following main heads.

- 1- Establishment
- 2- Operation
- 3- Capital
- 4- Others (not commonly used)

2.6 ACCOUNT CODES

For the convenience, every head has a code. Each head is further divided into subheads which have their own codes, in a logical way. The description of these codes is given in appendix A.

Normally for a particular program, all heads are not used for expenses i.e. if in any particular head the opening balance is not mentioned, then that head is not used for expenditures and, hence, balance of that head remains nil. For non-development programs, the expenditure code begins with '7', for development programs it begins with '6' and for miscellaneous programs the code also starts with '6' but we write it as 'Misc.-6'.

2.7 VOUCHERS

For maintaining accounts under these heads, the ledger section uses six types of vouchers.

- 1- Receipt voucher
- 2- Disbursement voucher
- 3- Salary voucher
- 4- Journal voucher
- 5- Disbursement journal voucher
- 6- Petty cash voucher

1- RECEIPT VOUCHER

Some programs of NARC also produce some income for it. Whenever it gets some income from its programs for example maize, honey bee, vegetable, fruit etc. then

this income is deposited in the bank under respective program head and account-no for receipts. The cashier of the bank issues a receipt and gives it to a person who deposits the amount. Then a receipt voucher is prepared and this voucher comes into ledger section. In the ledger section, following information related to this voucher is recorded.

- Date
- Received from
- Account-no
- Program name
- Amount received
- Head code

2- DISBURSEMENT VOUCHER

Whenever NARC issues some cheques for payment of expenditures to its employees or some other bodies, then before taking over the cheques, the person or body fills a disbursement voucher and attach some supporting documents with it for the proof of expenditure. This voucher after auditing comes into the ledger section. In the ledger section, the following information is recorded related to this payment.

- Date
- Payable to
- Account-no
- Program name
- Amount
- Head description
- Head code
- Narration

3- SALARY VOUCHER

The payroll system of NARC is already computerized, the establishment branch sends salary voucher to the ledger section every month and this salary voucher is directly posted to general ledger.

4- JOURNAL VOUCHER

If some error occurs during maintaining accounts for instance in case of incorrect balance, then the journal voucher is used for the correction of balance. The following information are recorded related to this type of voucher.

- Date
- Program name
- Head code
- Debit amount
- Credit amount
- Description

5- DISBURSEMENT JOURNAL VOUCHER

All the cheques issued for payment are entered into the disbursement book. At the end of every month, from entries of disbursement book a disbursement journal voucher is prepared in ledger section.

6- PETTY CASH VOUCHER

For minor expenses upto Rs. 500.00, a petty cash voucher is used by the cashier, for example, expense on photocopy, stamps etc. Actually the cashier draws some amount from a particular program's head in advance using disbursement voucher and then with this amount this type of minor payments are made using petty cash voucher. The following information are recorded related to petty cash voucher.

- Date
- Program name
- Payable to
- On account of
- Amount
- Expense on

2.8 BOOKS

For the entry of above mentioned types of vouchers the following subsidiary books are used in the ledger section.

- Receipt books
- Disbursement books
- Voucher registers
- Salary vouchers
- Advance registers

The first four books are separate for development, non-development and miscellaneous programs, but advance register is same for all types of programs.

A) RECEIPT BOOK

All the information of the receipt voucher and information of un-suspended amount is entered into this book. At the end of every month a summary of this book is prepared and is posted to general ledger.

B) DISBURSEMENT BOOK

All the bank-cheque issued from ledger section are coded into this book. At the end of every month, a disbursement journal voucher is prepared and posted to the general ledger. This book is also used to check the bank reconciliation report.

C) VOUCHER REGISTER

All the information of the disbursement voucher is entered into this book. At the end of every month, a summary is prepared for posting to general ledger and also presented to the management.

D) ADVANCE REGISTER

NARC makes some advance payments to its employees. Through disbursement voucher these information are recorded into this register. Expenditures are presented into the disbursement voucher by that person and un-suspended amount is recovered by receipt voucher. So this register provides information about all employee's advances and balances of these advances.

E) LEDGER

Accounts department (ledger section) is using ledger for the retrieval of details of different accounts heads at the end of the year, this ledger is called general ledger.

GENERAL LEDGER

When all transactions for a particular program have been done, the next step is to classify them according to the account-no. It is done through general ledger. Purposes of maintaining general ledger are as follows.

- To retrieve details about every account-no from a single source.
- To retrieve the balance of any program irrespective of its type.
- To retrieve the balance of any particular account head.
- To do final balancing at the end of the year.
- To produce final reports needed by the department.

At the end of every month, an expenditure statement of every program is prepared and to get an idea of balances, a trial balance is prepared from time to time.

At the end of every financial year first a trial balance is prepared by collecting the expenditure statements of every month and then a balance sheet of budgeted and actual expenditures is prepared and is presented to the management. The management takes some decisions on the basis of these reports to come to know about gains as well as losses from a particular program. On the basis of this decision, a list of next year's programs is prepared.

If in a particular year, the government does not allocate budget for some programs, then these programs are stopped during that particular year.

2.9 DRAWBACKS

There are a number of drawbacks in the existing system, some of them are as follow:

- 1) **P**resently, information is stored in a manner that results in the wastage of storage as well as stationery.
- 2) **T**here is a massive amount of data duplication.
- 3) **F**inal balancing of accounts need a big amount of calculations and when done manually involves a big proportion of errors and is very time consuming.
- 4) **W**henever a mistake is committed in record keeping, it remains until it is pointed out by someone. By that time it becomes very difficult to correct it because of sequential searching mechanism.
- 5) **R**eports about the details of accounts are prepared only at the end of year. If someone needs a detail during the year, it is not available.
- 6) **P**osting of different vouchers to general ledger is also done manually which doubles the amount of manual work and does increases the chances of errors.
- 7) **A** number of books are used for record keeping, these are huge in size, and not easy to handle.
- 8) **D**ue to large number of vouchers, the voucher entry can not be made at correct

time, so no up-to-date information about balances is available.

- 9) The number of employees are not sufficient to do the entire work, and the organization is not in a position to increase man-power.

The volume of flow of information and required input/output has tremendously increased, so to overcome the difficulties faced by the accounts department of NARC, it was felt that an improved system is inevitable.

The department is also willing for the computerization. Keeping in view all these shortcomings it was decided to computerize the accounting system for providing the relevant information and to keep things up-to-date.

CHAPTER 3

THE PROPOSED SYSTEM

Faith in God is no substitute of hardwork.

3.1 INTRODUCTION

Computerization means to change over from a manual system to a computer based system. Since our existing system is working manually, so to computerize it or for its modification it is essential to develop a logical model for the proposed system.

Frequent visits to the organization and interviews of the concerned staff and some executives to understand the existing working strategy are the basis of the proposed system. In addition, various record maintaining documents and reports prepared were consulted to meet the requirements and problems faced by NARC's accounts department.

The objectives of the proposed system should clearly be defined and newly designed system should meet those objectives. A menu driven system has been suggested for proper functioning and requirements of the organization and to make the system more efficient, effective, easy to use and error free.

This chapter explains the objectives of the proposed system, its differences from the existing system, input of the system and describes software and hardware selection.

3.2 PROJECT OBJECTIVES

For a successful database, it is most important that it satisfies the user's requirements. Most projects fail due to the unreasonable expectations attached to them. User's expectations should clearly be defined. The main goal of this project is to design and implement a system in which data entry and report generation is possible, which helps accounts department in decision making. Following objectives are kept in mind while proposing the system:

- The computerized accounts system should have the capability to maintain and process information (daily vouchers) which are entered into it.
- The new system should be efficient.

- It should be error-free and reliable.
- It should be flexible to cope with future changes.
- It should be user-friendly and provide help to user, where necessary.
- The proposed system should be a comprehensive database consisting of insertion, deletion, modification, retrieval for any voucher entry and facilities of various queries and reports.
- The proposed system should minimize redundancy of data which frequently occurs in non-computerized systems.
- The goal of proposed system should be to keep every thing nice and simple for all users.
- To make data reliable, data validation checks should be provided in the system.
- The system should keep the balances of projects, account heads up-to-date.
- The system should generate trial balance and balance sheet whenever it is demanded by the user.

3.3 THE PROPOSED SYSTEM

This section previews the characteristics of the proposed system. It specifies various inputs that are required to be entered and also discusses the desired output.

3.3.1 SPECIFICATION OF THE INPUTS

There are various types of inputs such as constant inputs, variable inputs etc. which are classified according to their mode of entry in the data base. These are discussed in the following paragraphs.

3.3.1.1 CONSTANT INPUTS

Some inputs remain constant during the working of the system. Once these are entered, these can never be changed. These include project code, project type, project name, voucher types and voucher name, account heads and description, book codes, voucher no.1 etc.

3.3.1.2 VARIABLE INPUTS

Some inputs change each time a voucher entry (payment or receipt) is made or when any new project is added in currently running projects. These include voucher data, voucher amount, voucher particulars, cheque #, voucher no. 2, opening balance, credit balance, debit balance etc.

3.3.1.3 CONDITIONAL INPUTS

There are some inputs entered in the system which depend upon some conditions. Such inputs include the entry of new account head which depends upon the condition whether the project incharge sanction some amount for it or not. The entry of new project which depends upon the predicate whether Government or some other organization will allocate budget for it or not. The entry of new book code which depends whether a new account is opened or not in the bank etc. These inputs are called conditional inputs.

3.4 SOFTWARE TOOL FOR DEVELOPMENT

There are three aspects of a database; input and output, the programs that manage all the operations and storage of information. Besides this, the programming aspect is the most important one in this respect that it controls both the input and output activities and storage of information inside a database. Thus, it is very important that a suitable software tool or a database management system is chosen, keeping in view all the aspects of the problem.

The problem under consideration involves the storage and processing of a large amount of data; specifically the voucher of payment or receipt. Moreover, it requires updation and retrieval of balances in the shortest possible time. After the study of different software tools, **FoxPro 2.5 for DOS** was considered to be the most appropriate for the proposed system. It fulfills the above mentioned requirements because of the following features.

It is a database management system, which is basically developed to handle databases.

- It contains all the features of a DBMS, i.e. relations, operations like insertion, deletion, modification etc., data integrity, consistency, crash recovery and 4th GL Tools.
- RQBE (Relational Query By Example) facility to help visually create complex single and multi-table queries for program and reports.
- Debugging and trace facilities and powerful on line help with suitable examples are available for any function used.
- It has menu driven, windowed user interface.
- Powerful and efficient indexing (compact and compound) limited only by memory, are bright features of it.
- It provides low level file functions and handles.
- It is easy to modify, as it has English like syntax which enable even non-technical user to understand and modify the program.
- It contains rich library of commands and functions (specially string and date) which simplifies any programming task.
- Fast processing and we can open up to 25 files at a time, due to this facility we can retrieve and transfer data easily.

3.5 HARDWARE CONSIDERATIONS

The hardware and operating system requirements for the proposed system are

- An IBM PC 80486 / 80386 (AT) or compatible computer with 4 Mb RAM.
- A 200 megabyte hard disk.
- A VGA color monitor.
- A printer with 80 columns width.
- MS-DOS operating system.

CHAPTER 4

SYSTEM DESIGN

Simplicity is that ray that fixes in every heart.

4.1 INTRODUCTION

Design phase is the realization of the proposals developed in the requirement analysis phase of system analysis, so system designing is the most challenging job of all the phases in the system life cycle. Analyst should plan a new system which meets the requirement of the organization. Before development of any system, it is very important to sketch preliminary specifications and with more analysis draw a detailed design, output report and query formats, layout of all the data base files and their relationships. The procedure and functions to be developed are also included in the detailed design. Economy, reliability, responsiveness and modularity should be taken into account in design. These requirements may best be achieved with a modest start and a careful testing of each phase before proceeding to the next. For convenience, the design phase has been divided into the following sub-phases.

- i) Logical database design
- ii) Physical database design

This chapter deals with the details of the logical and physical database design.

4.2 LOGICAL DATABASE DESIGN PHASE

The logical database design consists of

- Output design
- Input design

4.2.1 OUTPUT DESIGN

The output design constitutes an important part of any computerized system, because the end-user of the system is more concerned with the results and their formats, rather than the design and working of the system. Initial output considerations in discussion with the users, include what information is needed, how it should be presented (screen oriented or printed reports), what format it should have, when it is needed and what its volume will be. In designing outputs the following factors are kept in mind.

- i) It should be good looking.
- ii) It should be easy to understand.
- iii) Purpose of the output should be clearly mentioned.
- iv) Output should be precise and without unnecessary information.

There are two types of outputs.

- Screen outputs
- Printed outputs

4.2.1.1 SCREEN OUTPUTS (Queries)

Queries are statements that retrieve data on the screen in any combination, expression or order. Since the proposed system is on-line, therefore on-line outputs should be appropriate, precise and effective. From time to time, management needs some precise information about the payment, receipts and balances etc. for decision purposes. Input query is necessary to produce the brief response in a real time environment. The NARC's accounts system has a facility to get the following queries answered by the system.

- i) Expenses of particular project

Expenses may be in

- a) Summary
- b) Detailed form.

- ii) Expenses of particular account # , these expenses may be in

- a) Summary
- b) Detailed form.

- iii) List of currently running projects.
- iv) Transactions of any particular date.
- v) Highest opening balance of a project.
- vi) Highest payment ever made.
- vii) Balance of a particular account head.
- viii) Highest receipt from any project.

- ix) Balance of any project's account head.
- x) Highest no. of transactions in a day.

4.2.1.2 PRINTED OUTPUTS (Reports)

Report is also a type of query, the only difference being that it is in printed form. The reports of the proposed system are designed so that they are simple, meaningful and informative. In all reports date, page number are mentioned, leading zeroes are suppressed, columns are aligned, commas and dashes are inserted properly and summary totals are calculated where required, each head-code and its description of debit and credit balances are given and headings are prominent. The system produces the following printed reports.

- i) Chart of account
- ii) Edit list of any voucher type within a given period.
- iii) Bank reconciliation report within a given period.
- iv) Trial balance of
 - 1) Particular project under.
 - a) Main
 - b) Control-1
 - c) Control-2
 - d) Subsidiary accounts
 - 2) Non-developments project wise
 - 3) Development project wise
 - 4) Miscellaneous project wise
- v) Balance sheet
- vi) Monthly expenditure list which may be
 - i) Summary
 - ii) Detail
 - iii) Non-development projects
 - iv) Development projects
 - v) Miscellaneous projects

4.2.2 INPUT DESIGN

Input is the information that is required from the user for further processing by the system. Required output cannot be produced until and unless adequate information about the data objects are not inputted. Input design activity is related to design of receiving such information from the user in well format. Input design also concerns with data contents (what is actually needed) data format i.e. (description of data) and auditing (tracing the data through the system). Before designing the data entry system the length and type of each field were determined, keeping in view that it, not only save time and memory, but also avoid duplication and redundancy. Data entry screens were designed and applications were written to get data. In the considered system the inputs are entered mainly from the different types of vouchers while other inputs are rare or entered only once. Input design include the following:

- i) Code design
- ii) Screen Design

4.2.2.1 CODE DESIGN

The data input to a computer system eventually has to be retrieved. So to avoid time consuming data entry and minimize error chances codes have been assigned to different entities; whenever found feasible, in the designed system. Code designing also makes information retrieval quick and efficient. In our system, codes have been designed for the following aspects of the system:

- Account heads
- Account number
- Projects/ Programs
- Voucher types

4.2.2.2 SCREEN DESIGN

Screens are designed for data entry in such a way that the input process is clear and data input is accurate. User can toggle between all enterable fields during data entry and can correct any entry he wants. For updation and deletion, the user is

given the choice to select the records by showing him the data and voucher number etc. and when proper record is retrieved, user can update or delete the record. Where possible help messages are provided during the data entry so that the user can have knowledge of what he has to enter. As already stated that in the designed system data entry mainly consists of vouchers so screens are designed keeping in mind the format of these vouchers for correct data entry and convenience, because users first process these vouchers in department and are well familiar with their format.

4.2.3 PASSWORD

The password system is implemented for security purposes. Whenever a user starts the system, he will have to provide his identity, by typing his password. Those are the actual users of the system which are succeeded in entering correct passwords, and only those can enter the data in the system and can receive output from it.

4.2.4 VALIDATION CHECKS

Several data validation checks have been imposed to each stage to ensure correct data entry. These checks include :

- No duplication is allowed in each field.
- While entering payment voucher user cannot access credit entry, while in receipt voucher user cannot access the debit one.
- User cannot delete the active project or active account head.
- Balances are updated with each entry of voucher and expenditures are calculated simultaneously.

4.3 PHYSICAL DATABASE DESIGN

It is the process of selecting particular storage structure and access path for the data base files to achieve good performance. This is the most important part of system

design. The entire system depends on good file design. The problems of data duplication and data redundancy are taken into account very carefully. Normalization, a technique of database, is used to overcome such problems.

The proposed system contains data files and index files, before describing these files, a brief introduction of these files is given here.

DATABASE (.DBF) FILES

Database files store data in records and fields. Each record is entered to store a set of unique information. FoxPro database files can hold up to one billion records. Each record can contain up to 65,000 bytes, which may use a maximum of 255 data fields.

INDEX (.IDX) FILES

Index files provide the means to use a data base file in a logical order rather than a physical one. The physical order is the order in which the records were entered, where as the logical order is an alphabetical or numeric order based on the field type. Indexes optimize system performance in two ways.

First they minimize database access time by significantly reducing the number of disk input and output operations. Second, indexes enforce primary key uniqueness. Index file relate a key to a corresponding database record number. While using the order of the key item, the key, which can be of one or more fields, may also be used to provide direct access to a particular record.

4.3.1 STRUCTURE OF DATABASE FILES

A brief description of all the database files in the system is given below.

1- MAIN_AC.DBF

This file contains the information of the main account head. It is an **indexed sequential file**. The structure of the file is given below.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	1		Account Code (main)
AC_NM	CHARACTER	40		Account Name

2- COM_NAME.DBF

This file contains information about the company name and its financial year i.e. start and end date of financial year. The structure of file is as under.

PRIMARY KEY : It is an all key relation.

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
CO_NM	CHARACTER	40		Company Name
ST_DT	DATE	8		Starting Date
EN_DT	DATE	8		Ending Date

3) PROJECT.DBF

This is the main file in the developed system, contains all the information related to the projects currently running at NARC. These information include project codes, project name, opening balance, duration and book code under which its expenditures are manipulated. It is an **indexed sequential file**, the structure of this file is given below.

PRIMARY KEY : P_CODE

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
P_CODE	CHARACTER	3		Project Code
P_NAME	CHARACTER	40		Project Name
OP_BAL	NUMERIC	13	2	Opening Balance
US_BAL	NUMERIC	13	2	Used Amount
BALANCE	NUMERIC	13	2	Balance
PG_TYPE	CHARACTER	15		Project Type
REL_AMT	NUMERIC	13	2	Released Amount
B_CODE	CHARACTER	3		Book Code

4- CON1_AC.DBF

This file contains the information about the control-1 account head. It is an **indexed sequential file**. The structure of the file is given below.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	2		Account Code
AC_NM	CHARACTER	40		Account Name

5- CON2_AC.DBF

This file contains the information about the control-2 account head. It is an **indexed sequential file**. The structure of the file is given below.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	3		Account Code
AC_NM	CHARACTER	40		Account Name

6- SUB_AC.DBF

This file contains the information about the subsidiary account heads of the NARC account heads coding scheme. Because the opening balance is mentioned at this level, so this file contains ac_head, ac_name, opening balance, expenses balance and book-code under which these expenses are manipulated. This is an **index sequential file**.

The structure of the file is given below.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	9		Account Code
AC_NM	CHARACTER	40		Account Name
OP_BAL	NUMERIC	13	2	Opening Balance
US_BAL	NUMERIC	13	2	Used Amount
BALANCE	NUMERIC	13	2	Balance
B_CODE	CHARACTER	3		Book Code

7. T_VR.DBF

It is transaction file of the developed database which contains information of all vouchers entered, their code, amount and particulars. It is the mostly used file. The structure of the file is given below.

PRIMARY KEY : VR_DT+VR_NO1+VR_NO2

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	9		Account Code
VR_DT	DATE	8		Voucher Date
VR_NO1	CHARACTER	3		Voucher Type
VR_NO2	CHARACTER	5		Voucher No.
VR_PRT	CHARACTER	50		Voucher Particular
VR_AMT	NUMERIC	13	2	Voucher Amount
VR_ST	CHARACTER	1		Voucher Status
BK_ST	CHARACTER	1		Bank Status
END_DT	DATE	8		Entering Date
ENT OP	CHARACTER	10		Entry Operator

8- V_TYPE.DBF

This file contains all the information related to vouchers i.e. their type, name, nature and position relative to each other. It is an **indexed sequential file**. The structure of the file is given below.

PRIMARY KEY : VR_TYP

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
VR_TYP	CHARACTER	3		Voucher Type
AC_CD	CHARACTER	9		Account Code
AC_NM	CHARACTER	30		Account Description
VR_NT	CHARACTER	1		Voucher Nature
VR_PST	CHARACTER	1		Voucher Position

9-TEMP_VR.DBF

This is a temporary file, used during voucher entry. When, after each entry of voucher the user save the entire voucher, this file is zapped and its contents are then copied into the T_VR.DBF file. The structure of the file is.

PRIMARY KEY : BK_ST

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	9		Account Code
VR_DT	DATE	8		Voucher Date
VR_NO1	CHARACTER	3		Voucher Type
VR_NO2	CHARACTER	5		Voucher No.
VR_PRT	CHARACTER	50		Voucher Particular
DVR_AMT	NUMERIC	13	2	Debit Amount
CVR_AMT	NUMERIC	13	2	Credit Amount
VR_ST	CHARACTER	1		Voucher Status
BK_ST	CHARACTER	1		Bank Status

10-P_RHEAD.DBF

This file is not actually concerned with the main database. No data entry and modification in this file. It is used for reports and an **index sequential file**. The selected records are stored and then displayed. The structure of the file is given as under.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	4		Account Code
AC_NM	CHARACTER	40		Account Name
VR_PRT	CHARACTER	50		Voucher Particulars
BUDGET	NUMERIC	13	2	Budget
E_PMNT	NUMERIC	13	2	Expenditures Of Previous Month
E_CMNT	NUMERIC	13	2	Expenditures Of Current Month
E_UMNT	NUMERIC	13	2	Expenditures Upto This Month
BALANCE	NUMERIC	13	2	Balance

11-P_RTEMP.DBF

It is also temporary file and used only in report generation. The blocks of records are selected are copied here, manipulated and displayed on the screen or printer, then this file is zapped. The structure of the file is as under.

PRIMARY KEY : AC_CD

FILE LAYOUT

Field-name	Type	Width	Dec.	Description
AC_CD	CHARACTER	4		Account Code
AC_NM	CHARACTER	40		Account Name
VR_PRT	CHARACTER	50		Voucher Particulars
BUDGET	NUMERIC	13	2	Budget
E_PMNT	NUMERIC	13	2	Expenditures Of Previous Month
E_CMNT	NUMERIC	13	2	Expenditures Of Current Month
E_UMNT	NUMERIC	13	2	Expenditures Upto This Month
BALANCE	NUMERIC	13	2	Balance

A text file named **P_RATE.TXT** is also used, which is created during the report generation. All the selected records are written on it and from this displayed on the screen.

CHAPTER 5

SYSTEM DEVELOPMENT

A house is built by hands, but a home is built by hearts.

5.1 INTRODUCTION

Once the system is proposed and designed, its development starts which involves the realization of the actual system. In the development phase, the system is built to meet the proposed and designed specifications. The development phase focuses on how? that is done. During development, the software developer attempts to describe how data structures and software architectures are to be designed, how procedural details are to be implemented, how the design will be translated into programming language and testing will be performed.

The system development activities include preparation of a plan, called an implementation plan, for bringing the system into operational use. During the development phase, personnel are trained and preparation is made for changing over a project environment to an operational environment.

5.2 DEVELOPMENT PHASE

The method applied during the development phase will vary depending upon the software engineering paradigm applied. However the most important steps are :

- Development approach.
- Implement the database design.
- Choose the appropriate software tool.
- Develop application to store and retrieve information from the database.
- Test the application with sample data for debugging purposes.
- Produce the desired output.

5.3 DEVELOPMENT APPROACHES

There are several development approaches used in developing system now a days, these are :

5.3.1 TOP DOWN APPROACH

In this approach, the development with a scheme containing high level abstraction and then successive top down refinements are applied. For example a main program is designed first and then its subprograms are written.

5.3.2 BOTTOM UP APPROACH

In this scheme, the developers, start with a scheme containing basic abstractions and then combine or add these abstractions. For example all sub-modules are written and tested separately and then all these modules are combined in a main module.

5.3.3 INSIDE OUT APPROACH

Here the abstractions are focused on a central set of concepts that are most evident. This is a special case of bottom up approach. Modeling them spreads outward by considering new concepts in the vicinity of the existing ones.

5.3.4 MIXED APPROACH

Instead of following any particular approach through out the development; the requirements are partitioned while using a top down approach and part of the scheme is designed for each partition using a bottom up approach. The various scheme parts are then combined.

Out of all these the development approach used in developing the system is the bottom up approach. In this approach all the programs are separately developed and checked, after that, they are linked with the main module. The importance of this approach is that each and every program can be tested separately, and modularity can be achieved. When the developer is satisfied with the working of each and every program then he can link them into menus. Again the system is checked with these menus to ensure that it is error free.

5.4 DATABASE DEVELOPMENT

After selecting the “**FoxPro 2.5 for DOS**” for the development, and designing the database files, the development starts; in the development the computer programs are written and tested with dummy and actual data, using modular approach.

5.5 SYSTEM COMPONENTS

The developed “**Account System of NARC**” consists of the following modules.

- Main Module
- Data Entry Module
- Report Module
- Query Module
- Utility Module
- System Parameter Module

5.5.1 MAIN MODULE

It is the module which controls the whole system and calls different independent modules in a sequence. The starting program which initialize the system are executed first. These programs include :

WELCOME.EXE

This program, written in **Turbo C 2.0** language, welcomes the user displaying beautiful screen having project name, developers, department and the monogram of the organization.

PASS-WORD.PRG

This program, written in **FoxPro 2.5 under DOS**, displays pass-word screen and expects the user pass word. On entering the wrong pass word, it displays a

message “**INVALID PASS-WORD**” and presents another screen again expecting user pass word. Similarly it provides three chances to user, if user could not succeed, then it terminates the FoxPro session.

MENU.PRG

This program controls the main loop and activates the above mentioned modules that are executed recursively, until user wants to end the execution of the system.

GOOD-BY.EXE

This program, written in C-language is executed at the end when user exits form the main loop. This program displays a good-by screen and aborts to the command window of FoxPro.

5.5.2 DATA ENTRY MODULE

This module is used to enter newly arrived data in the related database files. Entry of data in some files are not done on regular basis because not all files in the database are transaction files except **T_VR.DBF** and **TEMP_VR.DBF**. Whenever a new project is started or a new account head is allocated budget, then other files are updated, therefore these files are called code files. The data entry consists of the following sub-modules.

- Project Codes
- Account Codes
- Payment Vouchers
- Receipt Vouchers
- Journal Vouchers

5.5.2.1 PROJECT CODES

This module is used for the project codes, the project codes are entered, edited and can be deleted here. Actually there is no separate module for edit and deletion. This

module activates the program **G_PROJ.PRG** which controls these activities. This program calls the following sub-programs:

A_PROJ.PRG

This is used for the addition of new project records in the database.

E_PROJ.PRG

This is used for the modification of an existing project record.

D_PROJ.PRG

This is used for the deletion of an existing project record.

If that particular project is busy i.e. some payments are made from this project then a message comes

This Project Code is Active Cannot be Deleted.

on the screen, otherwise the project is deleted from the database. After the addition or edit of data an option comes on the bottom of screen

Do You Want to Save This Record.

on pressing 'Y' the required data is committed in the database.

5.5.2.2 ACCOUNT CODES

This module activates the program named **G_CODE.PRG**.

G_CODE.PRG

This sub-module is related to the different account heads in the NARC accounts department. It activate the following options.

- Main Accounts
- Control-1 Accounts
- Control-2 Accounts
- Subsidiary Accounts

MAIN ACCOUNTS

This sub-module activates the **G_MNCD**. Which controls the addition, editing and deletion of main account codes in the database. This program calls the following programs.

- **A_MNCD** for addition
- **E_MNCD** for modification
- **D_MNCD** for deletion

CONTROL-1 ACCOUNTS

This sub-module activates the **G_CNCD1.PRG** which is a group program and controls the addition, editing and deletion of the control-1 account codes in the database. This program calls the following subprograms.

- **A_CNCD1.PRG** for addition
- **E_CNCD1.PRG** for modification
- **D_CNCD1.PRG** for deletion

CONTROL-2 ACCOUNTS

This sub-module activates the **G_CNCD2.PRG** which controls the addition, editing and deletion of the control-2 accounts by calling the following subprograms.

- **A_CNCD2** For addition
- **E_CNCD2** For modification
- **D_CNCD2** For deletion

SUBSIDIARY ACCOUNTS

This sub-module activates the **G_SBCD.PRG** which controls the addition, editing and deletion of the subsidiary account heads by calling the following subprograms.

- **A_SBCD.PRG** For addition

- **E_SBCD.PRG** For modification
- **D_SBCD.PRG** For deletion

5.5.2.3 PAYMENT VOUCHERS

This sub-module is not related with the codes. It is related with the daily transactions. It activates the **G_PMNT.PRG** which is a group program written for the payment vouchers and controls the addition, editing and deletion of payment vouchers by calling the following subprograms.

- **A_PMNT.PRG** For addition
- **E_PMNT.PRG** For modification
- **D_PMNT.PRG** For deletion

5.5.2.4 RECEIPT VOUCHERS

This sub-module is related with the daily transactions of receipt vouchers. It activates the **G_RCPT.PRG** which controls the addition, editing and deletion of the receipt vouchers by calling the following subprograms.

- **A_RCPT.PRG** For addition
- **E_RCPT.PRG** For modification
- **D_RCPT.PRG** For deletion

5.5.2.5 JOURNAL VOUCHERS

This sub-module is related with the transactions of the journal vouchers. It activates the **G_JOUR.PRG** which controls the addition, editing and deletion of journal vouchers by calling the following subprograms.

- **A_JOUR.PRG** For addition
- **E_JOUR.PRG** For modification
- **D_JOUR.PRG** For deletion

5.5.3 REPORT MODULE

Regular outputs reports are designed for PARC and higher management of NARC accounts department. Out of which one is balance sheet prepared normally at the end of the year, Trial-balance can be generated on demand. Chart of account, Bank reconciliation report, edit list, expenditure statement and other reports can be generated as needed by the accounts department. A separate module is written for each report.

5.5.4 QUERY MODULE

Ten queries are written in the developed system, keeping in mind the normal requirement of the user, say balance of any project, particular head, daily transaction etc., a separate module is written for each query.

5.5.5 UTILITIES MODULE

Irrespective of addition, modification and deletion of records, some other facilities are also provided in the developed system. These are :

- Back up
- Data Indexing.

BACK UP

The back up utility provides the DOS back up of all the database files in the system.

DATA INDEXING

The data indexing utility creates an index file of all the used database file. If the index file is already exist, it overwrites it.

5.5.6 SYSTEM PARAMETERS MODULE

Normally all computer based system do not provide such type of module, but to

achieve generalization the developer also include this module in the system, this module has following sub-modules.

- Company Name
- Voucher Type
- Trial Balance Maintenance.
- Global deletion

A separate module is written for each parameter.

COMPANY NAME

If the organization is willing to change his company name then this program can do so by overwriting the previous name.

VOUCHER TYPE

If you add or delete any voucher type from your daily transactions then this parameter can help you in doing so.

TRIAL BALANCE MAINTENANCE

Once the trial balance is generated by the system, it is maintained by this parameter, in order to save the time for re-generation. The new transactions are updated by this module in the previously generated trial balance.

GLOBAL DELETION

At the end of every financial year all the data after back up can be deleted by this sub-module. This data includes :

- All the transaction of vouchers.
- All the projects and their opening balances.
- All the voucher types.
- All the account heads and their opening balances.
- Company name.

CHAPTER 6

SYSTEM IMPLEMENTATION

AND

EVALUATION

*Good better best
Don't let it rest
Until your good is better
And better is the best*

6.1 INTRODUCTION

System implementation and evaluation is the final phase in the system development life cycle, after development of the software. In this chapter various methods of system implementation, description of testing and conversion techniques used for the developed system, are discussed. The system is then evaluated according to the standard.

6.2 SYSTEM IMPLEMENTATION

Implementation is the process of bringing into operational use, a system that has been developed. This phase starts at the beginning of the development phase with a plan, called the implementation plan. Under this plan the new system is tested, converted and replaced by the old system. The new system may be totally new, replacing an existing one or it may be a major modification to an existing system. In either case, proper implementation is essential to provide a reliable system to meet the requirements of the organization. The major parts of this phase are

- System testing
- System conversion

6.2.1 SYSTEM TESTING

Testing and validation of results is very important to make the system acceptable. Even if the system is developed using correct algorithms, its reliability remains doubtful. The system can not be handed over to the user until its accuracy is proved mathematically and by hand. System testing is the process of executing a program, with the intent of finding errors. The data is entered into the database with the intent of determining, whether the system will process it correctly or not. The system testing is performed in the following three steps.

- Unit Testing
- Integrated Testing
- System Testing

UNIT TESTING

In unit testing, different modules of the developed system are tested, independently of each other. The purpose is to determine whether each module is working properly and to locate the logical and coding bugs.

INTEGRATED TESTING

After testing the system at unit level, all these units are combined in a menu driven environment, and then their testing is carried out. The main purpose is to determine that the modules are correctly interacting with each other.

SYSTEM TESTING

System testing is performed to ensure, that it is operating according to the desired specifications and requirements of the organization. The size and structure of data fields are checked while using the actual data. The reports / queries generated by the system were checked against the requirements.

6.2.2 SYSTEM CONVERSION

After the successful completion of testing phase, preparations can be made to switch over to new system. There are four different methods, for performing system conversion ensuring proper working of the system.

- Direct Conversion
- Phase in Conversion
- Pilot Conversion
- Parallel Conversion

DIRECT CONVERSION

In this method, the old system is abandoned and the new one start functioning, no matter how does it perform in the long run. In case of the new system failure, the loss of data may pose several difficulties to the management, if no backup of the old system

is present. This is the major drawback of this type of conversion. That is why this approach requires carefully designed implementation plan. This strategy is also called Cut and Start conversion strategy.

PHASE-IN CONVERSION

The phase-in method is used when it is not possible to install a new system through an organization all at once, i.e. it will be brought in gradually. In this type of conversion long phase-in periods create difficulties.

PILOT CONVERSION

In this method, system is first implemented over a small part of the system or some other small system similar to the existing one, to avoid heavy financial loss and chaos spreading in case of designed system failure.

PARALLEL CONVERSION

In this method, both the systems, existing and designed, work simultaneously for a specific period of time. At the end of the parallel run period, if the new system is approved on the basis of results produced, the existing system will be dropped and the designed system will continue from there onward.

PROPOSED SYSTEM CONVERSION

Since the existing system cannot be discarded at once, direct conversion was not suitable. Pilot conversion was also not good, because the system works as a unit, not in parts. Phase-in conversion was also not applicable due to its similar nature as of pilot conversion. Therefore, the parallel conversion strategy is recommended for this system implementation. Although this implementation approach is more expensive and involves additional work load; the old system will be safe. This approach is selected because :

- It is normally the safest and suitable conversion strategy.
- It minimize the problems that may arise from system failure.

- If unfortunately, system fails, data would not be lost because the old system would also be working in parallel.
- It provides an opportunity to compare the results of the existing system with those of the developed system.

6.3 SYSTEM EVALUATION

Another activity to judge whether the developed system has meet the desired objectives of the proposed system, which are set in the system description, by comparing its merits and demerits, is called system evaluation. The system description is reviewed and evaluated with respect to its completion and efficiency. It also suggests future enhancements in the developed system.

6.3.1 MERITS

Major features of the developed system are :

ACCURACY

By accuracy we mean that the inputs are sufficiently precise for their desired output. This new system is accurate because during data entry several data validation checks are provided. However, there is small probability of incorrect data in non transaction files as a user might input wrong spellings and wrong figures.

EFFICIENCY

The new system is efficient than the existing system of NARC accounts department. To increase system's efficiency the information which are duplicated are now entered only once due the well designed coding structure. The updation of balances, expenditures and remaining balances are done at vouchers entry time, so no additional effort is involved for summation and balance. Also, access of information is very fast because of well designed database.

MODULARITY

The system is divided into a number of modules integrated together to fulfill user's requirements. These modules are independent of each other. Another major advantage of modularity is the ease of modification and extension of the developed system.

EASY TO USE

The developed system is menu driven. Help is provided at every possible point. Data entry, updation and deletion are all provided on a single screen. During data entry, the user can toggle, between almost all fields.

CONSISTENCY

Uniform notations within the system are used to ensure that program contents make its purpose clear to other programs.

SECURITY

In the system, entry can only be made by giving correct user password. A password is also required for global deletion. During data entry of key fields the user remains on that field until the correct figure or code is entered. This makes the system protective from unauthorized user.

6.3.2 DEMERITS

The demerits are identified as.

- The **DOS** backup is provided by the system in the utilities, but it is optional, the user have to select this option before backup. An automatic regular backup strategy should be provided to the system.
- At the initialization of the system, a bulk of data have to entered (only once) for e.g. no of running projects and their related information, the head codes, the voucher types and the book codes etc.
- The system is designed for single user environment. While keeping in mind the number of transactions of vouchers, it should be for multi-user environment to

achieve efficiency.

6.3.3 CONCLUSION

In the end, I would like to say that developing this system was an interesting experience, from practical point of view. I learnt a lot during this, because it was not just based on assumptions, but on actual work. The information was collected, by conducting all the phases of the System Life Cycle, at the concerned department. I hope that with the development of this system some, if not all problems of NARC Accounts section, will be solved.

CHAPTER 7

USER'S GUIDE

*You can fool some people all the time, all people for some time, but you
can't fool all the people all the time.*

7.1 INTRODUCTION

The use of any new system is questionable for the user. Although the system under consideration, is menu driven; options that are provided, self explanatory; proper help and error messages are available at every place where one can face difficulty in operation. However, to operate the system successfully without any difficulty and to gain full usability this guide will help the user.

7.2 GETTING STARTED

In order to start with the developed system, switch on the computer and load the system i.e. on system prompt type "FoxPro" followed by pressing <ENTER>, the FoxPro command window will appear.

Type "DO MENU" followed by pressing <ENTER> key. First of all the well come screen comes with the monogram of the organization. After this a Password screen appears and system asks for password in order to continue execution. If wrong Password is entered, the system will give an error message and will give user one more chance for entering Password. After the entry of correct Password the system will display the "MAIN MENU" as shown in (Fig. 1), which contains the following options.

- Data Entry
- Reports
- Queries
- Utilities
- System Parameters
- Exit

First of all the selection of financial year is made. The space bar is used for the different options of financial year, any other key is for selection. Selection of main menu option is done by light bar or by directly pressing the serial number key. The

National Agriculture Research Centre

Accounts System

(Year 94-95)

MAIN MENU

Year : 94-95

1. Data Entry
2. Reports
3. Queries
4. Utilities
5. Sys. Parameters
6. Exit

Use Arrow Keys to Switch Between Different Options

(Fig. 1)

light bar can be moved from one option to other by using the arrow keys. After the selection of option the respective routine is called and executed. Details about the different routines are given below.

7.2.1 DATA ENTRY

On selection of data entry option from the main menu a sub-menu is appeared on the screen, as shown in (Fig. 2) containing different options. The user can select any option using light bar or by directly pressing the serial number key followed by pressing <ENTER> key. The movement of bar is again handled by arrow keys. This sub-menu contains the following option.

- Project Codes
- Account Codes
- Payments Voucher
- Receipt Voucher
- Journal Voucher
- Exit

PROJECT CODES

On selection of this option from the sub-menu, a screen is appeared, on the bottom of the screen different options are available for the users. These option are

1 ADD 2 EDIT 3 DELETE 4 PREVIOUS 5 NEXT 6 SEARCH 7 EXIT

These options can be selected using light bar or by directly pressing the serial number key followed by <ENTER> key, light bar can be moved with the help of arrow keys.

ADD

On selection of this option, a data entry screen of project codes is appeared as shown in (Fig. 3), and user can enter the data in it. In case of duplicate record the error message is displayed.

National Agriculture Research Centre

Accounts System

Data Entry

- 1. Project Codes**
- 2. Account Codes**
- 3. Payment Vouchers**
- 4. Receipt Vouchers**
- 5. Journal Vouchers**
- 6. Exit**

Use Arrow Keys to Switch Between Different Options

(Fig. 2)

Date:

Time:

Project Codes (Data Entry)

Project No. :
Project Name :
Project Type :
Budget Sanctioned :
Budget Released :
Project Duration :
Book Code :

1.Add 2.Edit 3.Delete 4.Prev. 5.Next 6.Search 7.Exit

(Fig. 3)

EDIT

On selection of this option, a data edit screen is appeared. The user has to enter the project code first which he wants to modify. If this project code exists, the record of that project is displayed and user can modify it, otherwise an error message

“ Record Not Found. ”

is given by the system.

DELETE

On selection of this option, a data deletion screen is appeared. The user has to enter the project code which he wants to delete. If this project code exists the record is displayed on the screen , if this project is not active the user can delete it, otherwise an error message

“ Project Code is Active, Cannot be Deleted ”

is given by the system.

EXIT

This option will take the user back from the sub-menu to data entry.

ACCOUNT CODES

On selection of account codes from the data entry menu, a sub-menu is appeared as shown in (Fig. 4) with different options, the user can select any option using light bar or by directly pressing the serial number key followed by < ENTER> key . This sub-menu contains following options.

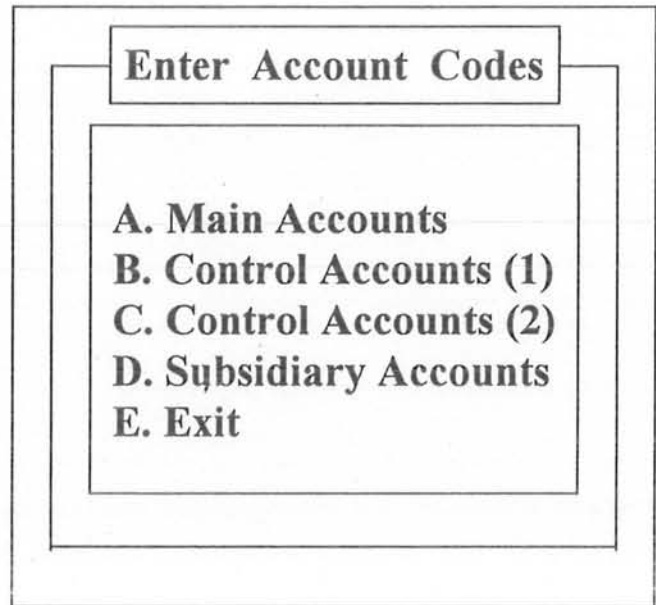
- Main Accounts
- Control-1 Accounts
- Control-2 Accounts
- Subsidiary Accounts
- Exit

On selecting any of the above option, the respective account code screen is appeared, containing following options in the bottom

1 ADD 2 EDIT 3 DELETE 4 PREVIOUS 5 NEXT 6 SEARCH 7 EXIT

National Agriculture Research Centre

Accounts System



Use Arrow Keys to Switch Between Different Options

(Fig. 4)

These options can be selected using light bar or by directly pressing the serial number key followed by <ENTER> key. The light bar can be moved with the help of arrow keys.

ADD

This option will add a new account code in the file.

EDIT

This option will modify an existing account code record.

DELETE

This option will delete an existing account code record if it is not active.

EXIT

This option will take the user back from the sub-menu to data entry.

PAYMENT VOUCHERS

On selection of this option from the data entry menu, the payment voucher screen is appeared as shown in (Fig. 5) containing following options in the bottom.

1 ADD 2 EDIT 3 DELETE 4 PREVIOUS 5 NEXT 6 SEARCH 7 EXIT

These options can be selected using light bar or by directly pressing the serial number key followed by <ENTER> key. The light bar can be moved with the help of arrow keys.

ADD

This option will add a new payment voucher in the transaction file.

EDIT

This option will modify an existing payment voucher in the transaction file.

DELETE

This option will delete an existing payment voucher.

EXIT

This option will take the user back from the sub-menu to data entry.

RECEIPT VOUCHERS

On selection of this option from the data entry menu, the receipt voucher screen is appeared as shown in (Fig. 6) containing following options in the bottom.

1 ADD 2 EDIT 3 DELETE 4 PREVIOUS 5 NEXT 6 SEARCH 7 EXIT

These options can be selected using light bar or by directly pressing the serial number key followed by <ENTER> key. The light bar can be moved with the help of arrow keys.

ADD

This option will add a new receipt voucher in the transaction file.

EDIT

This option will modify an existing receipt voucher in the transaction file.

DELETE

This option will delete an existing receipt voucher.

EXIT

This option will take the user back from the sub-menu to data entry.

JOURNAL VOUCHERS

On selection of this option from the data entry menu, the journal voucher screen is

Receipt Vouchers (Data Entry)

Book : 000-00-00-00

Date: Vr. No.

A /C Code	Particulars	Debit	Credit
	Total		

1. Add 2. Edit 3. Delete 4. Prev. 5. Next 6. Search 7. Exit
--

(Fig. 6)

appeared as shown in (Fig. 7) containing following options in the bottom.

1 ADD 2 EDIT 3 DELETE 4 PREVIOUS 5 NEXT 6 SEARCH 7 EXIT

These options can be selected using light bar or by directly pressing the serial number key followed by <ENTER> key. The light bar can be moved with the help of arrow keys.

ADD

This option will add a new journal voucher in the transaction file.

EDIT

This option will modify an existing journal voucher in the transaction file.

DELETE

This option will delete an existing journal voucher.

EXIT

This option will take the user back from the sub-menu to data entry.

7.2.2 REPORTS

Several reports are generated by the system, which are presented to the management for decision making. On selecting this option from the main menu, a sub-menu is appeared on the screen as shown in (Fig. 8) containing the list of reports. These reports are :

Report # 1:

Print the chart of accounts

Report # 2:

Edit list of any voucher type with in a given period.

Report # 3:

Bank reconciliation report with in a given period.

Accounts System

Reports

- 1. Chart of Accounts**
- 2. Edit List**
- 3. Bank Book**
- 4. Trial Balance**
- 5. Balance Sheet**
- 6. Expenditure List**
- 7. Exit**

Use Arrow Keys to Switch Between Different Options

(Fig. 8)

Report # 4:

Trial balance of

- i) Particular project under following heads
 - a) Main heads
 - b) Control-1 heads
 - c) Control-2 heads
 - d) Subsidiary heads
- ii) Non development projects
- iii) Development projects
- iv) Miscellaneous projects

Report # 5:

Balance sheet

Report # 6:

Monthly expenditure statement, which may be

- i) Detailed
- ii) Summary
- iii) Non development projects
- iv) Development projects
- v) Miscellaneous projects

The user can select any report by using light bar or by pressing the serial number key followed by pressing <ENTER> key. The movement of bar can be handled using arrow keys. On selection of any report the user is prompted for the entry of some key fields of that particular report followed by device options.

SCREEN PRINTER

as shown in (Fig. 9). Choice list of these options can be handled by space bar and selection is done by pressing < ENTER > key. After this messages

“ Working in Progress”

“ Please Wait ”

and

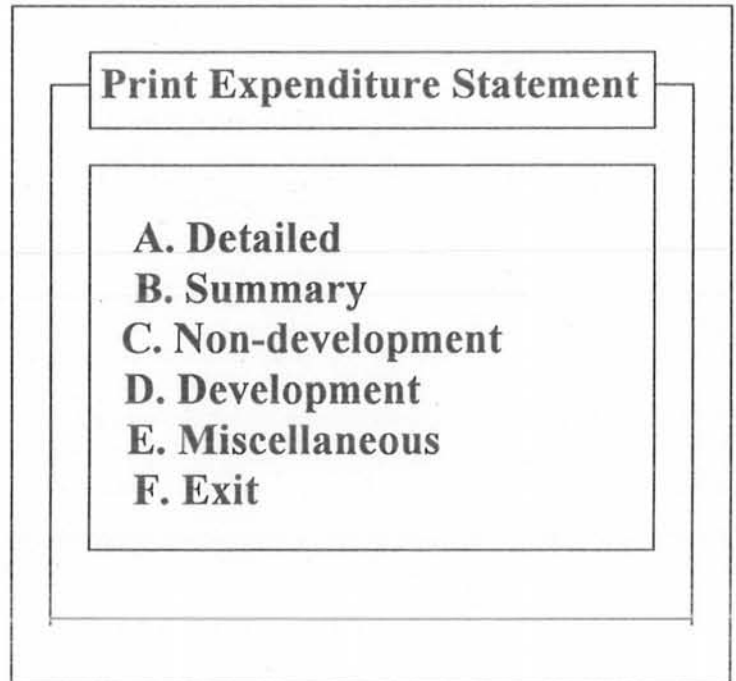
“ Printing in Progress”

“ Please Wait ”

are appeared on the screen, as shown in (Fig. 10) and after a short while the results of

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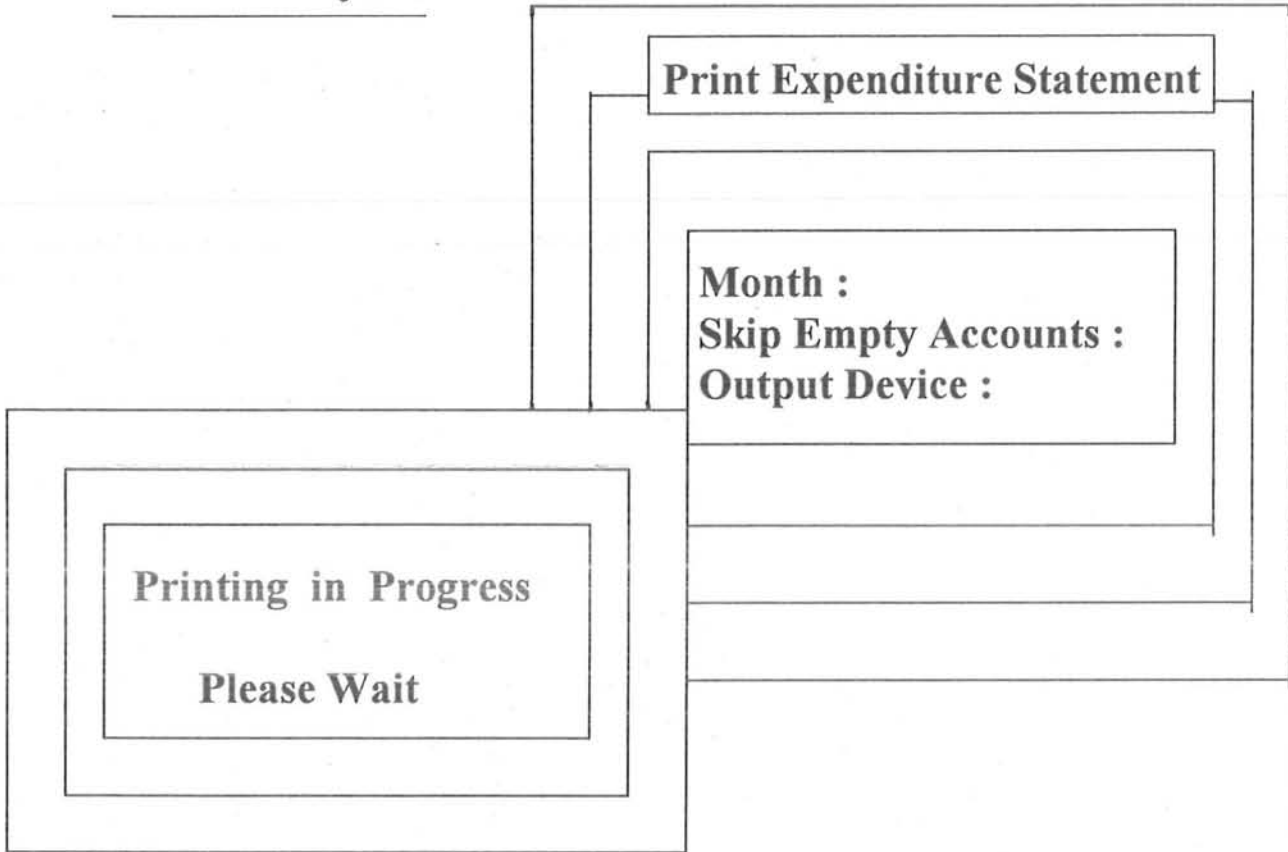
Accounts System



Use Arrow Keys to Switch Between Different Options

(Fig. 9)

Accounts System



(Fig. 10)

the corresponding report are displayed on the selected device, if data is available. If the entered key fields of report do not match with any record in the database then

“ Sorry ! Data is not Available ”

message is appeared on the selected device.

7.2.3 QUERIES

Like report option, on selection of queries option from the main menu, a sub-menu is appeared containing the list of queries, as shown in (Fig. 11). The following queries are available for users.

Query # 1:

Expenses of any particular project, these expenses may be in

- i) Summary
- ii) Detailed

form.

Query # 2:

Expenses of any particular account # , these expenses may be in

- i) Summary
- ii) Detailed

form.

Query # 3:

List of currently projects

Query # 4:

Transactions of any particular date.

Query # 5:

Highest opening balance of a project.

Query # 6:

Highest payment ever made in any transaction.

Query # 7:

Balance of any particular account head.

Query # 8:

Highest receipt from any project's head.

Accounts System

Queries

- 1. Particular Project Expenses**
- 2. Particular Account # Expenses**
- 3. Currently Running Projects**
- 4. Particular Date Transactions**
- 5. Highest Opening balance**
- 6. Highest Payment Made**
- 7. Highest Receipt**
- 8. Particular Head Balance**
- 9. Particular Project Head Balance**
- 10. Highest No. of Vouchers in a Day**
- 11. Exit**

Use Arrow Keys to Switch Between Different Options

(Fig. 11)

Query # 9:

Balance of particular project account head.

Query # 10:

Highest number of transactions in a day.

The selection of any query is made using light bar or by directly pressing the serial number key, followed by pressing <Enter> key. On selecting any query the user is prompted for some key fields of the query. After the entry a message

“ Working in Progress”

“Please Wait”

is appeared on the screen as shown in (Fig. 12), and then the results of the query are displayed on the screen. If the entered key fields of query does not match with any record in the database then

“ Sorry ! Data is not Available”

message is displayed on the screen by the system.

7.2.4 UTILITIES

On selecting this option from main menu, a sub-menu is appeared as shown in (Fig. 13), having following options.

- Data Backup
- Data Indexing
- Exit

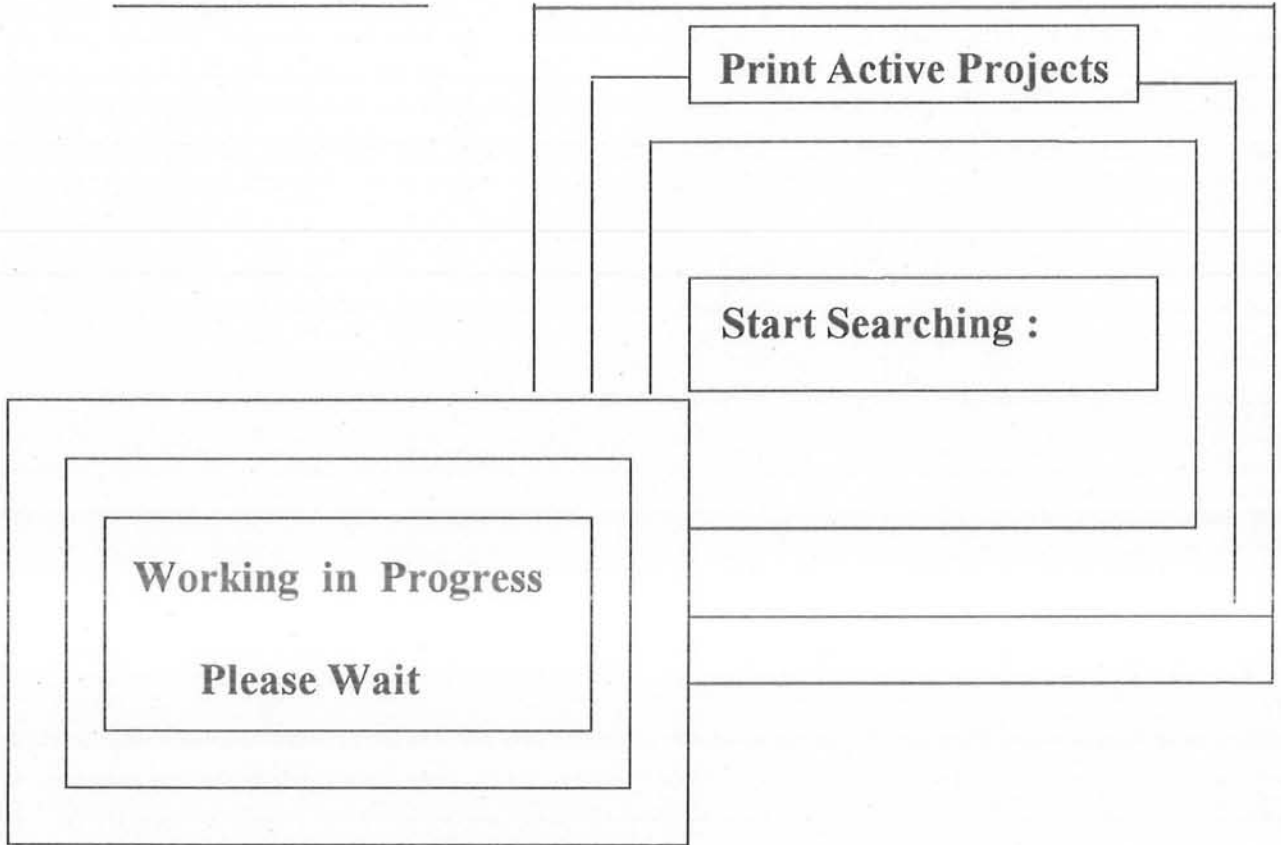
The selection of any option is made using light bar or by directly pressing serial number key, followed by pressing <ENTER> key. The movement of bar can be made using arrow keys.

DATA BACKUP

This option provides the DOS backup of all the database files. On selecting this option a screen with a message **“ Insert Floppy in Drive A and press return ”** is appeared. After pressing return

National Agriculture Research Centre

Accounts System



(Fig. 12)

National Agriculture Research Centre

Accounts System

Utilities

- 1. Data Backup**
- 2. Data Indexing**
- 3. Exit**

Use Arrow Keys to Switch Between Different Options

(Fig. 13)

“ Please Wait ”

message is given by the system and then the data is copied on the floppy in drive A.

DATA INDEXING

On selecting this option from the sub-menu a screen with message “ Please wait ” is appeared, then indexes of all the database files are created. If these indexes already exist then these are updated using this option.

EXIT

This option will take the user back from the sub-menu to main menu.

7.2.5 SYSTEM PARAMETERS

On selecting this option from main menu, a sub-menu is appeared on the screen as shown in (Fig. 14) containing following options.

- Company Name
- Voucher Types
- Trial Balance Maintenance
- Global Deletion
- Exit

The selection of any option can be made using light bar or by directly pressing the serial number key, followed by pressing < ENTER > key. Movement of bar can be controlled with arrow keys.

COMPANY NAME

On selecting this option from the sub-menu, with a message “ Enter Company Name ” is appeared. The user can enter the new name followed by pressing < ENTER > key. The name of the company is then replaced by the new one.

VOUCHER TYPE

On selecting this option from the sub-menu, a data entry screen of new voucher type is appeared and user can enter the related information of that particular voucher type.

National Agriculture Research Centre

Accounts System

System Parameters

- 1. Company Name**
- 2. Voucher Types**
- 3. Trial Balance Maintenance**
- 4. Global Deletion**
- 5. Exit**

Use Arrow Keys to Switch Between Different Options

(Fig. 14)

TRIAL BALANCE MAINTENANCE

On selecting this option from the sub-menu, the previously generated trial balance is updated using the transactions after its creation. This option makes no effect, if trial balance has not yet been created.

GLOBAL DELETION

On selection of this option from the sub-menu, the user is prompted with a password screen. On entering correct password all the voucher types, account codes, voucher transactions and running projects can be deleted by selecting "Y" in each option on this screen. Hence, it is recommended that do not use this option in normal operation.

EXIT

This option will take the user back from the sub-menu to main menu.

7.2.6 EXIT

On selection of this option from the main menu, the system will be closed and the user will be taken back to the command window of **FoxPro 2.5**.

7.3 HOT KEYS

Some hot keys are also available in the system. Whenever these are pressed (may be during any process) the running process is suspended and these are given priority to be executed.

ESC Key

When it is pressed the running process is aborted immediately. It is also used for picking data from the help window during code entry.

In data entry of vouchers, several keys are available for the help of users. These are :

F1 Key

On pressing this key, a help window is appeared containing the key fields with description, by pressing ESC key user can take data from this window.

F2 Key

It is used for the same purpose as F1 key.

F9 Key

Is used for the addition of current entry in the voucher (Payment, Receipt etc.).

F10 Key

Is used for modification of the current entry in the vouchers.

F11 Key

Is used for the deletion of the current entry in the vouchers.



APPENDICES

Happiness is crazy mathematics, it multiplies when you divide it.

APPENDIX A
ACCOUNT CODES

<u>ACCOUNT HEAD</u>	<u>TITLE OF ACCOUNT</u>
---------------------	-------------------------

71	Establishment Expenses
71-1	Salaries & Allowance
71-10	Salaries & Allowances Officers
71-10-01	Basic Salary
71-10-02	House Rent Allowance
71-10-03	Conveyance Allowance
71-10-04	Indexation
71-10-05	Research Allowance
71-10-06	Qualification Allowance
71-10-07	Miscellaneous Allowance
71-10-08	Deputation Allowance
71-11	Salaries & Allowances Staff
71-11-01	Basic Salary
71-11-02	House Rent Allowance
71-11-03	Conveyance Allowance
71-11-04	Indexation
71-11-05	Research Allowance
71-11-06	Qualification Allowance
71-11-07	Miscellaneous Allowance
71-11-08	Deputation Allowance
71-12	Contigent Paid Staff
71-2	Other Benefit
71-20	Other Benefits Officers
71-20-01	Honoraria
71-20-02	Overtime
71-20-03	Bonus
71-20-04	Awards
71-20-05	Uniform & Liveries
71-21	Other Benefit Staff
71-21-01	Honoraria
71-21-02	Overtime
71-21-03	Bonus
71-21-04	Awards
71-21-05	Uniform & Liveries
71-3	Medical Charges
71-30	Medical Charges Officers
71-31	Medical Charges Staff
71-4	Contributions
71-40	CPF Contribution
71-41	Welfare Fund Contribution
71-42	Group Insurance

71-43	Prov. For Gratuity/Pension Contributions
71-44	Foreign Services Contribution
72	Operating Expenses
72-1	Transportation
72-10	TA / DA To Officers & Staff
72-11	TA / DA Non Officials
72-12	Conveyance Charges
72-13	Running Cost of Vehicles
72-14	Transportation of Goods
72-15	TA / DA Foreign Experts
72-2	Communications
72-20	Postage & Telegram
72-21	Telephone & Trunk Calls
72-22	Telex & Teleprinters
72-23	Courier & Pilot Services
72-3	Utilities / Office Supp / Rent
72-30	Utilities
72-30-01	Gas
72-30-02	Electricity
72-30-03	Water
72-31	Stationery
72-32	Printing & Publications
72-33	Newspapers & Periodicals
72-34	Rent of Office Buildings
72-35	Rent of Residential Buildings
72-36	Consumable Stores
72-37	Other Misc. Expenditure
72-38	Land Lease
72-4	Repair & Maintenance
72-40	Office Buildings
72-41	Residential Buildings
72-42	Research Equipment & Machinery
72-43	Computer & Office Equipment
72-44	Furniture & Fixture
72-45	Vehicles
72-46	Others
72-5	Other Services
72-50	Audit Expenses
72-51	Legal Expenses
72-52	Consultancy Services
72-53	Essay Article & Bulletin Writing
72-54	Payment to Other Agencies / Misc.
72-55	Other Services-DPL

72-6	Other Charges
72-60	Publicity & Advertisement
72-61	PARC Contribution to Foreign Agencies
72-62	Project Review Expenses
72-63	Seminar / Workshops / Conferences
72-64	Foreign Delegation
72-65	Delegation Abroad
72-66	Scholarships / Stipend
72-67	Unforeseen Expenditure
72-69	Other
72-69-01	Meeting Expenses
72-69-02	Entertainment & Gifts
72-69-03	Bank Charges
72-69-04	Custom Duty / Sale Tax
73	Capital Expenses
73-1	Fixed Assets
73-10	Land
73-10-01	Freehold Land
73-10-02	Leasehold Land
73-11	Buildings
73-11-01	Buildings on Freehold Land
73-11-02	Buildings on Leasehold Land
73-12	Research Equipments & Machinery
73-13	Computer & Office Equipment
73-14	Furniture & Fixture
73-15	Vehicles
73-16	Livestock
73-17	Books
73-19	Other Assets (Subscription of International Databases)
73-2	Capital Work in Progress
73-20	Irrigation Works
73-21	Embankment & Drainage Works
73-22	Buildings
73-29	Other Works
74	Others

APPENDIX B

CURRENTLY RUNNING PROGRAMS

NON DEVELOPMENT PROGRAMS

- 1) Administration & general services
- 2) Planning research & monitoring cell

(a) CROP SCIENCES INSTITUTE

- 3) Wheat coord. unit
- 4) Wheat P.I. unit
- 5) Rice coord unit
- 6) Rice P.I. unit
- 7) Sorghum & Millet coord. unit
- 8) Sorghum & Millet P.I. unit
- 9) Maize P.I. unit
- 10) Maize coord. unit
- 11) Pulses coord. unit
- 12) Pulses P.I. unit
- 13) Oil seed coord. unit
- 14) Oil seed P.I. unit
- 15) Sugar coord. unit
- 16) Sugar P.I. unit
- 17) Plant introduction centre
- 18) Plant genetic resources
- 19) Crop sciences directorate
- 20) Fruit
- 21) Vegetable coord. unit
- 22) Vegetable P.I. unit
- 23) Flouri-culture

(b) ANIMAL SCIENCES INSTITUTE

- 24) Animal sciences institute
- 25) Livestock research station
- 26) Animal health
- 27) Reproductive Physiology buffalo
- 28) Embryo transfer
- 29) Dairy technology
- 30) Animal breeding & genetic
- 31) Poultry performance testing
- 32) Dairy cattle cross-breeding
- 33) Aqua culture in Rawal Lake
- 34) Livestock feed resources
- 35) Catla Catla

(c) NATURAL RESOURCES INSTITUTE

- 36) Honey bee research program
- 37) Remote sensing
- 38) Forage & pasture coord. unit
- 39) Forage & pasture
- 40) Fooder coord. unit
- 41) Fooder
- 42) National Herbarium
- 43) Barking deers in Margala Hills
- 44) Research planning system
- 45) Agro-forestry
- 46) Sericulture
- 47) High efficiency irrigation system
- 48) Agro-meteriology
- 49) Rawal watershed management
- 50) Fertilizer use efficiency
- 51) Applied micro biology
- 52) Micro nutrient
- 53) Soil capabilities assess. network
- 54) Soil & water conservation barani land

(d) SOCIAL SCIENCES INSTITUTE

- 55) Computer & statistics section
- 56) Agri-extension
- 57) Agriculture economics research unit

(e) CENTRAL LABS

- 58) Tissue culture
- 59) Virus diseases
- 60) Entomolgy research labs
- 61) Vertebrate pest control
- 62) Food nutrition quality labs
- 63) Cyto-genetic labs
- 64) Lab. Equipment maintenance & repair unit
- 65) Farm machinery institute
- 66) Crop diseases research unit
- 67) Cori muree
- 68) Training institute
- 69) Farm operation & services
- 70) Workshop
- 71) Scientific information unit

(f) OTHER THAN REGULAR

- 72) Water resources research institute
- 73) ORP ARP-II
- 74) PARC Strengthening
- 75) Laryus improvement program
- 76) ORP range research project in Pothohar area
- 77) ORP livestock feed & MGT. in Pothohar area
- 78) Asian grain legumes network
- 79) Improv. of small runinants project
- 80) Audio video communication channel-II
- 81) Barani agriculture research & development(BARD)
- 82) Weeds
- 83) Jordanian training
- 84) Plant nutrition
- 85) I C MOD
- 86) Operational research project
- 87) Tissue culture lab. Rawalpindi
- 88) Rice bio-technology
- 89) Rice wheat project

DEVELOPMENT PROGRAMS

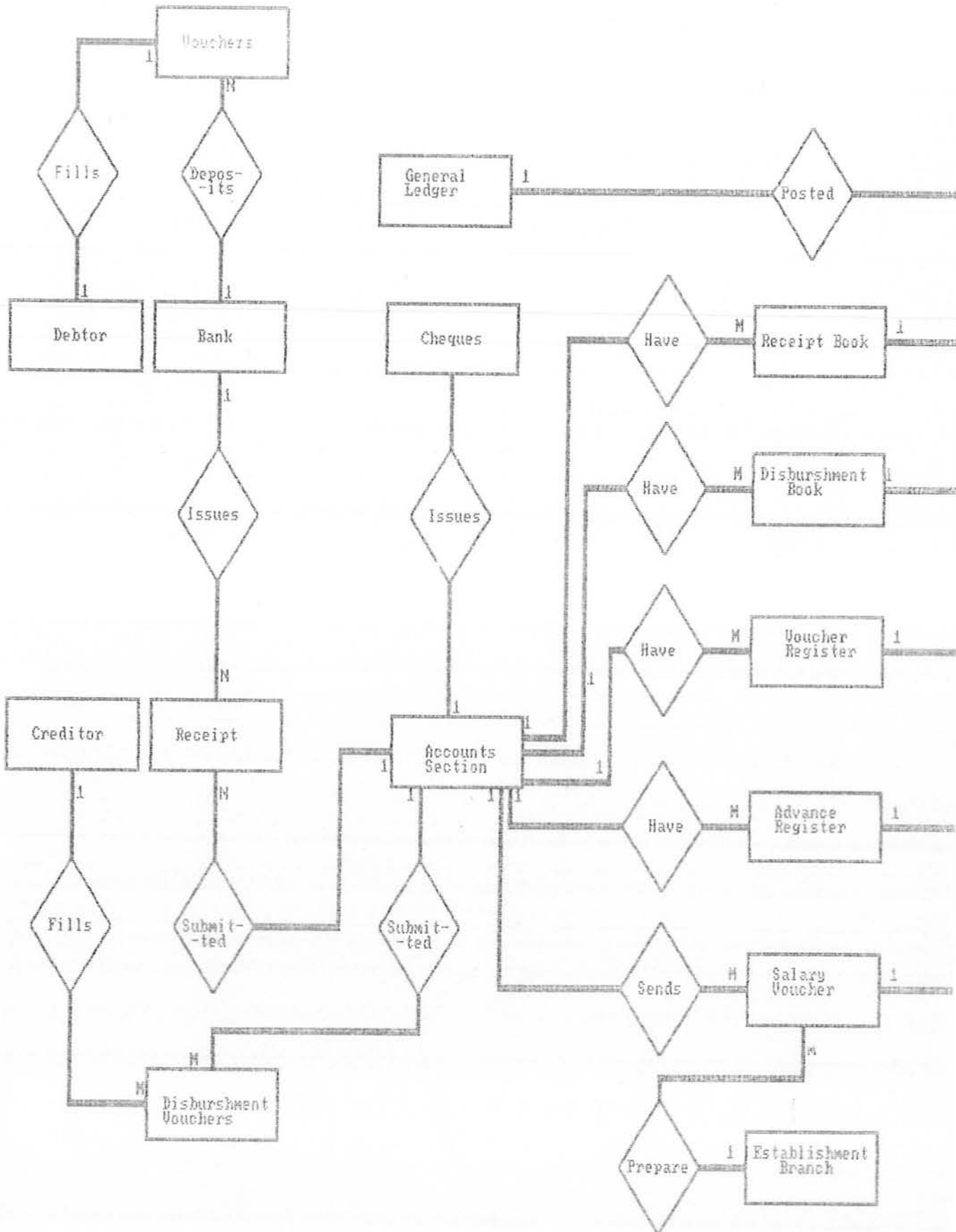
- 1) Audio video communication / MART media
- 2) MART training
- 3) MART training courses
- 4) FSR coord. unit
- 5) FSR long term trail
- 6) FSR Fateh Jang
- 7) Italian technology assistance
- 8) FSR oil seed
- 9) FSR / LRRI Gujar Khan
- 10) FSR / TTU Gujar Khan
- 11) FSR / Fooder Gujar Khan
- 12) FSR / Pulses Gujar Khan
- 13) FSR / Agro-forestry Gujar Khan
- 14) Range water management ARP-II
- 15) Stress physiology (ODA)
- 16) Sheep & wool
- 17) Horti-culture research
- 18) Soil fertility
- 19) AERU (ARP-II) NARC Component
- 20) Soil physics (ARP-II) NARC Component
- 21) Nili Ravi
- 22) Integrated pest management
- 23) Hydo precardium
- 24) Date palm tissue culture
- 25) Studies on improvement of Haemorrhagic Vac.
- 26) Studies on Semen Pro & Jersi crossbread
- 27) FSH Purification
- 28) PHY. ASP. of crop production under stress environment
- 29) ET. of Sahiwal cattle (Embryo transfer)

MISCELLANEOUS PROGRAMS

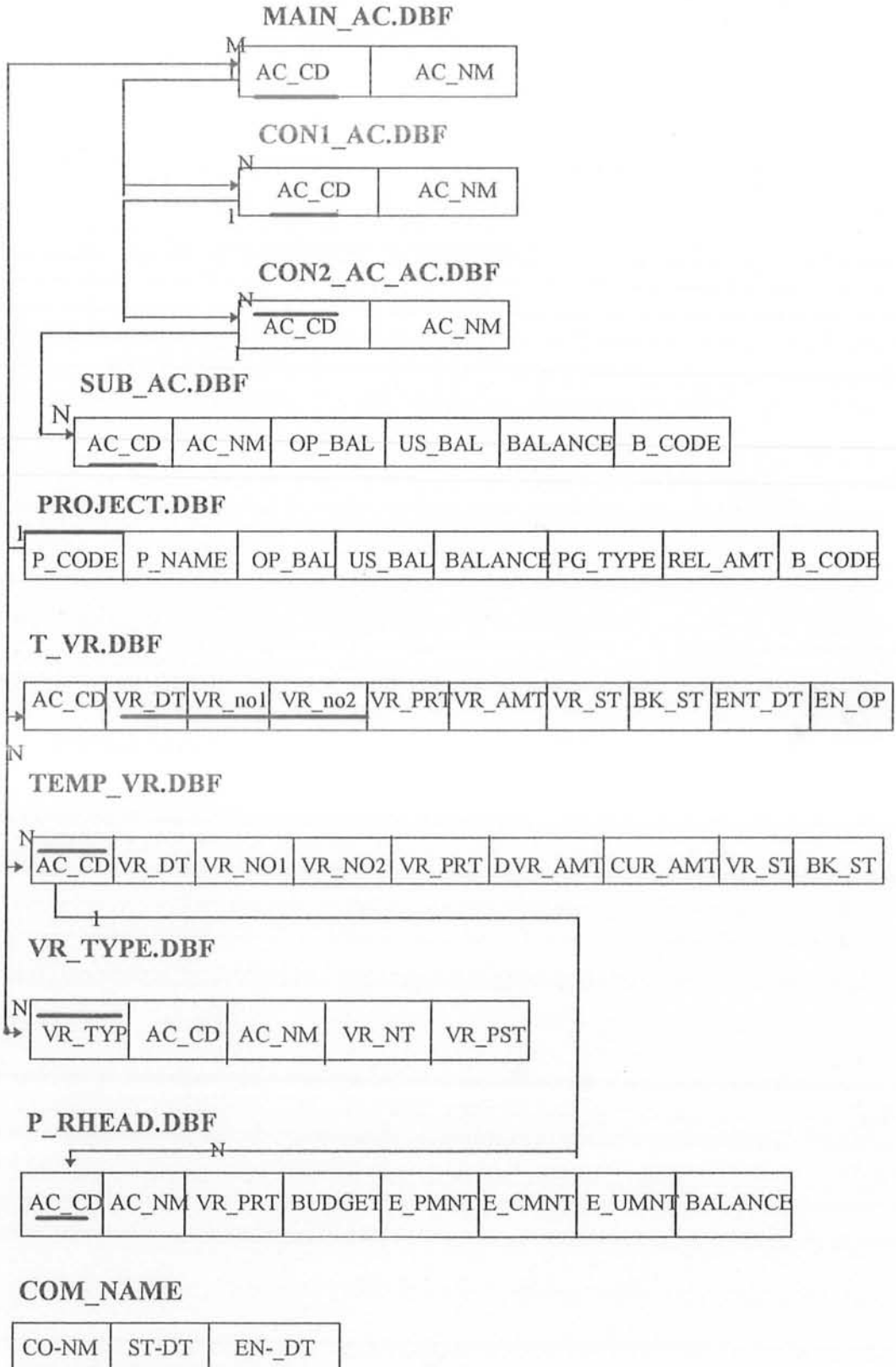
- 1) Irrigation system management
- 2) PEP Fruit
- 3) Green bug
- 4) Soil chemistry
- 5) University grants commission(UGC)
- 6) Dairy cattle cross-breeding phase-II
- 7) Rice Wheat Rice
- 8) Tractor testing, FMI
- 9) Genetic resources seed research lab.
- 10) Leaf curl virus diseases in tomato & potatos
- 11) Bacterial wilt in tomato & pepper
- 12) MGT. of Moist & Facts. in tomato & chill
- 13) NARC Facilities ARP-II
- 14) Horticulture-II
- 15) Agro forestry ARP-II

APPENDIX C

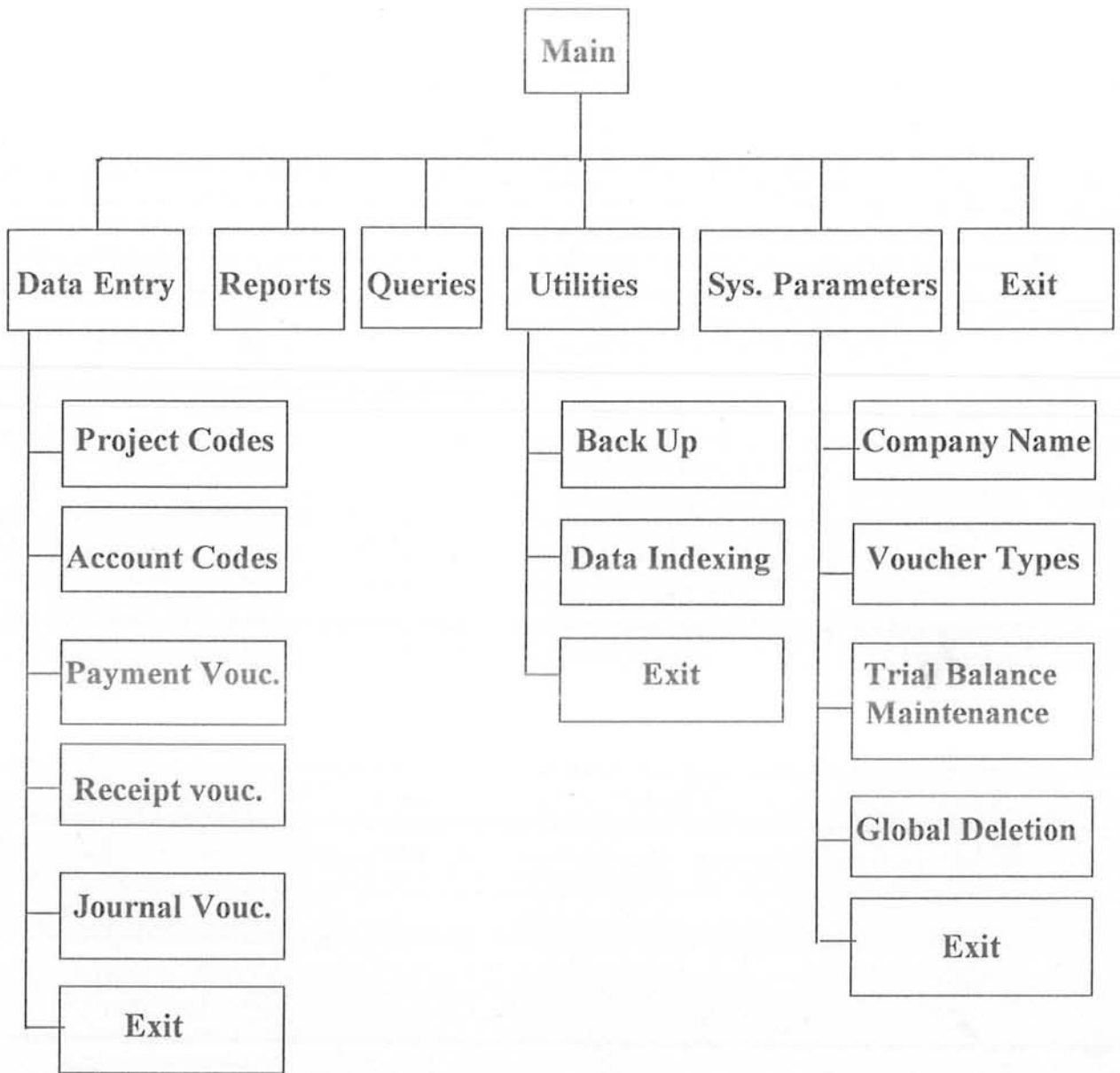
ENTITY RELATIONSHIP DIAGRAM



EXTENDED BACHMAN DIAGRAM



System Chart



APPENDIX D

SOME SAMPLE REPORTS

NATIONAL AGRICULTURE RESEARCH CENTRE

EXPENDITURE STATEMENT

SUMMARY : (PROJECT)

MONTH : MAR., 1995

CODE	PROJECT TITLE	EXP. UPTO PREVIOUS MONTH	EXP. OF CURRENT MONTH	EXP. UPTO CURRENT MONTH	BALANCE
001	Administration and genral services	1,500.00	2,920.00	4,420.00	-4,420.00
002	Planning research & monitoring cell	2,000.00	1,500.00	3,500.00	-3,500.00
003	Wheat coord. unit	1,200.00	2,700.00	3,900.00	-3,900.00
004	Oil seed coord. unit	3,000.00	2,200.00	5,200.00	-5,200.00
020	Fruit	3,400.00	2,000.00	5,600.00	-5,600.00
024	Animal sciences institute	1,5000.00	4,000.00	19,000.00	-19,000.00
110	Nili Ravi	2,300.00	1,800.00	4,100.00	-4,100.00
117	Irrigation system management	23,000.00	21,000.00	44,000.00	-44,000.00
	Total	51,400.00	38,120.00	89,520.00	-89,520.00

NATIONAL AGRICULTURE RESEARCH CENTRE

BANK RECONCILIATION

FROM : 02-02-95

UPTO : 06-06-95

ACCOUNT #	DEBIT AMOUNT	CREDIT AMOUNT	BALANCE
045-8	100.00	-334,495,013.00	-334,494,913.00
0175	0.00	-785,263,314.70	-785,263,314.70
043-0	650.00	-649,748.00	-649,098.00
046-7	3500.00	-3,543,158.00	-3,539,658.00
057-3	950.00	-3,527,659.00	-3,526,709.00
059-1	1,260.00	-4,365,768.00	-4,364,508.00
064-4	0.00	-345,726,589.00	-345,726,589.00
082-2	0.00	-54,236,157.00	-54,236,157.00
100-0	0.00	-3,245,768.00	-3,245,768.00
113-5	0.00	-3,245,768.00	-3,245,768.00
189-4	0.00	-21,654,657.00	-21,654,657.00
178-4	0.00	-3,427,654.00	-3,427,654.00
178-7	0.00	-236,576.00	-236,576.00

NATIONAL AGRICULTURE RESEARCH CENTRE

TRIAL BALANCE (CONTROL-1 ACCOUNTS)

PROJECT: A ADMINISTRATION & GENERAL SERVICES

DATE: 06-07-95

CODE	PARTICULARS	DEBIT	CREDIT
71	Establishment Expeences	7,410.00	
			600.00
71-1	Salaries & Allowances	5,820.00	
			500.00
71-2	Other Benefits	1,590.00	
			100.00
72	Otperating Expences	200.00	
72-1	Tranportation	200.00	
	Head office sanction		658,399,040.00
	Bank balance	658,406,650.00	
	Total :	658,399,640.00	658,399,640.00

APPENDIX E

SOURCE DOCUMENTS

PAKISTAN AGRICULTURAL RESEARCH COUNCIL

RECEIPT VOUCHER

Date _____

Name of fund _____

Received from _____

Account of _____

Name of Project _____

Amount Received Rupee. _____

CODE No.	NARRATION	AMOUNT	
		Rs.	Ps.
TOTAL			

DOCUMENTS ATTACHED : (Please mention here all supportings attached)

Prepared by	Checked by	Authorised by	Posted	Voucher No.
-------------	------------	---------------	--------	-------------