Dedication

To our Parents, who brought us up in the appropriate educational and religious atmosphere and whose far-sightedness and guidance enables us to achieve the comprehensive understanding as a result we are able to do this project.

Rizwan Mushtaq Khokhar
Sajjad Hyder Nasir

Acknowledgement

First of all we would like to thank Allah the Almighty, for his blessings that enabled us to complete our project and our degree.

We are greatly thankful to Mr. Bilal Ashraf Awan, because he guided us to understand the Project, after which we are able to produce the outcome in a systematic way.

We would also be grateful to our teacher Mr. Shehzad Qureshi for his guidance and assistance throughout the project lifecycle.

Certificate

We accept the work contained in this report as a confirming to the required standard for the partial fulfillment of the degree of MCS.

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Abstract

Accounts Manipulation System for National Savings Organization is converted from manual system to computerized system. This system allows management of National Savings to monitor the activities effectively. Previously National Savings management was using manual ledgers to maintain these records but it was not efficient and organized. Now with the development of new computerized system, most of the Services related to the accounts management are automated.

The system is covering the major accounts offered by National Savings Organization, which are Savings Account and Special Savings Account.

List of Figures

Table of Contents

Chapter 1

Introduction

1.1 Introduction of the Organization

The history of *National Savings Organization* dates back to the year 1873 when the Government Savings Bank Act, 1873 was promulgated.

Till December 1971, the National Savings Organization functioned as a Publicity organization and its activities were merely promotional in nature. But in early 1972, the scope of its activities was enlarged as the Central Directorate started selling II-Rupee Prize Bonds, and subsequently engaged in the operations of other savings schemes. This resulted in considerable expansion of the National Savings Organization.

At present, this Organization has a total sanctioned strength of more than 3365 employees in various grades and its main component units are as under

a) Central Directorate of National Savings, Islamabad. Directorate of Inspection and Accounts, Islamabad. Training Institute of National Savings, Islamabad along with sub-Training Institute at Karachi.
b) 12 Regional Directorates (located at Peshawar, Abbottabad, Rawalpindi, Gujranwala, Lahore, Faisalabad, Multan, Bahawalpur, Sukkhar, Hyderabad, Karachi, Quetta) 366 National Savings Centres scattered all over the country.

1.2 Project Overview

In this project we are to deal with some common services provided by National Savings, which are:

i. Savings Account
ii. Special Savings Account

Currently these services are running manually and big registers are maintained for every day transactions. We now briefly discuss all these services.

1.2.1 Savings Account

Savings Account is also known as ordinary account. A holder of an account can withdraw or deposit sum of amount any time without any kind of notification. Profit and zakat is applicable on this type of account. Profit is calculated added on monthly basis. Zakat is calculated and deducted on first of Ramadan of every Islamic year.

1.2.2 Special Savings Account

This is much similar to Savings Account but it involves a time period and on every deposit there is profit involved. In this type of account deposits are treated as sub accounts. Zakat deduction and withdrawal procedure for a single deposit is same as of complete ordinary account but further deposits within a deposit are not allowed. Profit calculation procedure is completely different from savings account. Profit is calculated on every deposit on term basis.

Chapter 2

Proposed System

2.1 Problems in the Existing System

In the existing system as discussed in the Chapter 1, the main problem is that searching and making the summary of all transactions, which takes lot of time because all the records are maintained manually and lots of human efforts are needed to do so.

Similarly, finding out any transaction is going to take lots of time. The risk factors are too much for these kinds of services. If any of the accounts register is lost or stolen, then the consequences can be worse.

2.2 New Proposed System

On the basis of information gathered, the proposed system has been conceived which will automate activities mentioned above. A complete database will be developed for that purpose and will be capable of storing all information. It will have provision of output in form of reports.

The primary function of this system will be to facilitate the National Savings day-to-day work and improve the throughput. Key to success would be in carrying out thorough system analysis and design.

The aim is to provide fast, secure and comprehensive data access for multiple users. For achieving this goal, we will maintain the distributed application based on two-tier i.e. Client/Server. The two-tier application structure is not very complex in nature but main emphasis is on the efficient and robust data access. It also provides ease of application maintenance.

The Project is windows based client/server application.

2.3 System Feature

- Database to store and maintain data of the organization.
- Operational system for clerks to make data entry convenient.
- Decision support system for higher management to generate different reports.
- Online account information for customers

Chapter 3

Tools and Technologies

3.1 Why use C#?

C# is a new programming language introduced in Visual Studio .NET. An evolution of C and C++, C# is simple, modern, type-safe, and object-oriented. It was designed for building a wide range of enterprise applications that run on the .NET Platform. Code that you write with C# is compiled as managed code, which means it benefits from the services of the Common Language Runtime. These services include language interoperability, garbage collection, enhanced security, and improved versioning support. [W3]

Visual C# is fully supported within Visual Studio .NET by project templates, designers, property pages, code assistants, an object model, and other features of the development environment. The library for Visual C# programming is the .NET Framework. [W3]

3.2 Why use Oracle as Backend DBMS[W2]

1. Oracle runs on many platforms. The multiplatform nature of Oracle makes it a true enterprise solution.
2. Efficient data processing especially in large database.
3. Resourceful implementation of data warehouse.
4. Physical data control at the lowest grain (level).

3.3 Why Use Crystal Reports as a Reporting Tool

With Crystal Reports, you can rapidly transform almost any data into powerful, interactive content for tight integration into .NET, Java, and COM applications and extend your reporting solutions to other environments including Crystal Enterprise, portals, wireless devices, and Microsoft Office documents.

Crystal Reports is designed to work with your database to help you analyze and interpret important information. Crystal Reports makes it easy to create simple reports, and, it also has the comprehensive tools you need to produce complex or specialized Reports.

Crystal Reports is designed to produce the reports you want from virtually any data source. Built in report expert guide lets you step by step through building reports and completing common reporting tasks. Formula, cross tabs, sub reports and conditional formatting help makes sense of data and uncover important relationships that might otherwise be hidden. Graph Communicate information visually when words and numbers are simply not enough [W6].

Application Developers can save time and meet their user's needs by integrating the report processing power of Crystal Reports into their database applications. Support for most popular development languages makes it easy to add reporting to any application.

Chapter 4

Requirement Analysis

4.1 Overview

After the preliminary investigation of the system and keeping in mind the new proposed system, first we have to identify the users of the system and their tasks. To do so UML (Unified Modeling Language) help us in representation of these work on paper. So as a first step we perform the Use Case Analysis.

4.2 Analysis of the Existing System

The accounts system is working manually it contains different types of accounts. The requirement analysis would be on the following account types.

- Saving Account
- Special Saving Account

4.2.1 Form Details

The depositor fills the form for account opening. The Form contains the following information to be filled in by the depositor.

- Depositor Name
- NIC Number
- Address
- Date of Birth
- Balance
- Cash / cheque Entry
- Bank information (*in case of balance through cheque*)
- Major / Minor Entry (*minor if age less than 18 years*)
- Guardian information (*in case of Minor Account*)
    - Name
    - NIC Number
    - Address
    - Relation
    - Signature

- Account type (*Single, Joint A, Joint B*)
- Nominee Information
    - Name
    - Address
    - Relation
    - Share (*% age*)
- Signature / Thumb impression
- Introducer Account Number

Form contains an Account Number field, which is to be filled by the Clerk.

4.2.2 Detail of Savings Account

- National Savings issues a unique Account Number to a newly opened account.
- The Account number lies between the Volume Ranges.
- Depositors interested in opening an account get the form from the clerk.
- Depositor fills out the form and hand it over to the clerk. The minimum amount for opening an account is 100 Rs.
- In case if a Depositor is Minor i.e. person's age is less than 18, then both Minor and Guardian information is to be provided to open the account and fill out the form. When account holder age exceeds 18 years limit then guardian cannot run Minors Account and minor is turned into major account. So new information regarding minor is re-entered.
- If more then one persons want to open an account jointly then information of both persons would be needed. Maximum two Account Holders can exist against a Joint account. There are two types of Joint Accounts i.e. Joint-A and Joint-B. In Joint-A, amount is payable to the account holders jointly and in Joint-B, amount is payable to either account holders.
- Nominee entry (entries) are required if the Account Holder wants to nominate the Account. Nominee is the person who would get the principal amount or some percentage of the amount, in case if account holder dies.

- More than one Nominee can exists against one account but their share %age should not exceed 100% of their principal amount.
- After the death of the account holder a single nominee can continue to run the account but if nominees are more than one then account is considered closed and if nominees want to continue the account then new joint account is opened.
- Modes of operation i.e. Withdrawal and Deposit, are defined at the time of account opening. These modes are through cheque or through cash i.e. Withdrawal slip for withdrawal, Deposit slip for deposit. If the mode is through cheque then the profit is 0.5% less than that of transaction through Deposit/Withdrawal slip.
- The profit is issued annually but the profit is calculated on monthly basis.
- The following rules apply to calculate profit monthly.
    - If there are only deposits in a month then the minimum amount deposited before 6^{th} would be taken in account as profit calculation.
    - If there were only withdrawals in a month then the minimum amount left between 6^{th} to 30^{th} would be taken for profit calculation.
    - If there are both deposits and withdrawals in a month then profit would be calculated according to above mentioned processes.
    - Monthly profit is calculated as follows.
    - Amount = (Min. balance of months)
    - The profit is applied on this Amount on the basis of the profit rate given according to government policy.
    - Annual Profit = (Amount x Profit Rate) / 100
    - Monthly Profit = (Amount * (Profit Rate) / 12) / 100
- If the Account is inactive for the period of six years then its status become freeze and no transaction is applicable.
- The status of the account is considered closed when the balance in the account becomes zero.
- Daily Transaction Report is generated at the end of the day and submitted to Regional Directorate for further actions.

- 2.5% Zakat shall be deducted only once at the time of actual encashment on the value fallen due on the relevant valuation date i.e. 1st Ramadan.
- Following Account Status exists
    - Open
    - Closed
    - Freezed
    - Inactive
    - Transferred

4.2.3 Detail of Special Savings Account

- The account opening form is same like savings Account.
- The (form filling) information regarding special savings account is same as that of the saving account except the minimum amount of the account opening.
- Deposit in this account can be made in multiple of Rs. 500/-.
- Profit is paid on completion of each period of six months.
- Profit is paid on every transaction after six months from its initiation as per profit rate given by the ministry of finance at that time. This profit rate is applicable on this amount till the principal amount is not being withdrawal.
- Zakat is deducted at the time of actual encashment @ 2.5 on the principal amount.

4.2.4 Use Case Analysis

After the preliminary investigation of the system and keeping in mind the new proposed system, first we have to identify the users of the system and their tasks. To do so UML (Unified Modeling Language) help us in representation of these work on paper. So as a first step we perform the Use Case Analysis.

4.2.4.1 Primary Actors

- Accountant
- Head Accountant
- Manager
- Administrator

Accountant

Accountant is the person who is responsible for all the daily transaction.

Head Accountant

Head Accountant is responsible for account opening, editing accounts information, entering setup values (database initialization process), zakat deduction, running profit procedures, update transaction etc.

Manager

Manager is the super user in this system all other users works under him/her. Manager's responsibility is to enter profit rates, set min. account opening amount, changing account status, verifying system users, viewing reports etc

Administrator

Administrator is responsible for user creation, editing users information, checking logged users etc.

4.2.4.2 Stake Holders

- Depositor
- Database

This Use Case Analysis gives us the basic idea of how the system's business processes works and which user will need which part of the new proposed system. This activity is also useful in finding most of the entities and attributes of the database which going to be provides support for new system.

Use Case 1: Accountant Uses AMS

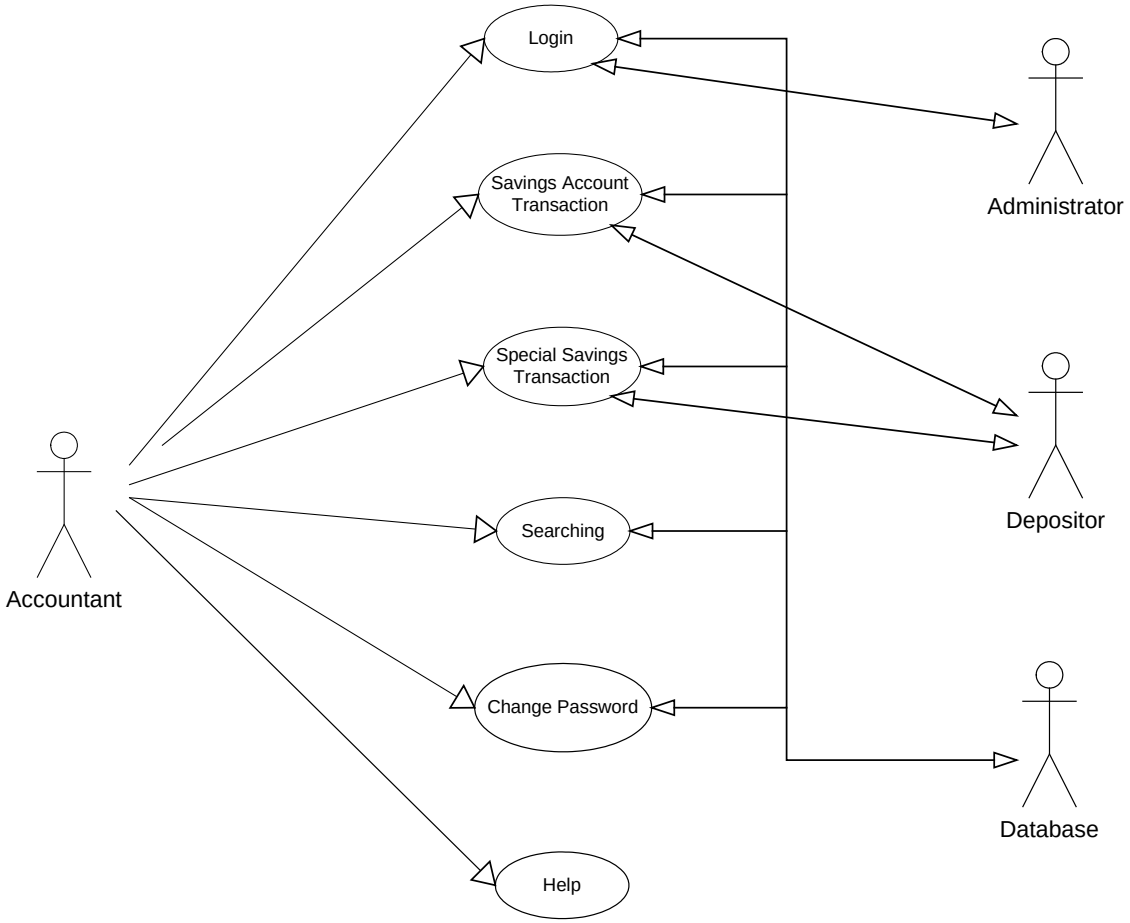


Figure: Use Case Diagram 1: Accountant Uses AMS

Use Case 1: Accountant Uses AMS Description

Primary Actor

Accountant

Stake Holder(s)

Depositor, Head Accountant, Administrator

Precondition(s)

- Accountant should have the access to the application.

Main Success Scenario(s)

1.1 Login to the application.

1.2 Uses savings account module.

1.3 Uses special savings account module.

1.4 Search for records.

1.5 Change his/her login and password.

1.6 Uses help from application.

Exception(s)

1.1.a Database services not started

Exception Handling

1.1.a.1 Start database services with the help of admin.

Post Condition(s)

- User successfully uses the application.

Use Case 1.1: User Login

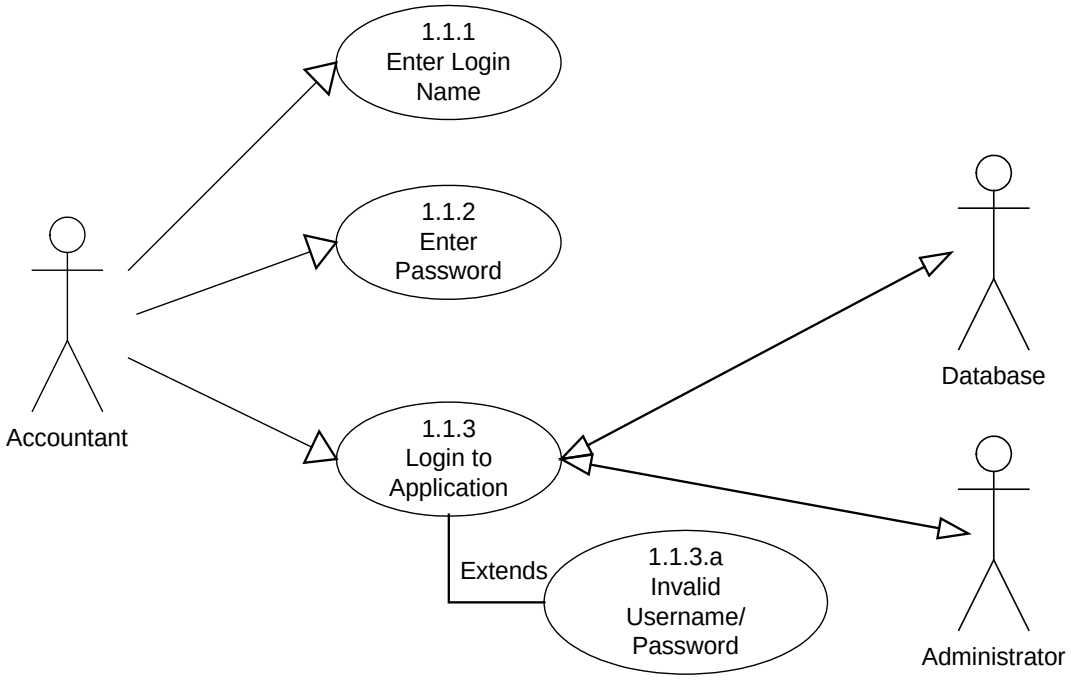


Figure: Use Case Diagram 1.1: User Login

Use Case 1.1: Use Login Description

Primary Actor

Accountant

Stake Holders

Administrator

Precondition

- Application should be available to the accountant.
- Accountant should have application access rights (username and password).

Main Success Scenario

1.1.1. Enter login name.

1.1.2. Enter Password.

1.1.3. Login to application.

Exception

1.1.3. a. Invalid username / password.

Exception Handling

1.1.3. a. 1. Enter a valid username / password.

1.1.3. a. 2. In case of forgotten username / password contact system administrator.

Post condition

- Accountant successfully login to application.

Use Case 1.2: Savings Account Transactions

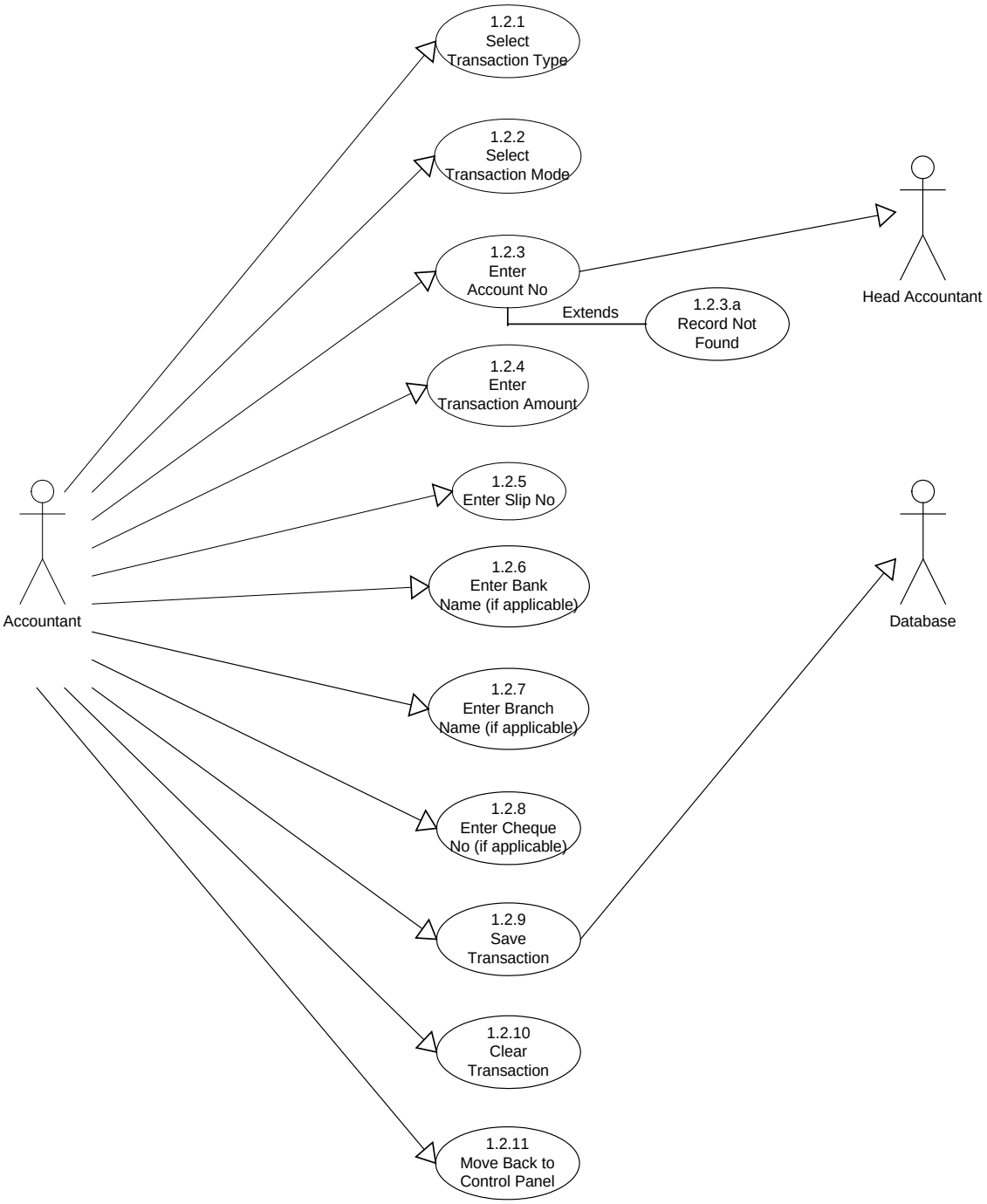


Figure: Use Case Diagram 1.2: Savings Account Transaction

Use Case 1.2: Savings Account Transactions Description

Primary Actor

Accountant.

Stake Holders

Depositor, Head Accountant, Database.

Precondition

- Accountant successfully logon to application.
- Depositor should have an account no.
- All transactions should be as per National Savings rules

Main Success Scenario

1.2.1 Select transaction type.

1.2.2 Select Transaction mode.

1.2.3 Enter account no.

1.2.4 Enter transaction amount.

1.2.5 Enter slip no.

1.2.6 Enter bank name (if applicable).

1.2.7 Enter branch name (if applicable).

1.2.8 Enter cheque no (if applicable).

1.2.9 Save transaction.

1.2.10 Clear Transaction.

1.2.11 Move back to control panel.

Exception

1.2.3. a. Record not found.

Exception Handling

1.2.3. a. 1. Enter accounts information using account opening form.

Post condition

- Transaction completed successfully

Use Case 1.3: Special Savings Account Transactions

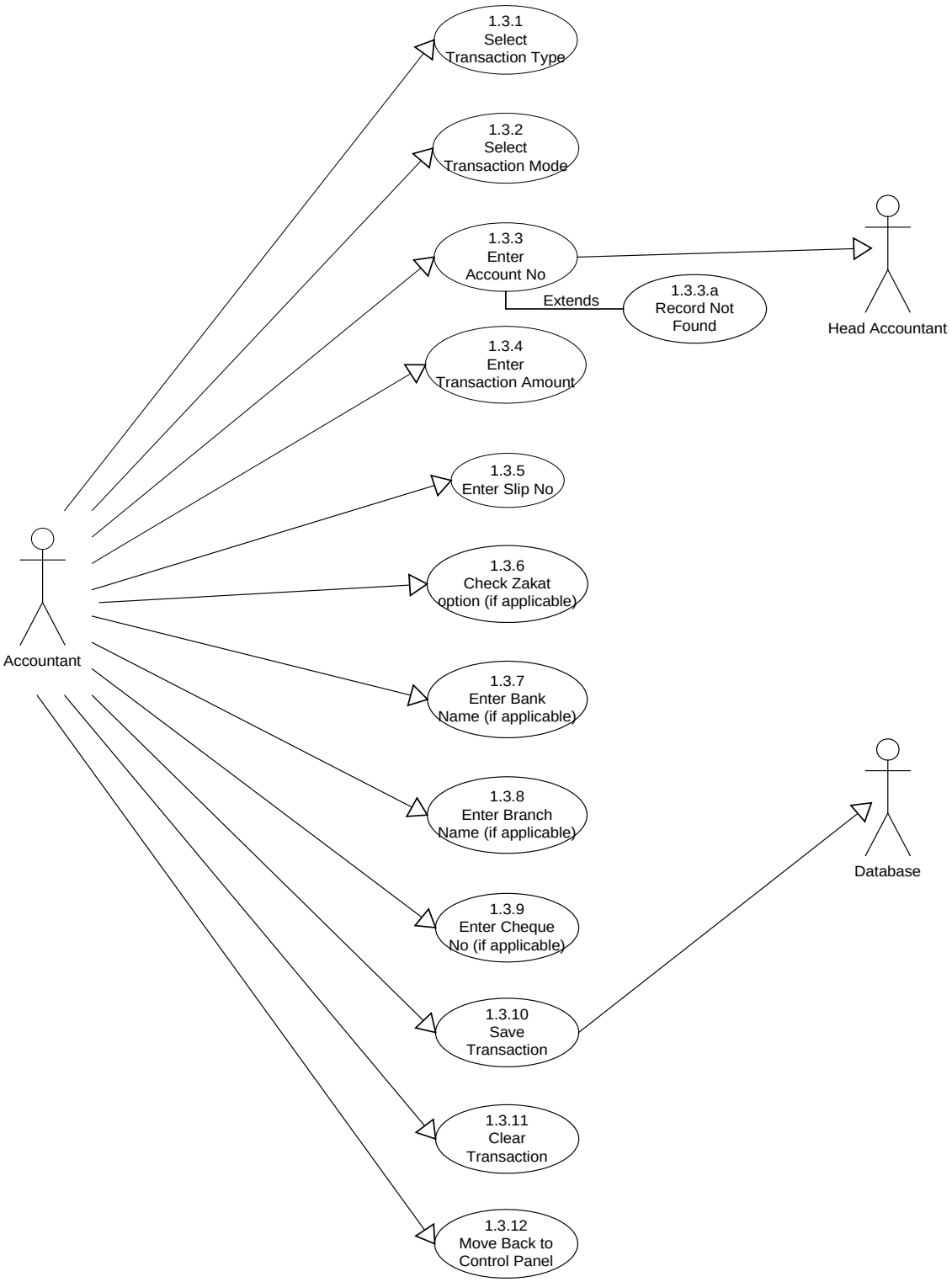


Figure: Use Case Diagram 1.3: Special Savings Account Transaction

Use Case 1.3: Savings Account Transactions Description

Primary Actor

Accountant.

Stake Holders

Depositor, Head Accountant, Database.

Precondition

- Accountant successfully logon to application.
- Depositor should have an account no.
- All transactions should be as per National Savings rules

Main Success Scenario

1.3.1 Select transaction type (deposit, withdrawal, profit).

1.3.2 Select Transaction mode.

1.3.3 Enter account no.

1.3.4 Enter transaction amount.

1.3.5 Enter slip no.

1.3.6 Check zakat option, if transaction type is withdrawal.

1.3.7 Enter bank name (if applicable).

1.3.8 Enter branch name (if applicable).

1.3.9 Enter cheque no (if applicable).

1.3.10 Save transaction.

1.3.11 Clear Transaction.

1.3.12 Move back to control panel.

Exception

1.2.3. a. Record not found.

Exception Handling

1.2.3. a. 1. Enter accounts information using account opening form.

Post condition

- Transaction completed successfully

Use Case 1.4: Search for Records

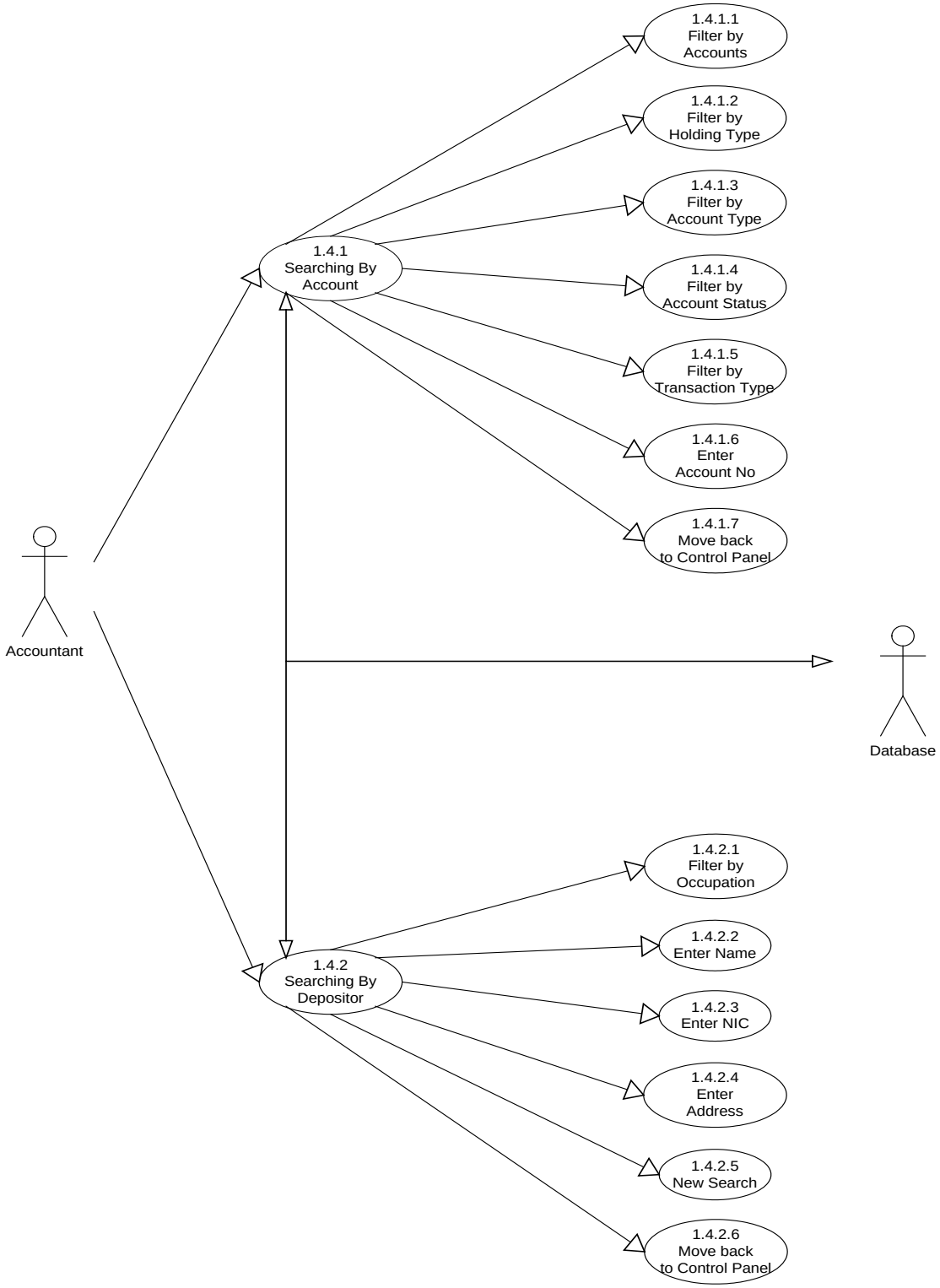


Figure: Use Case Diagram 1.4: Search for Records

Use Case 1.4: Search for Records

Primary Actor

Accountant.

Stake Holders

Depositor, Head Accountant, Database.

Precondition

- Accountant successfully logon to application.

Main Success Scenario

1.4.1 Searching by account.

1.4.1.1. Filter by accounts.

1.4.1.2. Filter by holding type.

1.4.1.3. Filter by account type.

1.4.1.4. Filter by account status.

1.4.1.5. Filter by transaction type.

1.4.1.6. Enter account no.

1.4.1.7. Move back to control panel.

1.4.2 Searching by depositor.

1.4.2.1. Filter by occupation.

1.4.2.2. Enter Name.

1.4.2.3. Enter Address.

1.4.2.4. Enter NIC.

1.4.2.5. New search

1.4.2.6. Move back to control panel

Exception

None.

Exception Handling

None.

Post condition

- Search completed successfully.

Use Case 1.5: Change Password

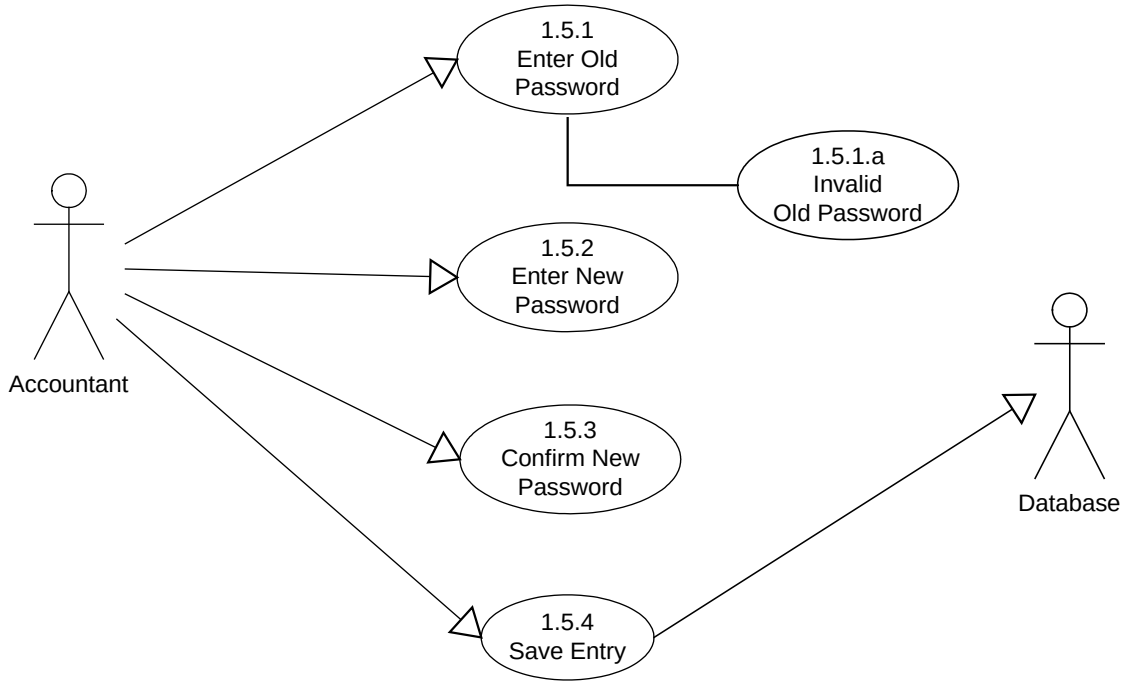


Figure: Use Case Diagram 1.5: Change Password

Use Case 1.5: Change Password Description

Primary Actor

Accountant.

Stake Holders

None.

Precondition

- Accountant successfully logon to application.

Main Success Scenario

1.5.1 Enter old password.

1.5.2 Enter new password.

1.5.3 Confirm new password.

Exception

1.5.1. a. Invalid old password.

Exception Handling

1.5.1. a. 1. Enter a valid password again.

1.5.1. a. 2. In case of forgotten username / password contact system administrator.

Post condition

- Accountant successfully changes his / her password.

Use Case 1.6: Help

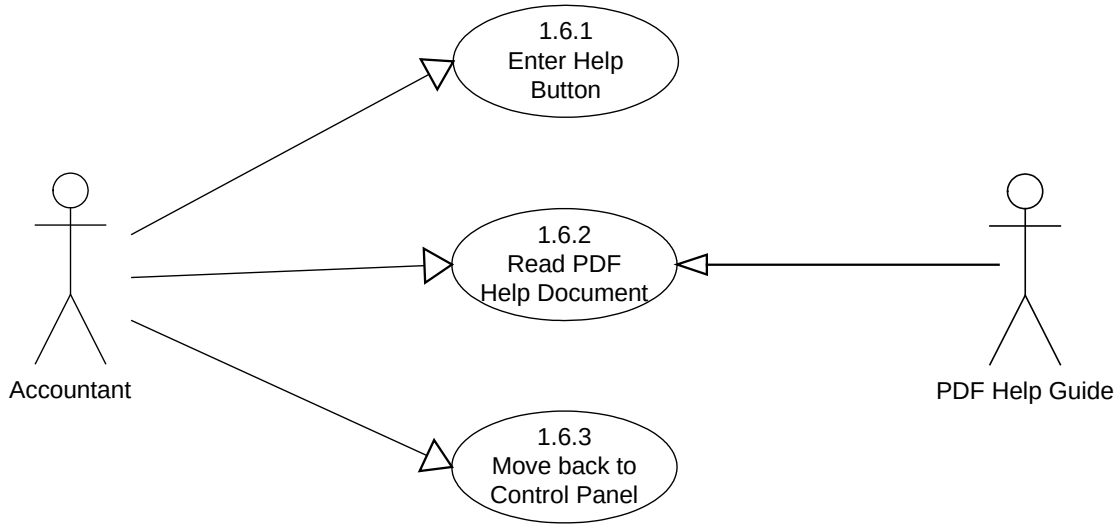


Figure: Use Case Diagram 1.6: User Help

Use Case 1.6: Help Description

Primary Actor

Accountant.

Stake Holders

None.

Precondition

- Accountant successfully logon to application.

Main Success Scenario

1.6.1 Enter help button.

1.6.2 Read PDF help document.

1.6.3 Move back to control panel.

Exception

None.

Exception Handling

None.

Post condition

- Accountant successfully used system help.

Use Case 2: Head Accountant Uses AMS

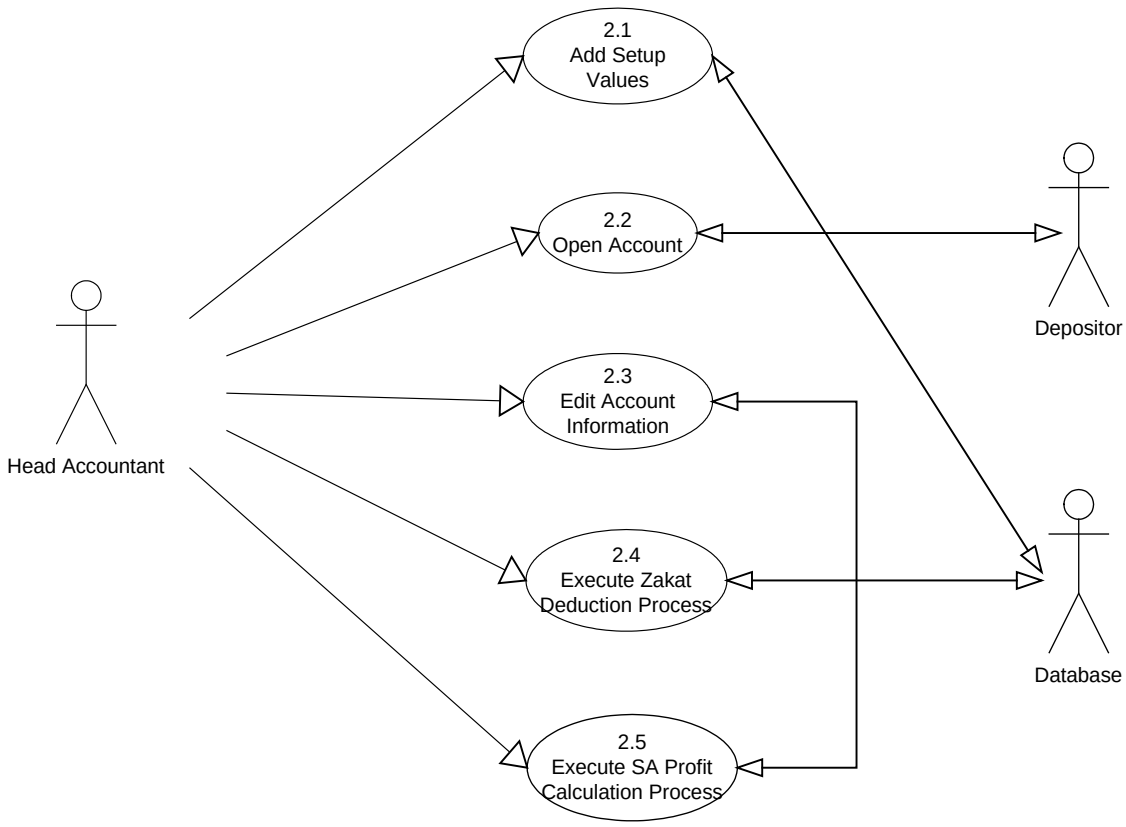


Figure: Use Case Diagram 2: Head Accountant Uses AMS

Use Case 2: Head Accountant Uses AMS Description

Primary Actor

Head Accountant.

Stake Holders

Depositor, Database.

Precondition

- Head Accountant successfully logon to application.

Main Success Scenario

2.1 Add setup values.

2.2 Open new account.

2.3 Edit Account Information.

2.4 Execute zakat deduction process.

2.5 Execute savings account profit calculation process.

Exception

None.

Exception Handling

None.

Post condition

- Head Accountant successfully used system.

Use Case 2.1: Add Setup Values

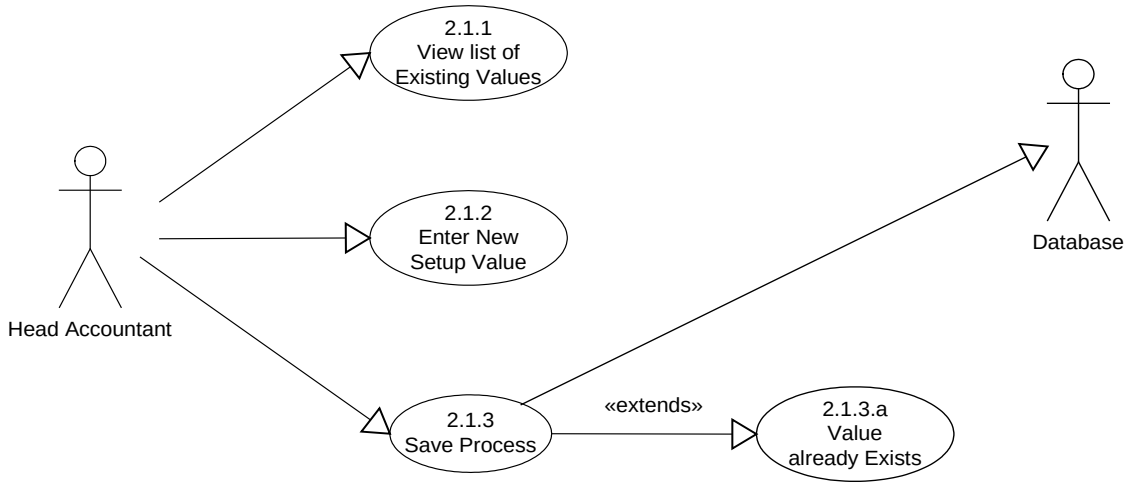


Figure: Use Case Diagram 2.1: Add Setup Values

Use Case 2.1: Add Setup Values Description

Primary Actor

Head Accountant.

Stake Holders

Database.

Precondition

- Head Accountant successfully logon to application.

Main Success Scenario

2.1.1 View list of existing values.

2.1.2 Enter new setup value.

2.1.3 Save entry.

Exception

2.1.3.a Entered value already exist.

Exception Handling

2.1.3.a.1 Enter another value.

Post condition

- Head Accountant successfully add the setup value.

Use Case 2.2: Open New Account

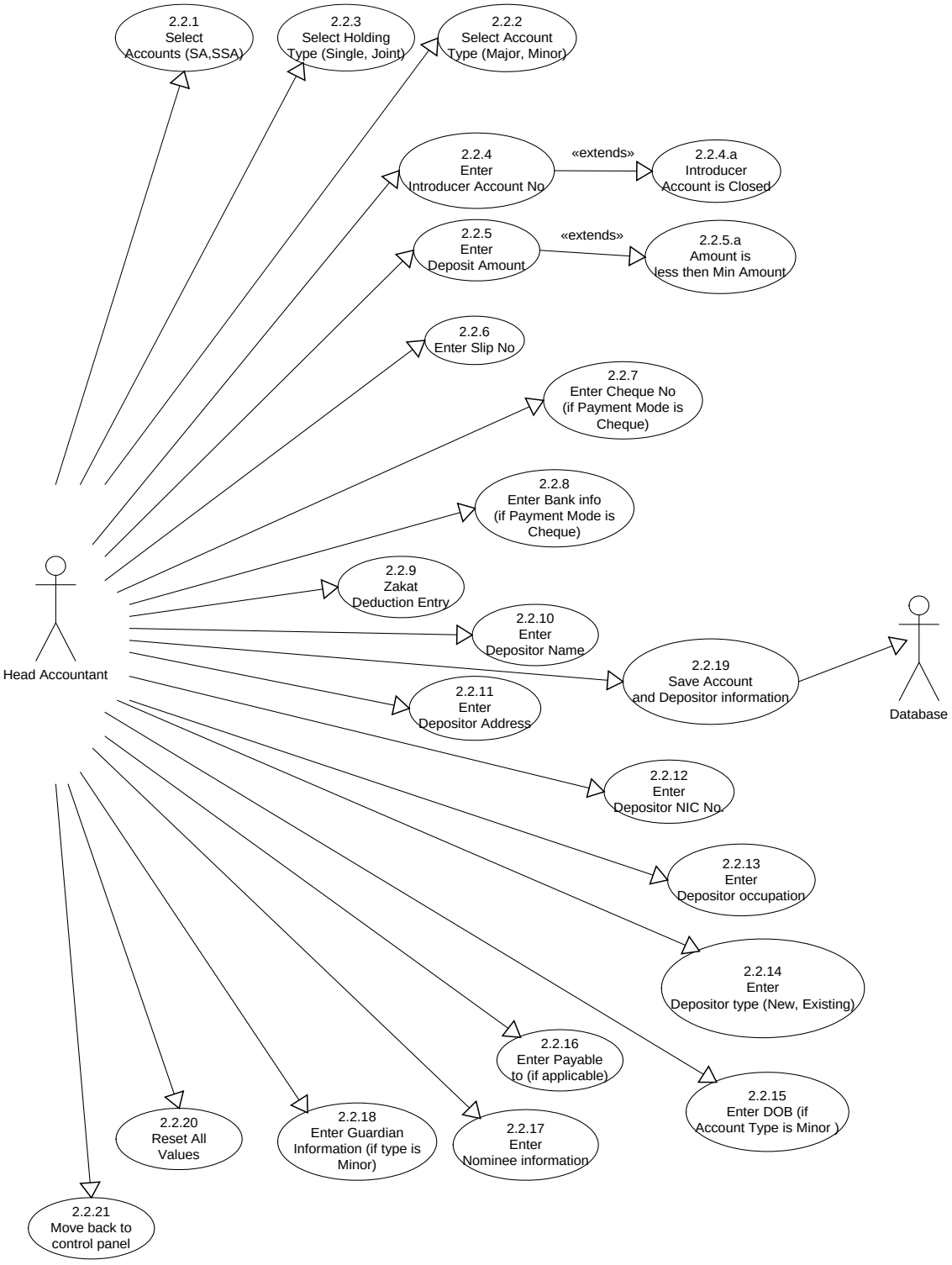


Figure: Use Case Diagram 2.2: Open New Account

Use Case 2.2: Open New Account Description

Primary Actor

Head Accountant.

Stake Holders

Database.

Precondition

- Head Accountant successfully logon to application.

Main Success Scenario

2.2.1 Select account (savings account or Special Savings Account).

2.2.2 Select account-holding type (single or joint).

2.2.3 Select account Type (major or minor).

2.2.4 Enter introducer account no.

2.2.5 Enter Deposit Amount.

2.2.6 Enter slip no.

2.2.7 Enter cheque no (if payment mode is cheque).

2.2.8 Enter bank information (if payment mode is cheque).

2.2.9 Enter zakat deduction information.

2.2.10 Enter depositor name.

2.2.11 Enter depositor address.

2.2.12 Enter depositor NIC no.

2.2.13 Enter depositor's occupation.

2.2.14 Enter depositor type (new or existing).

2.2.15 Enter DOB (if account type is minor).

2.2.16 Enter payable to (if applicable).

2.2.17 Enter nominee information.

2.2.18 Enter guardian information (if type is minor).

2.2.19 Save all account related information.

2.2.20 Reset all values.

2.2.21 Move back to control panel.

Exception

2.2.4.a Introducer account is CLOSED or not OPEN.

2.2.5.a Amount is less then min. amount

Exception Handling

2.2.4.a.1. Enter another introducer no.

2.2.5.a.1. Enter valid account opening amount.

Post condition

- Head Accountant successfully open a new account.

Use Case 2.3: Update Account Information

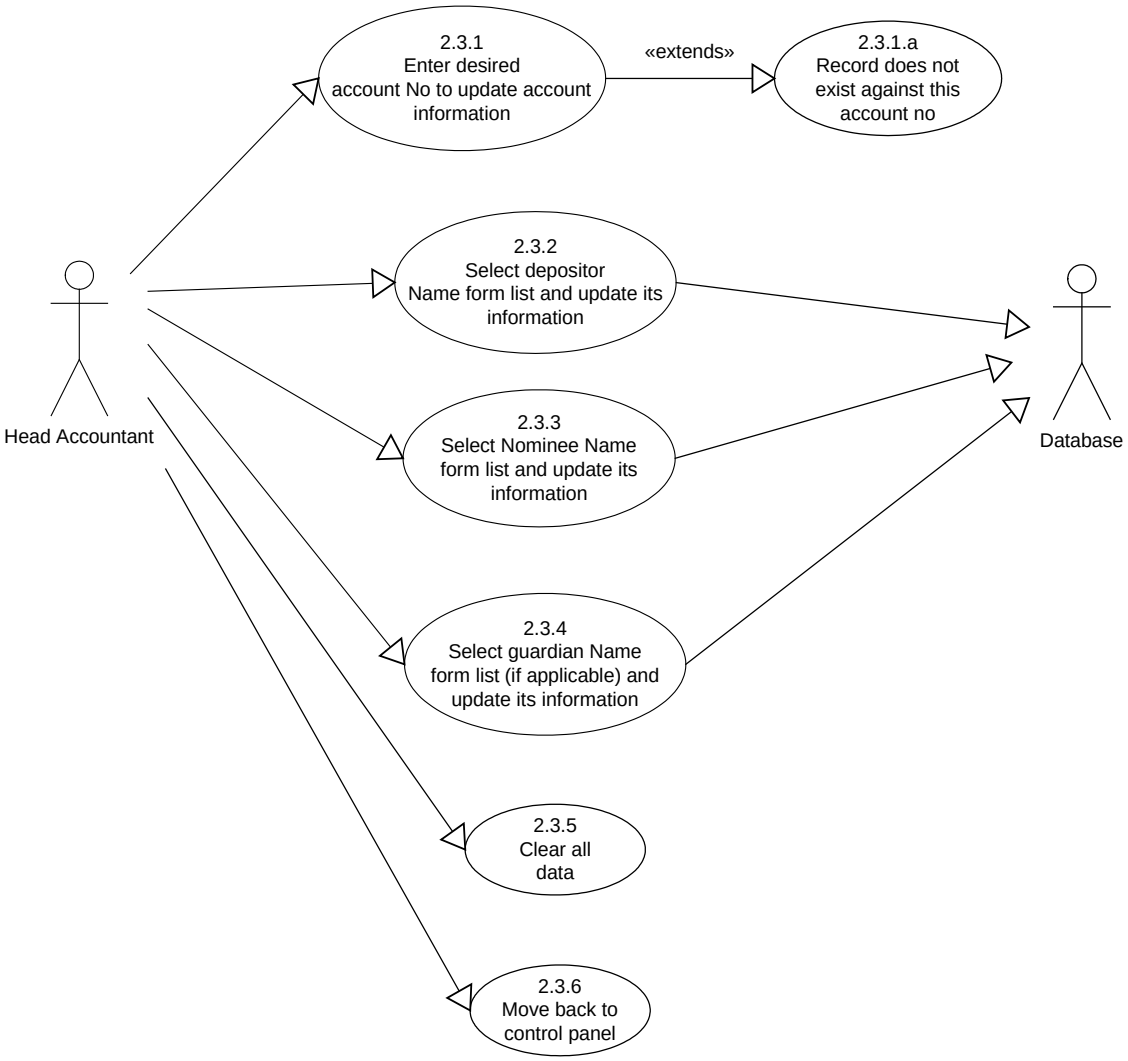


Figure: Use Case Diagram 2.3: Update Account Information

Use Case 2.3: Update Account Information Description

Primary Actor

Head Accountant.

Stake Holders

Database.

Precondition

- Head Accountant successfully logon to application.
- Account information is needs to be updated.

Main Success Scenario

2.3.1 Enter desired account no to update account information.

2.3.2 Select depositor name form list and update its information.

2.3.3 Select nominee name form list and update its information.

2.3.4 Select guardian name from list (if applicable) and update its information

2.3.5 Clear all data.

2.3.6 Move back to control panel.

Exception

2.3.1.a Record does not exists against this account no.

Exception Handling

2.3.1.a.1 Enter valid account no.

Post condition

- Head Accountant successfully update accounts information.

Use Case 2.4: Zakat Deduction

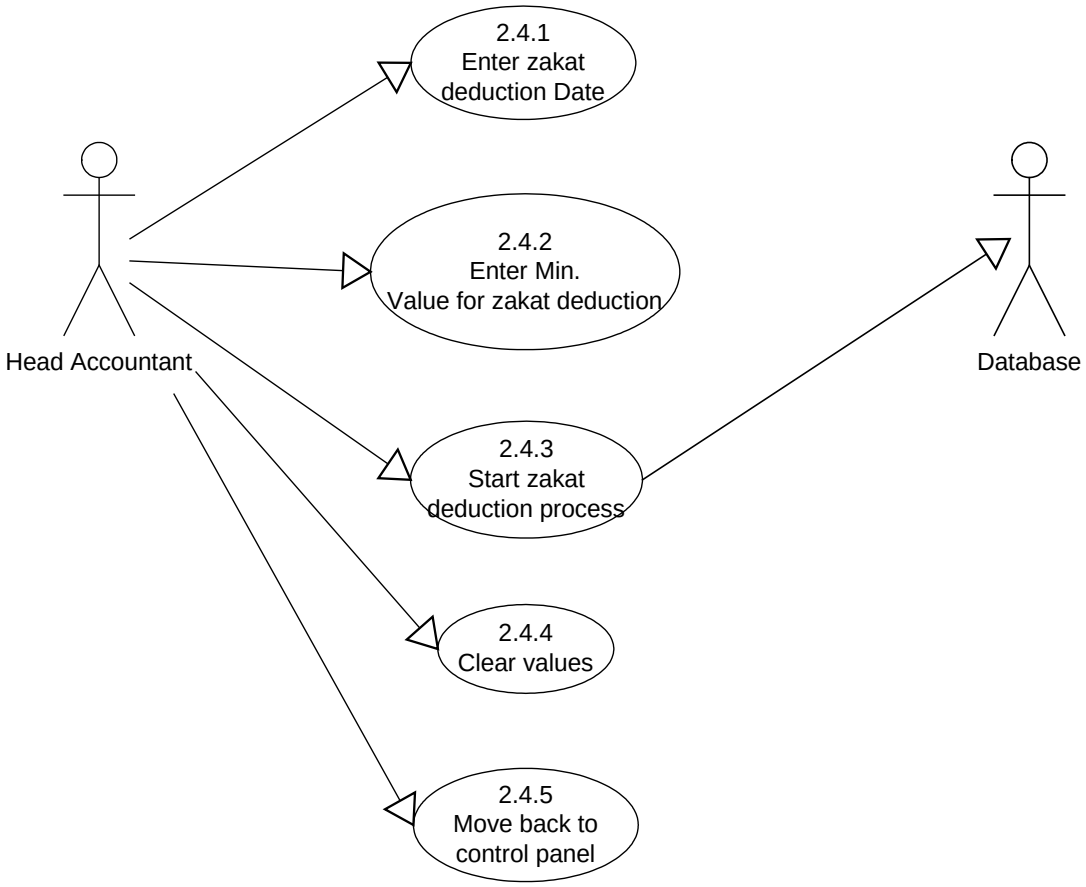


Figure: Use Case Diagram 2.4: Zakat Deduction

Use Case 2.4: Zakat Deduction Description

Primary Actor

Head Accountant.

Stake Holders

Database.

Precondition

- Head Accountant successfully logon to application.
- Its 1st of Ramadan.
- Min. value on which zakat is to be deducted should be available.

Main Success Scenario

2.4.1 Enter zakat deduction date.

2.4.2 Enter min. value for zakat deduction.

2.4.3 Start zakat deduction process.

2.4.4 Clear all values.

2.4.5 Move back to control panel.

Exception

No.

Exception Handling

No.

Post condition

- Zakat is deducted successfully from all accounts (where balance is greater then or equal to min. value).

Use Case 2.5: SA Profit Calculation Process

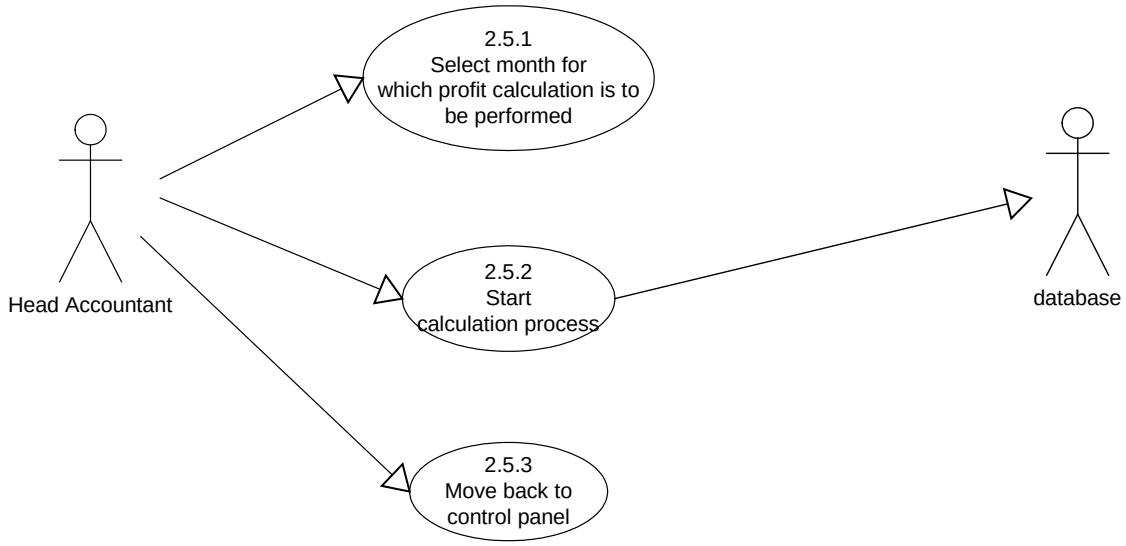


Figure: Use Case Diagram 2.5: SA Profit Calculation Process

Use Case 2.5: SA Profit Calculation Process Description

Primary Actor

Head Accountant.

Stake Holders

Database.

Precondition

- Head Accountant successfully logon to application.
- Its last (working) day of the month.
- Profit rate should be available from database.

Main Success Scenario

2.5.1 Select month for which profit calculation is to be performed.

2.5.2 Start profit calculation process.

2.5.3 Move back to control panel.

Exception

No.

Exception Handling

No.

Post condition

- Profit is calculated and all accounts balance is updated.

Use Case 3: Manager Uses AMS

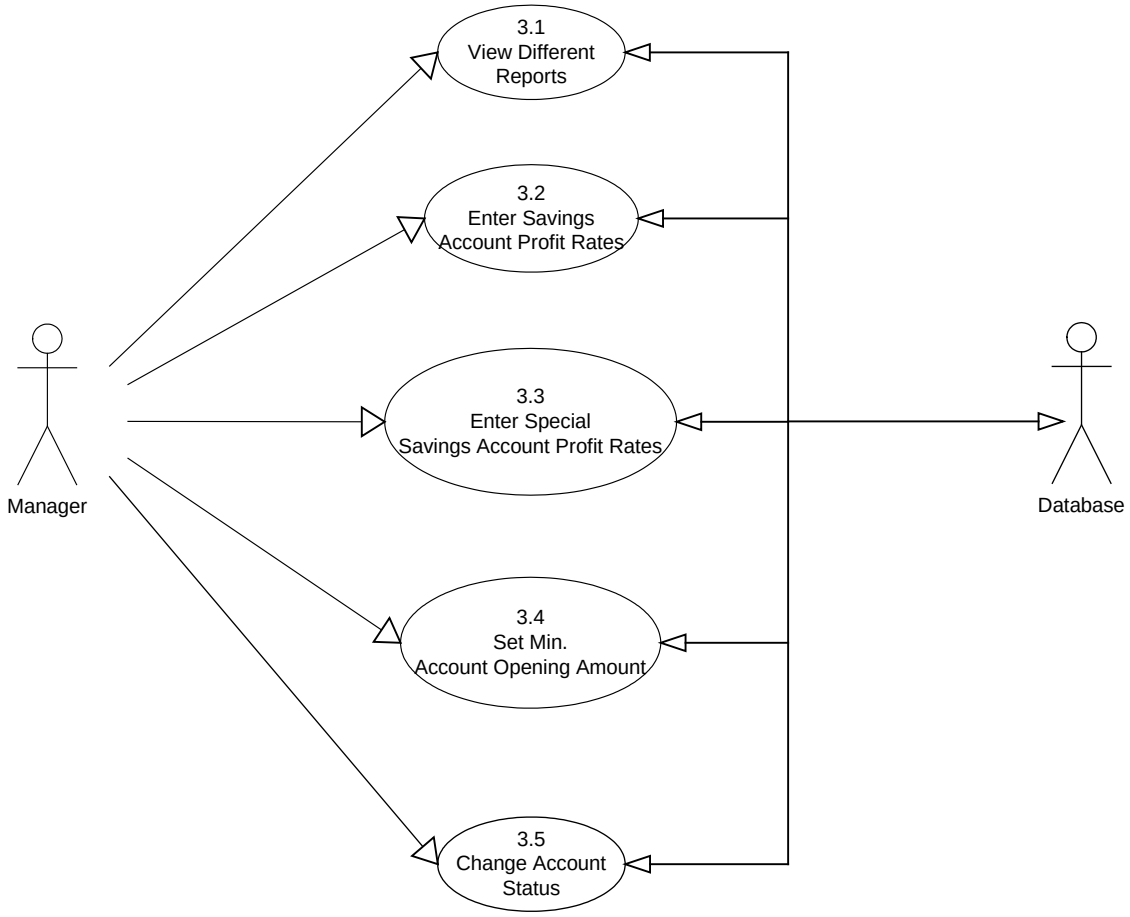


Figure: Use Case Diagram 3: Manager Uses AMS

Use Case 3: Manager Uses AMS Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.

Main Success Scenario

3.1 View different reports.

3.2 Enter savings account profit rates.

3.3 Enter special savings account profit rates.

3.4 Set Min. account opening amount.

3.5 Change account status.

Exception

None.

Exception Handling

None.

Post condition

- Manager successfully used system.

Use Case 3.1: Reports

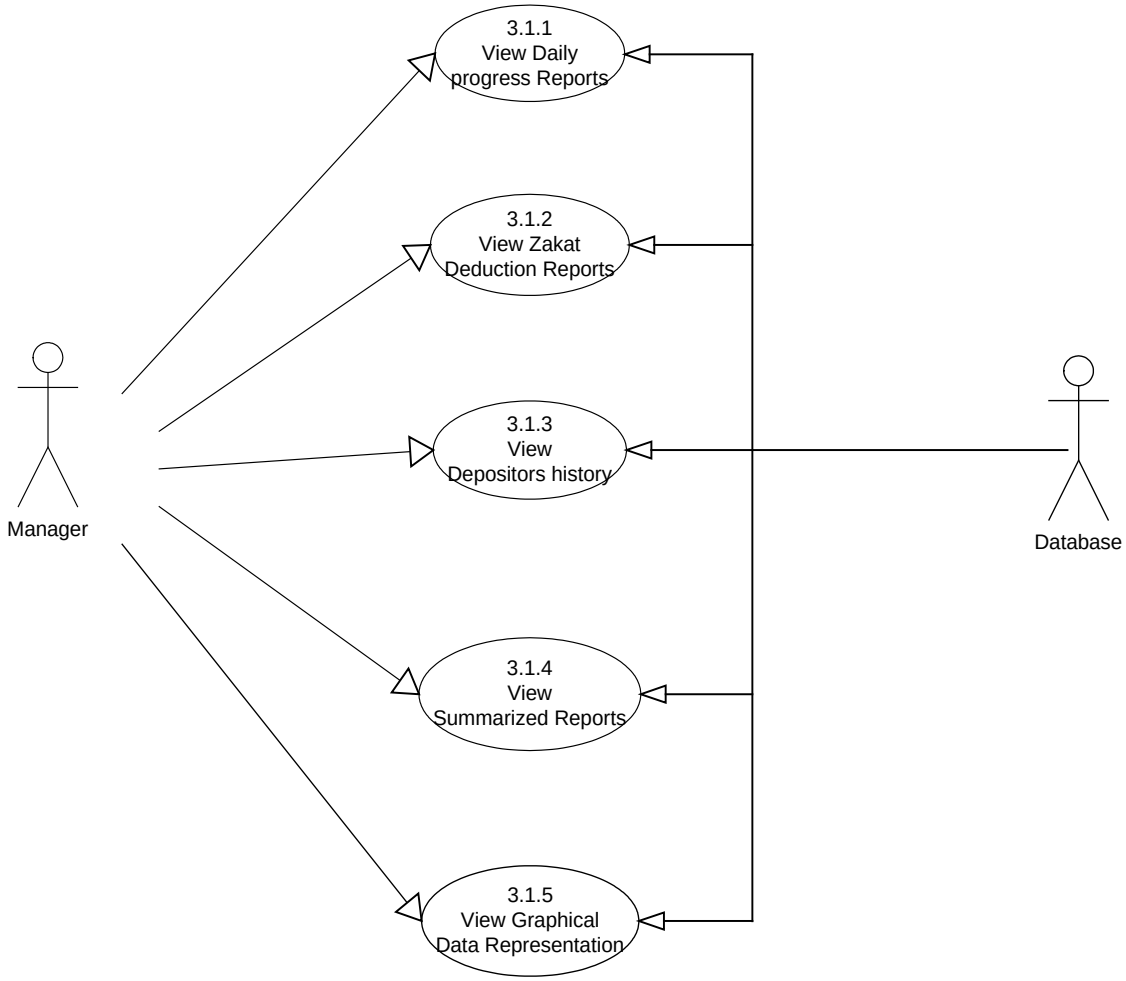


Figure: Use Case Diagram 3.1: Reports

Use Case 3.1: Reports Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.

Main Success Scenario

3.1.1 View daily progress reports.

3.1.2 View zakat deduction reports.

3.1.3 View depositors account history.

3.1.4 View summarized reports.

3.1.5 View graphical data representation.

Exception

None.

Exception Handling

None.

Post condition

- Manager successfully used all kinds of reports.

Use Case 3.2: Savings Account Profit Rates

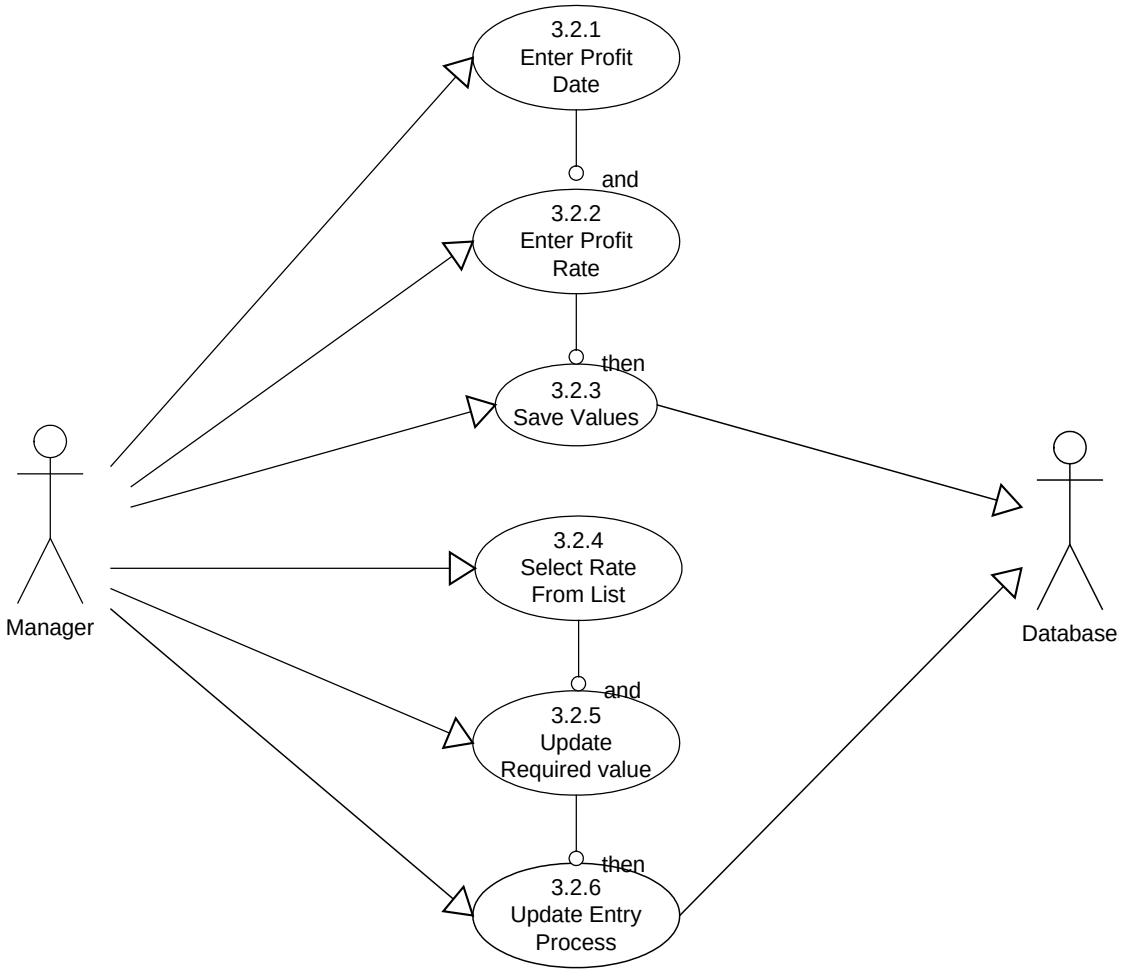


Figure: Use Case Diagram 3.2: Savings Account Profit Rates

Use Case 3.2: Savings Account Profit Rates Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.
- New profit rates announced by government.

Main Success Scenario

3.2.1 Enter profit date.

3.2.2 Enter profit rate.

3.2.3 Save profit value to the database.

3.2.4 Select rate from list.

3.2.5 Update required value.

3.2.6 Initiate update process.

Exception

None.

Exception Handling

None.

Post condition

- Manager successfully enter/update savings account profit rate.

Use Case 3.3: Special Savings Account Profit Rates

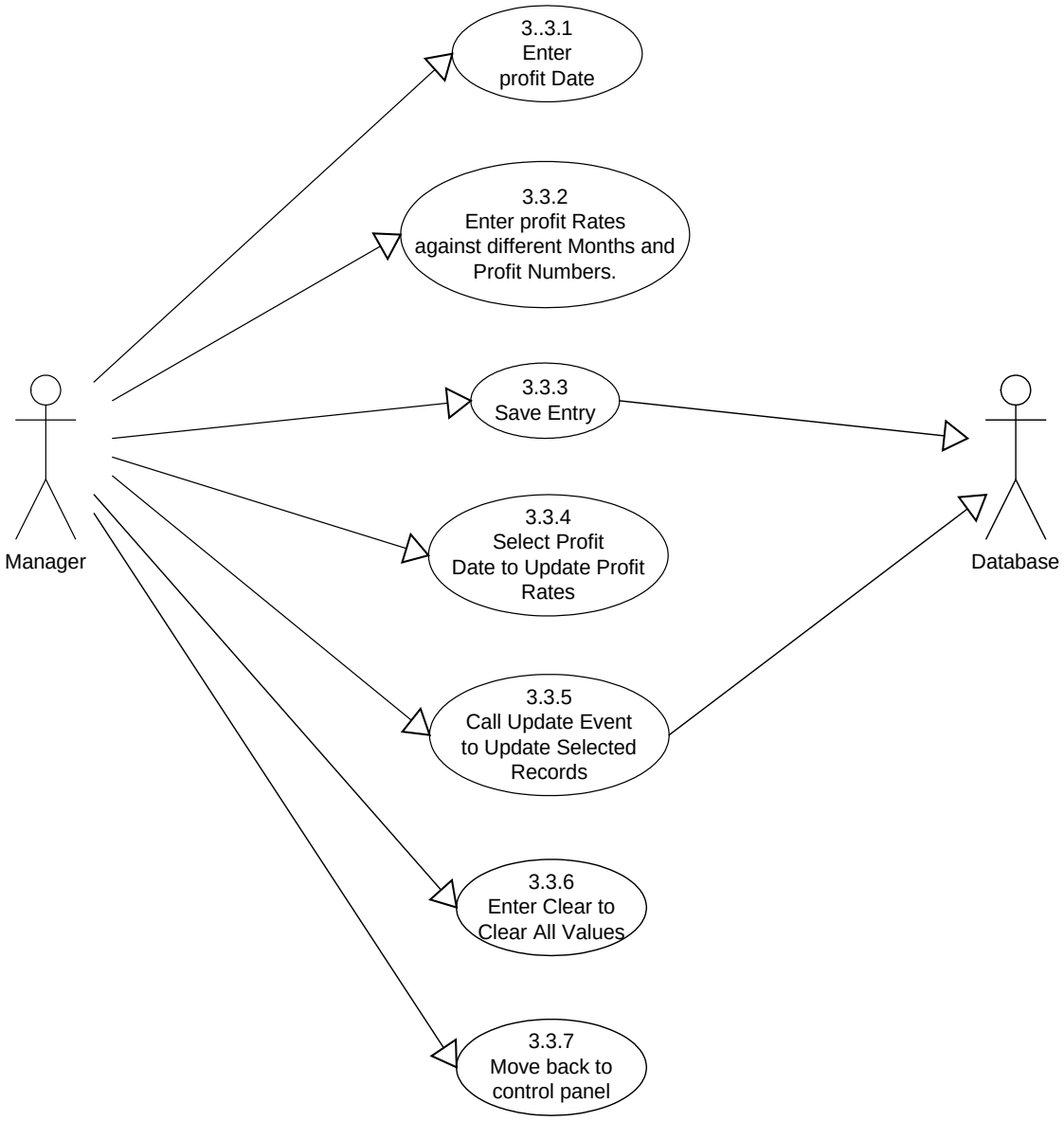


Figure: Use Case Diagram 3.3: Special Savings Account Profit Rates

Use Case 3.3: Special Savings Account Profit Rates Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.
- New profit rates announced by government.

Main Success Scenario

3.3.1 Enter profit date.

3.3.2 Enter profit rate against different months and profit numbers.

3.3.3 Save profit value to the database.

3.3.4 Select profit date to update profit rates.

3.3.5 Call update event to update selected record.

3.3.6 Clear all values.

3.3.7 Move back to control panel.

Exception

None.

Exception Handling

None.

Post condition

Manager successfully enter/update Special savings account profit rate.

Use Case 3.4: Minimum Account Opening Amount

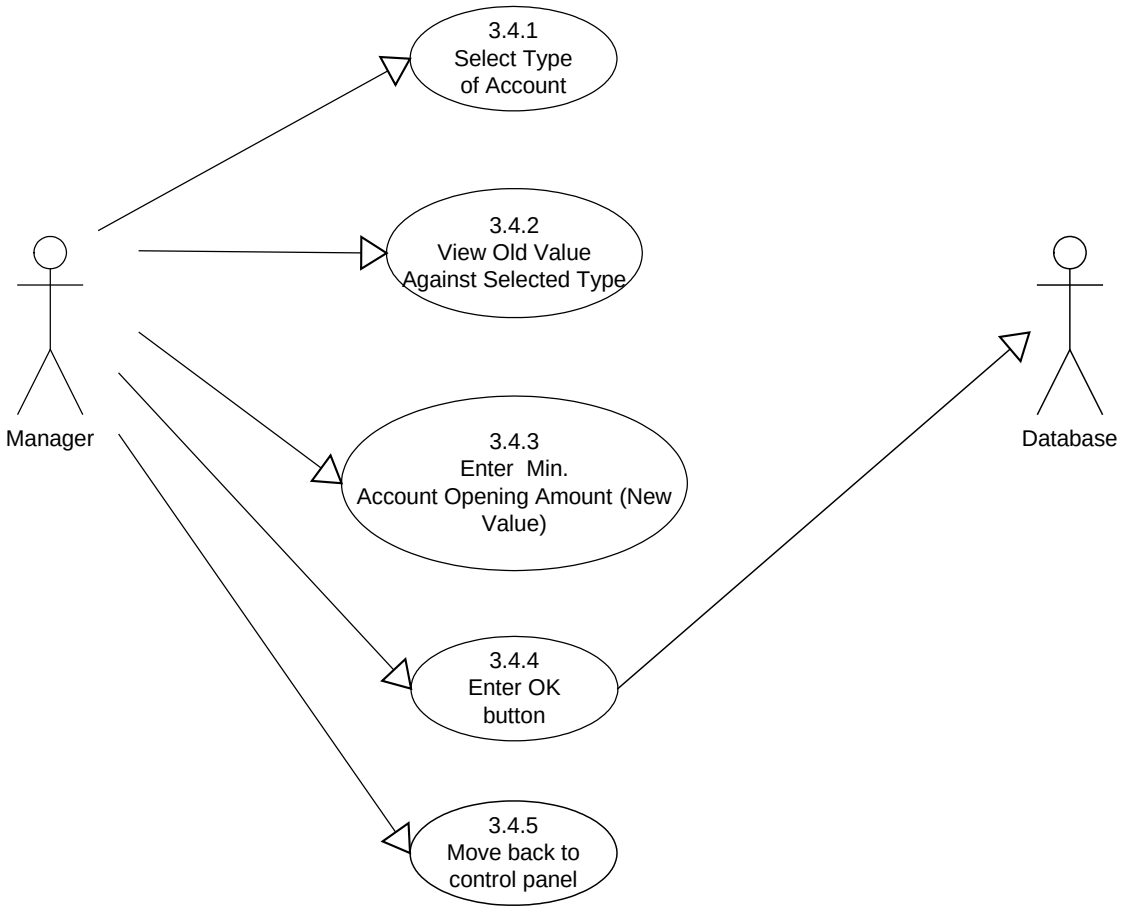


Figure: Use Case Diagram 3.4: Minimum Account Opening Amount

Use Case 3.4: Minimum Account Opening Amount Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.
- New profit rates announced by government.

Main Success Scenario

3.4.1 Select type of account.

3.4.2 View old value against selected type .

3.4.3 Enter min. account opening amount.

3.4.4 Enter OK button to save the record.

3.4.5 Move back to control panel.

Exception

None.

Exception Handling

None.

Post condition

Manager successfully enter/update Special savings account profit rate.

Use Case 3.5: Change Account Status

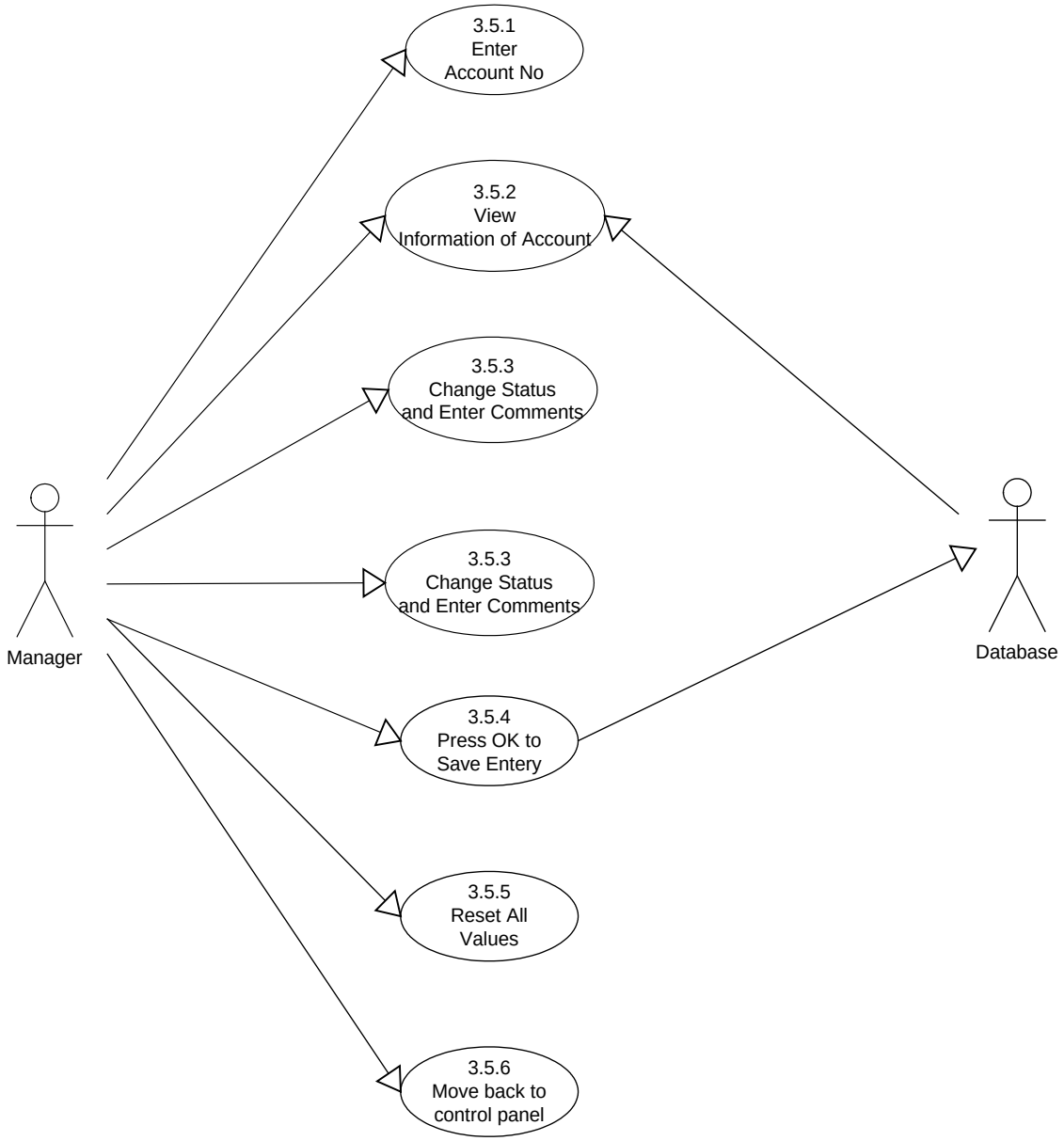


Figure: Use Case Diagram 3.5: Change Account Status

Use Case 3.5: Change Account Status Description

Primary Actor

Manager.

Stake Holders

Database.

Precondition

- Manager successfully logon to application.
- Account status is to be updated due to certain reasons.

Main Success Scenario

3.5.1 Enter account number.

3.5.2 View account status information.

3.5.3 Change status and enter comments.

3.5.4 Enter OK button to save the record.

3.5.5 Reset all values.

3.5.6 Move back to control panel.

Exception

None.

Exception Handling

None.

Post condition

Manager successfully changes account status.

Use Case 4: Administrator Uses AMS

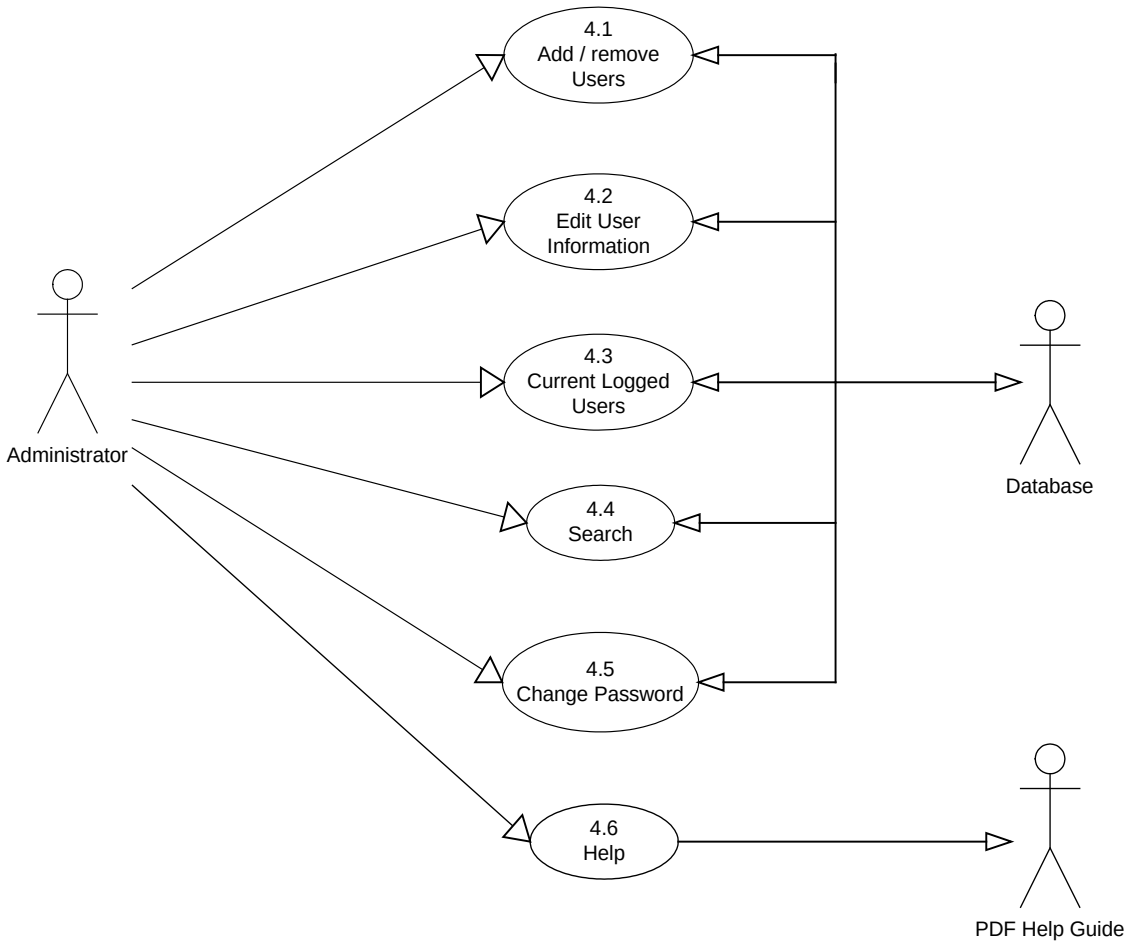


Figure: Use Case Diagram 4: Administrator Uses AMS

Use Case 4: Administrator Uses AMS Description

Primary Actor

Administrator.

Stake Holders

Database, PDF Help Guide

Precondition

- Administrator successfully logon to application.

Main Success Scenario

4.1 Add / remove users.

4.2 Edit user information.

4.3 View current logged users.

4.4 Search depositors and accounts.

4.5 Change password.

4.6 Move back to control panel.

Exception

None.

Exception Handling

None.

Post condition

Administrator r successfully uses the system.

Use Case 4.1: Add / Remove User

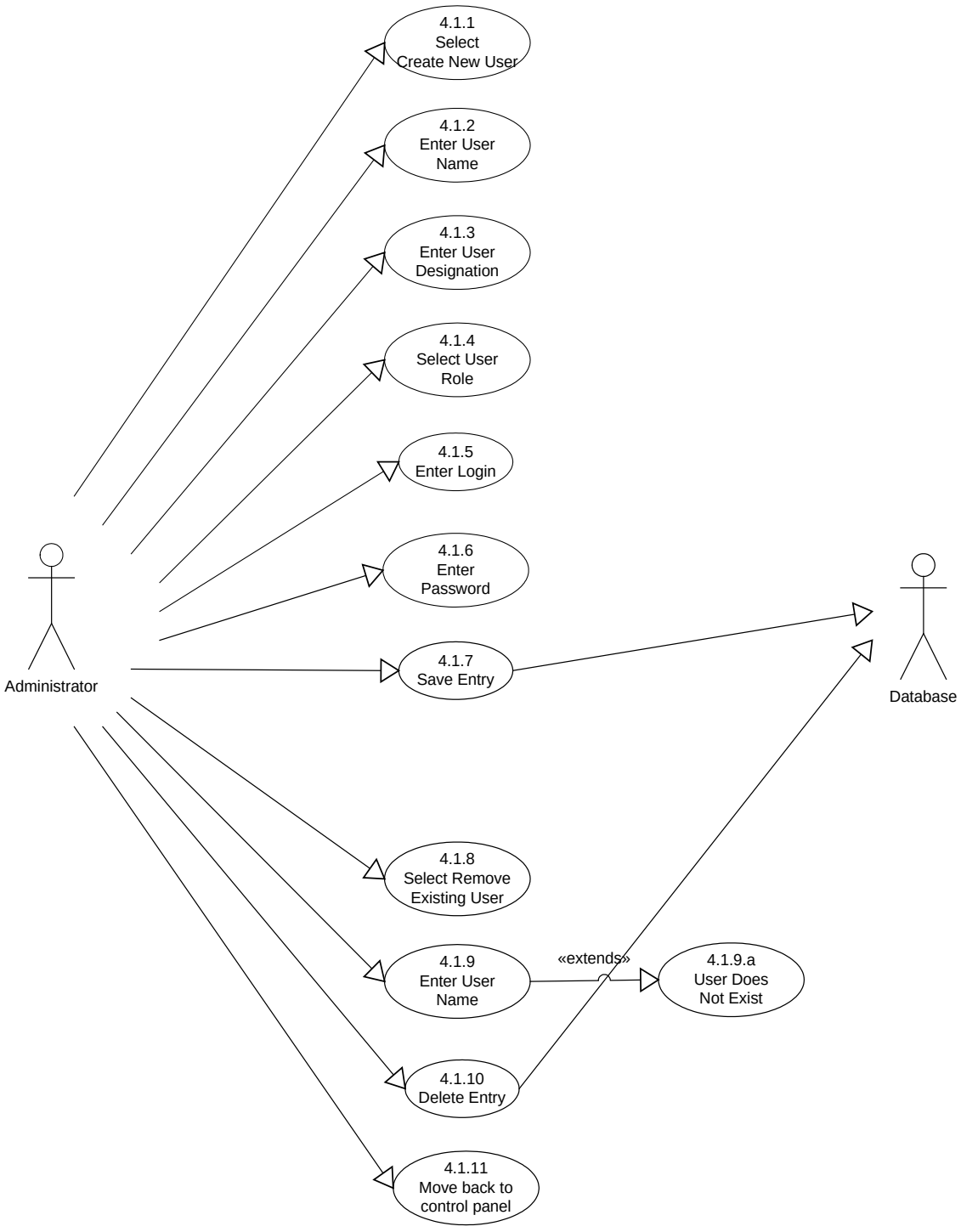


Figure: Use Case Diagram 4.1: Add / Remove User

Use Case 4.1: Add / Remove User Description

Primary Actor

Administrator.

Stake Holders

Database.

Precondition

- Administrator successfully logon to application.

Main Success Scenario

4.1.1 Select create new users.

4.1.2 Enter user name.

4.1.3 Enter user designation.

4.1.4 Select user role.

4.1.5 Enter login.

4.1.6 Enter password

4.1.7 Save entry to save created users record.

4.1.8 Select remove existing user.

4.1.9 Enter username to delete the user.

4.1.10 Delete entry.

4.1.11 Move back to control panel

Exception

4.1.9.a Invalid username or user does not exist in the database.

Exception Handling

4.1.9.a.1 Enter a valid username.

Post condition

Administrator successfully adds / remove users.

Use Case 4.2: Edit User Information

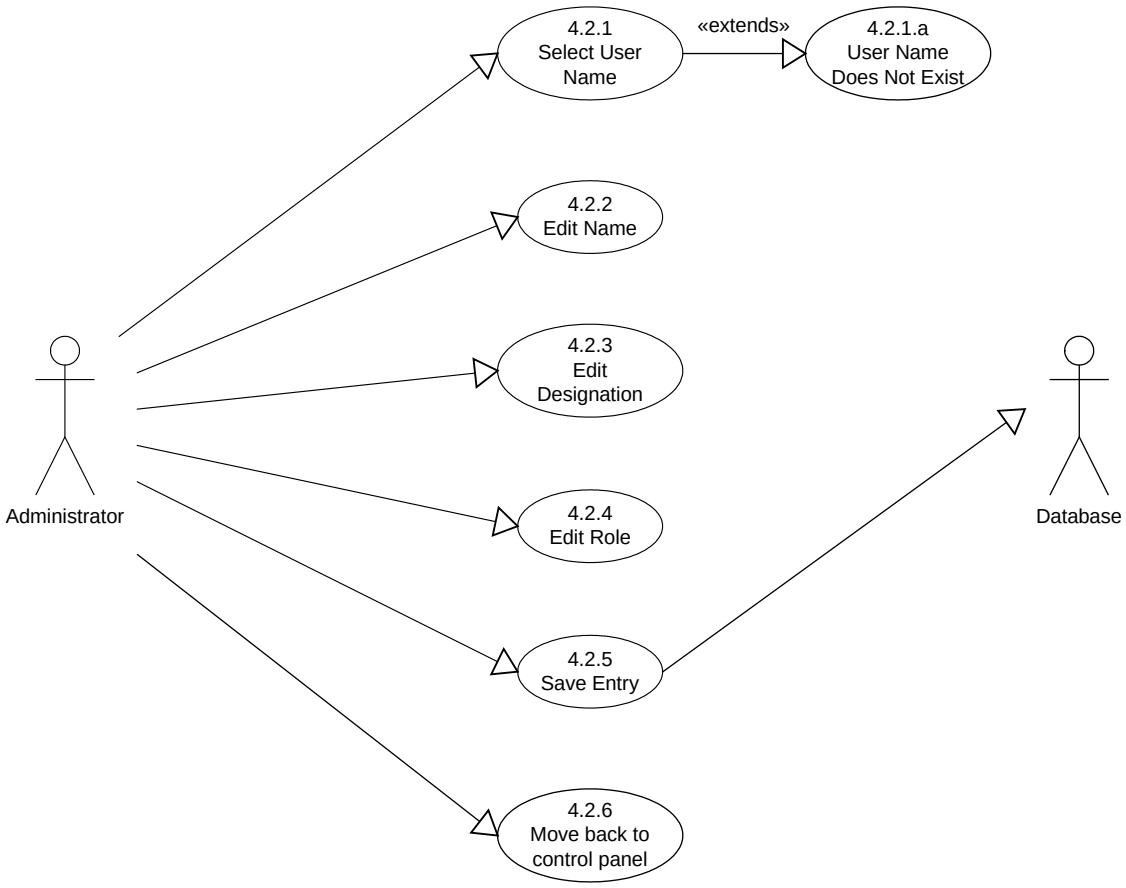


Figure: Use Case Diagram 4.2: Edit User Information

Use Case 4.2: Edit User Information Description

Primary Actor

Administrator.

Stake Holders

Database.

Precondition

- Administrator successfully logon to application.

Main Success Scenario

4.2.1 Select username to edit information.

4.2.2 Edit name.

4.2.3 Edit designation.

4.2.4 Edit user role.

4.2.5 Save entry to update user information.

4.2.6 Move back to control panel

Exception

4.2.1.a Invalid username or user does not exist in the database.

Exception Handling

4.2.1.a.1 Enter a valid username.

Post condition

Administrator successfully edits users information.

Use Case 4.3: Edit User Information

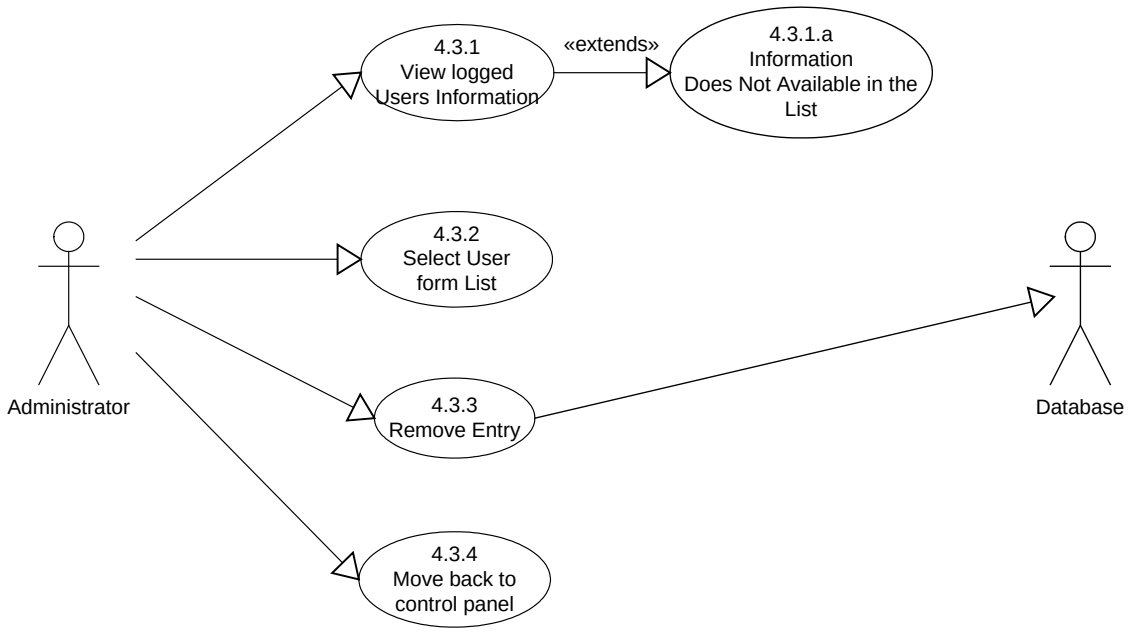


Figure: Use Case Diagram 4.3: Edit User Information

Use Case 4.3: Edit User Information Description

Primary Actor

Administrator.

Stake Holders

Database.

Precondition

- Administrator successfully logon to application.

Main Success Scenario

4.3.1 View logged user information

4.3.2 Select user from list.

4.3.3 Remove entry from list and database.

4.3.4 Move back to control panel

Exception

4.3.1.a Information does not available in the list.

Exception Handling

4.2.1.a.1 Nobody is logged in at the moment.

Post condition

Administrator successfully view logged users information.

4.2.5 Activity Diagrams

Activity diagrams encourage you to notice and document parallel and concurrent activities. This makes them excellent tools for modeling workflow, analyzing use cases, and dealing with multi-threaded applications.

From now on in this chapter, describe the activities extracted from the existing systems. Each activity diagram corresponds to the related use case .

In these activity diagrams represent a flow driven by internally generated actions by the stakeholders of the system.

4.2.5.1 Activity Diagram – Account Opening (Accounts Information)

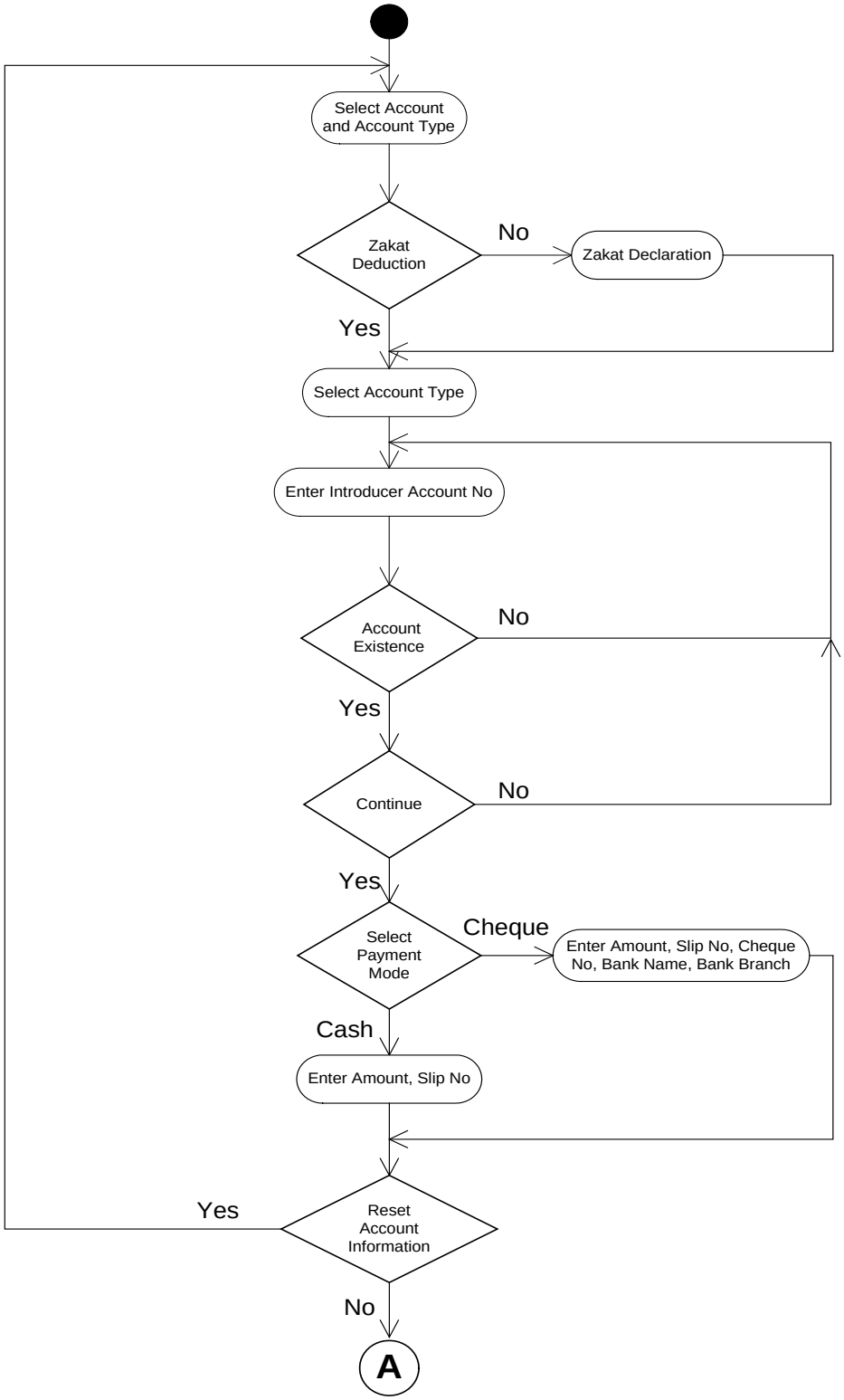


Figure: Activity Diagram – Account Opening (Accounts Information)

4.2.5.2 Activity Diagram – Account Opening (Depositors Information)

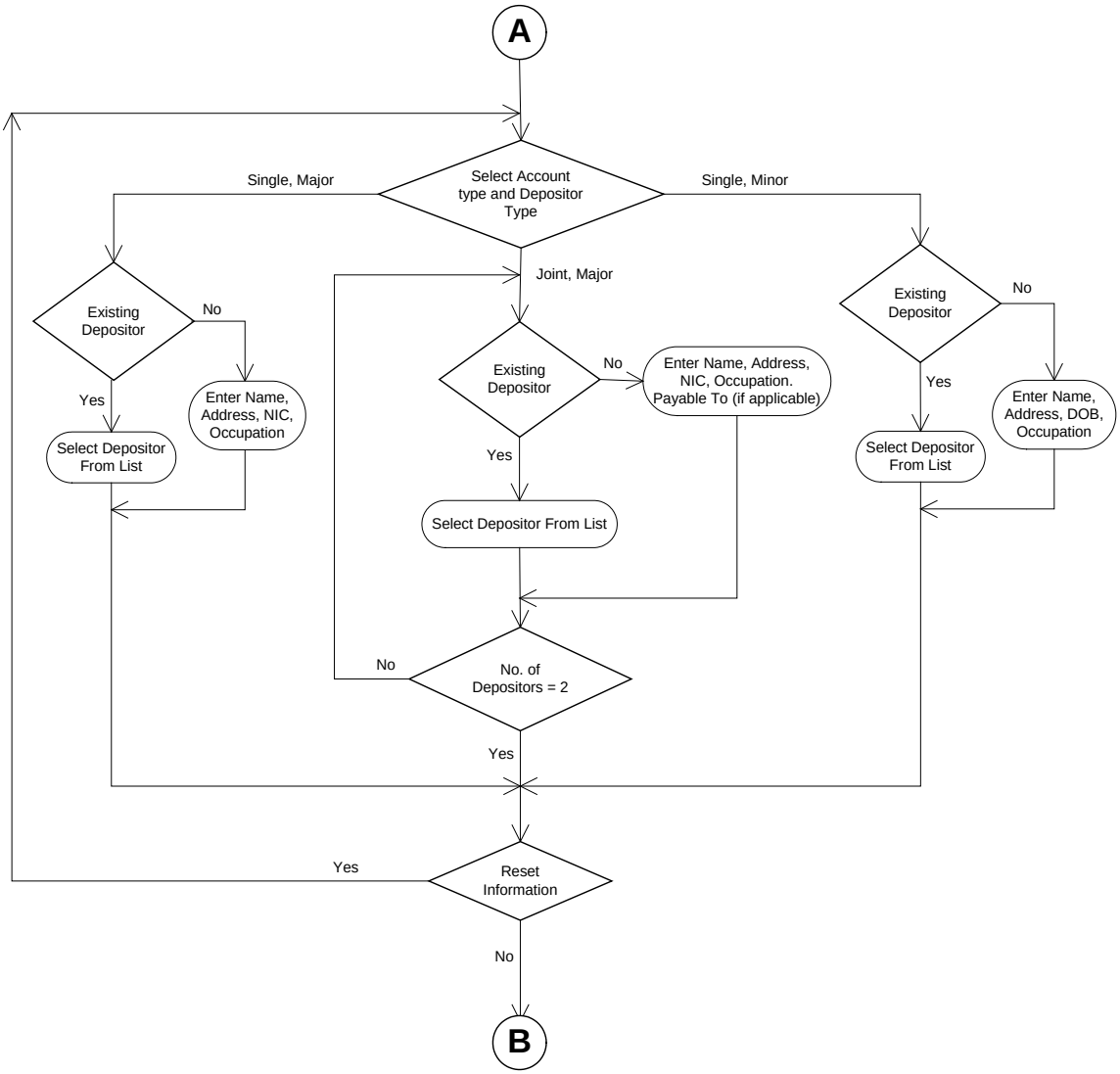


Figure: Activity Diagram – Account Opening (Depositors Information)

4.2.5.3 Activity Diagram – Account Opening (Nominee Information)

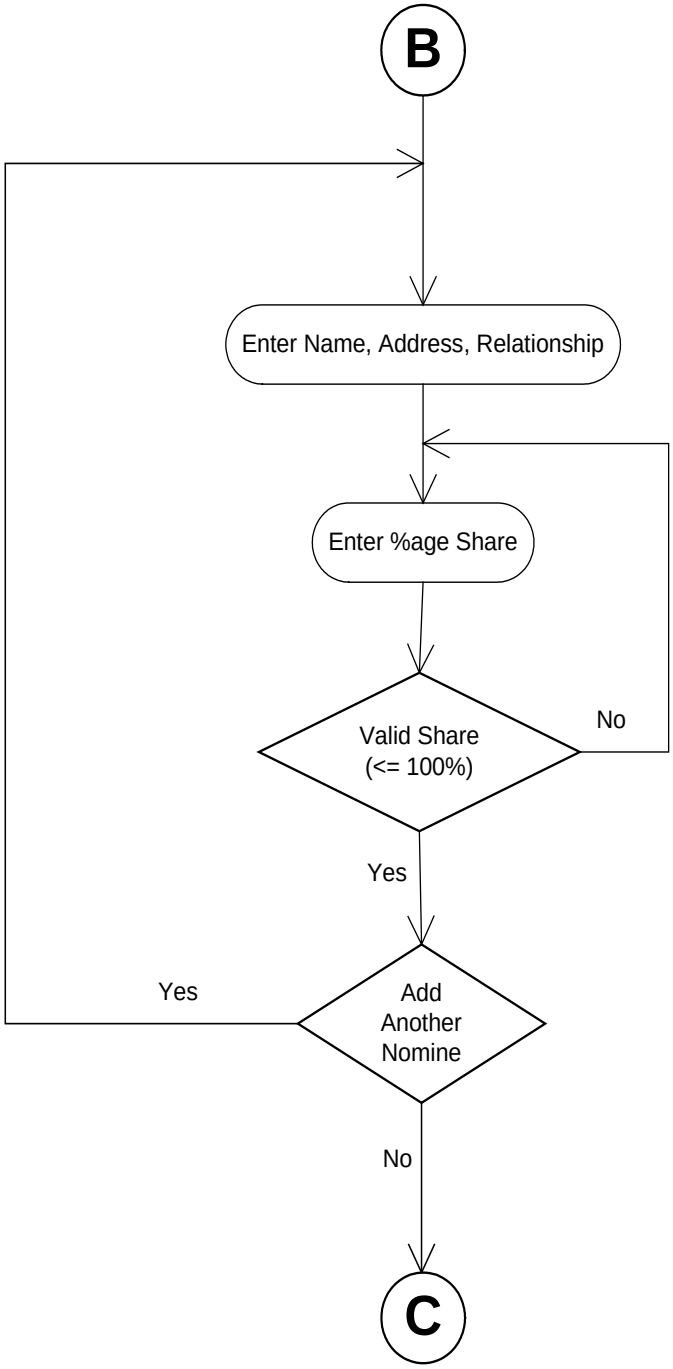


Figure: Activity Diagram – Account Opening (Nominee Information)

4.2.5.4 Activity Diagram – Account Opening (Guardian Information)

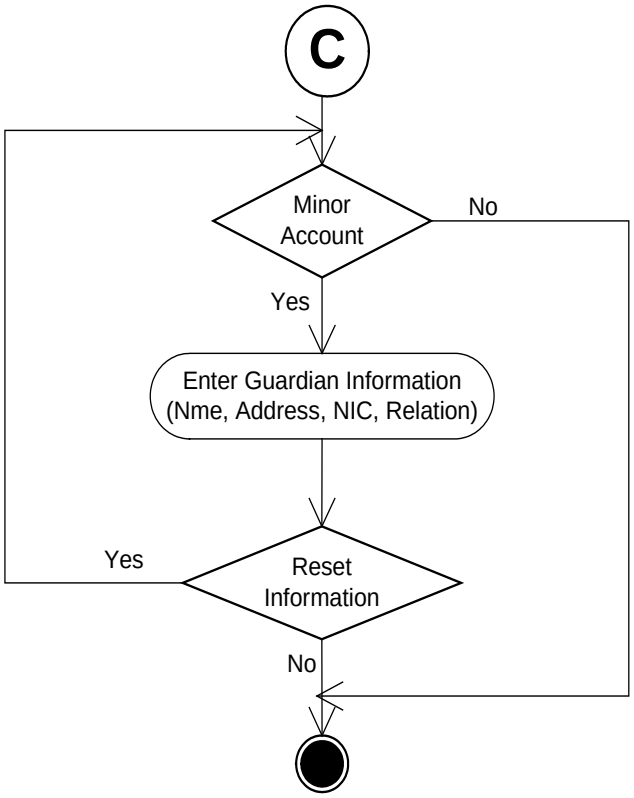


Figure: Activity Diagram – Account Opening (Guardian Information)

4.2.5.6 Activity Diagram – Savings Account Transaction

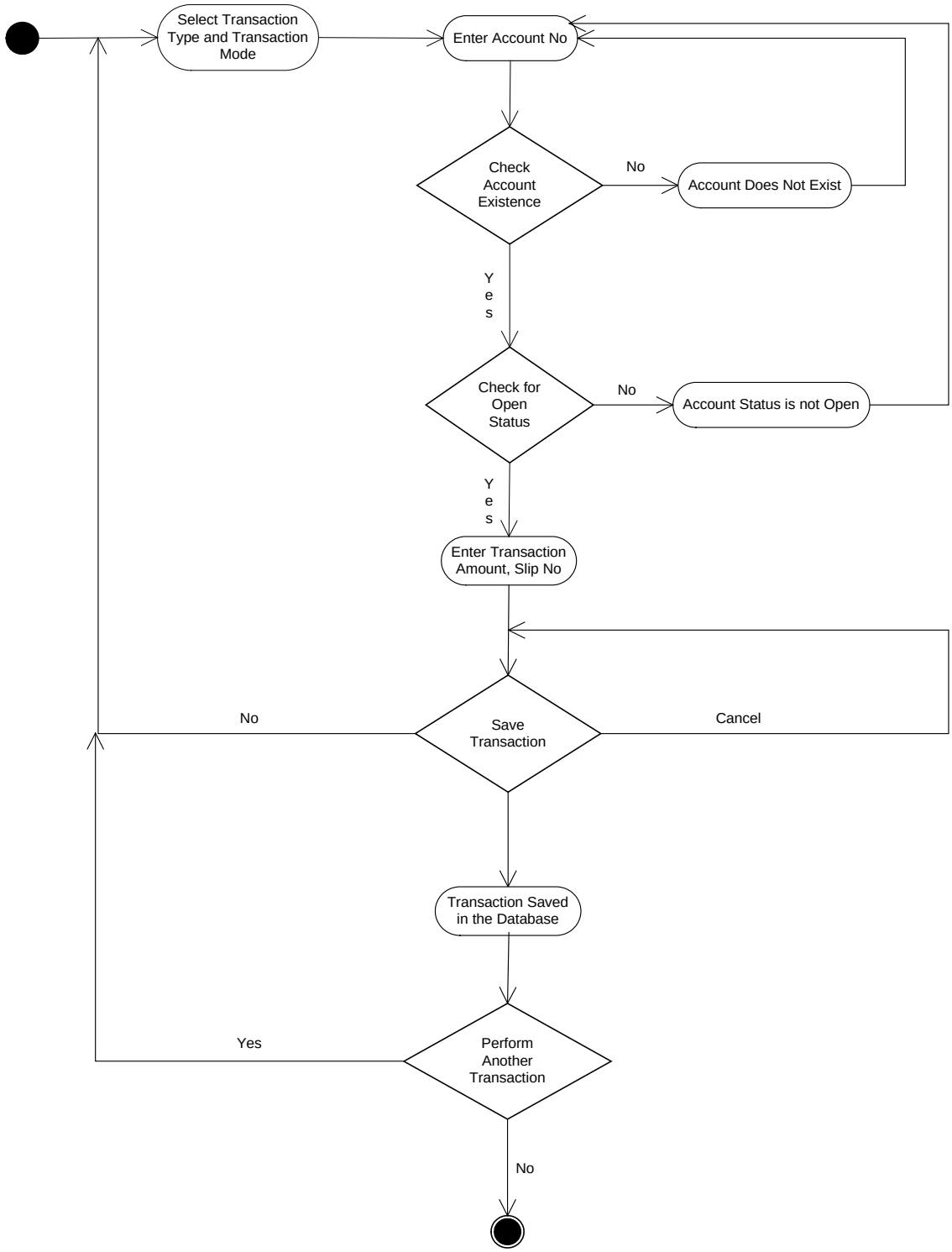


Figure: Activity Diagram – Savings Account Transaction

4.2.5.7 Activity Diagram – Special Savings Account Transaction

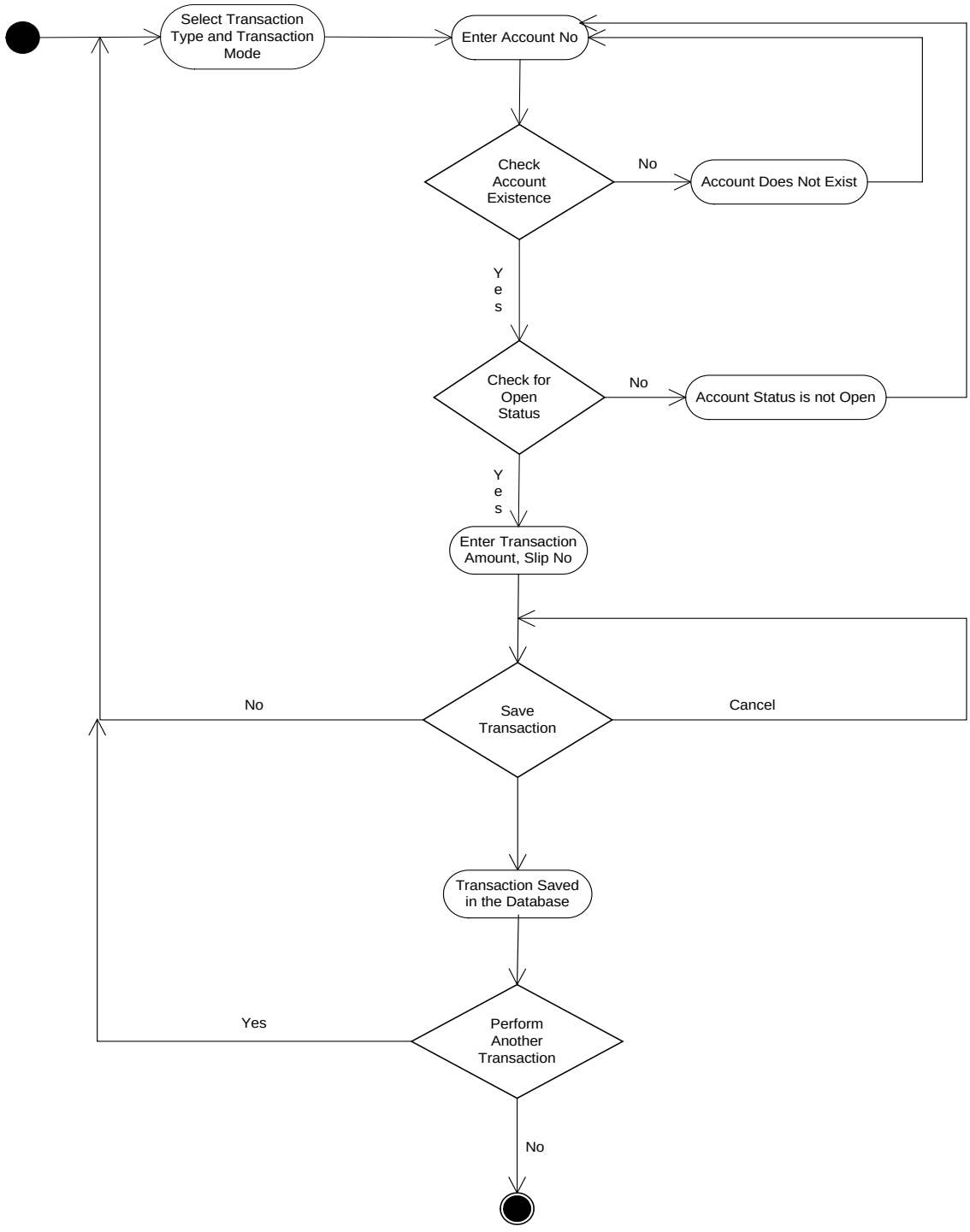


Figure: Activity Diagram – Special Savings Account Transaction

4.2.5.8 Activity Diagram – Adding Setup values

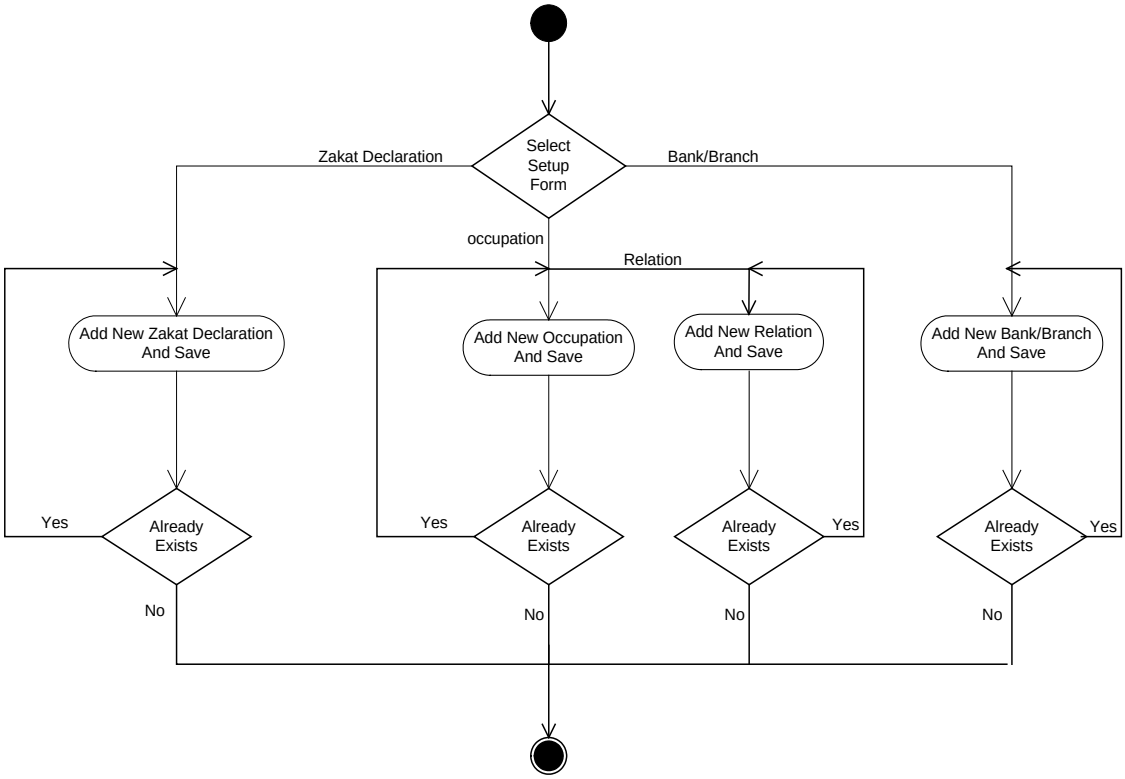


Figure: Activity Diagram – Adding Setup values

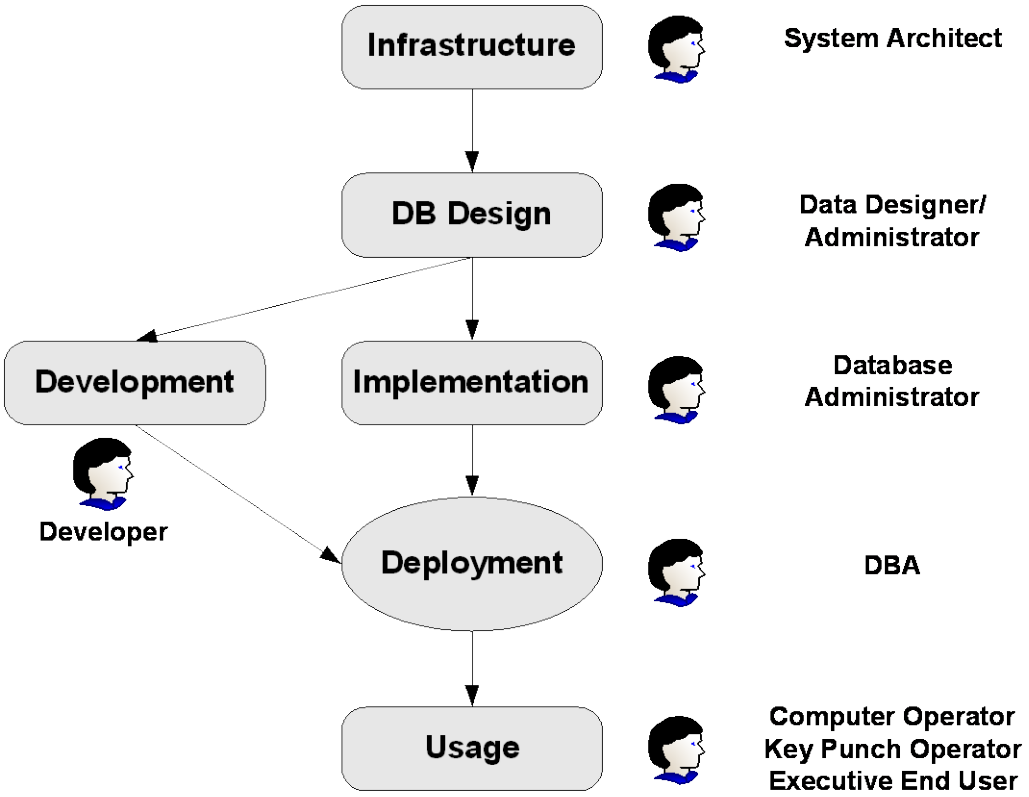
Chapter 5

Design and Implementation

5.1 Overview

Design starts only after a complete analysis of the requirements has been undertaken.

5.2 Enterprise Design Methodology



Infrastructure: Designed by system architects

Database design: Designed by data designer/data administrator

Database implementation: Implemented by database administrator (DBA)

Application development: Developed by developers

System deployment: Deployed by Database administrator (DBA)

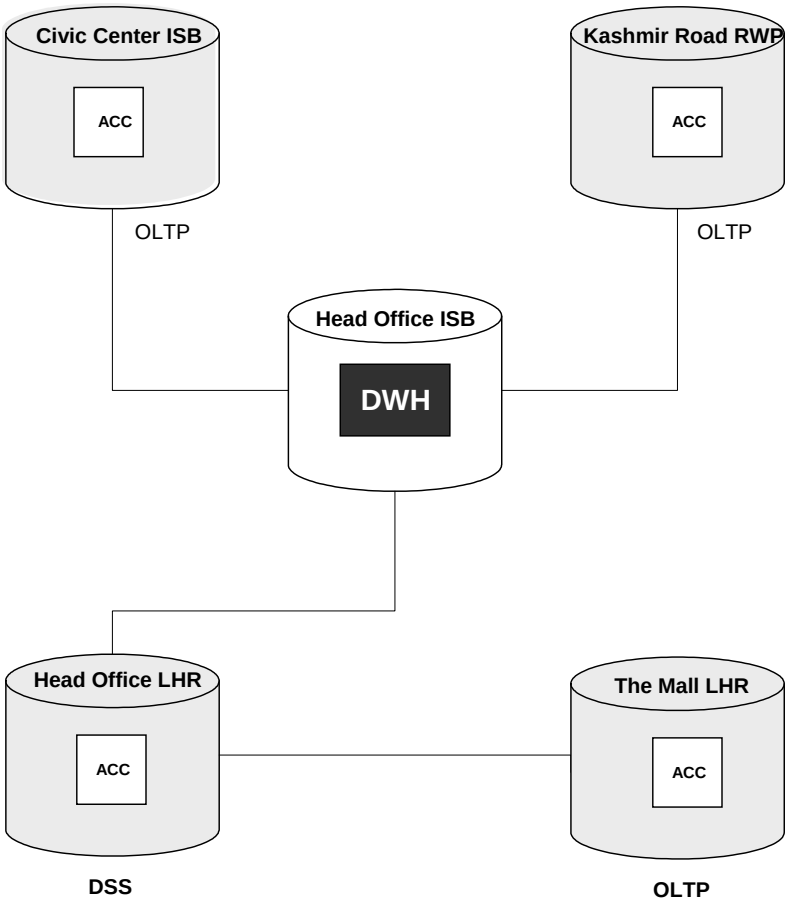
System usage: Used by

- Computer operator
- Keypunch operator
- Executive end user

5.3 Database Design

Process of creating design for database, which will support daily Accounts manipulation.

5.4 Database Model



5.4.1 Model

Client Server

5.4.2 Type

- Branches: OLTP
- Zonal Head office: DSS
- Head Office: DWH

5.4.3 Layout

Tree Like

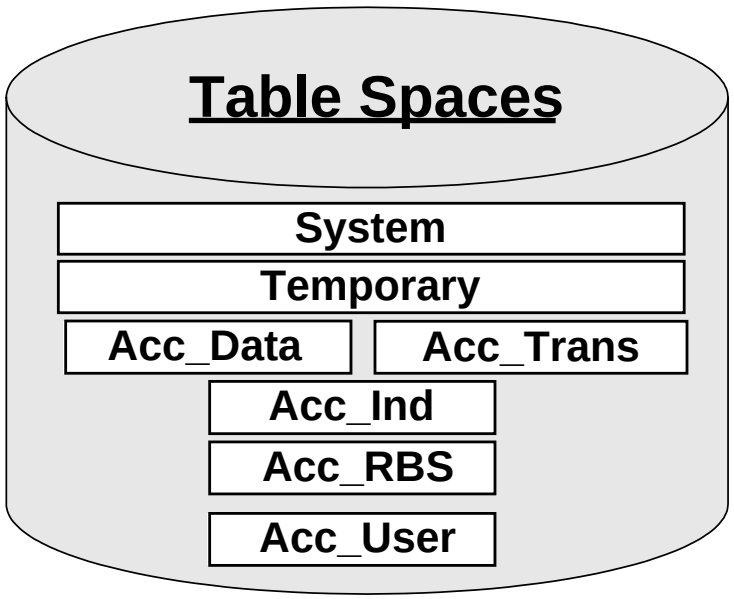
5.5 Logical Database Design

5.5.1 Schemas

- AMS

5.5.2 Table spaces

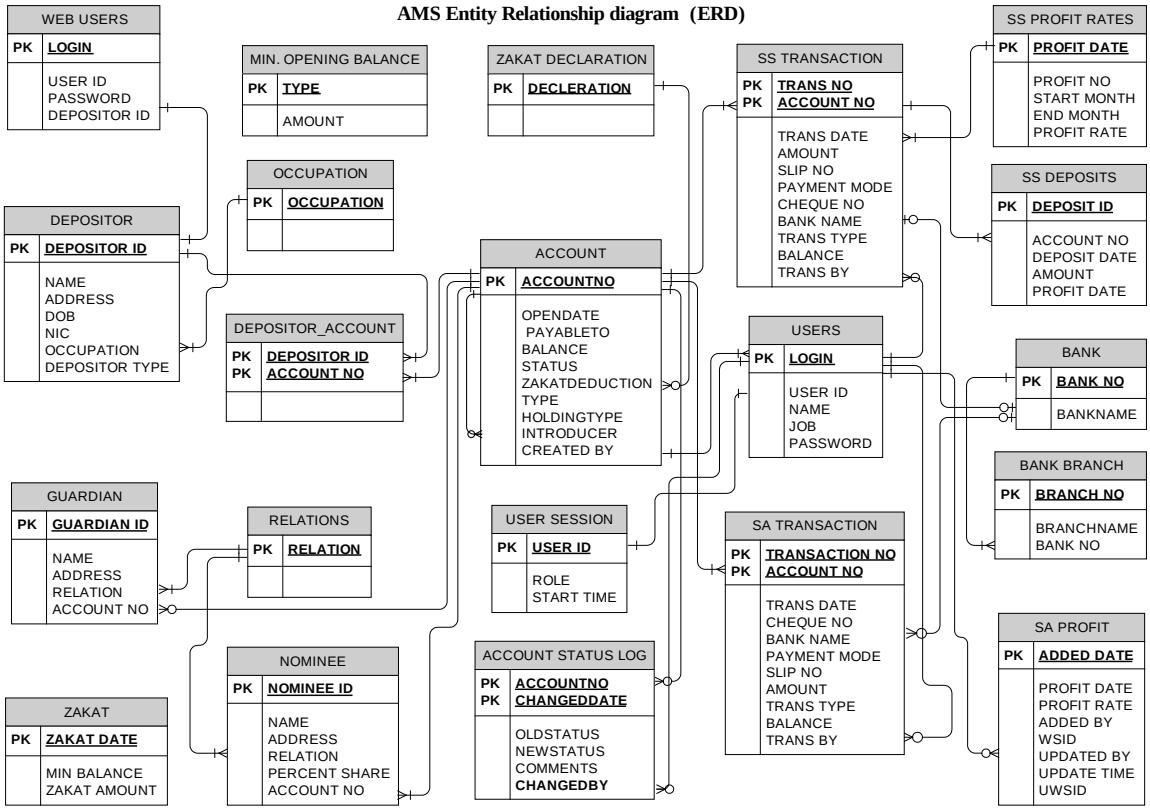
- System
- Temporary
- Acc_Data
- Acc_Trans
- Acc_Ind
- Acc_RBS
- Acc_User



5.5.3 Data Objects

All tables shown in ERD will be the Data objects of the database.

5.5.4 Entity Relationship Diagram (ERD)



5.6 Logical Attributes of Data Objects

Name: **Account** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
AccountNo	Varchar2	9		Not Null	PK	
OpenDate	Date		SysDate	Not Null		
PayableTo	Varchar2	40				
Balance	Number	14,2		Not Null		
Status	Varchar2	10	Open	Not Null		
ZakatDeduction	Varchar2	20	Yes	Not Null		
Type	Varchar2	10		Not Null		Major, Minor
Holdingtype	Varchar2	10				Single, Joint A, Joint B
Introducer	Varchar	9		Not Null		AccountNo

Name: **Depositor** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
DepositorID	Number	9		Not Null	PK	1 .. 99999999
Name	Varchar2	40		Not Null		
Address	Varchar2	80		Not Null		
DOB	Date					
NIC	Varchar2	15				
Occupation	Varchar2	20		Not null	FK	
DepType	Varchar2	15		Not null		

Name: **Occupations** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
Occupation	Varchar2	20		Not Null	PK	

Name: **Nominee** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
NomineeID	Number	9		Not Null	PK	1 .. 999999999
Name	Varchar2	40		Not Null		
Address	Varchar2	80		Not Null		
Relation	Varchar2	20		Not Null	FK	
PercentShare	Number	5,2		Not Null		
AccountNo	Varchar2	9		Not Null	FK	

Name: **Guardian** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
GuardianID	Number	9		Not Null	PK	1 .. 999999999
Name	Varchar2	40		Not Null		
Address	Varchar2	80		Not Null		
Relation	Varchar2	20		Not Null	FK	
AccountNo	Varchar2	9			FK	

Name: **Bank** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
BankNo	Number	3		Not Null	PK	1 … 999
BankName	Varchar2	50		Not Null		

Name: **BankBranch** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
BranchNo	Number	6		Not Null	PK	1 … 999999
BranchName	Varchar2	50		Not Null		
BankNo	Number	3		Not Null	FK	

Name: **SATransaction** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
TransactionNo	Number	10		Not Null	PK	1 … 9999999999
AccountNo	Varchar2	9		Not Null	PK	
TransDate	Date			Not Null		
PaymentMode	Varchar2	10	Cash	Not Null		Cash, Cheque
ChequeNo	Varchar2	10				
BankName	Varchar2	40				
SlipNo	Varchar2	10				
Amount	Number	9,2		Not Null		0.01 .. 9999999.99
Type	Varchar2	15		Not Null		
Balance	Varchar2	14,2		Not Null		
TransBy	Varchar2	15		Not Null	FK	

Name: **SAProfit** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
ProfitDate	Date			Not Null	PK	
ProfitRate	Number	5,2		Not Null		
AddedBy	Varchar2	40		Not Null	FK	
AddedTime	Date					
WDIS	Varcahr2	25				
UpdatedBy	Varchar2	40				
UpdatedTime	Date					
UWSID	Varchar2	25				

Name: **ZakatDecleration** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
Decleration	Varchar2	20		Not Null	PK	

Name: **SSTransaction** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
TransactionNo	Number	10		Not Null	PK	1 … 9999999999
AccountNo	Varchar2	9		Not Null	PK	
TransDate	Date			Not Null		
PaymentMode	Varchar2	10	Cash	Not Null		Cash, Cheque
ChequeNo	Varchar2	10				
BankName	Varchar2	40				
SlipNo	Varchar2	10				
Amount	Number	9,2		Not Null		0.01 .. 9999999.99
TransType	Varchar2	15		Not Null		
Balance	Varchar2	14,2		Not Null		
TransBy	Varchar2	15		Not Null		

Name: **SSDeposit** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
AccountNo	Varchar2	9		Not Null	PK	
DepositID	Number	4		Not Null	PK	0 … 9999
DepositDate	Date					
Amount	Number	10,2		Not Null		0.01 … 99999999.99
LastProfitDate	Date					

Name: **MinOpeningBalance** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
Type	Varchar2	9		Not Null	PK	
Amount	Number	9		Not Null		

Name: **SSProfitRates** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
ProfitDate	Date			Not Null	PK	
ProfitNo	Number	1		Not Null	PK	1 … 9
StartMonth	Number	2		Not Null		1 … 12
EndMonth	Number	2		Not Null		1 … 12
ProfitRate	Number	5,2		Not Null		

Name: **AccountStatusLog** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
AccountNo	Varchar2	9		Not Null	PK	
ChangeDate	Date			Not Null	PK	
OldStatus	Varchar2	20		Not Null		
NewStatus	Varchar2	20				
Comments	Varchar2	200				
ChangedBy	Number	5		Not Null	FK	

Name: **DepositorAccount** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
DepositorID	Number	9		Not Null	PK	1 … 999999999
AccountNo	Varchar2	9		Not Null	PK	

Name: **Relations** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
Relation	Varchar2	20		Not Null	PK	

Name: **Zakat** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
ZakatDate	Date			Not Null	PK	
MinBalance	Number	10,2		Not Null		
SAZakat	Number	14,2		Not Null		
SSZakat	Number	14,2				

Name: **NS_Users** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
UserID	Number	3		Not Null	PK	1 … 999
Name	Varchar2	40		Not Null		
Job	Varchar2	15		Not Null		
Login	Varchar2	15		Not Null		
Password	Varchar2	15		Not Null		
NSRole	Varchar2	15		Not Null		

Name: **Web_Users** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
UserID	Number	5		Not Null	PK	1 … 99999
Login	Varchar2	15		Not Null		
Password	Varchar2	15		Not Null		
DepositorID	Number	9		Not Null	FK	

Name: **DepositorAccount** Type: Regular table

Column	Data Type	Size	Default	Constraint	Key	Domain
UserID	Varchar2	20		Not Null	PK	
StartTime	Date			Not Null	PK	
Role	Varchar2	20				

5.7 Physical Attributes of Data Objects

Object Name	Schema	Table Space	Initial	Next	Min	Max	Pctincrease	%Free	%Used	Init Trans	MaxTrans	Free List
DEPOSITOR	AMS	Acc_Data	50K	5K	1	UL	0	5	80	1	1	1
ACCOUNT	AMS	Acc_Data	50K	5K	1	UL	0	5	80	1	1	1
DEPOSITORACCOUNT	AMS	Acc_Data	50K	5K	1	UL	0	5	90	1	1	1
NOMINEE	AMS	Acc_Data	50K	5K	1	UL	0	5	80	1	1	1
GUARDIAN	AMS	Acc_Data	50K	5K	1	UL	0	5	80	1	1	1
SATRANSACTION	AMS	Acc_Trans	200M	1M	1	UL	10	5	90	2	5	5
SATRANSACTION	AMS	Acc_Trans	200M	1M	1	UL	10	5	90	2	5	5
SSDEPOSITS	AMS	Acc_Trans	100M	1M	1	UL	5	2	90	2	5	5
SAPROFIT	AMS	Acc_Trans	50K	5K	1	UL	0	2	90	1	1	1
SSPROFITRATES	AMS	Acc_Trans	50K	5K	1	UL	0	2	90	1	1	1
BANK	AMS	Acc_Data	50K	5K	1	UL	0	2	90	1	1	1
BANKBRANCH	AMS	Acc_Data	100K	10K	1	UL	0	2	90	1	1	1
MIN_OPEN_AMOUNT	AMS	Acc_Data	10K	5K	1	5	0	2	90	1	1	1
OCCUPATIONS	AMS	Acc_Data	50K	5K	1	UL	0	2	90	1	1	1
RELATIONS	AMS	Acc_Data	50K	5K	1	UL	0	2	90	1	1	1
ZAKATDECLERATION	AMS	Acc_Data	50K	5K	1	UL	0	2	90	1	1	1
ZAKAT	AMS	Acc_Trans	100K	10K	1	UL	10	2	90	1	1	1
NS_USERS	AMS	Acc_User	100K	10K	1	UL	15	2	90	1	1	1
USERSESSION	AMS	Acc_User	50K	10K	1	5	0	5	80	1	1	1
WEB_USERS	AMS	Acc_User	100K	10K	1	UL	10	5	90	1	1	1

5.8 Physical Database Design

5.8.1 Objective

- Maximize Reliability
- Minimize Load

5.8.2 Hard Disks Organization

Drive	HDD	Volume Label	Size	Usage
C:	Hdd 1	OS	4 GB	Operating System
D:	Hdd1	SW	8 GB	DBMS & other SWs
E:	Hdd1	RLFs	3 GB	Redolog files & Control files
F:	Hdd2	RLFs	3 GB	Redolog files & Control files
G:	Hdd3	RLFs	3 GB	Redolog files & Control files
H:	Hdd1	DFs	25 GB	Data files (Tablespaces)
I:	Hdd2	DFs	25 GB	Data files (Tablespaces)
J:	Hdd3	DFs	25 GB	Data files (Tablespaces)
K:	Hdd2	Backup	12 GB	Archived RLF's
L:	Hdd3	Backup	12 GB	Backup of the Database
Z:	**Offsite**	Backup	40 GB	Backup of the Database

5.8.3 Tablespace Organization

Drive	Tablespaces			
H:	Acc_Trans	System,Temporary		
I:		Acc_RBS	Acc_Data	Acc_ind
J:			Acc_user	

5.8.4 Control files & Redo log Files Organization

Drive	CFs	RLF Group 1	RLF Group 3	RLF Group 2	RLF Group 4
E:	Control1.ctl	RedoG1M1.ora	RedoG3M1.ora		
F:	Control2.ctl	RedoG1M2.ora	RedoG3M2.ora	RedoG2M1.ora	RedoG4M1.ora
G:	Control3.ctl			RedoG2M2.ora	RedoG4M2.ora

5.8.5 Data files Organization

H:	Acctransdf1.ora	System01.ora	Temp01.ora	
I:	Acctransdf2.ora	Accrbsdf1.ora	Accdatadf1.ora	
J:	Acctransdf3.ora	Accuserdf1.ora	Accdatadf2.ora	Accinddf1.ora

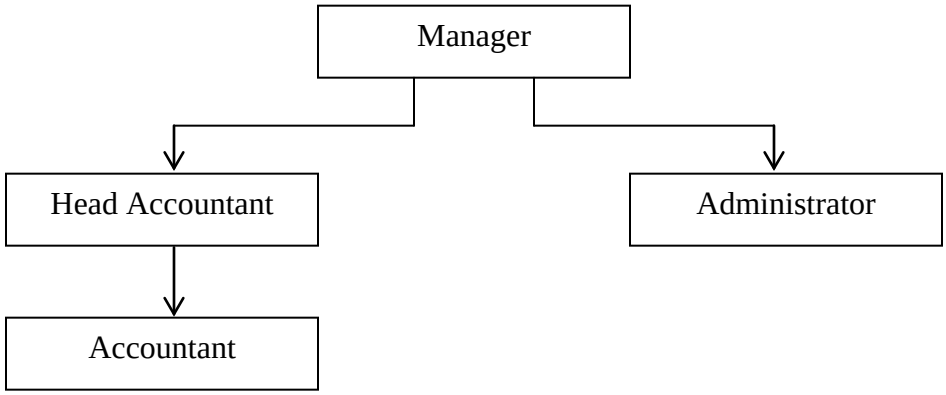
5.9 Security & Policy Scheme

AMS will provide role-based security.

5.9.1 Roles

Following will be the roles.

- Manager
- Head Accountant
- Accountant
- Administrator



Manager: Manager role will be on the top of hierarchy. It will have the entire super set of privileges.

Head Accountant: Head accountant will have the sub set of privileges owned by manager.

Accountant: Accountant will have the sub set of privileges contained by head accountant.

Administrator: Administrator role has sub set of privileges owned by manager but different from head accountant.

5.9.2 Objects Access Matrix

Role / Object	Manager	Head Accountant	Accountant
Depositor	Select	**Select**	Select
	Insert	Insert	
	Update	Update	
Account	Select	Select	Select
	Insert	Insert	
	Update	Update	
SATransaction	Select	Select	Select
	Insert	Insert	
	Update	Update	Insert
SSTransaction	Select	Select	Select
	Insert	Insert	
	Update	Update	Insert
SSDeposits	Select	Select	Select
	Insert	Insert	
	Update	Update	Insert
SAProfitRates	Select		
	Insert		
	Update		
SSProfitRates	Select		
	Insert		
	Update		
Zakat	Select	Select	
	Insert	Insert	
	Update	Update	
NS_Users	Select	Select	Select
	Insert		
	Update	Update	Update

User_Session	Insert	Insert	Insert
	Delete		
Web_Users	Select		
	Insert		
	Update		
Min_opening_Amount	Select		
	Update		

5.10 Backup & Recovery Strategy

5.10.1 Mode of Database

- Archivelog Mode
- Autoarchiving Enabeled

5.10.2 Backup Schedules

Schedule	**Type**		Time	Destination
Daily	Incremental	Physical (cold)	17:00 hrs daily	L: (local)
		Logical	16:30 hrs daily	L: (local)
Weekly	Incremental	Physical (cold)	17:00 hrs every Saturday	Z: (Offsite)
		Logical	16:00 hrs every Saturday	Z: (Offsite)
Monthly	Full	Physical (cold)	Last weekend of month	CD ROMs
		Logical	Last working day of month	CD ROMs

5.11 Designing of Database Attribute

5.11.1 Text Attributes

All text attributes like Depositor name, address, etc. does not take integral values. These attributes have certain limit to take input. It does not allow exceeding that limit .e.g. if one text attribute has 20 characters of its limit. Then it does not allow you to enter more than 20 characters.

5.11.2 Numeric Attributes

All numeric attribute like all types of Amounts e.g. deposits and withdrawals do not take any alphabetic values and not allow starting with the negative sign. All attributes have certain limit to take input. It does not allow exceeding that limit .e.g. if one numeric attribute has 9 digits of its limit. Then it does not allow entering more than 9 digits.

5.11.3 Date Attributes

All date attributes like account opening date; transaction dates are stored in the “date” data type.

5.12 Designing of Form’s Attribute

Different attributed are designed in different methods.

5.12.1 Text Attributes

All text attributes like Depositor name does not take integral values. And all attributes have certain limit to take input. It does not allow exceeding that limit .e.g. if one text attribute has 20 characters of its limit. Then it does not allow entering more than 20 characters.

5.12.2 Numeric Attributes

All numeric attribute like Amounts do not take any alphabetic values and not allow to start with the negative sign. All attributes have certain limit to take input. It does not allow exceeding that limit .e.g. if one numeric attribute has 7 characters of its limit. Then it does not allow entering more than 7 characters.

5.12.3 Date Attributes

All date attributes like transaction dates are chosen from the calendar to save data entry time, storage space and avoid format conflicts. Date has also range from 2000 to 9999 year. So one can select the date from this interval. All attributes have certain limit to take input.

Chapter 6

Data warehouse Design

6.1 Overview

A data warehouse is a subject-oriented, integrated, time-variant, and nonvolatile collection of data in support of management's decision-making process. The ccollection of data that is used primarily in organizational decision making. It is a decision support database that is maintained separately from the organization's operational database.

Subject oriented: Oriented to the major subject areas of the Organization based on the type of information.

Integrated: There is no consistency in encoding, naming conventions, …, among different data sources. These data sources may be heterogeneous. When data is moved to the warehouse, it is converted.

Non-Volatile: Operational data is regularly accessed and manipulated a record at a time, and update is done to data in the operational environment. Warehouse Data is loaded and accessed. Update of data does not occur in the data warehouse environment.

Time Variance: The time horizon for the data warehouse is significantly longer than that of operational systems. Operational database deals with current value data. Data warehouse data is nothing more than a sophisticated series of snapshots, taken of at some moment in time.

6.2 Why Separate Data Warehouse?

Performance: Special data organization, access methods, and implementation methods are needed to support multidimensional views and operations typical of OLAP.Complex OLAP queries would degrade performance for operational transactions. Concurrency control and recovery modes of OLTP are not compatible with OLAP analysis.

Missing data: Decision support requires historical data which operational DBs do not typically maintain or stores in archieved form.

Data Consolidation: Decesion making requires consolidation (aggregation, summarization) of data from heterogeneous sources, operational DBs and/or external sources.

Data quality: Different sources typically use inconsistent data representations, codes and formats which have to be transformed.

Advantages of Warehousing

- High query performance.
- Queries not visible outside warehouse.
- Local processing at sources unaffected.
- Can operate when sources unavailable.
- Can query data not stored in a DBMS.
- Extra information at warehouse.
- Modify, summarize (store aggregates).
- Add historical information.
- More up-to-date data.
- May be less draining on sources.

Traditional OLTP Vs OLAP

OLTP: On Line Transaction Processing describes processing at operational sites.
OLAP: On Line Analytical Processing describes processing at warehouse.

Traditionally, DBMS have been used for on-line transaction processing (OLTP). For example withdraw rs10,000 from account X.

- Clerical data processing tasks.
- Daily up-to-date data.
- Short transactions are the unit of work.
- Read and/or Insert and/or Update a few records.

6.3 The Architecture of Data Warehousing

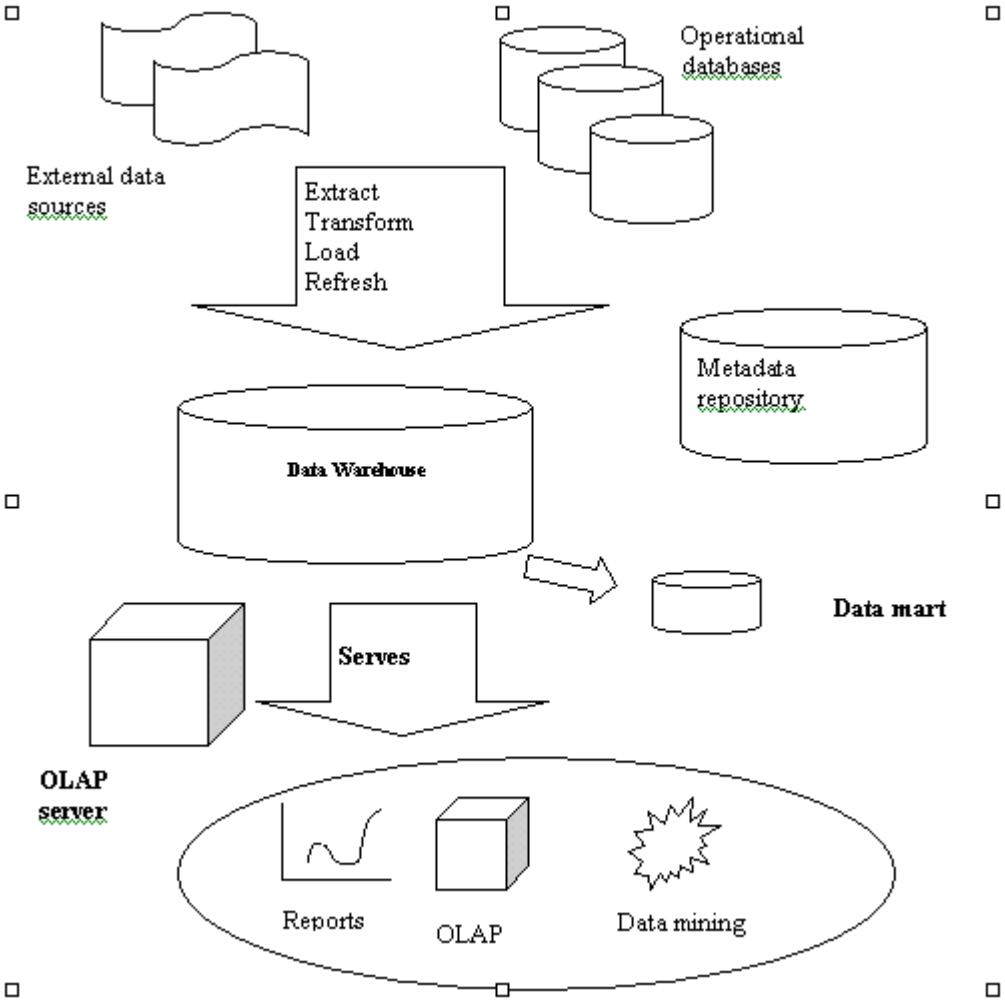


Figure: DWH Architecture

6.4 OLTP vs. OLAP

	OLTP	OLAP
Users	Accountants	Higher Management
Function	Day to day operations	Decesion support
DB Design	Application oriented	Subject oriented
Access	Simple read and/or insert,update	Complex data read/retrievel
Unit of Work	Simple transactions	Complex queries
Users	15 – 20 per branch	3-5 per zone
Records accessed	Hunderds	Hunderd thousands

6.5 Designing Warehouse (Using nine step Methodology)

The methodology specifies the steps required for the design of a data mart, however, the methodology also ties together separate data marts so that over time they merge together into a coherent overall data warehouse.

Step 1: Choosing the Process

The process (function) refers to the subject matter of a particular data mart of the data warehouse. The first data mart to be built should be the one that is most likely to be delivered on time, within budget, and to answer the most commercially important business questions.

The processes for national savings will be:

- Number of Depositors/Accounts.
- Number of Transactions (Deposits/Withdrawals).
- Total Profits paid.
- Total Zakat Deducted.

Step 2: Choosing the Grain

This second step seems like a technical detail, but it is actually the secret to making progress on the design. Choosing the grain means deciding exactly what a fact table

record represents. The fact table is the large central table in the dimensional design that has a multipart key. Each of the components of the multipart key is a foreign key to an individual dimension table. Only when you have chosen the grain can you have a coherent discussion of what the dimensions of the data mart's fact table are.

For National Savings Data warehouse the multipart key of fact table will include:

- ZoneNo
- BranchNo
- PeriodNo
- AccountTypeNo
- DepositorTypeNo
- TransactionTypeNo

Step 3: Identifying and Conforming the Dimensions.

The dimensions are the drivers of the data mart. These set the context for formulating queries about the facts in the fact table. Dimensions should be chosen with the long-range data warehouse in mind. If any dimension occurs in two data marts it said to be conformed.

The Dimensions for under discussion data warehouse will be:

- Period
- Area (Zones/Branches)
- Types (Account/Depositor/Transaction)

Step 4: Choosing the Facts

The grain of the fact table determines which facts can be used in the data mart – all facts must be expressed at the level implied by the grain.

The facts are Depositors, Accounts, Transactions, Profit, Zakat.

Step 5: Storing pre-calculations in the fact table

Once the facts have been selected each should be re-examined to determine whether there are opportunities to use pre-calculations.

Pre-calculations for National savings Data warehouse will be

- Profit calculations (and/or formulas)
- Zakat calculations (and/or formulas)

Step 6: Rounding out the dimension tables

In this step we return to the dimension tables and add as many text descriptions to the dimensions as possible.The text descriptions should be as intuitive and understandable to the users as possible.

Text descriptions for the dimension tables will be

- Period
    - Week
    - Month
    - Year
- Branch
    - Name
    - Location
    - Contact
- Zone
    - Name

Step 7: Choosing the duration of the data warehouse

The duration measures how far back in time the fact table goes.

The duration for this Data warehouse will be Last Fifteen years.

Step 8: Tracking slowly changing dimensions

The changing dimension problem means that the proper description of the old depositor/account and the old branch must be used with the old data warehouse schema. Usually, the data warehouse must assign a generalized key to these important dimensions in order to distinguish multiple snapshots of depositors/accounts and branches over a period of time

Step 9: Deciding the query priorities and the query modes

In this step we consider physical design issues.

- The presence of pre-stored summaries and aggregates
- Materialized views
- Security issue
- Backup issue
- Archive issue

At the end of this methodology, we have a design for a data mart that supports the requirements of business process of National Savings and allows the easy integration with other related data marts to ultimately form the enterprise-wide data warehouse.

Summaries and Aggregates

Aggregation Operators: The operators are:

- Count
- Sum
- Average

Summary Queries: Some of the queries are

- Count

  - Total number of accounts of each/particular account type in each/particular branch in each/particular zone opened in each/particular period.
  - Total number of depositors of each/particular depositor type in each/particular branch in each/particular zone opened in each/particular period.
- Sum
  - Total amount of Deposits against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Total amount of Withdrawals against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Total amount of Profits paid against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Total amount of Zakat deducted against each/particular account type in each/particular branch in each/particular zone in each/particular period.
- Average
  - Average amount of Deposits against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Average amount of Withdrawals against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Average amount of Profits paid against each/particular account type in each/particular branch in each/particular zone in each/particular period.
  - Average amount of Zakat deducted against each/particular account type in each/particular branch in each/particular zone in each/particular period.

6.6 Conceptual Model

The basic conceptual schema used is Star schema.

Star Schema: A single object (fact table) in the middle connected to a number of dimension tables.

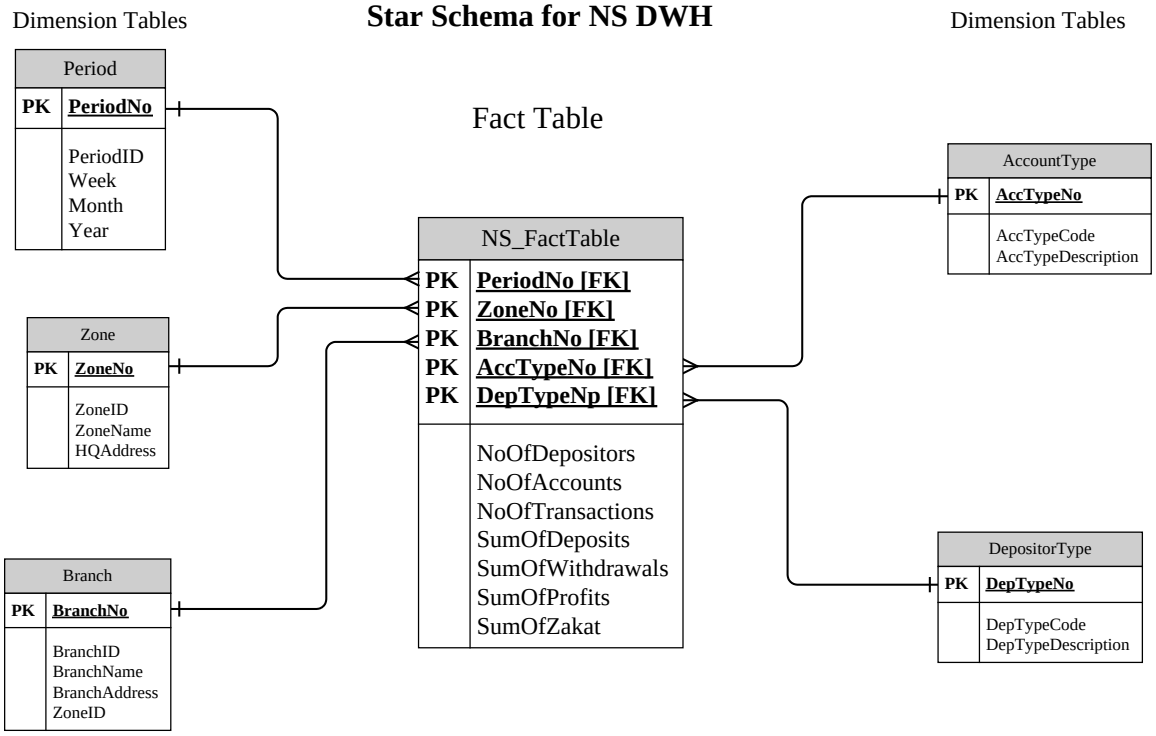


Figure: DWH Star Schema

Fact Table: The relation, which relates the dimensions to the measure of interest.

In the National savings DWH the fact table will be NS_FactTable

Dimension Tables: A collection of relations, which stores information about dimensions.

Dimension tables will be

- Period
- Zone
- Branch

- DepositorType
- AccountType

Attributes: Each dimension can have a set of associated attributes.

- Period
    - PeriodID
    - Week
    - Month
    - Year
- Zone
    - ZoneID
    - ZoneName
    - HQAddress
- Branch
    - BranchID
    - BranchName
    - BranchAddress
    - ZoneID
- DepositorType
    - DepTypeCode
    - DepTypeDescription
- AccountType
    - AccTypeCode
    - AccTypeDescription

6.7 ETL (Extract, Transform, Load)

Data warehouse needs several tools that automate or support ETL. ETL involves following Tasks.

- Data extraction from different external data sources, operational databases and files.

- Data cleaning (finding and resolving inconsistency in the source data).
- Integration and transformation of data (between different data formats, languages, etc.)
- Data loading (loading the data into the data warehouse)
- Data replication (replicating source database into the data warehouse)
- Data refreshment
- Checking for data quality
- Analyzing metadata

6.8 Data Cube

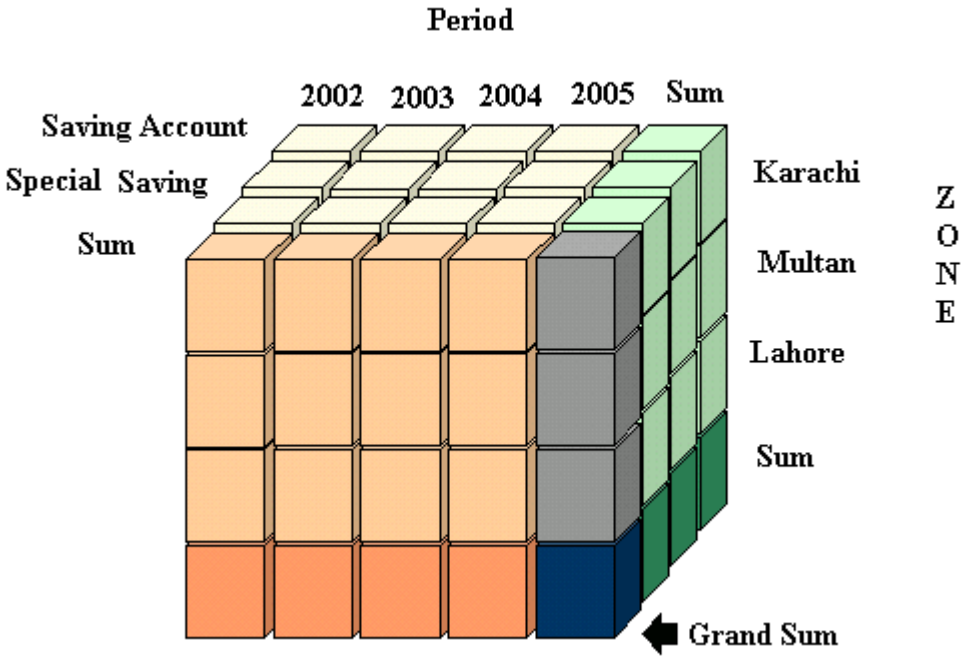


Figure: Data Cube

Conclusion and Future Enhancements

The document is completed after a complete system analysis. This extensive system study process has taken about three months to analyze the business process of National Savings Accounts System, during this process several interviews and discussion sessions were conducted with National Savings representatives.

According to the requirements complete analysis and design is written in this document, which covers almost all the aspects of this accounts system.

Future enhancements always remain there, so we tried our level best to design the system in such a way that it can be upgraded based on the same design and architecture.

Appendix A: Technical Guide

A.1 Server Side Configuration

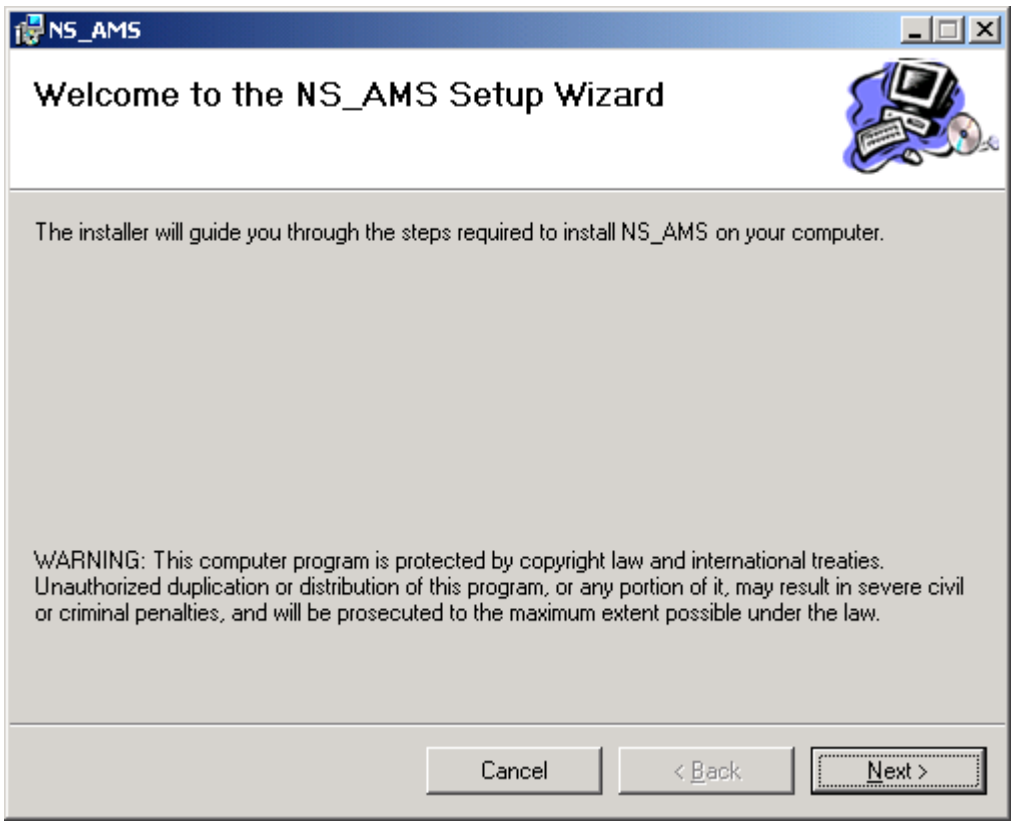
Following are the steps to configure the server to make it ready for the application.

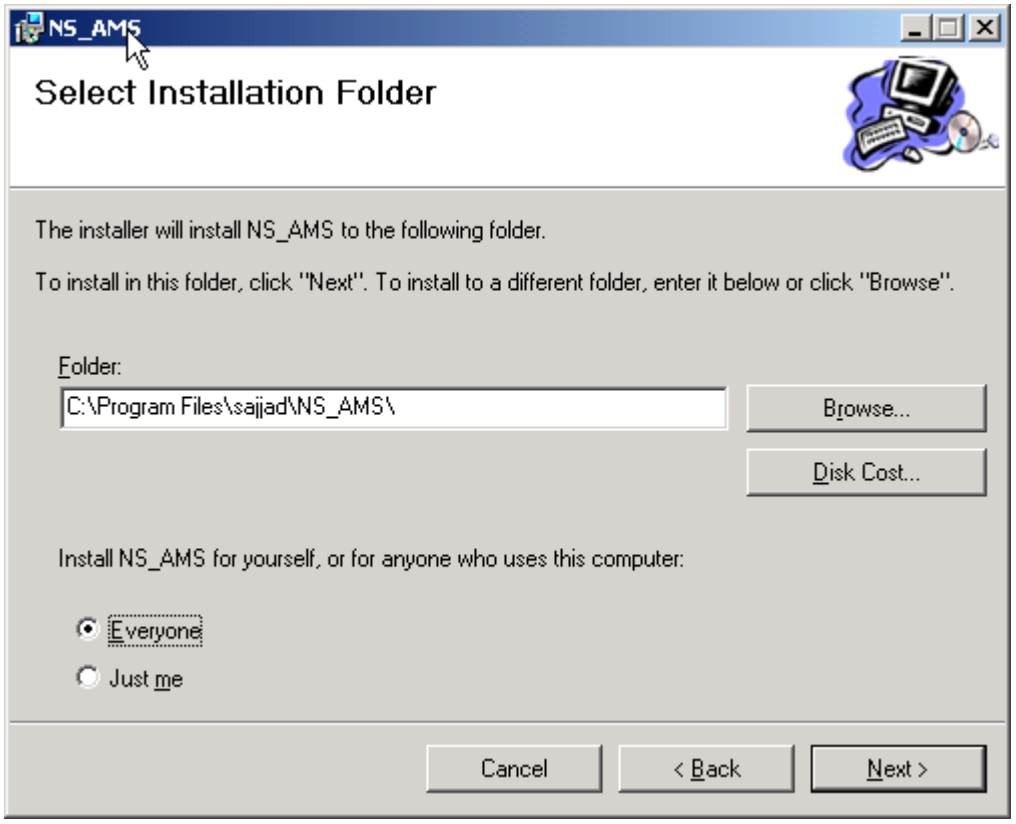
- Install Oracle 9i Database server. Follow the design given in section “5.8 Physical Database Design”.
- Connect with default DBA user system/manager using Oracle SQL *Plus.
- Run the given script to create database structure. It will
    - Create user schema with user id “ams” and password “ams”.
    - Create tables required to store the data.
    - Insert initial required rows in the tables to initiate the application.
    - Create two application users
        - Login “manager” Password “manager” with Manager Role.
        - Login “admin” Password “default” with Administrator Role.
- Change password after connecting to the database with ams/ams.

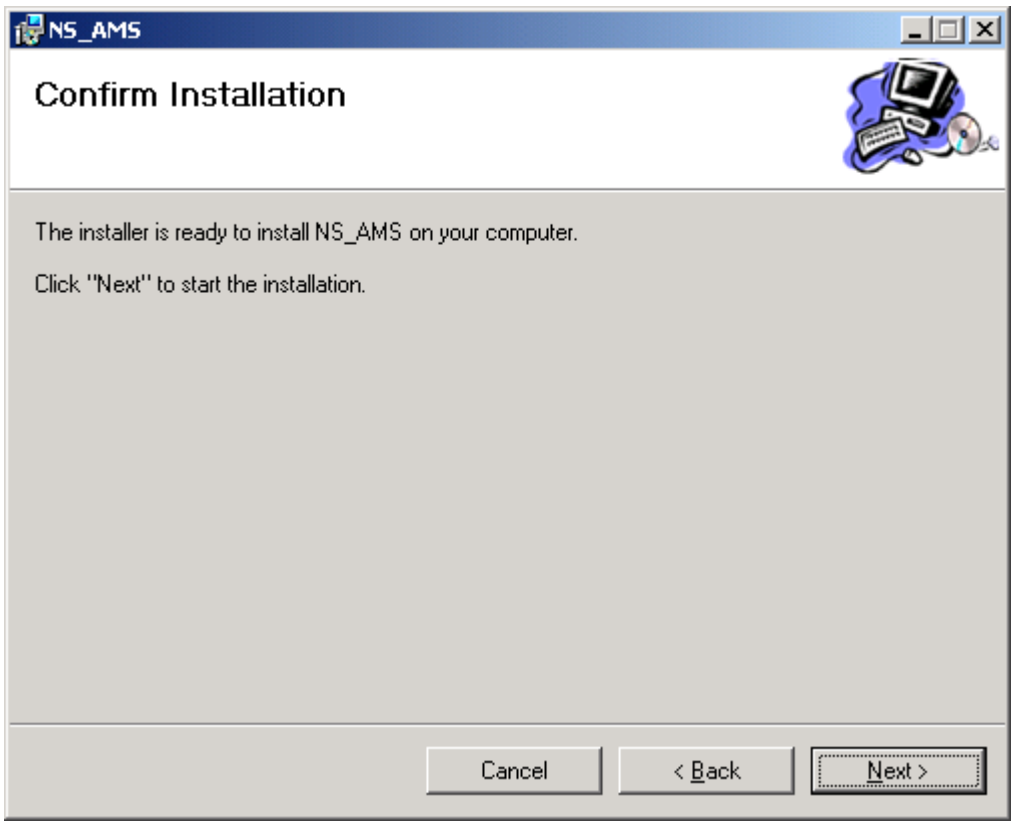
A.2 Client Side Configuration

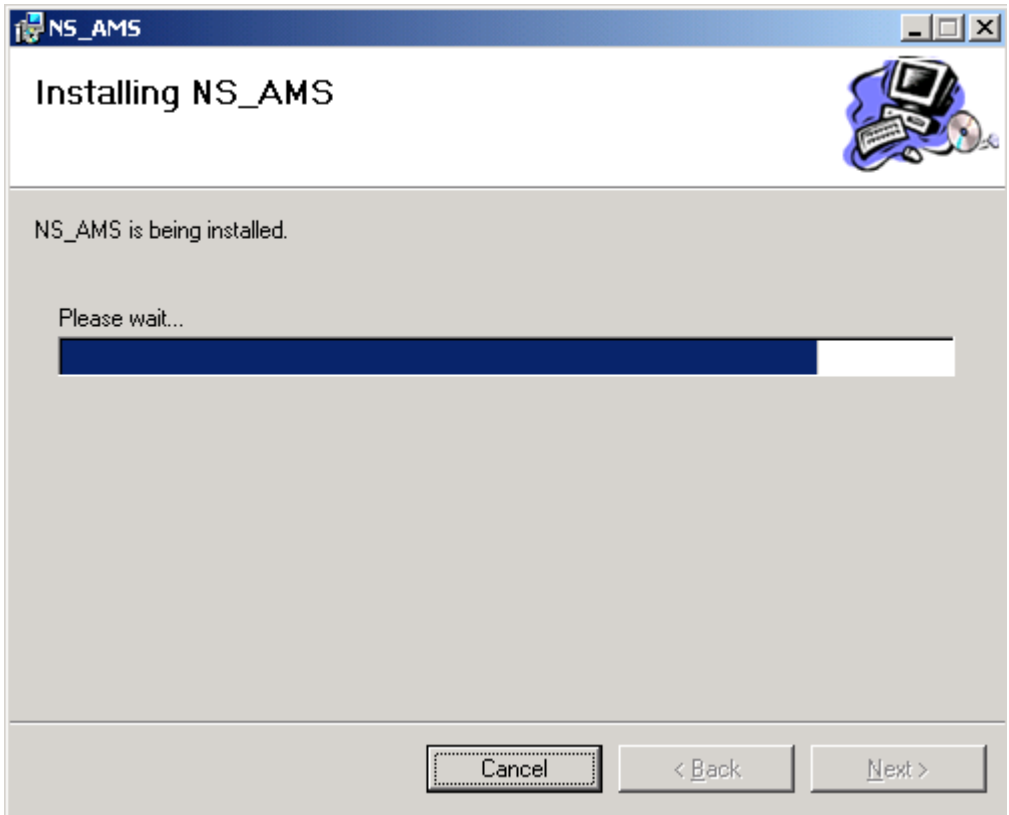
Following are the steps to configure client machines.

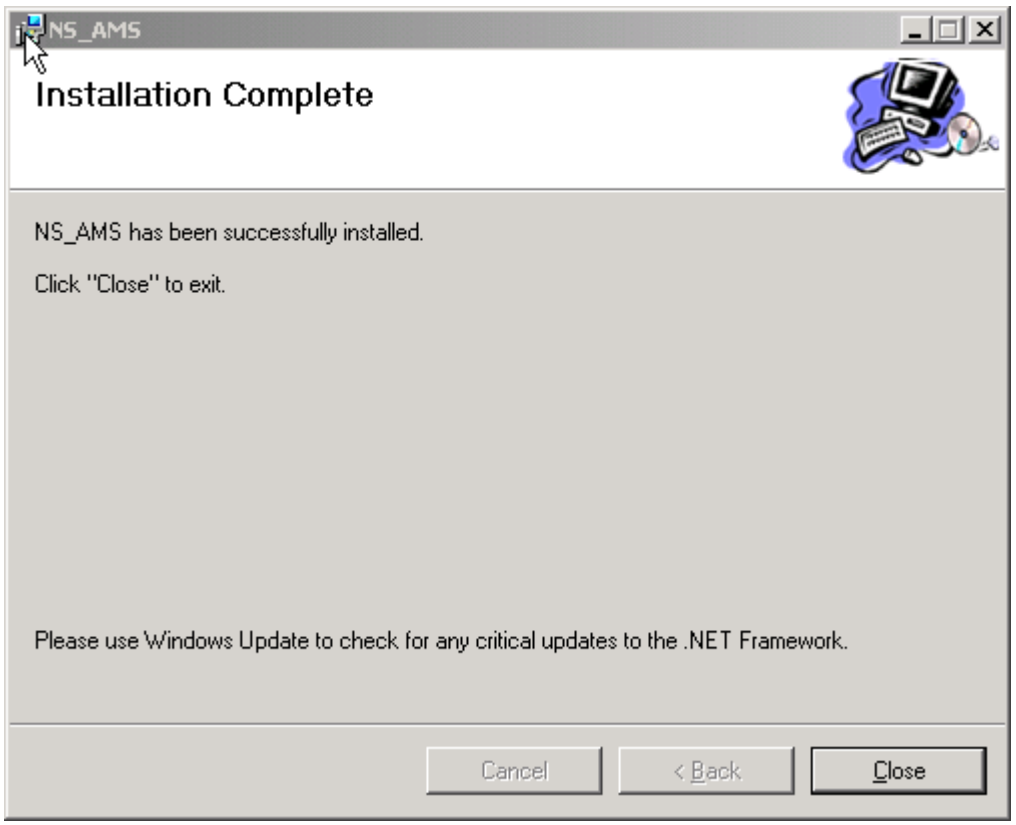
- Install Oracle client Software.
- Create net service name (alias for the database) using Oracle Net Configuration Assistant.
- Install .Net prerequisites.
- Install AMS application using the given Setup as shown in the figures.


NS_AMS
Welcome to the NS_AMS Setup Wizard
The installer will guide you through the steps required to install NS_AMS on your computer.
WARNING: This computer program is protected by copyright law and international treaties. Unauthorized duplication or distribution of this program, or any portion of it, may result in severe civil or criminal penalties, and will be prosecuted to the maximum extent possible under the law.
Cancel
< Back
Next >

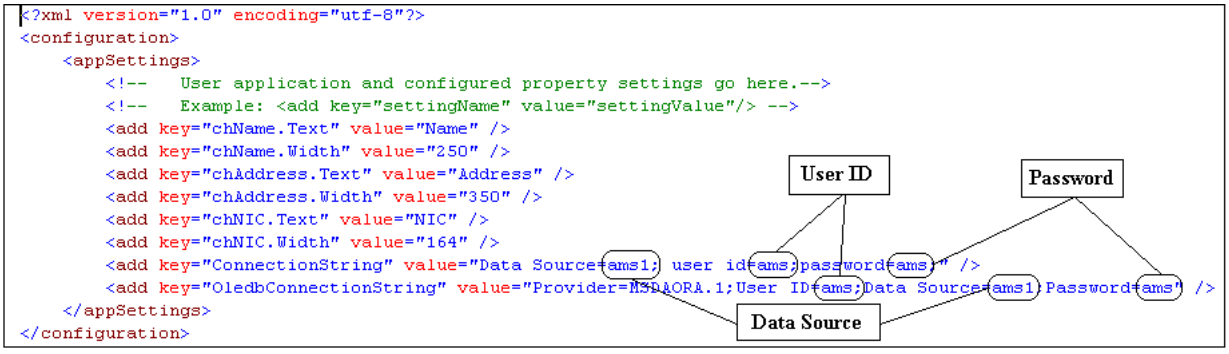

NS_AMS
Select Installation Folder
The installer will install NS_AMS to the following folder.
To install in this folder, click "Next". To install to a different folder, enter it below or click "Browse".
Folder:
C:\Program Files\sajjad\NS_AMS\
Browse...
Disk Cost...
Install NS_AMS for yourself, or for anyone who uses this computer:
Everyone
Just me
Cancel
< Back
Next >


NS_AMS
Confirm Installation
The installer is ready to install NS_AMS on your computer.
Click "Next" to start the installation.
Cancel
< Back
Next >


NS_AMS
Installing NS_AMS
NS_AMS is being installed.
Please wait...
Cancel
< Back
Next >



- Open AMS Configuration file in text editor and set the values
  - Data Source = net service name (e.g “ams1”)
  - User ID = “ams”
  - Password = your database password.



Appendix B: Application Guide

B.1 Application Login Form

Figure B.1a Login Form

Login form is the first form where users interact with AMS Application. This form takes two inputs from user (i.e. username and password) and on valid entry a message will appear showing “Access Granted” and control of application goes to “Control Panel” on invalid entry the message will show “Access Denied” and the control of application remains on this form.

Figure B.1b Login Form

B.2 Control Panel

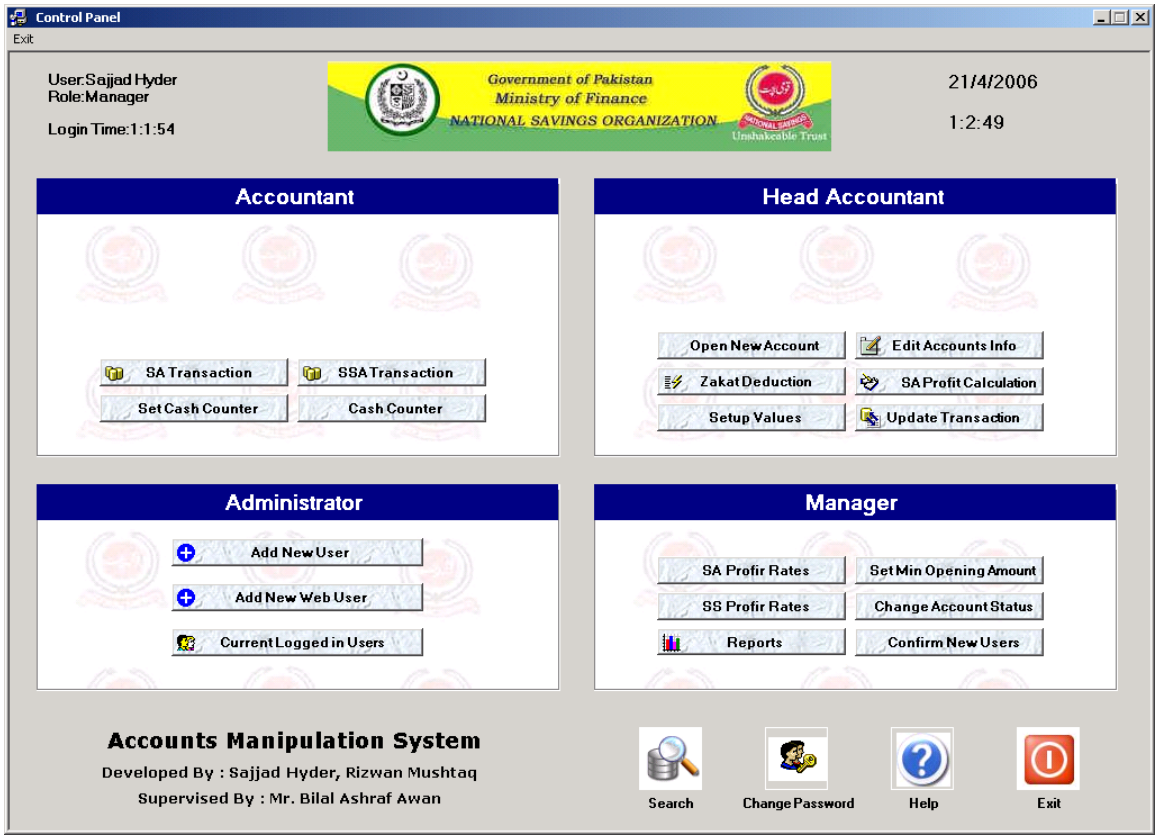


Figure B.2a Control Panel

After successful login the user will see this form. This form shows four different controls in it showing four users and there rights in this application. The four users are

- Accountant
- Head Accountant
- Manager
- Administrator

Search, Change Password and Help are the common features among all users.

B.2 Control Panel

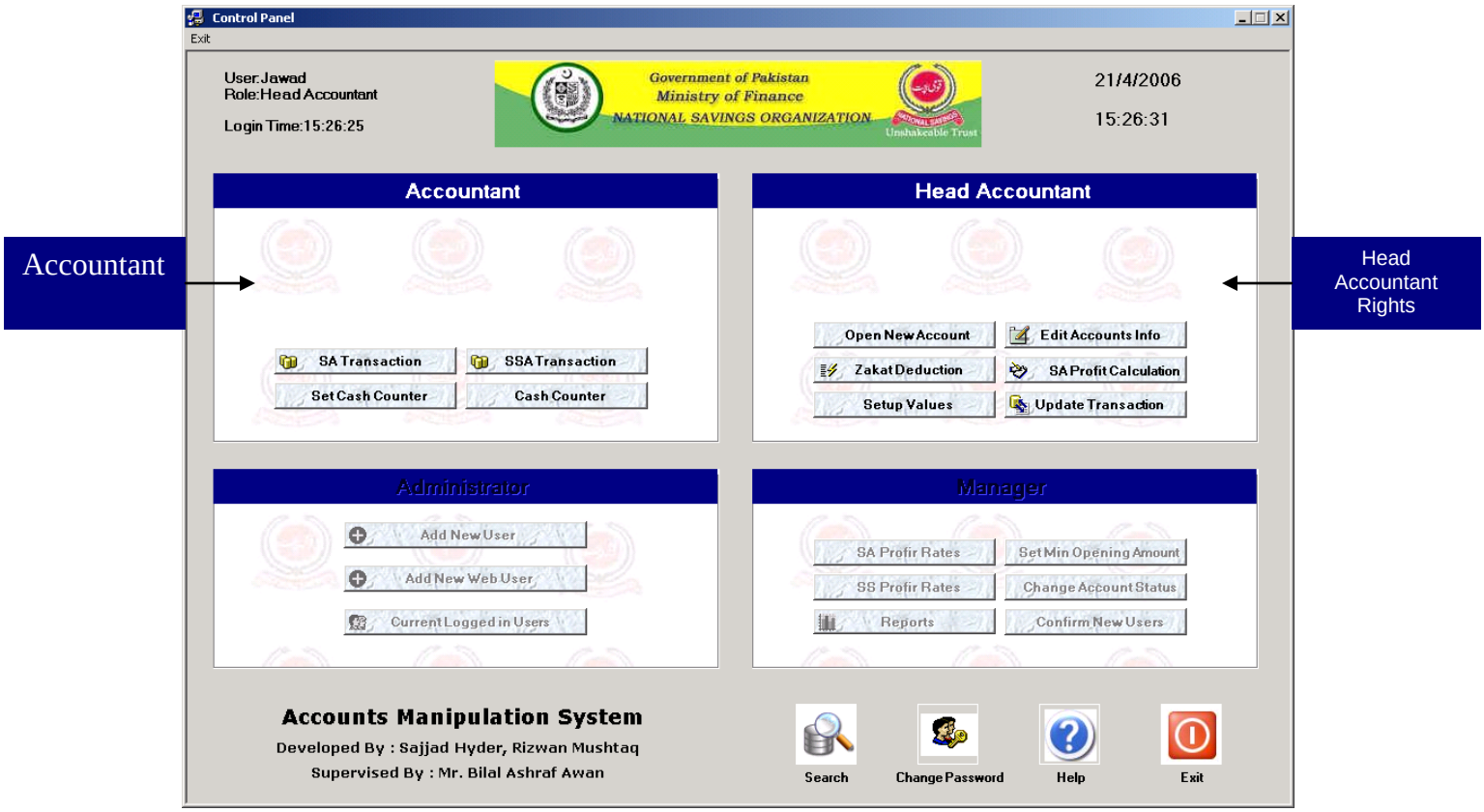


Figure B.2b Control Panel

An upper level of user can use the rights of his lower rank. As shown in this figure Head Accountant can use his rights and at the same time the rights of Accountant

B.3 Account Opening Form

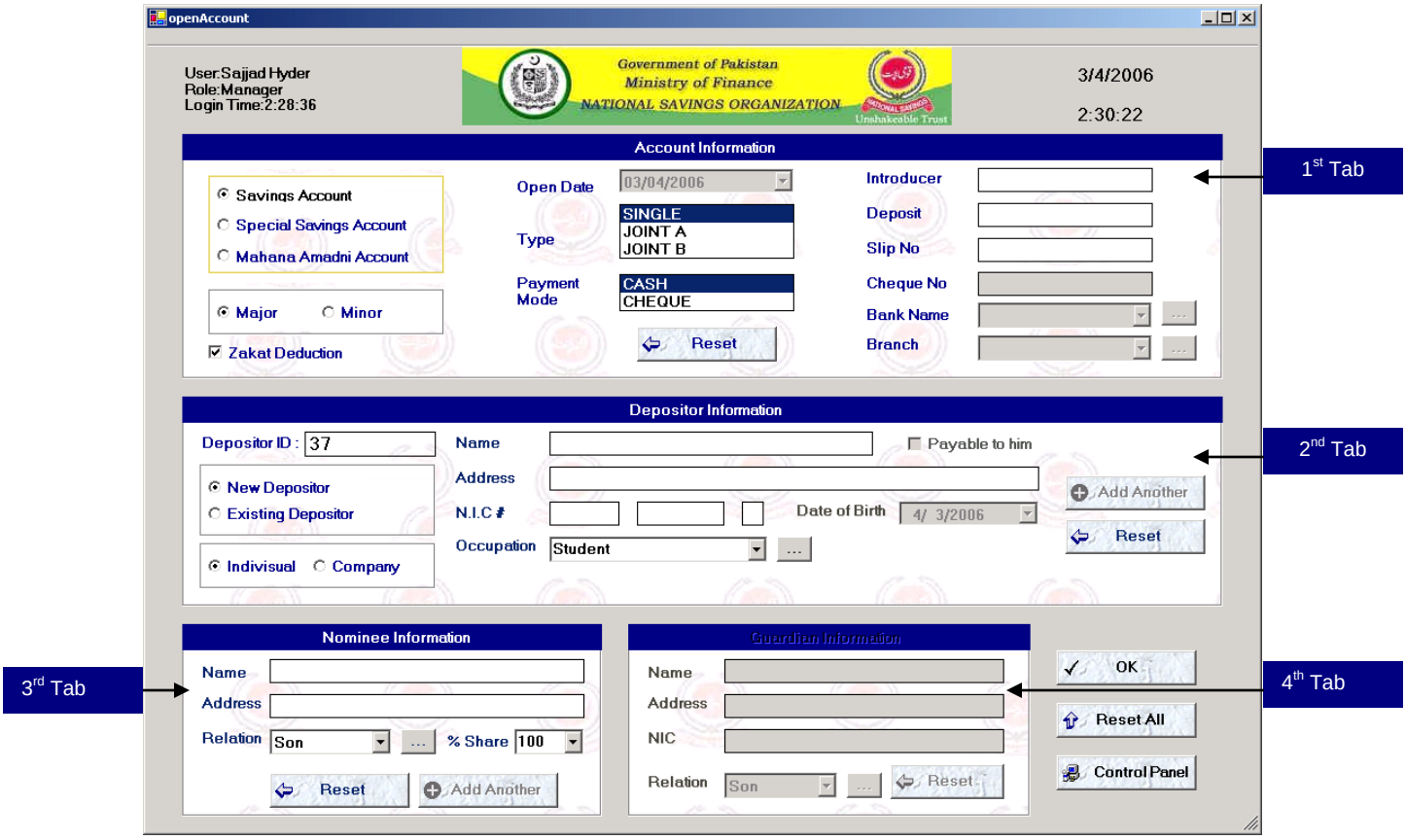


Figure B.3a Account Opening Form

Account opening form requires four types of input from user.

1. Accounts information (1st Tab)
2. Depositor's information (2nd Tab)
3. Nominee information (3rd Tab)
4. Guardian information (4th Tab)

Head Accountant performs this task.

B.3 Account Open Confirmation

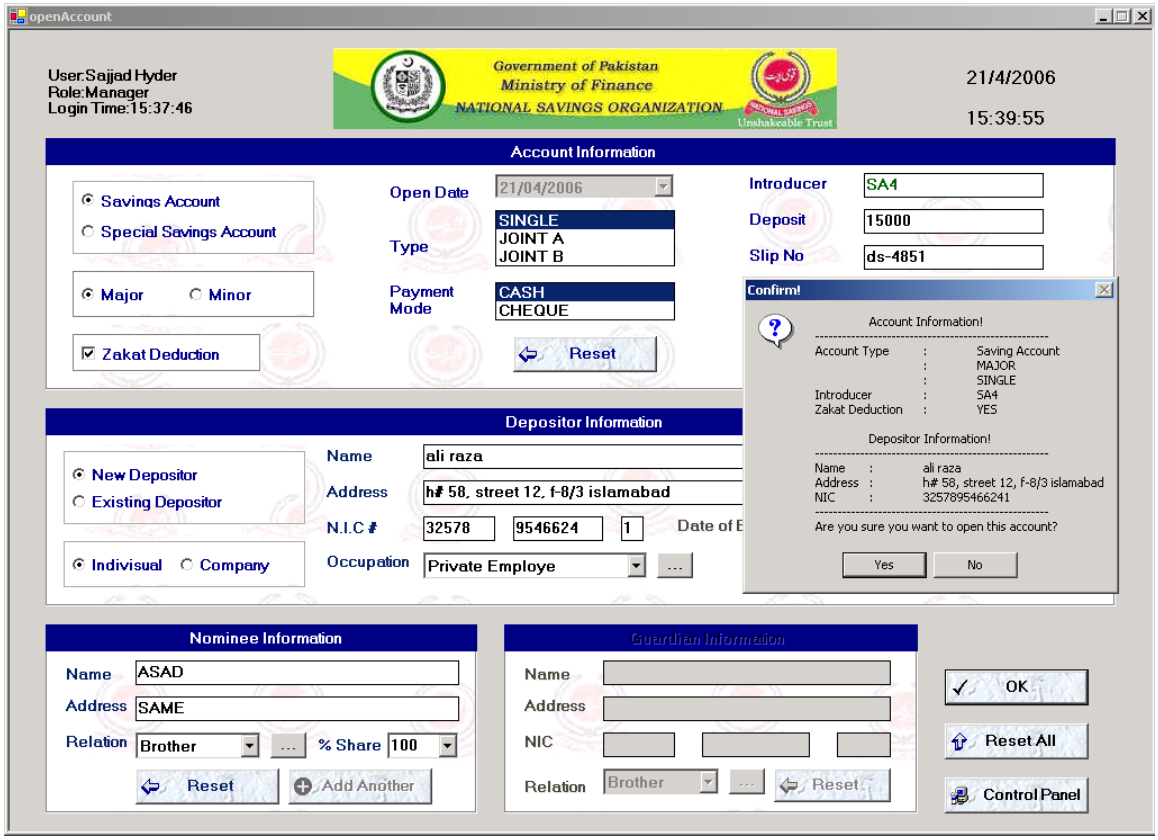


Figure B.3b Account Opening Form

Confirmation message for account opening, On pressing “OK” the Account information would be saved and a new account no would be allocated to the depositor (as shown below).

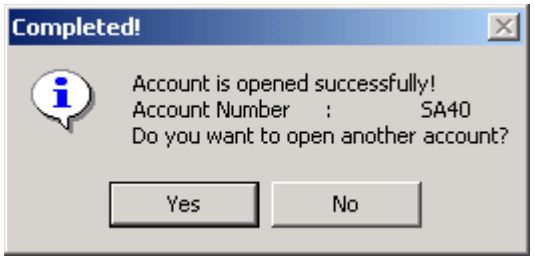


Figure B.3c Account Creation Message

B.4 Update Accounts Information

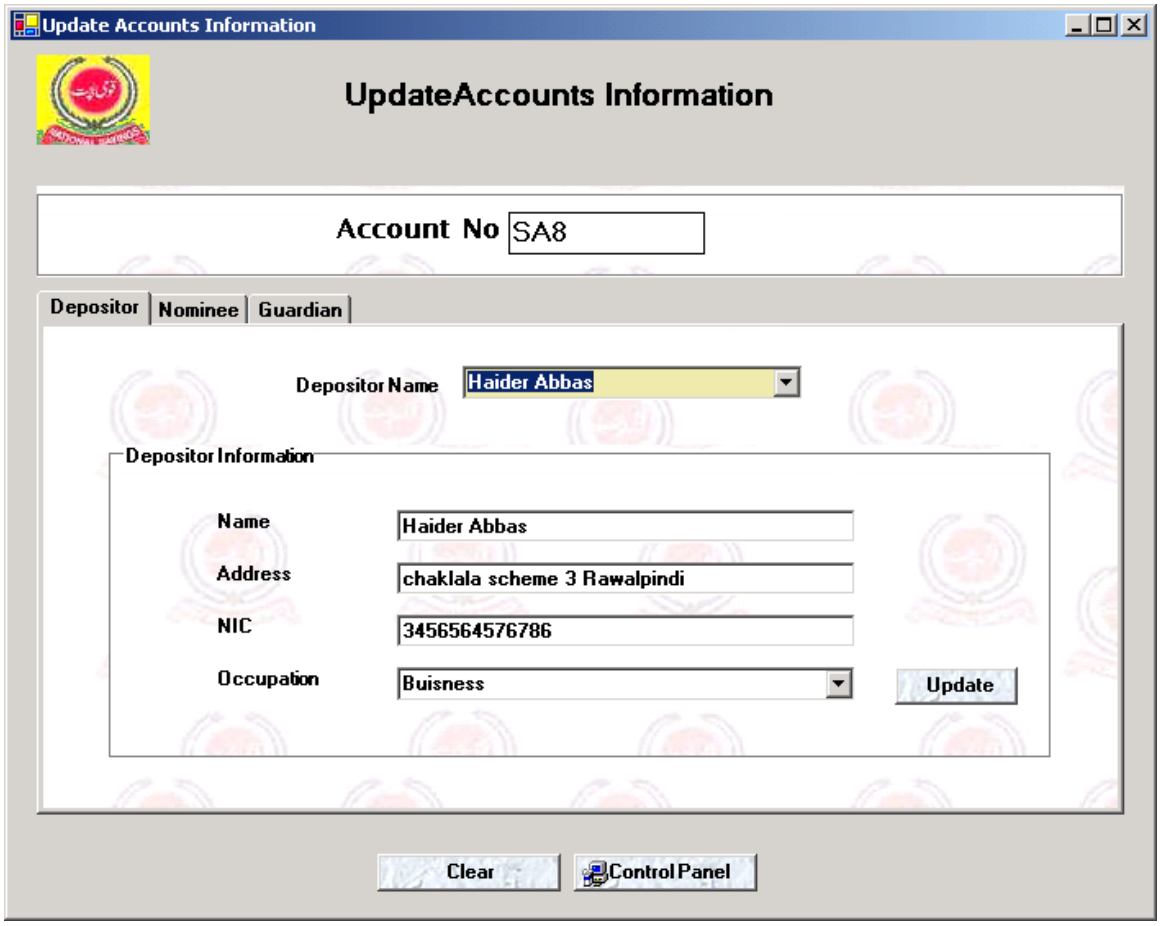


Figure B.4a Update Account Information

Accounts information is updated using Update Accounts Information form. The process of updating accounts information is as under

1. Enter account no in the text field Account No and press enter.
2. If the Account No is valid then tabs below will populate with related records.
3. On depositor edit the above shown information and then press Update button, the depositors information would be updated accordingly.
4. Same is the case with all three tabs

B.4 Update Accounts Information

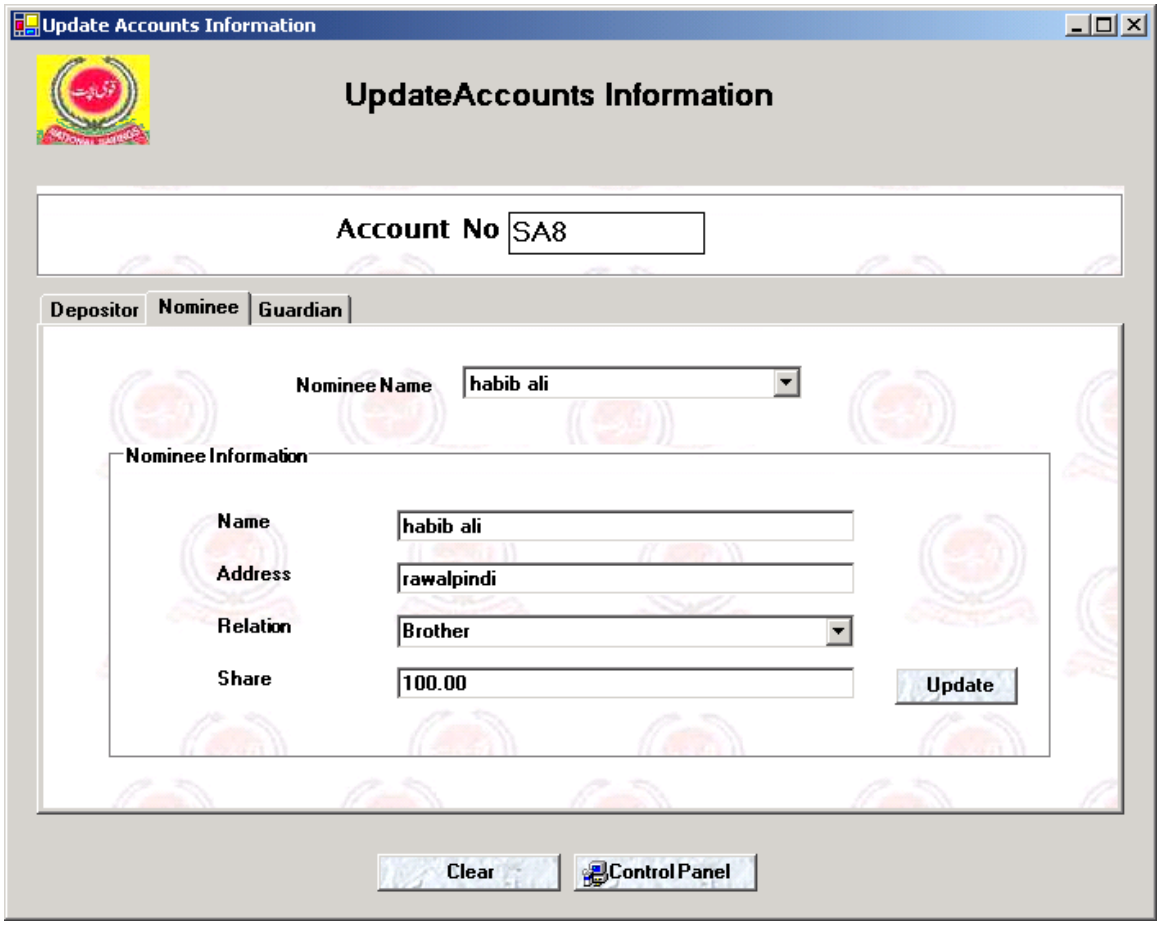


Figure B.4b Update Account Information

Process of updating Nominee information is same as explained above.

B.5 Zakat Deduction Form

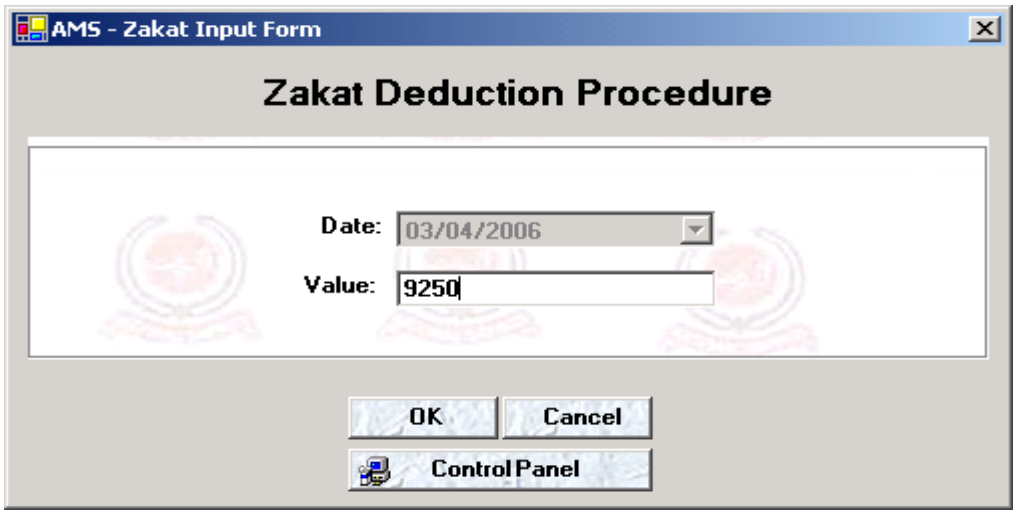


Figure B.5a Zakat Deduction Process - 1

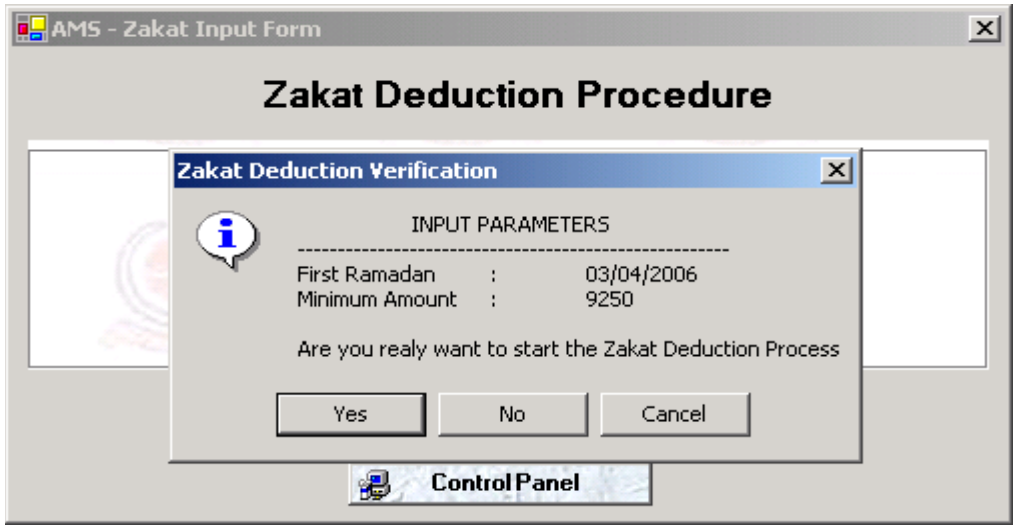


Figure B.5b Zakat Deduction Process - 2

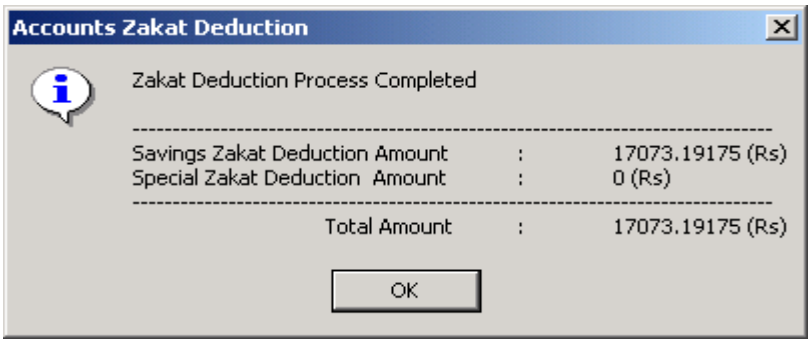


Figure B.5c Zakat Deduction Process - 3

Zakat Deduction procedure is shown as above.

B.6 Savings Account Profit Calculation

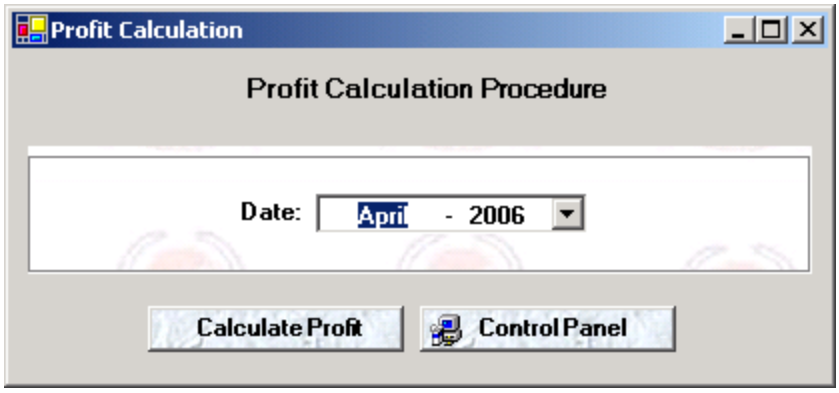


Figure B.6a Profit Calculation - 1

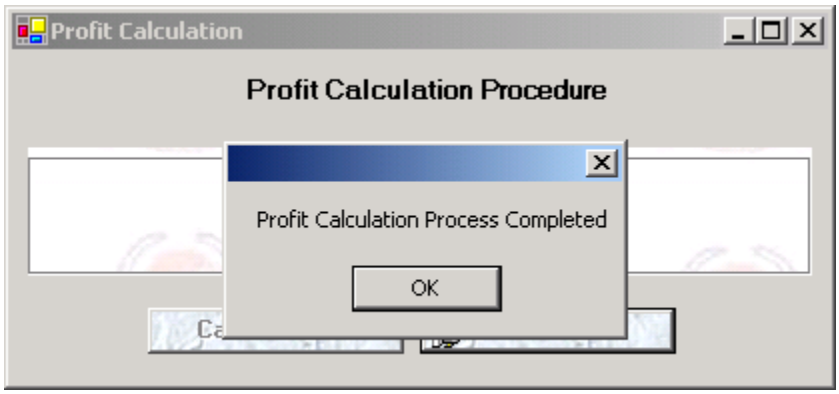


Figure B.6b Profit Calculation - 2

Profit calculation procedure is run on last (working) day of every month. Its procedure is shown above

B.7 Setup Values

Figure B.7 Setup Form

Setup form is used to initialize database with those values that are necessary for the system. Four types of Setup values are shown in this form. You can click on the button and set different values.

B.8 Zakat Declaration Setup

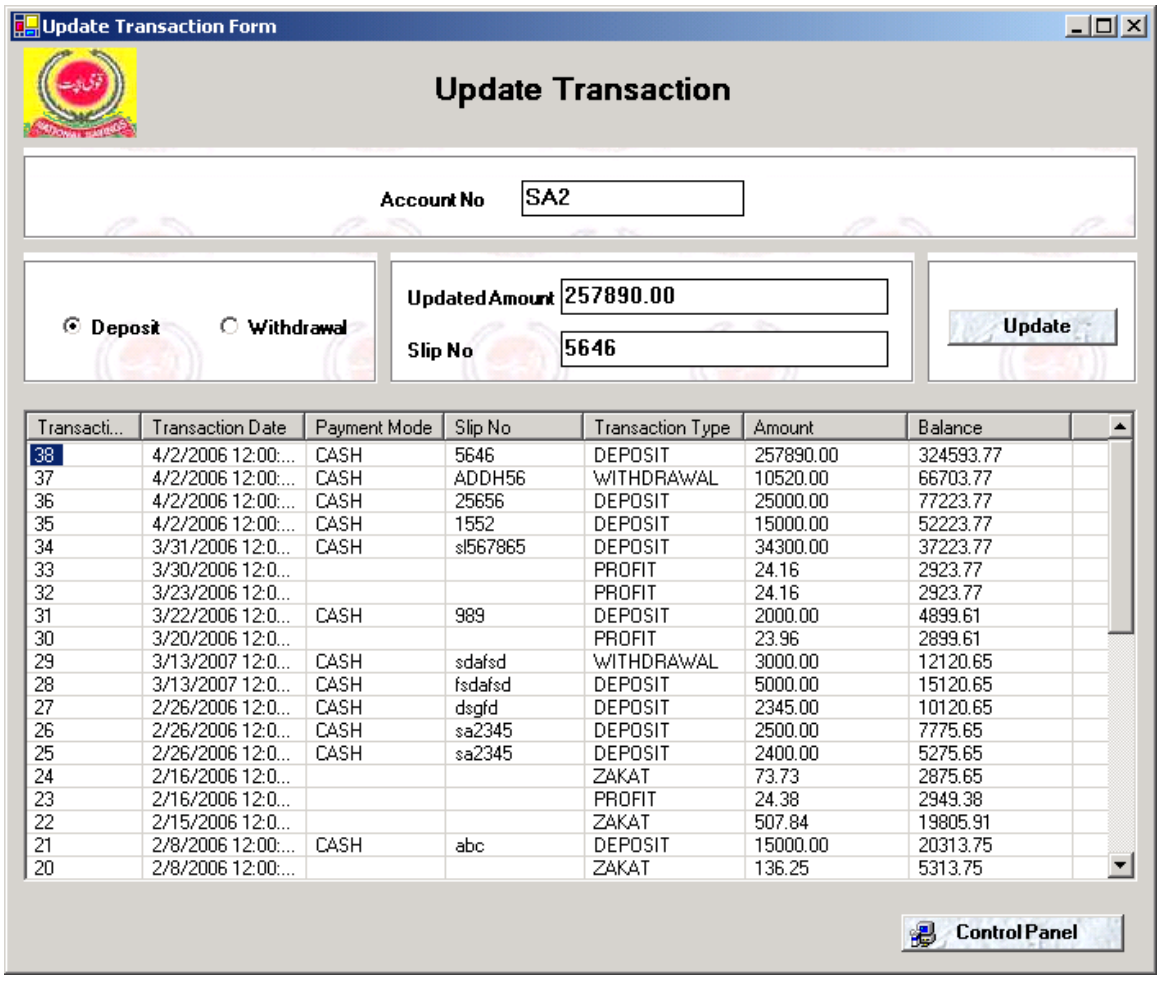
Figure B.8 Zakat Declaration Entry

Enter declaration in Add New text box and then press OK button.

B.9 New Bank Setup

Figure B.9 Add New Banks / Branches

B.10 Update Transaction



Transacti...	Transaction Date	Payment Mode	Slip No	Transaction Type	Amount	Balance
38	4/2/2006 12:00:...	CASH	5646	DEPOSIT	257890.00	324593.77
37	4/2/2006 12:00:...	CASH	ADDH56	WITHDRAWAL	10520.00	66703.77
36	4/2/2006 12:00:...	CASH	25656	DEPOSIT	25000.00	77223.77
35	4/2/2006 12:00:...	CASH	1552	DEPOSIT	15000.00	52223.77
34	3/31/2006 12:0...	CASH	sl567865	DEPOSIT	34300.00	37223.77
33	3/30/2006 12:0...			PROFIT	24.16	2923.77
32	3/23/2006 12:0...			PROFIT	24.16	2923.77
31	3/22/2006 12:0...	CASH	989	DEPOSIT	2000.00	4899.61
30	3/20/2006 12:0...			PROFIT	23.96	2899.61
29	3/13/2007 12:0...	CASH	sdafsd	WITHDRAWAL	3000.00	12120.65
28	3/13/2007 12:0...	CASH	fsdafsd	DEPOSIT	5000.00	15120.65
27	2/26/2006 12:0...	CASH	dsgfd	DEPOSIT	2345.00	10120.65
26	2/26/2006 12:0...	CASH	sa2345	DEPOSIT	2500.00	7775.65
25	2/26/2006 12:0...	CASH	sa2345	DEPOSIT	2400.00	5275.65
24	2/16/2006 12:0...			ZAKAT	73.73	2875.65
23	2/16/2006 12:0...			PROFIT	24.38	2949.38
22	2/15/2006 12:0...			ZAKAT	507.84	19805.91
21	2/8/2006 12:00:...	CASH	abc	DEPOSIT	15000.00	20313.75
20	2/8/2006 12:00:...			ZAKAT	136.25	5313.75

Figure B.10 Update Transaction

Transaction can be edit by using this form. Only last Deposit, Withdrawal updation is allowed by using this form.

B.11 Savings Account Transaction

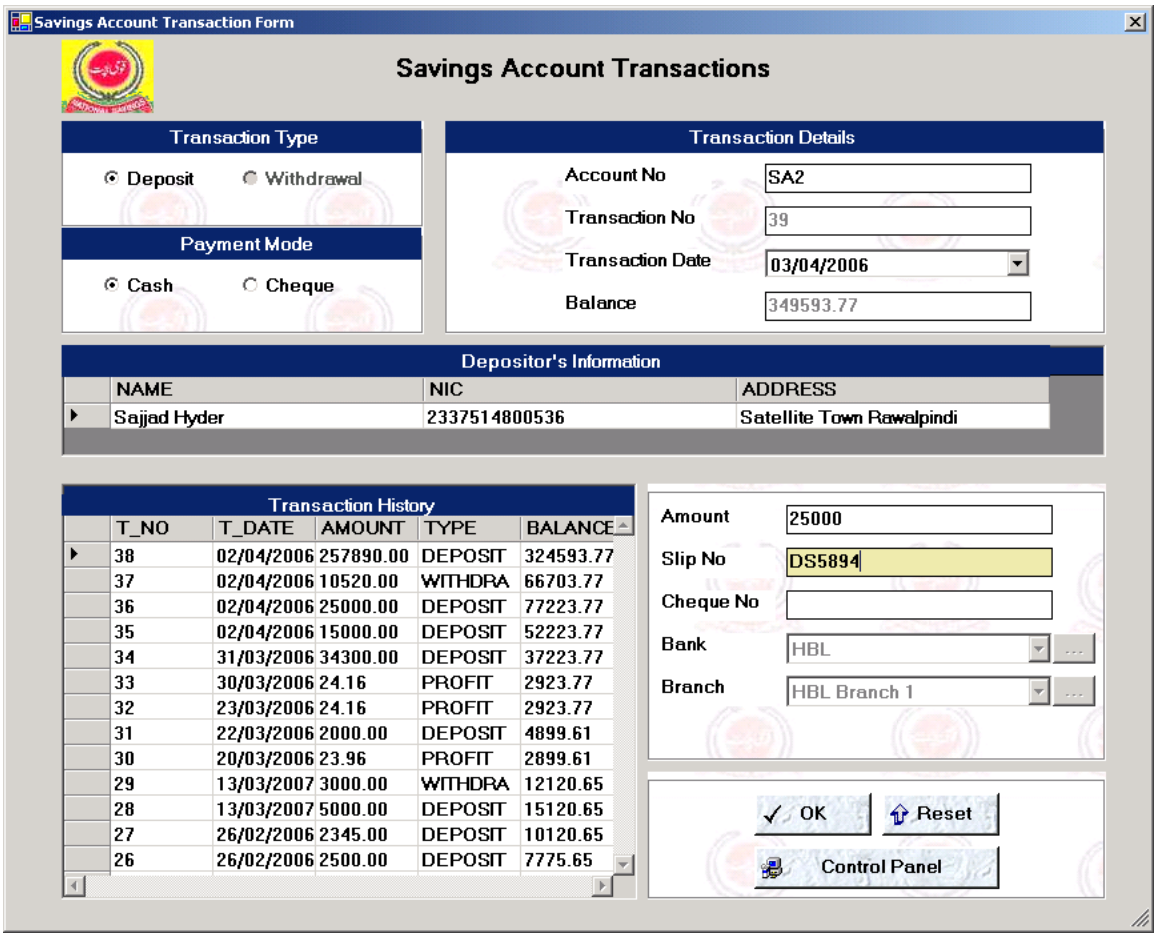


Figure B.11a Savings Account Transaction

Select “Transaction Type” and “Payment Mode” then enter “Account No” and press enter the form will populate itself with accounts historical data then enter transaction amount, “Slip No” then press “OK” to complete transaction process.

B.11 Savings Account Transaction

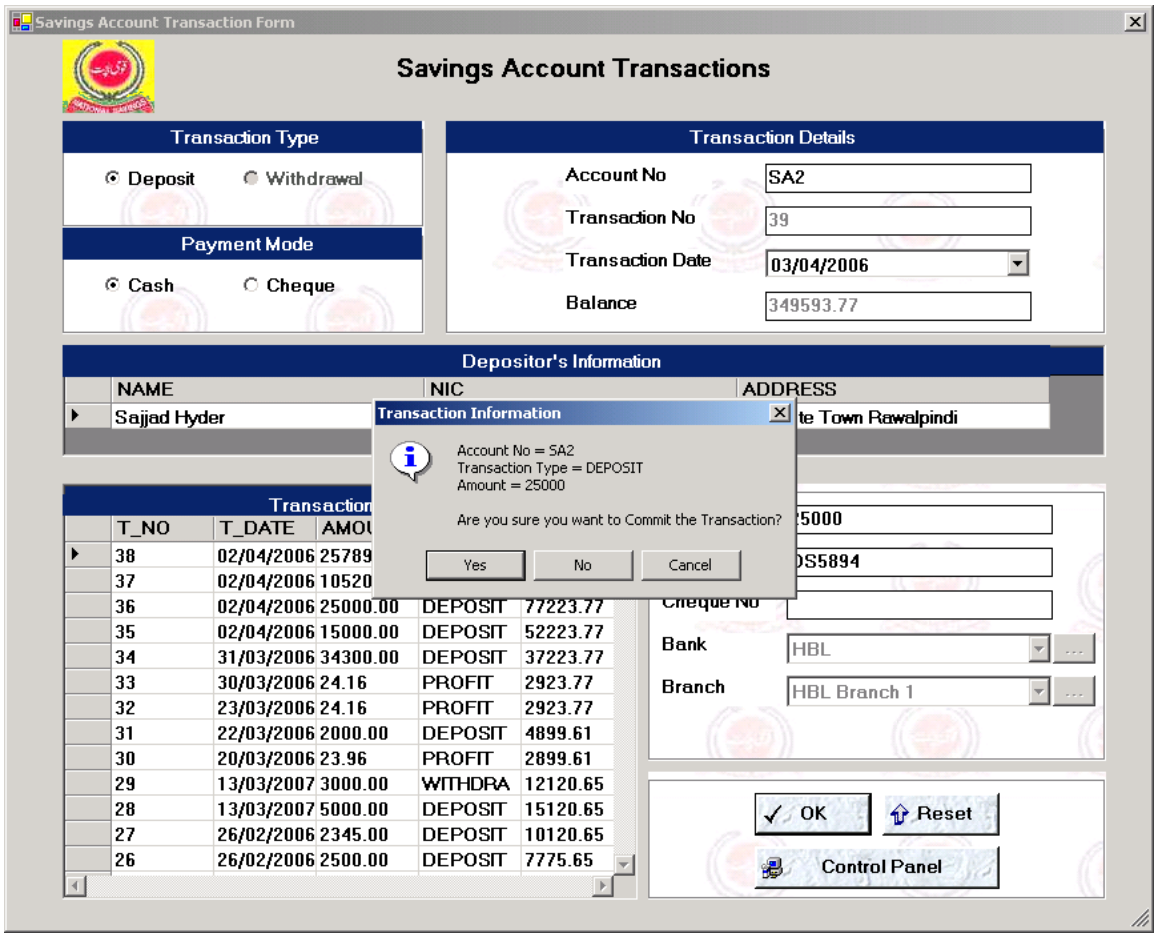


Figure B.11b Savings Account Transaction

On pressing OK button after A.12a the above shown message appears. On its “Yes” event the transaction would be saved.

B.11 Savings Account Transaction

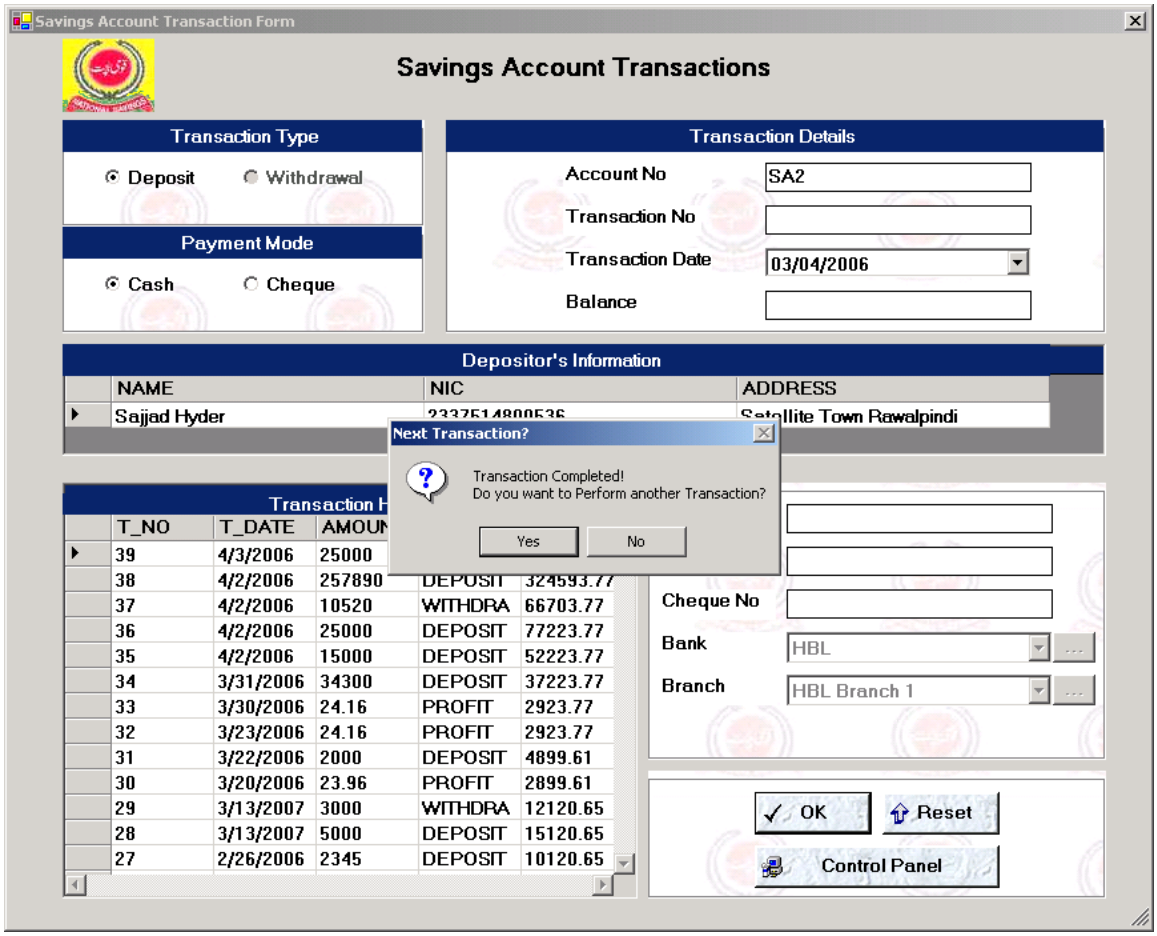


Figure B.11c Savings Account Transaction

Savings Account transaction is made using “Savings Account Transaction” form transaction complete sequence is shown in above figures. Accountant will use this form to make these transactions.

B.12 Special Savings Account Deposit

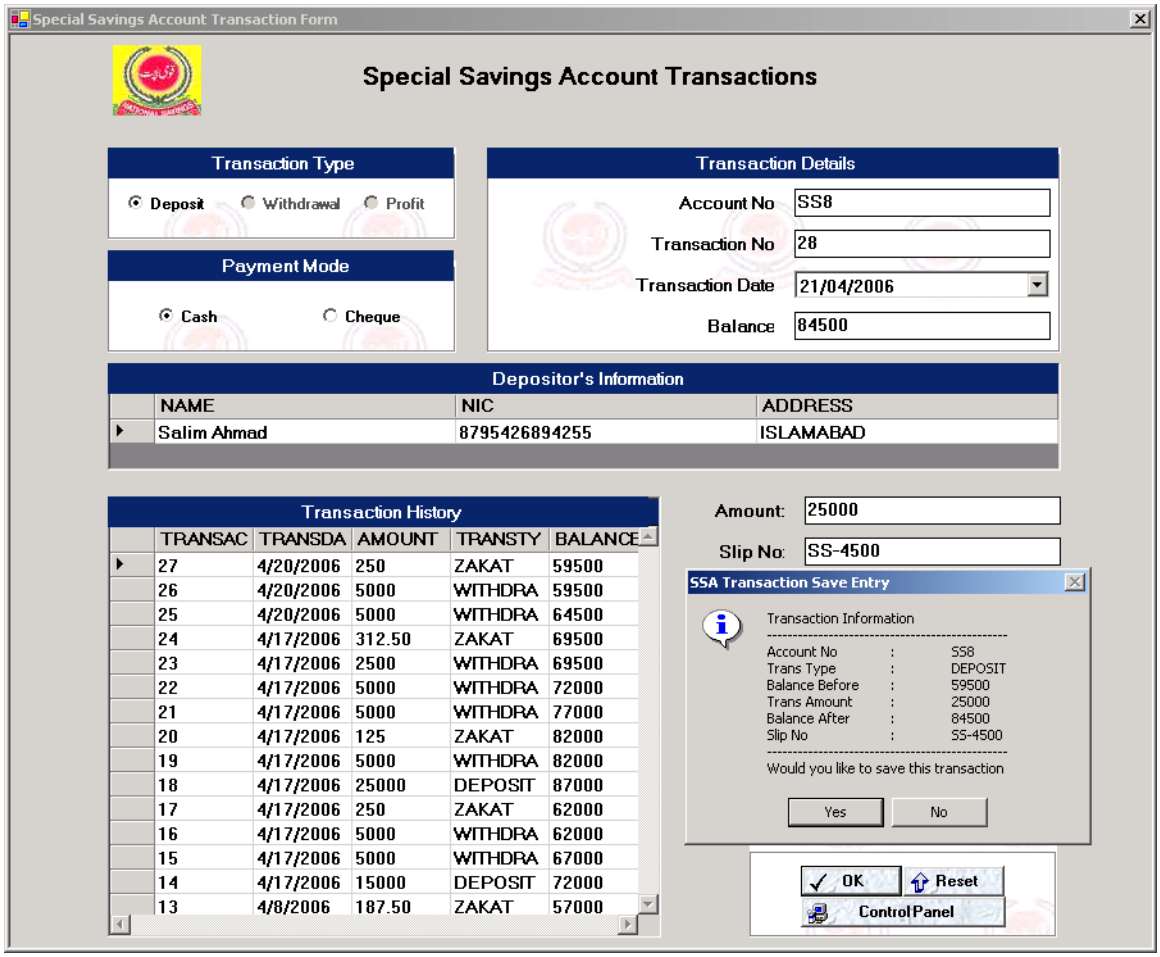


Figure B.12 Special Savings Account Deposit

Special Savings Account deposit process is same as of Savings Account.

B.13 Special Savings Account Withdrawal

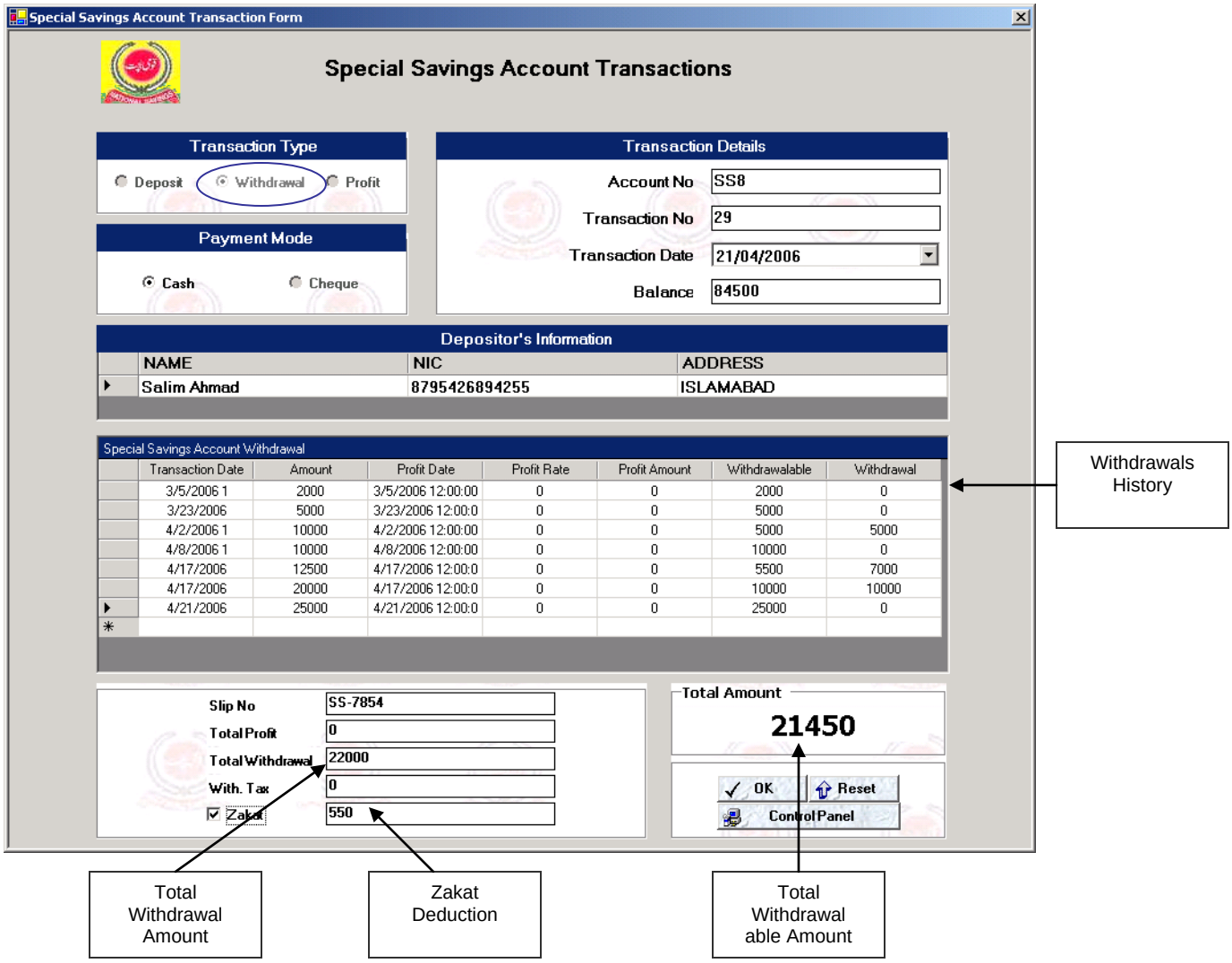


Figure B.13 Savings Account Withdrawal

Steps for withdrawal are as follows.

- Select Withdrawal from transaction type section then enter account no in the relevant field and press enter the will populate itself with account details.
- From withdrawal history section enter amount against deposit from which you want to withdrawal certain amount.
- If zakat is applicable then check the zakat check box.
- Total withdrawal able amount is shown in the “Total Withdrawal able Amount” section.

B.14 Special Savings Account Profit

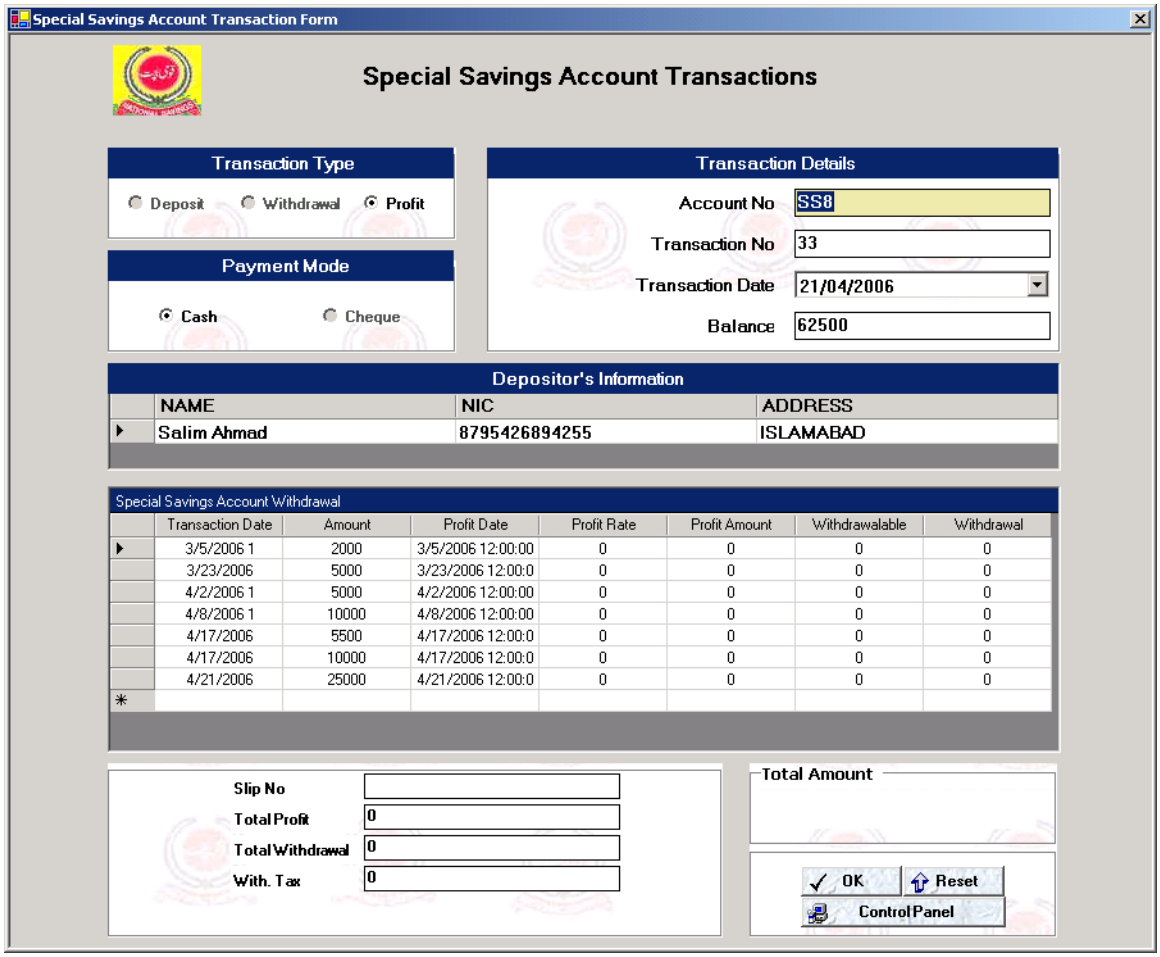


Figure B.14 Savings Account Profit

Profit withdrawal process is same as withdrawal amount process. In this section zakat is replaced with withholding tax.

B.15 Set Cash Counter

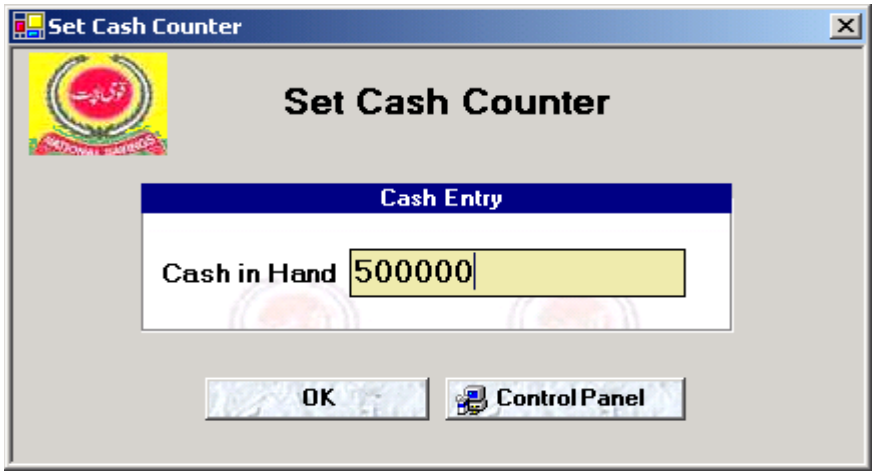


Figure B.15 Set Cash Counter

Head Accountant will set his cash counter after login.

B.16 View Cash Counter

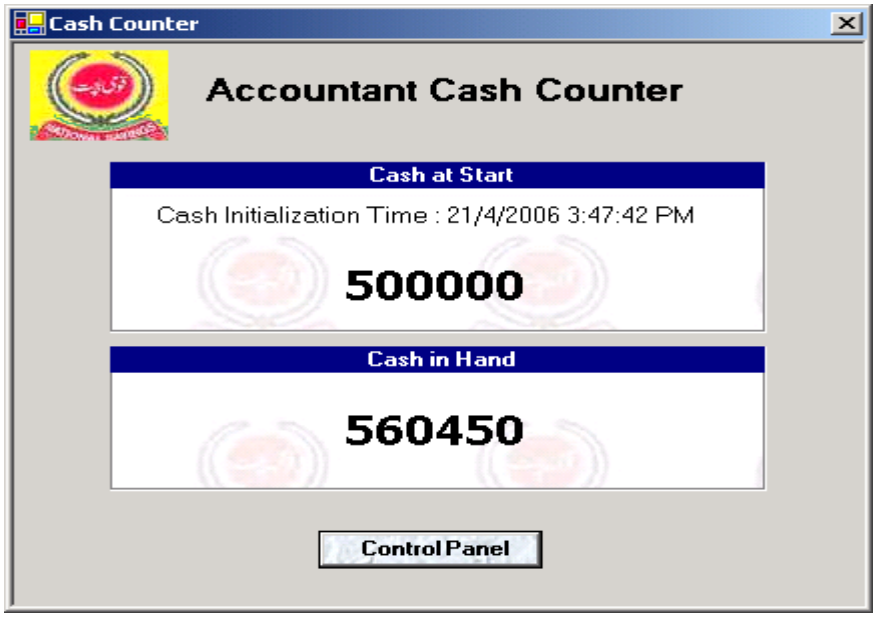


Figure B.16 Savings Account Transaction

Cash Counter will help Accountant to see Cash in hand at any time.

B.17 Savings Account Profit Rates

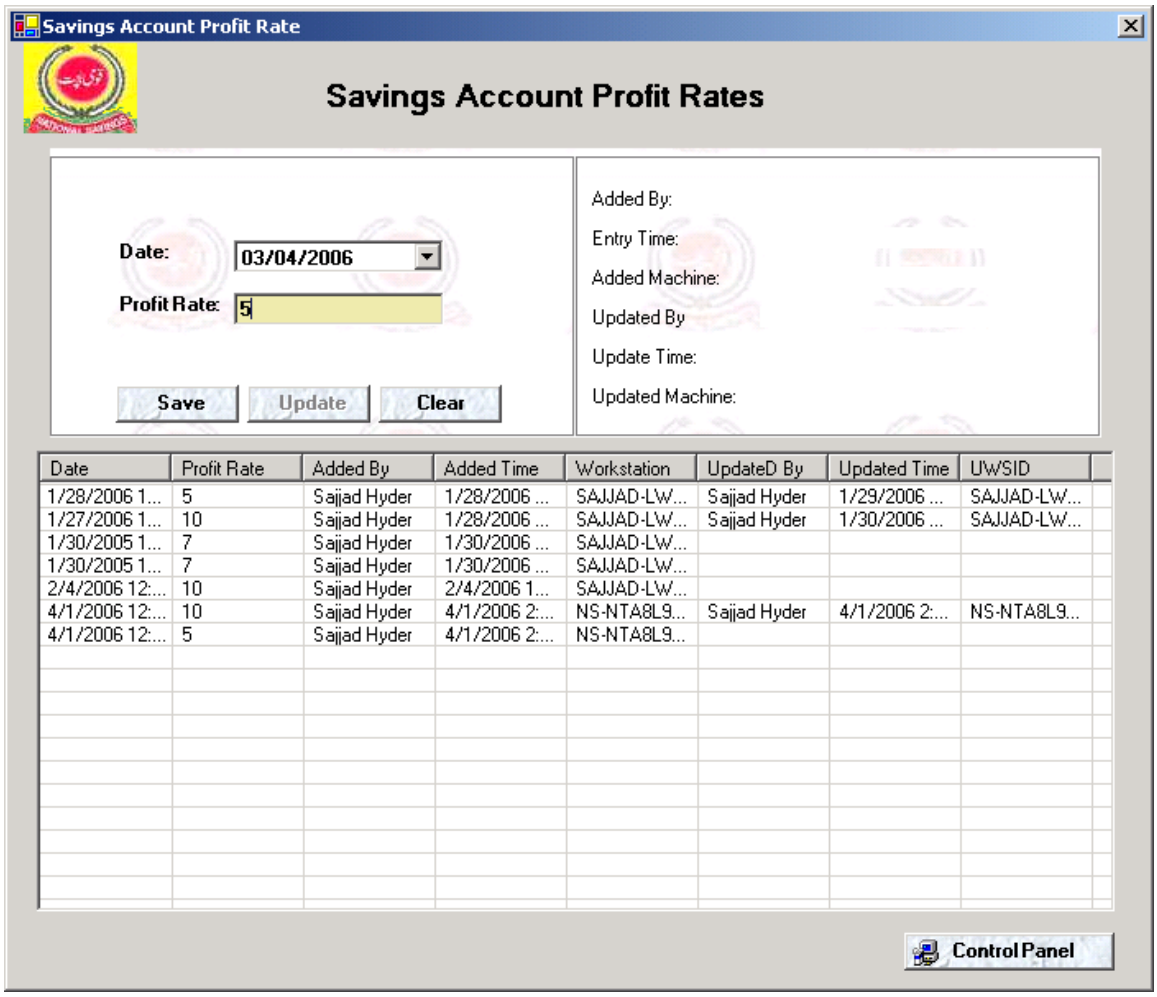


Figure B.17 Savings Account Profit Rates

Manager uses this form to add or update savings account profit rates. Manager will enter the rates when Government announces new profit rates.

B.18 Special Savings Account Profit Rates

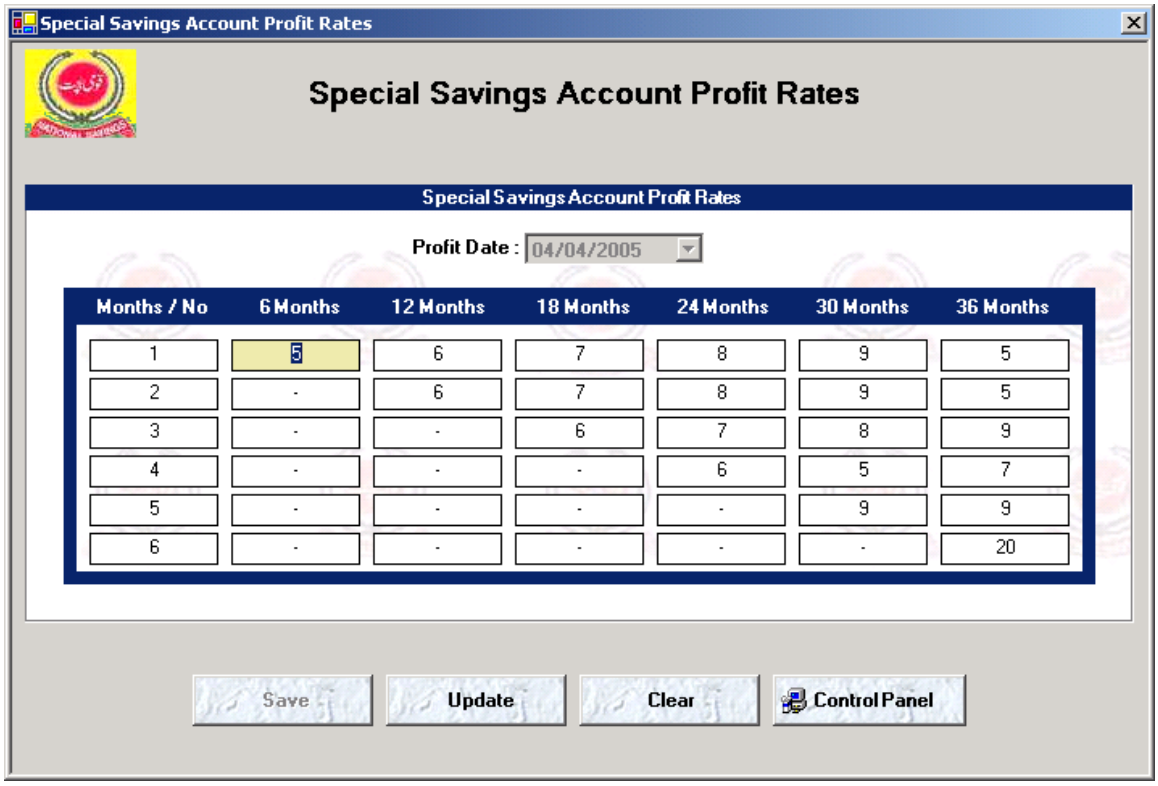


Figure B.18 Special Savings Account Profit Rates

The rules for special savings account profit rates entry is same as of savings account. Its transaction style is bit different from savings account.

B.19 Set Min Account opening Amount

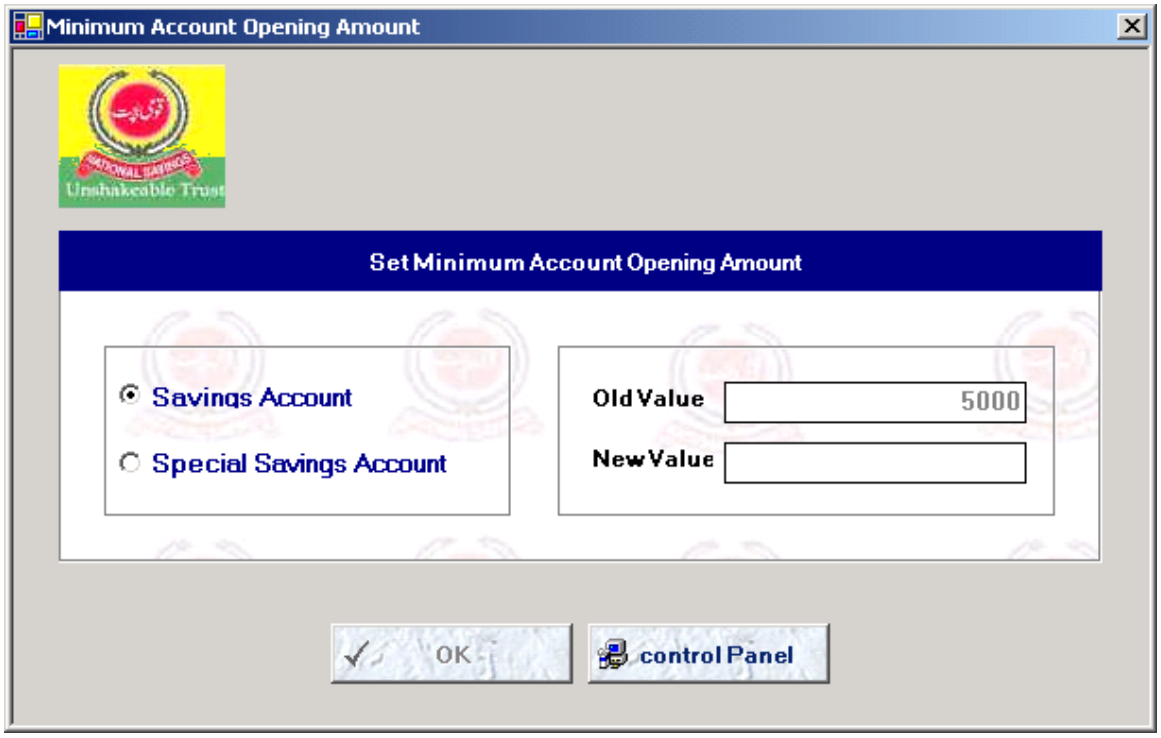


Figure B.19 Minimum Account Opening Amount

Select account type using radio buttons then enter its min. account opening amount as announced by the government. Then save the entry.

B.20 Change Account Status

Figure B.20a Change Account Status

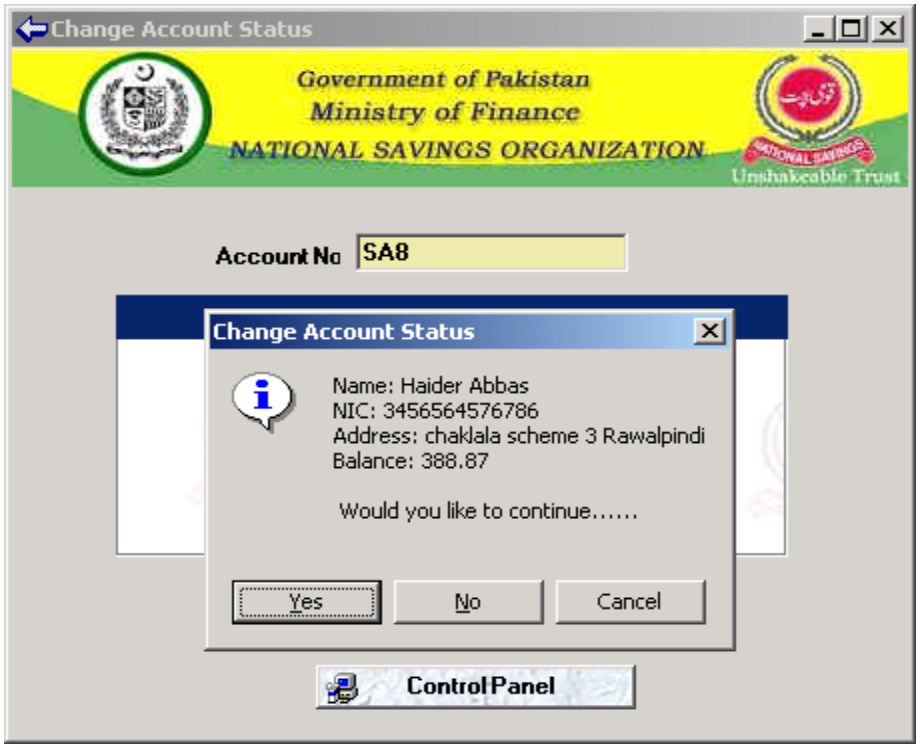


Figure B.20b Change Account Status

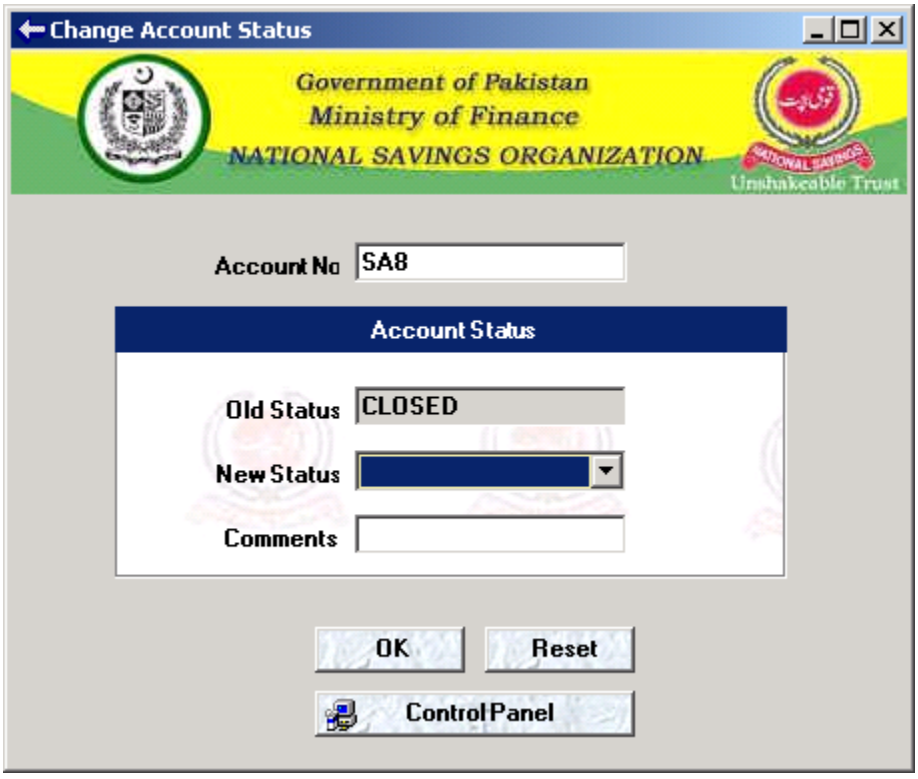


Figure B.20c Change Account Status

Figure B.20d Change Account Status

B.21 Confirm New User

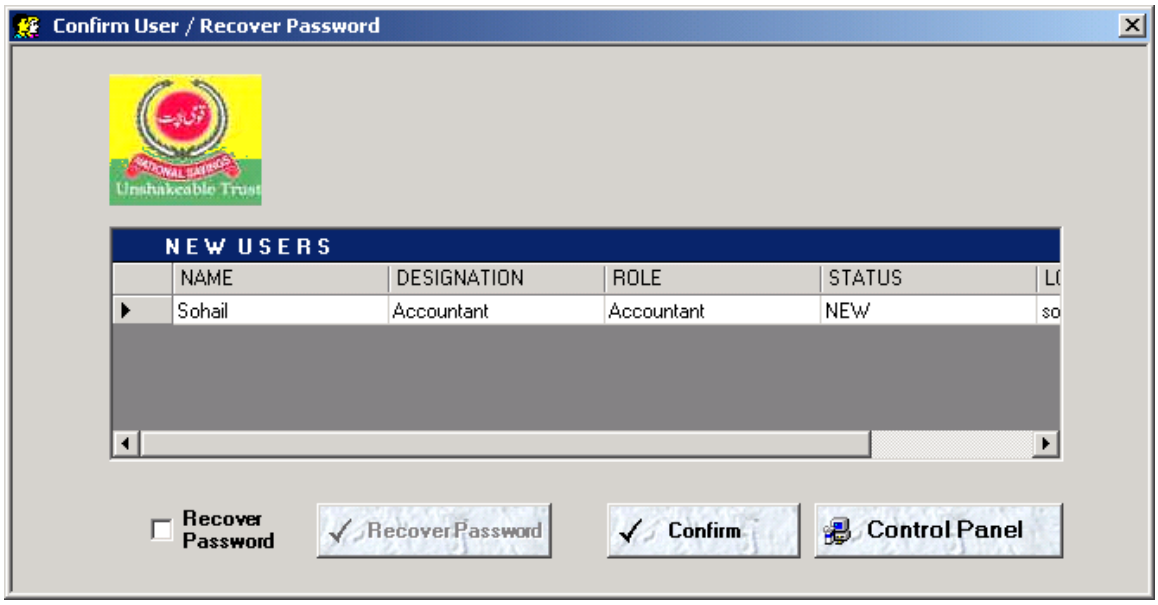


Figure B.21a Confirm New User

When administrator creates a new application user then manager confirms that user by using the above form, manager select user from list and press confirm.

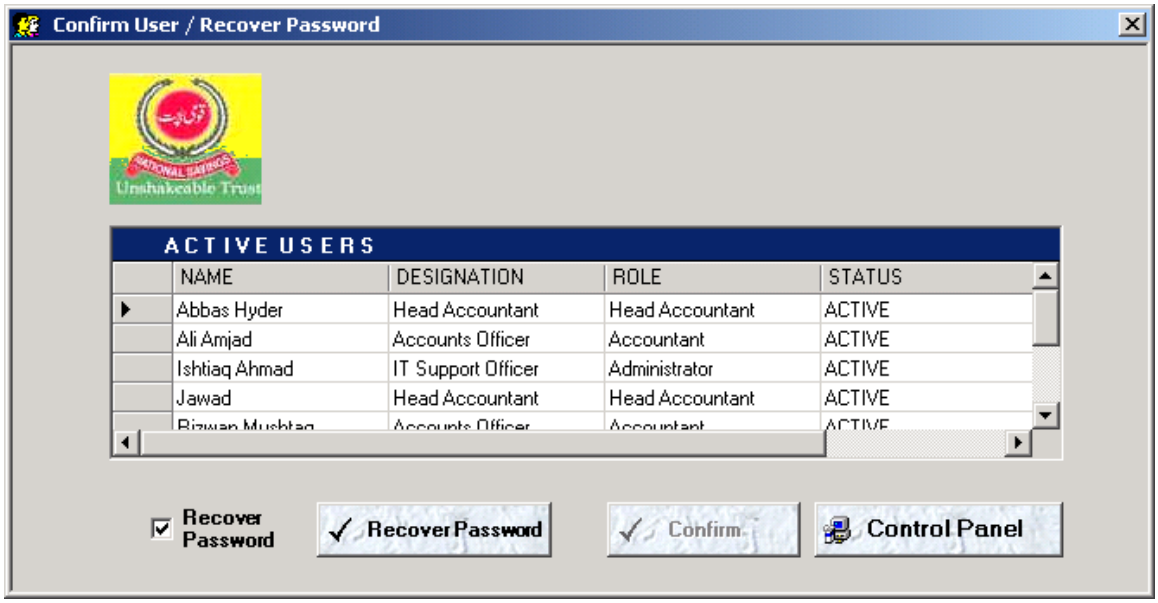


Figure B.21b Recover Password

Users password can also be recovered by using this form, check recover password check box then press “Recover Password” button. It will set the password of the user as “default”.

B.22 Reports

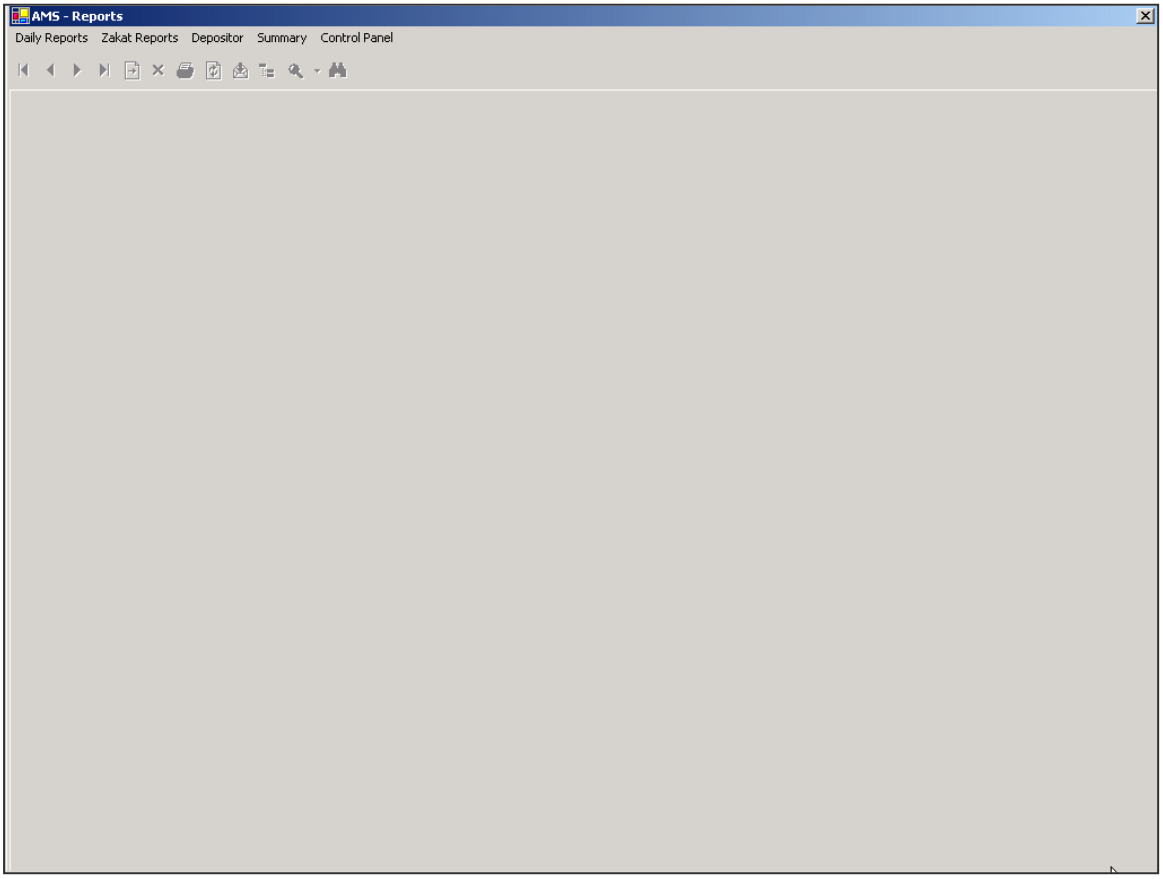
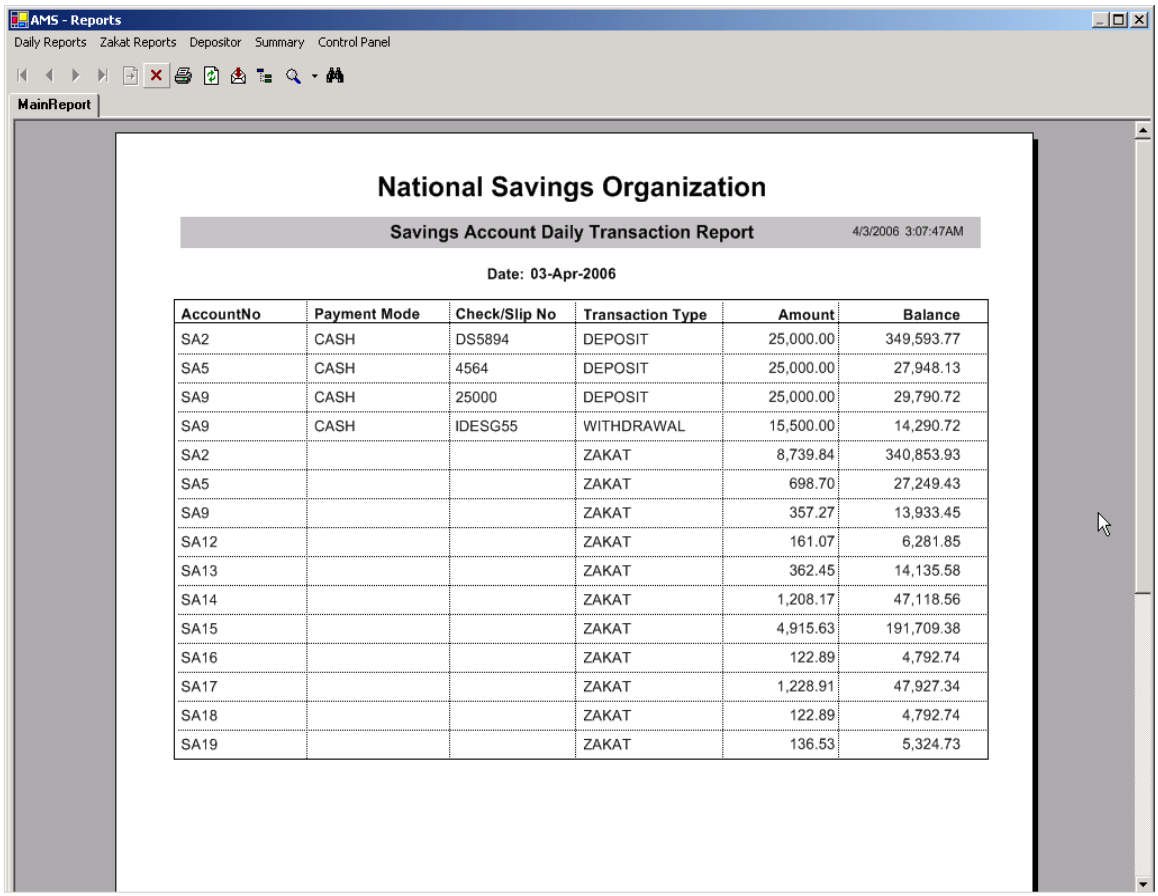


Figure B.22 Reports

Manager can use the reports section. The reports available in the system are as follow

- Daily Savings account report.
- Daily Special Savings account report.
- User wise Daily Savings account report.
- User wise Daily Special Savings account report.
- Zakat deduction report.
- Bank statement.
- Monthly deposit withdrawal summary.
- Accounts status summary etc.

B.23 Savings Account Daily Transaction Reports



AccountNo	Payment Mode	Check/Slip No	Transaction Type	Amount	Balance
SA2	CASH	DS5894	DEPOSIT	25,000.00	349,593.77
SA5	CASH	4564	DEPOSIT	25,000.00	27,948.13
SA9	CASH	25000	DEPOSIT	25,000.00	29,790.72
SA9	CASH	IDESG55	WITHDRAWAL	15,500.00	14,290.72
SA2			ZAKAT	8,739.84	340,853.93
SA5			ZAKAT	698.70	27,249.43
SA9			ZAKAT	357.27	13,933.45
SA12			ZAKAT	161.07	6,281.85
SA13			ZAKAT	362.45	14,135.58
SA14			ZAKAT	1,208.17	47,118.56
SA15			ZAKAT	4,915.63	191,709.38
SA16			ZAKAT	122.89	4,792.74
SA17			ZAKAT	1,228.91	47,927.34
SA18			ZAKAT	122.89	4,792.74
SA19			ZAKAT	136.53	5,324.73

Figure B.23 SA Daily Transaction Report

The above shown report is the date wise transaction report of savings account.

B.24 Special Savings Account Daily Transaction Reports

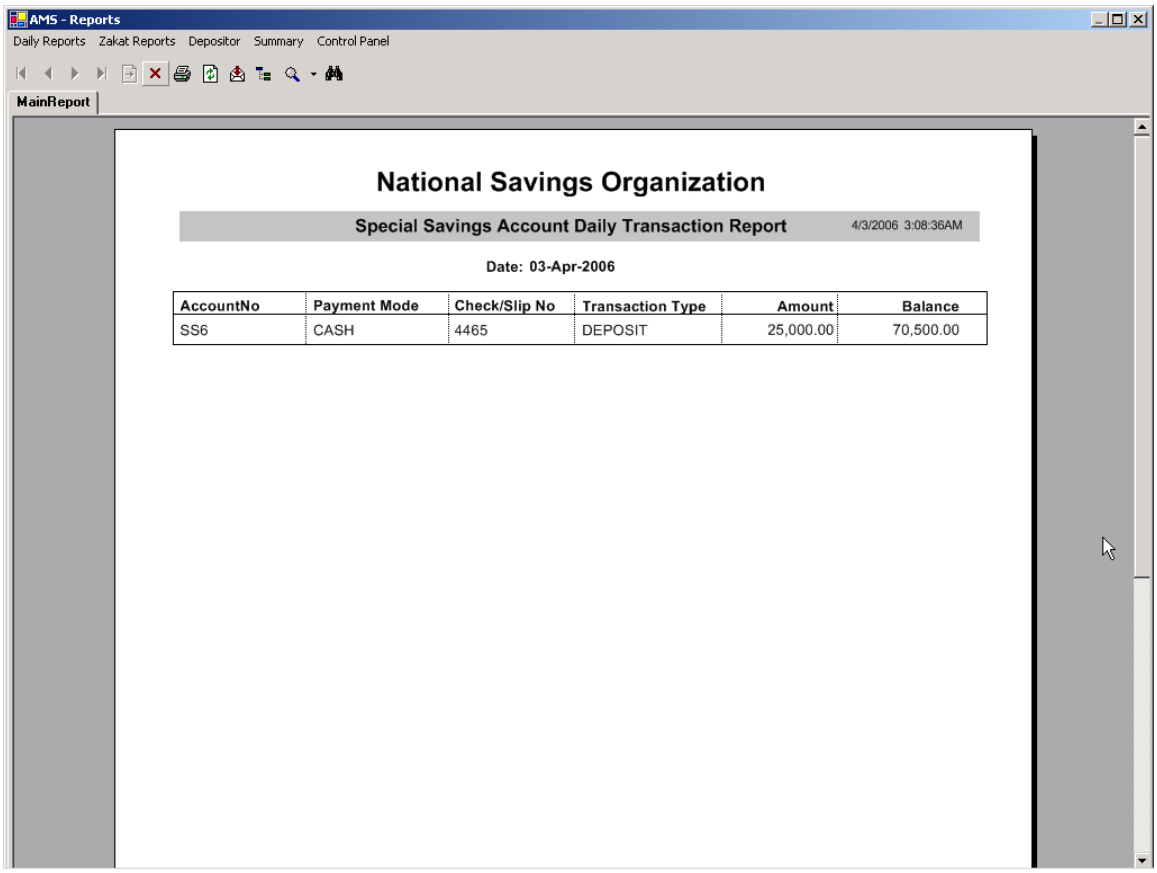
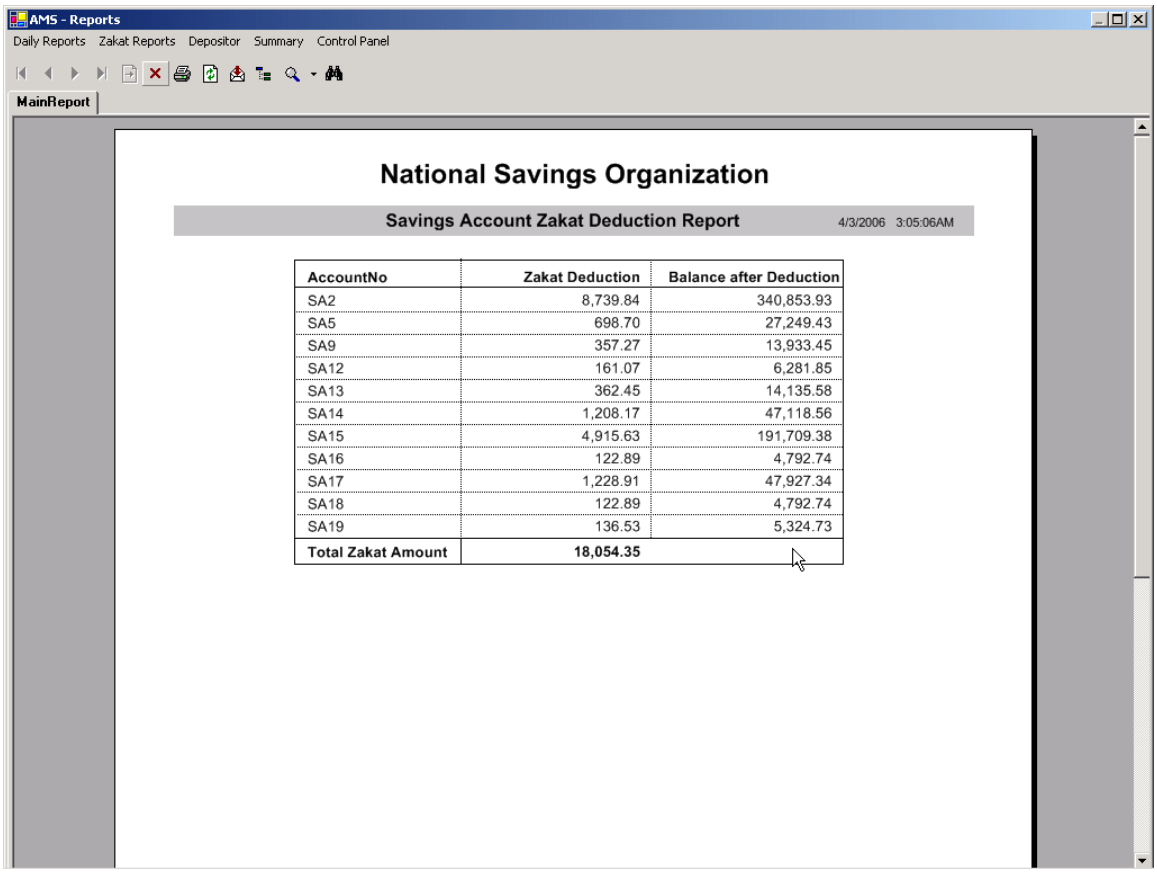


Figure B.24 SSA Daily Transaction Report

The above shown report is the date wise transaction report of special savings account.

B.25 Zakat Report



AccountNo	Zakat Deduction	Balance after Deduction
SA2	8,739.84	340,853.93
SA5	698.70	27,249.43
SA9	357.27	13,933.45
SA12	161.07	6,281.85
SA13	362.45	14,135.58
SA14	1,208.17	47,118.56
SA15	4,915.63	191,709.38
SA16	122.89	4,792.74
SA17	1,228.91	47,927.34
SA18	122.89	4,792.74
SA19	136.53	5,324.73
Total Zakat Amount	**18,054.35**	

Figure B.25 Zakat Deduction Report

The above shown report is the zakat deduction report shows the zakat deduction on different account and total deduction amount.

B.26 Summary Reports

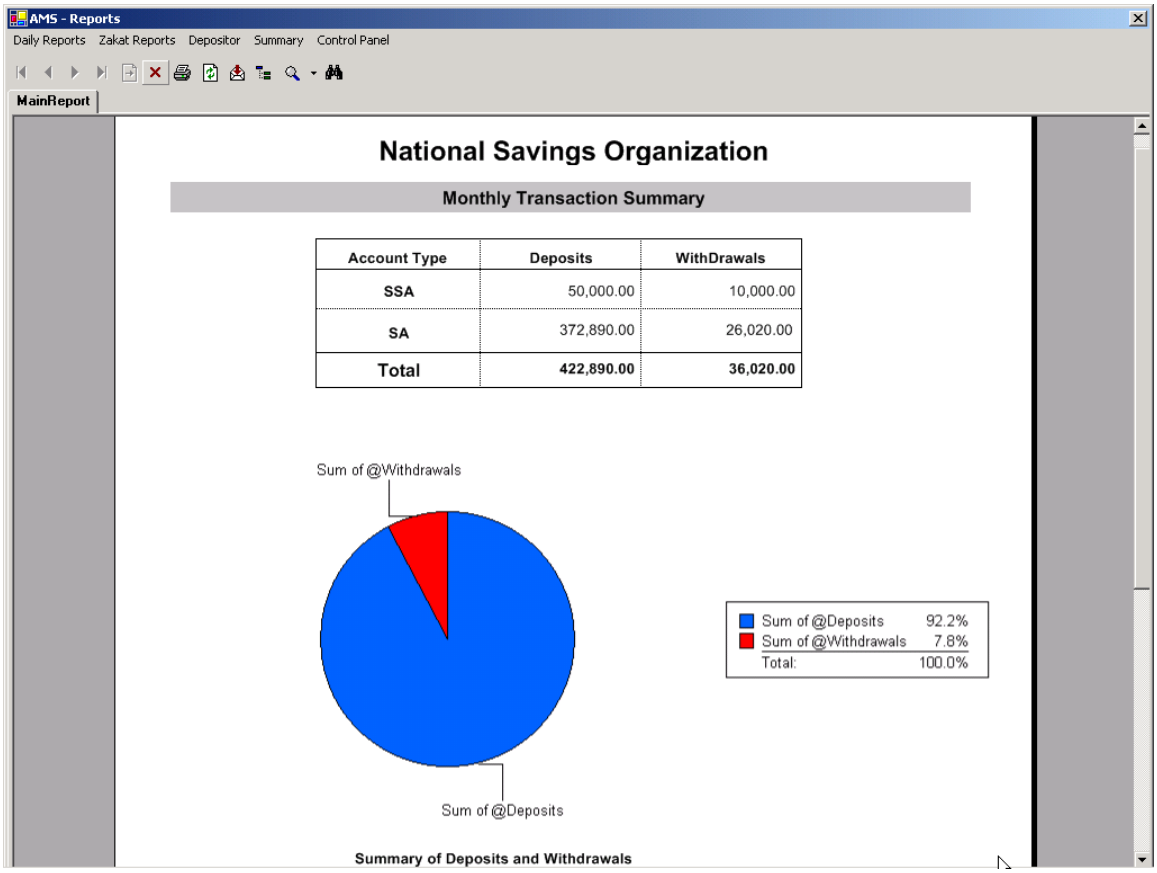


Figure B.26 Monthly Deposit / Withdrawal Report

The above shown report is the monthly deposit withdrawal comparison report, which shows data in both value and graphical format.

B.27 Summary Reports

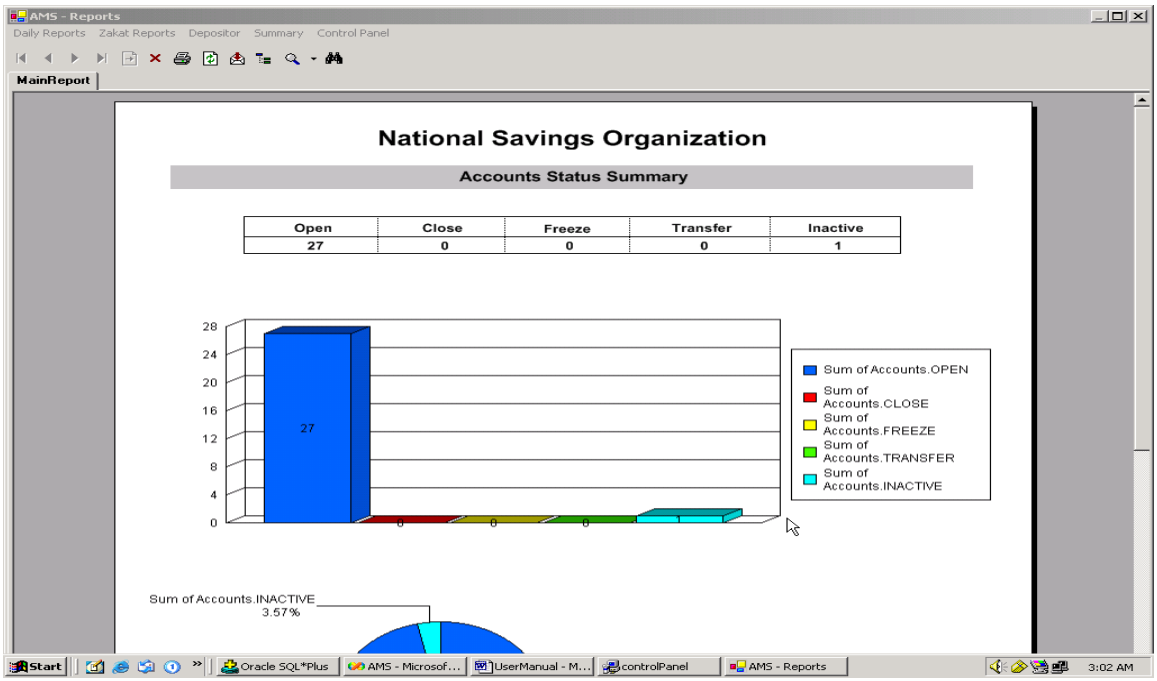


Figure B.27a Accounts Status Summary

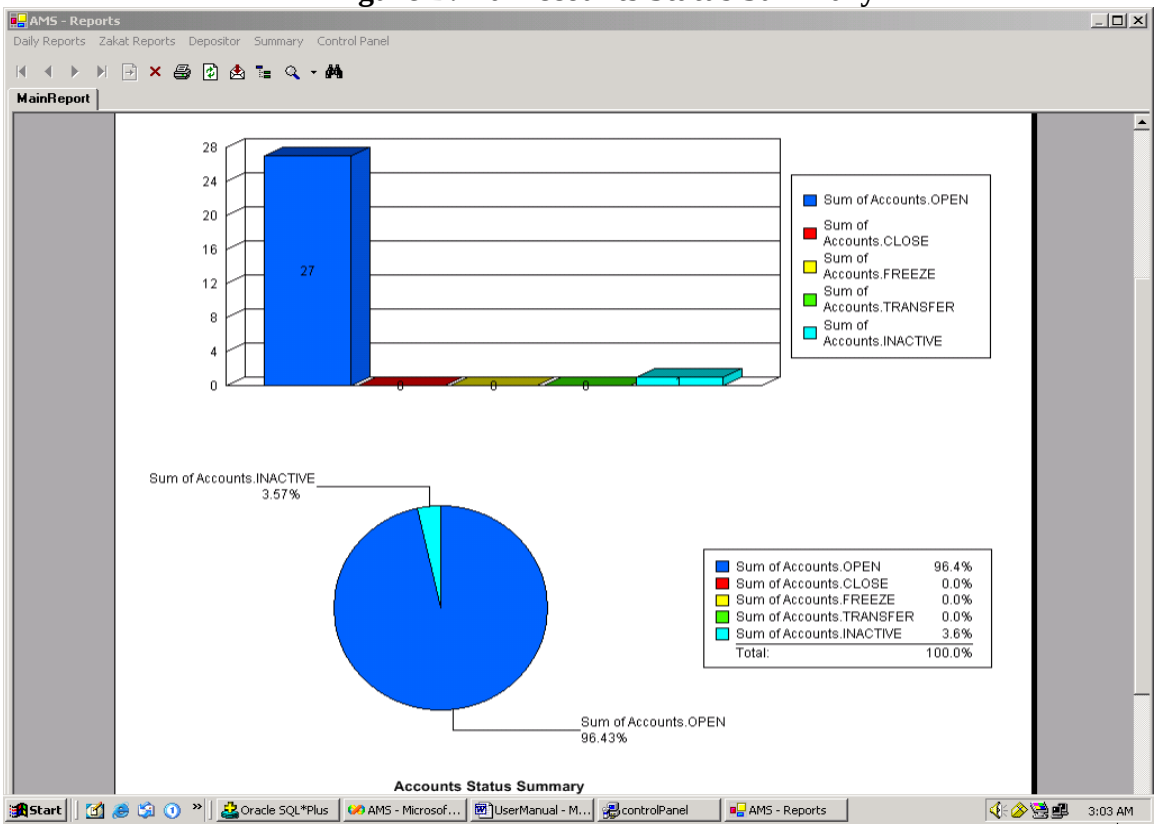


Figure B.27 Accounts Status Summary

B.28 Account Verification Report

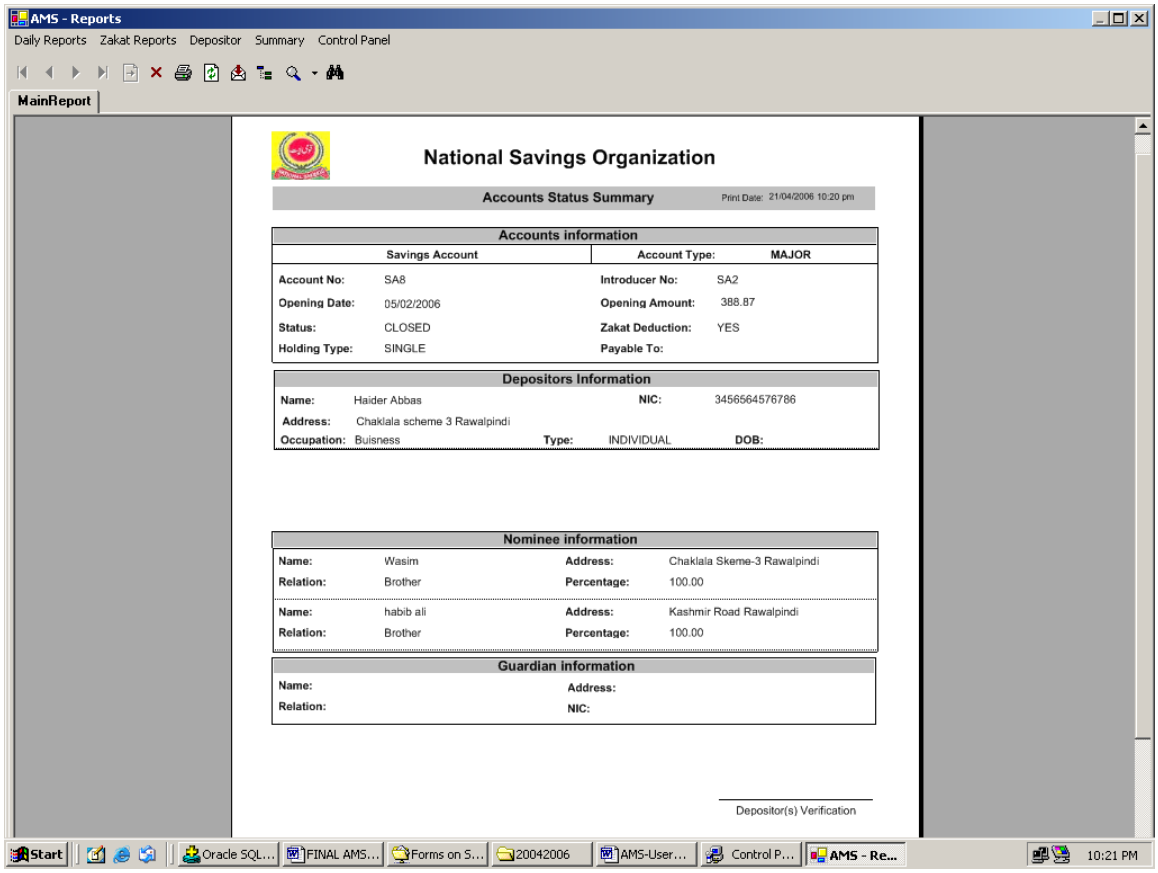


Figure B.28 Account Verification Report

Account status summary report is the account verification report given to the depositor at account opening time, the depositor verify the information by signing the document.

B.29 Bank Statement

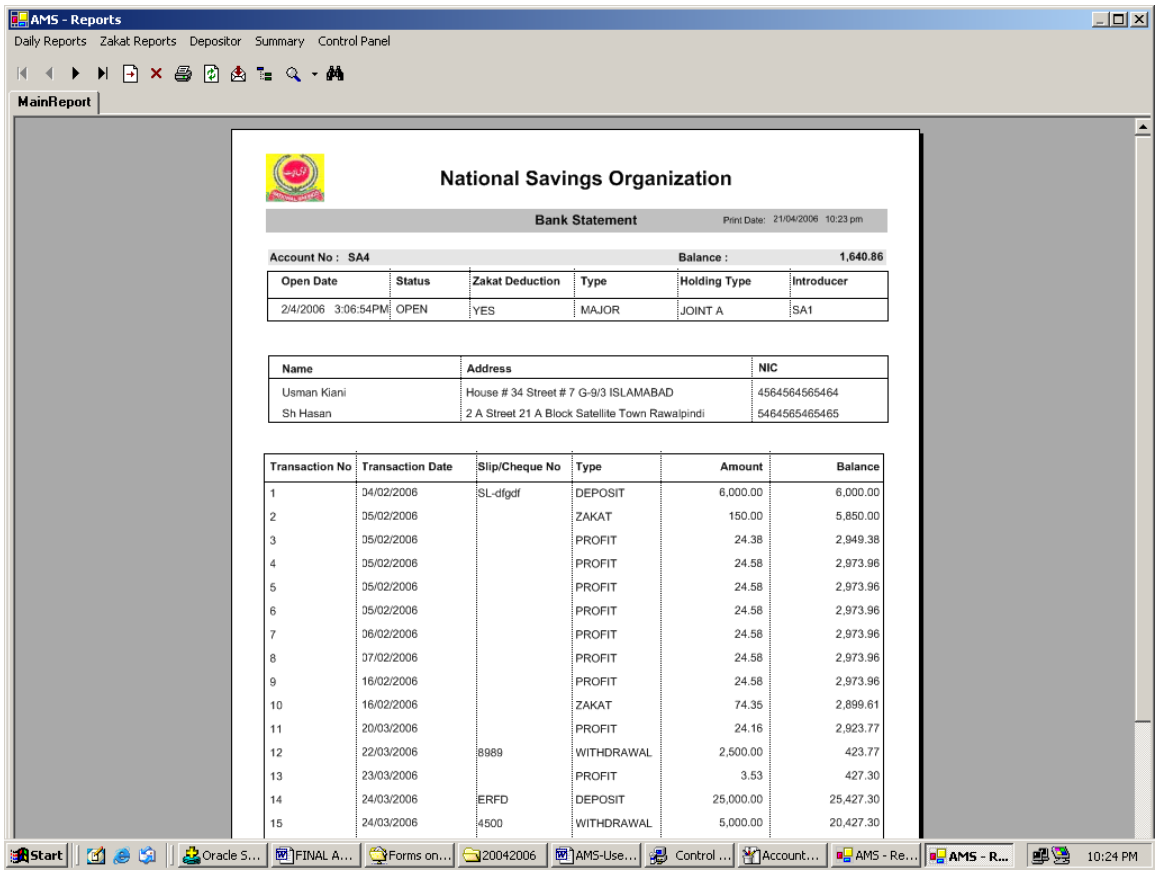


Figure B.29 Bank Statement

The above shown report is the bank statement, which is given to the depositors on their request.

Appendix C: Web Guide

C.1 Website Enhancement

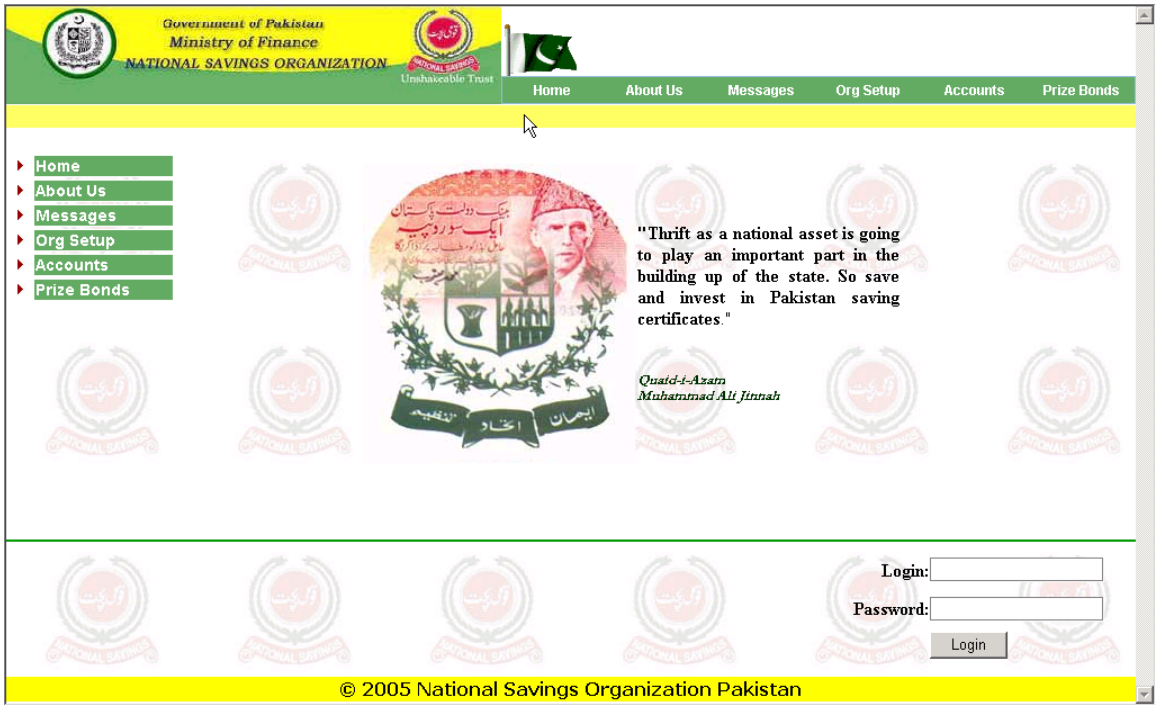
System includes enhancement of website so that the depositors can access information about their accounts using the web.

C.2 Static Part

Website contains some of static pages providing information about National Savings Organization. These pages are public.

C.3 Dynamic Part

User Logs in using Login and password.



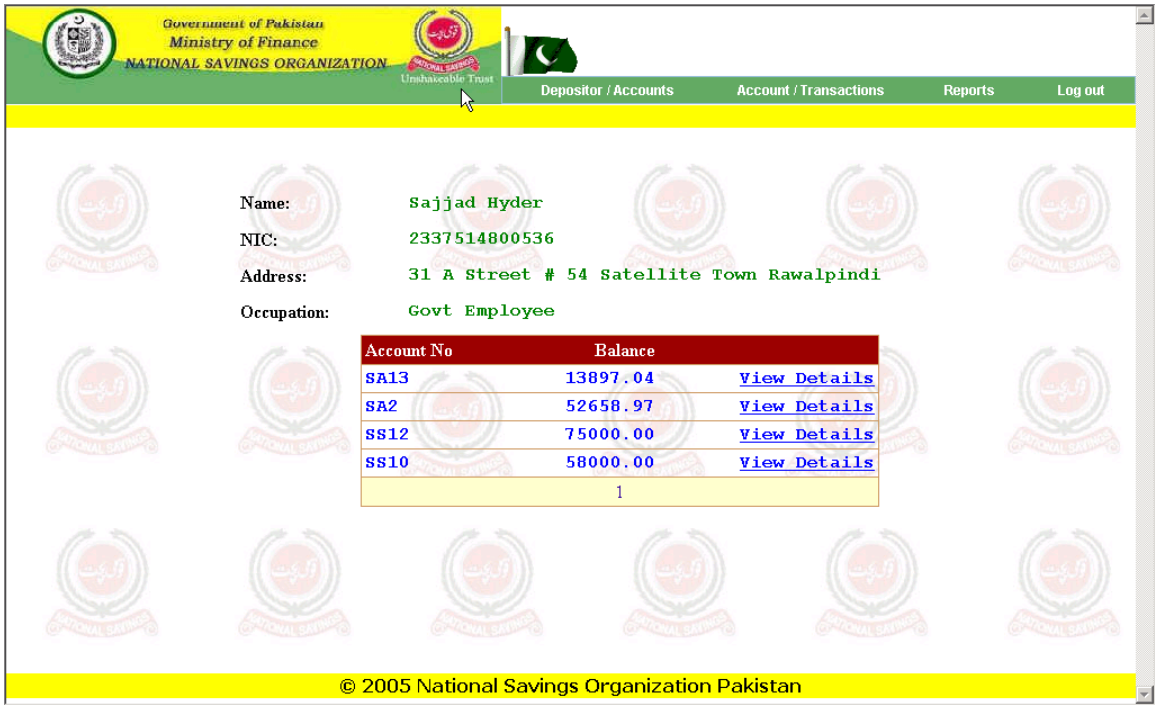
C.3.1 Depositor / Accounts Information

This page displays depositor's personal information.

- Name
- NIC
- Address
- Occupation

Accounts that belong to that depositor are displayed in a grid with current balance.

To view details of each account click "View Details" in the grid.



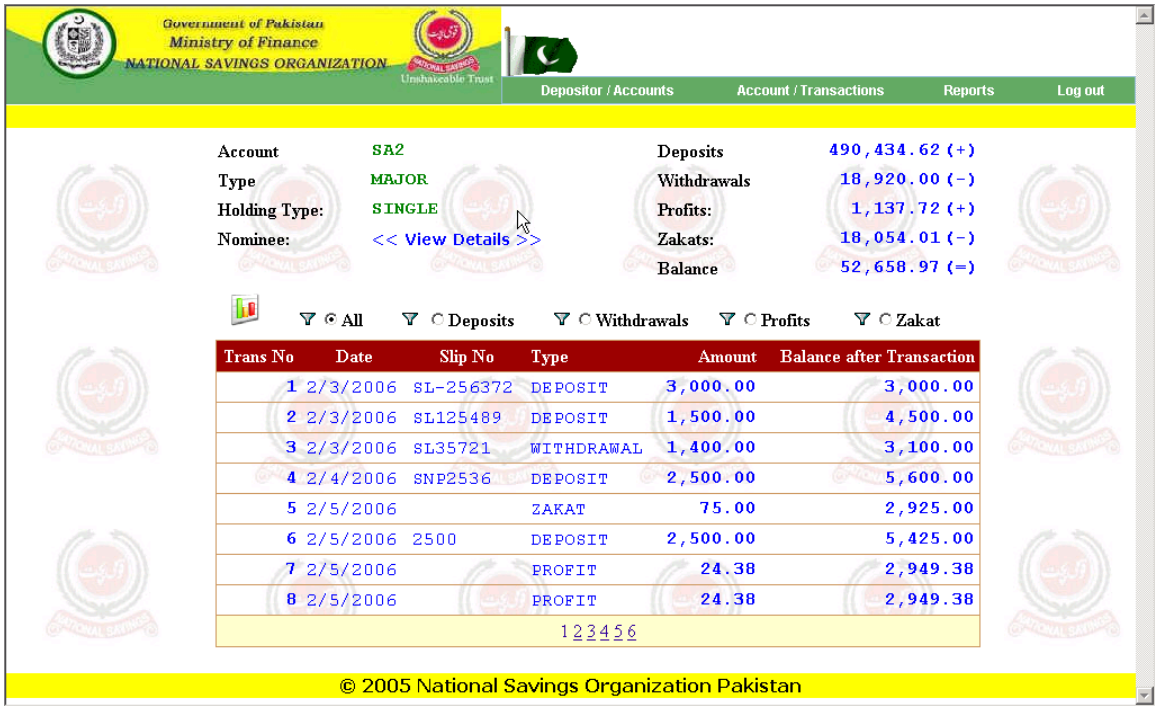
C.3.2 Account / Transactions Information

This page displays account's information

- Account Number
- Type
- Holding Type
- Link to view Nominees

Details of transactions are displayed in a grid. Page also shows

- Sum of Deposits
- Sum of withdrawals
- Sum of Profits
- Sum of Zakat

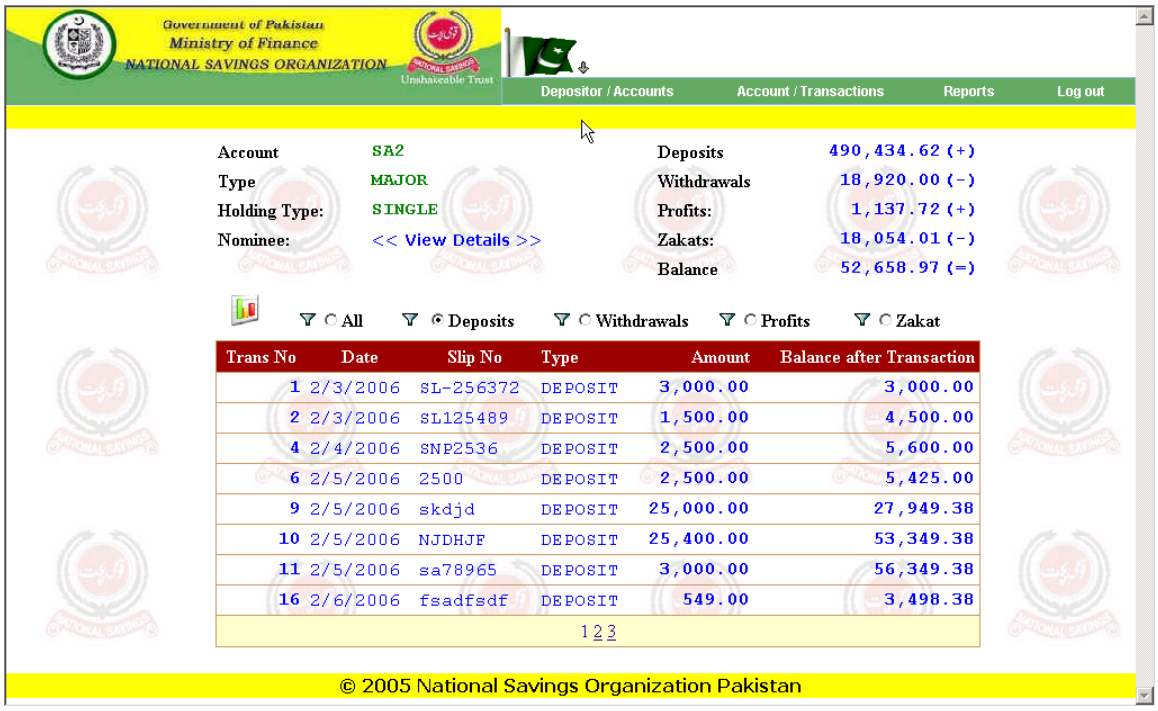


C.3.3 Customized view of Transactions

Click radio buttons on the top of the grid to have a customized view of transactions.

Transactions can be filtered by

- All Transactions
- Deposits
- Withdrawals
- Profits
- Zakat

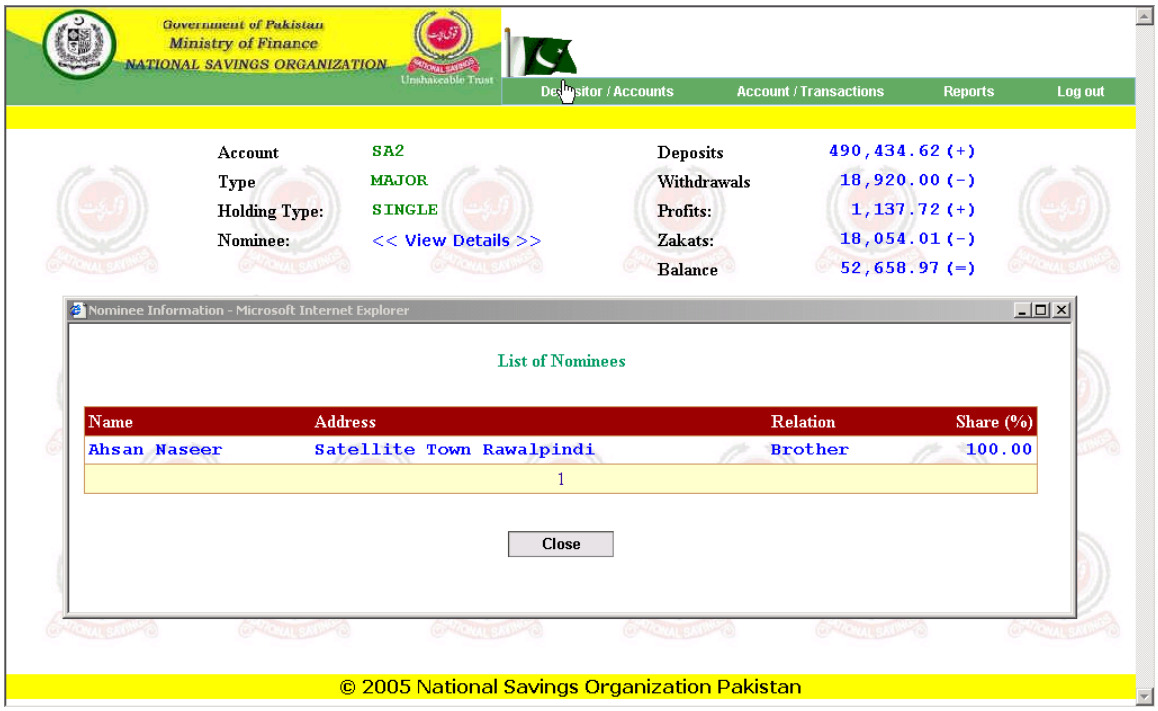


C.3.4 Nominee Information

To view Nominee Information click link button “View Details”. A popup will open displaying list of nominees in a grid.

Nominee Information includes

- Name
- Address
- Relation
- Percentage share.

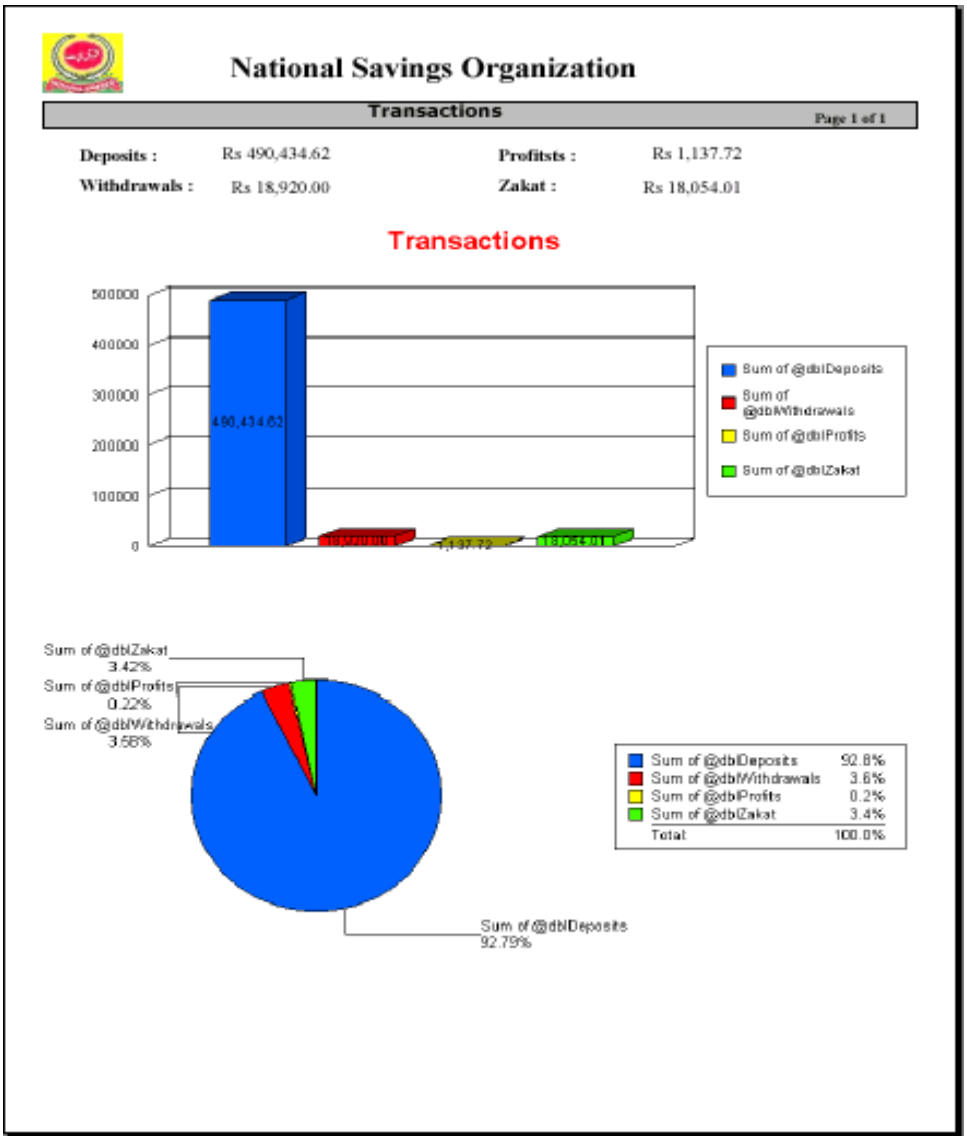


C.3.5 Transaction Report

Transaction report is viewed by clicking report icon in .pdf format.

Report displays Deposits, Withdrawals, Profits and Zakat in

- Numeric
- Bar graph
- Pie graph



References

Websites:

[W1] http://www.microsoft.com

[W2] http://www.oracle.com

[W3] MSDN

Site Used for Development reference

[W4] http://codeproject.com/

[W5] http://c-sharpcorner.com/

[W6] http://www.crystalreport.com/

Books Used for Development Reference

[B1] *Jonson Price*, **Mastering C Sharp Database Programming** Published in 2003 By Sybex

[B2] *Sybex Inc*, **C Sharp Complete** Published in 2003 by Sybex