CS 4320/7320: Software Engineering I

Project Workbook

Spring 2025

Revision History

Date	Issue	Description	Author
February 11, 2025	Project Phase 1	Adding Glossary for assignment1	Group13/Spring 2025
February 18, 2025	Project Phase 2	Identify classes, relations, multiplicity, and start a diagram	Group13/Spring 2025
February 25, 2025	Project Phase 2	Creating class diagrams, associations, multiplicity, adding to glossary, and attributes table	Group13/Spring 2025
March 19, 2025	Project Phase 3	Running the given code, finish the sequence diagrams, complete the table, and add to glossary	Group13/Spring 2025

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IFINANCE System Glossary

1.1 Introduction

This document is used to define terminology specific to the problem domain, explaining terms, which may be unfamiliar to the reader of the use-case descriptions or other project documents. Often, this document can be used as an informal *data dictionary*, capturing data definitions so that use-case descriptions and other project documents can focus on what the system must do with the information.

1.2 Glossary

The glossary contains the working definitions for the key concepts in the IFINANCE System.

Term	**Definition**
iFINANCE	Personal finance management system that makes accounting easy for those with little experience
User	Person who logs into iFINANCE to manage their transactions, accounts, and reports
System Admin	A special user with more privileges (create, update, delete user accounts and manage the system)
double entry bookkeeping	Each transaction will have 2 effects: a debit and a credit entry.
Debit entry	Entry associated with increased assets, increased expenses, decreased liability, or decreased income
Credit entry	Entry associated with decreased assets, decreased expenses, increased liability, or increased income
Double Entry	Entry that affects both debit and credit. All transactions in the iFINANCE system are Double Entries.
Trial Balance	A report that presents the closing balance of all master accounts. Ensures total debits equal total credits across all accounts. Used for accuracy of the financial records
Cash Flow Statement	Report that shows cash flow during a period of time by dividing income and expenses into various sections.
Profit and Loss Statement	Report that summarizes revenue, expenses, and profit or loss over a period of time
Balance Sheet	Report that shows assets plus inventory on one side and liabilities + profit or loss on the other side
Financial Report	A report generated by iFinance to provide insight into a user's financial status, includes balance sheets, trial balance, profit and loss statement, or a cash flow statement
Account Type	Classification of accounts as either debit or credit type
iFINANCE	Custom user-created sub-category that contains a groupID, groupName, groupElement,

Custom Group	Group that tracks Assets, Liabilities, Income, Expenses, and groupParent.
Master Account	A financial account that is the parent for assets, liabilities, income, and expenses
Bank Account	A type of asset representing a user's checking and or savings account. Allows deposits and withdrawals
Investment Account	A type of asset where a user holds investments such as stocks, bonds, or mutual funds.
Transaction	An event that affects accounts, follows double-entry bookkeeping
Net Worth	The total value of assets minus liabilities
Annual Income	The total earnings from income sources over a year long period
Process Transaction	A Method that validates and executes a financial transaction
Balance	The remaining value in an account after transactions are processed
Interest Rate	The percentage charged on borrowed money or earned on savings and investments
Depreciation	Gradual reduction is asset values over time
Transfer Funds	A function that allows users to move money between accounts
Sequence Diagram	A UML diagram that shows the interactions between objects in a system over time, focusing on the order and timing of messages exchanged
ALT	A part of the sequence diagram showing where an IF/ELSE statement will be executed
CRUD	The four fundamental operations performed on data in a database (Create, Read, Update, Delete)
MVC (Model-View-Controller)	The architectural pattern followed by iFINANCE
Boundary Object	An object is a sequence diagram that represents the user interface or API for interaction
Control Object	An object responsible for handling logic and coordination of the use case
Entity Object	An object representing a data entity stored in the system
Manage Account Groups	A use case allowing users to create, modify, and delta account groups with iFINANCE
Manage Chart of Accounts	A use case allowing users to manage Master Accounts and their relationships with iFINANCE

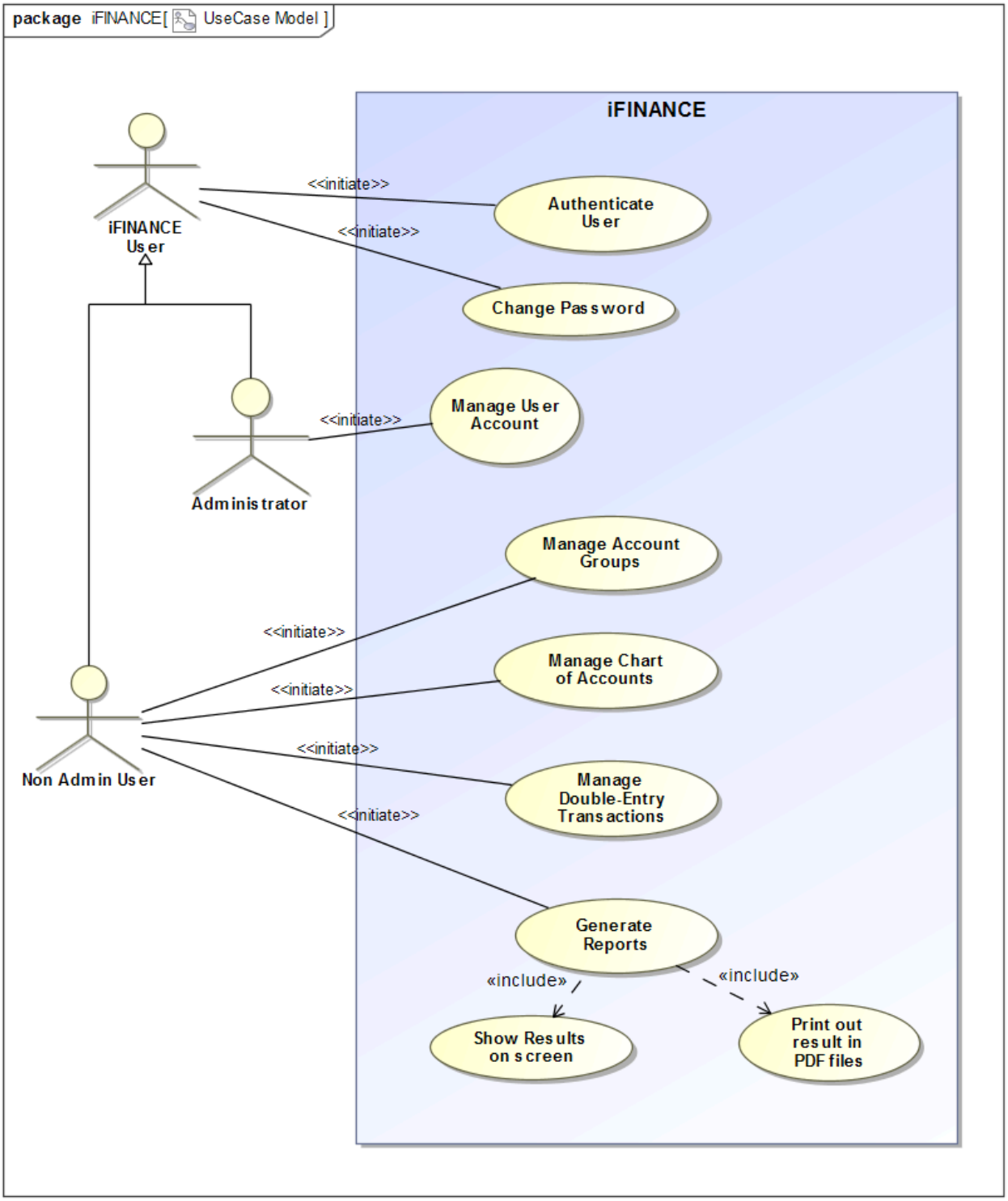
IFINANCE System Actors

Actor	**Description**
User	Small businesses, clubs, associations, or others who use the software
System Administrator	Manages user accounts (add/edit/delete users)
Non admin user	A day-to-day iFINANCE user uses the iFINANCE system to control their personal finances, keep track of bank and investment accounts, cash, and credit cards.

IFINANCE System Use cases

Use Case	Actor	Description
Log in	User System Admin	Using username and encrypted password, user logs into their account. The access controls change to match the accounts permissions once logged in
Manage User Account	System Admin.	Ability to add user accounts, edit profiles, and delete them from the system.
Change password	User, System Admin	All users can change their password
Manage Master Account	User	User can create, update, or delete Master Accounts (cash, bank, credit card accounts)
Update iFINANCE Custom Group	User	User can add, update, or delete custom groups
Manage Chart of Accounts	User	Provide a GUI to help non-admin users to add, update, or delete Master Account (e.g., cash, bank, and credit card). Each Master Account in the Chart of Accounts record will include accountID, accountName, openingAmount, closingAmount, and accountGroup (to specify a group/sub-group to which the account belongs).
Manage account transactions	User	Users may add, update, or delete transactions in a Master-Detail style form. The Master part of the form includes the transaction number, date, total debit, total credit, and comments. The Detail part of the form is a grid containing the account number, account name, debit amount, and credit amount.
Generate Reports	User	Users can generate financial reports including the Trial Balance, Balance Sheet, Profit & Loss, or a cash flow statement from the users financial data.
Display all reports	User	Users can display generated reports on the screen
Print results to PDF	User	Users can export the reports to a PDF file, which can then be printed out later

IFINANCE System Use case Diagram



List of Candidate Classes

- User
- Bank Account
- Investment Account
- Authentication
- Reports
    - Trial Balance
        - Closing Balance
        - Debit accounts
        - Debit sum
        - Credit accounts
        - Credit sum
    - Profit & Loss Statement
        - Expense
        - Income
        - Net income
    - Balance Sheet
        - Assets
        - Inventory
        - Liabilities
        - Net income
- Master Account
    - Income
        - type: Debit
    - Expense
        - type: Credit
    - Asset
        - type: Debit
    - Liability
        - type: Credit
- Custom Group
    - groupId
    - groupName
    - groupElement
        - Assets
        - Liabilities
        - Income
        - Expenses
    - groupParent
- UI
- Master Account
    - accountId
    - accountName
    - openingAmount
    - closingAmount
    - accountGroup
- Transaction
    - number
    - date
    - debitAmount
    - creditAmount
    - notes

Potential iFinance Classes

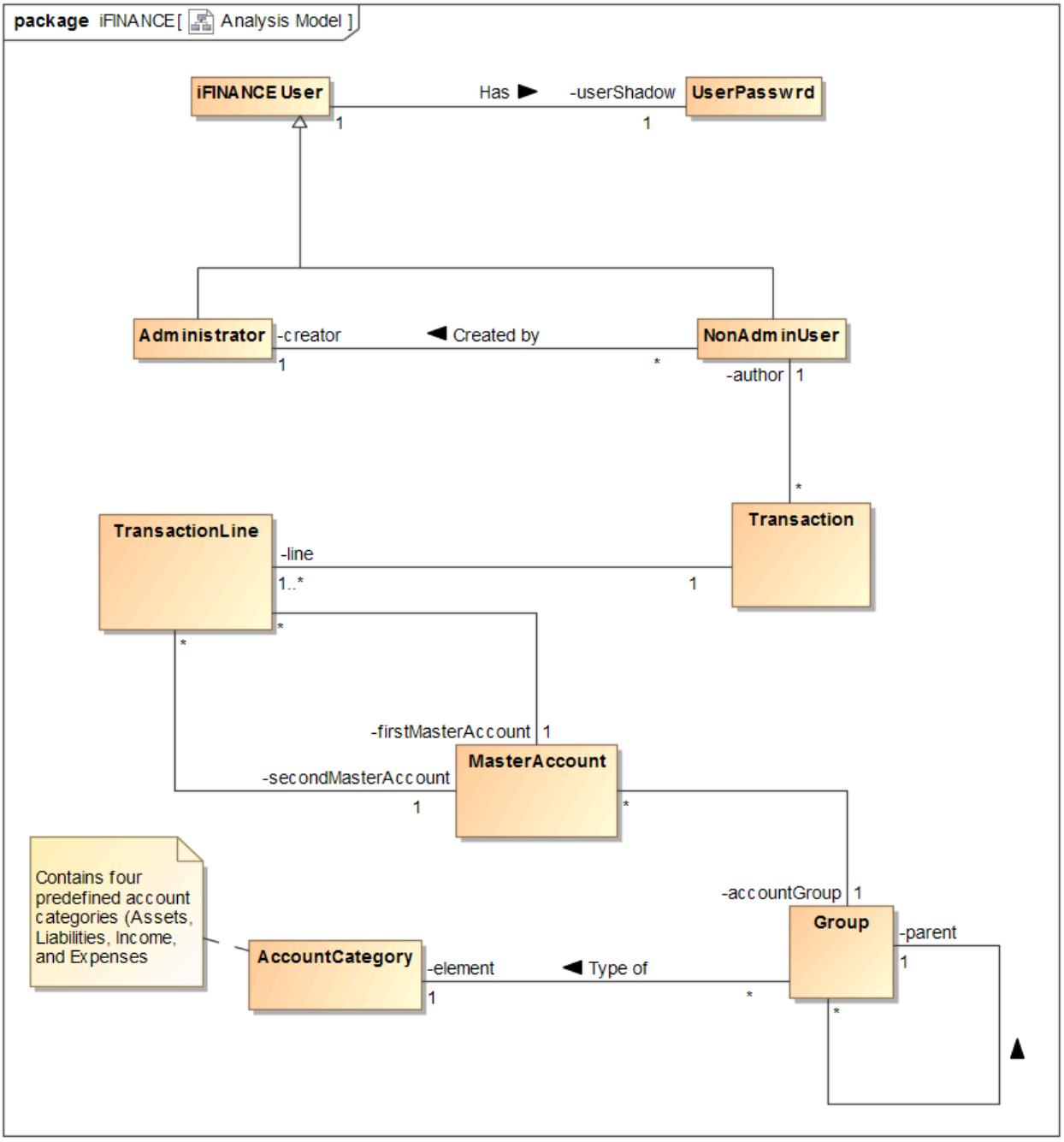
Potential iFINANCE Classes

Class name	Type	Brief Description
UserAuthenticationForm	Boundary	The UserAuthenticationForm will be displayed by the iFINANCE system asking the user to enter its username and password to be authenticated.
iFINANCE User	Entity	The common information of the iFINANCE non admin users and the iFINANCE admin such as User ID and User name will be maintained by this entity class.
Non admin user	Entity	Non admin users is a specification class inherits the iFINANCE User class and add specific information about the user such as name, date of birth, address and email.
Administrator	Entity	iFINANCEAdmin is a specification class inherits the iFINANCE User class and add specific information about the system administrator such as the starting and ending date for the admin responsibility.
UserPassword	Entity	The UserPassword class store the iFINANCE user account information that include a password related information like an encrypted password of a user, the day the password expires, whether or not the password has to be changed from time to time, the minimum and maximum time between password changes, etc.
UserAuthenticationController	Control	A control class to accept and validate the iFINANCE username and its corresponding password. It takes the decision whether the iFINANCE user is allowed to access the iFINANCE services or not.
ManageUserAccountsForm	Boundary	iFINANCE displays the ManageUserAccountsForm when the system admin initiates the process for adding/modifying iFINANCE user account. This form will help the admin to enter the user general information like name and addresses and the secret information like password and the associated access roles.
UserRole	Entity	UserRole class maintains a list of all available iFINANCE access roles and the related permissions. For example, System administrator who has a privilege to create/modify user accounts, Non admin user who has a privilege for all iFINANCE financial functionalities.
ManageUserAccountsController	Control	A control class to create and store the new iFINANCE users' information. It also determines whether the entered username has been used by other user or not, it encrypts the password before storing, and finally assign a specific system access role to the user.

ChangePasswordForm	Boundary	The UserAuthenticationForm will be displayed by the iFINANCE system when the non admin user ask to change his/her password. This form will ask the user to enter the old password and the new password two times.
ChangePasswordController	Control	A control class to accept and validate the non admin user old and new password. The old password needs to be related to this user and the two new passwords should match each other. This control will update the UserPassword entity class.
CustomGroupForm	Boundary	CustomGroupForm is a boundary class that show all exiting financial group names in a Tree View style control, allowing the user to edit, add, or delete a groups and subgroups.
Group	Entity	Group class defines the basic information of the system financial group names and its parent-child relationship. It also determines the type of the group whether it is an Assets, Liabilities, Income, or Expenses.
AccountCategory	Entity	An entity class that defines the account types such as Income, Expense, Asset.
CustomGroupController	Control	This class defines the attributes and the methods needed to retrieve the information of all account groups and subgroups names from the Group objects and display it in a TreeView control in CustomGroupForm organized by the main account type categories. It also allows for edit, add, or delete functionalities using the same form.
ChartOfAccountForm	Boundary	A boundary class to define a graphical user interface GUI element that display a list of all Master accounts at iFINANCE information such as name, group, type, closing and opening amount. The form allows the user to add new master account, edit or delete exiting ones.
MasterAccount	Entity	This entity class defines the basic information of the system financial Masters Accounts such as name, group, type, closing and opening amount.
ChartOfAccountController	Control	This class defines the attributes and the methods needed to retrieve the existing master accounts data and display it in a grid control in ChartOfAccountForm. It allows the user to add new master account, edit or delete exiting ones using the same form.
iFINANCETransactionForm	Boundary	iFINANCE provides a that facilitate the user to add, update, or delete a transaction's entry in a Master-Detail style form. The iFINANCETransactionForm consists of a master part that includes the transaction number, date, the total amount of debit, the total amount of credit in addition to a comments/notes field. The Detail part of this form is a grid that has in each line the account number and name, the debit amount, the credit amount and a field of comments.
Transaction	Entity	This entity class defines the data involved in master part of the iFINANCETransactionForm. This data includes: the transaction number, date, the total amount of debit, the total amount of credit in addition to a comments/notes field.

TransactionLine	Entity	This entity class defines the data involved in detail part of the iFINANCETransactionForm. This data includes: the account number and name, the debit amount, the credit amount and a field of comments in a grid format.
iFINANCETransactionController	Control	A control class to define the application logic that add, edit, or delete accounts' transactions (called double entry bookkeeping or double entry accounting). In each transaction it will recognize one of two processes: a debit entry and a credit entry, such that for every Debit entry, there will always be an equal Credit entry. In the Debit entries we do one of the following: increase assets account, increase expense account, decrease liability account, or decrease income account. However, In the Credit entries we do one of the following: decrease assets account, decrease expense account, increase liability account, or increase income account. iFINANCE deals with two basic transactions—deposits and withdrawals.
GenerateReportForm	Boundary	iFINANCE provides their non admin users with a form represented by the GenerateReportForm boundary class by which the user can enter specific criteria and option to generate reports such as Trial Balance, Balance Sheet, a Profit and Loss statement, or a cash flow statement.
TrialBalanceReport	Boundary	TrialBalanceReport class presents the closing balance of all master accounts in a tabular layout with the debit accounts on one side and the credit accounts on the other. The sum of all credit balances should always match the sum of all debit balances. The Trial Balance is the basis of preparing the Profit and Loss account and the Balance Sheet.
BalanceSheetReport	Boundary	BalanceSheetReport class shows Assets plus Inventory on one side and Liabilities + Profit or Loss (as derived above) on the other. These two sides should be equal.
ProfitLossStatement	Boundary	ProfitLossStatement class is all about subtracting all Expenses from Income to derive a Profit or Loss figure. Thus: Profit or (Loss) = Income – Expenses.
CashFlowStatement	Boundary	CashFlowStatement is a boundary class that shows how changes in balance sheet accounts and income affect cash and cash equivalents, and breaks the analysis down to operating, investing and financing activities.
GenerateReportController	Control	This control class defines the methods that read the user options in which report they would like to generate and to read the specific criteria that is related to the chosen report, such as date range, account types, or account categories. Then calculate and generate the desire report. It also determines whether the output will be displayed on the screen or saved as PDF.

Potential iFinance Class Diagram (Entity Classes Only)



Revised iFINANCE Class Diagram

1. iFINANCEUser Class

Attribute name	Type	Brief Description
ID	String	This is the primary key of the iFINANCE user info class. Every registered iFINANCE user is assigned a unique user ID.
name	String	The name attribute stores the full name of the iFINANCE user.

2. NonAdminUser Class

Attribute name	Type	Brief Description
address	String	The address attribute stores the address of the iFINANCE non admin user.
email	String	The email attribute stores the email address of birth of the iFINANCE non admin user.

3. Administrator Class

Attribute name	Type	Brief Description
dateHired	Date	The date when the system administrator is hired by iFINANCE.
dateFinished	Date	The date when the system administrator left the iFINANCE.

4. UserPassword Class

Attribute name	Type	Brief Description
ID	String	This is the primary key of the UserPassword class. The value of this attribute need to be the same as the value of the iFINANCE user ID.
userName	String	The name attribute stores the use account name of the non admin user.
encryptedPassword	String	The userEncryptedPassword attribute stores the encrypted version of the non admin user password. A salted hash will be used in order to encrypt the password.
passwordExpiryTime	Integer	From time to time the system requires the user to change the password. The passwordExpiryTime attribute stores this period of time.
userAccountExpiryDate	Date	The userAccountExpiryDate attribute stores the expiry date of the user account if any.

5. AccountCategory Class

Attribute name	Type	Brief Description
ID	String	This is the primary key of the AccountCategory class. The value of this attribute distinguishes one category from the other.

name	String	The name attribute stores the iFINANCE pre-defined account category name. Example, Assets, Liabilities, Income, and Expenses.
type	String	The type attribute stores the type of account category, this could be Debit or Credit.

6. Group Class

Attribute name	Type	Brief Description
ID	String	This is the primary key of the Group class. The value of this attribute distinguishes one account group from the other.
name	String	The name attribute stores the name of the group or its subgroups.

7. MasterAccount Class

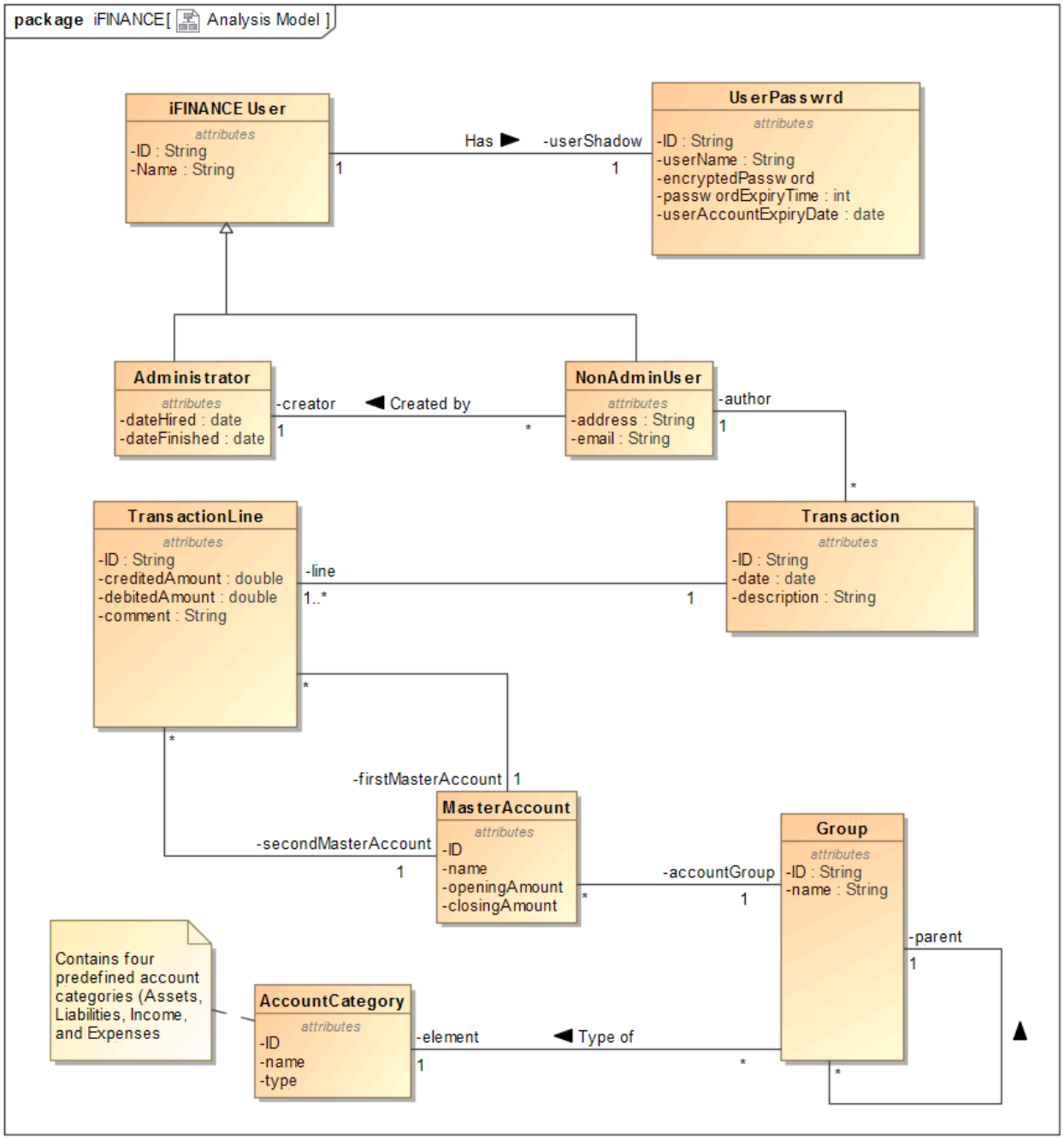
Attribute name	Type	Brief Description
ID	String	This is the primary key of the master account class.
name	String	The name attribute stores the full name of the master account.
openingAmount	double	The openingAmount attribute stores the balance brought forward at the beginning of an accounting period.
closingAmount	double	The openingAmount attribute stores the amount remaining in an account within the chart of accounts, positive or negative, at the end of an accounting period or year end.

8. Transaction Class

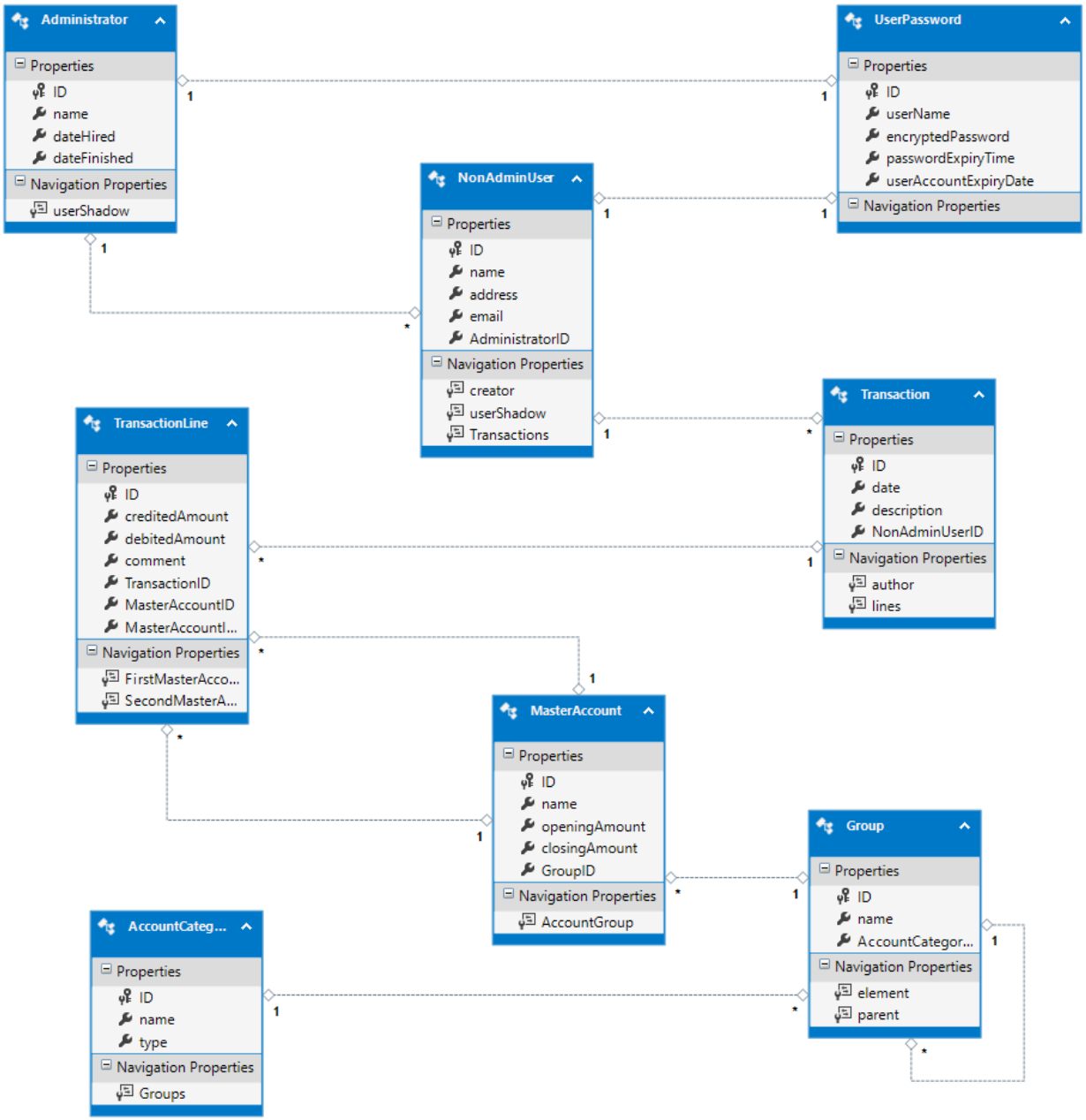
Attribute name	Type	Brief Description
ID	String	This is the primary key of the transaction header class. The value of this attribute should at least one value in the transaction line class objects.
date	Date	The date attribute stores the date and time of the transaction.
description	String	The description attribute stores the detail comments about the transaction.

9. TransactionLine Class

Attribute name	Type	Brief Description
ID	String	This is the primary key of the TransactionLine class.
creditedAmount	double	The creditedAmount attribute stores the credited amount of the transaction.
debitedAmount	double	The debitedAmount attribute stores the debited amount of the transaction.
comments	String	The comments attribute stores the detail comments about the transaction.

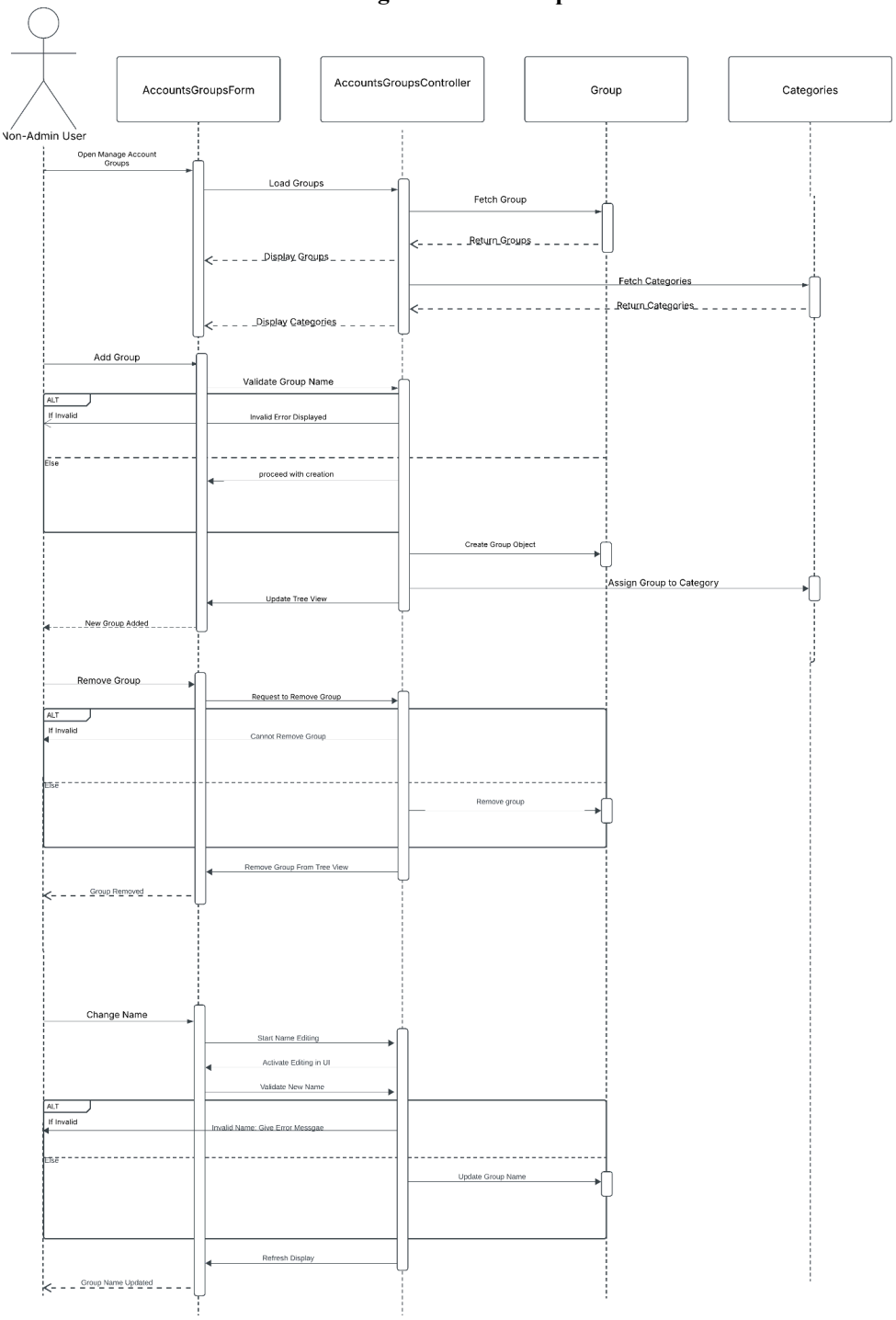

package iFINANCE[Analysis Model]
iFINANCE User
attributes
-ID : String
-Name : String
Has
-userShadow
1
1
UserPasswrd
attributes
-ID : String
-userName : String
-encryptedPassword
-passwordExpiryTime : int
-userAccountExpiryDate : date
Administrator
attributes
-dateHired : date
-dateFinished : date
-creator
1
Created by
*
NonAdminUser
attributes
-address : String
-email : String
-author
1
*
TransactionLine
attributes
-ID : String
-creditedAmount : double
-debitedAmount : double
-comment : String
-line
1..*
1
Transaction
attributes
-ID : String
-date : date
-description : String
*
*
-firstMasterAccount
1
MasterAccount
attributes
-ID
-name
-openingAmount
-closingAmount
-secondMasterAccount
1
-accountGroup
*
1
Group
attributes
-ID : String
-name : String
-parent
1
Contains four predefined account categories (Assets, Liabilities, Income, and Expenses
AccountCategory
attributes
-ID
-name
-type
-element
1
Type of
*
*

Modeling and Mapping

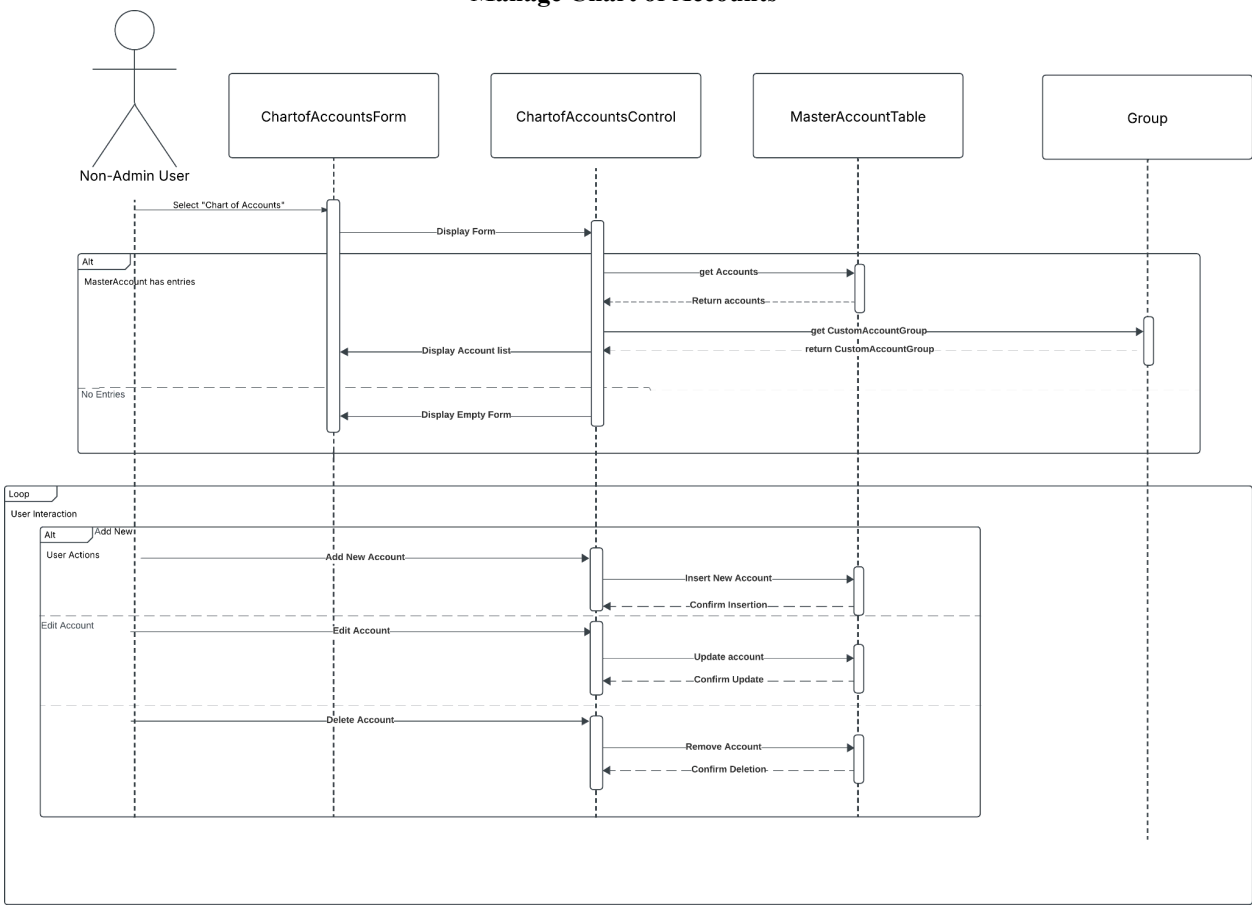


Potential iFinance Sequence Diagram

Manage Account Groups



Manage Chart of Accounts



Operations Details

Class Name	Receiving Message	Brief Description
ChartofAccountsForm	Select “Chart of Accounts	Actor begins Use Case by clicking “Chart of Accounts”
ChartofAccountsForm	Display Account List	Show list of accounts with information attached
ChartofAccountsForm	Display Empty List	No accounts in the list, form is empty.
ChartofAccountsControl	Display Form	prompts ChartofAccountsControl to gather the Master Accounts information for the display.
ChartofAccountsControl	Return Accounts	Receives account information from MasterAccount

ChartofAccountsControl	**Return CustomAccountGroup**	**Receives information about the group associated with the MasterAccount.**
ChartofAccountsControl	**Add New Account**	**Prompts ChartofAccountsControl to add an account to the MasterAccountTable**
ChartofAccountsControl	**Edit Account**	**Prompts ChartofAccountsControl to update account info in MasterAcccountTable**
Chart of AccountsControl	**Delete Account**	**Prompts ChartofAccountsControl to remove an account from MasterAccountTable**
ChartofAccountsControl	**Confirm Insertion**	**Receive Confirmation that the new account has been added.**
ChartofAccountsControl	**Confirm Update**	**Receive Confirmation that the account information has been updated.**
ChartofAccountsControl	**Confirm Deletion**	**Receive confirmation that an account has been deleted.**
MasterAccountTable	**get Accounts**	**prompts MasterAccountTable to return the accounts it holds and the correlated information**
MasterAccountTable	**Insert New Account**	**Adds Account to the MasterAccountTable**
MasterAccountTable	**Update Account**	**Edit information in an account**
MasterAccountTable	**Remove Account**	**Delete Account from the table.**
Group	**get Custom Account Group**	**Return the account group to ChartofAccountsControl**
AccountsGroupsForm	**Select Manage Account Groups**	**Actor begins the use case by clicking “Manage Account Groups”**
AccountsGroupsForm	**Load Groups**	**Loads available groups and sends a request to fetch details**
AccountsGroupsForm	**Display Groups**	**Displays the available groups into the UI**
AccountsGroupsForm	**Display Categories**	**Displays available categories into the UI**
AccountsGroupsForm	**Validate Group Name**	**Validates the name of newly added group**
AccountsGroupsForm	**Request to remove group**	**Send a request to remove a group based on user input**

AccountsGroupsForm	**Remove group from tree view**	**Removes the group from the UI after confirmation**
AccountsGroupsForm	**Start name editing**	**Begin the process of changing a groups name**
AccountsGroupsForm	**Validate new name**	**Validates the name of an edited group name**
AccountGroupsController	**Fetch group**	**Retrieve group data from the system**
AccountGroupsController	**Fetch categories**	**Retrieve categories for groups**
AccountGroupsController	**Create group object**	**Creates a new group in the system**
AccountGroupsController	**Assign group to category**	**Link a group to a category**
AccountGroupsController	**Remove group**	**Removes the group from the system**
AccountGroupsController	**Activating editing in UI**	**Allow editing for name changes in the UI for user input**
AccountGroupsController	**Update group name**	**Updates the group name after editing is complete**
AccountGroupsController	**Refresh display**	**Refreshes the UI with correct name**
Group	**Return groups**	**Returns list of available groups**
Category	**Return categories**	**Returns a list of categories**