Multilateral Clearing & Settlement System Using Trade Flows In Equity Securities – Team 4

[v0.1]

Document Version History

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Document Approval

Approved By:

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Introduction

Project Team & Roles

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Document Conventions

This document utilizes the following conventions:

1. CH → Clearing House
2. CM → Clearing Member
3. Admin → Administrator
4. FR → Functional Requirement
5. NFR → Non Functional Requirement
6. ES → Equity Shares

Project Background

A clearinghouse is a designated intermediary between a buyer and seller in a financial market. The clearinghouse validates and finalizes the transaction, ensuring that both the buyer and the seller honor their contractual obligations. Every financial market has a designated clearinghouse or an internal clearing division to handle this function.

The responsibilities of a clearinghouse include "clearing" or finalizing trades, settling trading accounts, collecting margin payments, regulating delivery of the assets to their new owners, and reporting trading data.

The clearing house has a clearing and settlement system built in order to settle up the transactions of a day . The system is built to handle any kind of transactions taking place in the day. It stores the information regarding the companies using the settlement house and the stocks as well as funds associated with the respective company.

There are millions of transactions occurring in a single day, it is impossible to handle this by humans, as it creates a large error margin which can affect the company profits on a large scale. This software is in the stock market line of business where the stocks and funds transacted in a day are handled by the clearing house and the necessary funds/equities to be settled are shown accordingly to the corresponding clearing members through an obligation report.

Project Assumptions

Assumption No.	Assumption	Detail about the assumption & why it was made
1	Base Cost	Base cost of settlement is assumed to be 0. Assumed interest rates are used to calculate the final cost.
2	Initial Fund and Equities	Initial fund and equities for each custodian is generated randomly.
3	Settlement	Settlement is excluded since the simulation is for one day and settlement will be happening on the next day in accordance with the clearance data computed.

Requirements Scope

In Scope

The project primarily concentrates on the clearing algorithm which considers the latest balances of the custodians as well as the new transactions that have occurred until the point of the current clearance and generates new balances for the custodians based on the transactions. The clearance will occur on invocation of the provided option for clearance to mimic the end of the day calculations using the algorithm and all the required obligation reports, cost of settlement reports and corporate action reports will be generated and shown on the UI for each custodian. The project assumes that the user of the system can add transactions to the system hence gives the user the option to do the same.

Future Scope

For now, the project assumes that this is strictly a one day simulation which can be extended to multiple days to provide a more robust settlement algorithm.
Functionalities to take data like trades and settlement rates can be taken from the real time market to generate practical reports. Further, options to enlist further equities and custodians can be given to the admin.

Requirements Description

Functional Requirements

Index	Requirement Name	Description
FR 0	Manual Addition of Trade Records	The Admin is provided the option to manually add new trades over and above the randomly generated trade records.
FR 1	Trade Value Calculation	Trade values corresponding to each transaction are computed using Equity Share quantities and their corresponding prices.
FR 2	Multilateral Netting	The Netting Amount for each Clearing Member is calculated based on all their BUY and SELL trades.
FR 3	Obligation Report Generation	For each Clearing member, Obligation Reports for both Equity Shares and Funds are generated. The same is also made available as a consolidated report for the Clearing House.
FR 4	Shortage Check	Each Clearing Member is checked for shortage of Funds and Equity shares using the precomputed netting amount (ref. FR 2) and their opening balances, and alerted accordingly.
FR 5	Cost of Settlement Report Generation	In case a Shortage arises, Clearing Members are displayed the Cost of Settlement calculated using the principal shortage amount and a predefined interest rate over the span of 1 day. The same is also made available as a consolidated report for the Clearing House.
FR 6	Corporate Actions Report Generation	In case any corporate actions are carried out on a particular day, Clearing Members are displayed the revised balances of Funds and Equity Shares post application of the corporate action. The same is also made available as a consolidated report for the Clearing House.

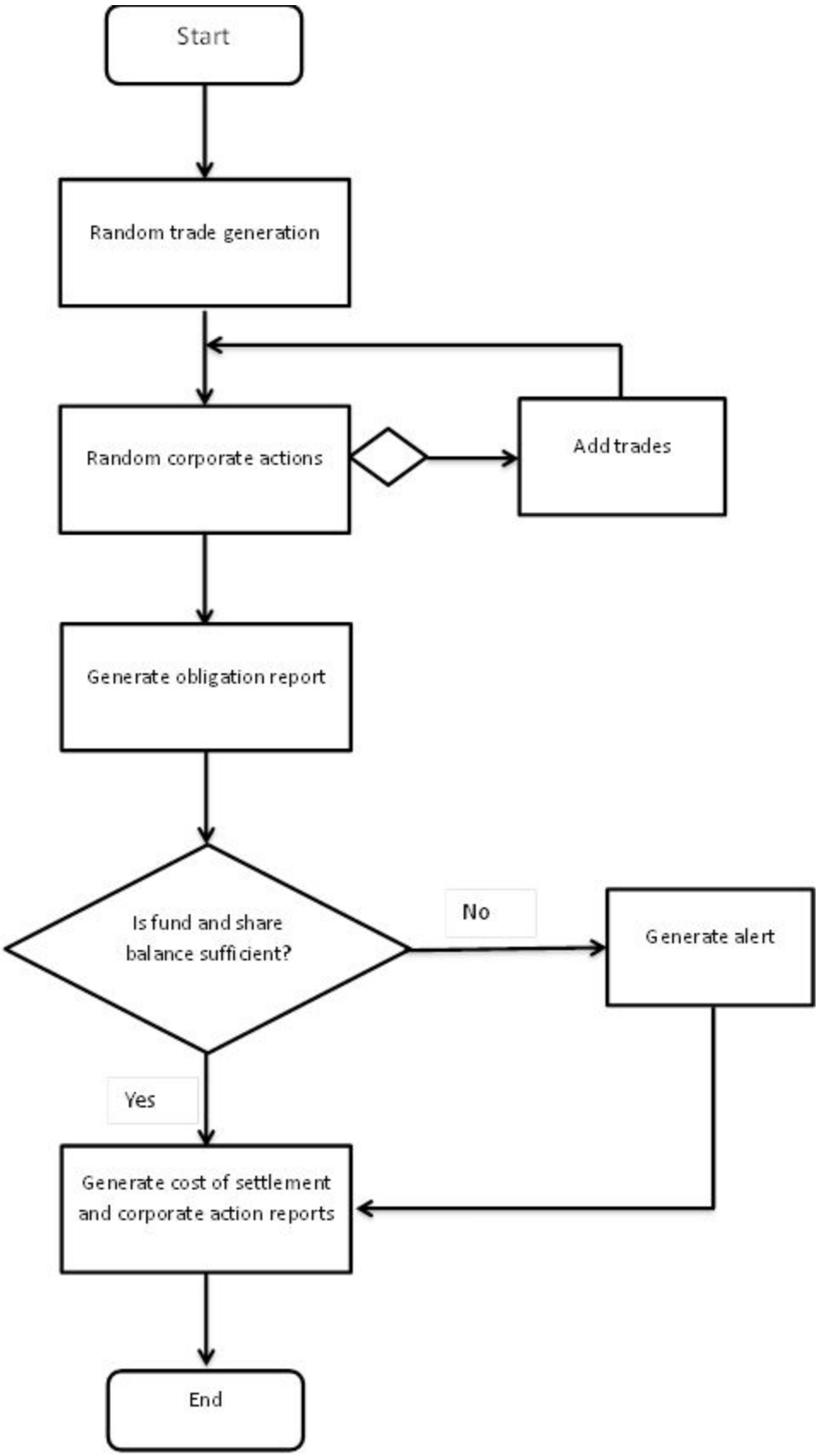
Scenarios Covered

Index	Scenario	Description
S 1	*A) No Shortage Arises*	Sufficient Fund or ES balance → NO NEED TO BORROW
	B) Shortage Arises	Insufficient Fund or ES balance → COMPUTE AND DISPLAY BORROW DETAILS
S 2	*A) No Corporate Action*	No Corporate Action occurs → NO NEED TO COMPUTE REVISED FUNDS AND/OR ES
	B) One or More Corporate Actions	One or More Corporate Actions occurs → COMPUTE AND DISPLAY REVISED FUNDS AND/OR ES

Non-functional Requirements

Index	Requirement Name	Description
NFR 1	Accuracy	All calculations should be mathematically correct.
NFR 2	Throughput	Times for connection, computations and display should be optimized.
NFR 3	Usability	UIs should be user-friendly. All Information presented should be easy to read, concise and useful to the user (CH, CM and admin).

Logical Flow Chart



Wireframes (UI Screen Designs)

TBD

Project Architecture

Schematic Project Architecture

TBD

Data Model (ERD)

TBD

Class Diagram

TBD

Testing Approach

Test Scenarios

1. End-to-end testing for CMs, CH and admin UI.
2. Testing for corporate actions after updated settlement reports are generated.
3. Upload/Download functionality testing for trades and reports.

Test Cases

1. Incorrect username/ password - block after 3 attempts/ forgot password?
2. Admin is given a correct error message in case of improper formatted input trade data.
3. CH can avail the list of all executed trades considered for the settlement.
4. Adding trades from UI must bring change only to concerned parties(CMs) taking part in the trades.
5. In case of shortages, interest is included in the cost of settlement.