Digital Stock Trading Platform

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1 System requirements

1.1 Introduction

In the past, before online trading were invented, transactions were made in trading halls by the stock market representatives that acted on behalf of investors, those in the course of time started taking a bigger piece of the pie. This process was cumbersome and slow, and accessible to only small part of the population of potential investors.
We envision a digital platform to replace the current system that imitates basic operations so to forgo the current methods and activities. The platform will be accessible from any contemporary machine running it that has an internet connection available.

1.1.1 Purpose of the system

Our vision is to broaden the investment house customer bank, achieving that by simplifying the process of stock trading and portfolio management by means of making it more accessible for everybody, easy to use with minimum effort, we seek to minimize the necessity of stock exchange representatives to act on behalf of our customers nevertheless providing different degrees of financial advice in a digital automated manner.

1.1.2 Scope of the system

Like every investment house we provide the opportunities to trade in the stock market. We also would like to provide financial advice for the investors to make wise decisions regarding their investments. Our clients will be able to Ask or Bid at a specific price regardless of Bid-Ask spread. Our platform convention is also to charge clients for fee periodically regardless any other parameter especially the number of Ask/Bid operations done. Since our system is digital our "door" is always open, there is no need to come by and all needed information is one click away.

1.2 Current system

The current system(the one to be replaced by our digital platform) is extremely cumbersome, from a personal point of view one must contact in some physical manner his preferred stock market representative i.e. his stock broker - who is not always available - and initiate a long process of demands and reports between them:
-The investor contacts his broker.
-The investor may ask for information regarding quotes and stock market trends.
-The broker in turn, should fetch this information either personally being physically in the trading hall or using availble methods within his office.
-When the investor is ready he can ask the broker to Ask or Bid on his behalf numerous times.
-The former operations are done against the stock market so the broker has to translate the

investors requests formally to the stock market also, upon doing so only one part of the whole
   process is done, now the broker and the investor await for a response to the former
   operations.
-When the stock market shows a change in the relevant stocks, the broker and/or investor
   check for this changes periodically and physically, they can make further decisions or actions
   regarding the outcomes.
this process is somehow exhausting considering our time, also we cannot hide the varying commission rates for the broker's services. For stock market information one could ask his broker, read the newspaper or visit the stock market physically all of the above possibilities are time consuming and not always up to date. we could also consider the investment house point of view, it is subject to a lot of pressure providing enough professional manpower to service any potential customer losing money on those who are not reached or serviced moreover, the investment house is burden by manually managing all its essential records and activities.

1.3 Actors & Goals

Actor	Major	Description	Goals
Investor	✔	Main actor in the system, since it was created for him.	Manage a portfolio effortlessly, specifically making ask and bid operations at any time or place.
Lead	✔	Potential Investor who requests to open a portfolio.	Submit a request to open a portfolio.
FinancialManager	✔	An investment house employee.	-Provide financial advice for the investment house customers. -Accept new Leads after examining their requests to open a portfolio. -Confirm and handle fees reports.
StockMarket	✗	A system provided by the stock market to serve as a utility to its members, an interface.	Process requests usually made by stock brokers to say the least in particular, process : -bid/ask operations. -quotes requests operations.

1.4 Functional requirements

1.4.1 Use case diagram
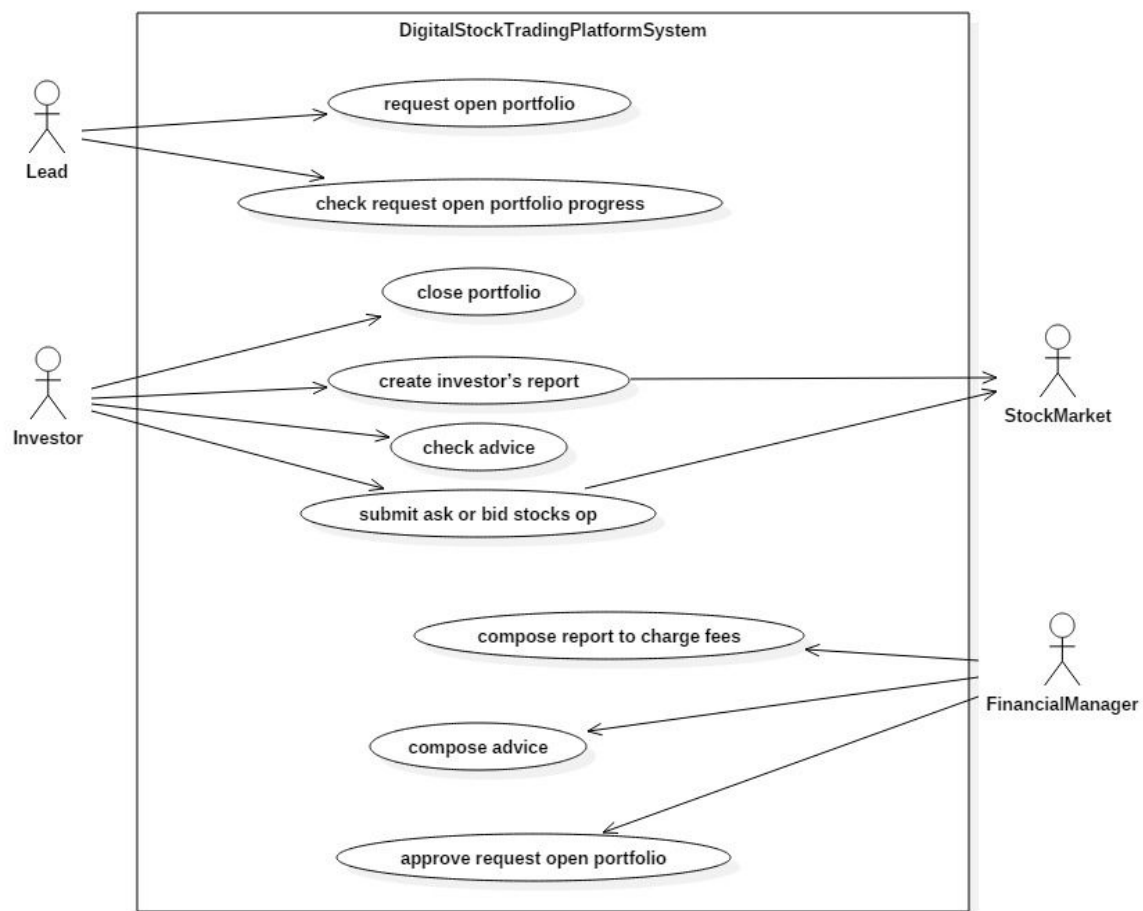
1.4.2 Use cases

Use Case Name: request open portfolio.
Participating Actors: Lead (Major).
Goal: issue a request to open a portfolio.
Flow of Events (or basic flow activity diagram):
1. The Lead requests to open a new portfolio.
2. The system presents a form for the Lead to fill.
3. The Lead fills the form
4. The Lead submits the form.
5. The system gets the form.
6. The system issues the new request to open a portfolio accompanied with the data from the
   form at step 3.
7. The system records the operation for farther processing by a FinancialManager.
8. The system prompts the Lead with instructions and a special unique number with an
   explanation that the number should be used by the Lead to check if his request has
   been approved.
9. The Lead acknowledges the systems prompt.

Alternate flows:

Alternative flow A:
A.1. At step 5 the system detects the form has errors.
A.2. The the system prompts the Lead with an appropriate error
   message.
A.3. The flow continues from step 2.

Alternative flow B:
B.1. At step 5 the system detects that the Investor or Lead already exists in the system.
B.2. The system prompts the Lead with an appropriate error
   message.

Use Case Name: approve request open portfolio.
Participating Actors: FinancialManager(Major).
Goal: Approve or disapprove a Lead request to open a portfolio.
1. The FinancialManager request the system for pending Lead request to open a portfolio.
2. The system locates a pending request and presents it to the FinancialManager.

3. The FinancialManager validates the information provided by the Lead.
4. The FinancialManager approves the Lead and asks the system to change the Lead's status.
5. The system changes Lead's status to approved.
6. The system presents the FinancialManager with an appropriate message.

Alternate flows:

Alternative flow A:
A.1. At step 4 the FinancialManager does not approve the Lead and asks the system to change the Lead's status.
A.2. The system changes Lead's status to disapproved.
A.3 The system records the operation.
A.3. The system presents the FinancialManager with an appropriate message.

Use Case Name: check request open portfolio progress.
Participating Actors: Lead(Major).
Goal: check the progress of the request to open a portfolio, register Lead when approved.
Flow of Events (or basic flow activity diagram):
1. The system presents a form for the Lead to fill, the form contains one field for a number.
2. The Lead submits the special unique number he has.
3. The system gets the number.
4. The system locates the Lead.
5. The system checks the status of the Lead.
6. The system presents the Lead a registration form to fill, the form only contains new authentication fields.
7. The Lead fills the form and submits it.
8. The system gets the form and registers the Lead as an Investor, the system relates all previous and relevant data to this new Investor's account and a new portfolio for the Investor is also created.
9. The system records the operation.
10. The system removes Lead's record and revokes his special number.
11. The systems presents the Lead with an appropriate message.

Alternate flows:

Alternative flow A:
A.1. At step 5 the system detects the Lead is not approved.
A.2. The the system prompts the Lead with the appropriate error message.
A.3 The system removes Lead's record and revokes his special number.

Alternative flow B:
B.1. At step 5 the system detects the Lead has not been processed yet.
B.2. The the system prompts the Lead with the appropriate message.

Alternative flow C:
C.1. At step 4 the system detects there is no such number.
C.2. The the system prompts the Lead with the appropriate message.

Alternative flow D:
D.1. At step 8 #any erros encountered when filling the (second) form by the Lead#

Use Case Name: close portfolio.
Participating Actors: Investor(Major).
Goal: close an Investor's portfolio.
Flow of Events (or basic flow activity diagram):
1. The Investor requests to close their portfolio.
2. The system notes the Investor's request.
3. The system checks Investor's portfolio ask/bid ops status.
4. The system removes Investor's record.
5. The system prompts the Investor the portfolio is now closed.

Alternate flows:

Alternative flow A:
A.1. At step 3 the system detects unfinished ask/bid operations in the portfolio .
A.2. The system prompts the user with the appropriate error message.

Use Case Name: submit ask or bid stocks op.
Participating Actors: Investor(Major), StockMarket(secondary).
Goal: submit investors requests to buy or sell stocks.
Flow of Events (or basic flow activity diagram):
1. The system asks the StockMarket for quotes.
2. The StockMarket responds to the systems request.
3. The system presents the received information from the StockMarket to the Investor.
4. The system presents a form asking for the following details for the transaction:
   bid or ask op, stock name, amount, limit price.
5. The Investor fills and submits the details elaborated at step 4.
6. The system receives Investor submission.
7. The system delivers the Investor's request to the StockMarket.
8. The StockMarket approves the receiving of the request.
9. The system receives the StockMarket approval and records the Investor's request.
10. The system prompts a success message to the Investor.

Alternate flows:

Alternative flow A:
A.1. At step 8 the StockMarket disapproves the request.

A.2. The StockMarket informs the system of the error.

A.3. The system prompts the Investor with the appropriate error message.

Use Case Name: compose advice.

Participating Actors: FinancialManger(Major).

Goal: advise Investors about attractive options in the stock market.

Flow of Events (or basic flow activity diagram):

1. The system asks the FinancialManger to enter an advice.

2. The FinancialManger submits an advice.

3. The advice is received by the system.

4. The system updates the advice and makes it available to all Investors.

5. The systems presents the FinancialManger the new advice has been updated.

Alternate flows:

Alternative flow A:

A.1.

Use Case Name: check advice.

Participating Actors: Investor(Major).

Goal: be adviced/informed by a proffesional.

Flow of Events (or basic flow activity diagram):

1. The Investor asks the system to show available advice.

2. The system gets the request.

3. The systems presents the advice.

4. The Investor responds that he got it.

Alternate flows:

Alternative flow A:

A.1 At step 3 the systems detects there is no advice available.

A.2 The system prompts the Investor with an appropriate message.

Use Case Name: create investor's report.

Participating Actors: Investor(Major), StockMarket(secondary).

Goal: compose reports regarding relevant Investor's data.

Flow of Events (or basic flow activity diagram):

1. The Investor asks the system to make a report.

4. The system receives Investor's request.

5. The system asks the StockMarket for quotes for each asset the investor has.

7. The StockMarket responds and the systems collects the response for further refinement.
6. The system also asks the StockMarket for each command issued who has the correct status
    to report its progress.
7. The StockMarket responds and the systems collects the response for further refinement.
6. The system prompts the composed information to the Investor.

Alternate flows:

Alternative flow A:
A.1. At step 5 the system detects the Investor has no available data.
A.2. The system prompts the Investor that there is no new information to show.

Use Case Name: compose report to charge fees.
Participating Actors: FinancialManger(Major).
Goal: be presented with a report of the fees that should be charged.
Flow of Events (or basic flow activity diagram):
1. FinancialManger requests the system for a fees report.
2. The system accepts the request.
3. The systems composes the report.
4. The system presents it to the FinancialManger, emphasising: the current date, joining date,
    bank account, bank name, Investor full name.

Alternate flows:

Alternative flow A:
A.1.At step 3 the system detects there is no fees to charge.
A.2.The system inform the FinancialManger with a special message.

1.5 Non functional requirements

**U**sability/**R**eliability/**P**erformance/**S**upportability

| Requirement name	Requirement type (U/R/P/S)
Processes are performed completely or not at all.	R
Precision is 2 digits after the decimal point.	R
The system will have help instructions - to some extent - to guide/help the Investor in each of the systems functions.	U
Any user who had previous experience in stock trading should be able to use our system without the any user help or manual.	U

2 System analysis

2.1 Dynamic model

Use case name: request open portfolio
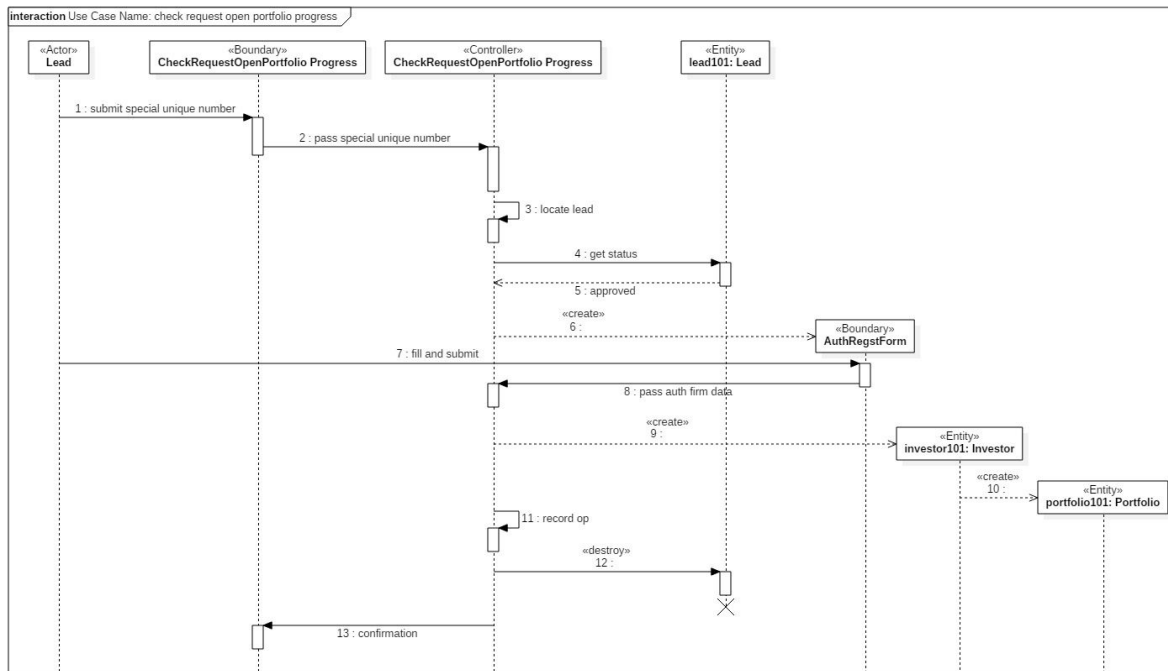
Sequence diagram:
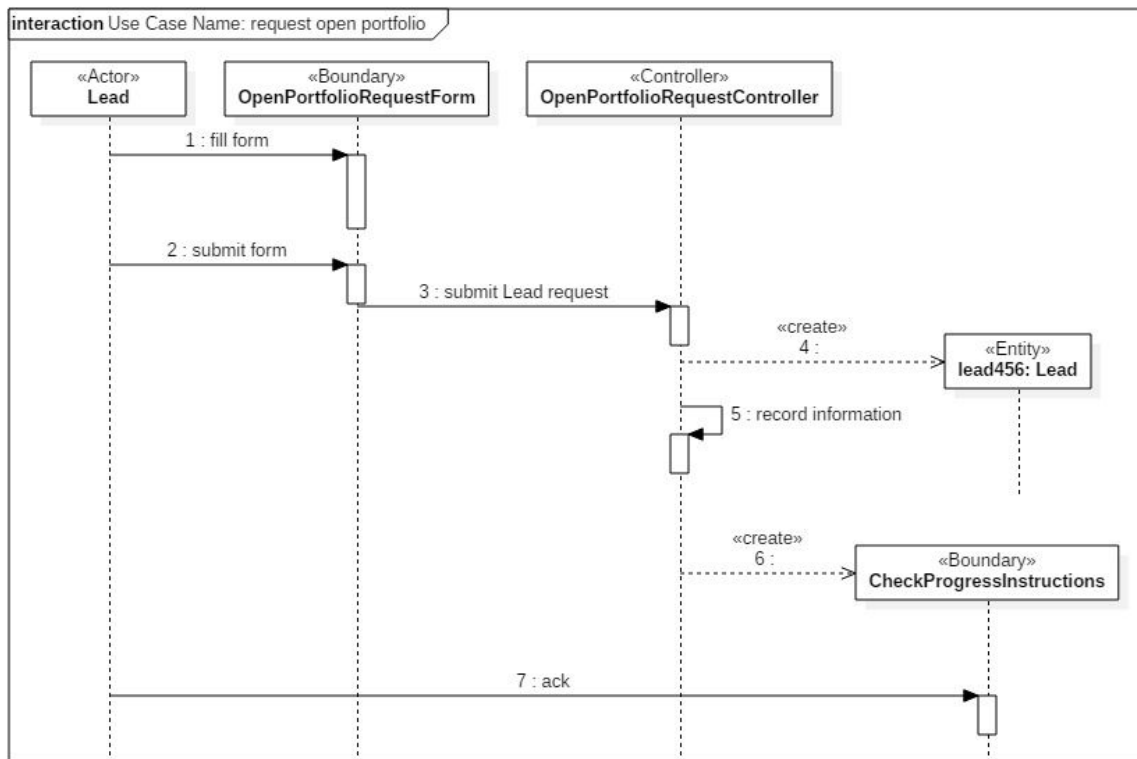
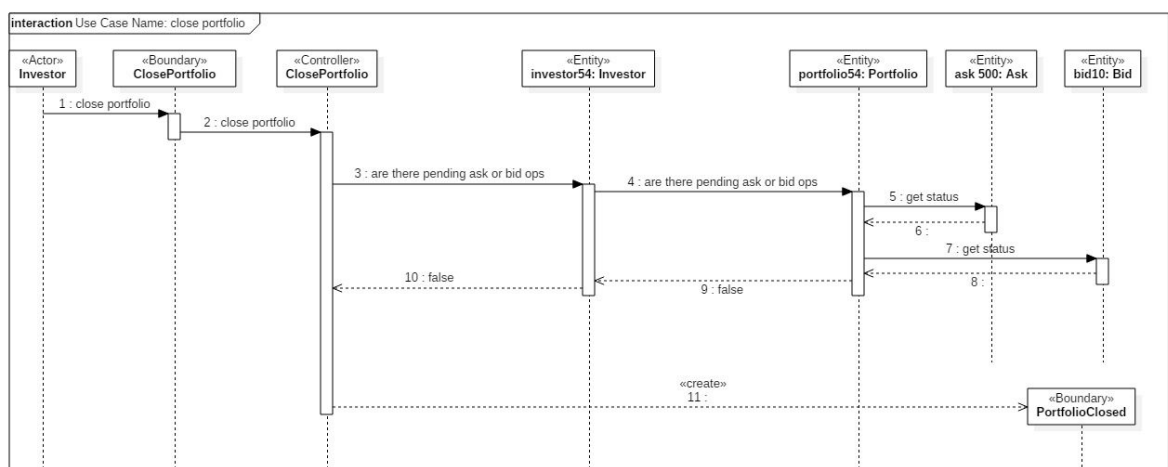**Use case name: open portfolio**

Sequence diagram:
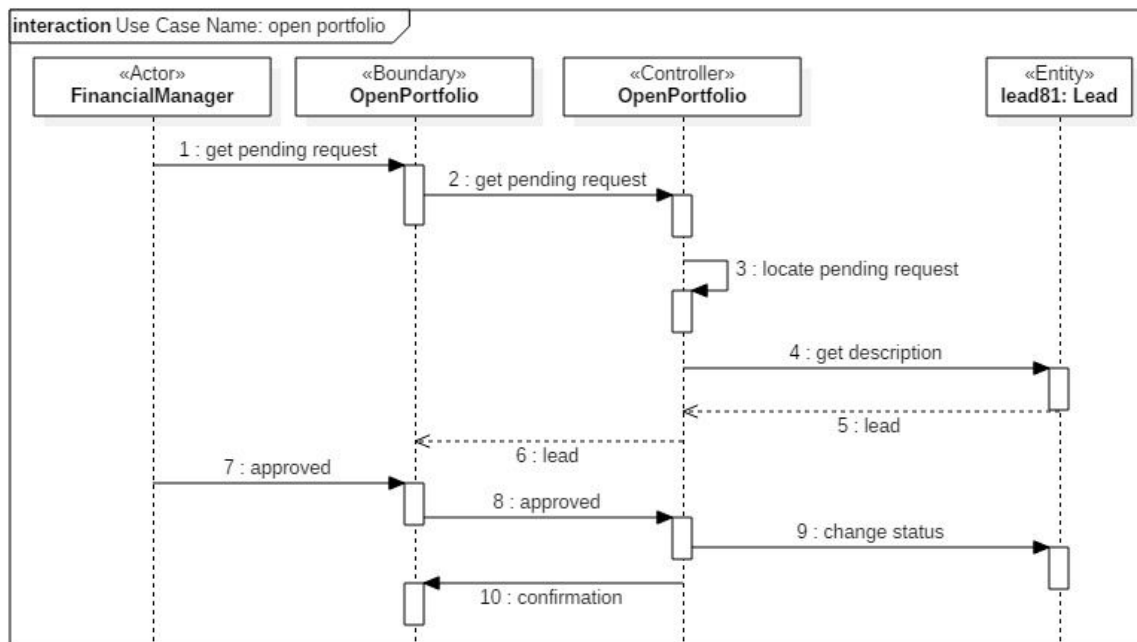
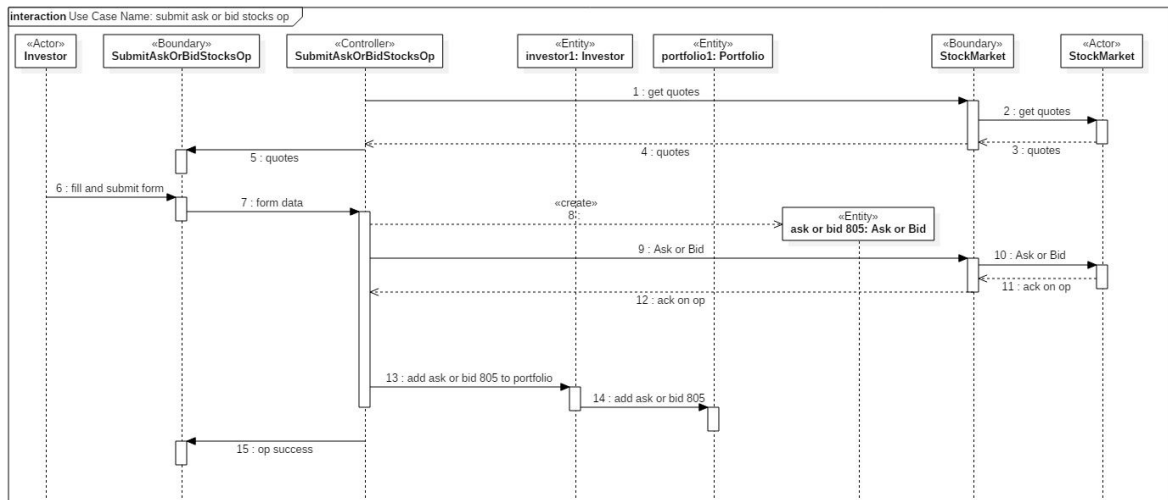**Use case name: check request open portfolio progress**

Sequence diagram:
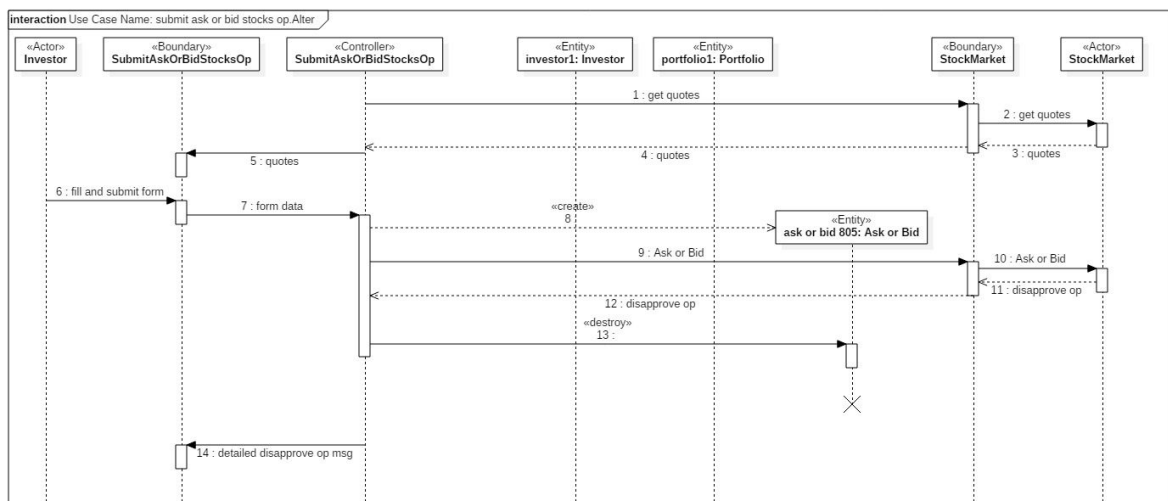
Use case name: close portfolio

Sequence diagram:

Use case name: submit ask or bid stocks op
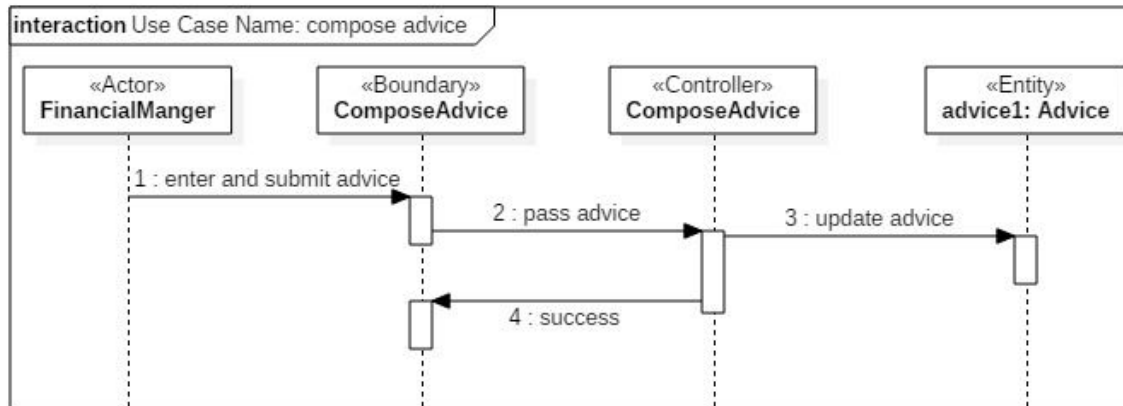
Sequence diagram:

interaction Use Case Name: submit ask or bid stocks op

| «Actor» Investor | «Boundary» SubmitAskOrBidStocksOp | «Controller» SubmitAskOrBidStocksOp | «Entity» investor1: Investor | «Entity» portfolio1: Portfolio | «Boundary» StockMarket | «Actor» StockMarket |

1 : get quotes
2 : get quotes
3 : quotes
4 : quotes
5 : quotes
6 : fill and submit form
7 : form data
«create»
8 :
«Entity» ask or bid 805: Ask or Bid
9 : Ask or Bid
10 : Ask or Bid
11 : ack on op
12 : ack on op
13 : add ask or bid 805 to portfolio
14 : add ask or bid 805
15 : op success

Alteranative:

interaction Use Case Name: submit ask or bid stocks op.Alter

| «Actor» Investor | «Boundary» SubmitAskOrBidStocksOp | «Controller» SubmitAskOrBidStocksOp | «Entity» investor1: Investor | «Entity» portfolio1: Portfolio | «Boundary» StockMarket | «Actor» StockMarket |

1 : get quotes
2 : get quotes
3 : quotes
4 : quotes
5 : quotes
6 : fill and submit form
7 : form data
«create»
8 :
«Entity» ask or bid 805: Ask or Bid
9 : Ask or Bid
10 : Ask or Bid
11 : disapprove op
12 : disapprove op
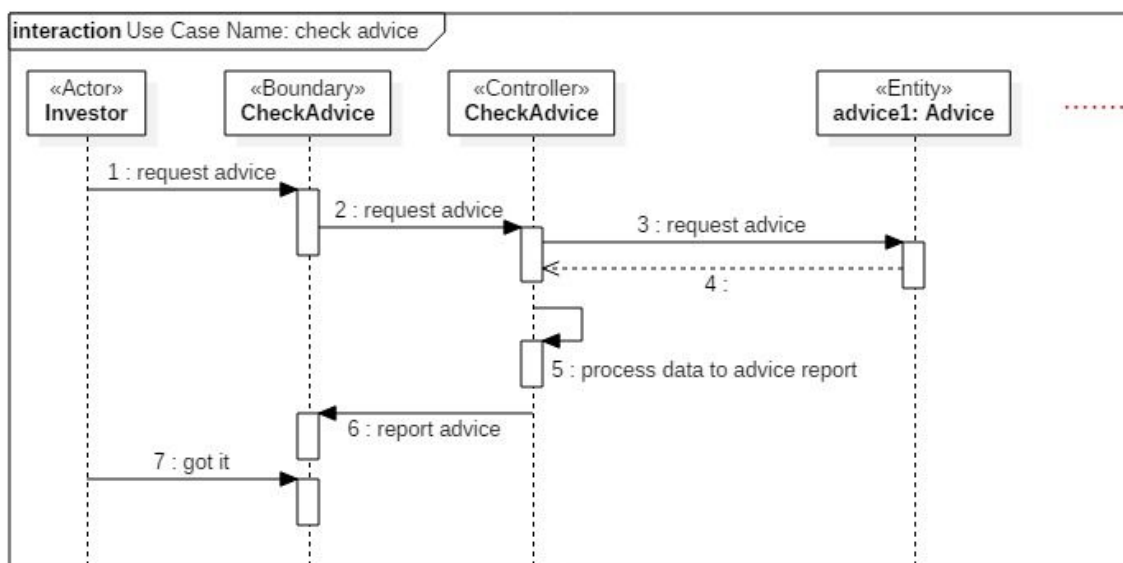«destroy»
13 :
14 : detailed disapprove op msg

Use case name: compose advice

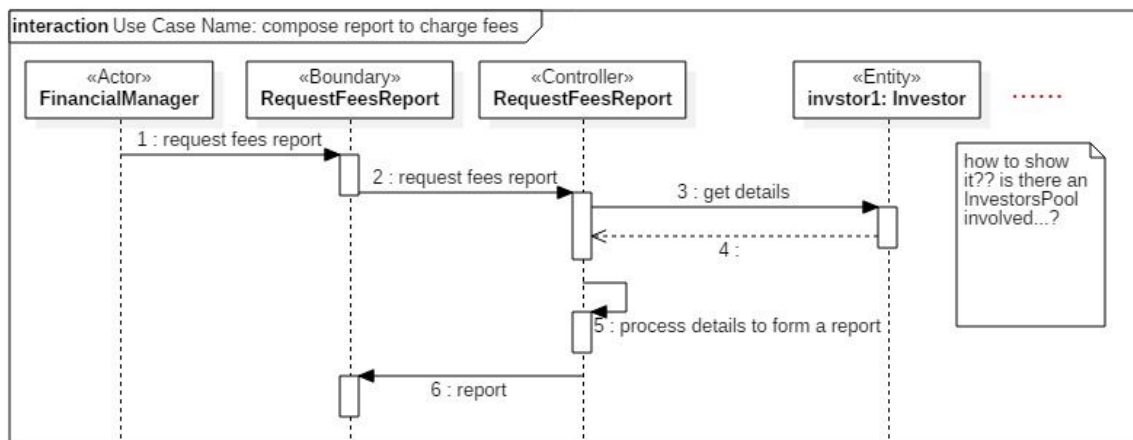Sequence diagram:

Use case name: check advice

Sequence diagram:

Use case name: create investor's report
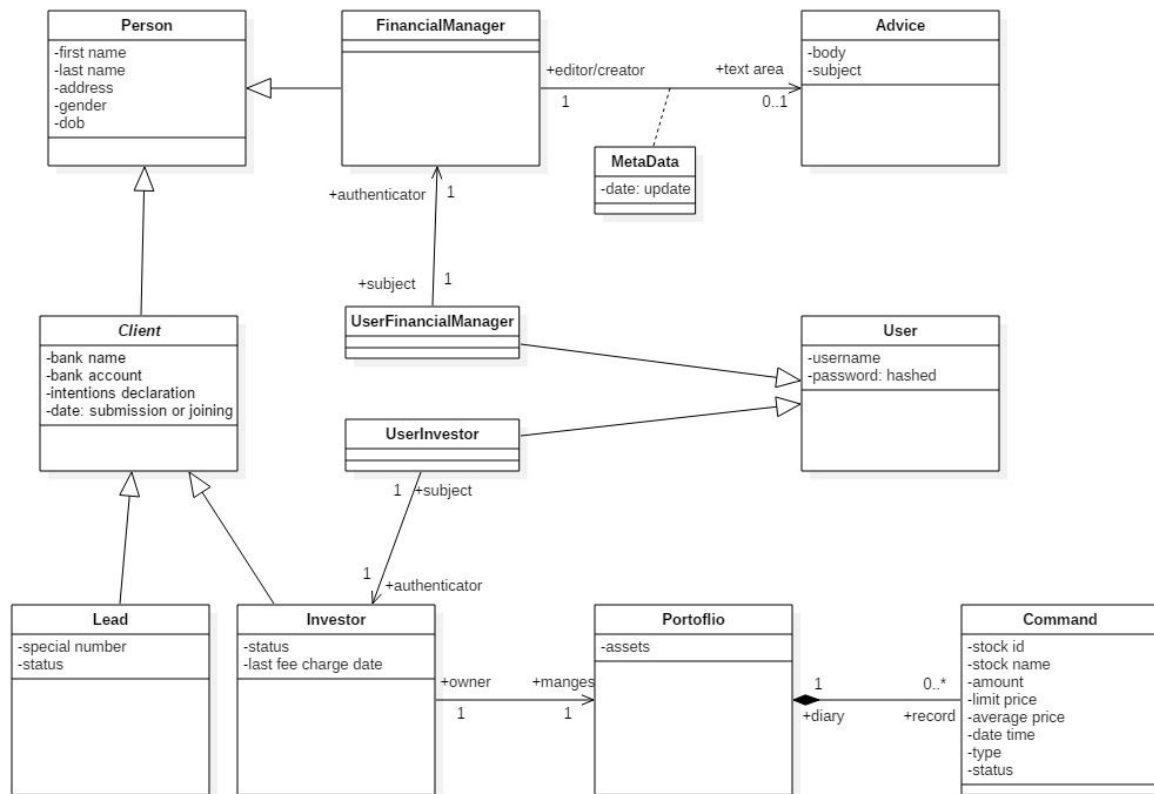
Sequence diagram:
/*
*
*
*
*
*
*
*
*
*
*
*
*/
Use case name: compose report to charge fees

Sequence diagram:

Person
-first name
-last name
-address
-gender
-dob

FinancialManager

+editor/creator   +text area

Advice
-body
-subject

1   0..1

MetaData
-date: update

+authenticator   1

+subject   1

UserFinancialManager

User
-username
-password: hashed

Client
-bank name
-bank account
-intentions declaration
-date: submission or joining

UserInvestor

1 +subject

1
+authenticator

Lead
-special number
-status

Investor
-status
-last fee charge date

+owner   +manges

1   1

Portoflio
-assets

1   0..*

+diary   +record

Command
-stock id
-stock name
-amount
-limit price
-average price
-date time
-type
-status

3 System design

3.1 Current system architecture

The current system based on physical actions involving in the trading process, i.e being present in the stocks hall at trading hours.
Because of this constraint, The system does not handle well with large number of investor.

The manual nature of the system's operations requires considerably large manpower for the purpose of managing the investment portfolios, and the process itself is cumbersome and difficult to manage.

Also we managed to find links on actual digital platforms:

link0

link1

link2

link3

link4

link5

link6

http://www.meitavtrade.co.il/tel-aviv-trading

http://tradeit.bizportal.co.il/best-trading-software/

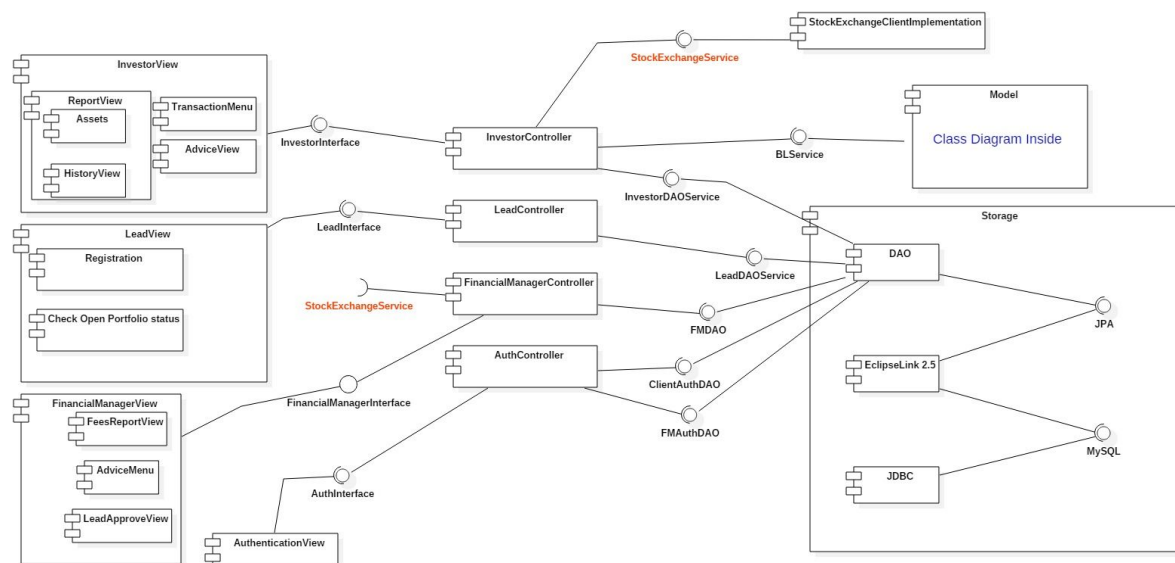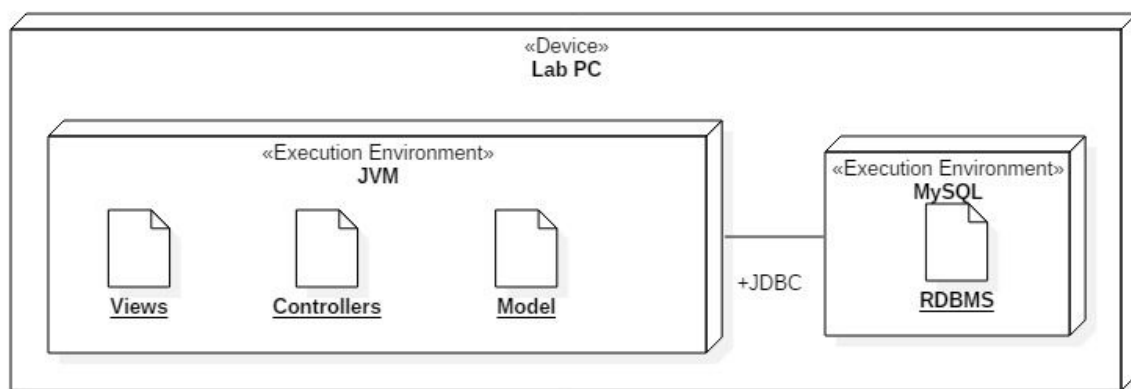https://www.megamot.co.il/tradingcoputer/

http://www.atrade.co.il/trading-platforms

3.2 Proposed system architecture

3.2.1 Subsystem decomposition

It should be a MVC architecture...

3.2.2 Hardware/software mapping

As we don't have any valued non functional requirements and it appears that we have in sufficient technical knowledge we assume nada.

For a demo App our gut feeling tells us that a 4-8 core pc with at least 2.3 Ghz and 3GB of RAM and at least 1GB of hard disk volume will do the job, this are the so called boundary conditions and the Demo may need much less in practice.

3.2.3 Persistent data management

The data we wish to store are objects and more specifically POJO entities. We chose to use an object relational persistence solution with ORM mechanism framework i.e. EclipseLink JPA with MySQL RDBMS in its base for the following reasons:

- we are short in time and we want a tool to deal with objects without the need to implement our own mapping and other related services including hands on SQL queries writing.

- this is a demo for a startup so development is quick and needs to serve only as an appetizer for potential investors.
- using an object relational persistence solution with ORM framework also allows to more easily translate class diagram logic into ERD logic with provided sugar syntax.
- although we consider using mongodb now available through EclipseLink JPA, we decided for now to stick to what we know.

3.2.4 Access control

Actor/Entity	Person	Client	Lead	Investor	FinancialManager	User	Portfolio	Transaction	Advice
Lead	CR	CR	CR	C	X	C	X	X	X
Investor	X	X	X	X	X	X	R	CR	R
FinancialManager	CR	X	X	R	X	X	R	R	CRUD
StockMarket	X	X	X	X	X	X	X	X	X
Time	X	X	X	X	X	X	R	U	X

C-Create, R-Read, U-Update, D-Delete

3.2.5 Boundary conditions

Use Case Name: Investment House Install
Participating Actors: System Administrator
Flow of Events (or basic flow activity diagram):
1. The system administrator installs clean operation system if one is not already installed.
2. The system administrator installs Java SE Development Kit 8 (JDK) or higher.
3. The system administrator configures financial managers usernames and passwords in the underlying db directly.

Alternative flow A:
A.1
A.2

Use Case Name: Client Install
Participating Actors: Lead, Investor as Client.
Flow of Events (or basic flow activity diagram):
1. The Client installs clean operation system if one is not already installed.
2. The Client installs Java SE Development Kit 8 (JDK) or higher.

Alternative flow A:
A.1
A.2

Use Case Name: Investment House startup
Participating Actors: System Administrator
Flow of Events (or basic flow activity diagram):
1. The system administrator runs an instalation program.

Alternate flows:

Alternative flow A:
A.1 There is an error running the App jar, the System Administrator contacts the App Support
    liaison

Use Case Name: Client startup
Participating Actors: Lead, Investor as Client
Flow of Events (or basic flow activity diagram):
1. The Client runs the App (jar).

Alternate flows:

Alternative flow A:
A.1 There is an error running the App jar, the Client contacts the Investment House Support

liaison

Use Case Name: Client shutdown
Participating Actors: Lead, Investor as Client.
Flow of Events (or basic flow activity diagram):
1. The Client presses the exit/logout option in his app view and waits for the app to close.

Alternate flows:

Alternative flow A:
A.1 The app does not close after pressing the exit/logout button.
A.2 There is an error running the App jar, the Client contacts the Investment House Support
   liaison

Use Case Name: error
Participating Actors: System Administrator
Flow of Events (or basic flow activity diagram):
1. The system detects an error.
2. The system collects all the information on the error to a log file.
2. The system recovers from the error and resume normal state.

Alternate flows:

Alternative flow A:
A.1 The system cannot recover from the error.
A.2 The system collects all the information on the error to a log file.
A.3 The log file is sent to the system Administrator.
A.4 The system will initate a restart phase trying to minimize persistency damages.

X. Glossary

Term	Description
Portfolio	A collection of investments owned by an investor. You can have as little as one stock in a portfolio to an infinite amount of stocks.
Quote	Information on a stock's latest trading price.
Stock/Security	
Ask	This is the quoted ask, or the lowest price an investor will accept to sell a stock. Practically speaking, this is the quoted offer at which an investor can buy shares of stock; also called the offer price.
Bid	The price a potential buyer is willing to pay for a stock/security.
Offer	Indicates a willingness to sell at a given price.
Investment house	
Trading hall	
Lead	Potential investor, potential user of the digital platform.
Stock broker	
Startup	
Install	
Shutdown	
Error	
System Administrator	Is not an actor, he is an IT personnel in charge on all system aspects for example he is responsible for all financial managers work posts.