

Requirement Document

Team 29



University of Sussex

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| Functional Requirements: | | | |
| References | User Requirement | System Requirement | Type |
| F1 | A client may determine the level of risk that is appropriate for their gross investment | The percentage of risk available to the client’s investment shall be set on a | Mandatory |
| F2 | Has an expectation on the level of financial return on their investment over time | The client’s financial return shall be generated including the current investment, start date and to date, and percentage of return. | Mandatory |
| F3 | A client will wish at any point in time to be advised of the total net worth of their investments | A 15-minute total net worth of client’s investment shall be calculated. | Mandatory |
| F4 | The total net worth of a company is determined by the total value of its shares at any point in time | A 15-minute total shall be calculated and generated on the interface. | Mandatory |
| F6 | Over the course of one calendar year, starting from 1 January 2017 until 31 December 2017, trading will take place on each working day (Monday through Friday inclusive) during that year. The stock market is closed on Saturdays and Sundays, and on Christmas Day, Boxing Day, Good Friday and Easter Monday. | The system shall use Georgian calendar.  The simulation shall stop on 31/12/2017  The market shall be closed on the weekends, Christmas day, boxing day, good Friday and Easter Monday. | Mandatory |
| F7 | All share values remain static when the stock market is closed. | Share values shall remain static when the market is closed. | Mandatory |
| F8 | The stock market opens at 9:00AM every day, and closes at 4PM. | The market shall be open from 9Am every day and closes 4PM. | Mandatory |
| F9 | Clients will each start the simulation with a set amount of cash and share assets. | The system shall use a spreadsheet document to store initial cash and share assets.  The system shall be able to read CSV file extension as this is the spreadsheet extension. | Desirable |
| F10 | Each client is assigned to one of the traders. | Each client joining the company shall be assigned to an available trader. | Desirable |
| F11 | We will work in 15-minute trading cycles | The system shall use GMT time.  The system shall update the graph and trading information every 15 minutes. | Mandatory |
| F12 | Random traders must be designed to take into account the assets of their clients. So, they cannot buy stock for a client using money that the client does not have. | The system shall only allow traders to trader within the client’s assets.  The client asset shall be records in the spreadsheet file. | Mandatory |
| F13 | The random trader will have been assigned a number of clients and will this have access to existing share portfolios and cash assets and will use these to make trades. In any one 15-minute period of the simulation, each random trader will attempt as a rough guide, to trade around 1% of the assets available to it. | The system shall store and show the clients asset every 15 minute and trading limit should be updated.  The random traders shall be allowed to trade around 1% of their assets available. | Mandatory |
| F14 | In the balanced mode, for any 15-minute simulation period, the random trader will choose random stocks up to the value of 1% (where the value between 0 and 1% is chosen at random) of its current available assets and put them up for sale on the exchange. Similarly, it will choose stocks to the value of between 0 and 1% of its current asset wealth and try to buy them from the trading exchange.  In the aggressive purchaser mode, for any 15-minute simulation period, the random trader will try to purchase random stocks to a value in the range 0 to 2% of its current available assets. It will only try to sell random stocks up to the value of 0.5% of current asset wealth.  In the aggressive seller mode, for any 15-minute simulation period, the random trader will choose random stocks up to the value of 2% of its current available assets and put them up for sale on the exchange. It will only try to purchase up to 0.5% of its current asset wealth in stocks from the trading exchange. | The system shall have two entities for random each seller at each mode. The first entity will be the percentage they are able to put on the market and the second entity is the percentage amount they are able to purchase.  The system shall only allow between 0 and 1% of client’s asset to be put on the market when the trader is in a balanced mode.  The system shall only allow between 0 and 1% of client’s asset to be bought on the market when the trader is in a balanced mode.  The system shall only allow between 0 and 2% of client’s asset to be purchased on the market when the trader is in an aggressive purchaser mode.  The system shall only allow up to 0.5% of client’s asset to be sold on the market when the trader is in an aggressive purchaser mode.  The system shall only allow up to 2% of client’s asset to be purchased on the market when the trader is in an aggressive seller mode.  The system shall only allow up to 2% of client’s asset to be sold on the market when the trader is in an aggressive seller mode.  The way a random trader knows how much they can sell and how much they can buy will be displayed on the screen in two-text field. This will be calculated and updated every 15 minutes as a trader can earn money and the percentage they can sell and buy will be different. Therefore, an up to date figure will be available every 15 minute. | Mandatory |
| F15 | If the share value of a company reaches 0, the stock of the company is worthless and may no longer be traded. | The systems shall disallow the company to trade when hourly-generated shares total reach 0 then the system/programme will be to a halt and be declared as worthless. | Mandatory |
| F16 | Currently, traders may only buy and sell shares that are entrusted to them by their clients. | The system should only allow shares to be bought and sold by traders for their assigned client. | Mandatory |

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| Non-Functional Requirements: | | | |
| References | User Requirements | System Requirements | Types |
| NF 1 | Any individual traded company will only ever issue a fixed number of shares. | The system shall only issue a fixed number of shares | Mandatory |
| NF 2 | Ensure that the sales and purchases are precisely balanced so ensure that shares do not go missing. | The sales and purchases shall be balanced using the shares purchased and shares sold formulas. | Mandatory |
| NF 3 | A random trader component: A trader that will buy and sell shares on a random basis the simulation will need to be able to accommodate any number of random traders. | The random trader shall be able to buy and sell shares.  The simulation shall be able to have any number of random traders. | Mandatory |
| NF 4 | An intelligent trader component: A trader that adopts some kind of more strategic approach to the buying and selling of shares, and that will hopefully (although it’s not guaranteed) to outperform the random traders. The intelligent trader component may utilise any reasonable approach you deem appropriate to perform its task including, although not limited to, rule based systems, finite state machines, machine learning or any other Artificial Intelligence approaches you can think of. | The intelligent trader shall have the random generator characteristics and then additional skills for trading. | Desirable |
| NF 5 | A means of uploading initial data: to get the simulation started you will need a means of initialising it with data on clients and their worth, the traded companies that exist on the trading exchange and their current share price. This data will be provided to you in the form of a set of one or more Excel spreadsheets | The simulation shall use the Excel document provided to us which contains the traded companies, clients and their worth.  The data shall be used to start the simulation. | Mandatory |
| NF 6 | A means of monitoring the performance of the simulation: including the current share price, an indication of whether it is currently a bull or bear market, and the value of the clients’ current worth. | The system shall have space which displays up to date information for the current share price, bull or bear market and the clients detail including the clients current worth. | Mandatory |
| NF 7 | Supply and demand is the general economic principle that causes share prices to rise and fall. The principle is simple:  • Where demand exceeds supply, share prices rise.  • Where supply exceeds demand, share prices fall.  • Where demand is matched to supply, share prices remain stable. | The share prices shall rise when demand exceeds supply.  The share price shall fall when supply exceeds demand.  The share prices shall remain stable when demand is same as supply. | Mandatory |
| NF8 | Shares can only be bought and sold in integer units, so sensible rounding will need to be applied. | Shares shall be rounded to 2 decimal places when bought or sold for each individual share.  The shares purchased shall be calculated suing the provided formula. | Mandatory |
| NF9 | If there is a net over-supply for a stock, then all orders can be satisfied, but not all sellers will be able to sell their stock. In that case, we determine how many shares will be sold by each trader as follows: | The system shall use the formula to calculate the shares sold. | Mandatory |
| NF10 | Once the trades are made, then the share prices are updated. If a share was subject to over demand, the share price will rise for the next simulation period according to: | The system shall update the share price when trades are made.  The price should rise for the next simulation period when share is an over demand.  The formula shall be used to calculate the increase in share price. | Mandatory |
| NF11 | If a share price was subject to over-supply, then the share price will fall for the next simulation period according to: | In accordance to each simulation period, the decrease in share price will be equivalent to excess supply of share into current share price per each number of shares.  The system shall update the share price when trades are made.  The share price shall fall for the next simulation when share price is over supply.  The decrease in share price should be calculated using the formula. | Mandatory |
| NF12 | There must be at least two random traders in operation as otherwise no actual trading can take place. | -The system shall have minimum two random generators.  -The system shall check for minimum 2 random traders before allowing trading to commence. | Mandatory |

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| Domain Requirements: | | | |
| References | User Requirements | System Requirements | Types |
| D1 | part intended as a game application | The system shall be able to be developed in the future without the re write of all of the classes. The system shall be imported in to other classes and used as a library. | Desirable |

Testing Strategy:

1. Unit Testing - We will test the methods against the requirements document and reasonable input parameters to ensure that the requirements have been met.
2. System Testing – We will test the system as a whole against the user requirements to ensure all required functionality of the system is provided.

The system shall use the Java language to implement the simulation and the GUI design. The system will use JFreeChart to implement the graph of the market. There will no use of database modelling and data will be stored in memory.