# System Analysis and Design Part 1

## Overview

You are required to develop a **design** for a “Trade Generator” system. This system allows internal portfolio managers to generate buy and sell orders which are placed in the stock market.

**Your goal is develop a system** **design**. This should include:

* A relational data model, targeting SQL Server. This should include data types and constraints.
* A class diagram showing classes, properties and method definitions.
* A description of how you would implement this in .NET C# web solution and what technologies you would use. This might include a description of how data is accessed and saved, how business rules are implemented and how state is maintained.
* Any design patterns used
* A list of any third party components or libraries you would use (if any).

This system will be added as a module to an existing system, so you can assume users are already authenticated and have a unique User ID (numeric value).

**You can submit your solution as a Word document, or a Visual Studio project or both.**

**This task should take approximately 1 to 2 hours to complete.**

## Domain Definitions

### Security

A security is a financial instrument traded on the stock market. For example, the shares in Microsoft are a security.

### Ticker

This is a unique symbol used to identify securities and is usually less than 50 characters long. For example, the ticker for Microsoft is “MSFT US Equity”.

### Position

A position is a quantity held in a security. For example, if 1000 shares in Microsoft are bought, then a position of 1000 shares is created. If an additional 2000 shares are subsequently bought, then the position becomes 3000 shares.

### Portfolio

A portfolio is a collection of open positions. An “open” position is any position with a quantity not zero.

### Trade

A trade is a buy or sell transaction in a security.

### Long / Short

A “long” position is a position with a positive quantity.

A “short” position is a position with a negative quantity.

A “long” trade is either:

* A buy trade initiating or increasing a “long” position quantity.
* A sell trade reducing a “long” position quantity.

A “short” trade is either:

* A sell trade initiating or decreasing a “short” position quantity
  + Example:
    - Current short position = -1000 Microsoft
    - Trade = Sell 2000 Microsoft
    - Current short position after trade = -3000 Microsoft
* A buy trade increasing a “short” position quantity
  + Example:
    - Current short position = -1000 Microsoft
    - Trade = Buy 1000 Microsoft
    - Position becomes zero

### Position Value

This is the market value of the position.

Examples:

The current share price of Microsoft is $55 US Dollars.

For a long position of 1000 Microsoft shares, the position value is 1000 x $55 = $55,000 US dollars. With an exchange rate of $1 US dollar = 0.75 Australian dollar, the position value = $73,333 Australian dollars.

For a short position of -1000 Microsoft shares, the position value is -1000 x $55 = -$55,000 US Dollars.   
With an exchange rate of $1 US dollar = 0.75 Australian dollar, the position value = -$73,333 Australian dollars.

### Net Asset Value

This is the sum of all position values in the portfolio.

## Users

* Portfolio Managers.

## Use case

* The user is presented with a list of portfolios they have access to.
* The user selects a portfolio.
* The user is presented with a screen showing a summary of their portfolio and their current open positions.
* The portfolio summary shows
  + The current total Net Asset Value (NAV) in Australian dollars
* The position list shows
  + For each position
    - The security name (Example: “Microsoft”)
    - The security ticker (Example: “MSFT US Equity”)
    - Type of position (“Long” or “Short”)
    - The most recent security price (Numeric, example: 55.00)
    - The current quantity held (Numeric)
    - The current weight (Percentage, can be positive or negative)
  + Each line has a unique security ticker
* The user can choose to
  + Increase a position size (increase weight)
  + Decrease a position size (decrease weight)
  + Open a new position
    - When opening a new position, the user must enter the Ticker as well as the weight.
  + Close a position (reduce to weight to zero)
* When creating a new position or changing the weight of position, the user must always enter a trade price. This can be a money value or “At Market Price” (which means execute the trade at what the current price is).
* When the user has finished making changes, the user submits the changes and the system generates trades which are recorded in the database and sent as an Excel file to the user and also other users who have been configured to receive the trade files. Each trade has the following attributes:
  + Trade date and time (Example: “July 1, 2016 3:12PM”)
  + Security ticker (Example: “MSFT US Equity”)
  + Trade Type (“Buy Long” or “Sell Long” or “Sell Short” or “Buy to Cover”)
  + Quantity (Example: 2000)
  + Trade Price (Example: $55.00)
    - If Trade Price is “At Market Price”, then record “At Market Price”
  + Total trade value in the currency of the security (Example: $USD 110,000)
    - If Trade Price is “At Market Price”, then total trade value = “Market Value”
  + Total trade value in Australian dollars (Example: $AUD 146,666.67)
    - If Trade Price is “At Market Price”, then total trade value = “Market Value”
  + Portfolio Identifier (Example: 1232)
  + Portfolio name (Example: “ABC Portfolio”)

## Business Rules

* A portfolio can be of type “Long” or “Short”.
  + A “Long” portfolio can only have “Long” positions and will have a positive NAV
  + A “Short” portfolio can only have “Short” positions and will have a negative NAV
* A trade can only be done on a security that exists in the system.
* Once a trade is submitted it cannot be altered except by a system administrator.
* A portfolio can be owned by one entity (an entity is a corporate body like a company).