Project Phase III Report

On

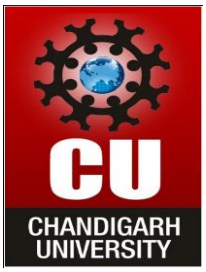
Advanced algorithmic trading system

Submitted for the requirement of

Project course

BACHELOR OF ENGINEERING

COMPUTER SCIENCE & ENGINEERING



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ABSTRACT

Algorithm trading is all about the use of computers programs to automate one or more stages of the trading process: pre trade analysis (data analysis), trading signal generation (buy and sell recommendations), and trade execution. Today, Algorithmic trading is amongst the most talked about technologies in the recent years. It has given trading Firms more power in the rapidly evolving markets by eliminating human errors and changing the way financial markets are interlinked today. Its usage is credited to most markets and even to commodity trading.

For this project we will use python and machine learning. Machine learning models are becoming increasingly prevalent in algorithmic trading and investment management. The spread of machine learning in finance challenges existing practices of modelling and model use and creates a demand for practical solutions for how to manage the complexity pertaining to these techniques. Python has become a preferred choice for trading recently as Python is open-source and all the packages are free for commercial use. Python has gained traction in the quant finance community. Python makes it easy to build intricate statistical models with ease due to the availability of sufficient scientific libraries.

The process to retrieve, format and use data is an essential part of trading using Python, as without data there is nothing we can go ahead with. Financial data is available on various online websites. This data is also called as time-series data as it is indexed by time (the timescale can be monthly, weekly, daily, 5 minutely, minutely, etc.). Apart from that, we can directly upload data from Excel sheets too which are in CSV format, which stores tabular values and can be imported to other files and codes.

After that at the end we will have to do Backtesting. Backtesting a trading strategy is the process of testing a trading hypothesis/strategy on the historical data. Let's say we formed a hypothesis. This hypothesis states that securities that have positive returns over the past one year are likely to give positive returns over the next one month. By using historical data, we can backtest and see whether our hypothesis is true or not. It helps assess the feasibility of a trading strategy by discovering how it performs on the historical data. If we backtest our strategy on the historical data and it gives good returns, we will be confident to trade using it. If the strategy is performing poorly on the historical data, we will discard or re-evaluate the hypothesis.

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Feature / Characteristics Identification

1. Objectives –

- The main objective of algo-trading is not just to profit by trading but to save costs, minimize market impact, and the execution risk of a trading order. Traders don't need to watch stocks or send slices manually.

- Algorithmic trading is mainly used by institutional investors and big brokerage houses to cut down on costs associated with trading. Typically, market makers use algorithmic trades to create liquidity.

- Algorithmic trading also allows for faster and easier execution of orders, making it attractive for exchanges. In turn, this means that traders and investors can quickly book profits off small changes in price.

- Algorithmic trading can also be used for high frequency trading (HFT) or quant-based trading.

2. Single Entity –

This project is the result of the dedicated and combined effort of the whole team. Everything, from drafting the project to implementing it, is attributed to the hard work of the team.

3. Life Span –

It has a long term life span, as software requires smooth management of the things. This project is divided into four phases: first phase i.e. requirement gathering includes the collection of data that can be done within 10 days, second phase i.e. planning phase can consume about 10 days. Writing the main code, implementation and removal of bugs will nearly take 5 days.

4. Life Cycle –

Each project has a life cycle with different stages like start, growth, maturity, and decay. A project has to pass through different stages to get it completed. Let's consider an example where the project is related to software development then you can say SDLC (Software Development lifecycle) will be the life cycle of the project where you will see many stages like planning, defining, designing, building, testing, and deployment, etc.

5. Team Spirit –

Team spirit is required to get the project completed because the project constitutes different members having different characteristics and from various disciplines. But to achieve common goal harmony, missionary zeal, team spirit is necessary.

6. Risk and uncertainty –

Risk and uncertainty are synonymous with projects. No matter how prepared we think we are there are always risk lurking. So, the best thing to do is to have a concrete idea relating to the project. It will reduce the risk by a large amount because when everything is already prepared then the risk of it going wrong is substantially less.

7. Flexibility –

We believe in "everything is constant except change" philosophy, our ideas are constantly evolving to make the best ever product. We are not rigid regarding our ideas and think the only way to move forward is through making changes.

8. Sub- Contracting –

A subset of every project and without which no project can be completed unless it is a proprietary firm or tiny in nature. The more complexity of a project the more will be the extent of contracting. Every project needs the help of an outsider consultant, engineer, or expert in that field. Our project supervisor and co supervisor were quite helpful in giving us suggestions to make our project look appealing and had also helped us whenever we faced any difficulty.

9. Cost –

Algorithmic Trading is basically a software development project, so the cost was minimal as only laptops were required in the name of hardware and rest was mainly focused on coding. The time was the major factor in our project and not the cost.

Constraints Identification

Constraints are infamous among us as they take away our freedom through removing several options. They are the set of rules imposed on us. But looking on the bright side, it is the constraints that lead us to find smart solutions with a blend of creativity and innovation. As a fundamental part of design, constraints can open the doors of many opportunities in the unforeseen trajectory. In a way, proper understanding and implementation of constraints will help you improve the usability of the software with minimal code error. Such software can engage more users through a more effective experience.

Here are some constraints that were there while designing the software:

1. Time –

It has a long term life span, as software requires smooth management of the things. This project is divided into four phases: first phase i.e. requirement gathering includes the collection of data that can be done within 10 days, second phase i.e. planning phase can consume about 10 days. Writing the main code, implementation and removal of bugs will nearly take 5 days.

2. Cost –

The budget here is a very rough estimate and pushed to the extreme so we do not run out of funds when we actually commit to the project. The cost estimate will depend upon the work of project and the staff. There is no extra hardware cost are required, the only requirements are a windows based platform, machine learning and a python supporting software.

3. Scope –

Although I still hate algorithmic trades for because we're hit quite a few times, I must agree that it has a bright future. Speed is important for fills more than often. Also, man made indicators almost always lag. And, gradually Artificial intelligence (AI) and machine learning will gradually work. At this stage, I am not sure if they can completely replace regular indicators but, I am more than sure that they will make room for themselves in not too distant a future. Indian markets are no exception or isolated and technology nowadays does move fast due to globalization.

4. Quality –

This project ensures that the user has good user experience .

5. Benefits –

There are many benefits to algorithmic trading, especially in instances where trades are executed within the shortest time possible. The following are some of the key benefits of algo-trading.

- Ability to Remove Human Emotions from the Market
- Accuracy in Trading
- Ability to Place Multiple Trades Under Fast Speeds
- Ability to Back Test
- Reduced Transaction Costs
- High Frequency Trading
- Increased Market Volume
- Short Term Traders

Analysis of features and finalization subject to constraints

Algorithmic trading is a concept that employs advanced mathematical tools to facilitate and forecast transaction decisions in the financial trading markets. In this trading system, we use algorithmic trading software to do the trading, and the decision-making timings are swift as the requirement for human intervention is removed.

Following are some of the top features of algo trading:

Markets and Instruments :

Many algo trading platforms and software support various instruments and markets to offer you a massive range of trading strategies. A good platform will also have standard market access support so that you can connect to new markets. And the open, modular architecture can permit you for easy integration with financial institutions' systems.

The Feature to Develop a Strategy:

With algorithmic trading, you will find several useful features to help you form and test any quantitative trading strategies in any market, such as shares, commodities, forex, futures, cryptocurrencies, and bonds.

Complete Automation :

An algorithmic trading platform is overly technical, and since it is completely automated, it can help you remove an hour of manual human labor. It saves you valuable time and keeps your work streamlined.

Proper Security :

Good algorithmic software will have a set of safeguards and warnings against most general human error. It will also have a configurable set of restrictions and protection mechanisms on the server. Similarly, you may also find an extensive, configurable alerts system in the trading software.

User Interface and Reports :

When you use any reliable algorithmic trading software, you will experience various custom management and reporting features in algo trading to go well with your operations. Also, when you have an intuitive user interface, you can flawlessly do algorithmic trading.

High Accessibility and Performance :

Algo trading is a powerful and reliable system as it is constructed on a memory-efficient, highly concurrent, and multi-threaded architecture. It results in a good level of performance and availability.

Efficient Execution of Trades :

The right algo trading platform has an efficient execution strategy that will ensure you do not slip any trading opportunity, and it even reduces your pending orders. After all, if you execute the trade slowly, it can turn out to be disruptive for you in terms of profits.

Reliable :

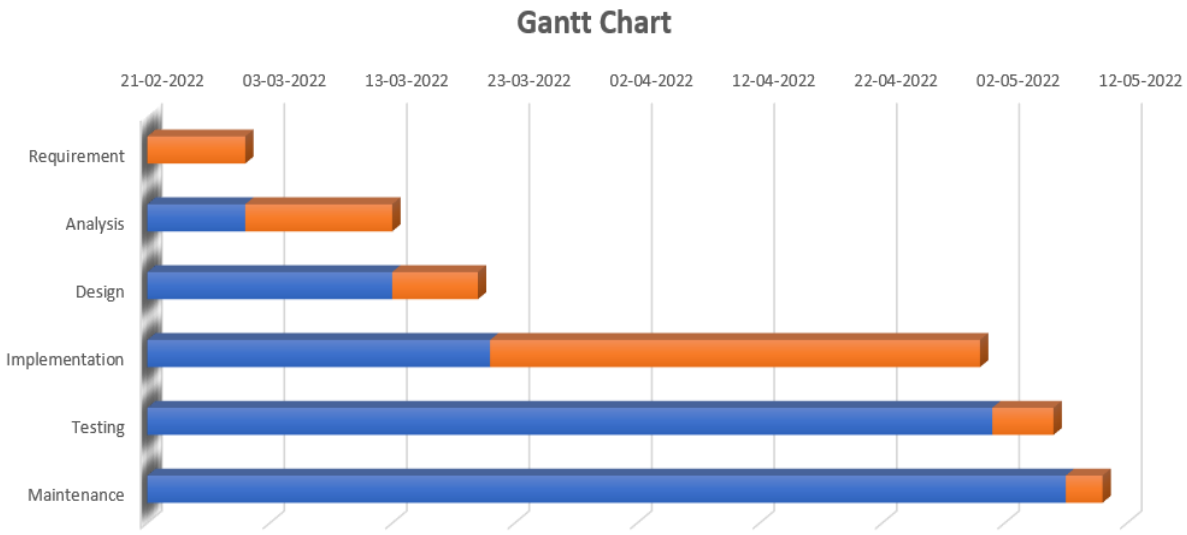
Algorithmic software will offer you complete reliability once you start using it. While you develop algorithmic strategies, you can be sure that you execute them most productively. After all, good algorithmic software for trading is constantly tested by professionals to ensure that users (you) do not experience any doubts about anything.

Easy to Use :

Once we use professional and good algorithmic software for trading, you will experience no hurdles. Good software is always easy to use, and you do not even need to get into coding. The feature of ease in algorithmic software makes it a favorite of contemporary age traders.

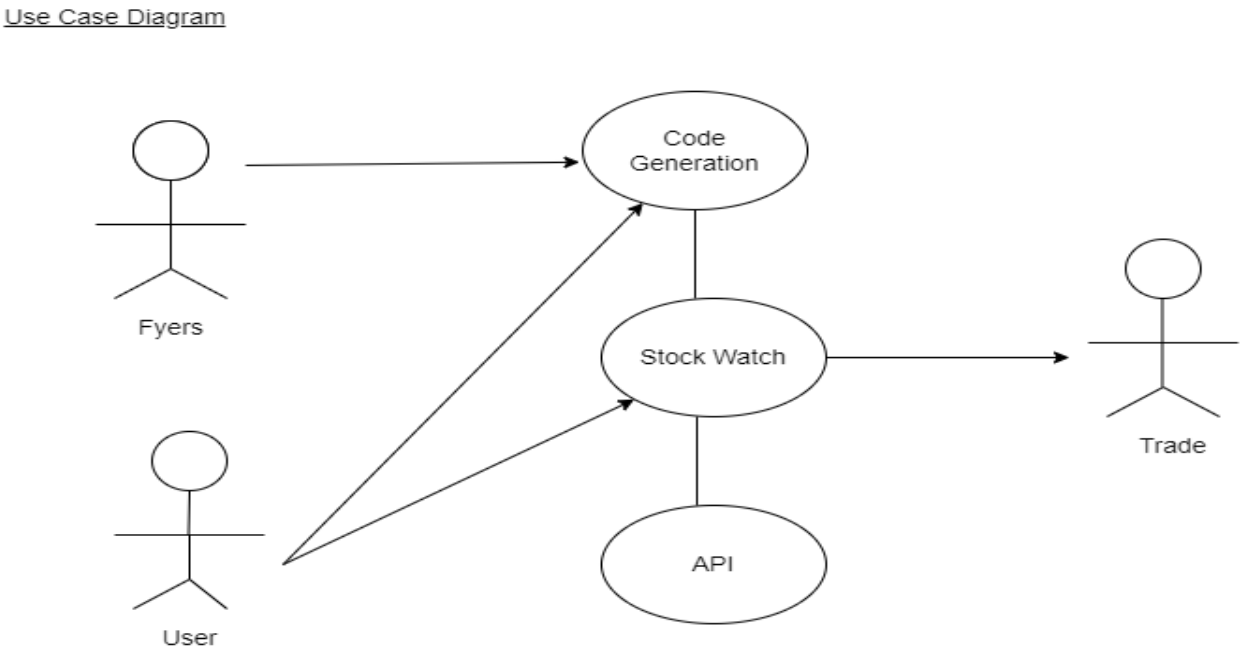
Design Selection

- **Gantt Chart:**



	Maintenance	Testing	Implementation	Design	Analysis	Requirement
Start Date	07-05-2022	01-05-2022	21-03-2022	13-03-2022	01-03-2022	21-02-2022
Duration (days)	3	5	40	7	12	8

- **Use Case Diagram:**



- **DFD LEVEL – 0 :**

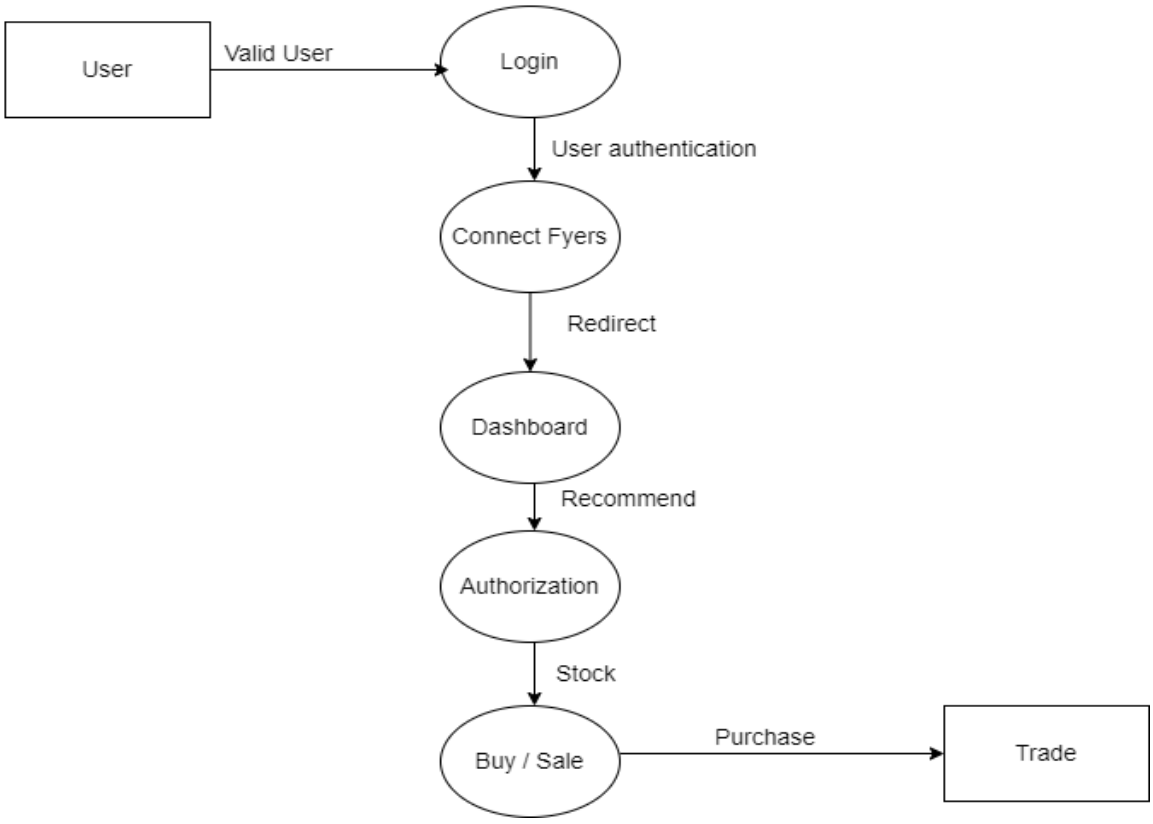
DFD

LEVEL - 0

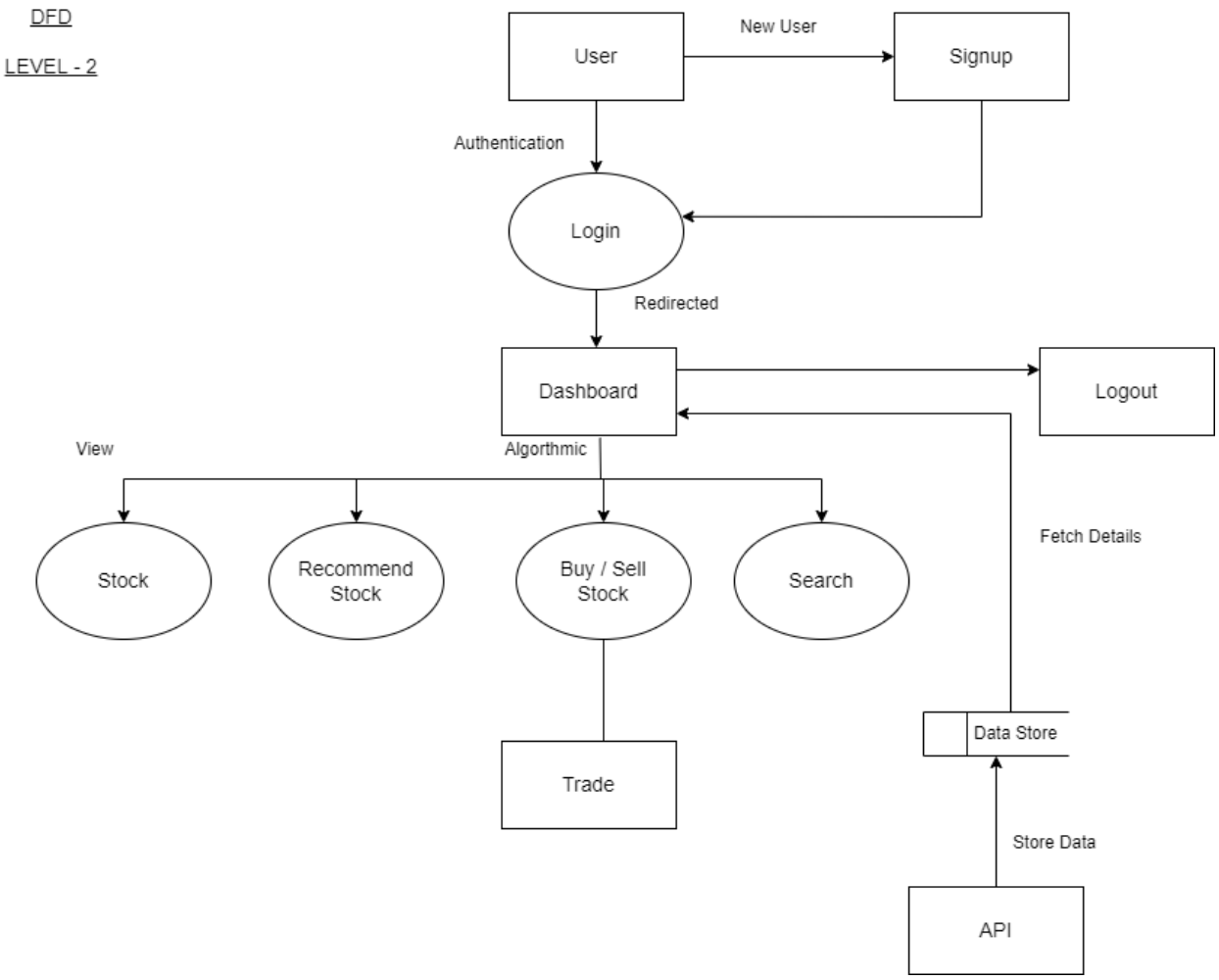
- **DFD LEVEL – 1 :**

DFD

LEVEL - 1



- **DFD LEVEL – 2 :**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LEVEL - 2
User
New User
Signup
Authentication
Login
Redirected
Dashboard
Logout
View
Algorthmic
Stock
Recommend Stock
Buy / Sell Stock
Search
Fetch Details
Data Store
Trade
Store Data
API

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