

FTEC3002 Introduction to Financial Infrastructures

# *Eduvestment:*

## **Smart Solution for Investment**

Project Report

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## Executive Summary

We observe the difficulty in starting an investment journey among young adults. Those who lack investment knowledge and only have small amounts of savings are reluctant to enter financial markets. Traditional banking industries and fintech companies have developed several solutions to this pain point, including attracting young investors with funds of no lock-in period and low-cost robo-advisory services. However, according to our research on existing products, these solutions have their different focuses but are not comprehensive. Targeting at this potential market, we propose our innovative solution *Eduvestment* as a one-stop platform providing a credible and consolidated education for young adults. Our platform can function as a built-in section in Virtual Banks, which is expected to deliver more banking and financial services online for the younger generation.

Our proposed platform *Eduvestment* enables the users to start from the low-threshold investment. It is intended to provide a quick ETF transfer function to help users make their first investment step. With education progressive schema, interactive investment education, such as mock investment and investment game, cleans the barriers for the young adults to explore different financial products. We hope *Eduvestment*'s financial training will help more young adults grow into mature investors.

For the technical implementation, AWS provides support for infrastructure building especially in database construction. All customers' behavioral data are stored and utilized for learning schema customization. Figma is used in making interactive user interface design and the website is implemented with vue.js framework. For demonstration purposes, we built our website with the streamlit package. Our source code can be found in the following repository: [https://github.com/XUXiangCUHK/FTEC3002Project\\_Eduvestment](https://github.com/XUXiangCUHK/FTEC3002Project_Eduvestment).

To evaluate our product, we will perform comprehensive testings and conduct surveys for users to evaluate our project outcome. The number of new users, users' portfolio performance and extra financial sources are also taken into our consideration. Finally, we propose our future developments based on collected feedback.

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# Introduction

## 1.1 Background Information

### 1.1.1 Current Market Situation

Based on the research conducted by Securities and Futures Commission (SFC) [11], only 28% of young adults have investment planning and own at least one investment product other than Mandatory Provident Fund (MPF) / Occupational Retirement Scheme (ORSO). Despite some young adults (18-29) show literacy in basic common sense in finance, in most cases acquired from textbooks or daily-life talk, they have little concern or attachment about their financial position. There is a huge potential in the young adults investment market. Over 40% of young adults feel they do not have enough money to invest and one third of them do not know how, revealed by the survey, conducted online in March 2016 by Harris Poll [7]. How to invest in certain financial products remains unclear for some young Hong Kong people, such as investing in ETFs. With a reasonable investing plan, financial knowledge should have helped young adults accumulate more resources in their early career. These all indicated that a platform of financial education and planning is crucial to the young adults and other groups for their financial well-being. There is a demand for a credible and consolidated financial education for young adults.

Virtual banks, which recently emerged in Hong Kong, target mainly at individuals who embrace the new technologies with delivering their banking services online without physical branches. We believe such platform can be integrated into virtual banking. However, no such platform is in place now.

### 1.1.2 Pain Points

From background research, we conclude that a large percentage of young adults are not equipped with financial knowledge. We conclude the observations as follows.

1. Some believe that investing needs a lot of prior knowledge so that they are reluctant to enter financial markets.
2. Some people show little concern about their financial positions with no investing habits.
3. Some believe a large amount of capital is required to start investment.

### *1.1.3 Existing Solution*

We classify current existing solution providers into three categories: fintech start-ups, securities companies and fintech giants. We discuss their solutions and their distinctive features in this section.

1. **Fintech Start-ups:** Most technology solutions are designed for professional investors and institutional clients. For instance, Axial [5], Ironfly [17], PriveTechnologies [18], Finantix [10] and Finex [11] all have functions such as delivering managed accounts for wealth managers and their clients. According to our research, Aqumon [2], Drivewealth [8] are two solutions targeted at non-affluent individual investors based in Hong Kong. Their common functionalities contain risk-profiling, robo-advisory, intended to provide low-cost wealth management services for non-affluent classes. SmartSave.life [21] provides low commission investing services in ETFs.
2. **Securities Company:** Generally investor education service is not an emphasized function for securities companies. Only Futu Securities [13] and Valuable Capital [16] have educational elements to some limited extent. For instance, the terminology explanations and introductions of financial products are provided on Futu. Small amount investing is allowed in Futu Securities, which is attractive for non-affluent investors. Various investment options, including ETFs, funds, stock and derivatives are able to serve different levels of investors.
3. **Fintech giant:** Yu'e Bao is a fintech product aimed for non-affluent users to start investing in ETFs with small amounts of cash assets. Yu'e Bao reported 114 million users signed up until the end of 2017. Its net asset reached 1.13 trillion yuan in 2018 [6]. According to Alipay, the number of active users is 870 million in 2018 [6]. Then we can conclude that around 13% of users of Alipay had tried the ETF market, showing the attractiveness of low-barrier investing for users. However, with different business purposes, Yu'e Bao does not serve as a financial education channel.

We compared three non-affluent-targeted solutions in Table 1. We observe that the key distinctive features offered by existing solutions can be grouped into three categories:

1. **Low-cost technical solutions for wealth management:** Traditionally, wealth management services are only available for high-net-worth customers. Robo-advisory lowers the cost of providing financial advisory services and approaches mass-affluents or non-affluents due to the economies of scale.
2. **Low-threshold investment opportunities:** No lock-in period, low commission and allowing small amount investment are aimed to help non-affluents enter the ETF market. This investment does not require prior financial knowledge or large amounts of assets. We define this feature as low threshold investing in this report.

3. **Financial education:** Financial education plays an essential role when users hope to learn financial concepts or trading strategies.

However, no current existing solutions cover all of the three categories. They are limited to one or two categories because of their different business purposes.

Solution/Function		Wealth Tech			Low threshold investing			Education
		Risk profiling	Various investment options	Robo-advisory	No ETF commission	No lock-in period	Small investment	
Fintech Start-up	Aqumon	✓	✓	✓				
	Drivewealth	✓	✓	✓				
	Smartsave.life	✓			✓	✓		
Securities Company	Futu Securities		✓			✓	✓	✓
	Valuable Capital		✓					✓
	uSMART		✓	✓				
Fintech Giant	Yu Ebao				✓	✓	✓	

Table 1: Overview of Existing Solutions in the Market

## 1.2 Provided Solution

### 1.2.1 Problem Statement

Through market research, young adults' common misunderstandings of investment bars them from financial planning. The existing solutions only partially address this pain point. Some low-threshold investment options are friendly to young adults who have a few savings and no prior knowledge of investment while they are not beneficial for long-term or more complicated financial planning. Some solutions provide basic investment education. Some fintech companies only provide low-cost solutions for wealth management. Therefore, there is no solution combining financial training, low-cost wealth management technologies and low-threshold investing opportunities.

### 1.2.2 Main Idea

We propose our platform with all the listed features in Table 1. Our product is intended to provide low-threshold investing opportunities to help users make their first investment step. For those who hope to explore more about finance, low-cost wealth management solutions enable them to invest in an economical way. With financial education integrated to the

platform, interactive investment education such as mock investment and investment game cleans the barriers for the young adults to grow into mature investors.

### 1.2.3 Solution Delivery Processes

As we show in Figure 1, we deliver our innovative solution in 6 parts. We discuss Problem Statement and Solution Conception in Section 1. Users' Requirements will be discussed in Section 2. Architecture Design and Implementation will be discussed in Section 3. In Section 4, we do testing, project evaluation and review based on collected feedback.

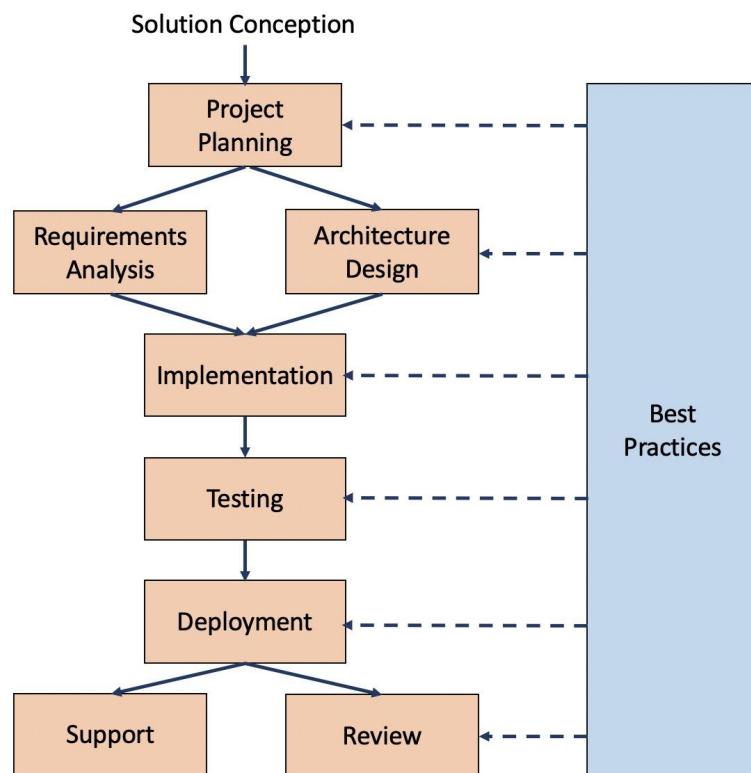


Figure 1: Workflow for Solution Delivery

# *Eduvestment Platform*

## 2.1 Overview

*Eduvestment* is an aggregated platform combining low-threshold investment opportunities, low-cost wealth management services and financial education, which aims to enable the users to grow into mature investors.

## 2.2 User Journey

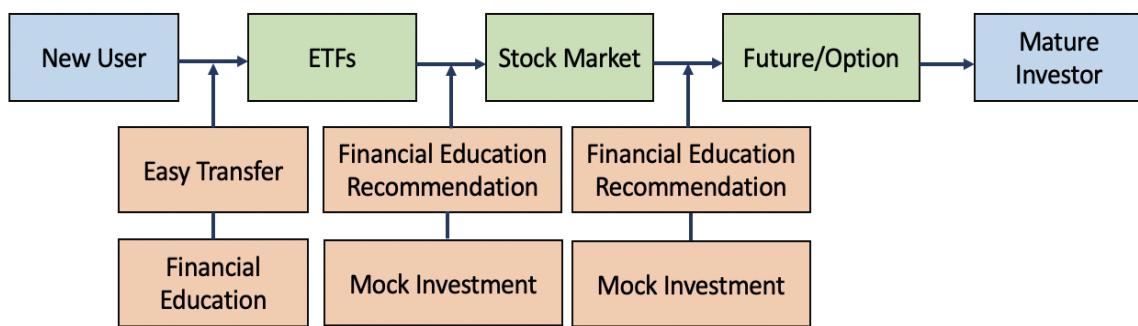


Figure 2: Customer Journey Flow Chart Interpretation

We describe the user journey from a beginner with an amount of balance in the virtual bank account growing into a mature investor who is proficient in investing in all the financial products, as is shown in Figure 2.

User Level	ETFs (Level 1)	Stock Market/Future/Option (Level 2/3)
User Interface Support	Balance Transfer Financial Educational Content	Mock Investment Financial Educational Content
Steps	<ul style="list-style-type: none"><li>- Select funds</li><li>- Indicate amount</li><li>- Transfer</li></ul>	<ul style="list-style-type: none"><li>- Mock Investment</li><li>- Portfolio Adjustment</li><li>- Submit order</li></ul>
Advantages	<ul style="list-style-type: none"><li>- No lock-in period</li><li>- Small amount investment</li><li>- Low commission</li><li>- Education-oriented</li></ul>	<ul style="list-style-type: none"><li>- Education-oriented</li><li>- Various investment options</li><li>- Robo-advisory</li><li>- Risk profiling</li><li>- Gamified and personalized experience</li></ul>

Table 2: UI Support and Advantages of Different User Levels

With the balance in the virtual bank account, investing in ETFs is as simple as transferring balance to the virtual bank account, as is shown in the table below. *Eduvestment*'s advantages for ETF investing include no lock-in period investing, small amount investment and low commission charging. These advantages are attractive for the users to start their investment journey.

In the next stage, when the users are qualified to invest in the stock market or other financial derivatives, we provide financial educational content and a mock investment platform. The users are able to adjust their portfolios, test their portfolio performance and justify their speculative ideas through the mock investment platform. The financial educational contents are recommended to the users according to the user's browsing data. In conclusion, gamified and personalized financial education helps the users become more capable of investing.

### 2.2.1 UI and UX

Our UI design has three main considerations:

1. The steps to invest should be exposed to the users and arouse their interests.
2. The steps to invest should be user-friendly enough for beginner users to follow.
3. Financial education should be clear to read and interesting to follow.

Our first emphasis is that traditional ETFs investment is on a separated page, which makes it less accessible for users who are not familiar with ETFs. We believe integrating ETF investment function into the page displaying bank account information motivates users to learn about ETFs and invest in ETFs with more visual exposure of relevant information (Appendix 1 - Account Information & ETF Purchasing).

Secondly, traditional banking apps have unclear instructions about how to send stock orders or the steps are not easy to follow. For example, on the sending order webpage of FUTU Securities, there are limit order, market order and other condition orders. It is not user-friendly for beginners to have a comprehensive understanding of different order types. Therefore, we adopt a simplified interface, containing only long and short, both are simple market order, to help beginners start their investment (Appendix 1 - Account Information & ETF Purchasing, Real Investment Platform).

Finally, few banking apps provide educational materials. Banking apps aiming to provide financial education usually display the educational content in separated pages. Our products integrate financial educational materials into the investing procedures. If the users have confusion about some financial concept, it is easy to navigate the web page for explanations and then continue the investment process (Appendix 1 - Concept Education, Mock Training).

### 2.2.2 Financial Education Progressive Schema

*Eduvestment's* supporting financial products include ETFs, stock market, futures and options. It is designed to encourage users to invest in certain markets if the user satisfies the corresponding criteria. Upon the criterion listed in the following table is satisfied, *Eduvestment* considers the user as qualified for the next level. Then, relevant financial educational content is recommended and promoted to the users, arousing the users' interest in certain types of financial products and facilitating their investment process. Before the user enters a higher level, there are trading restrictions such as trading amount ceilings, which are listed in the next section. This is designed to prevent high-risky trading for beginners. Table 3 in the following is not a finalized version, and it requires A/B testing according to real user cases.

	ETFs	Stock Market	Future/Option
User Level	Level 1 <sup>1</sup>	Level 2	Level 3
Balance	Over \$5,000 bank account balance	Over \$7,000 bank account balance or over \$2,000 in ETFs	Over \$10,000 bank account balance or \$5,000 in stock account or over \$5,000 in ETFs
Using Age	N/A	1 years or above	3 years or above
Behavioral Actions	Start to read ETFs financial education content	Start to try mock investment (stock market) function Start to read stock market financial education content	Start to try mock investment (future/option) function Start to read future/option financial education content
Total Trading Amount	N/A	Over \$2,000 in ETFs	Over \$5,000 in stock account or over \$5,000 in ETFs
Risky Trading Frequency	N/A	Twice per month in trading high-risky stocks <sup>2</sup>	Five times per years in trading high-risky assets
Annualized Return	2%-3%	>3%	>5%

Table 3: Financial Education Schema Criteria

<sup>1</sup> The user is Level 0 if the user is not investing in any type of financial products.

<sup>2</sup> The level of stock risk is quantified according to price-to-earning ratios, price-to-book ratio, company locations, etc. Companies such as Sniper Market Timing provide stock risk level analysis and their criteria are potentially adopted.

### 2.2.3 User Level Restrictions

The access for users in each level is granted according to the following table.

User Level	ETFs	Stock Market	Future/Option
Level 0	Recommended	Less than 20% of total balance	Less than 10% of total balance
Level 1	Full Access	Recommended	Less than 20% of total balance
Level 2	Full Access	Full Access	Recommended
Level 3	Full Access	Full Access	Full Access

Table 4: User Level Restrictions

### 2.2.4 Investing Strategies Introduction

Basic investing strategies are delivered to users for education purposes. Besides, the platform adopts fundamental models to construct optimal portfolios or offer suggestions.

#### Markowitz Model

Markowitz Model, which is also called mean-variance model, is a portfolio optimization model [14]. It can guide investors to make better selection of the most efficient portfolio and reduce their risk. The model is stated as follows: after achieving an expected return level  $z$ , we try to minimize the risk (variance) of the portfolio. Mathematically speaking, we obtain the following optimization problem [14]:

$$\begin{aligned} \text{Min } & \frac{1}{2} w^T \Sigma w \\ \text{Subject to } & w^T r = z \\ & w^T e = 1 \end{aligned}$$

where  $\Sigma$  is the covariance matrix of  $r_1, r_2, \dots, r_n$ ,  $\bar{r} = E(r)$  and  $e$  is an n-dimensional column vector of all 1's.

#### CAMP Model

The capital asset pricing model (CAPM) is an equilibrium pricing model for an individual asset. It is widely used to determine a theoretically appropriate required rate of return of an asset [15]. With holding it, investors can see whether a specific asset is underpriced or overpriced in the market, and then make a decision whether to add it to a well-diversified portfolio. Its formula is shown as follows [15]:

$$\bar{r}_i - r_f = \beta_i (\bar{r}_M - r_f)$$

$$\text{where } \beta_i = \frac{\text{cov}(r_i, r_M)}{\text{var}(r_M)}.$$

## 2.3 Main Functionalities

The platform is designed to provide the following functionalities.

	Main Functionality	Description
Account Management	Account Creation & Account Login	Create an integrated account and connect it to your current bank account
	Account Overview	View your current account position (i.e. your resource allocation in different investing market)
	Transfer & Payment	Transfer money between different accounts and make payment to other organizations
Education	Market Exploration	Explore the basic asset information available in the market
	Concept Education	Learn necessary concepts and knowledge before entering the investing market
	Historical Performance	Show historical performance of specific asset or customized portfolio regarding to its relative growth, annualized return, volatility and sharpe ratio
	Video courses	Provide video courses for customer to learn more investing strategies
	Mock Training	Try to construct your own portfolio in mock platform and compare your portfolio's performance in the history with the optimal portfolio's performance
	Mock Investment	Open a virtual account for users to do long-term mock investment and get feedback from behavioral evaluation
Investment	ETFs	The ETFs provided have no commissions and lock-in periods
	Stocks	Suggest optimal portfolios to users
	Financial news	Post financial reports and relevant daily news
	Risk profiling & robo-advisory	Show risk profiles and provide robo-advice automatically
Community	Knowledge Sharing	Sharing of investment experiences and opinions
	Analyst Recommendation	Show current market trading information and recommendations from asset analysts

Table 5: Detailed Description for Main Functionalities Provided

## Feasibility

### 3.1 Technical Feasibility

Figure 3 is the overview of our technical implementation. We provide details for each part in the following subsections.

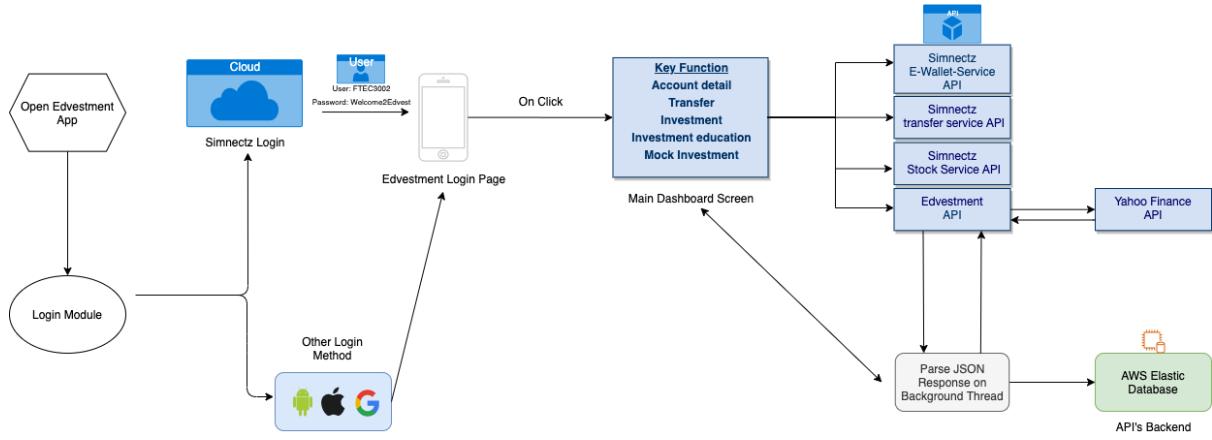


Figure 3: Workflow of Technical Implementation

#### 3.1.1 Web Application Construction

The front-end web application is constructed with JavaScript and vue.js framework, including all four major functionalities. In our demonstration, we use the python package Streamlit to construct the webpage for convenience.

#### 3.1.2 Login Methods

Lots of corporations such as Facebook, Google, provide services for developers to make it available to log in their own software with these existing accounts of users.

Take Facebook as an example. A developer is supposed to register for an account, register and configure the softwares and download Facebook SDK (Software Development Kit) to enable the application to call Facebook login APIs [9]. Then one can log in with his/her Facebook account to the application.

#### 3.1.3 Database Construction

AWS (Amazon Web Services) provides database services – Amazon Relational Database Service (Amazon RDS), which allow developers to construct relational databases on the

cloud [4]. Once a developer opens an account, he/she can create a DB instance and customize his/her own database configurations to fulfill different requirements.

*Eduvestment* uses MySQL to query the database for posting and fetching information.

### 3.1.4 Data Communication and APIs

The main functionalities of *Eduvestment* require connection to banking databases. In this case, APIs provided by banks or banking companies will be called to fulfill users' commands. For example, in order to transfer money, *Eduvestment* will call the transfer API to gain connection to the banking database and the database will send back responses of the request. In the demonstration, *Eduvestment* is connected through APIs to the Simnectz database as Simnectz provides the majority of banking services and it is convenient and easy to implement for simple functionality demonstration.

### 3.1.5 Security and Authentication

As *Eduvestment* supports third-party login and requires connection to banking systems, it is especially important to ensure security.

#### Login Security

In our developing phase, we will ensure login security with methods [12]:

- use unique short-term tokens on client
- use the official SDKs when possible
- reduce the app's attack surface by locking down the app setting
- use HTTPS

#### API Security

*Eduvestment* use APIs to connect and transfer data with banking databases. The APIs may be broken, exposed and hacked to cause data breaches.

Faced with these attacks, we use REST (Representational State Transfer) APIs, which implement TLS (Transport Layer Security) encryption to keep the data encrypted and unmodified [16].

#### Database Security

*Eduvestment* user information database is constructed with AWS. For AWS, it is responsible for the infrastructure security. Third-party auditors would regularly test the effectiveness of the security of AWS. For our part, we protect the user information security in the following ways [3]:

- prevent SQL injection attacks via symbol checking
- use HTTPS requests when querying the database
- use multi-factor authentication (MFA) with each account
- use AWS encryption solutions, along with all default security controls within AWS services

### *3.1.6 Artificial intelligence / Machine learning methods*

There are two functions requiring machine learning algorithms, namely robo-advisor for portfolio selection and user behavior pattern detection for personalized recommendation.

Our platform will build a robo-advisor by training AI/ML models with financial market data to generate optimal portfolios. Users will see the comparison between the optimal portfolio recommended by the models and their own choices in table and diagram forms. It will not only contribute to investment education but also be useful for users to make investment decisions in real life.

Moreover, we use AI/ML methods to study the user behavioral patterns. Selecting studying time, portfolio performance, investing capital amount, historical risky behaviors as main features, we build a supervised classification model to automatically check whether the customer is qualified as a higher level investor. The classifiers include Decision Tree, SVM, Ensemble Method, k-Nearest Neighbor, etc. Compared with human employees, analyzing user behavior with AI/ML saves an enormous amount of time [19]. AI/ML data analysis will be implemented to recommend courses and financial news for users.

## **3.2 Regulation Feasibility**

According to the regulation of SFC, *Eduvestment* is required to obtain the following licenses for the corresponding services. [20]

Licenses	Services
Type 1 Dealing in securities	Stock market investment
Type 2 Dealing in futures contracts	Futures investment
Type 3 Leveraged foreign exchange trading	FX investment
Type 4 Advising on securities	Robo-advisory & Risk Profiling
Type 5 Advising on futures contracts	Robo-advisory & Risk Profiling
Type 9 Asset management	Robo-advisory & Risk Profiling

Table 6: Licenses and corresponding services

## Evaluation and Review

### 4.1 Testing

#### 4.1.1 A/B Testing

A/B testing is useful for understanding new features of a product and potential customer engagement performance [27]. *Eduvestment* requires A/B testing for the following assumptions:

1. Young adults will try investing in ETFs with the UI design.
2. Young adults who hope to invest in the stock market may easily follow the steps and send orders successfully.
3. Progressive schema design is effective for users to study finance.

With the result from A/B testing, we could adjust UI Design until the interface satisfies the assumptions.

#### 4.1.2 Unit Testing

Unit Testing ensures each unit of *Eduvestment* functions normally and meets the business goals [26]. They should apply to the following technical parts:

1. All the functionalities in *Eduvesment*, including but not limited to login, mock investment, stock investment.
2. APIs and database connection
3. Do prediction with built machine learning model

#### 4.1.3 Integration Testing

Integration testing ensures *Eduvestment* functions normally after integrating all the software modules together. It is conducted to evaluate the consistency and compliance of different technical parts [26].

#### 4.1.4 User Acceptance Testing

User Acceptance Testing validates *Eduvestment* against its business goals and requirements. This is carried out by the users who understand the business context of *Eduvestment* [23].

### 4.2 Expected Outcome

Customers	Virtual Bank
Increase the comfortable level in investing	Engage more customers on virtual bank
Develop the habit of saving and investing	Free revenue and balance amount increases

Table 7: Expected Outcome of Participants

The key purposes of *Edvestment* are to provide investment education for young adults based in Hong Kong and grow into mature investors in the early stage of young adults' life. Another important outcome is that the virtual bank is able to engage more customers and witness increased fee revenue and balance amounts.

### 4.3 Evaluation & Feedback Collection

The evaluation methods for the corresponding outcomes are listed as follows.

Outcomes	Evaluation methods
Millennials gain substantial knowledge prior to entering financial markets.	<ul style="list-style-type: none"> <li>- Surveys intended to analyze the comfortable level to invest for customers</li> </ul>
Banks have more sources for finance as more mature customers use their platform.	<ul style="list-style-type: none"> <li>- Portfolio performance evaluation</li> <li>- Calculate extra financial sources from our platform</li> </ul>

Table 8: Evaluation Method

The outcome evaluations can be conducted through surveys through young customers and the investment amounts and performance of new young adults. The survey is intended to analyze the comfortable level to invest for customers, including questions regarding their confidence in investing in different financial products.

Since they purchase securities through the virtual bank application, the virtual bank may investigate their portfolio performance to identify whether they have adequate finance knowledge.

### 4.4 Solution Lifecycle

Referring to Chapter 8 of the textbook [22], we summarize our solution lifecycle as follows.

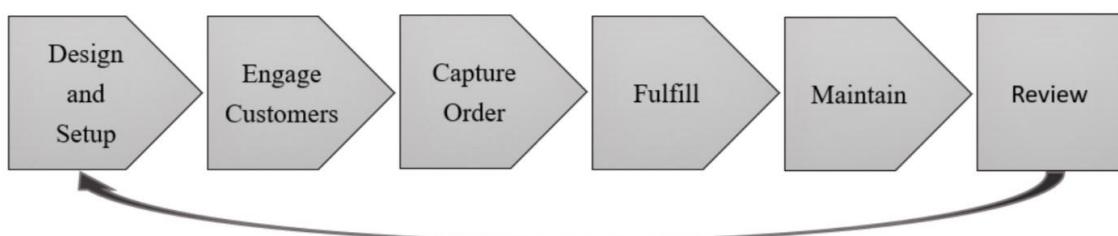


Figure 4: General Solution Lifecycle

#### 4.4.1 Design and Setup

- Setup and configuration of supporting IT systems [22]

- Construction of *Eduvestment* Platform

#### 4.4.2 Customer Engaging

- Marketing and promoting *Eduvestment* Platform to customers

Fields	Specific Ways
Financial education	Investment lectures, Stock pitch competitions, Market insight sharing
Social Media	Facebook, Twitter, Instagram, Wechat, Weibo
Offered Benefits	Commission fee waiver, Gift card

Table 9: Marketing Strategies to Engage Customers

#### 4.4.3 Capture Order

- Acquisition of customer order details
- Acquisition of user identity
- Agreement to legally execute the transaction [22]

#### 4.4.4 Fulfill Transaction

- Transaction confirmation, accounting, disbursement and remittance [22]

#### 4.4.5 Maintain Transaction

- Order validation
- Account balance validation

#### 4.4.6 Review

- Evaluate the effectiveness and profitability of products and services
- Feeds back into the design and setup stage

### 4.5 Future Development

In the future, we will incorporate Touch/Face ID authentication for payment and investment. The new authentication ways provide higher convenience and confidentiality. Moreover, we will develop APIs to enable users to connect to our portfolio selection model. Users then can obtain optimal portfolio weights based on stock selection through these APIs. To fulfill the needs of different customers, the fund will be more diversified, we will expand our target customer to the elder and high net worth group.

## Conclusion

To conclude our report, *Eduvestment* adopts banking APIs, data-driven approaches and AWS infrastructures to help our customers become mature investors. Our innovative functions, such as quick ETF transfer, interactive investment education and mock investment provide convenient investment experience and progressive education. Despite several technical tools used to demonstrate our innovative solution, there is room for further improvement of our application according to the feedback of our testing and evaluation. With the help of technologies like Open APIs, machine learning and data analytics, more customers will benefit from the financial market using our platform. We positively believe if our application is put into practice, customers will benefit from financial education and convenient investing experience.

## Individual Reflection

### XU Xiang

My major contributions in the project are basic infrastructure construction and platform integration. I help my groupmates find out how to connect with Simnnectz API and fetch customer data from the database. Then I review the codes from my teammates and integrate all functionalities into our *Eduvestment* platform. Therefore, I was assigned to do the demonstration in our presentation. In terms of report writing, I am in charge of Solution Delivery Process Part, Investing Strategies Part, Main Functionalities Part, Solution Life Cycle Part and Appendix as well. From this course project, I learn how to incubate an innovative idea and gradually make it into a real product. I also gain lots of experience in building infrastructure as technical support, in designing user journeys to better engage customers, in project evaluation and how to improve it based on feedback, and in how to be a useful contributor to push a challenging project forward.

### CHEN Yu

It is an interesting experience to do this project, especially during the pandemic. It helps a lot to keep myself connected with my schoolmates. It was fun and rewarding when I was brainstorming the ideas, coding the prototype, designing the products, when imagining myself as one of the users of *Eduvestment*. Meanwhile, when we structured the proposal and report, I obtained new perspectives to start my reasoning. I contributed to existing solution market search, report writing in customer journey, testing and part of evaluation and two web pages of prototype.

My mom is working in a tech company which provides tech products for CRM. We had a lot of discussions together thanks to this course. I also learned a lot about feasibility analysis from her.

I learned a lot about the tech stacks behind financial technology products from this course. During my past online internship, our team is responsible for sending orders to FIX. I had been reading colleagues' materials for hours and I was still very confused about how everything was going on before taking this course. I benefited a lot from the lectures in FTEC3002 in understanding the logic behind the capital market order management system.

### Weiting Ou

Through this project, I enriched my understanding of the Hong Kong investment intermediate market and the pain point customers had. We proposed an application to provide an investment platform for non professional investors who have no prior knowledge of

investment. We made use of APIs such as Yahoo Finance, Simnectz and AWS database. The development process gave us a chance to practise our application development skills. From early market research to final presentation, I have a better vision on fintech infrastructure and investment planning among young adults. One of my duties is coding the transaction system, I have to consider every situation and be detail-minded. This project put us into the market maker position. Achieving the object is not the only goal but building a system that can continue to improve and evaluate it.

### **WANG Chenyu**

In the project, I was responsible for the functionality introduction and technical infrastructure explanation and also for coding on interaction with Simnectz banking APIs. Initially I was new to this area. During the development I've learnt how to organize thoughts on a financial product and further expand it. For me the course content is hard to understand, let alone to use it. But the project and my teammates enlighten me how to get acquainted with the core ideas and how that can be involved in our project.

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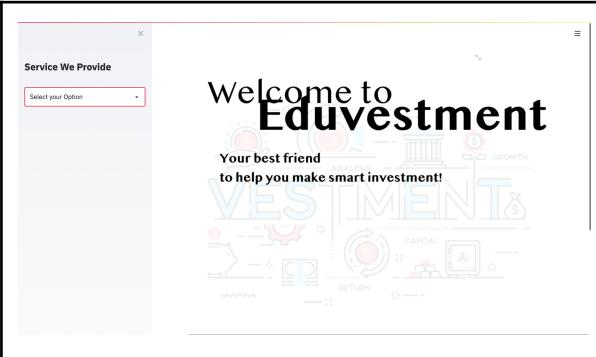
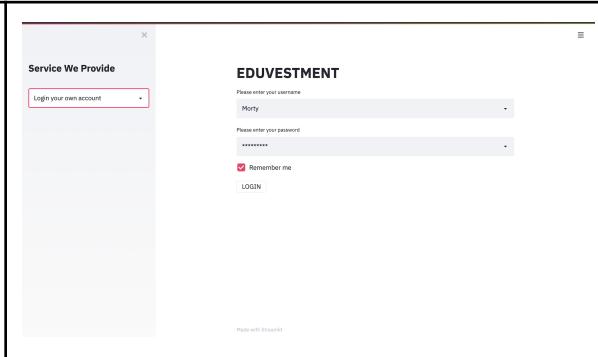
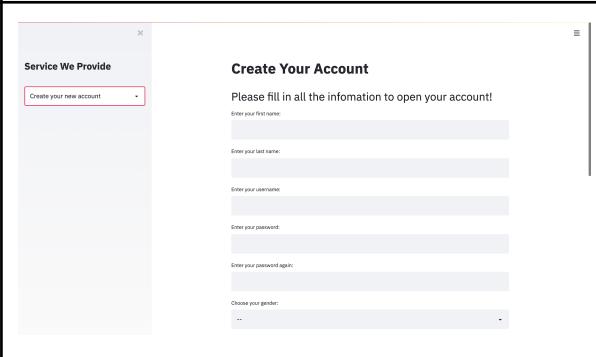
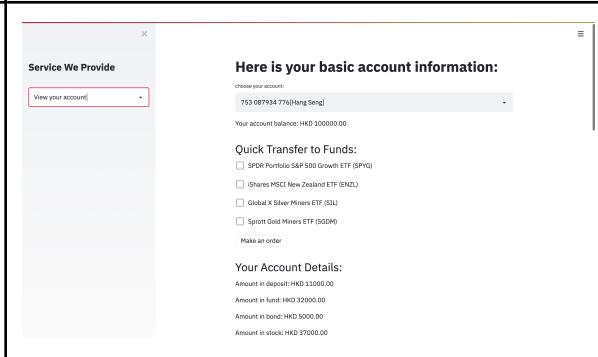
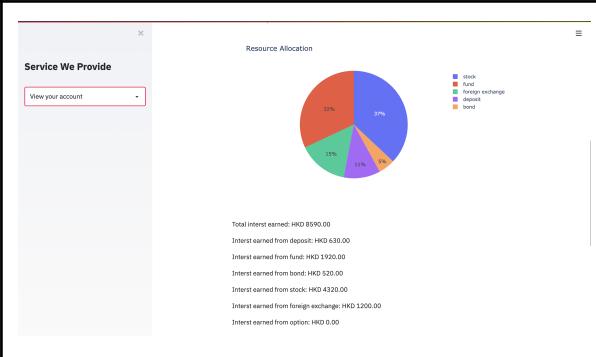
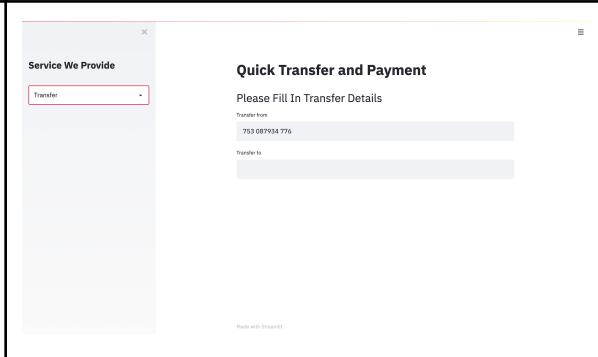
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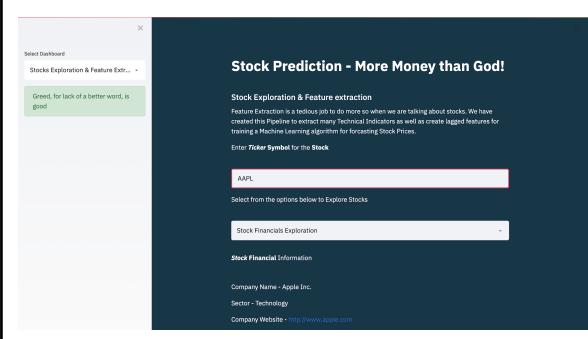
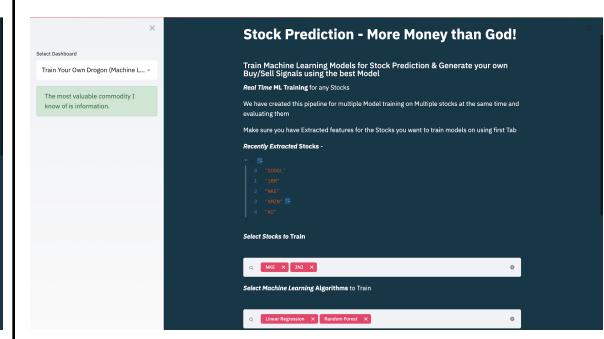
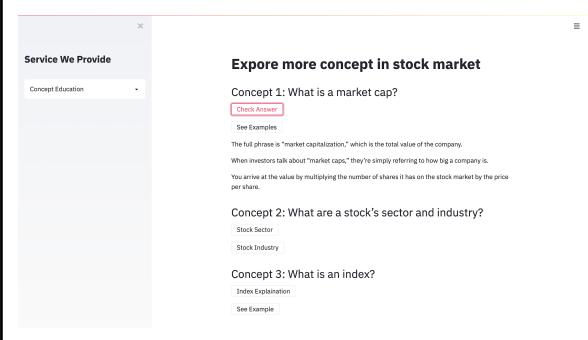
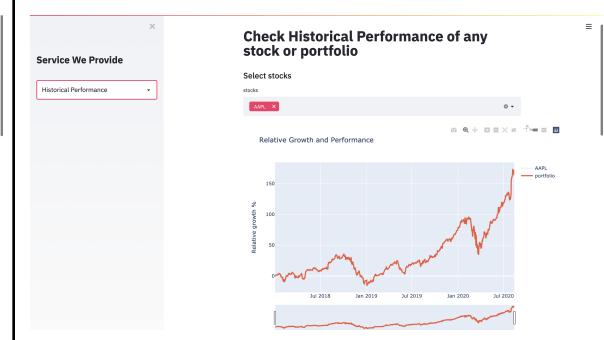
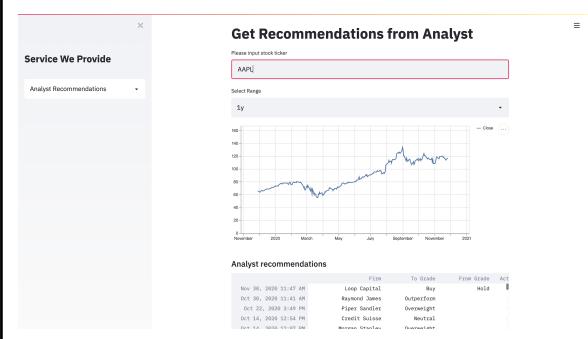
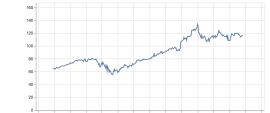
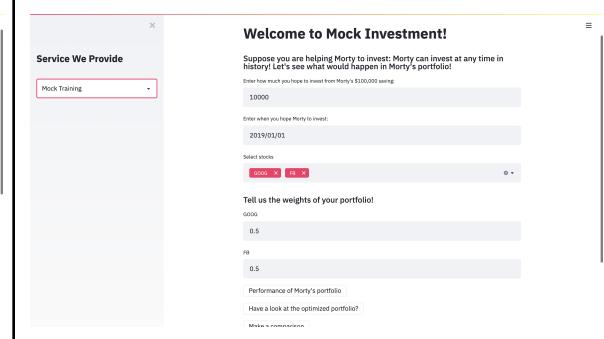
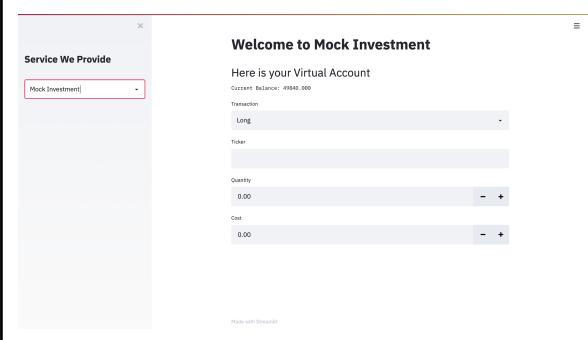
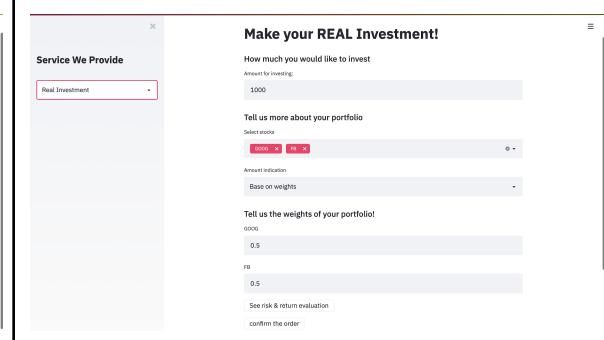
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# Appendix

## Appendix 1

Screen shots for our website are listed as below.

	
<p>Landing Page</p>	<p>Account Creation</p>
	
<p>Account Creation</p>	<p>Account Information &amp; ETF Purchasing</p>
	
<p>Account Profile</p>	<p>Transferring and Payment</p>

 <p><b>Stock Prediction - More Money than God!</b></p> <p>Stock Exploration &amp; Feature extraction</p> <p>Feature Extraction is a tedious job to do more so when we are talking about stocks. We have created this Pipeline to extract many Technical Indicators as well as create lagged features for training Machine Learning algorithm for forecasting Stock Prices.</p> <p>Enter Ticker Symbol for the Stock</p> <p>AAPL</p> <p>Select from the options below to Explore Stocks</p> <p>Stock Financial Information</p> <p>Company Name - Apple Inc. Sector - Technology Company Website - <a href="http://www.apple.com">http://www.apple.com</a></p>	 <p><b>Stock Prediction - More Money than God!</b></p> <p>Train Machine Learning Models for Stock Prediction &amp; Generate your own Buy/Sell Signals using the best Model</p> <p>Real Time ML Training for any Stocks</p> <p>We have created this pipeline for multiple Model training on Multiple stocks at the same time and evaluating them</p> <p>Make sure you have Extracted features for the Stocks you want to train models on using first Tab</p> <p>Recently Extracted Stocks -</p> <ul style="list-style-type: none"> <li>1. AAPL</li> <li>2. IBM</li> <li>3. TSLA</li> <li>4. AMZN</li> <li>5. MSFT</li> </ul> <p>Select Stocks to Train</p> <p>MSFT IBM</p> <p>Select Machine Learning Algorithms to Train</p> <p>Linear Regression Random Forest</p>																									
<h2>Stock Exploration</h2>	<h2>Stock Exploration</h2>																									
 <p><b>Service We Provide</b></p> <p><b>Explore more concept in stock market</b></p> <p>Concept 1: What is a market cap?</p> <p><b>Check Answer</b></p> <p>See Examples</p> <p>The full phrase is "market capitalization," which is the total value of the company.</p> <p>When investors talk about "market caps," they're simply referring to how big a company is.</p> <p>You arrive at the value by multiplying the number of shares it has on the stock market by the price per share.</p> <p>Concept 2: What are a stock's sector and industry?</p> <p>Stock Sector Stock Industry</p> <p>Concept 3: What is an index?</p> <p>Index Explanation See Example</p>	 <p><b>Service We Provide</b></p> <p><b>Check Historical Performance of any stock or portfolio</b></p> <p>Select stocks</p> <p>stocks</p> <p>Relative Growth and Performance</p>  <p>Relative growth %</p> <p>AAPL portfolio</p>																									
<h2>Concept Education</h2>	<h2>Historical Performance</h2>																									
 <p><b>Service We Provide</b></p> <p><b>Get Recommendations from Analyst</b></p> <p>Please input stock ticker</p> <p>AAPL</p> <p>Selected Range</p> <p>1y</p>  <p>Analyst recommendations</p> <table border="1"> <thead> <tr> <th>Date</th> <th>Analyst</th> <th>Action</th> <th>Target Price</th> <th>Reason</th> </tr> </thead> <tbody> <tr> <td>Nov 01, 2020 11:47 AM</td> <td>Leopoldo Caltanais</td> <td>Buy</td> <td>\$130</td> <td>Outperform</td> </tr> <tr> <td>Oct 22, 2020 11:41 AM</td> <td>Raymond James</td> <td>Overweight</td> <td>\$125</td> <td>Outperform</td> </tr> <tr> <td>Oct 14, 2020 10:14 AM</td> <td>Piper Sandler</td> <td>Neutral</td> <td>\$120</td> <td>Neutral</td> </tr> <tr> <td>Oct 06, 2020 10:14 AM</td> <td>Credit Suisse</td> <td>Neutral</td> <td>\$120</td> <td>Neutral</td> </tr> </tbody> </table>	Date	Analyst	Action	Target Price	Reason	Nov 01, 2020 11:47 AM	Leopoldo Caltanais	Buy	\$130	Outperform	Oct 22, 2020 11:41 AM	Raymond James	Overweight	\$125	Outperform	Oct 14, 2020 10:14 AM	Piper Sandler	Neutral	\$120	Neutral	Oct 06, 2020 10:14 AM	Credit Suisse	Neutral	\$120	Neutral	 <p><b>Service We Provide</b></p> <p><b>Welcome to Mock Investment!</b></p> <p>Suppose you are helping Morty to invest: Morty can invest at any time in history! Let's see what would happen in Morty's portfolio!</p> <p>Enter how much you hope to invest from Morty's \$100,000 savings:</p> <p>10000</p> <p>Enter when you hope Morty to invest:</p> <p>2019/03/01</p> <p>Selected stocks</p> <p>GOOG FB</p> <p>Tell us the weights of your portfolio!</p> <p>GOOG 0.5 FB 0.5</p> <p>Performance of Morty's portfolio</p> <p>Have a look at the optimized portfolio?</p> <p>Make a contribution</p>
Date	Analyst	Action	Target Price	Reason																						
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<h2>Analyst Recommendation</h2>	<h2>Mock Training</h2>																									
 <p><b>Service We Provide</b></p> <p><b>Welcome to Mock Investment</b></p> <p>Here is your Virtual Account</p> <p>Current Balance: -\$9840.00</p> <p>Transaction</p> <p>Long</p> <p>Ticker</p> <p>Quantity</p> <p>Cost</p> <p>Margin</p> <p>(May be Withdrawn)</p>	 <p><b>Service We Provide</b></p> <p><b>Make your REAL Investment!</b></p> <p>How much would you like to invest</p> <p>Amount for investing</p> <p>1000</p> <p>Tell us more about your portfolio</p> <p>Selected stocks</p> <p>GOOG FB</p> <p>Amount indication</p> <p>Base on weights</p> <p>Tell us the weights of your portfolio!</p> <p>GOOG 0.5 FB 0.5</p> <p>See risk &amp; return evaluation</p> <p>confirm the order</p>																									
<h2>Mock Investment Platform</h2>	<h2>Real Investment Platform</h2>																									