Project Case *DS Using C*	
Periode Berlaku Semester Genap 2023/2024 ***Valid on*** *Even Year 2023/2024*	**Software Laboratory Center** **Assistant Recruitment 24-2**

Note: Please focus on the main logic and main feature!
(Splash screen and design are not scored)

Soal

Case

MetaFi

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- **Main Menu Page**
  - This Menu contains of 3 menus, which are **Login**, **Register**, and **Exit Application**.
  - **Prompt** user to **input chosen menu**. **Validate** the input must **between 1 and 3 inclusively**.

Figure 1. Home Page

1. If user choose **Log In To Trade** (**Menu 1**), then:
   - **Prompt** user to **input email**. **Validate** the email must **not empty.** Prompt **error message** if the input is empty. **If** the **input** is **0** then go back to **Main Menu Page**.

Figure 2. Input email

Figure 3. Input Password

- **Prompt** user to **input password**.
  - **Validate** the **email** and the **password** must match with registered user in **user.txt**.
  - If the user does not exist, then **prompt** an **error message** after that ask the user to **input** from **email** again.
  - If the **input** is **0** then return to **Main Menu Page**.
  - If the **valid user** is not in the **hash table,** then get the **user data** from **user.txt** then **insert it** into the **hash table chaining.**
  - The **hashing function** is **sum of all** the username's character in **ASCII value** and then **modulo** it with **26.**

```
Formula:
SUM(username's ASCII) % 26

Example:
username: bokman
b = 98, o = 111, k = 107, m = 109, a = 97, n = 110.
(98+111+107+109+97+110) % 26 = 8.
```

Figure 4. Hashing Function

- If the **valid user** is in the **hash table**, then get the **user data** from the **hash table** instead**.**
- If the credential is valid **redirect** user to the **User Menu Page** (**figure 7**)

2. If user choose **Register Account** (**Menu 2**), then:
   - **Prompt** user to **input username**.
     - **Validate** username must be between **1 and 20 characters.**
     - **Validate** usernames only contain **alphabet** and **number.**
     - **Validate** username must be **unique.**
     - **If** the user **inputs 0**, then return the user to the **Main Menu Page.**
     - **If** there are **errors**, then **prompt** an **error message** then ask the user to **input username** again.
   - **Prompt** user to **input email.**
     - **Validate** email must be between **6 and 36 characters.**
     - **Validate** email only contains **alphabet** and **number.**
     - **Validate** email must be **started** with a **character.**
     - **Validate** email does **not contain tag '#'.**
     - **Validate** email only **contains one '@'.**
     - **Validate** email must be **ended** with **'.com'.**
     - **Validate** email can't have **white space ' '.**
     - **Validate** email must have **domain. Email format**: **[EMAIL]@[DOMAIN].com. Ex: email@example.com.**
     - **Validate** email must be **unique.**
     - **If** the user **inputs 0**, then return the user to the **Main Menu Page.**
     - **If** there are **errors**, then **prompt** an **error message** after that ask the user to **input** again.
   - **Prompt** user to **input password**.
     - **Validate** password must be between **8 and 36 characters.**
     - **Validate** password contains at least **one alphabet** and **one number.**
     - **Validate** password does not **contain symbol.**
     - **If** the user **inputs 0**, then return the user to the **Main Menu Page.**

- **If** there are **errors**, then **prompt** an **error message** after that ask the user to **input** again.

Figure 4. Text Format

- **If** the data is **valid**, then **write** the new user to **user.txt**, with **format above.** The default value for currency is **10000.** After user, return to **Main Menu Page**.

3. If user choose **Exit Application** (**Menu 3**):

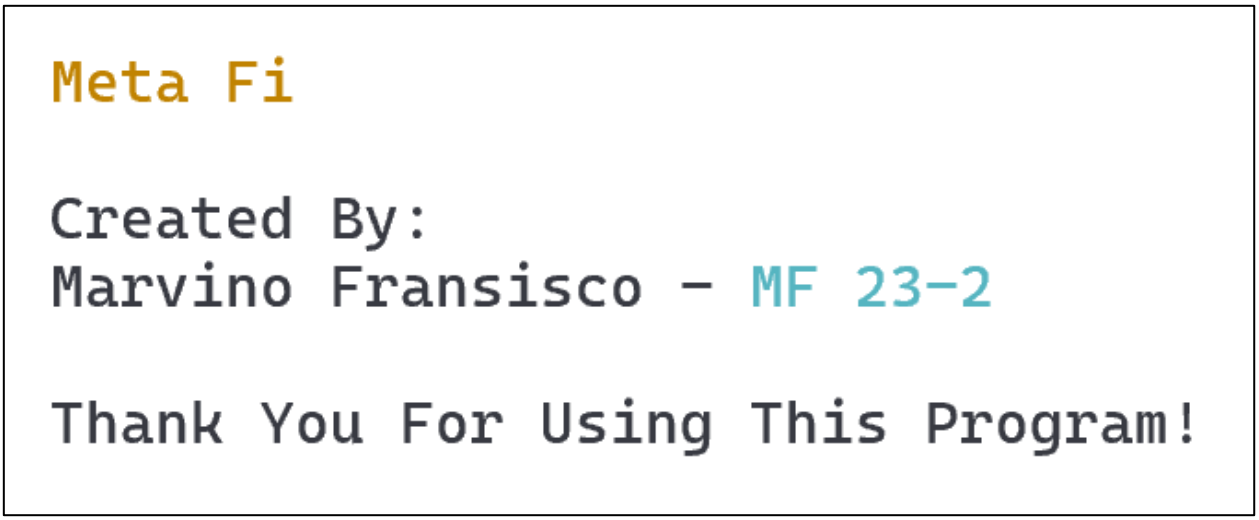

Figure 5. Exit Message

Figure 6. 23-2 Logo

- **Display** exit message and terminate the program.

➢ **User Menu Page**

- This Menu contains of 4 menus, which are **Start Trade**, **Trade History**, **Guide,** and **Log Out**.
- **Prompt** user to **input chosen menu**. **Validate** the input must **between 1 and 3 inclusively**.

```
MetaFi - User's Menu
--------------------
1. Start Trade
2. Trade History
3. Guide
4. Log Out
>>
```

x

Figure 7. User Menu Page

1. If user choose **Start Trade** (**Menu 1**)**:**
    - **Display** the **Home Page**
2. If user choose **Trade History** (**Menu 2**)**:**

Figure 8. No Trade History Message

- If there are no **Trade** that made by **logged in** user, then **prompt** no trade history **message**.

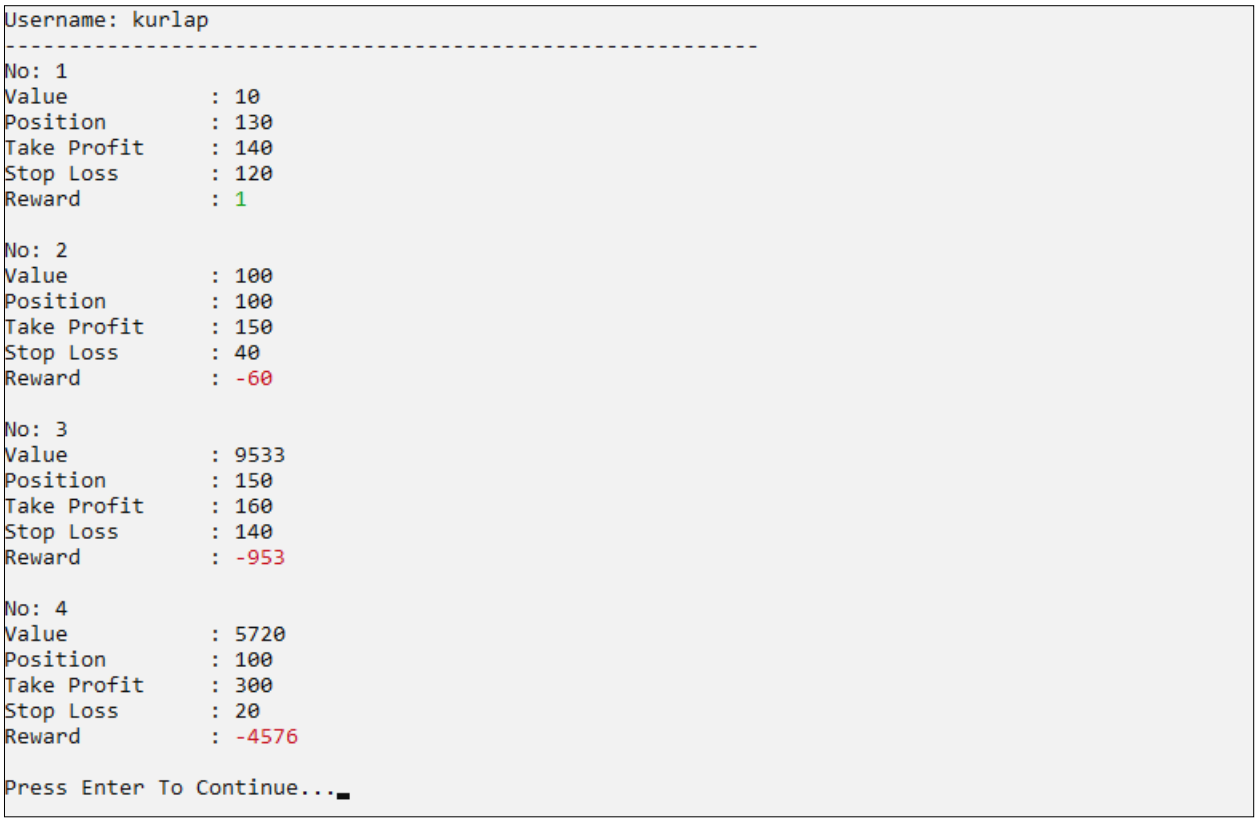

Figure 9. History Page

- If there are any **Trade** that made by **logged in** user, then **display all** the **trade** that have been made start from the **highest reward** to the **lowest**. (**It's not using any sorting algorithm, instead we use priority queue**)**.**

3. If user choose **Guide** (**Menu 3**):

```
What Is Forex?
"Forex", short for foreign exchange, is a global decentralized marketplace for trading currencies.
In forex trading, participants buy one currency by selling another currency simultaneously, with the aim of profiting from fluctuat
ions in exchange rates.
It is one of the largest and most liquid financial markets in the world, operating 24 hours a day, five days a week.

What Is Candle Stick?
"Canlde Stick" in charts are a type of financial chart used to represent price movements in trading markets, including forex.
They visually display the open, high, low, and close prices for a specific period.
if the close price is higher than the open price, the candle color will be green
then if the close price is less than the open price, the candle color will be red.
shadow or tick is the highest and the lowest price of a candle.


What Is Position?
"Position" in forex trading refers to where we want to enter the market at certain price point

What Is Long?
"Long" in forex trading refers to a trading position where a trader buys a currency pair
with the expectation that its value will increase over time.


What Is Short?
"Short" in forex trading refers to a trading position where a trader sells a currency pair
with the expectation that its value will decrease over time.


What is Take Profit?
"Take Profit" in forex trading refers to where we will leave the market at the specified price point
our position will automatically closed after the market price hit our take profit price


What Is Stop Loss?
"Stop Loss" in forex trading refers to where we will leave the market at the specified price point
it's used to make sure that we don't loss all of our money and many more
same like take profit, our position will automatically closed after the market price hit our take profit price

Press Enter To Continue...
```

Figure 10. Guide Page

   - **Redirect** user to the **Guide Page** and then **display** the information. If the user press **enters** then **redirect** user to the **User Menu Page**.

4. If user choose **Log Out** (**Menu 4**):
   - **Return** user to the **Main Menu Page**.

➢ **Home Page**

This Menu contains of 6 menus such as **New Day**, **Previous**, **Next**, **Long**, **Short**, and **Logout.** Before we create the **Home Page**, we need to understand the **basics** of **forex.**

What is Forex (**Foreign Exchange**)

Forex trading is different with other trading. In **Forex,** we are going to **analyze** where the price will be in the **future**. After **analyzing**, we will **enter** the **market**, set the **Take Profit** (**TP**) and **Stop Loss** (**SL**) at certain **price point**. **Ex:** From **figure 8**, we could see that the **position** is at **100** (**White Line**)**, Take Profit** (**TP**) is at **300** (**Green Line**)**, Stop Loss** (**SL**) is at **10** (**Red Line**)**.**

If the **current market price** (**represented by candle stick**) cross our **position**, then our trade will be **active**. Now if our **trade** is **active**, then we could gain **profit** or **loss** based on the **direction** that we choose. **Direction** in **Forex** is only **Long** (**Buy**) or **Short** (**Sell**)**.**

We could say that **Long** is **Up,** which means if the **market price** is going **higher**, then we **gain money** but if the **market price** is going **lower** then we **loss money.**

We could say that **Short** is **Down**, which means if the **market price** is going **lower,** then we **gain money** but if the **market price** is going higher then we **loss money**.

If the **current market price** (**represented by candle stick**) cross our **Take Profit** (**TP**) or **Stop Loss** (**SL**), then the **trade** is closed (**inactive**).

What is Candle Stick

Candle Stick is one of many ways to represent **current market price,** from image in **figure 10**, we could see that if the **close price** is higher than **open price** then the candle stick color is **green**. If the **close price** is **lower** than the **open price**, then the **candle stick color** is **red.**

Candle stick consist of four parts, **highest price, open price, close price,** and **lowest price. The highest price** is the price that a **candle reached** at one time period. **Open price** is the first price that a candle has. **Close price** is the last price that a candle has before the time period expires. **The lowest price** is the price that a **candle reached** at one time period. **Ex: At one hour time period a new candle has been created at 10:00 AM, the opening price is $100. Then at 10:22 AM, the price dropped to $86 but at 10:51 AM the price increased to $112, then at 11:00 AM, the price was $104. From that we know the opening price is $100, highest price is $112, lowest price is $86, and closing price is $104.**

Tick / Shadow, in **figure 10,** we could see that there is a straight **thin line**, it **represents** the **length** from the **highest price** to the **open/closed price**, and **from open/closed price** to the **lowest price.** It creates a **clear visualization** for people when they are looking at the **market**.

If the explanation above is still not too clear, you could do your own research.

Figure 11. Candle Stick

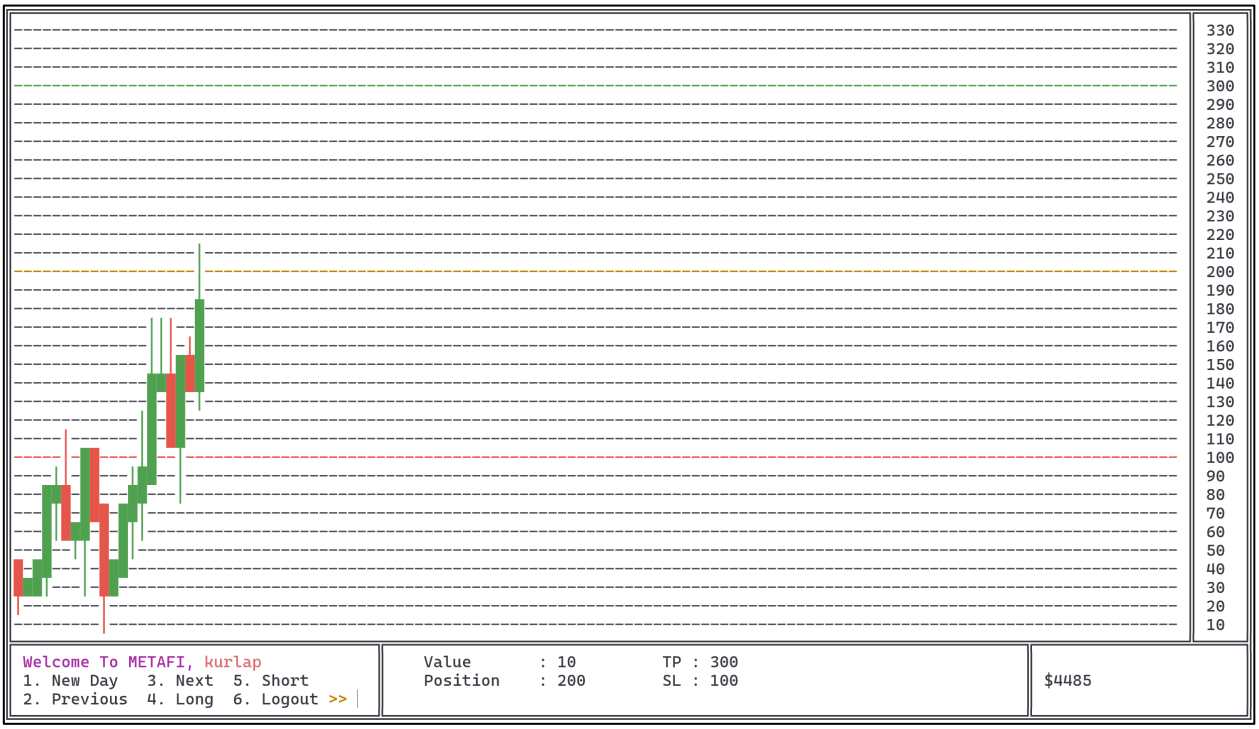

Figure 12. Home Page With Position Opened

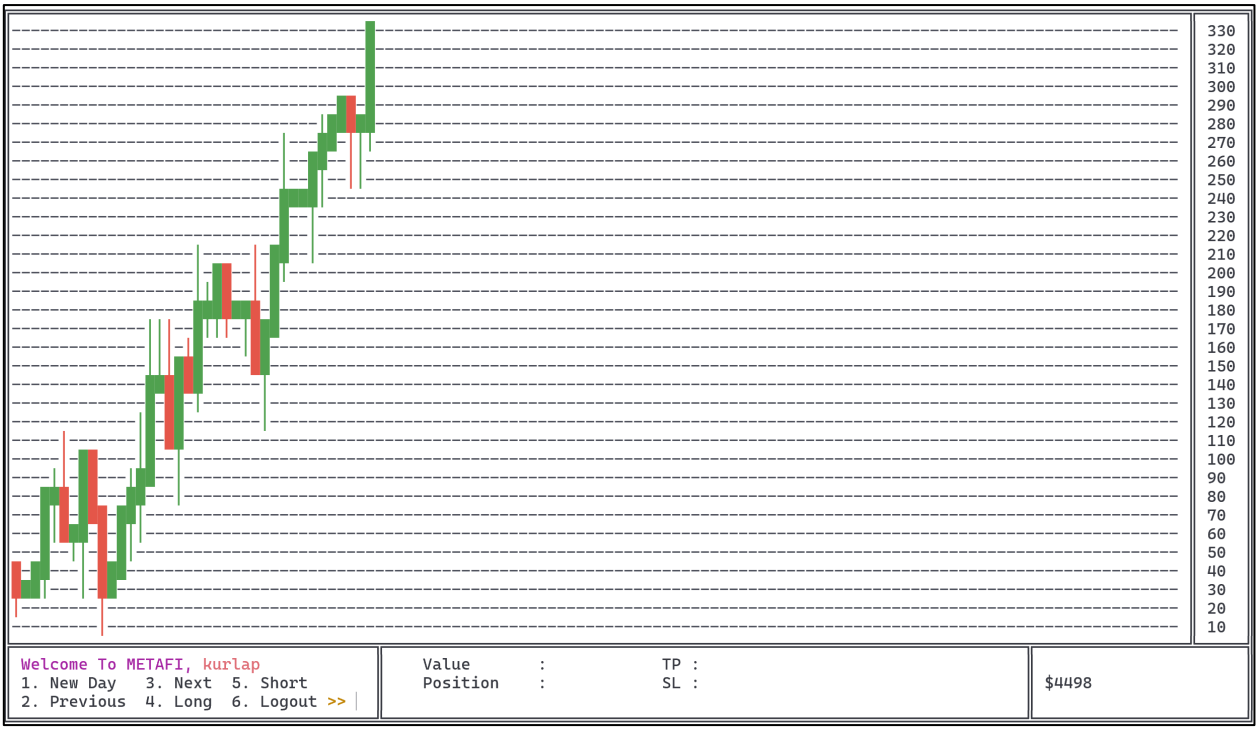

Figure 13. Home Page Without Position Opened

Candle Stick's ASCII		
Shape	**ASCII code**	**Description**
	219	Candle body
	179	Tick / Shadow

- **Display** the **current market price** using **candle stick.**
  - A candle stick consist of **open price, closed price, highest price,** and **lowest price**. Create the candle stick by using **double linked list**.
  - **Open Price** value is same from the previous **Close Price Candle**.
  - **Close Price**
    - **Close Price** have **10% chance** to be **equal** with it's **Open Price. Ex: Open Price = $100, Close Price: $100**
    - The rest **90% chance** is when the **Close Price** is not equal with it's **Open Price**, then the **Close Price** will have **50% chance** to be **higher or lower** then the **Open Price.**
    - The **difference** between **Open Price** and **Close Price** is beteween **10** and **60** (**Make sure the number is multiple of ten**). **Ex: Open Price = $100, Close Price = $40.**

- **Highest Price**
    - If the **Close Price** is **higher** than the **Open Price,** the **Highest Price** will have **30% chance** to be equal with it's **Close Price**
    - The rest **70% chance** is randomize between **0 – 40** (**Make sure the number is multiple of ten**) and then add the **randomized value** to the **Close Price** to create **Highest Price. Ex: Open Price = $100, Close Price = $140, Highest Price = $150**
    - If the **Close Price** is **Lower** than the **Open Price,** the **Highest Price** will have **30% chance** to be equal with it's **Open Price**.
    - The rest **70% chance** is randomize between **0 – 40** (**Make sure the number is multiple of ten**) and then add the **randomized value** to the **Open Price** to create **Highest Price. Ex: Open Price = $100, Close Price = $80, Highest Price = $130.**

- **Lowest Price**
    - If the **Close Price** is **higher** than the **Open Price,** the **Lowest Price** will have **30% chance** to be equal with it's **Open Price**
    - The rest **70% chance** is randomize between **0** and **40** (**Make sure the number is multiple of ten**) and then minus the **Open Price** with the **randomized value** to create **Lowest Price. Ex: Open Price = $100, Close Price = $140, Lowest Price = $60**
    - If the **Close Price** is **Lower** than the **Open Price,** the **Lowest Price** will have **30% chance** to be equal with it's **Close Price**.
    - The rest **70% chance** is randomize between **0** and **40** (**Make sure the number is multiple of ten**) and then minus **Close Price** with the **randomized value** to create **Lowest Price. Ex: Open Price = $100, Close Price = $80, Lowest Price = $70**

- **Display** the all market price by using **dashed line** (**'-'**) and **number.**
- **Display** user's **name** and current **currency**.
- **Display** input **prompt.**

- **Display** trade entry **prompt.**
- **Validate** if the user's currency is **0** then they can't trade anymore.

1. If user choose **New Day** (**Menu 1**):
   - **Create** a new **candle stick** by using **Push tail** and **display it**

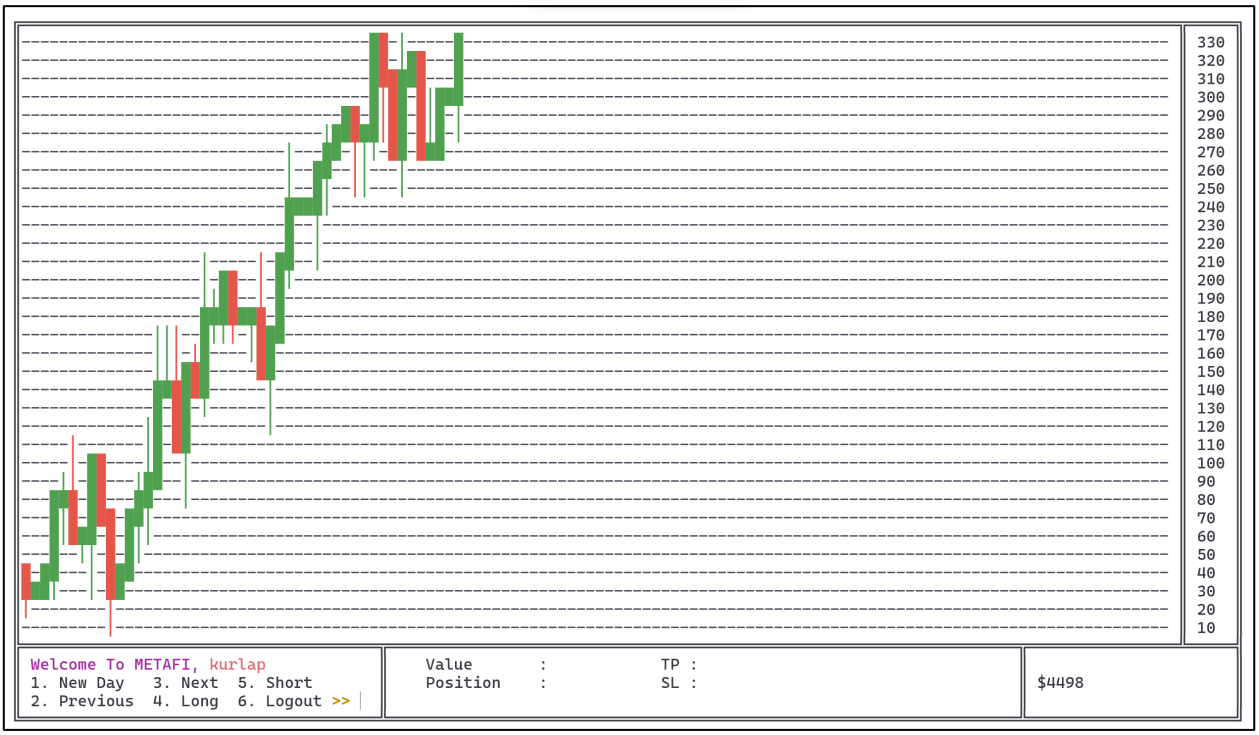

Figure 14. New Day (before)

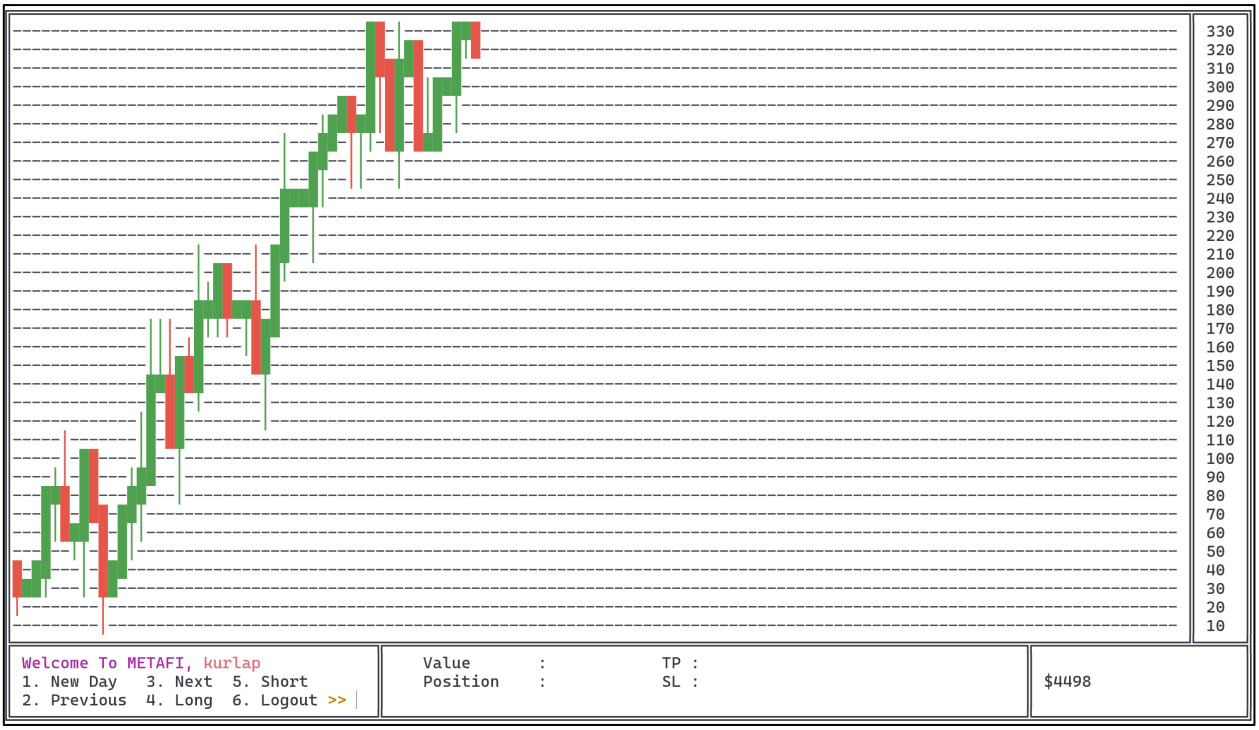

Figure 15. New Day (After)

2. If user choose **Previous** (**Menu 2**):
    - **Move all candle stick forward** to see **previous candle sticks.**
    - If there are no previous **candle stick**, then all **candle sticks** will **stay** in place.

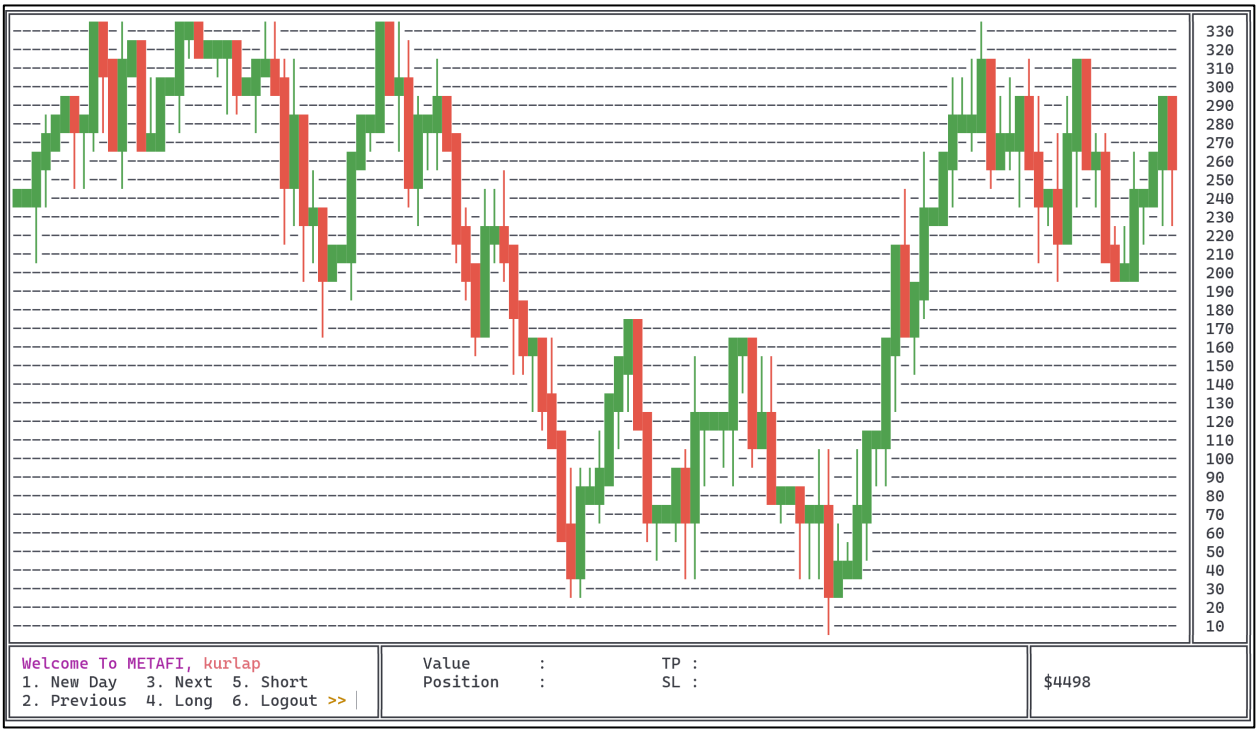

Figure 16. Previous (before)

Figure 17. Previous (after)

3. If user choose **Next** (**Menu 3**):
   - **Move all candle stick backward** to see **next candle sticks.**
   - If there is only one **candle stick** left on the screen then the **candle stick** will **stay in place**.

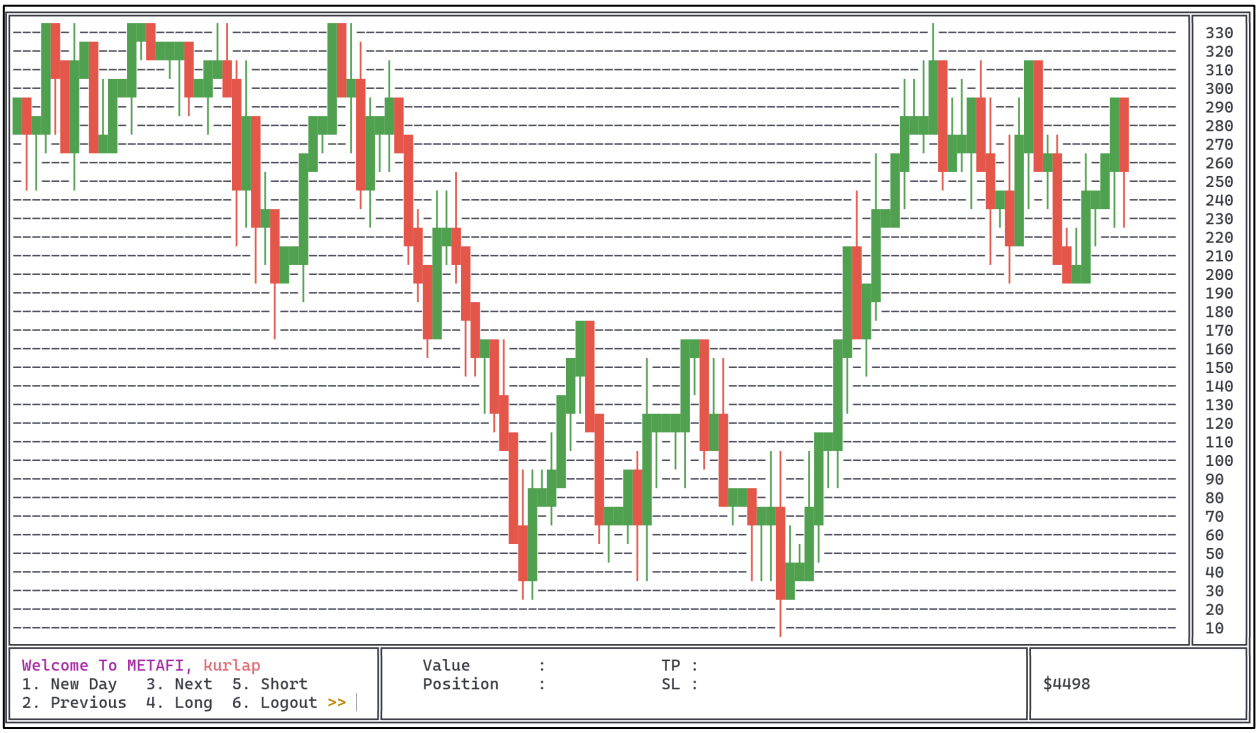

Figure 18. Next (Before)

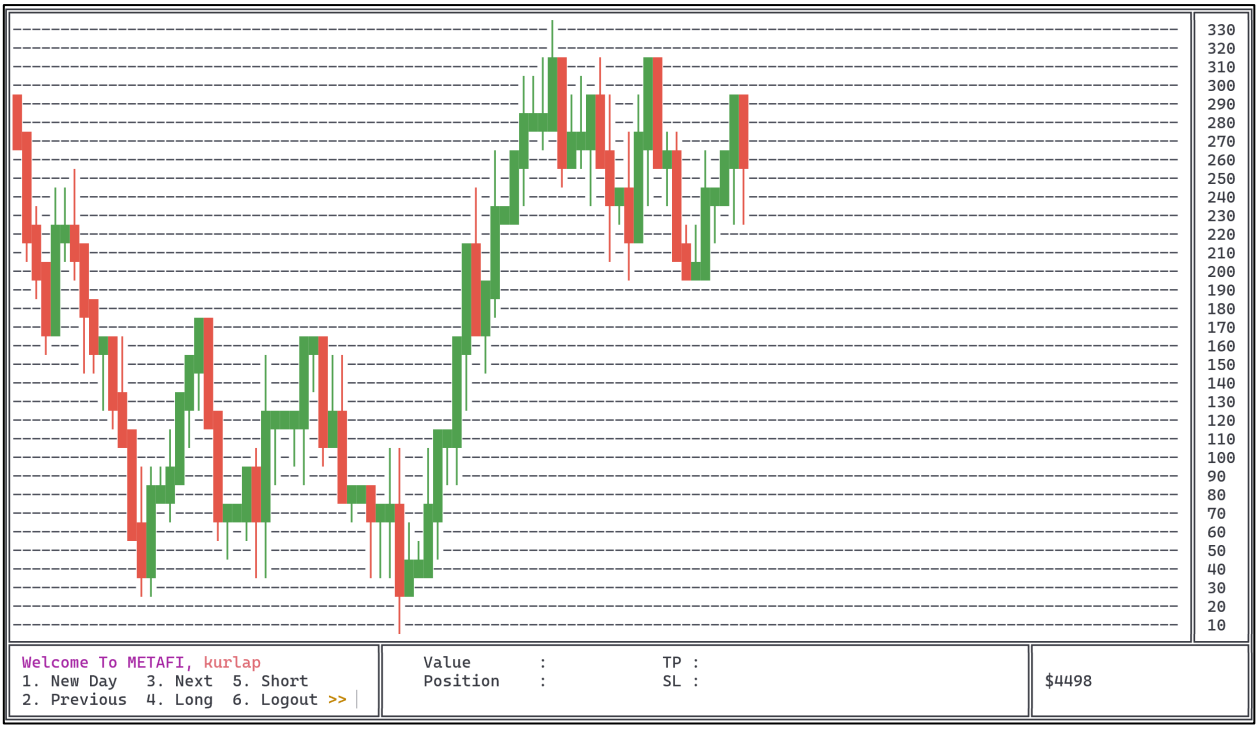

Figure 19. Next (After)

4. If user choose **Long** (**Menu 4**):
    - **Validate** that there is only **one trade** at the **moment**.
    - **Prompt** user to input **value**
        - **Validate** that the **value** must between **10** and **user's currency**
    - **Prompt** user to input **position**
        - **Validate** that the **position** should between **20** and **330**.
        - **Validate** that the **position** should be in **multiple of ten**.
        - **Display** error if user input is **invalid**.
    - **Prompt** user to input **take profit**
        - **Validate** that the **take profit** must be **higher** than **position**.
        - **Validate** that the **take profit** should be in **multiple of ten**.
        - **Validate** that the **take profit** must between **10** and **330**.
        - **Display** error if user input is **invalid**.
    - **Prompt** user to input **stop loss**
        - **Validate** that the **stop loss** must be **lower** than **position.**
        - **Validate** that the **stop loss** should be in **multiple of ten.**
        - **Validate** that the **stop loss** must between **10** and **330**.

- **Display** error if user input is **invalid**.

- **Display** inputted **position**, **take profit**, and **stop loss** by using **dashed line** (**‘-‘**)
  - **Take profit** line color is **green**
  - **Position** line color is **white**
  - **Stop loss** line color is **red**

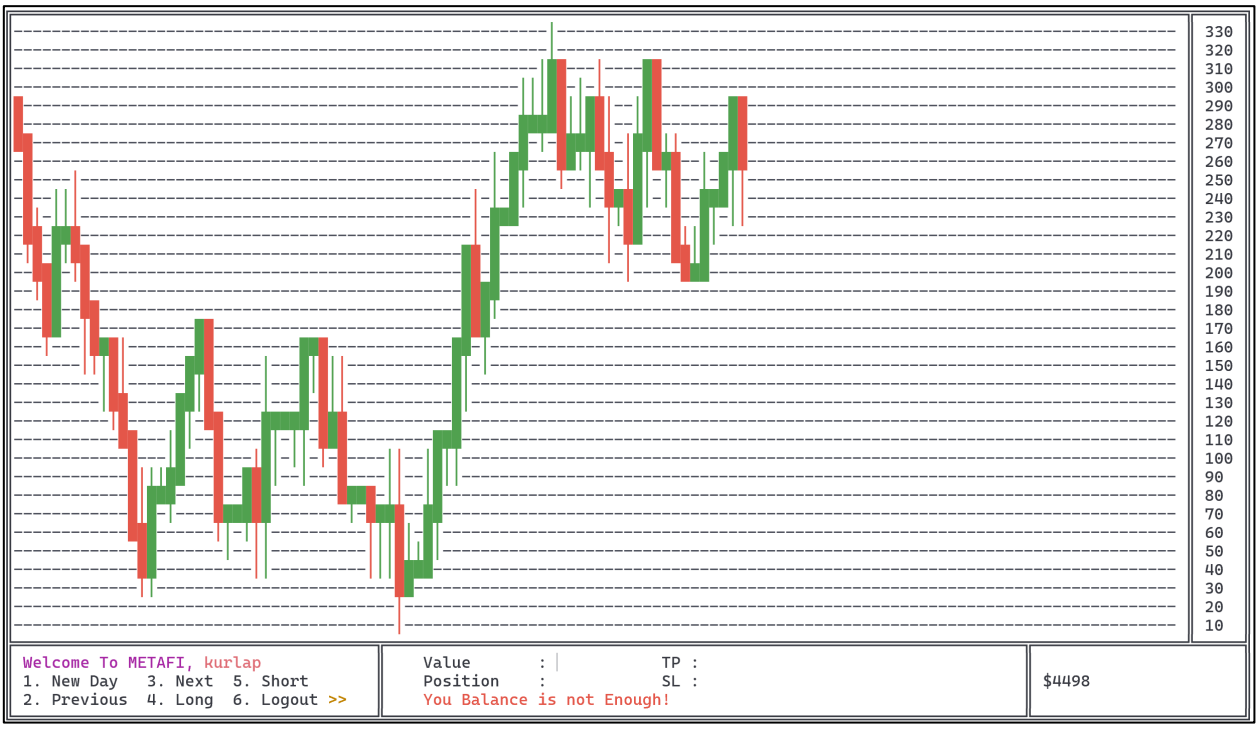

Figure 20. error message

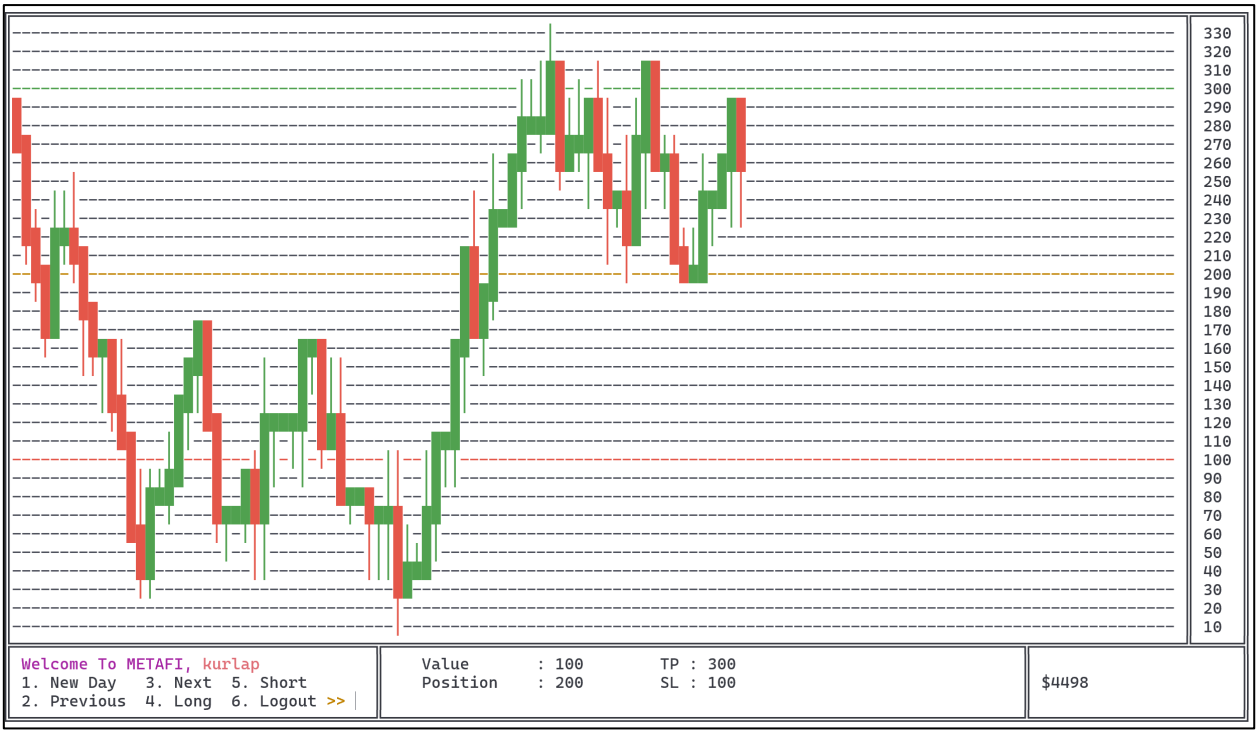

Figure 21. Long

5. If user choose **Short** (**Menu 5**):
    - **Validate** that there is only **one trade** at the **moment**.
    - **Prompt** user to input **value**
        - **Validate** that the **value** must between **10** and **user's currency**
    - **Prompt** user to input **position**
        - **Validate** that the **position** should between **20** and **320**.
        - **Validate** that the **position** should be in **multiple of ten**.
    - **Prompt** user to input **take profit**
        - **Validate** that the **take profit** must be **lower** than **position**.
        - **Validate** that the **take profit** should be in **multiple of ten**.
        - **Validate** that the **take profit** must between **10** and **330**.
    - **Prompt** user to input **stop loss**
        - **Validate** that the **stop loss** must be **higher** than **position.**
        - **Validate** that the **stop loss** should be in **multiple of ten.**
        - **Validate** that the **stop loss** must between **10** and **330**.

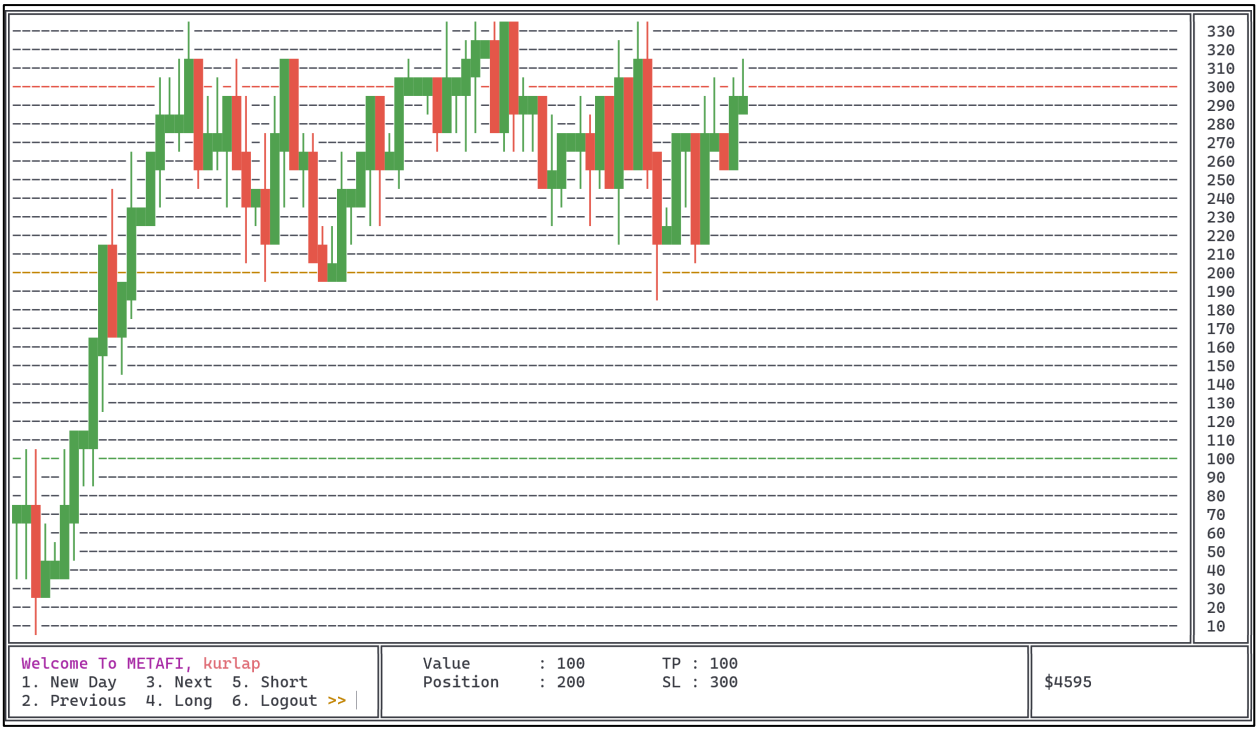

Figure 22. Short

6. **Trading mechanism**:
   - When the trade is opened, **validate** if the position is equal to **current close price**, then the trade is **active**. If it is not equal, then the trade is not active.
   - When a trade is active, the **user's currency** will change based on the current **candle stick's closed price**.
   - A trade will be **inactive** if the candle stick **crossed** the **take profit price** or **stop loss price** and the trade must be in **active** state.
   - If the trade is done, add the **current position data** to **current logged in user** using **single linked list** with **priority queue** from **highest** to **lowest reward.**

Figure 23. Position Opened

Figure 23. Figure Position Closed

```
reward = (value * absolute(close price - position)) / 100

Ex:
value = 1000
close price = 110
position = 100

(1000 * |110 - 100|) / 100 -> 10000 / 100
reward = 100
```

Figure 24. Reward formula

- **Calculate Reward**
  - To update user's currency, we need to calculate the **reward** based on the formula above.
  - If the user is **profit**, then we will add the **user's currency** with **calculated reward**. But if the user is **loss**, then we will **reduce user's currency** with **calculated reward**.

7. If user choose **Logout** (**Menu 6**):
   - **Redirect** back to the **Main Menu Page**.

Please run the EXE file to see the sample program.