User manual

1. Project Introduction

The purpose of this project is to build and develop a web application hosted on a decentralised network to facilitate the transaction of electricity between users. The users can be not only the electricity consumer but also the producer with rooftop solar equipment. Unlike traditional supply systems which can only provide electricity to users, this system allows users to buy or sell excessive electricity among users. This project's scope is to build private online ledgers to process electricity transactions between users using blockchain technology. Due to the distributed feature of the blockchain, the electricity supply system is also distributed which is quite different from the existing system.

Built with:

- Ubuntu 20.04

- Hyperledger Fabric

- VUE + Springboot (Java)

2. Get started

This project was tested in an Ubuntu 20.04 environment. You can install Ubuntu 20.04 on VirtualBox. Recommended Memory is 2G and recommended storage is

This is an example of how you may give instructions on setting up your project locally. To get a local copy up and running follow these simple example steps.

2.1 Prerequisites

2.1.1 Backend

This is an example of how to list things you need to use the software and how to install them.

- docker

```
sudo apt-get install docker
sudo apt-get install docker-ce
```

- SSH (It is required if the virtual machine needs connection with outside environment)

- MySQL (The codes beginning from line 7 should be copied exactly.)

```
1. sudo mysql
2. ALTER USER 'root'@'localhost' IDENTIFIED WITH
   mysql_native_password BY 'newpwd'; #newpwd is the new password
   you set for root
3. FLUSH PRIVILEGES;
4. quit;
5. sudo service mysql restart
6.
7. mysql -uroot -p #And enter the password you've just set
8. CREATE USER 'detscs341'@'localhost' IDENTIFIED WITH
   mysql_native_password BY 'detscs341';
9. GRANT ALL PRIVILEGES ON *.* TO 'detscs341'@'localhost' WITH GRANT
   OPTION;
10. FLUSH PRIVILEGES;
11. quit;
12. sudo service mysql restart
```

2.1.2 Frontend

- Java 11

- maven

```
sudo apt-get install Maven
```

- node.js v15.14.0

- npm 7.7.6

```
1. curl -sL https://deb.nodesource.com/setup_15.x | sudo -E bash -
2. sudo apt-get install -y nodejs
3. sudo apt-get install vue-cli
4. node -v && npm -v
```

- Vue-cli

```
sudo npm install -g @vue/cli
```

2.2 Initiation

- Clone the project into local directory:

```
git clone https://github.com/COMP5703-CS34/DETS.git
```

- Go to script dir,

```
cd script
```

- Run the script file step1.sh

```
sudo sh step1.sh
```

step1.sh is to build the database and start the chaincode network. It may take about 10-15 minutes to start up. The successful page should be like:

When the script file step1.sh runs successfully, run step2.sh (you can only run step2.sh if step1.sh runs successfully, otherwise an error will occur). If you get a red prompt or a non-successful screen when running the above command, you need to run the above command again.

```
sudo sh step2.sh
```

step2.sh is to start the front and back-end services. A successful run will result in as followed:

Then you can open an explorer and access to the URL shown in the terminal Frontend: Vue. You will see the home page.

Important: Do not close these two terminals. If you accidentally close them, you can use

```
sudo sh backscript.sh
# for restarting backend
```

or

```
sudo sh vuescript.sh
# for restarting frontend
```

to start the back-end and front-end respectively.
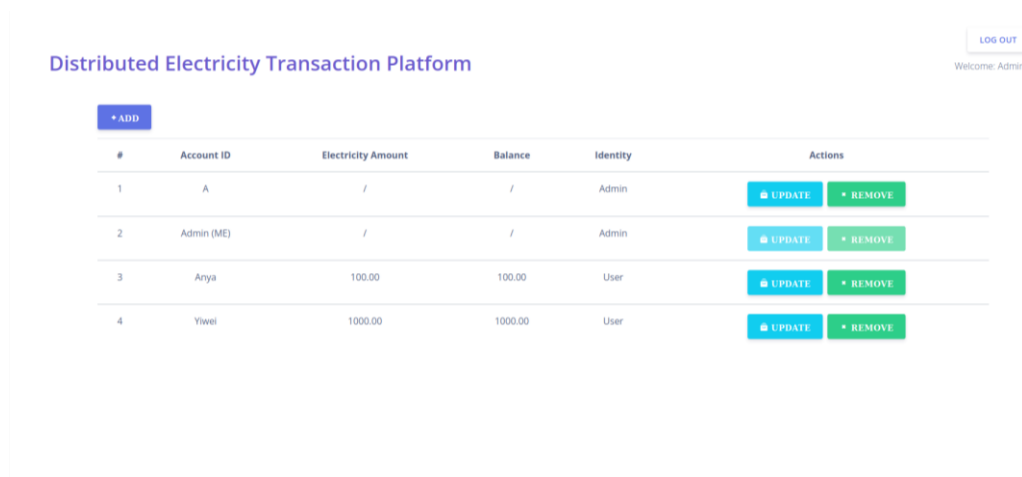
3. Operation Guidance

* This project is still under construction which can only run in the testing environment. Therefore, please log in with the username "Admin" and password "Adminpwd" to add users first before do further transaction testing.

The roles in the system are mainly divided into user and administrator.

3.1 Administrator

As an administrator you have the right to add, update or remove accounts. The steps are as follows.

Log in with your Admin Name and Admin Password, the system will automatically identify you as an administrator. And the system automatically displays the information of existing accounts.
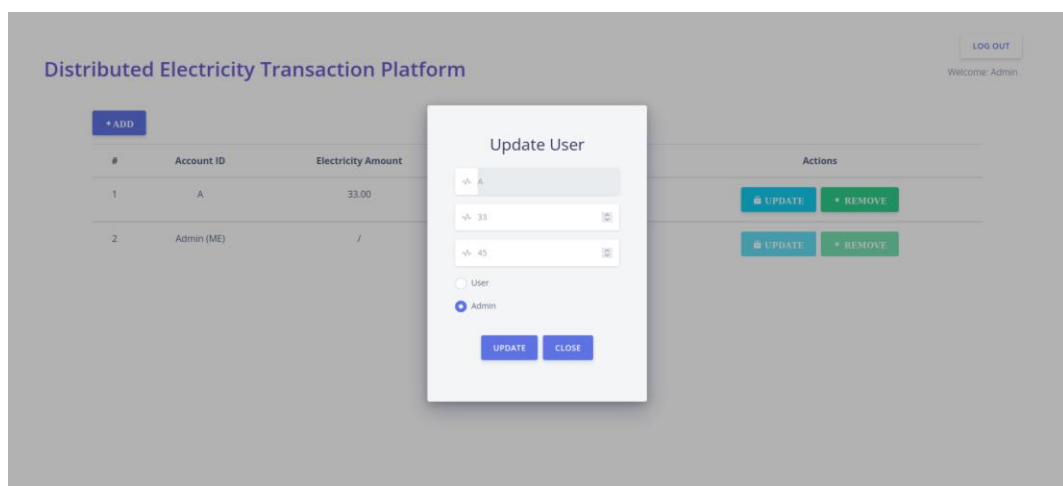

3.1.1 Add new accounts

You can click "+ADD" to add a new account. You will need to set the username, amount and balance for the new account and click "OK" to submit.

3.1.2 Update account

Administrators can click "UPDATE" to update user details, such as amount, balance and identity.

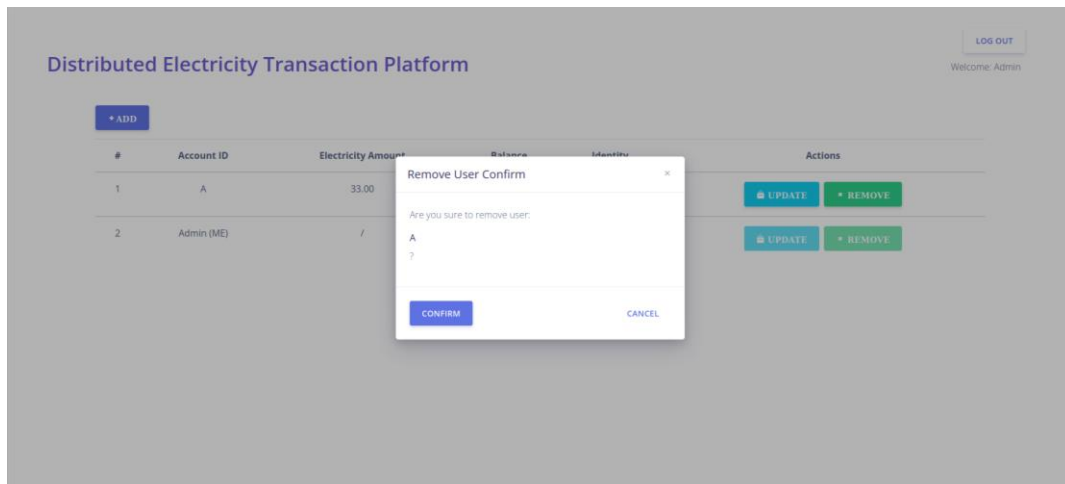### 3.1.3 Remove accounts

Administrators can remove abandoned accounts through "REMOVE".

* Due to the problem of the Hyperledger mechanism, the same user name can be added again after being deleted, but in subsequent use, the user will not be able to read its transaction history and other information. This issue cannot be resolved for now.

3.2 User

Administrator has been granted to add new users. If you would like to join the transaction system please contact the administrators. Your account name and password will be told by administrator. Then you can input your account name and password to login.
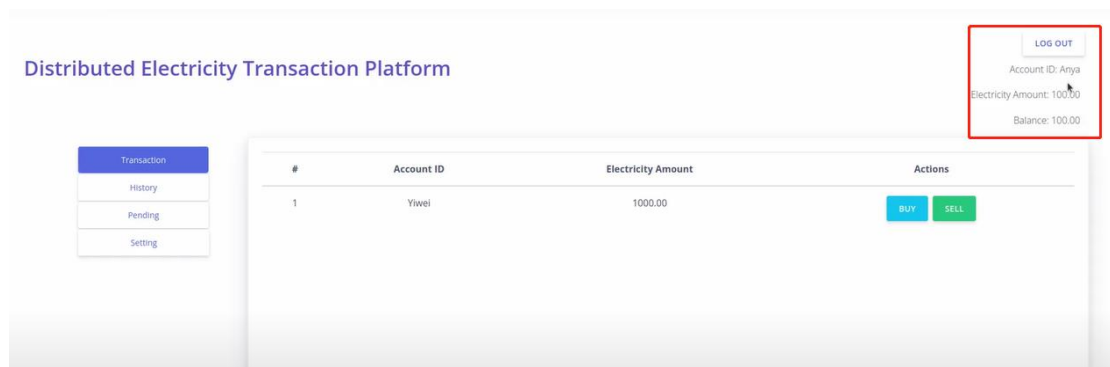
Note, in this testing environment, your default password is username + pwd, e.g. if your username is Anya, then the default password is Anyapwd.
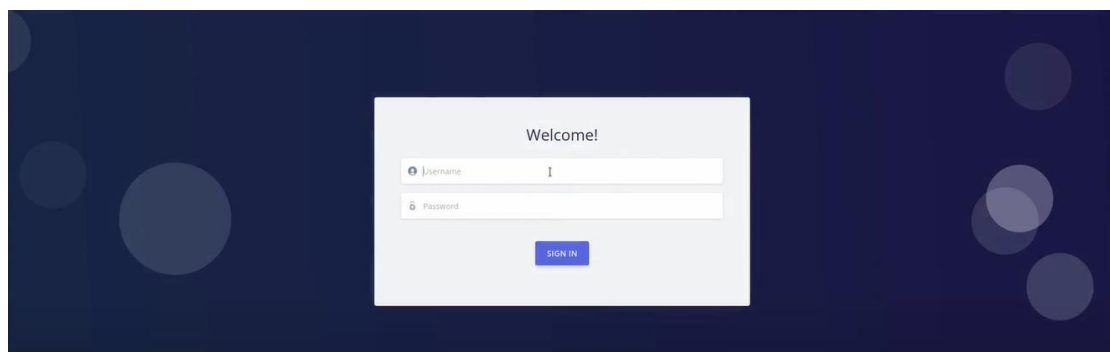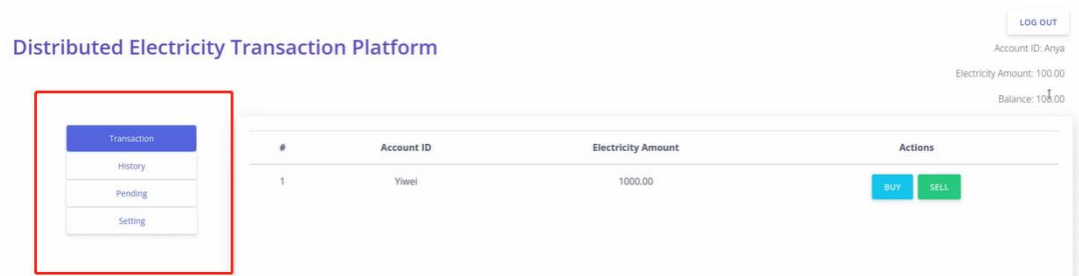

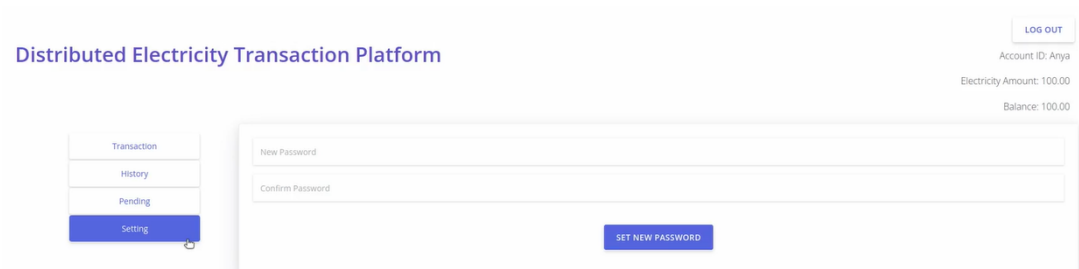Once you have logged into the system, you will see the page like:

All your information, including your account name, electricity amount and balance is noticed:
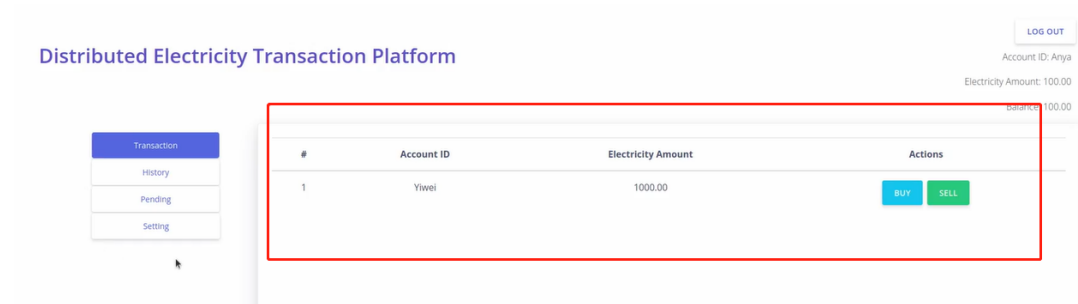

Here are the 4 tabs for core functions you can perform:

If it is the first time you log in to the system, you need to change your password at setting page. Then you can continue your transaction.


In transaction page, all tradable objects will be listed here, and you can apply for the "sell" or "buy" the subject's electricity

When you click on the "Buy" or "Sell" button, you have to fill in a form with the quantity of electricity and the price you want to buy or sell:


After click "OK" and "confirm", you can see the new request in your pending page. You can cancel it by click "cancel" button.
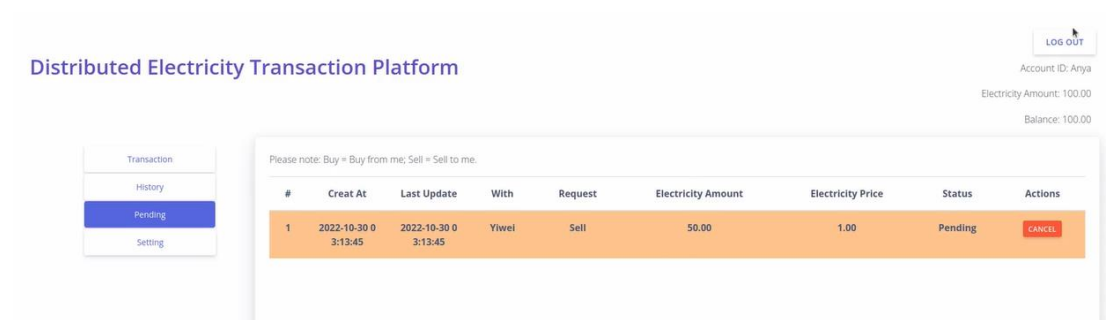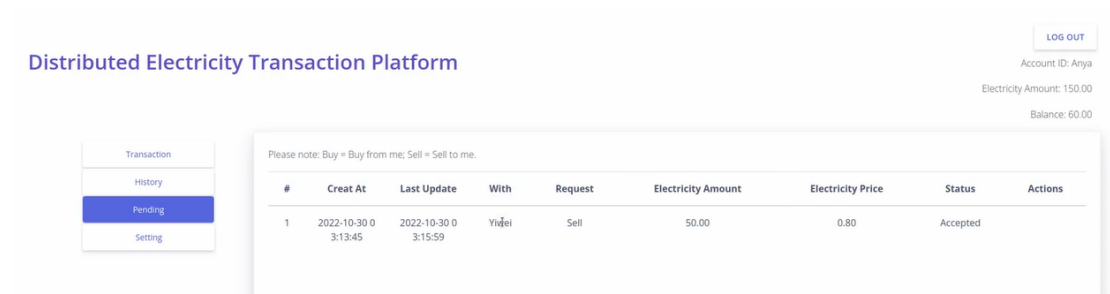

A request will also be sent to the person you are trading with and this request will be displayed on his/her pending page. The requested person can bargain, agree, or refuse to deal.
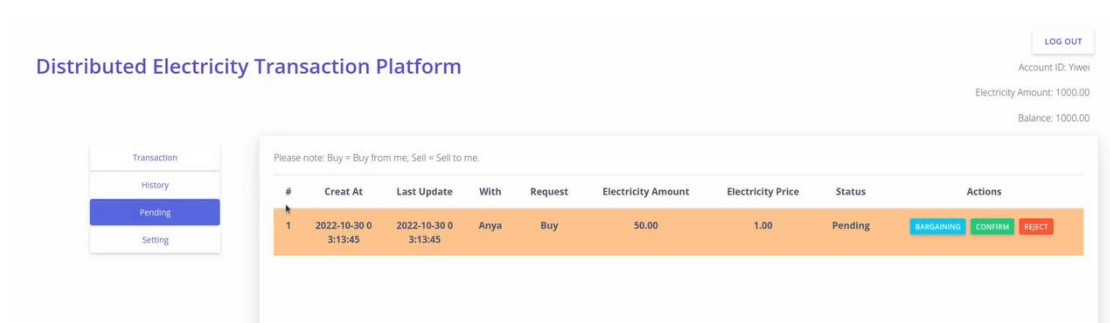
If you are not satisfied with the price, you can click "bargin" to ask for a better price by inputting the ideal price and click "OK".
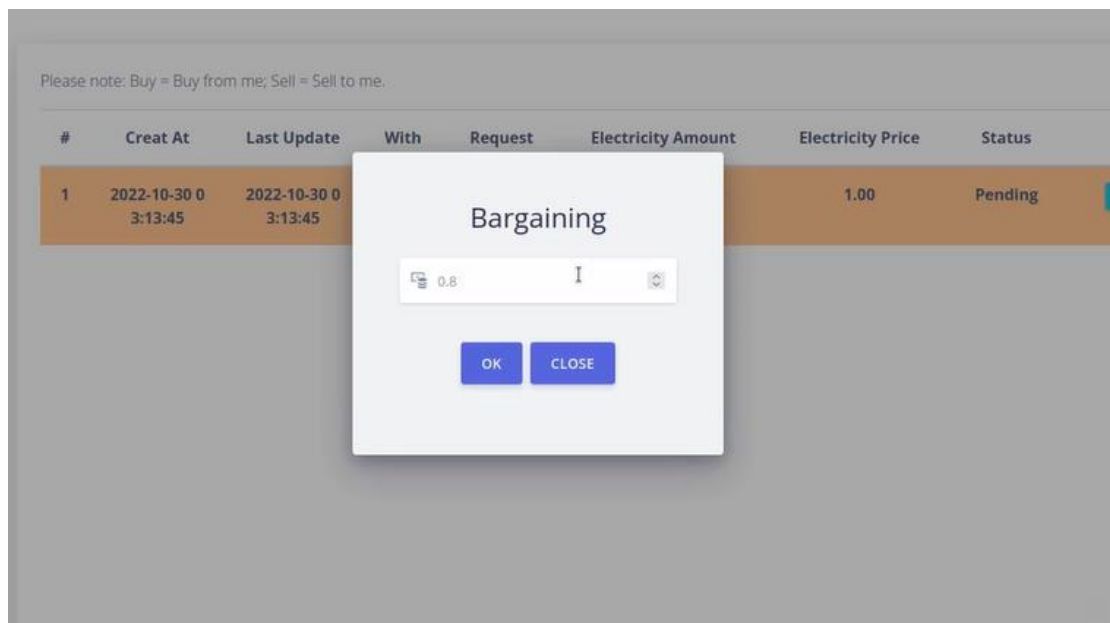
If the transaction is confirmed, the status will turn to accepted. The balance and electricity amount will also change.

You can find your transaction history at history page:

4. Error message & handling

In most cases, if you follow the instructions above, there won't be much problem during using. However, still some errors may occur when initiating and using our system due to Internet and operation problems.

Here lists some errors that might occur. If your error doesn't fit any of them, please contact us.

4.1 Initiation error

We have shown you how it will be if you successfully install the Hyperledger blockchain service in the previous pages. There are two common errors you may occur during initiating.

For most cases, the error when "cc install" can be solved either by adjusting your internet condition or reinstalling. If the problem still exists, please contact us.

4.1.1 Blockchain docker error

Though we have cleaned up the network and docker environment in step1, there might be some risks that there are some remaining images in docker.

If you see the error shown above, please redo

```
sudo sh step1.sh
```

to try to set up the environment again.

3.1.2 Gradle error

Because Gradle needs to be connected to the Internet for re-pulling during each startup, there may be problems with Gradle configuration failure due to network reasons. Please check the network and try again.

4.2 System error

During the use of the system, some errors and error messages may appear. You can troubleshoot according to the error message and the following operations. If you still can't solve it, please contact us.

4.2.1 Internet error

Please note that here **"internet" or "network" refers to frontend and backend connection**. If you see any error message related to the internet like below, please check your backend status and **please make sure the terminal holding backend cannot be closed during system use**.

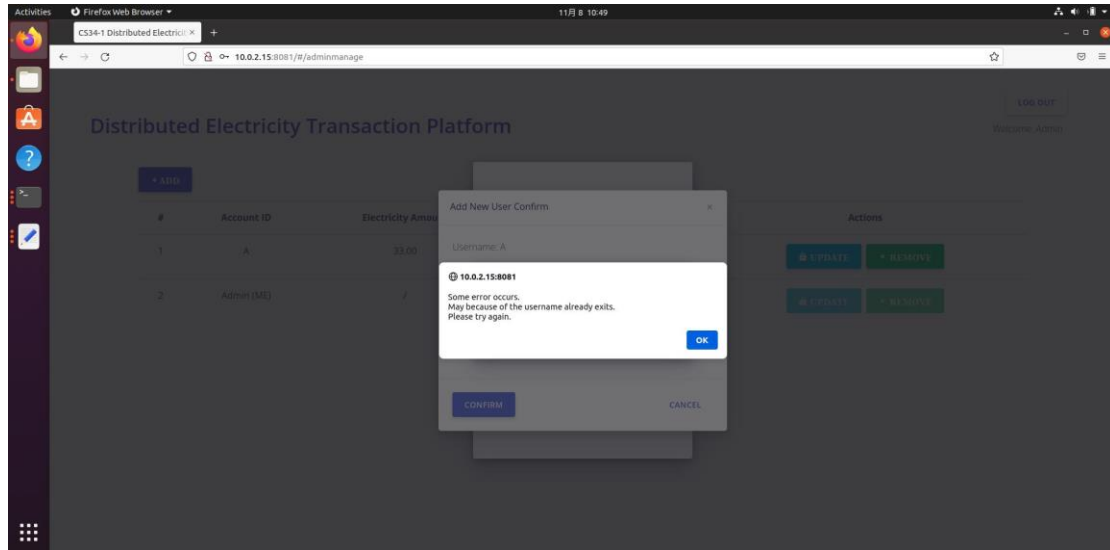If you accidentally close the terminal, please follow this instruction and try again.
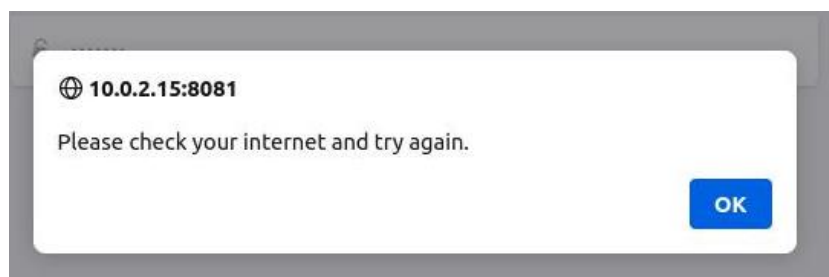
4.2.2 Operation error

During use, your following behaviors will be prompted with errors, please change your operation according to the prompts.

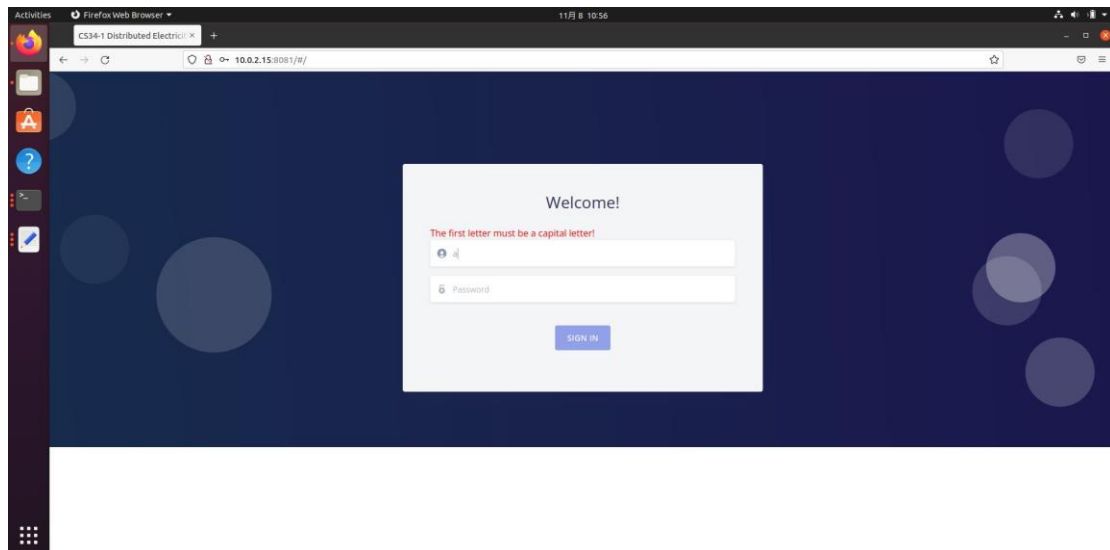**1. Add a user with the same username.**

Please change a username and try again.

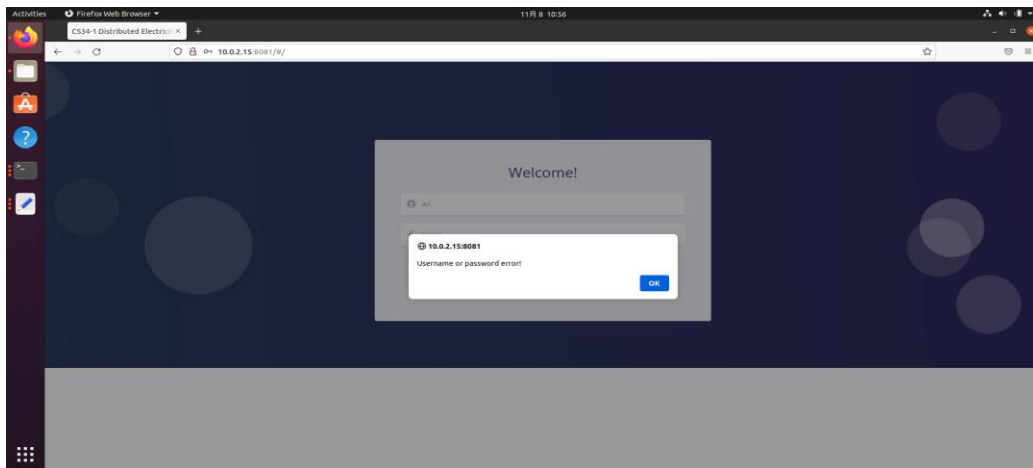## 2. Login with a username starting with a lowercase letter.

For system limitations, all usernames in our system are with a uppercase letter.

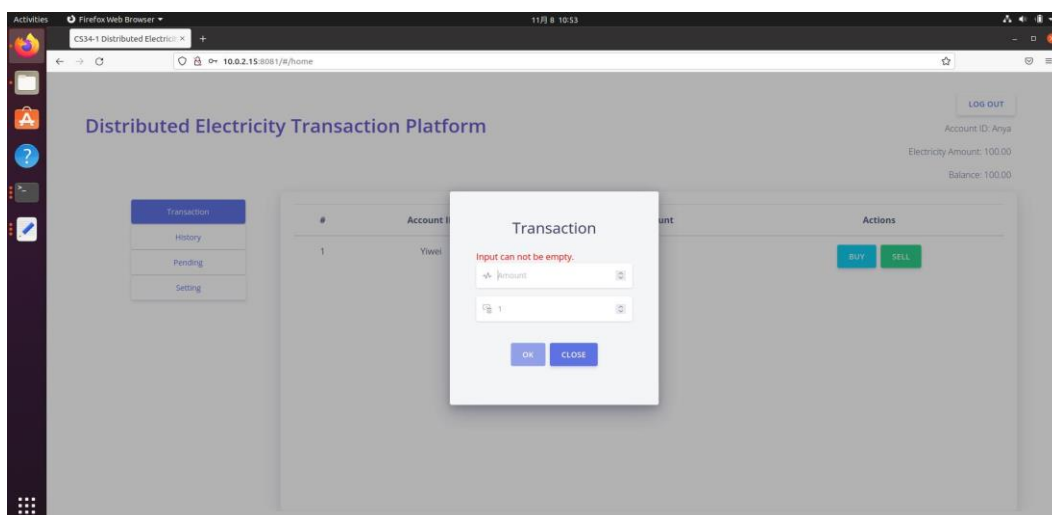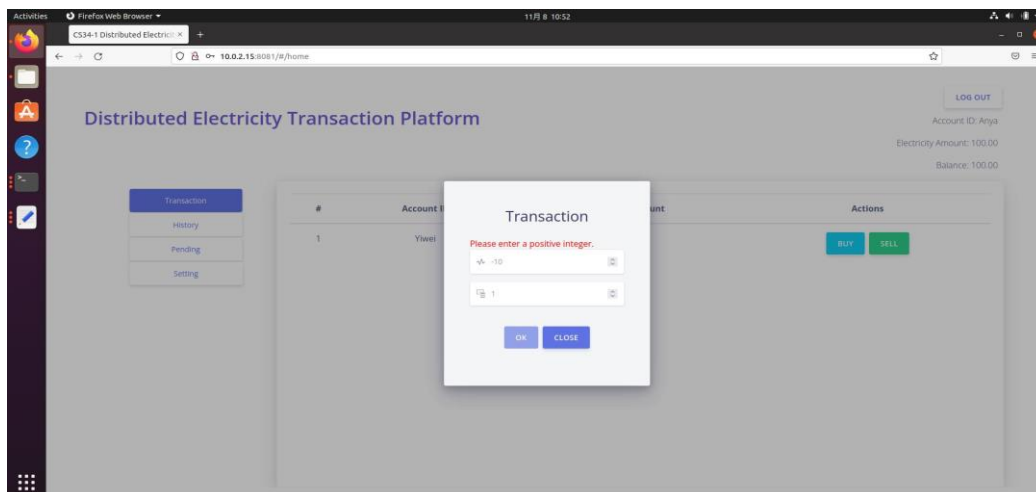

3. Username or password error.

Please check your username and password again before input.

Note, your default password is username + pwd, e.g. if your username is Anya, then the default password is Anyapwd.
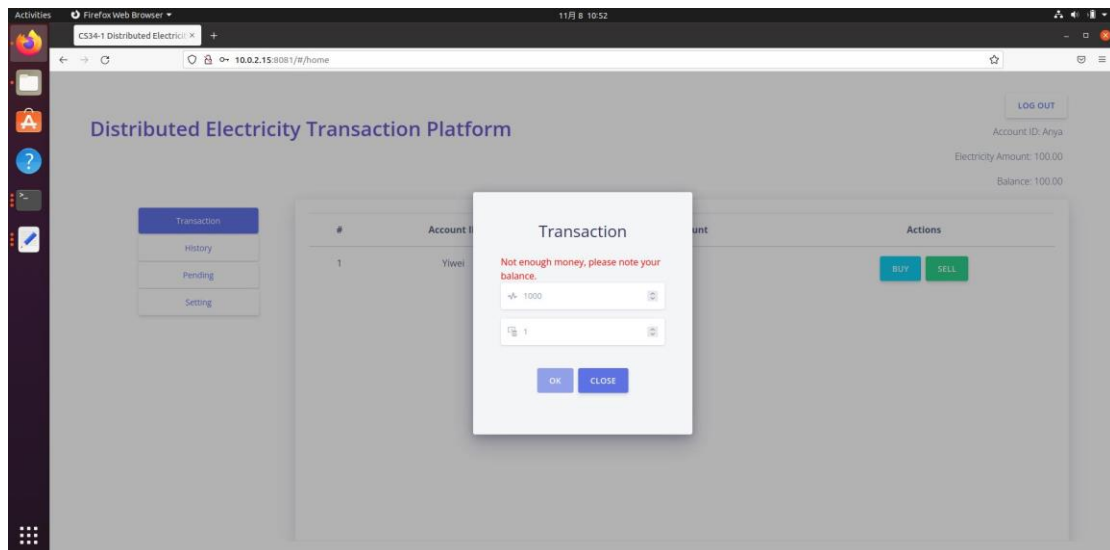
4. Input negative numbers or make empty input in amount or price.
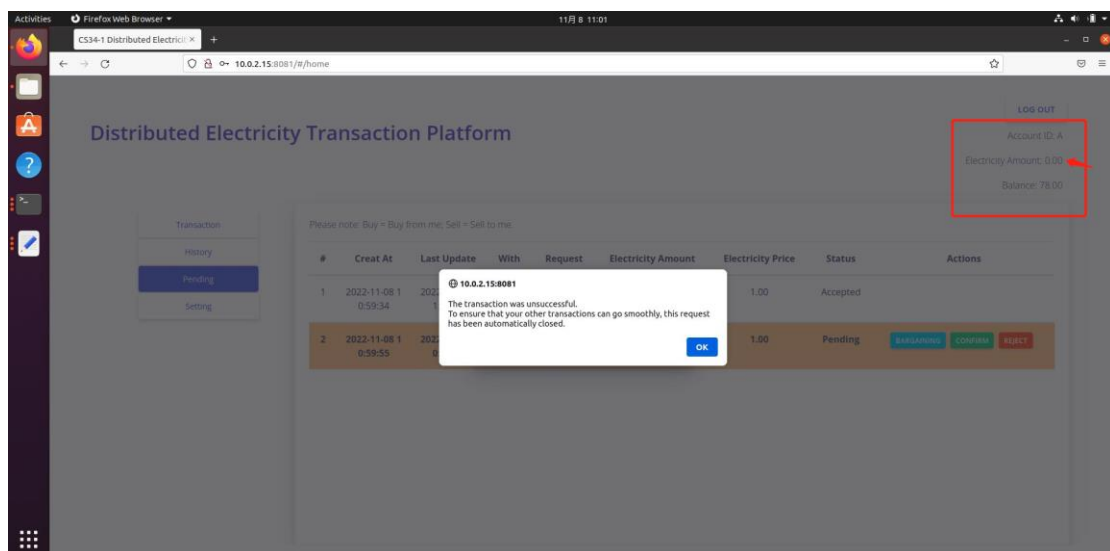
Please input a positive number.

5. Input out of range numbers.

Please check the remaining balance or electricity amount before input.

6. Illegal transaction.

If the balance or remaining power of any party involved in the transaction is insufficient, it will be automatically judged as "illegal transaction". The transaction will be closed directly.

7. Two passwords are not the same.

Please make sure your input of the passwords.

Distributed Electricity Transaction Platform

LOG OUT

Account ID: A

Electricity Amount: 0.00

Balance: 78.00

| Transaction |
| History |
| Pending |
| Setting |

The two passwords are not the same.

SET NEW PASSWORD