

CSE410 LAB 2

AIRLINE CONSORTIUM

BY

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1 Lab Overview

This is a Decentralized Airline Consortium using blockchain that facilitates a trusted layer for airlines that are not necessarily in relationship with each other to exchange and sell unsold but available seats on airlines in times of needs in an ad hoc and impromptu fashion.

For example, a strong snowstorm has lead to some major airlines like Delta Airlines to cancel their flight, therefore causing a lot of rescheduling their fleet, flights and passengers. Therefore, by using this web application, they will be able to check the amount of available seats from other airlines and change the seats for their passenger.

2 Required Components

1. MongoDB

This can be easily installed on any computer, simply by typing the command ***brew install mongodb*** on Terminal or Command Prompt.

2. Node.js

This can be easily installed on any computer, simply by going to Node.js website (<https://nodejs.org/en/download/>) and downloading the installer, based on the operating system.

3. Ganache

This can be easily installed on any computer, simply by going to Ganache website (<https://truffleframework.com/ganache>) and downloading the installer, based on the operating system.

4. MetaMask

This can be easily installed on any computer, simply by going to MetaMask website (<https://metamask.io/>) and installing the extension, based on the web browser.

3 Application Setup

3.1 Ganache

3.1.1 Settings

The screenshot shows the Ganache application interface. At the top, there is a navigation bar with icons for Accounts, Blocks, Transactions, Contracts, Events, and Logs. Below the navigation bar, there are several configuration settings: Current Block (0), Gas Price (2000000000), Gas Limit (6721975), Hardfork (PETERSBURG), Network ID (5777), RPC Server (HTTP://127.0.0.1:7545), Mining Status (AUTOMINING), and Workspace (QUICKSTART). There are also 'SAVE' and 'SWITCH' buttons. A search bar at the top right allows for searching block numbers or transaction hashes. The main area displays a list of accounts with their addresses and balances. The first account has a balance of 100.00 ETH. A green arrow points to the gear icon in the top right corner of the interface, with the word 'CLICK' written next to it.

ADDRESS	BALANCE	TX COUNT	INDEX
<code>0x37576d790968A602502C691a104e4aB4Ea78C9B9</code>	<code>100.00 ETH</code>	0	0
<code>0x79c5b5a103B1C8eE93Fa6644b5D962dF8d2FB9f4</code>	<code>100.00 ETH</code>	0	1
<code>0xD83FcBE0aA6639CD1e6285866c8B6c1d6ADa8916</code>	<code>100.00 ETH</code>	0	2

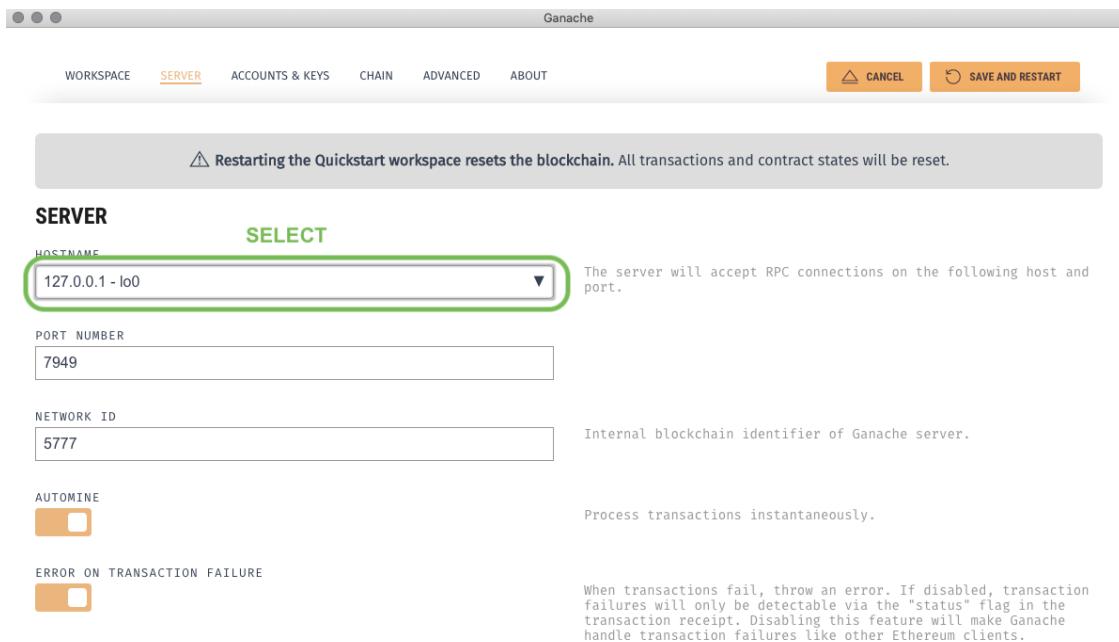
Open up Ganache application. Once it's opened, go to Settings by clicking the button as shown above.

3.1.2 Server Settings (1)

The screenshot shows the 'Settings' screen of the Ganache application. At the top, there is a navigation bar with tabs for WORKSPACE, SERVER (which is highlighted in orange), ACCOUNTS & KEYS, CHAIN, ADVANCED, and ABOUT. There are also 'CANCEL' and 'SAVE AND RESTART' buttons. A message box states: "⚠️ Restarting the Quickstart workspace resets the blockchain. All transactions and contract states will be reset." Below the tabs, there are configuration options: HOSTNAME (set to "0.0.0.0 - All Interfaces"), PORT NUMBER (set to "7949"), NETWORK ID (set to "5777"), AUTOMINE (a checkbox that is checked), and ERROR ON TRANSACTION FAILURE (a checkbox that is checked). A note next to the AUTOMINE setting says: "Process transactions instantaneously." Another note next to the ERROR ON TRANSACTION FAILURE setting says: "When transactions fail, throw an error. If disabled, transaction failures will only be detectable via the 'status' flag in the transaction receipt. Disabling this feature will make Ganache handle transaction failures like other Ethereum clients." A green arrow points to the 'SERVER' tab, with the word 'CLICK' written next to it.

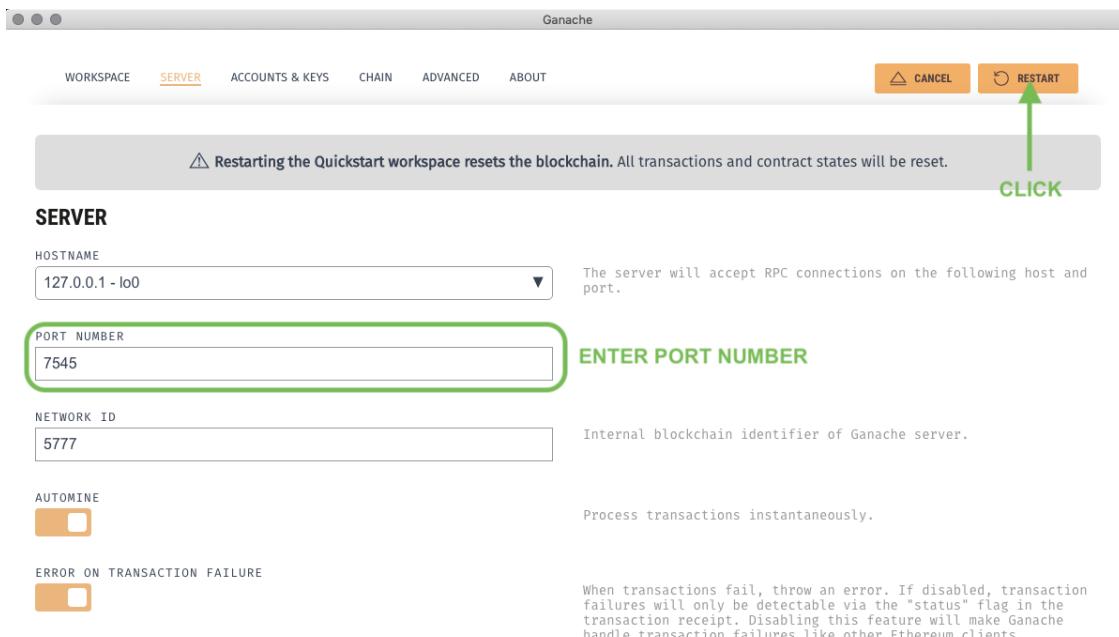
When you got into Settings, go to Server Settings by clicking the text as shown above.

3.1.3 Server Settings (2)



When you got into Server Settings, click on Host Name and choose **127.0.0.1** as shown above.

3.1.4 Server Settings (3)



When you selected Host Name, enter **7545** as Port Number. When you're done, save the changes by clicking Restart button as shown above.

3.2 MongoDB

3.2.1 Database

```
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] ** WARNING:
This server is bound to localhost.
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] **
Remote systems will be unable to connect to this server.
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] **
Start the server with --bind_ip <address> to specify which IP
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] **
addresses it should serve responses from, or with --bind_ip_all to
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] **
bind to all interfaces. If this behavior is desired, start the
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] **
server with --bind_ip 127.0.0.1 to disable this warning.
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten]
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten]
2019-05-07T20:22:54.237-0400 I CONTROL [initandlisten] ** WARNING:
soft rlimits too low. Number of files is 256, should be at least 100
0
2019-05-07T20:22:54.292-0400 I FTDC      [initandlisten] Initializing
full-time diagnostic data capture with directory '/data/db/diagnostic.data'
2019-05-07T20:22:54.295-0400 I NETWORK  [initandlisten] waiting for
connections on port 27017
```

Open Terminal or Command Prompt, and simply type the command ***mongo*** OR ***mongod*** to start the database as shown above.

3.3 Node.js

3.3.1 Web Application

```
[Alex-Kims-MacBook-3:Documents Alex$ cd GitHub
[Alex-Kims-MacBook-3:GitHub Alex$ ls
CSE410-Airline-Consortium           CSE442-Developers
CSE410-Decentralized-Marketplace
[Alex-Kims-MacBook-3:GitHub Alex$ cd CSE410-Airline-Consortium
[Alex-Kims-MacBook-3:CSE410-Airline-Consortium Alex$ ls
README.md      ballot-app      ballot-contract
[Alex-Kims-MacBook-3:CSE410-Airline-Consortium Alex$ cd ballot-app
[Alex-Kims-MacBook-3:ballot-app Alex$ ls
index.js       node_modules    package.json    src
[Alex-Kims-MacBook-3:ballot-app Alex$ node index.js
Example app listening on port 3000!
```

After starting Database, cd into the project directory and then into ballot-app. Then, type ***node index.js*** to start the web application as shown above.

3.4 MetaMask

3.4.1 Web Application

Airline Consortium

ANA Airline balance: 100  0x79c5b5a103b1c8... seats left :3 Send passenger	Qatar Airline balance: 100  0xd83fcbe0aa6639... seats left :2 Send passenger	Malaysia Airline balance: 100  0x995efa0722742b... seats left :1 Send passenger	Singapore Airline balance: 100  0x7a3d7ec6760ae9... seats left :0 Send passenger
---	---	---	---

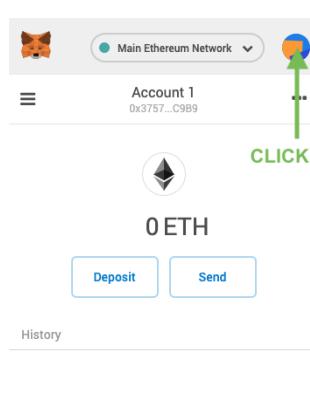
Airline assigned:
0

ticket price: 100

Chairperson :

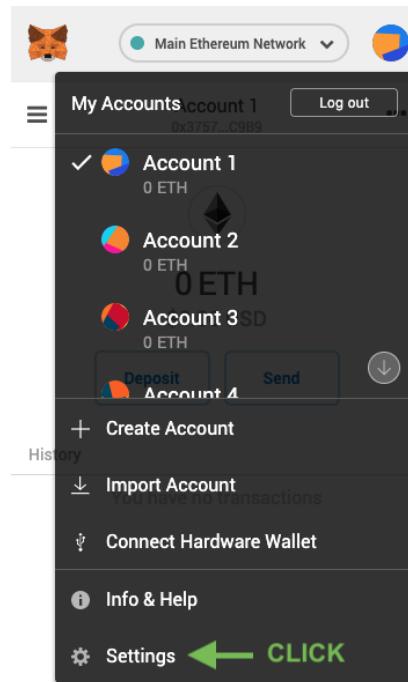
When you started Web Application, open any web browser and type ***http://localhost:3000*** to open Web Application as shown above.

3.4.2 MetaMask



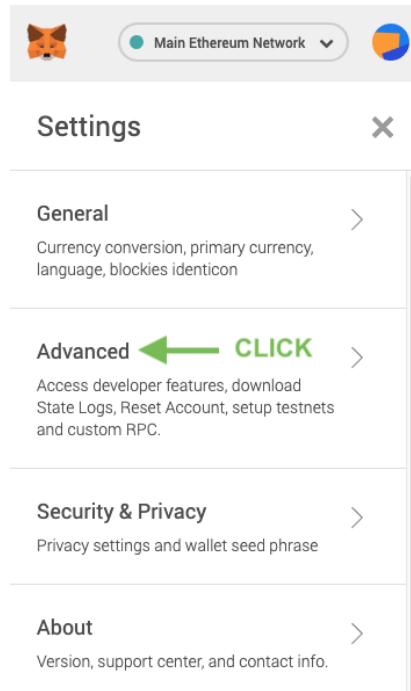
When you opened Web Application, open MetaMask extension by clicking the Fox icon. Then, go to Account Details by clicking the button as shown above.

3.4.3 Settings



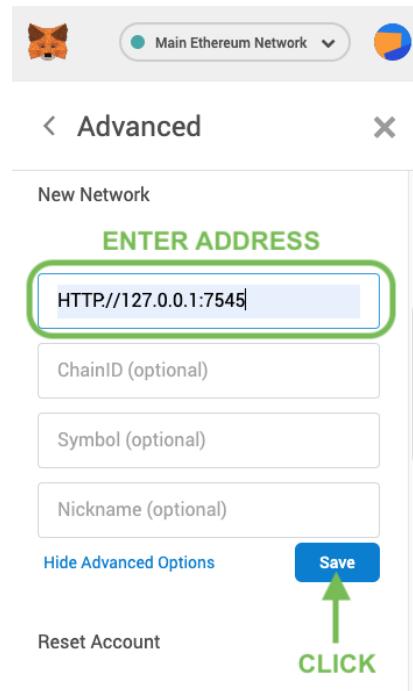
When you got into Account Details, go to Settings by clicking the button as shown above.

3.4.4 Advanced Settings



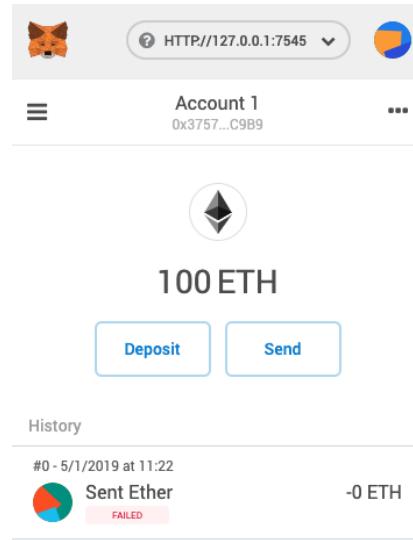
When you got into Settings, go to Advanced Settings by clicking the button as shown above.

3.4.5 Network Settings



When you got into Advanced Settings, enter **HTTP://127.0.0.1:7545** and click Save as shown above.

3.4.6 Balance



When everything has been successfully set up, new balance of 100 ETH will be added to your account as shown above.

4 Application Flow

4.1 Chairperson Address

4.1.1 Web Application

Airline Consortium

ANALyzer	Qatarlyzer	Malaysialyzer	Singaporelyzer
balance: 100 0x4964d7914f9fc9...  seats left : 3 <button>Send passenger</button>	balance: 100 0xa931fef6f62cae...  seats left : 2 <button>Send passenger</button>	balance: 100 0x29f478c133b6f5...  seats left : 1 <button>Send passenger</button>	balance: 100 0x363d9429e5736b...  seats left : 0 <button>Send passenger</button>

Airline assigned:
0

ticket price: 100

Chairperson : **0x19dd1207d5723d8aedbb7142a3101d2e5006ea9a** **Address of Chairperson**

When all steps from Application Setup has been successful, you'll be able to see the Address of Chairperson from the Web Application as shown above.

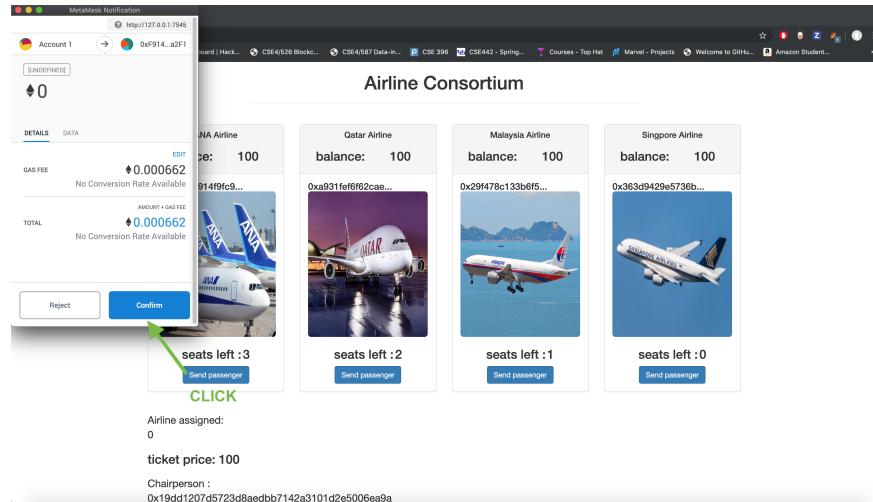
4.1.2 Ganache

MNEMONIC	HD PATH
two stick mistake cattle ankle stuff tag bird spell mom index flush	m/44'/60'/0'/0/account_index
Address Match with Chairperson 0x19dd1207d5723d8aedbb7142a3101d2e5006ea9a	BALANCE 99.99 ETH TX COUNT 4 INDEX 0
ADDRESS 0x4964d7914f9fc9f5fd9ff24cdde46f8b2df80076	BALANCE 100.00 ETH TX COUNT 0 INDEX 1
ADDRESS 0xA931fEf6f62CAe62241418a1D2905B968972Ddb4	BALANCE 100.00 ETH TX COUNT 0 INDEX 2
ADDRESS 0x29F478C133B6F5BB83af02f112f117Ce71cA880d	BALANCE 100.00 ETH TX COUNT 0 INDEX 3
ADDRESS 0x363d9429E5736Bc46590cd8e7a66ff09D04b47Bf	BALANCE 100.00 ETH TX COUNT 0 INDEX 4

To confirm the validity of the Address of Chairperson, open up Ganache and compare the addresses.

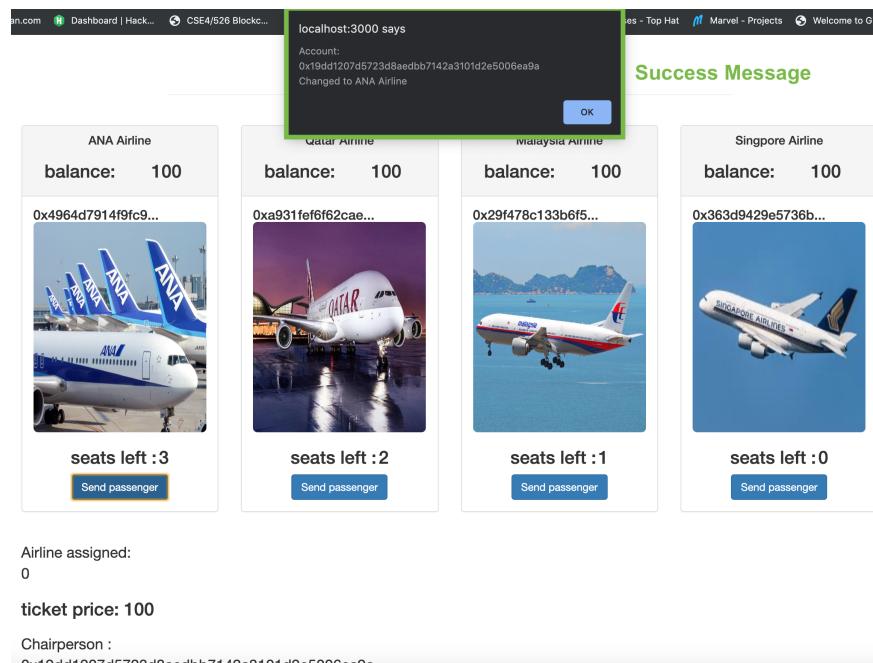
4.2 Good Transaction (1)

4.2.1 Valid Request



When you confirmed the validity of the address, make a request by clicking Send Passenger and Confirm buttons as shown above.

4.2.2 Valid Response (1)



If the seats are available with sufficient balance, it will accept the request and response back with success message as shown above.

4.2.3 Valid Response (2)

Airline Consortium

ANA Airline balance: 200  seats left :2 Send passenger	Qatar Airline balance: 100  seats left :2 Send passenger	Malaysia Airline balance: 100  seats left :1 Send passenger	Singapore Airline balance: 100  seats left :0 Send passenger
---	---	---	---

Airline assigned:
ANA Airline
CHANGES APPLIED

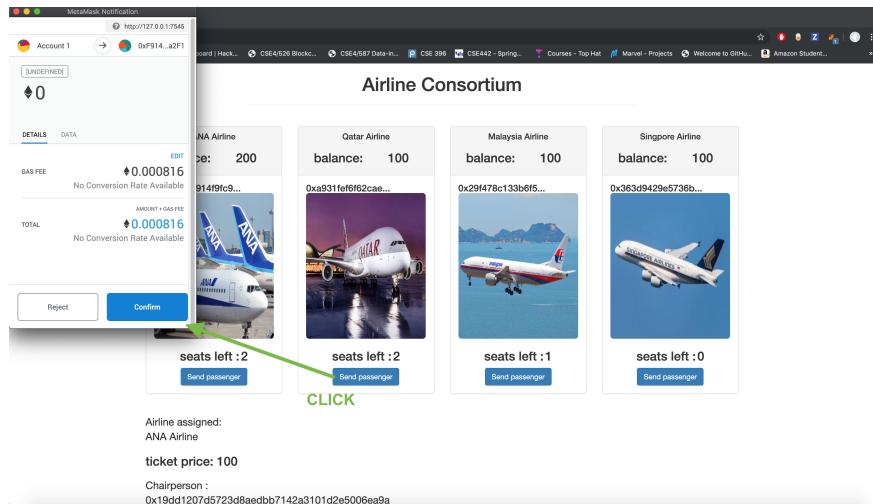
ticket price: 100

Chairperson :
0x19dd1207d5723d8aedbb7142a3101d2e5006ea9a

After closing the success message, all the changes (Balance, Number of Seats Left, Assigned Airline) will be updated as shown above.

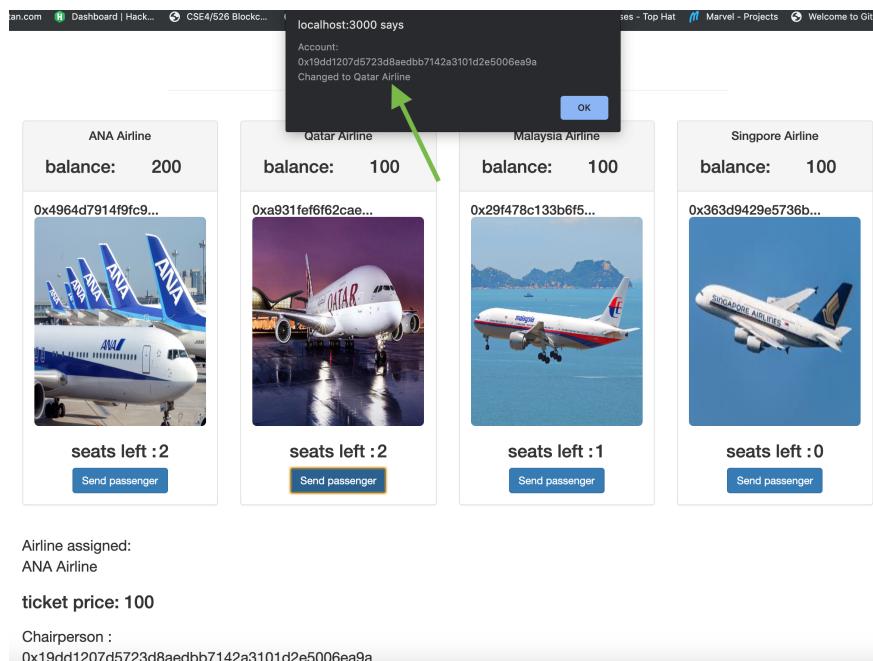
4.3 Good Transaction (2)

4.3.1 Valid Request



To make another changes, make another request by clicking Send Passenger and Confirm buttons again as shown above.

4.3.2 Valid Response (1)



If the seats are available with sufficient balance, it will accept the request and response back again with success message as shown above.

4.3.3 Valid Response (2)

Airline Consortium

ANA Airline balance: 100  0x4964d7914f9fc9... seats left :3 Send passenger	Qatar Airline balance: 200  0xa931fef6f62cae... seats left :1 Send passenger	Malaysia Airline balance: 100  0x29f478c133b6f5... seats left :1 Send passenger	Singapore Airline balance: 100  0x363d9429e5736b... seats left :0 Send passenger
---	---	---	---

Airline assigned:
Qatar Airline CHANGES APPLIED

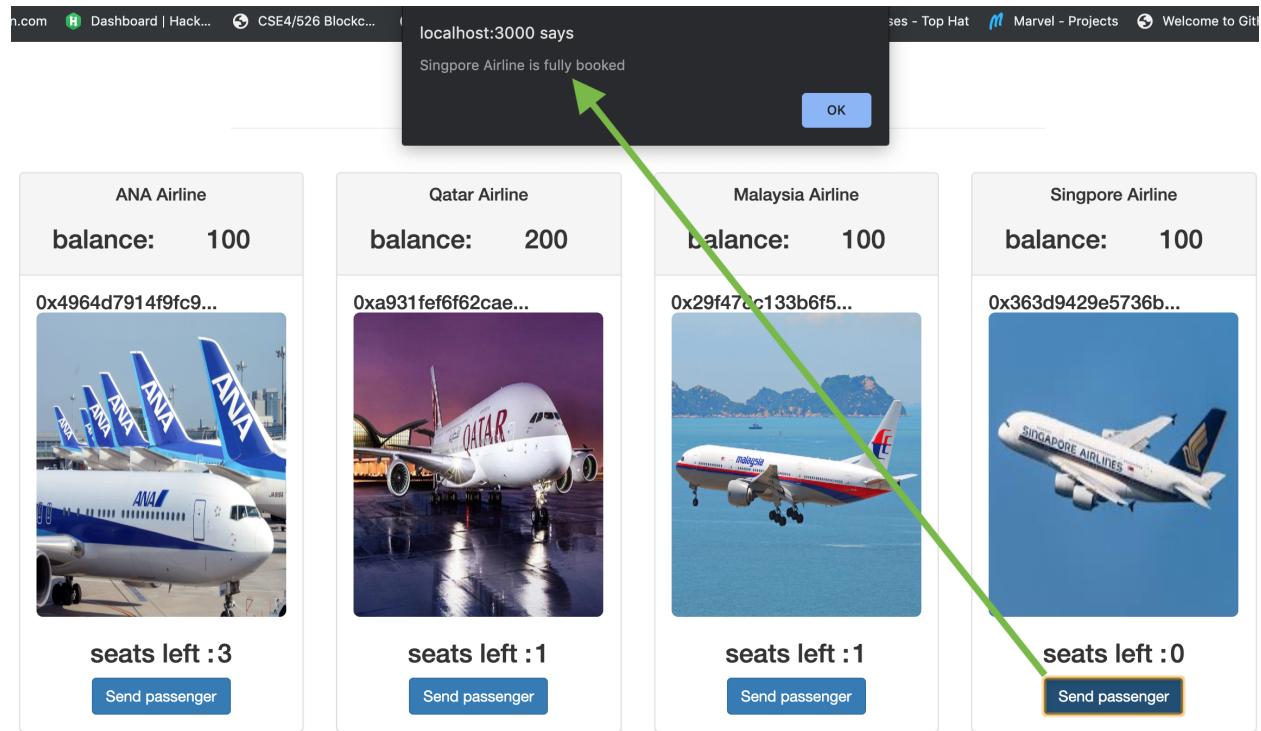
ticket price: 100

Chairperson :
0x19dd1207d5723d8aedbb7142a3101d2e5006ea9a

After closing the success message, all the changes (Balance, Number of Seats Left, Assigned Airline) will be updated again as shown above.

4.4 Bad Transaction

4.4.1 Invalid Request & Response



FULLY BOOKED MESSAGE

Airline assigned:
Qatar Airline

ticket price: 100

Chairperson :
0x19dd1207d5723d8aedbb7142a3101d2e5006ea9a

However, if you try to make a request to airlines with no available seats and/or insufficient balance, it will NOT accept the request and response back with unsucess message as shown above.