Resume-chain install instruction

This project implements a data-sharing application between Ethereum and Hyperledger Fabric. It can also be regarded as the interoperability between permissionless and permissioned blockchains.

The instruction will let you get a copy of the project Resume-chain and run the program on your local machine for development and testing purposes. The instruction is based on Ubuntu 22.04.1 Desktop (64-bit) operating system. We recommend that you run the program on that operating system.

1. Prerequisites Hyperledger Fabric 2.0

The following prerequisites have to be installed to run Hyperledger Fabric 2.0 locally on your machine:

(1) Install docker

Input the following commands in terminal.

```
$sudo apt-get install docker.io
```

Start the docker service and make it autorun when opening the operating system.

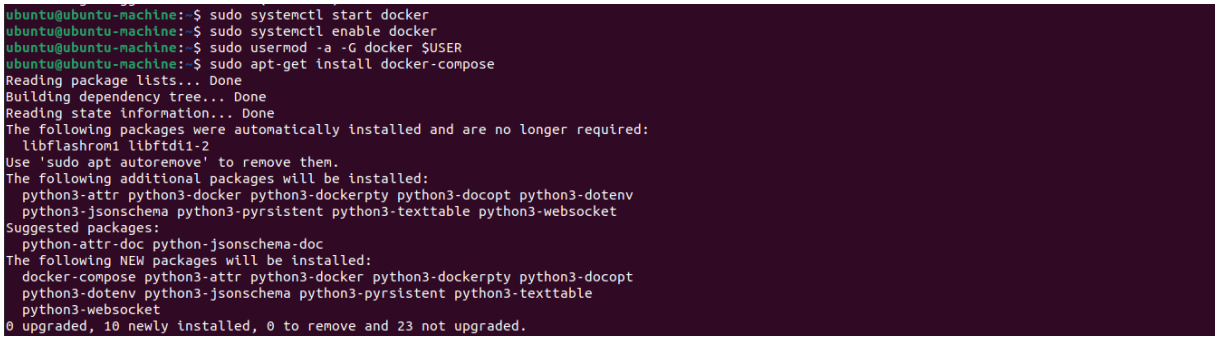
```
$sudo systemctl start docker
$sudo systemctl enable docker
```

Add user to the affiliate group.

```
$sudo usermod -a -G docker $USER
```

Install docker-compose.

```
$sudo apt-get install docker-compose
```



(2) Install Hyperledger Fabric 2.0 binaries

```
$curl -sSL https://bit.ly/2ysbOFE | bash -s -- 2.0.0
```

```
ubuntu@ubuntu-machine:~$ curl -sSL https://bit.ly/2ysbOFE| bash -s -- 2.0.0

Clone hyperledger/fabric-samples repo

===> Cloning hyperledger/fabric-samples repo
Cloning into 'fabric-samples'...
remote: Enumerating objects: 11487, done.
remote: Counting objects: 100% (83/83), done.
remote: Compressing objects: 100% (54/54), done.
remote: Total 11487 (delta 35), reused 56 (delta 23), pack-reused 11404
Receiving objects: 100% (11487/11487), 21.80 MiB | 882.00 KiB/s, done.
Resolving deltas: 100% (6151/6151), done.
===> Checking out v2.0.0 of hyperledger/fabric-samples

Pull Hyperledger Fabric binaries

===> Downloading version 2.0.0 platform specific fabric binaries
===> Downloading:  https://github.com/hyperledger/fabric/releases/download/v2.0.0/hyperledger-fabric-linux-amd64-2.0.0.tar.gz
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
  0     0    0     0    0     0      0      0 --:--:-- --:--:-- --:--:--     0
100 72.7M  100 72.7M    0     0  5620k      0  0:00:13  0:00:13 --:--:-- 6029k
==> Done.
===> Downloading version 1.5.5 platform specific fabric-ca-client binary
===> Downloading:  https://github.com/hyperledger/fabric-ca/releases/download/v1.5.5/hyperledger-fabric-ca-linux-amd64-1.5.5.tar.gz
```

If curl is uninstalled, you can input one of these commands to install.

```
$sudo apt install curl
```

or

```
$sudo snap install curl
```

```
ubuntu@ubuntu-machine:~$ curl -sSL https://bit.ly/2ysbOFE| bash -s -- 2.0.0
Command 'curl' not found, but can be installed with:
sudo snap install curl  # version 7.86.0, or
sudo apt  install curl  # version 7.81.0-1ubuntu1.6
See 'snap info curl' for additional versions.
```

(3) Install npm and node.js

```
$curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash -
$sudo apt-get install -y nodejs
$sudo apt-get install build-essential
```

```
ubuntu@ubuntu-machine:~$ curl -sL https://deb.nodesource.com/setup_14.x | sudo -E bash -

## Installing the NodeSource Node.js 14.x repo...


## Populating apt-get cache...

+ apt-get update
Hit:1 https://dl.google.com/linux/chrome/deb stable InRelease
Hit:2 https://packages.microsoft.com/repos/edge stable InRelease
Hit:3 http://security.ubuntu.com/ubuntu jammy-security InRelease
Hit:4 http://hk.archive.ubuntu.com/ubuntu jammy InRelease
Hit:5 http://hk.archive.ubuntu.com/ubuntu jammy-updates InRelease
Hit:6 http://hk.archive.ubuntu.com/ubuntu jammy-backports InRelease
Reading package lists... Done
W: Target Packages (main/binary-amd64/Packages) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.list.d/google.list:1
W: Target Packages (main/binary-all/Packages) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.list.d/google.list:1
W: Target Translations (main/i18n/Translation-en_US) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.list.d/google.list:1
W: Target Translations (main/i18n/Translation-en) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.list.d/google.list:1
W: Target DEP-11 (main/dep11/Components-amd64.yml) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.list.d/google.list:1
W: Target DEP-11 (main/dep11/Components-all.yml) is configured multiple times in /etc/apt/sources.list.d/google-chrome.list:3 and /etc/apt/sources.l
```

```
ubuntu@ubuntu-machine:~$ sudo apt-get install -y nodejs
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following packages were automatically installed and are no longer required:
  libflashrom1 libftdi1-2
Use 'sudo apt autoremove' to remove them.
The following NEW packages will be installed:
  nodejs
0 upgraded, 1 newly installed, 0 to remove and 23 not upgraded.
Need to get 25.7 MB of archives.
After this operation, 125 MB of additional disk space will be used.
Get:1 https://deb.nodesource.com/node_14.x jammy/main amd64 nodejs amd64 14.21.1-deb-1nodesource1 [25.7 MB]
Fetched 25.7 MB in 4s (6,121 kB/s)
Selecting previously unselected package nodejs.
(Reading database ... 213247 files and directories currently installed.)
Preparing to unpack .../nodejs_14.21.1-deb-1nodesource1_amd64.deb ...
Unpacking nodejs (14.21.1-deb-1nodesource1) ...
Setting up nodejs (14.21.1-deb-1nodesource1) ...
Processing triggers for man-db (2.10.2-1) ...
ubuntu@ubuntu-machine:~$ sudo apt-get install build-essential
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
build-essential is already the newest version (12.9ubuntu3).
```

(4) Clone this repository

$git clone https://github.com/jaysonli765/Resume-chain.git

```
ubuntu@ubuntu-machine:~$ git clone https://github.com/jaysonli765/Resume-chain
Cloning into 'Resume-chain'...
remote: Enumerating objects: 684, done.
remote: Total 684 (delta 0), reused 0 (delta 0), pack-reused 684
Receiving objects: 100% (684/684), 97.84 MiB | 3.38 MiB/s, done.
Resolving deltas: 100% (156/156), done.
```

Install required node dependencies from the package.json file in the folder "website".

$cd Resume-chain/website
$npm install

```
ubuntu@ubuntu-machine:~/Resume-chain/website$ npm install

> node@10.21.0 preinstall /home/ubuntu/Resume-chain/website/node_modules/node
> node installArchSpecificPackage

+ node-linux-x64@10.21.0
added 1 package in 1.74s
found 0 vulnerabilities


> pkcs11js@1.3.1 install /home/ubuntu/Resume-chain/website/node_modules/pkcs11js
> node-gyp rebuild

make: Entering directory '/home/ubuntu/Resume-chain/website/node_modules/pkcs11js/build'
  CXX(target) Release/obj.target/pkcs11/src/main.o
```

Upgrade the required packages.

$npm audit fix

```
ubuntu@ubuntu-machine:~/Resume-chain/website$ npm audit fix
npm WARN website@1.0.0 No description
npm WARN website@1.0.0 No repository field.

removed 1 package and updated 1 package in 1.8s

33 packages are looking for funding
  run `npm fund` for details

fixed 10 of 23 vulnerabilities in 511 scanned packages
  13 vulnerabilities required manual review and could not be updated
```

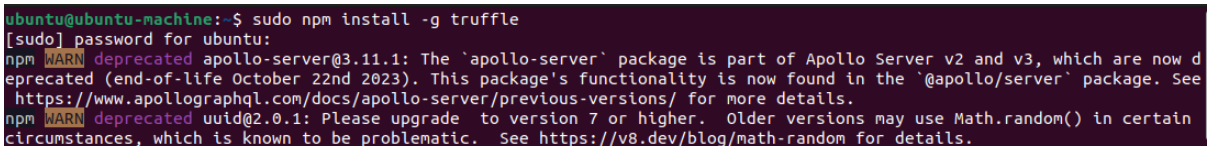
2. Prerequisites Ethereum

Ganache is software which can generate local Ethereum on your machine, and you can connect the local Ethereum with the program and test the program.

The following prerequisites have to be installed to run Ganache locally on your machine:

(1) Install truffle

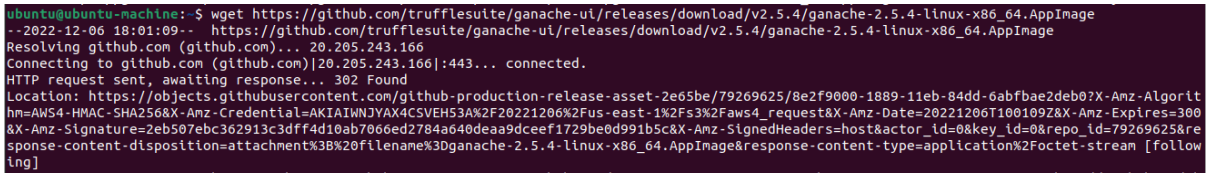
```
$sudo npm install -g truffle
```



(2) Install Ganache

Input the following command in terminal to download Ganache v2.5.4.

```
$wget https://github.com/trufflesuite/ganache-ui/releases/download/v2.5.4/ganache-2.5.4-linux-x86_64.AppImage
```



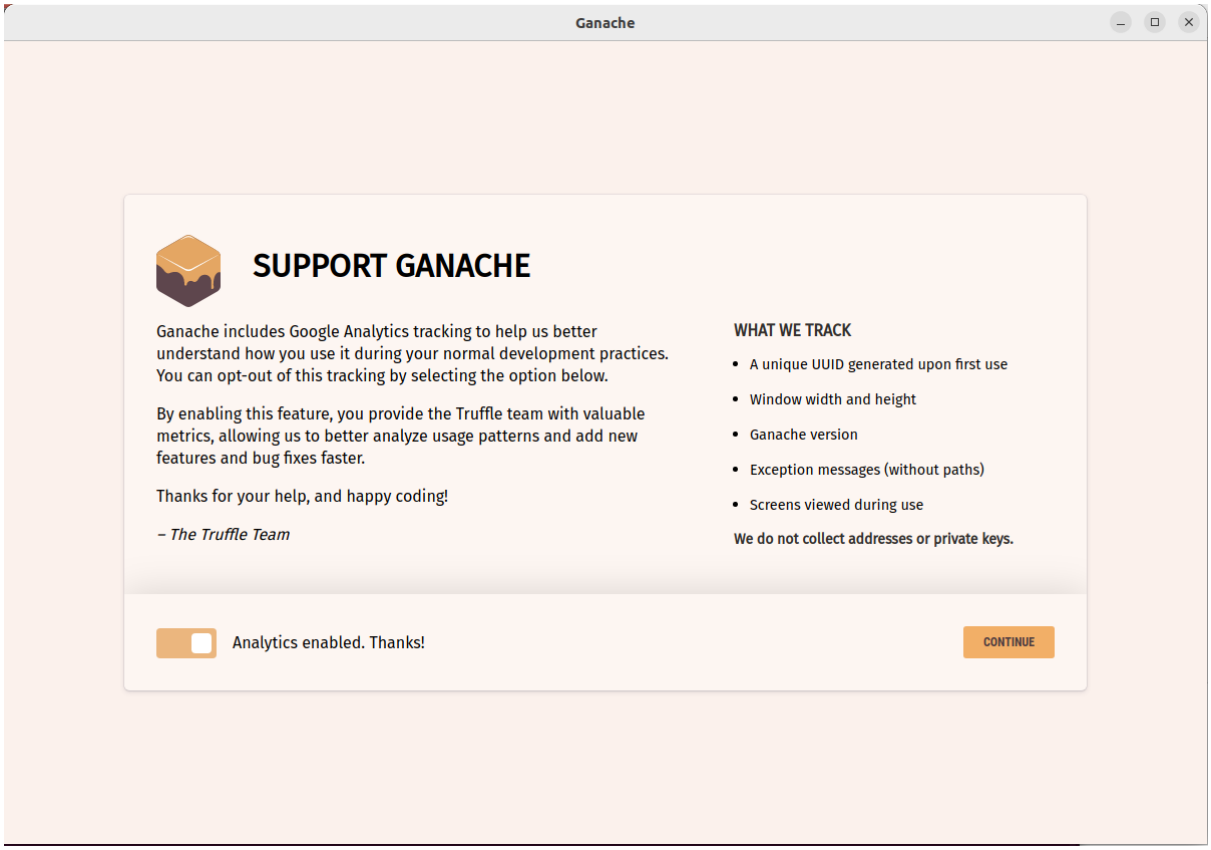
Modify permission of the file.

```
$chmod +x ganache-2.5.4-linux-x86_64.AppImage
```

Input the following command to run Ganache.

```
$sudo ./ganache-2.5.4-linux-x86_64.AppImage
```

Or right-click “ganache-2.5.4-linux-x86_64.AppImage” on the folder and click “Run”.



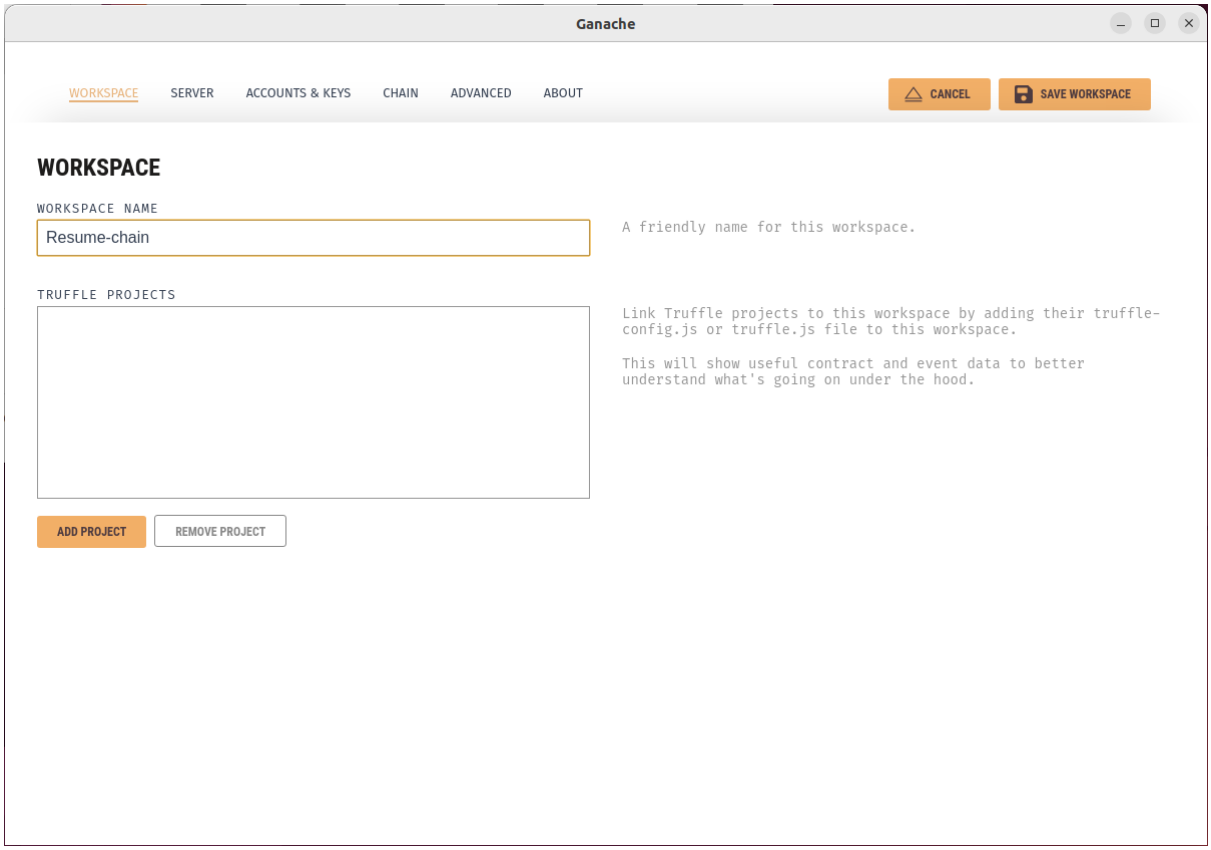
If libfuse2 is uninstalled, you can input the following command to install.

```
$sudo apt install libfuse2
```

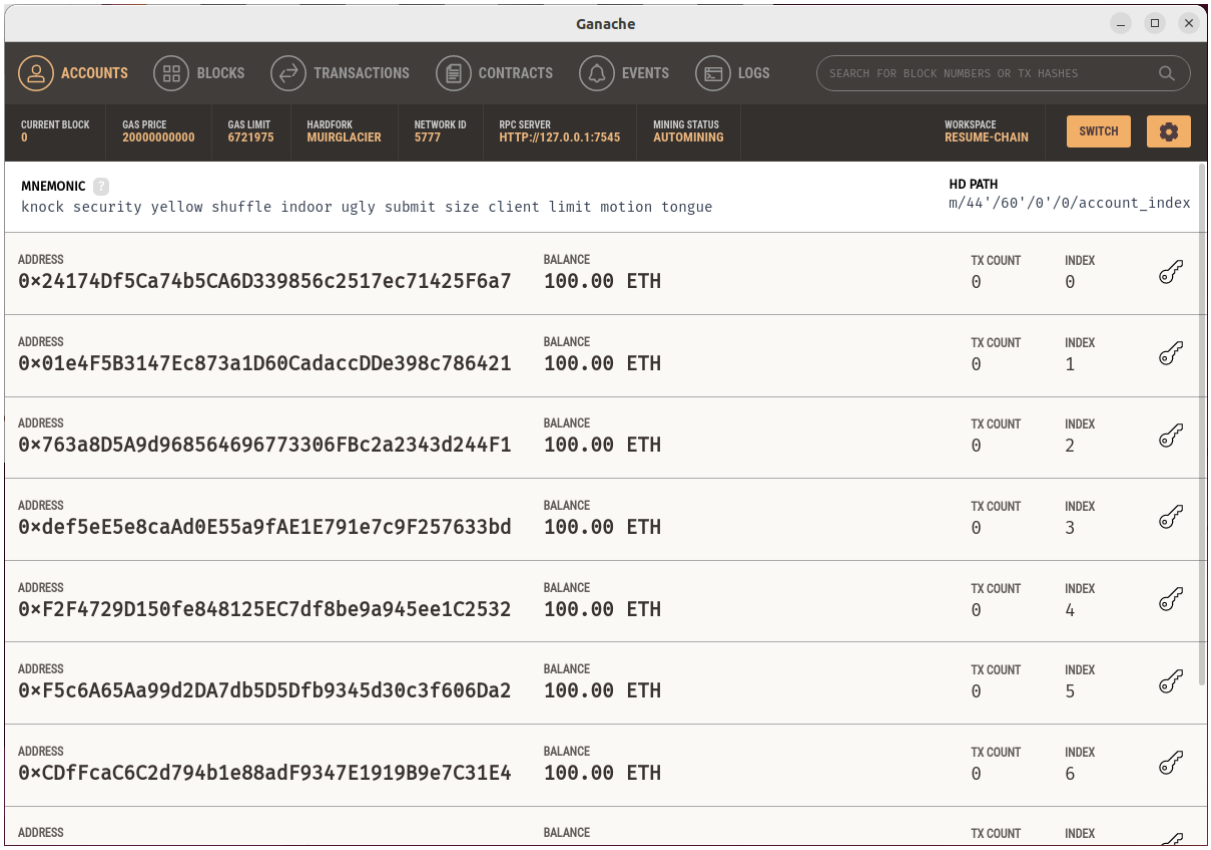
```
ubuntu@ubuntu-machine:~$ sudo ./ganache-2.5.4-linux-x86_64.AppImage
dlopen(): error loading libfuse.so.2

AppImages require FUSE to run.
You might still be able to extract the contents of this AppImage
if you run it with the --appimage-extract option.
See https://github.com/AppImage/AppImageKit/wiki/FUSE
for more information
ubuntu@ubuntu-machine:~$ sudo apt install libfuse2
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
The following NEW packages will be installed:
  libfuse2
0 upgraded, 1 newly installed, 0 to remove and 23 not upgraded.
```

(3) Config Ganache

Click “NEW WORKSPACE”, and enter a name for “WORKSPACE NAME”. For example, we input “Resume-chain” as the workspace name.

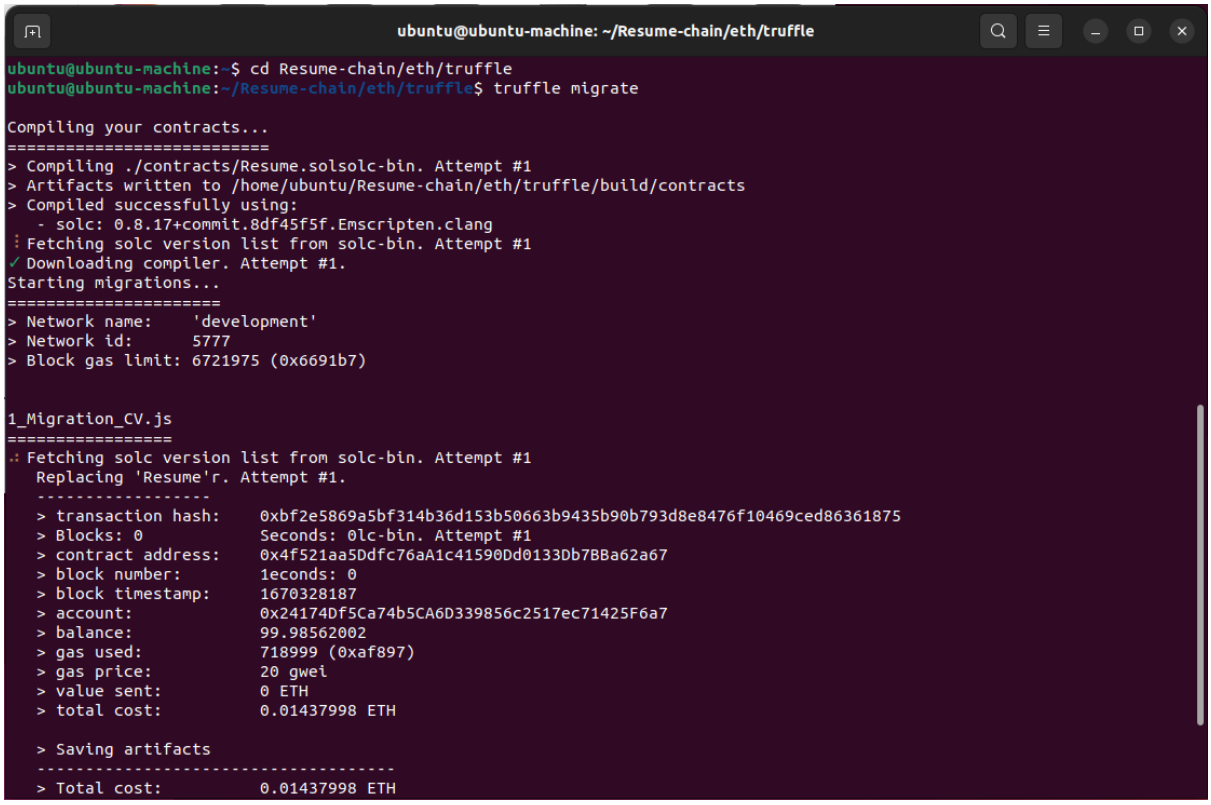


Click “ADD PROJECT” and add the path of the truffle-config.js file. For Resume-chain project, the path is “./Resume-chain/eth/truffle/truffle-config.js”. Then click “SAVE WORKSPACE”. You will see the following screen.



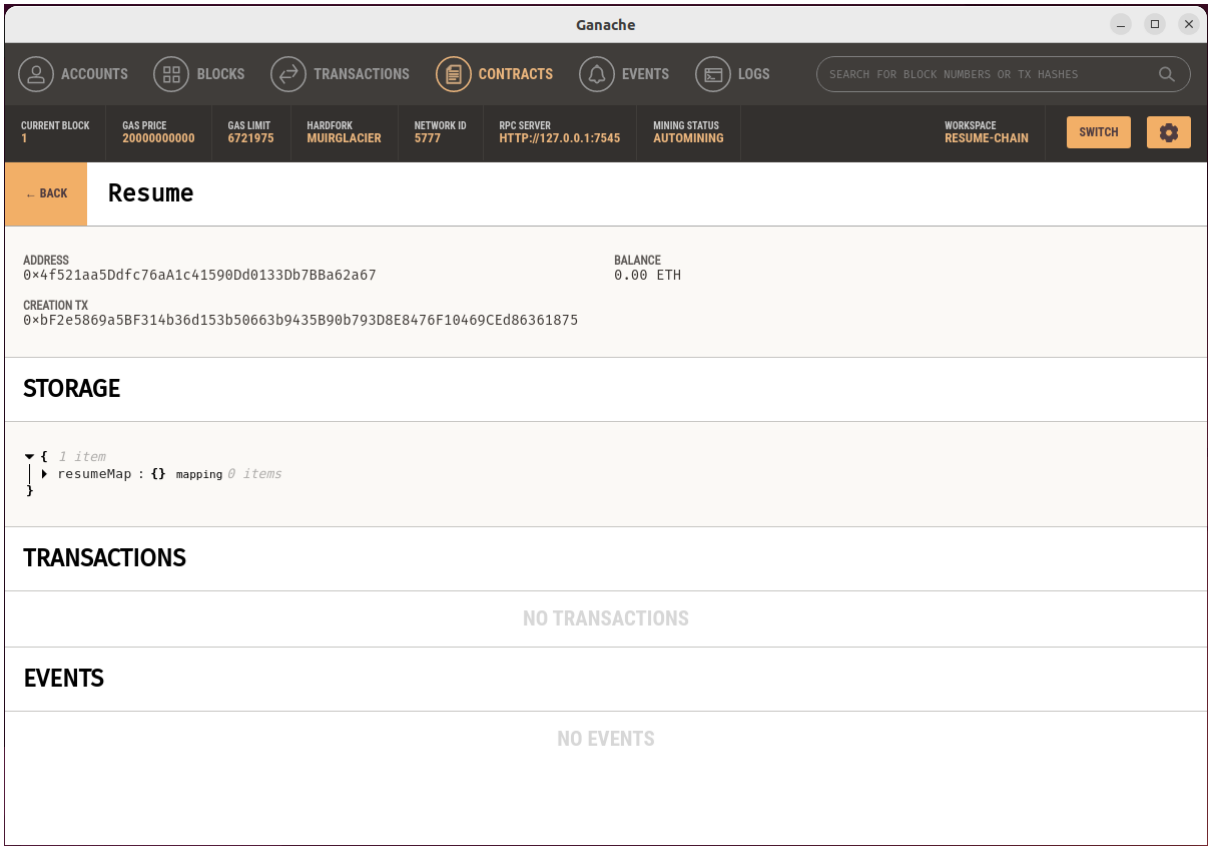
Enter the truffle folder, and migrate the contract to the blockchain created by Ganache.

```
$cd Resume-chain/eth/truffle
$truffle migrate
```

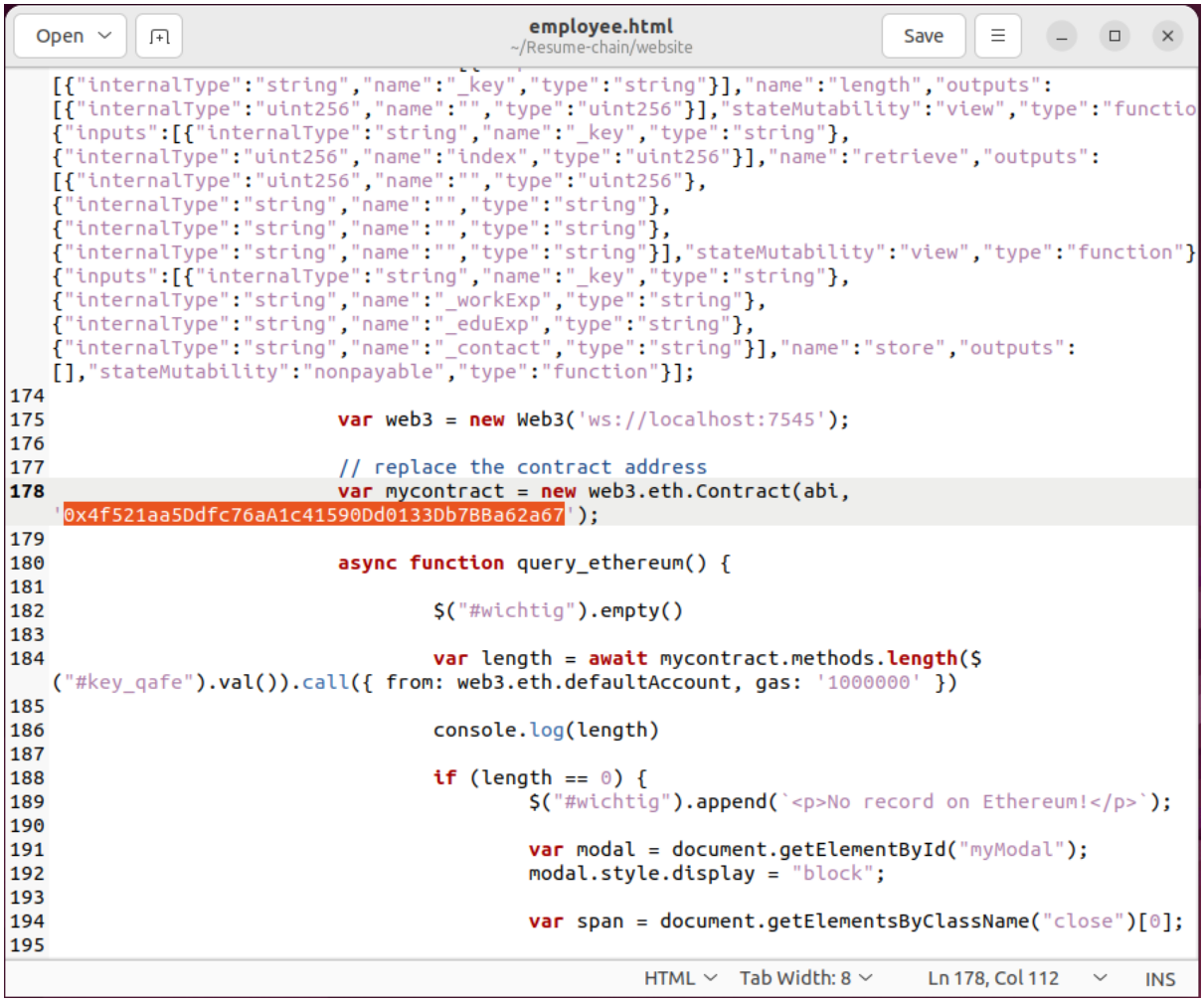


(4) Add contract address into program

Click the “CONTRACTS” tab in Ganache, and get the contract address. In this example, the address is “0x4f521aa5Ddfc76aA1c41590Dd0133Db7BBa62a67”.



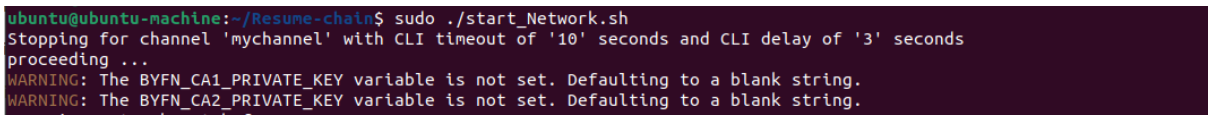
Enter “./Resume-chain/website”, and open the file “employee.html”. Replace the contract address with your address in line 178. Then open the file “employer.html” and repeat this operation in line 179.



3. Start the Hyperledger Fabric network and website

Input the following commands to start the program.

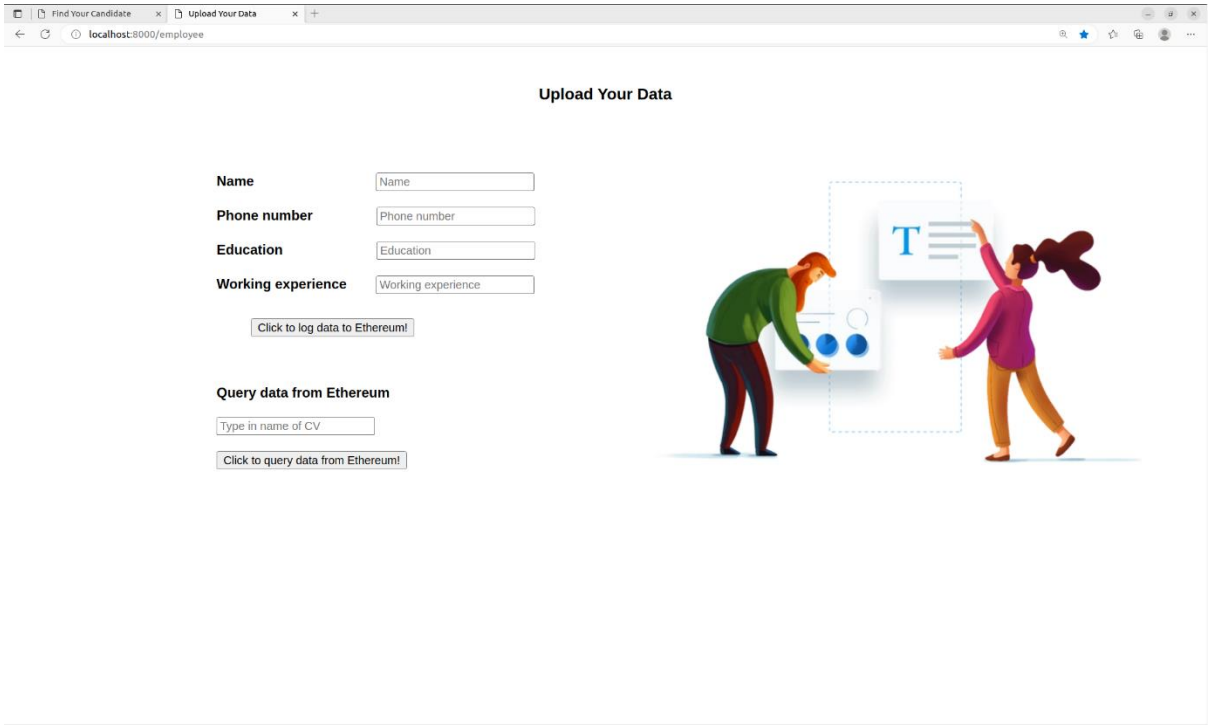
```
$cd Resume-chain
$sudo ./start_Network.sh
```



The program has been started successfully.

Open (http://localhost:8000/employee) and (http://localhost:8000/employer) in the browser. We can see the following two website pages.

The employee page:



The employer page: