Pete's Pet Shop DApp

Introduction

This document details the process of creating, deploying, and interacting with the Pete's Pet Shop DApp. I documented how to set up a local development environment, write and test a smart contract, build a front-end interface, and interact with the DApp via MetaMask and Ganache. All through Truffle Suite - Pet Shop tutorial.

Software Installation

Download VirtualBox
Download Ubuntu
I created a new virtual machine in VirtualBox, allocating 3 GB of RAM and 25 GB of storage.

Setting Up the Development Environment

After completing Ubuntu's installation process.
Initially, the following commands were executed:

```
sudo apt-get update
sudo apt-get upgrade
```

(this is optional as it takes quite long)

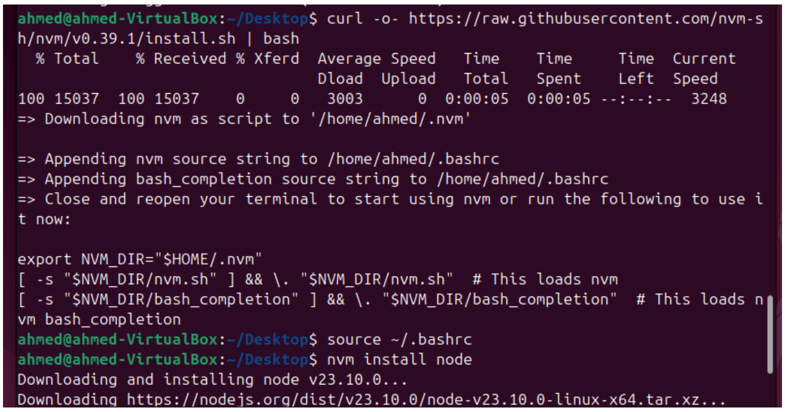
Install Node.js and npm via NVM

Open the terminal and the following commands were executed:

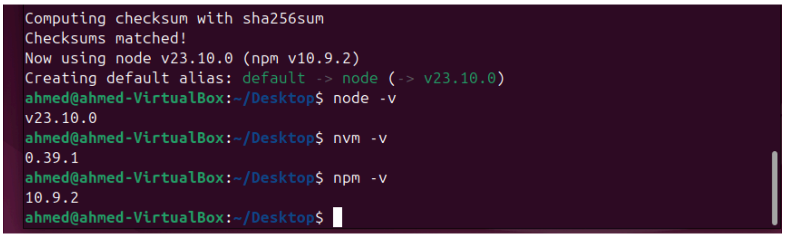
```
curl -o-
https://raw.githubusercontent.com/nvm-sh/nvm/v0.39.1/install.sh |
bash

source ~/.bashrc

nvm install --lts
```

Verify installation through:

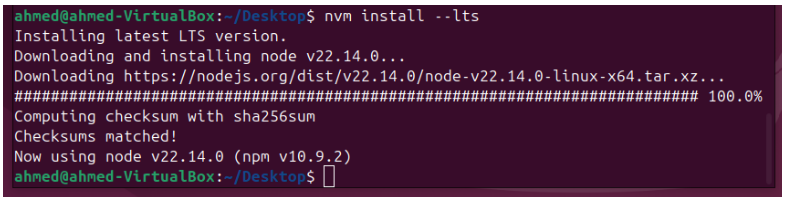
```
node -v
npm -v
```



```
ahmed@ahmed-VirtualBox:~/Desktop$ curl -o- https://raw.githubusercontent.com/nvm-s
h/nvm/v0.39.1/install.sh | bash
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
100 15037  100 15037    0     0   3003      0  0:00:05  0:00:05 --:--:--  3248
=> Downloading nvm as script to '/home/ahmed/.nvm'

=> Appending nvm source string to /home/ahmed/.bashrc
=> Appending bash_completion source string to /home/ahmed/.bashrc
=> Close and reopen your terminal to start using nvm or run the following to use i
t now:

export NVM_DIR="$HOME/.nvm"
[ -s "$NVM_DIR/nvm.sh" ] && \. "$NVM_DIR/nvm.sh"  # This loads nvm
[ -s "$NVM_DIR/bash_completion" ] && \. "$NVM_DIR/bash_completion"  # This loads n
vm bash_completion
ahmed@ahmed-VirtualBox:~/Desktop$ source ~/.bashrc
ahmed@ahmed-VirtualBox:~/Desktop$ nvm install node
Downloading and installing node v23.10.0...
Downloading https://nodejs.org/dist/v23.10.0/node-v23.10.0-linux-x64.tar.xz...
```



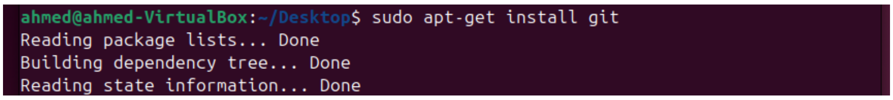
```
Computing checksum with sha256sum
Checksums matched!
Now using node v23.10.0 (npm v10.9.2)
Creating default alias: default -> node (-> v23.10.0)
ahmed@ahmed-VirtualBox:~/Desktop$ node -v
v23.10.0
ahmed@ahmed-VirtualBox:~/Desktop$ nvm -v
0.39.1
ahmed@ahmed-VirtualBox:~/Desktop$ npm -v
10.9.2
ahmed@ahmed-VirtualBox:~/Desktop$ 
```



```
ahmed@ahmed-VirtualBox:~/Desktop$ nvm install --lts
Installing latest LTS version.
Downloading and installing node v22.14.0...
Downloading https://nodejs.org/dist/v22.14.0/node-v22.14.0-linux-x64.tar.xz...
############################################################################## 100.0%
Computing checksum with sha256sum
Checksums matched!
Now using node v22.14.0 (npm v10.9.2)
ahmed@ahmed-VirtualBox:~/Desktop$ 
```

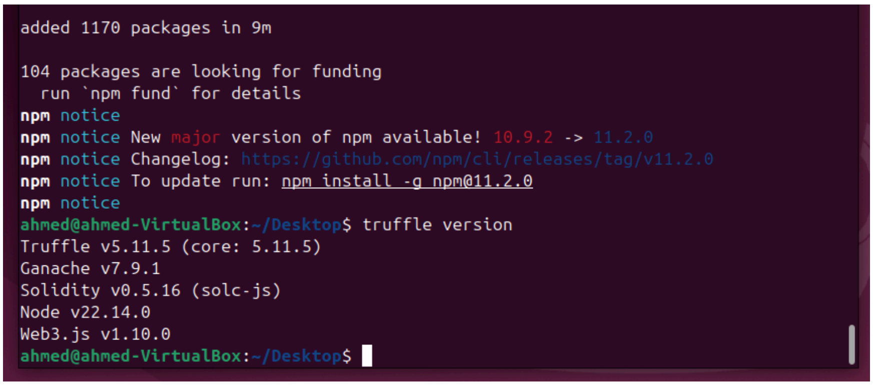
Install Git and Truffle

`sudo apt-get update`
`sudo apt-get install git`



```
ahmed@ahmed-VirtualBox:~/Desktop$ sudo apt-get install git
Reading package lists... Done
Building dependency tree... Done
Reading state information... Done
```

Installed Truffle globally:
`npm install -g truffle`
Then verified Truffle by : `truffle version`

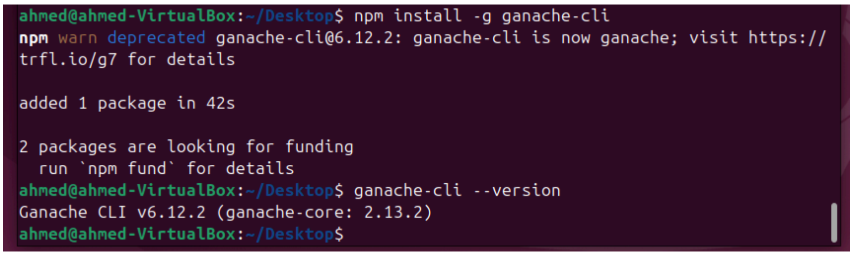


```
added 1170 packages in 9m

104 packages are looking for funding
  run `npm fund` for details
npm notice
npm notice New major version of npm available! 10.9.2 -> 11.2.0
npm notice Changelog: https://github.com/npm/cli/releases/tag/v11.2.0
npm notice To update run: npm install -g npm@11.2.0
npm notice
ahmed@ahmed-VirtualBox:~/Desktop$ truffle version
Truffle v5.11.5 (core: 5.11.5)
Ganache v7.9.1
Solidity v0.5.16 (solc-js)
Node v22.14.0
Web3.js v1.10.0
ahmed@ahmed-VirtualBox:~/Desktop$ 
```

Install Ganache

For downloading Ganache CLI:

```
npm install -g ganache-cli
```



```
ahmed@ahmed-VirtualBox:~/Desktop$ npm install -g ganache-cli
npm warn deprecated ganache-cli@6.12.2: ganache-cli is now ganache; visit https://
trfl.io/g7 for details

added 1 package in 42s

2 packages are looking for funding
  run `npm fund` for details
ahmed@ahmed-VirtualBox:~/Desktop$ ganache-cli --version
Ganache CLI v6.12.2 (ganache-core: 2.13.2)
ahmed@ahmed-VirtualBox:~/Desktop$
```

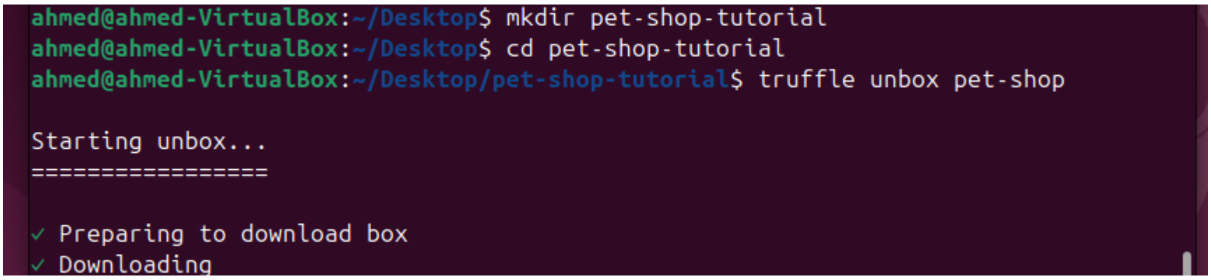
Downloaded Ganache GUI:
Visited Ganache - Truffle Suite and downloaded the appropriate version for Linux.

Then the file was set as executable by navigating into properties of the file and then setting the option "Executable as program".
Run it from the terminal if needed(i ran through the terminal):

```
chmod +x ganache-2.7.1-linux-x86_64.AppImage
./ganache-2.7.1-linux-x86_64.AppImage
```

Creating the Truffle Project Using a Truffle Box

Then created a new project directory and used truffle box to scaffold the project:



```
ahmed@ahmed-VirtualBox:~/Desktop$ mkdir pet-shop-tutorial
ahmed@ahmed-VirtualBox:~/Desktop$ cd pet-shop-tutorial
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ truffle unbox pet-shop

Starting unbox...
=================

✓ Preparing to download box
✓ Downloading
```

This command downloads the Pet Shop DApp template that includes the smart contracts, migrations, tests, and a simple front-end.

Directory Structure:

The default Truffle directory structure contains the following:

contracts/: Contains the Solidity source files for our smart contracts. There is an important contract here called Migrations.sol.

migrations/: Truffle uses a migration system to handle smart contract deployments. A migration is an additional special smart contract that keeps track of changes.

test/: Contains both JavaScript and Solidity tests for our smart contracts

truffle-config.js: Truffle configuration file

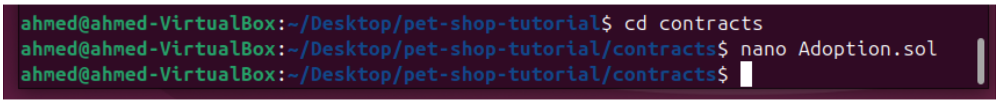
The pet-shop Truffle Box has extra files and folders in it, but we won't worry about those just yet.

Smart Contract Development

Creation of the Smart Contract File

Navigated to the contracts directory:
`cd contracts`
Created a new file named Adoption.sol:
`touch Adoption.sol`

Followed the tutorial and pasted the code as instructed there:
The code can be pasted from the text editor, but i used nano initially:



```
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ cd contracts
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial/contracts$ nano Adoption.sol
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial/contracts$
```

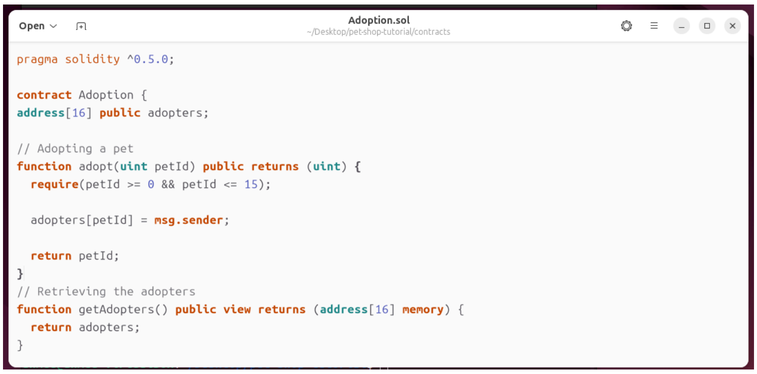
pragma solidity ^0.5.0;

contract Adoption {

}

Compilation, Migration, and Testing of the Smart Contract

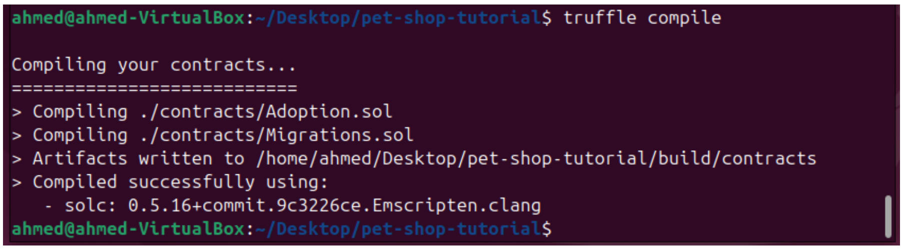
After completing the contract:



```
pragma solidity ^0.5.0;

contract Adoption {
address[16] public adopters;

// Adopting a pet
function adopt(uint petId) public returns (uint) {
  require(petId >= 0 && petId <= 15);

  adopters[petId] = msg.sender;

  return petId;
}
// Retrieving the adopters
function getAdopters() public view returns (address[16] memory) {
  return adopters;
}
```

Compiled the contract:
`truffle compile`

This compiles the Solidity contracts and reports any syntax or compilation issues.

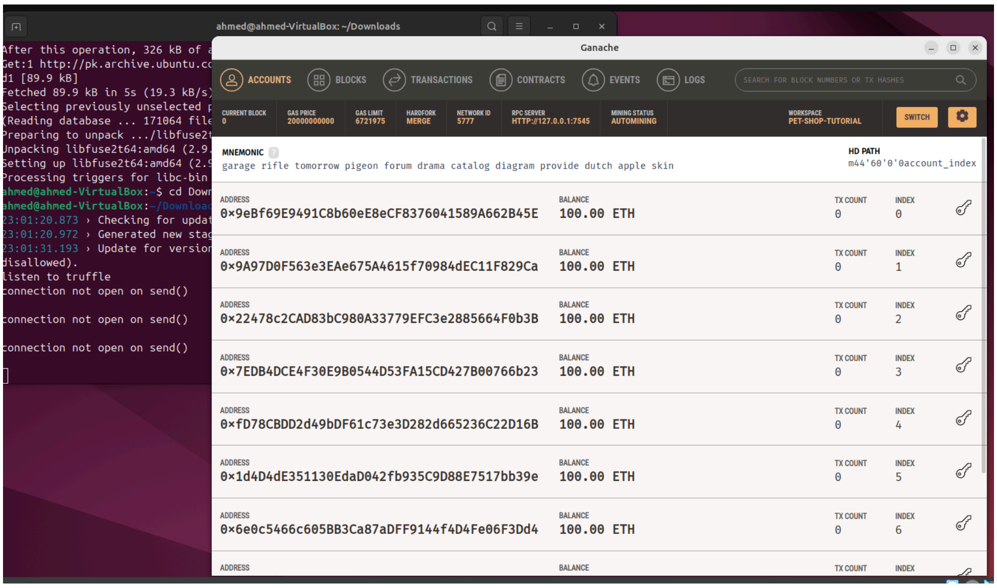


```
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ truffle compile

Compiling your contracts...
===========================
> Compiling ./contracts/Adoption.sol
> Compiling ./contracts/Migrations.sol
> Artifacts written to /home/ahmed/Desktop/pet-shop-tutorial/build/contracts
> Compiled successfully using:
   - solc: 0.5.16+commit.9c3226ce.Emscripten.clang
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$
```

Ensure Ganache is running.
I ran it through the terminal:

`./ganache-2.7.1-linux-x86_64.AppImage`

Ganache initially(the block number is initially zero):



ahmed@ahmed-VirtualBox: ~/Downloads
Ganache
ACCOUNTS
BLOCKS
TRANSACTIONS
CONTRACTS
EVENTS
LOGS
SEARCH FOR BLOCK NUMBERS OR TX HASHES
SWITCH

```
After this operation, 326 kB of a
Get:1 http://pk.archive.ubuntu.co
d1 [89.9 kB]
Fetched 89.9 kB in 5s (19.3 kB/s)
Selecting previously unselected p
(Reading database ... 171064 file
Preparing to unpack .../libfuse2t
Unpacking libfuse2t64:amd64 (2.9.
Setting up libfuse2t64:amd64 (2.9
Processing triggers for libc-bin
ahmed@ahmed-VirtualBox:~$ cd Down
ahmed@ahmed-VirtualBox:~/Downloac
23:01:20.873 › Checking for updat
23:01:20.972 › Generated new stag
23:01:31.193 › Update for version
disallowed).
listen to truffle
connection not open on send()

connection not open on send()

connection not open on send()
```

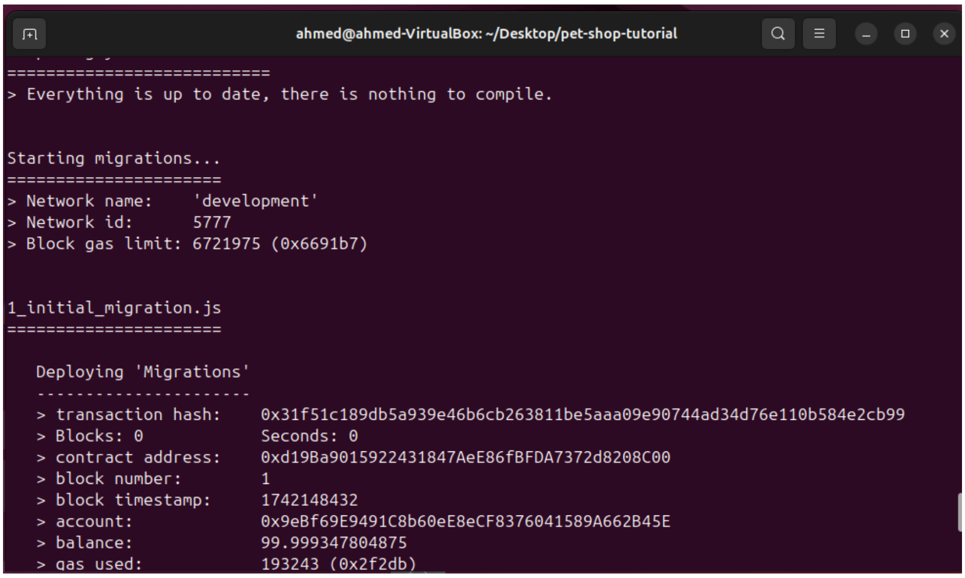
CURRENT BLOCK 0 | GAS PRICE 20000000000 | GAS LIMIT 6721975 | HARDFORK MERGE | NETWORK ID 5777 | RPC SERVER HTTP://127.0.0.1:7545 | MINING STATUS AUTOMINING | WORKSPACE PET-SHOP-TUTORIAL

MNEMONIC
garage rifle tomorrow pigeon forum drama catalog diagram provide dutch apple skin

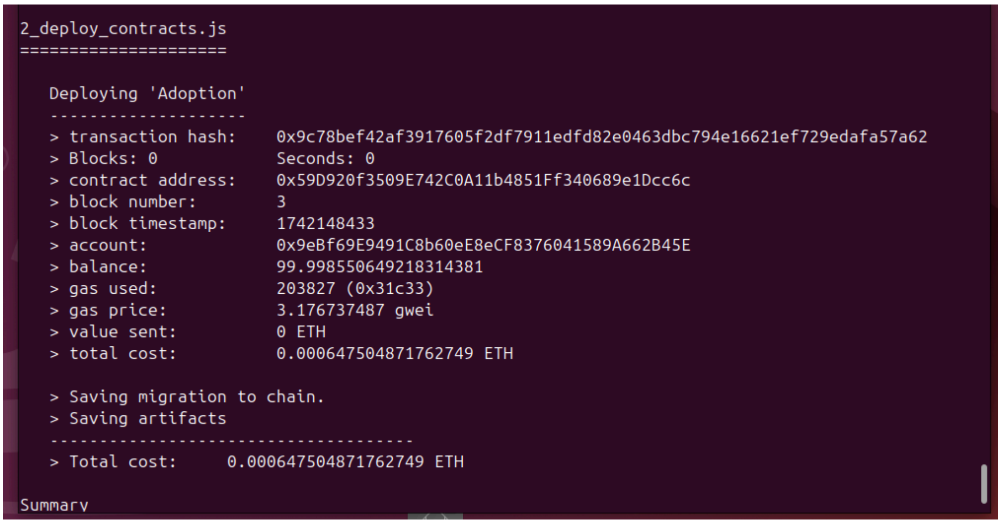
HD PATH
m44'60'0'0account_index

ADDRESS	BALANCE	TX COUNT	INDEX
0×9eBf69E9491C8b60eE8eCF8376041589A662B45E	100.00 ETH	0	0
0×9A97D0F563e3EAe675A4615f70984dEC11F829Ca	100.00 ETH	0	1
0×22478c2CAD83bC980A33779EFC3e2885664F0b3B	100.00 ETH	0	2
0×7EDB4DCE4F30E9B0544D53FA15CD427B00766b23	100.00 ETH	0	3
0×fD78CBDD2d49bDF61c73e3D282d665236C22D16B	100.00 ETH	0	4
0×1d4D4dE351130EdaD042fb935C9D88E7517bb39e	100.00 ETH	0	5
0×6e0c5466c605BB3Ca87aDFF9144f4D4Fe06F3Dd4	100.00 ETH	0	6

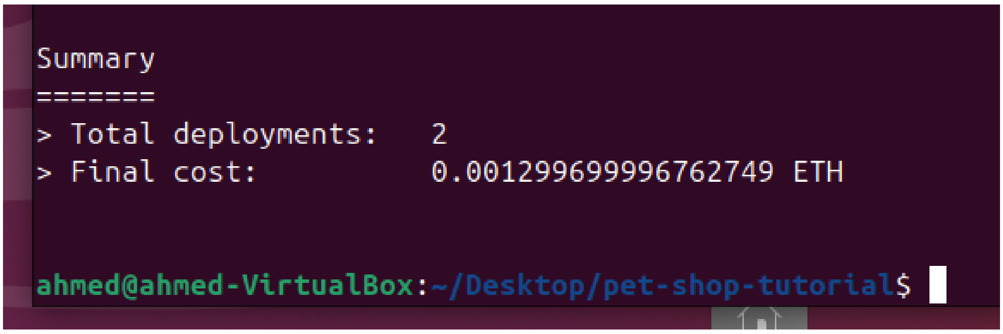
Then migration:
After: `truffle migrate` command



```
===========================
> Everything is up to date, there is nothing to compile.


Starting migrations...
======================
> Network name:    'development'
> Network id:      5777
> Block gas limit: 6721975 (0x6691b7)


1_initial_migration.js
======================

   Deploying 'Migrations'
   ----------------------
   > transaction hash:    0x31f51c189db5a939e46b6cb263811be5aaa09e90744ad34d76e110b584e2cb99
   > Blocks: 0            Seconds: 0
   > contract address:    0xd19Ba9015922431847AeE86fBFDA7372d8208C00
   > block number:        1
   > block timestamp:     1742148432
   > account:             0x9eBf69E9491C8b60eE8eCF8376041589A662B45E
   > balance:             99.999347804875
   > gas used:            193243 (0x2f2db)
```

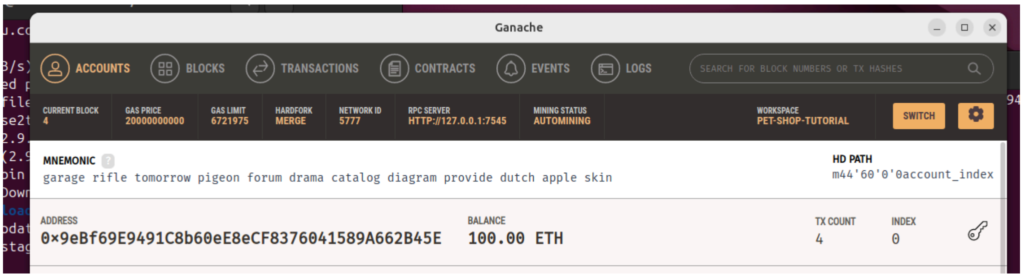


```
2_deploy_contracts.js
=====================

   Deploying 'Adoption'
   --------------------
   > transaction hash:    0x9c78bef42af3917605f2df7911edfd82e0463dbc794e16621ef729edafa57a62
   > Blocks: 0            Seconds: 0
   > contract address:    0x59D920f3509E742C0A11b4851Ff340689e1Dcc6c
   > block number:        3
   > block timestamp:     1742148433
   > account:             0x9eBf69E9491C8b60eE8eCF8376041589A662B45E
   > balance:             99.998550649218314381
   > gas used:            203827 (0x31c33)
   > gas price:           3.176737487 gwei
   > value sent:          0 ETH
   > total cost:          0.000647504871762749 ETH

   > Saving migration to chain.
   > Saving artifacts
   -------------------------------------
   > Total cost:     0.000647504871762749 ETH

Summary
```



```
Summary
=======
> Total deployments:   2
> Final cost:          0.001299699996762749 ETH


ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ 
```

The current block is now 4 as you can see below (Ganache GUI):



CURRENT BLOCK 4 | GAS PRICE 20000000000 | GAS LIMIT 6721975 | HARDFORK MERGE | NETWORK ID 5777 | RPC SERVER HTTP://127.0.0.1:7545 | MINING STATUS AUTOMINING | WORKSPACE PET-SHOP-TUTORIAL

MNEMONIC
garage rifle tomorrow pigeon forum drama catalog diagram provide dutch apple skin

HD PATH
m44'60'0'0account_index

ADDRESS 0x9eBf69E9491C8b60eE8eCF8376041589A662B45E | BALANCE 100.00 ETH | TX COUNT 4 | INDEX 0

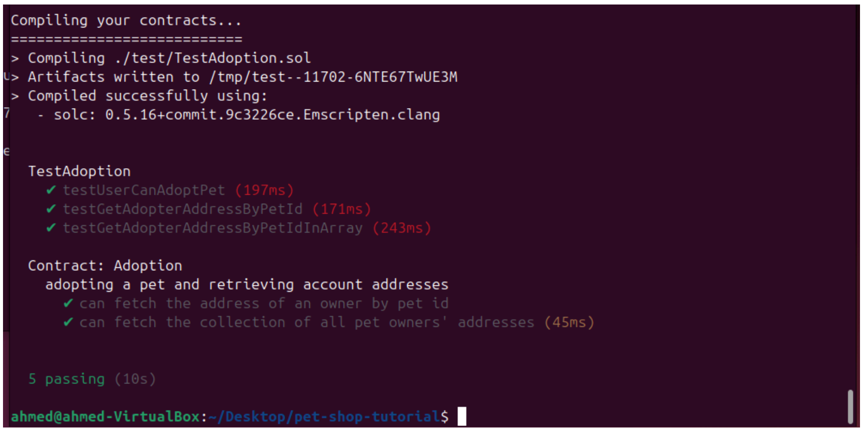
Then following the tutorial two files (a .sol and .js files were created) all to test the smart contract(s) using solidity and javascript.

Then testing:

The following command was executed:

```
truffle test
```

If all the tests pass, you'll see console output similar to this:



```
Compiling your contracts...
===========================
> Compiling ./test/TestAdoption.sol
> Artifacts written to /tmp/test--11702-6NTE67TwUE3M
> Compiled successfully using:
   - solc: 0.5.16+commit.9c3226ce.Emscripten.clang


  TestAdoption
    ✓ testUserCanAdoptPet (197ms)
    ✓ testGetAdopterAddressByPetId (171ms)
    ✓ testGetAdopterAddressByPetIdInArray (243ms)

  Contract: Adoption
    adopting a pet and retrieving account addresses
      ✓ can fetch the address of an owner by pet id
      ✓ can fetch the collection of all pet owners' addresses (45ms)


  5 passing (10s)

ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ 
```

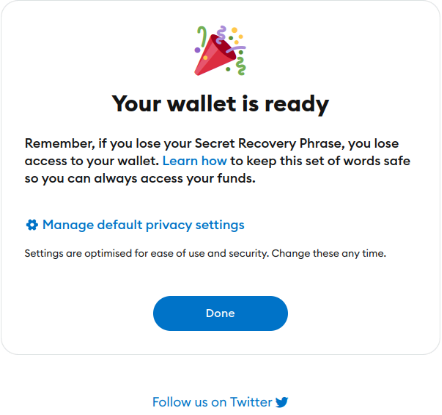
User Interface (Front-End)

Now, moving towards the front-end
Instantiating web3 in app.js
Open in the project's directory open /src/js/app.js in the text editor.
Locate the initWeb3 function and remove the multi-line comment.
Replace it with the code mentioned in the tutorial and similarly all the following replacements as per the instructions. The code was replaced in 4 areas.
Finally the edition was saved.

Interacting with theDapp using MetaMask

Added the MetaMask extension to your browser from metamask.io.
Navigated to the import wallet option and then there was a prompt to enter the 12 word secret recovery phrase (mnemonic) that can be found in Ganache.

Created a password and finished the wallet setup.



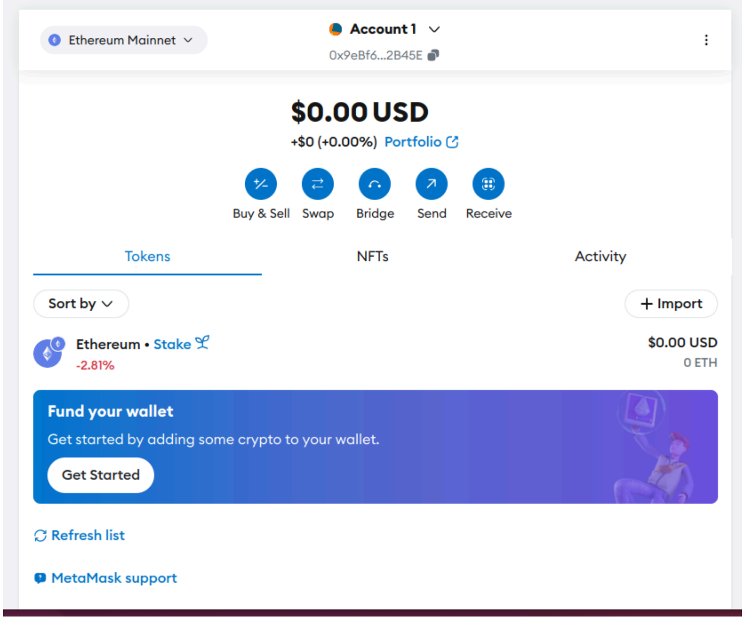
Your wallet is ready

Remember, if you lose your Secret Recovery Phrase, you lose access to your wallet. Learn how to keep this set of words safe so you can always access your funds.

Manage default privacy settings

Settings are optimised for ease of use and security. Change these any time.

Initial view of the wallet:



Ethereum Mainnet

Account 1

0x9eBf6...2B45E

$0.00 USD

+$0 (+0.00%) Portfolio

Ethereum • Stake

-2.81%

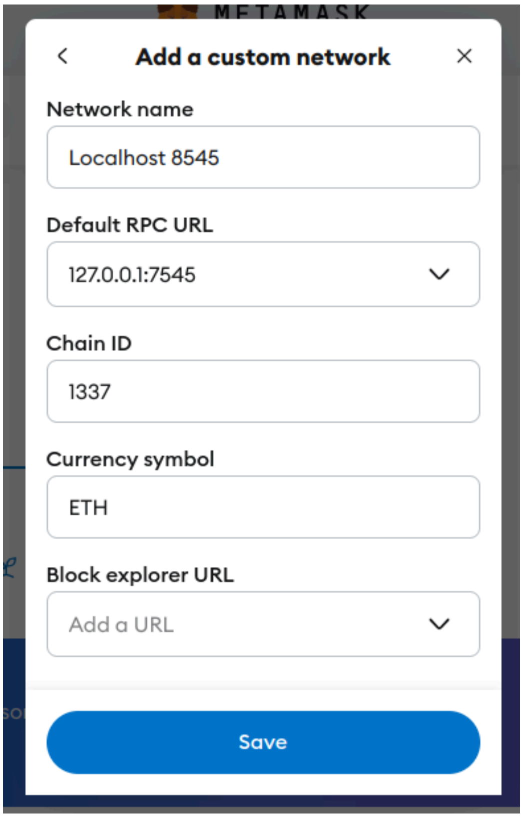
$0.00 USD

0 ETH

Fund your wallet

Get started by adding some crypto to your wallet.

To connect MetaMask to Ganache:
Clicked on the network dropdown in MetaMask (“Ethereum Mainnet”).
Selected and Added Custom Network.
Entered the following details:



Add a custom network

Network name: Localhost 8545

Default RPC URL: 127.0.0.1:7545

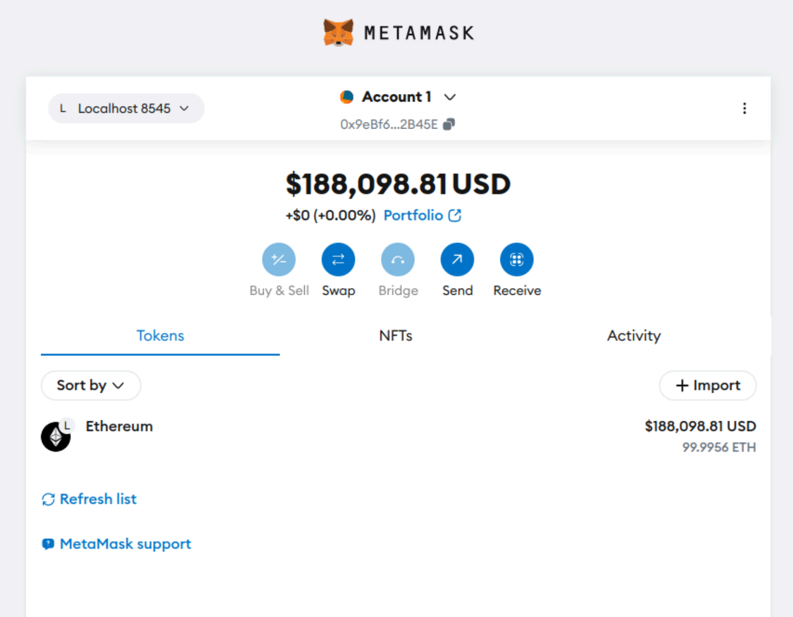
Chain ID: 1337

Currency symbol: ETH

Block explorer URL: Add a URL

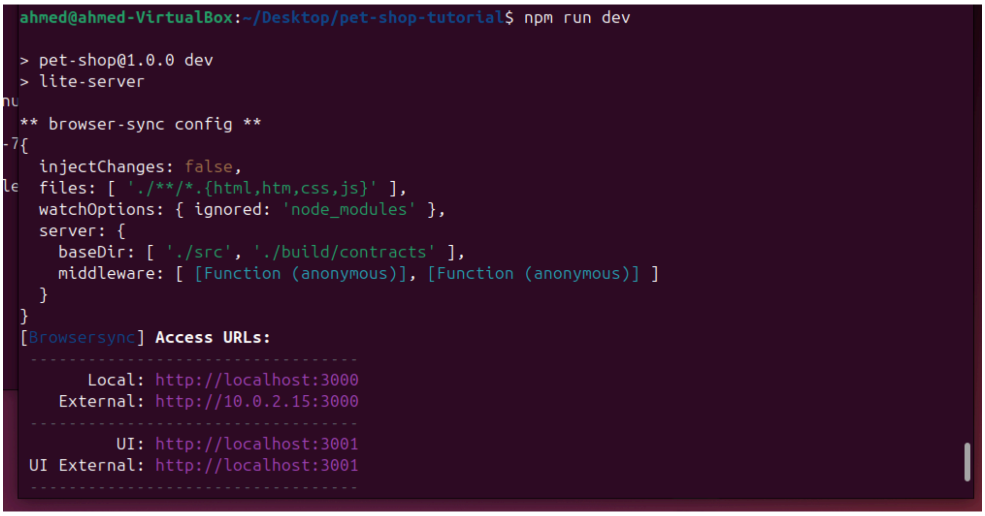
Save and switch to this network.

Following is the wallet that is connected to our Ganache.



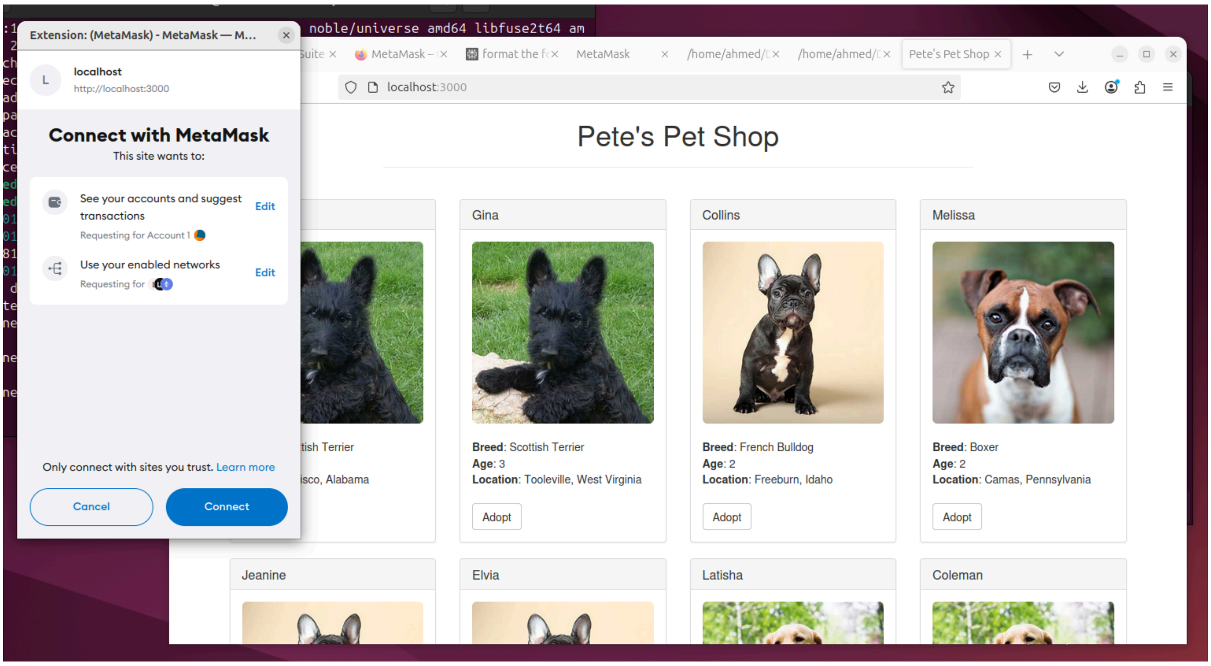
Launching and Using the Dapp

Start the server:
In the terminal (project's root directory), the following command was executed:
`npm run dev`



```
ahmed@ahmed-VirtualBox:~/Desktop/pet-shop-tutorial$ npm run dev

> pet-shop@1.0.0 dev
> lite-server

** browser-sync config **
{
  injectChanges: false,
  files: [ './**/*.{html,htm,css,js}' ],
  watchOptions: { ignored: 'node_modules' },
  server: {
    baseDir: [ './src', './build/contracts' ],
    middleware: [ [Function (anonymous)], [Function (anonymous)] ]
  }
}
[Browsersync] Access URLs:
 ----------------------------------
       Local: http://localhost:3000
    External: http://10.0.2.15:3000
 ----------------------------------
          UI: http://localhost:3001
 UI External: http://localhost:3001
 ----------------------------------
```

Observe the result:
Your default browser should open, showing the dapp interface.
The interface should list available pets with "Adopt" buttons.



```
noble/universe amd64 libfuse2t64 am
```

localhost
http://localhost:3000

Connect with MetaMask

This site wants to:

See your accounts and suggest transactions
Requesting for Account 1

Use your enabled networks
Requesting for

Only connect with sites you trust. Learn more

Pete's Pet Shop

tish Terrier
isco, Alabama

Gina
Breed: Scottish Terrier
Age: 3
Location: Tooleville, West Virginia

Collins
Breed: French Bulldog
Age: 2
Location: Freeburn, Idaho

Melissa
Breed: Boxer
Age: 2
Location: Camas, Pennsylvania

Jeanine

Elvia

Latisha

Coleman

Demo Video

The following link is of the video showcasing the interaction with Pete's Pet Shop DApp on a local Ethereum blockchain using Truffle, Ganache, and MetaMask. In just a minute, see how to adopt a pet and verify blockchain transactions in real time.

🎬 Demo Pete's Pet Shop DApp.mp4