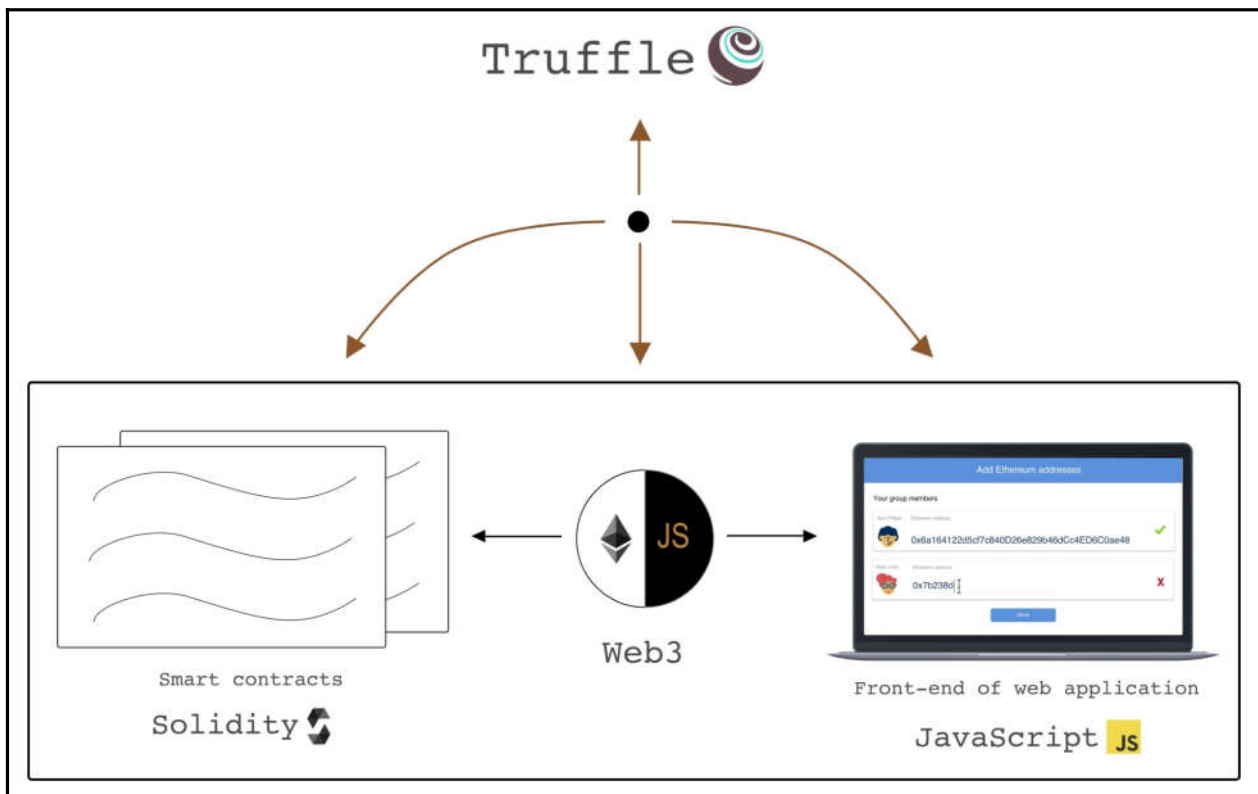


Chapter 1: Truffle for Decentralized Applications



You have
10000
TodoCoin

Reward a doer for their hard work - send them TodoCoin

Send TodoCoin

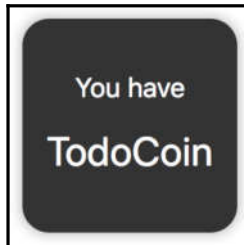
You have
10000
TodoCoin

Reward a doer for their hard work - send them TodoCoin

Send TodoCoin

Reward a doer for their hard work - send them TodoCoin

Send ToDoCoin



Reward a doer for their hard work - send them TodoCoin

You have
TodoCoin

Send ToDoCoin

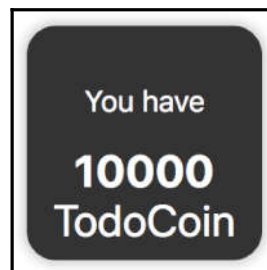
```
Truffle Develop started at http://localhost:9545/
```

Accounts:

- (0) 0x627306090abab3a6e1400e9345bc60c78a8bef57
- (1) 0xf17f52151ebef6c7334fad080c5704d77216b732
- (2) 0xc5fdf4076b8f3a5357c5e395ab970b5b54098fef
- (3) 0x821aea9a577a9b44299b9c15c88cf3087f3b5544
- (4) 0x0d1d4e623d10f9fba5db95830f7d3839406c6af2
- (5) 0x2932b7a2355d6fecc4b5c0b6bd44cc31df247a2e
- (6) 0x2191ef87e392377ec08e7c08eb105ef5448eced5
- (7) 0x0f4f2ac550a1b4e2280d04c21cea7ebd822934b5
- (8) 0x6330a553fc93768f612722bb8c2ec78ac90b3bbc
- (9) 0x5aeda56215b167893e80b4fe645ba6d5bab767de

Private Keys:

- (0) c87509a1c067bbde78beb793e6fa76530b6382a4c0241e5e4a9ec0a0f44dc0d3
- (1) ae6ae8e5ccbf04590405997ee2d52d2b330726137b875053c36d94e974d162f
- (2) 0dbb8e4ae425a6d2687f1a7e3ba17bc98c673636790f1b8ad91193c05875ef1
- (3) c88b703fb08cbea894b6aef5a544fb92e78a18e19814cd85da83b71f772aa6c
- (4) 388c684f0ba1ef5017716adb5d21a053ea8e90277d0868337519f97bede61418
- (5) 659cbb0e2411a44db63778987b1e22153c086a95eb6b18bdf89de078917abc63
- (6) 82d052c865f5763aad42add438569276c00d3d88a2d062d36b2bae914d58b8c8
- (7) aa3680d5d48a8283413f7a108367c7299ca73f553735860a87b08f39395618b7
- (8) 0f62d96d6675f32685bbdb8ac13cda7c23436f63efbb9d07700d8669ff12b7c4
- (9) 8d5366123cb560bb606379f90a0bfd4769eccc0557f1b362dcae9012b548b1e5



Reward a doer for their hard work - send them TodoCoin

Send TodoCoin

22

0x85db1e131b6c5c0c7eec98fed091a441ed856424



You have

9978
TodoCoin

Chapter 2: Web3 and Solidity in Truffle

```
Ganache CLI v6.0.3 (ganache-core: 2.0.2)
```

```
Available Accounts
```

```
=====
(0) 0x6ef727d2ae240b027e7174cad877586c8f499c21
(1) 0x1f4a302e5e2513728dd19978289c0eb6d28d8980
(2) 0xdcca5ac58497c032ba5ebb0f997736c6334e6ae6
(3) 0x9efa60c7721c39e25fa5008a79a85b0a34e2fbc0
(4) 0x586a166896d9c4b44f8c1713ec319dbdca6dec07
(5) 0xcab8c28553aa49b282b8245ffc20234294a27336
(6) 0x88632f8da98e4f3a4a62d1621d569855f92ca13e
(7) 0x3d5351216efb9d4df0e0dcd8dcb0a630e7255a0
(8) 0xc788d5f59adf287ffa1a7abbc4f075f1c17df1ff
(9) 0x737ecf7d5dfcd6a4384de3c9cae7d7d77993f6d4
```

```
Private Keys
```

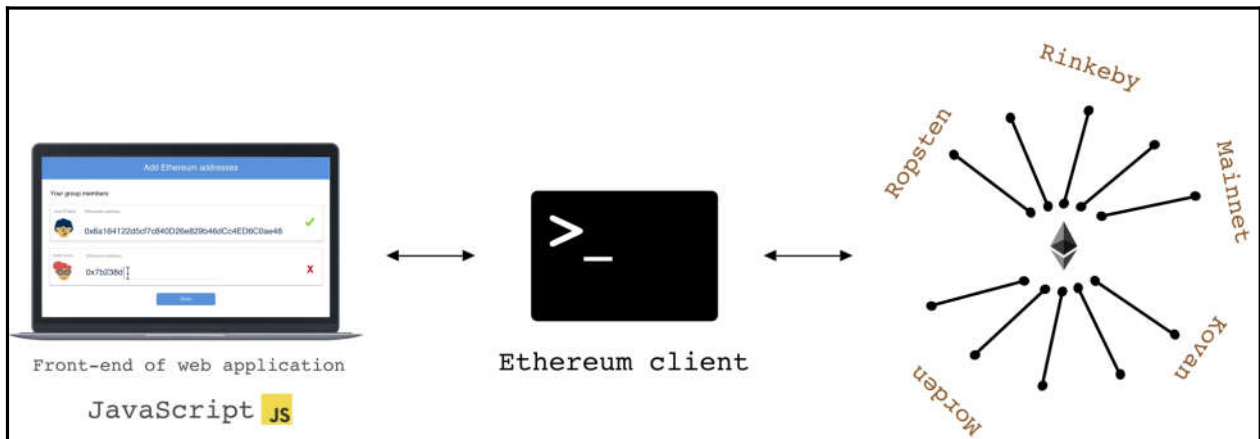
```
=====
(0) df32cf4ec79cfcb4d34e3876306764640aef02c222fdec3e9c279f83f7c67c46
(1) 73f27d7386daba07b6822745f4b274c4539f4c7b28e39d8f4aed33394de1c9c
(2) 9d41971ecd547a323da120b1e1bae1dd8f246990d3d52d66fb6aae0f308bedd6
(3) 31d29619a5e5df0f710d37140680c4ad1adf567c75508383899d48c57f0dba58
(4) d39bc6fdf96698691e5b83f78ba6b18a1ec6e55be96706b8bbd72e942fd8b2f1
(5) cc38d9f6dbb3d2fb8869406e5c42f40f2d4c1478f9d02c2fc7b0b1c659d5065f
(6) 2a972921c8af21ddef3f8251666145963ba8aa5b921aefd8f520ca95e67ea5eb
(7) da88c8fdf0b0a4b73a9dde5502a0baa8c2b961e5bcb963909d501f4ebbf1c9b
(8) 7acf44c9c29606e4a2e0fb565d9fc052549af41c7f9f18b09465b0ad18e750e0
(9) 9f9d73deef82c37ed6d13c931a4bb785d6897d4e4ec5e722e4b268e29f5c96ef
```

```
HD Wallet
```

```
=====
Mnemonic:      detail about ranch logic violin peace wisdom penalty uncle faculty board broom
Base HD Path:  m/44'/60'/0'/0/{account_index}
```

```
Listening on localhost:8545
```

Chapter 3: Choosing an Ethereum Client for Your Dapp



```
INFO [03-22|17:44:43] Maximum peer count           ETH=25 LES=0 total=
25
INFO [03-22|17:44:43] Starting peer-to-peer node           instance=Geth/v1.8.
2-stable/darwin-amd64/go1.10
INFO [03-22|17:44:43] Allocated cache and file handles     database=/Users/nik
hilwins/Library/Ethereum/geth/chaindata cache=768 handles=1024
INFO [03-22|17:44:44] Initialised chain configuration       config="{ChainID: 1
Homestead: 1150000 DAO: 1920000 DAOsupport: true EIP150: 2463000 EIP155: 2675000
EIP158: 2675000 Byzantium: 4370000 Constantinople: <nil> Engine: ethash}"
INFO [03-22|17:44:44] Disk storage enabled for ethash caches dir=/Users/nikhilwi
ns/Library/Ethereum/geth/ethash count=3
INFO [03-22|17:44:44] Disk storage enabled for ethash DAGs  dir=/Users/nikhilwi
ns/.ethash count=2
INFO [03-22|17:44:44] Initialising Ethereum protocol       versions="[63 62]"
network=1
INFO [03-22|17:44:44] Loaded most recent local header       number=1008264 hash
=6a9a62...9d3929 td=7239327024842070734
INFO [03-22|17:44:44] Loaded most recent local full block   number=0 hash
=d4e567...cb8fa3 td=17179869184
INFO [03-22|17:44:44] Loaded most recent local fast block   number=991049 hash
=9bbf93...6d46ad td=7029237091804882068
INFO [03-22|17:44:44] Upgrading chain index                 type=bloombits perc
centage=92
INFO [03-22|17:44:44] Loaded local transaction journal      transactions=0 drop
ped=0
INFO [03-22|17:44:44] Regenerated local transaction journal  transactions=0 acco
unts=0
INFO [03-22|17:44:44] Starting P2P networking
INFO [03-22|17:44:46] UDP listener up                       self=enode://e6f95d
133b86c25fe43502f65c249a30903484929b24c9dbbe789a2089667f19045b6f4cb1e9a10cea997ce9
```



```

2018-03-22 18:37:40 DB path /Users/nikhilwins/Library/Application Support/io.parity.ethereum/chains/ethereum/db/906a34e69aec8c0d
2018-03-22 18:37:40 Path to dapps /Users/nikhilwins/Library/Application Support/io.parity.ethereum/dapps
2018-03-22 18:37:40 State DB configuration: fast
2018-03-22 18:37:40 Operating mode: passive
2018-03-22 18:37:40 Configured for Foundation using Ethash engine
2018-03-22 18:37:43 Updated conversion rate to  $\Xi$ 1 = US$542.18 (219572140 wei/gas)
2018-03-22 18:37:46 Public node URL: enode://9b6f165951d72ed1a592f37af85c9a24a68ad6a4b3844028bcda397c24f8348b5dbfc86568b0733896306c707a68836b59d8279ef92f7464dbdd066dbb6942b5@10.0.0.23:30303
2018-03-22 18:37:46 Syncing #908951 acce...1798 0 blk/s 0 tx/s 0 Mgas/s
0+ 0 Qed #908951 16/25 peers 74 KiB chain 66 MiB db 0 bytes queue 10 KiB sync RPC: 0 conn, 0 req/s, 0  $\mu$ s
2018-03-22 18:37:56 Syncing snapshot 4/807 #908951 22/25 peers 74 KiB chain 66 MiB db 0 bytes queue 10 KiB sync RPC: 0 conn, 0 req/s, 0  $\mu$ s
2018-03-22 18:38:06 Syncing snapshot 7/807 #908951 25/25 peers 74 KiB chain 66 MiB db 0 bytes queue 10 KiB sync RPC: 0 conn, 0 req/s, 0  $\mu$ s
2018-03-22 18:38:11 Syncing snapshot 11/807 #908951 25/25 peers 74 KiB chain 66 MiB db 0 bytes queue 10 KiB sync RPC: 0 conn, 0 req/s, 0  $\mu$ s

```

```

Welcome to the Geth JavaScript console!

instance: Parity//v1.8.11-stable-21522ff-20180227/x86_64-macos/rustc1.24.0
coinbase: 0x0000000000000000000000000000000000000000000000000000000000000000
at block: 875305 (Wed, 20 Jan 2016 10:20:22 +07)
modules: eth:1.0 net:1.0 parity:1.0 parity_accounts:1.0 parity_pubsub:1.0 personal:1.0 pubsub:1.0 rpc:1.0 secretstore:1.0 shh:1.0 shh_pubsub:1.0 traces:1.0 web3:1.0

>

```

Ganache CLI v6.0.3 (ganache-core: 2.0.2)

Available Accounts

- ```
=====
(0) 0xf54b8cccd4d31149ee537263a1db74d3491fdab
(1) 0x585a25b3aea6070bd54cf7a41295389857b5a77e
(2) 0xaba74ffdc21fcbf6ab9ef01430c2e3a96682b5dc
(3) 0xcb54122c72d897c06eebd3a0f57437a838f2cef4
(4) 0x07151274f09f3bceb1267672f4e7aaf363882f73
(5) 0x639b6dc466129b0e194892493948a03a23741a00
(6) 0xeb9bfaaf1a9fffb95829c2b8247b8843b56b820c9
(7) 0xba098ff569b884acd8ad55cadef00a578a28e8e3
(8) 0x345c38cead231a62053ec5608c2f130cba286a0d
(9) 0x33cb07aef13711737ddbe738095b55d53032a583
```

Private Keys

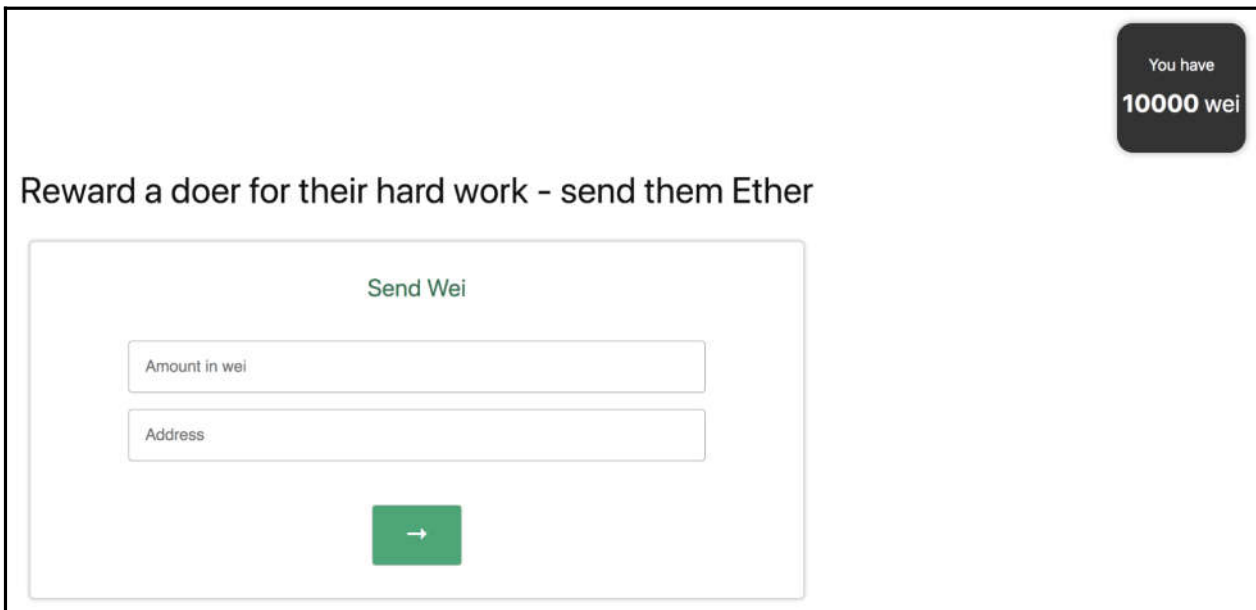
- ```
=====
(0) c746146664781fe70e7fc6f49e2f1c92c4073de1ac017d94b24785e5ef12e9fc
(1) 33a2456ce1225e5cccbf5991c0335297c5989b35eccf7972f48444ae21fd9d87
(2) 881c6669cbd026c22f58b3df9797b162298eba9473e12eea942283e1e9ae123
(3) d77175332ecd82823dd8ae46734cd5df234c3f1f974497f9088b66455d36acec
(4) b39f191b4f9ca67d8867b5290b54639e8ee51fbb78731a73d4e11737a80f5742
(5) 87d3ed94391e8153641b88fa7bdd254f867433edd5ef598b9ce13543fc794460
(6) 1f80b799d8444a91b98f0511e13fc1b542adddd56f45db5d9b5db478438b1e4
(7) d455e25ba828252317ced615f8e0598a03bc3883441ad421b5a57ba76f963d45
(8) 8d877931f67859639dbb8e4f63c47e47c646348ee6a9a4cf2a645cef3d0c6667
(9) 99cc6268fd63284d86e4093eb24bfe3f2b97b9d8288b67545d9331b9894395b5
```

HD Wallet

```
=====
Mnemonic:      upper online similar budget claw punch arrest casino nurse yard alone output
Base HD Path:  m/44'/60'/0'/0/{account_index}
```

Listening on localhost:8545

Chapter 4: Migrating Your Dapp to Ethereum Blockchains

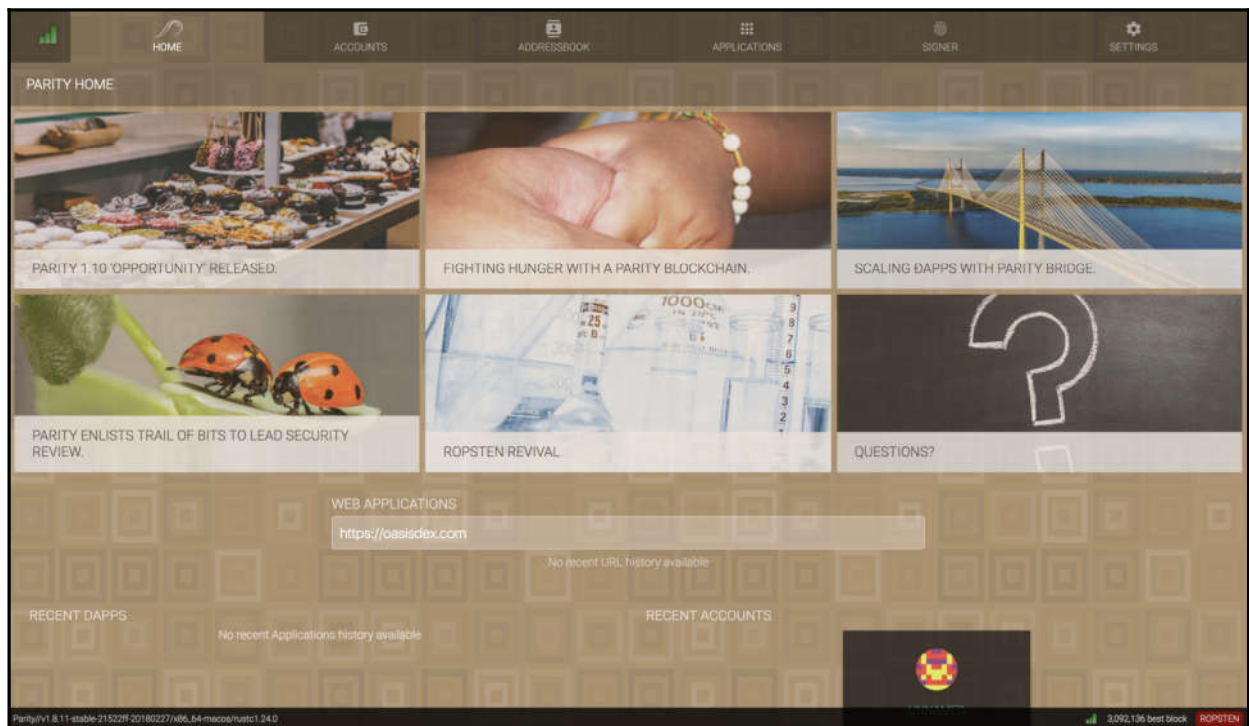


```
2018-04-23 14:39:09 Starting Parity/v1.8.11-stable-21522ff-20180227/x86_64-macos/rustcl.24.0
2018-04-23 14:39:09 Keys path /Users/nikhilwins/Library/Application Support/io.parity.ethereum/keys/Ropsten
2018-04-23 14:39:09 DB path /Users/nikhilwins/Library/Application Support/io.parity.ethereum/chains/test/db/ae90623718e47d66
2018-04-23 14:39:09 Path to dapps /Users/nikhilwins/Library/Application Support/io.parity.ethereum/dapps
2018-04-23 14:39:09 State DB configuration: fast
2018-04-23 14:39:09 Operating mode: active
2018-04-23 14:39:09 Configured for Ropsten using Ethash engine
2018-04-23 14:39:11 Updated conversion rate to E1 = US$639.50 (186157330 wei/gas)
2018-04-23 14:39:15 Public node URL: enode://9b6f165951d72ed1a592f37af85c9a24a68ad6a4b3844028bcd397c24f8348b5dbfc86568b0733896306c707a68836b59d8279ef92f7464dbdd066db
b6942b5010.100.0.238:30303
2018-04-23 14:39:20 Syncing #3073619 bc4a_f022 1 blk/s 108 tx/s 3 Mgas/s 68+ 127 Qed #3073833 10/25 peers 352 KiB chain 65 MiB db 12 MiB queue 3 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:39:30 Syncing #3073758 374e_58fd 13 blk/s 1178 tx/s 47 Mgas/s 0+ 483 Qed #3074243 10/25 peers 2 MiB chain 69 MiB db 30 MiB queue 31 MiB s
ync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:39:40 Syncing #3074045 6539_4871 28 blk/s 1821 tx/s 73 Mgas/s 2998+ 1217 Qed #3078716 10/25 peers 6 MiB chain 73 MiB db 128 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:39:50 Syncing #3074333 c294_ccc6 29 blk/s 2217 tx/s 86 Mgas/s 457+ 3893 Qed #3078716 10/25 peers 6 MiB chain 76 MiB db 220 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:00 Syncing #3074855 26f9_581e 52 blk/s 2913 tx/s 118 Mgas/s 0+ 3860 Qed #3078716 11/25 peers 6 MiB chain 78 MiB db 207 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:10 Syncing #3075529 9f50_7cac 67 blk/s 3899 tx/s 157 Mgas/s 0+ 3184 Qed #3078716 11/25 peers 6 MiB chain 79 MiB db 171 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:20 Syncing #3076263 b9d3_e8ae 73 blk/s 4346 tx/s 143 Mgas/s 0+ 2452 Qed #3078716 11/25 peers 6 MiB chain 79 MiB db 133 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:25 Syncing #3076641 a3ea_94fa 75 blk/s 4572 tx/s 129 Mgas/s 0+ 2072 Qed #3078716 11/25 peers 6 MiB chain 79 MiB db 114 MiB queue 12 MiB
sync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:35 Syncing #3077227 7588_0a8a 58 blk/s 3826 tx/s 117 Mgas/s 0+ 1488 Qed #3078716 11/25 peers 6 MiB chain 80 MiB db 81 MiB queue 12 MiB s
ync RPC: 0 conn, 0 req/s, 0 us
2018-04-23 14:40:40 Syncing #3077596 ec22_78b7 73 blk/s 4947 tx/s 155 Mgas/s 0+ 1116 Qed #3078716 11/25 peers 6 MiB chain 81 MiB db 59 MiB queue 12 MiB s
```

Welcome to the Geth JavaScript console!

```
instance: Geth/v1.8.2-stable/darwin-amd64/go1.10  
coinbase: 0xd35db5027107f222566894caaf987e9051269ece  
at block: 0 (Thu, 01 Jan 1970 07:00:00 +07)  
modules: eth:1.0 net:1.0 personal:1.0 rpc:1.0 web3:1.0
```

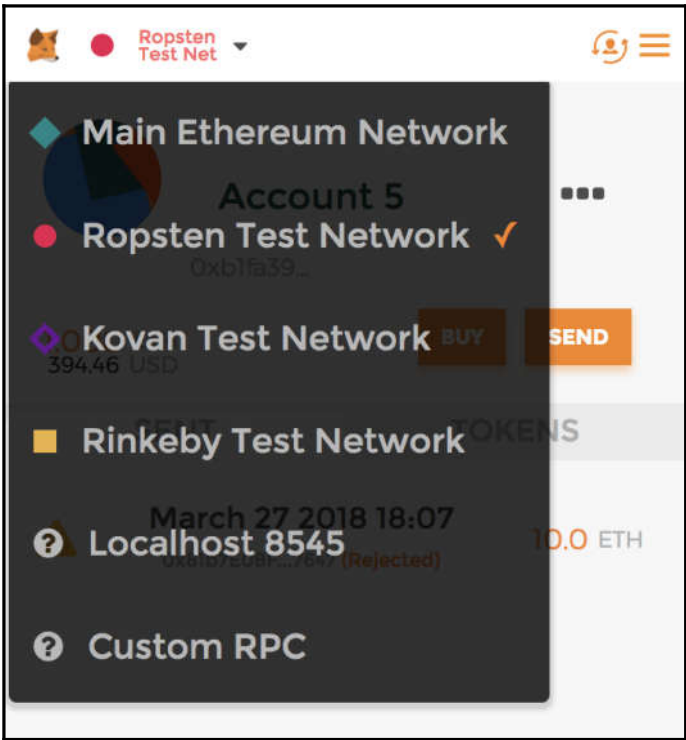
> █



```
> web3.eth.coinbase  
"0xb1fa39f962682f8c85cdf1e21042712195a74b14"  
> █
```

```
> web3.eth.syncing
{
  currentBlock: 3099084,
  highestBlock: 3099092,
  startingBlock: 3095513,
  warpChunksAmount: null,
  warpChunksProcessed: null
}
```

```
> web3.eth.syncing
false
> |
```



faucet

address: 0x81b7e08f65bdf5648606c89998a9cc8164397647

balance: 7628459.13 ether

request 1 ether from faucet

user

address: 0xb1fa39f962682f8c85cdf1e21042712195a74b14

balance: 1.00 ether

donate to faucet:

1 ether

10 ether

100 ether

transactions

```
Running migration: 1_initial_migration.js
  Deploying Migrations...
  ... 0xb390aff820e20a984c1360b0caed0f5ee48709d0bbe35c4859d9e07df056ad31
  Migrations: 0xddcdca6ab896af6bf35eaf8845a4d66aea1ef836
  Saving successful migration to network...
  ... 0x24f91429894a2a5859a01cb17ebb7a467311ba807fbb4fc9522063ee8565b7a5
  Saving artifacts...
Running migration: 2_deploy_contracts.js
  Deploying TaskMaster...
  ... 0x03f3ec36aeabaa1fa88a8d6473c56b1495aa53cb86e637cebd30c218f73b9180
  TaskMaster: 0x5ebb1d96fb1046c339c9719f186fb33f9894c74f
  Saving successful migration to network...
  ... 0xb8c49c03b2e8fb50c32c3ca8fe7678ce9c5778a889513cf27ff2c329d45f621a
  Saving artifacts...
```

```
Running migration: 1_initial_migration.js
  Replacing Migrations...
  ... 0xb95007417a6d7182d43fb4de9e70d0422c2b8daf6d6d946d12874b1cf0c1c996
  Migrations: 0xc8c9d0bd9f56868fa186460bb602e7854de40d8a
  Saving successful migration to network...
  ... 0x0c212d03301f9619854cfb24a71def9d26c1d03feaaebd021525ecaca84e5149
  Saving artifacts...
Running migration: 2_deploy_contracts.js
  Replacing TaskMaster...
  ... 0xfa4ecfd1ccdb2eda8a7068bc7b9927b2e0ee0e454514c3168cf6d3477df46f43
  TaskMaster: 0xfe0d504eef2507b11f2eb84869f9182221dc01a4
  Saving artifacts...
```

Chapter 5: Truffle and Popular JavaScript Technologies

Metacoin ~ Angular4 + Truffle Starter Dapp

You have 10000 META

Send Metacoin

Amount

To Address

Hint: open the browser developer console to view any errors and warnings.

Metacoin ~ Angular4 + Truffle Starter Dapp

You have 10000 META

Send Metacoin

Amount

To Address

Send

Hint: open the browser developer console to view any errors and warnings.

You have 9950 META

Truffle Box

Good to Go!

Your Truffle Box is installed and ready.

Smart Contract Example

If your contracts compiled and migrated successfully, below will show a stored value of 5 (by default).

Try changing the value stored on line 59 of App.js.

The stored value is: 5

Chapter 6: Testing Your Dapp

```
TestTaskMaster
  ✓ testInitialBalance (77ms)

1 passing (397ms)
```

```
TestTaskMaster
  1) testInitialBalance

Events emitted during test:
-----

TestEvent(result: <indexed>, message: Owner should have 10000 wei (Tested: 10000, Against: 10001))

-----

0 passing (607ms)
1 failing

1) TestTaskMaster testInitialBalance:
   Error: Owner should have 10000 wei (Tested: 10000, Against: 10001)
     at /Users/nikhilwins/.npm/versions/node/v6.12.0/lib/node_modules/truffle/build/cli.bundled.js:319138:17
     at Array.forEach (native)
     at processResult (/Users/nikhilwins/.npm/versions/node/v6.12.0/lib/node_modules/truffle/build/cli.bundled.js:319136:19)
     at process._tickDomainCallback (internal/process/next_tick.js:135:7)
```

```
TestTaskMaster
  ✓ testInitialBalance (55ms)
  ✓ testReward (93ms)

2 passing (427ms)
```



```
✓ should set owner balance
```

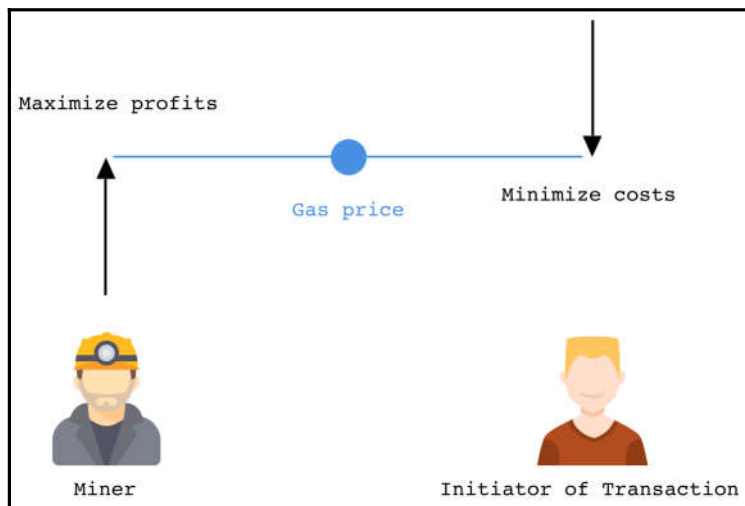
```
✓ should set owner balance
✓ should be able to reward recipient (57ms)
```

```
✓ should only allow owner to reward
```

```
✓ should not be able to reward recipient with reward
that exceeds owner balance
```

Chapter 7: Truffle Gotchas and Best Practices

TxHash:	0x617248f5eb178f81a4aea5c986a0b858b137bfae777979723c5507a6491340fb
Block Height:	3844796 (117 block confirmations)
TimeStamp:	33 mins ago (Jun-09-2017 11:06:34 AM +UTC)
From:	0xe7a3aa2509ec62386debd90f65a7d4f19199dc38
To:	Contract 0xf92f7c8012de01ae247a2523e6e3a086273ab03a  
Value:	1.71 Ether (\$451.27) - [CANCELLED]
Gas Limit:	59268
Gas Price:	0.000000020229599175 Ether
Gas Used By Txn:	59268
Actual Tx Cost/Fee:	0.0011989678839 Ether (\$0.32)



 Gas Price Std (Gwei)
6

Recommended Gas Prices

(based on current network conditions)

Speed	Gas Price (gwei)
SafeLow (<30m)	6
Standard (<5m)	6
Fast (<2m)	9