

Chapter 1: Introduction to Blockchain

Private key:

```
a7f9c7ad318014b11cbad0a18587b374c339d91f55ca64c4c5e067776d0b65cb
```

Public key:

```
04d8fc7523fcd7caa825b6ed97d8564c78f59e8ba903bff5fe1e3c096a45d435937  
942616f4dbccb353d3e19e822d707996143a603a6273cf237acfaf5bd029874
```

Wif: 5K6GJ5y9qSDSmrGZ1idLbWoXk4iaJpxFuDpiCC78cgngCXTSeDv




Address: 1GnUipq7cTjiPxEsCDzW6nYgbUyRa7eFYm

Denominations

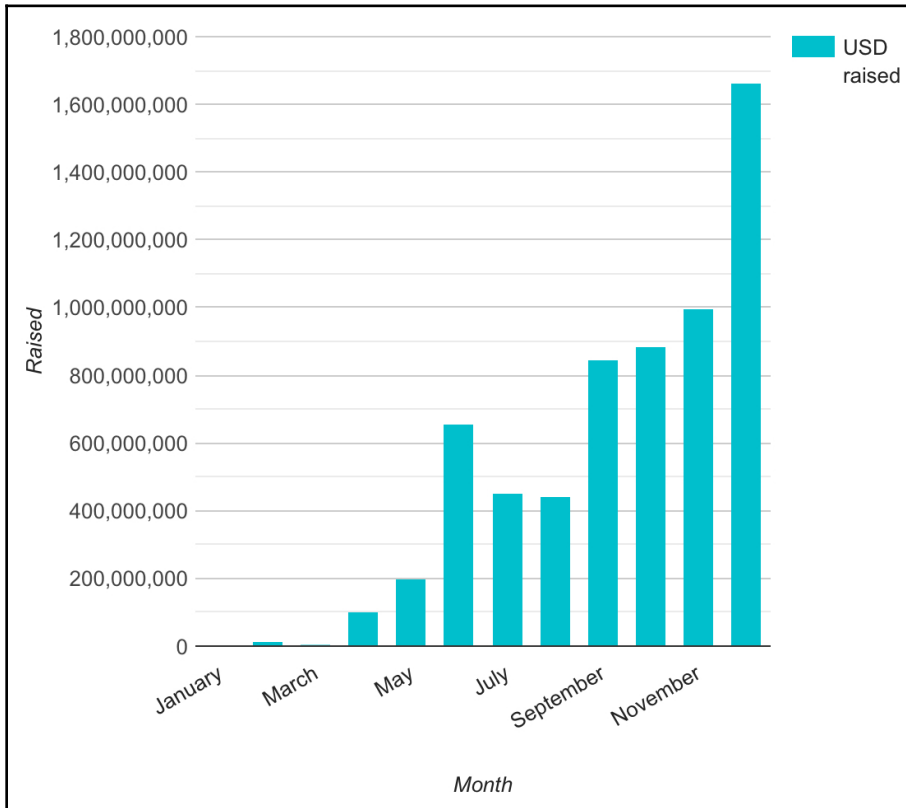
Unit	Wei Value	Wei
Gwei (shannon)	1e9 wei	1,000,000,000
microether (szabo)	1e12 wei	1,000,000,000,000
milliether (finney)	1e15 wei	1,000,000,000,000,000
ether	1e18 wei	1,000,000,000,000,000,000

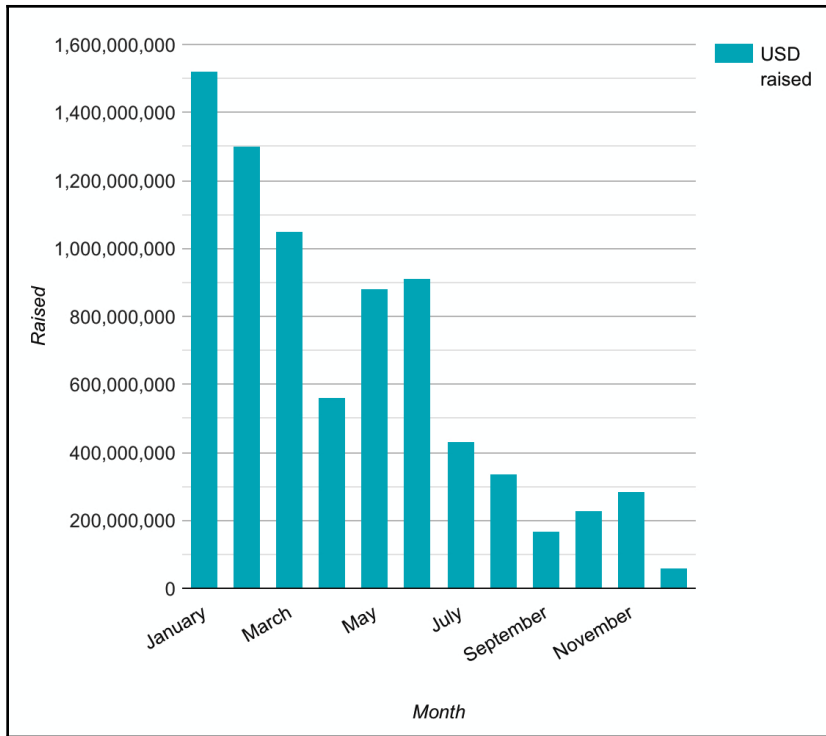
Browse top Ethereum Accounts

Show entries

Address	Name	Type	Balance
0x742d35cc6634c0532925a3b844bc454e4438f44e		Account	1776573.15488 ETH
0x281055afc982d96fab65b3a49cac8b878184cb16		Account	1538423.10657 ETH
0x6f46cf5569aefa1acc1009290c8e043747172d89		Account	1510065.64213 ETH
0x90e63c3d53e0ea496845b7a03ec7548b70014a91		Account	1507810.43876 ETH
0xfe9e8709d3215310075d67e3ed32a380ccf451c8		Account	1390688.14271 ETH
0x53d284357ec70ce289d6d64134dfac8e511c8a3d		Account	1378754.09307 ETH
0xab7c74abc0c4d48d1bdad5dcb26153fc8780f83e		 Contract	1000000.01136 ETH
0x61edcdf5bb737adffe5043706e7c5bb1f1a56eea		 Contract	984999.00001 ETH
0xc02aaa39b223fe8d0a0e5c4f27ead9083c756cc2		 Contract	948173.00438 ETH
0xfbb1b73c4f0bda4f67dca266ce6ef42f520fbb98	Bittrex	Account	942717.15953 ETH

Chapter 2: STO - Security Token Offering





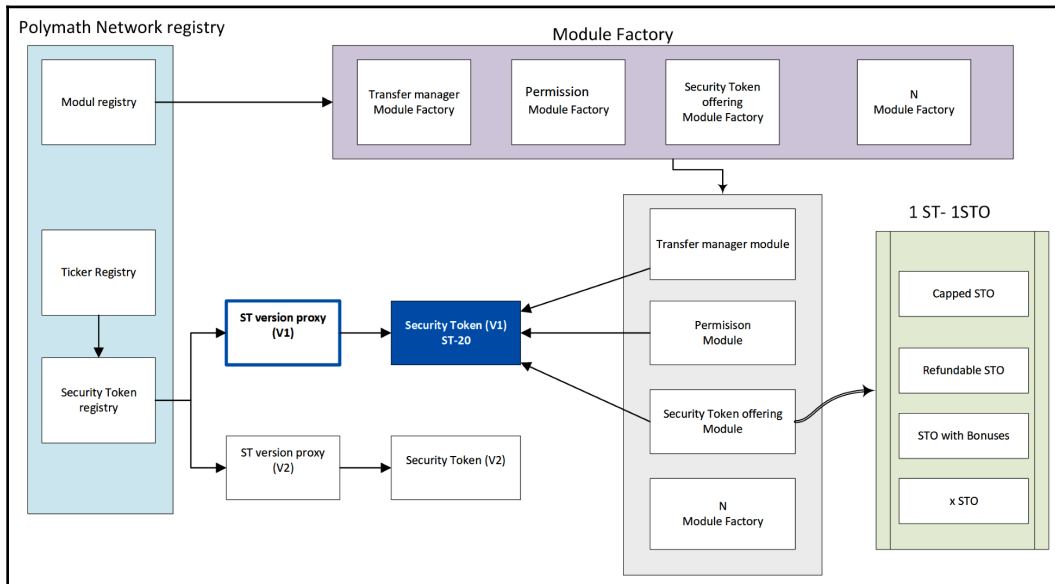
Chapter 5: Security Token Smart Contracts

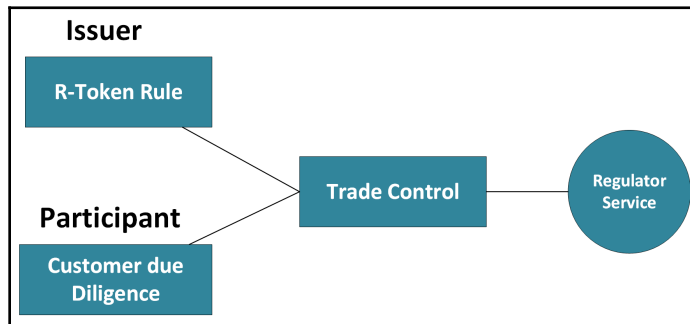
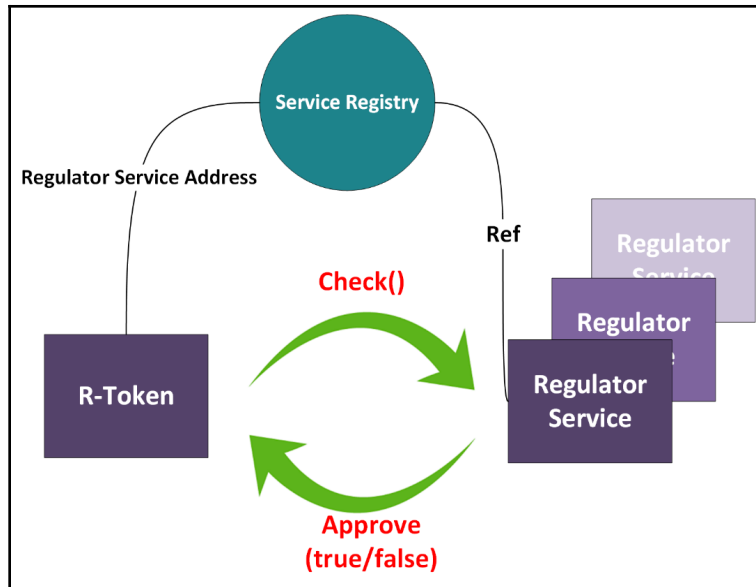


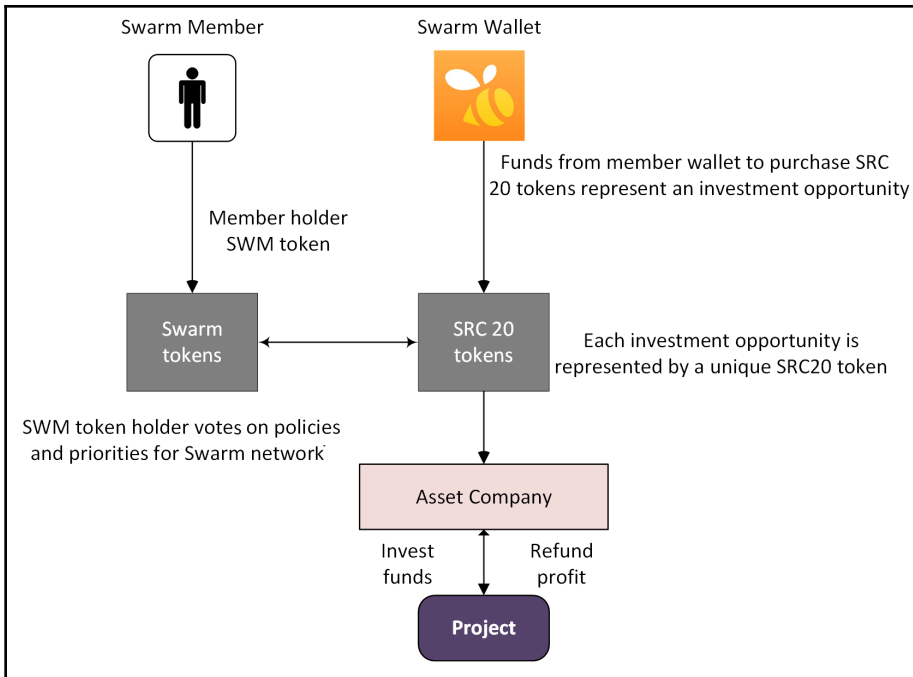
Kitty #1111
Owner: [0x51c3016d6699480EcCbEcf2155079c27EbAe040](#)
Born: November 25, 2017 at 10:15 PM UTC
Generation: 15
Block number: [0x46861e](#)
Block hash: [0xbf80877e0d7a85fa9d5d258375b5c0da49010b8067e48a767c1fdc07e626ad5](#)
Official profile: [CryptoKitty_#7479](#)
Attributes: himalayan, limegreen, kittencream, salmon, otaku, swampgreen, dali, luckystripe

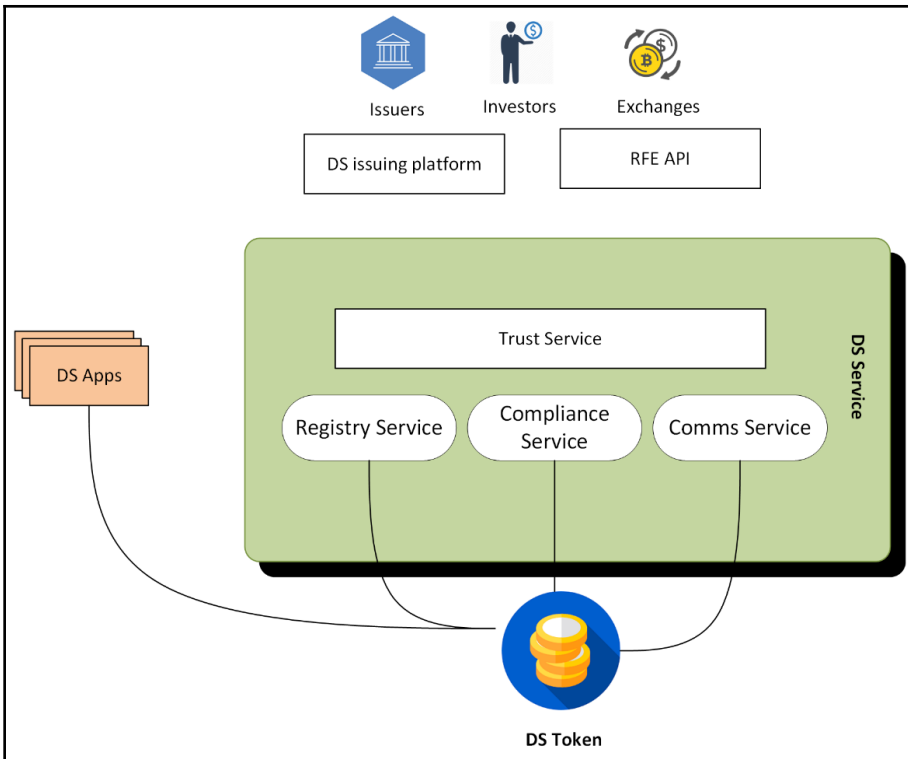
Genes
Use the explorer below to browse this kitty's genes in different formats. The most useful format is named after @kaigani, the CryptoKitty scientist who mapped the genome.

```
ka1 hex binary  
5777 8785 999a afam 4a27 6164 f7e9 788i 6875 1b42 9fga fodc
```

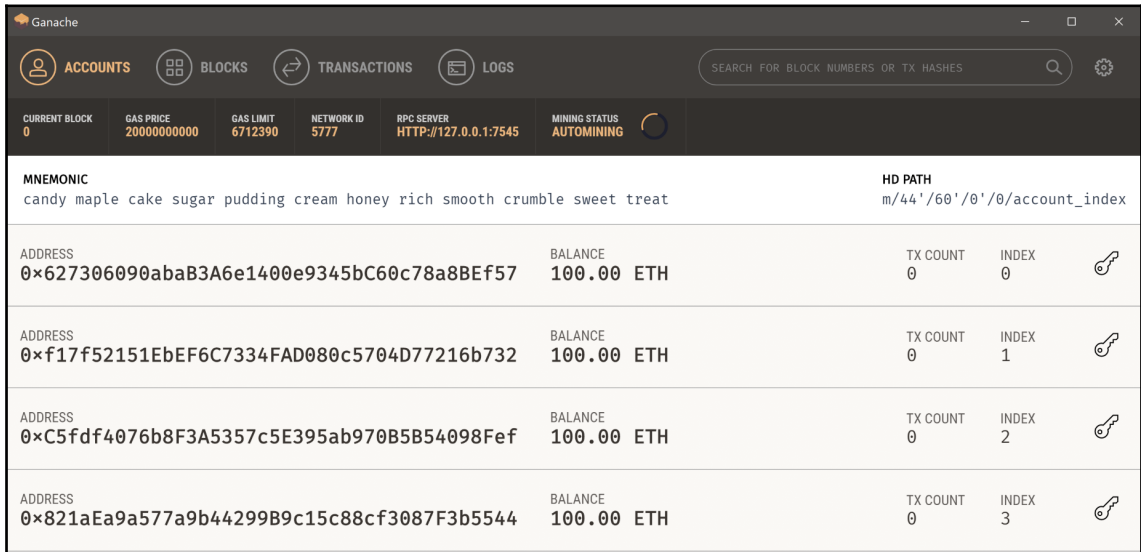








Chapter 6: Building a Security Token Dapp



The screenshot shows the Ganache application interface. At the top, there are navigation tabs for ACCOUNTS, BLOCKS, TRANSACTIONS, and LOGS. A search bar is located on the right side of the top bar. Below the navigation, a status bar displays various metrics: CURRENT BLOCK (0), GAS PRICE (2000000000), GAS LIMIT (6712390), NETWORK ID (5777), RPC SERVER (HTTP://127.0.0.1:7545), and MINING STATUS (AUTOMINING). The main content area displays account information for a mnemonic phrase: "candy maple cake sugar pudding cream honey rich smooth crumble sweet treat". The HD PATH is shown as "m/44'/60'/0'/0'/account_index". Below this, a table lists four accounts with their addresses, balances, and transaction counts.

ADDRESS	BALANCE	TX COUNT	INDEX
0x627306090abaB3A6e1400e9345bC60c78a8BEf57	100.00 ETH	0	0
0xf17f52151EbEF6C7334FAD080c5704D77216b732	100.00 ETH	0	1
0xC5fdf4076b8F3A5357c5E395ab970B5B54098Fef	100.00 ETH	0	2
0x821aEa9a577a9b44299B9c15c88cf3087F3b5544	100.00 ETH	0	3

```
Ganache CLI v6.1.0 (ganache-core: 2.1.0)
```

```
Available Accounts
```

```
=====
```

- (0) 0xef18baedab2a76cf9e564f2f7cc32ef5d976207d
- (1) 0x5b4c84cf76fc917970a5f98e825ebeb700ff208c
- (2) 0xe01c417a907dd8e8dfb405211f72ca50b59a93ea
- (3) 0x892a0ec934a4aba520dafa88f1d792260f553fd5
- (4) 0x73d6abafacafc414bb8b63788fa3f5175f89cce3
- (5) 0xaf4431b298333ec76f59c0ff5f231c6b1eb40449
- (6) 0x1f06727631762824602ba60a13e9bc8ac6c78e3f
- (7) 0x0954345c888733db4d8ef7dcd2e84135f8bf6f96
- (8) 0x527c4367249f8bf28ef2eb859555fdebe22b7eb2
- (9) 0x2933810a066c8cf890b583ecbc708852dae748f0

```
Private Keys
```

```
=====
```

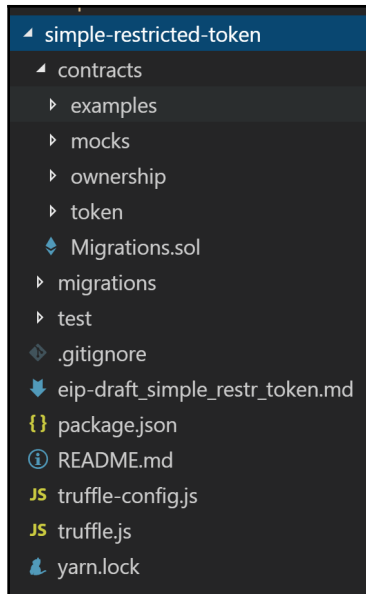
- (0) a02d2bb754a555266379768b5ba54aac1e259078e5b43cb0ef3ec3d8dcf1b188
- (1) aeae9066fb87841398714b00bf9edc9cf2b297788ff0eaf0294759d6ea7a5cd
- (2) 81b5451551bbf376abcd14be49bec8c7e4094a34db0e289deefa5648e45b82f0
- (3) ce8124e5e3c69f4ae73d5a22cd30111256d57a3732246ba7a1b4bf2705e7f1dd
- (4) 51282343720b7786103b6b134ddcca55e409a257806ccf2764293a0a6476f769
- (5) d564efd8213822a4e4c5588b3e6ab734604043c0ce3a605ae979328239e0d5a3
- (6) f55d530a63b4978f67dc6a6cc1da522f5f843f19e72fe32974027aafb1fba48b
- (7) 77e09b035bef9cacb099b030da8dafe59b4271e2aa04b59614148d1bc450a09a
- (8) 687d16661832f3d15656c35fcf6dab268ec78596d7c71c79219d45b395c98598
- (9) 425197ea31567b7d4942b31f80d413ea7bcc2286ddd487ceea60ee4bd259222e

```
HD Wallet
```

```
=====
```

```
Mnemonic:      hurt vapor history diamond next meat seven dress hill fish inflict try  
Base HD Path:  m/44'/60'/0'/0/{account_index}
```

```
Listening on localhost:8545
```



```
Compiling .\contracts\Migrations.sol...
Compiling .\contracts\examples\divisibility\IndivisibleToken.sol...
Compiling .\contracts\examples\number-of-accounts\MaxNumShareholdersToken.sol...
Compiling .\contracts\examples\other-standards\R-Token\RegulatedTokenExample.sol...
Compiling .\contracts\examples\other-standards\R-Token\RegulatorServiceExample.sol...
Compiling .\contracts\examples\other-standards\ST20\ST20Example.sol...
Compiling .\contracts\examples\ownership-percentage\IndividualOwnershipStakeToken.sol...
Compiling .\contracts\examples\ownership-percentage\MaxOwnershipStakeToken.sol...
Compiling .\contracts\examples\whitelists\BasicWhitelistToken.sol...
Compiling .\contracts\examples\whitelists\ManagedWhitelist.sol...
Compiling .\contracts\examples\whitelists\ManagedWhitelistToken.sol...
Compiling .\contracts\mocks\BasicTokenMock.sol...
Compiling .\contracts\mocks\BasicWhitelistTokenMock.sol...
Compiling .\contracts\mocks\IndividualOwnershipStakeTokenMock.sol...
```

```
Using network 'development'.

Running migration: 1_initial_migration.js
  Deploying Migrations...
  ... 0xc50c165b7645a9238ba7e66fc2726ab294fc5bcc1a9058981846144626bb1439
  Migrations: 0x3dc618e25d7d6469561743ee276aef4147724fda
  Saving successful migration to network...
  ... 0x419f2d268233c539808cd131770e9c4c674d46336a03586362f4edee8ff731cc
  Saving artifacts...
Running migration: 2_deploy_contracts.js
  Running step...
  Deploying MessagesAndCodes...
  ... 0x09b07834fd3261263a76829db20e74ff2cf03e00179f87e863f365ee33d62def
  MessagesAndCodes: 0x539be5b782074161969e0b152efa2754e8d5839e
  Linking MessagesAndCodes to IndivisibleTokenMock
  Linking MessagesAndCodes to BasicWhitelistTokenMock
  Linking MessagesAndCodes to ManagedWhitelistTokenMock
  Linking MessagesAndCodes to MaxOwnershipStakeTokenMock
  Linking MessagesAndCodes to MaxNumShareholdersTokenMock
  Linking MessagesAndCodes to IndividualOwnershipStakeTokenMock
  Linking MessagesAndCodes to ST20ExampleMock
  Saving successful migration to network...
  ... 0xbefdf0428fc96e996b5e0098f8d30ea7357b4e6bd95d1e67359c6240b4d74edc
  Saving artifacts...
```

```
net_version
eth_sendTransaction

Transaction: 0xc50c165b7645a9238ba7e66fc2726ab294fc5bcc1a9058981846144626bb1439
Contract created: 0x3dc618e25d7d6469561743ee276aef4147724fda
Gas usage: 277462
Block Number: 1
Block Time: Fri Mar 08 2019 17:51:01 GMT-0500 (Eastern Standard Time)

eth_newBlockFilter
eth_getFilterChanges
```

```
Contract: ST20Example
  ✓ should mint total supply of tokens to initial account
  ✓ should allow transfer between non-zero addresses (115ms)
  ✓ should allow transferFrom between non-zero addresses (after approval) (142ms)
  ✓ should deny transfer to the zero address
  ✓ should deny transferFrom to the zero address (after approval) (98ms)
  ✓ should detect success for transfer between non-zero addresses
  ✓ should detect zero address restriction for transfer to zero-address
  ✓ should return false for verifyTransfer call on transfer between non-zero addresses
  ✓ should return true for verifyTransfer call on transfer to zero-address
  ✓ should ensure success code is 0
  ✓ should return success message for success code
  ✓ should return restriction message for zero address restriction code
  ✓ should have tokenDetails set in the constructor
  ✓ should allow owner to mint tokens to an address (88ms)

Contract: RegulatedTokenExample
  ✓ should mint total supply of tokens to initial account
  ✓ should handle CHECK_ESEND condition (202ms)
  ✓ should handle CHECK_ERECD condition (248ms)
  ✓ should handle CHECK_ECDDIVIS condition (259ms)
  ✓ should allow for valid transfer (248ms)
  ✓ should handle CHECK_ELOCKED condition (258ms)

87 passing (16s)
```

```
Contract: MyERC1404
  ✓ should has token name and symbol (44ms)
  ✓ should mint total supply of tokens to initial account
  ✓ should revert transfers between non-whitelisted accounts (39ms)
  ✓ should revert use of transferFrom between non-whitelisted accounts (123ms)
  ✓ should detect restriction for transfer between non-whitelisted accounts
  ✓ should return non-whitelisted error message for whitelist error code
  ✓ should allow contract owner to whitelist an account (98ms)
  ✓ should allow transfer between whitelisted accounts (141ms)
  ✓ should allow use of transferFrom between whitelisted accounts (222ms)
  ✓ should detect success for valid transfer
  ✓ should ensure success code is 0
  ✓ should return success message for success code
```

```
Migrations: 0xaca936995d556bdf21333c4f20e7616ea134ea5f
Saving successful migration to network...
... 0x8f3a621a34478b70c43e005d784caef463fceb3b7bf3db96b7e72acc754c8af
Saving artifacts...
Running migration: 2_deploy_contracts.js
Running step...
Deploying MessagesAndCodes...
... 0x09b07834fd3261263a76829db20e74ff2cf03e00179f87e863f365ee33d62def
MessagesAndCodes: 0x23564a9a403ef622d12454d732f9906e8bc3a090
Linking MessagesAndCodes to IndivisibleTokenMock
Linking MessagesAndCodes to BasicWhitelistTokenMock
Linking MessagesAndCodes to ManagedWhitelistTokenMock
Linking MessagesAndCodes to MaxOwnershipStakeTokenMock
Linking MessagesAndCodes to MaxNumShareholdersTokenMock
Linking MessagesAndCodes to IndividualOwnershipStakeTokenMock
Linking MessagesAndCodes to ST20ExampleMock
Deploying MyERC1404...
... 0x5f5af354fd4bf309f56a346bb24afab347dd37f08babd07336e22add1e0ed8ce
MyERC1404: 0xc109f603b093dc21c6cf7a082c1cc5693909f7bc
Saving successful migration to network...
... 0x65661a738ad8599bc65beb8632791f1c5f3edaf4f700f232b0eaa059e8f3d170
Saving artifacts...
```

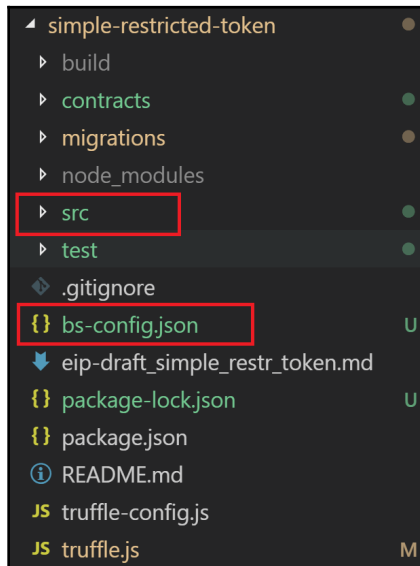
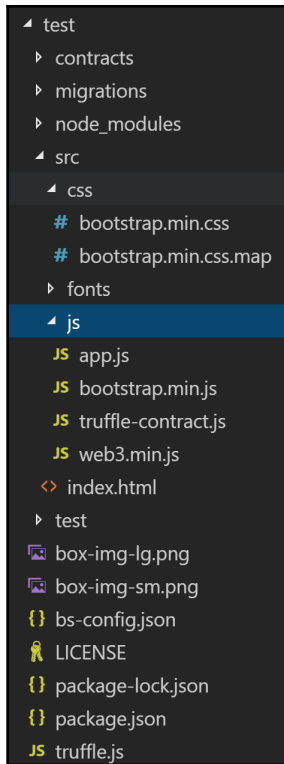
```
D:\projects\sto\test>truffle unbox tutorialtoken
```

```
✓ Preparing to download
✓ Downloading
✓ Cleaning up temporary files
✓ Setting up box
```

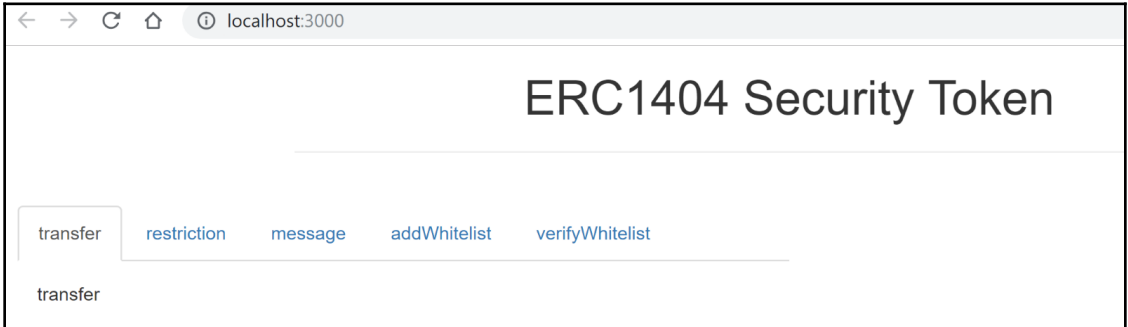
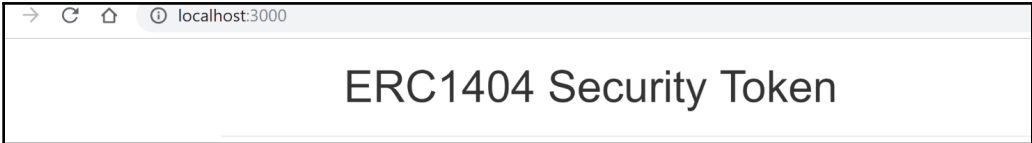
```
Unbox successful. Sweet!
```

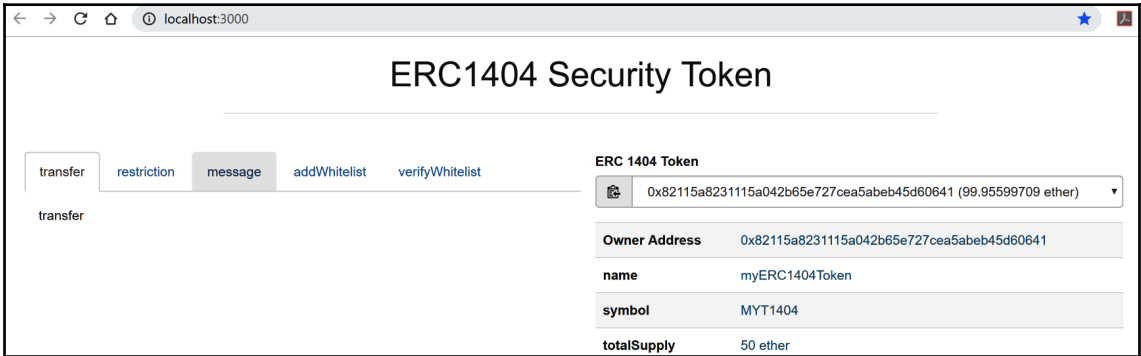
```
Commands:
```

```
Compile:      truffle compile
Migrate:      truffle migrate
Test contracts: truffle test
Run dev server: npm run dev
```



```
<title>ERC1404 Token Example</title>
<!-- Bootstrap -->
<link href="css/bootstrap.min.css" rel="stylesheet">
<!-- HTML5 shim and Respond.js for IE8 support of HTML5 elements and media queries -->
<!-- WARNING: Respond.js doesn't work if you view the page via file:// -->
<!--[if lt IE 9]>
  <script src="https://oss.maxcdn.com/html5shiv/3.7.3/html5shiv.min.js"></script>
  <script src="https://oss.maxcdn.com/respond/1.4.2/respond.min.js"></script>
<![endif]-->
</head>
<body>
  <div class="container">
    <div class="row">
      <div class="col-xs-12 col-sm-8 col-sm-push-2">
        <h1 class="text-center">ERC1404 Security Token</h1>
        <hr/>
        <br/>
      </div>
    </div>
  </div>
  <!-- jQuery (necessary for Bootstrap's JavaScript plugins) -->
  <script src="https://ajax.googleapis.com/ajax/libs/jquery/1.12.4/jquery.min.js"></script>
```





localhost:3000

ERC1404 Security Token

Error: VM Exception while processing transaction: revert

transfer restriction message addWhitelist verifyWhitelist

9 ether

To:

Transfer

ERC 1404 Token

0x82115a8231115a042b65e727cea5abeb45d60641 (99.95599709 ether)

Owner Address	0x82115a8231115a042b65e727cea5abeb45d60641
name	myERC1404Token
symbol	MYT1404
totalSupply	50 ether

ERC1404 Security Token

ERC1404 Message: ILLEGAL_TRANSFER_TO_NON_WHITELISTED_ADDRESS

transfer restriction message addWhitelist verifyWhitelist

7 ether

To:

detectTransferRestriction

ERC 1404 Token

0x82115a8231115a042b65e727cea5abeb45d60641 (99.955997089999974 ether)

Owner Address	0x82115a8231115a042b65e727cea5abeb45d60641
name	myERC1404Token
symbol	MYT1404
totalSupply	50 ether

ERC1404 Security Token

transfer restriction message addWhitelist verifyWhitelist

ILLEGAL_TRANSFER_TO_NON_WHITELISTED_ADDRESS

messageForTransferRestriction

ERC 1404 Token

0x82115a8231115a042b65e727cea5abeb45d60641 (99.955997089999974)

Owner Address 0x82115a8231115a042b65e727cea5abeb45d60641

name myERC1404Token

symbol MYT1404

totalSupply 50 ether

ERC1404 Security Token

Error: VM Exception while processing transaction: revert

transfer restriction message addWhitelist verifyWhitelist

Add To White List

0x6e6e8633a17579c016e81d0586e79095b0082bbb

Submit

ERC 1404 Token

0xf16a7014b4a3056a57c9e2dda7e0c843fc9fca0 (100 ether)

Owner Address 0x82115a8231115a042b65e727cea5abeb45d60641

name myERC1404Token

symbol MYT1404

totalSupply 50 ether

localhost:3000

ERC1404 Security Token

Success add 0x6e6e8633a17579c016e81d0586e79095b0082bbb to white List

transfer restriction message addWhitelist verifyWhitelist

Add To White List

0x6e6e8633a17579c016e81d0586e79095b0082bbb

Submit

ERC 1404 Token

0x82115a8231115a042b65e727cea5abeb45d60641 (99.955997089999974)

Owner Address 0x82115a8231115a042b65e727cea5abeb45d60641

name myERC1404Token

symbol MYT1404

totalSupply 50 ether

ERC1404 Security Token

The Address: 0x6e6e8633a17579c016e81d0586e79095b0082bbb is in white List

[transfer](#) [restriction](#) [message](#) [addWhitelist](#) [verifyWhitelist](#)

ERC 1404 Token

 0x82115a8231115a042b65e727cea5abeb45d60641 (99.955997089999927% ▼)

Verify White List

0x6e6e8633a17579c016e81d0586e79095b0082bbb

Verify

Owner Address 0x82115a8231115a042b65e727cea5abeb45d60641

name myERC1404Token

symbol MYT1404

totalSupply 50 ether

localhost:3000

ERC1404 Security Token

The Address: 0xf16a7014b4a3056a57c9e2dda7e0c843fc9cfa0 is not in white List

[transfer](#) [restriction](#) [message](#) [addWhitelist](#) [verifyWhitelist](#)

ERC 1404 Token

 0x82115a8231115a042b65e727cea5abeb45d60641 (99.955997089999927% ▼)

Verify White List

0xf16a7014b4a3056a57c9e2dda7e0c843fc9cfa0

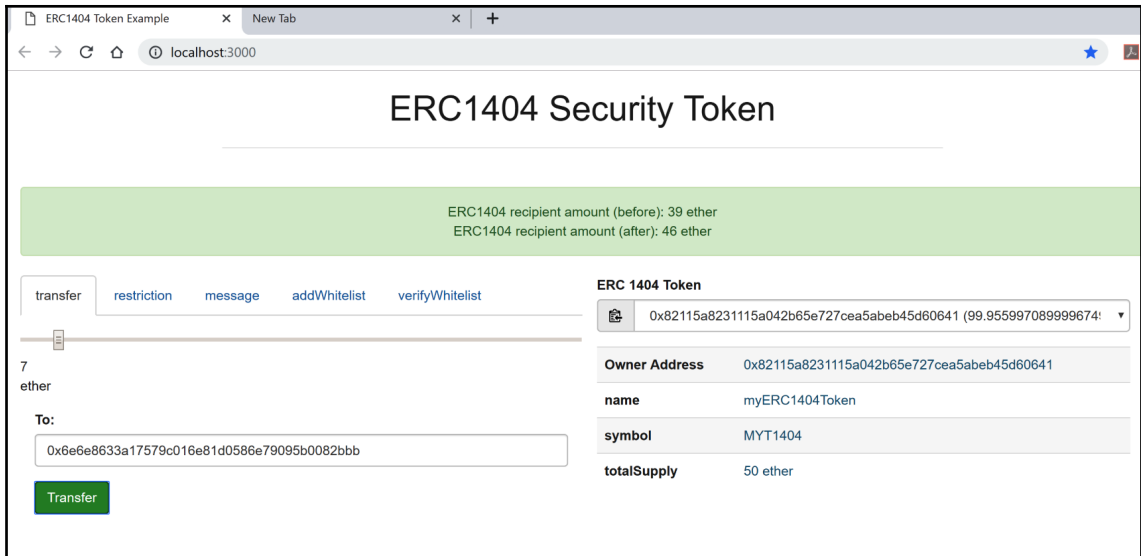
Verify

Owner Address 0x82115a8231115a042b65e727cea5abeb45d60641

name myERC1404Token

symbol MYT1404

totalSupply 50 ether

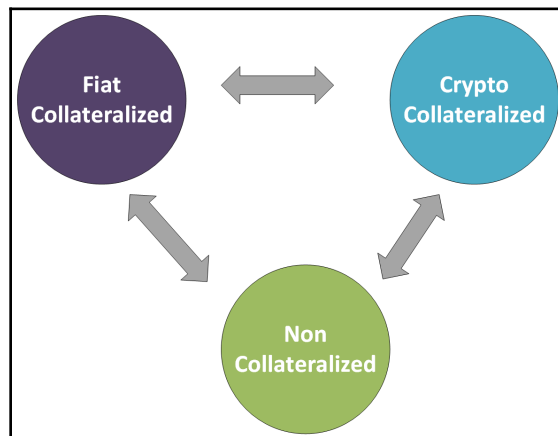
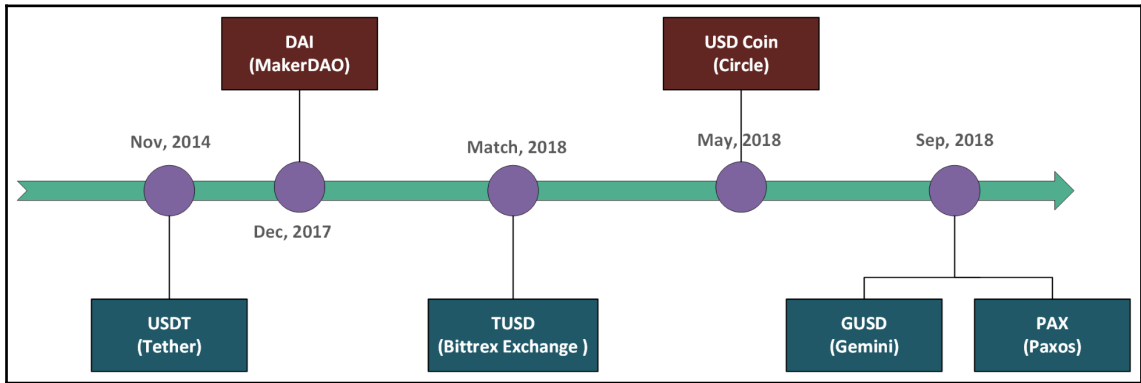


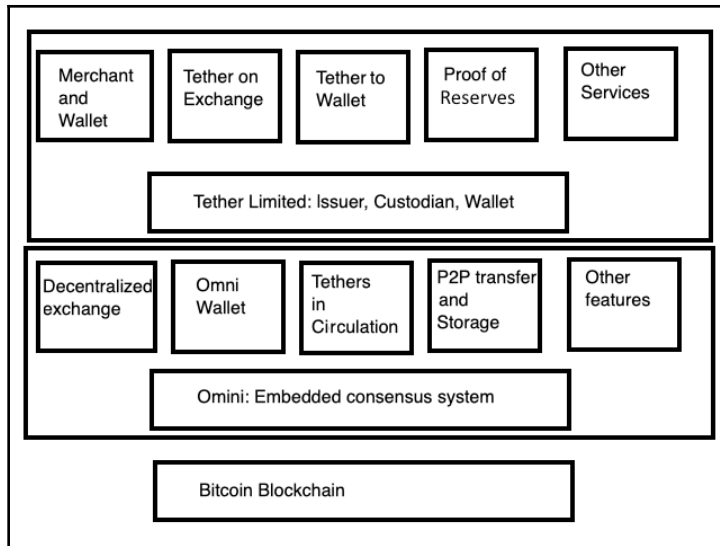
```
eth_sendTransaction
```

```
Transaction: 0x01d9f3a5bb4dfbf03e48e4804a22425ba9a8811215aa98059e9433f7f300c31a  
Gas usage: 38294  
Block Number: 18  
Block Time: Sat Mar 09 2019 03:29:34 GMT-0500 (Eastern Standard Time)
```

```
eth_getTransactionReceipt  
eth_call
```

Chapter 7: Stablecoin Smart Contracts






OMNIEXPLORER.INFO Search address, txid or property

Home API Property List Crowdsales Misc

Welcome to the new Omnexplorer.info



Omni
Featured Property

LAST UPDATE
As of Block 566967
2019-03-14 04:44:37 UTC

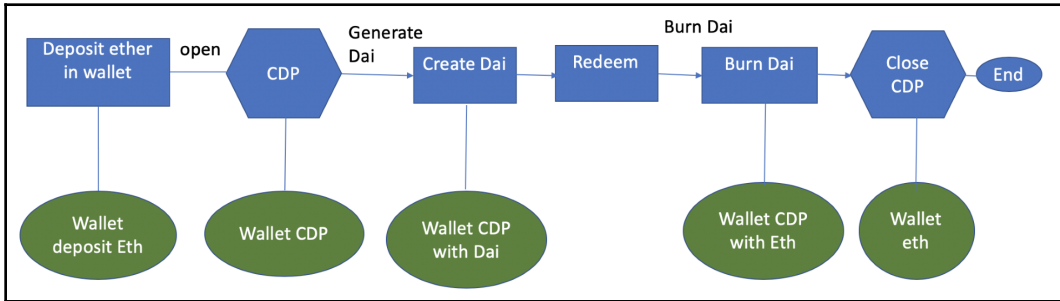
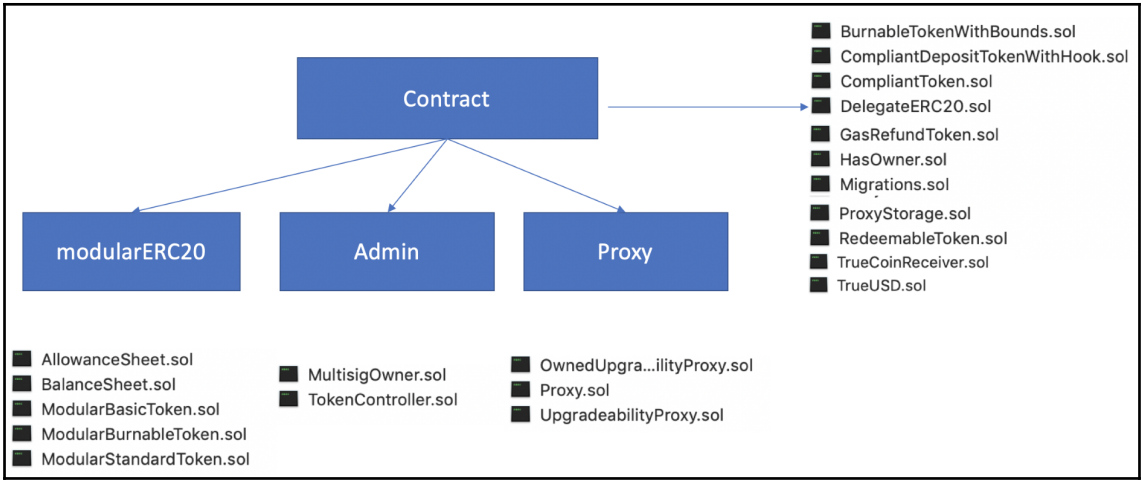
LATEST OMNI PRICE
0.000738 BTC / \$2.85

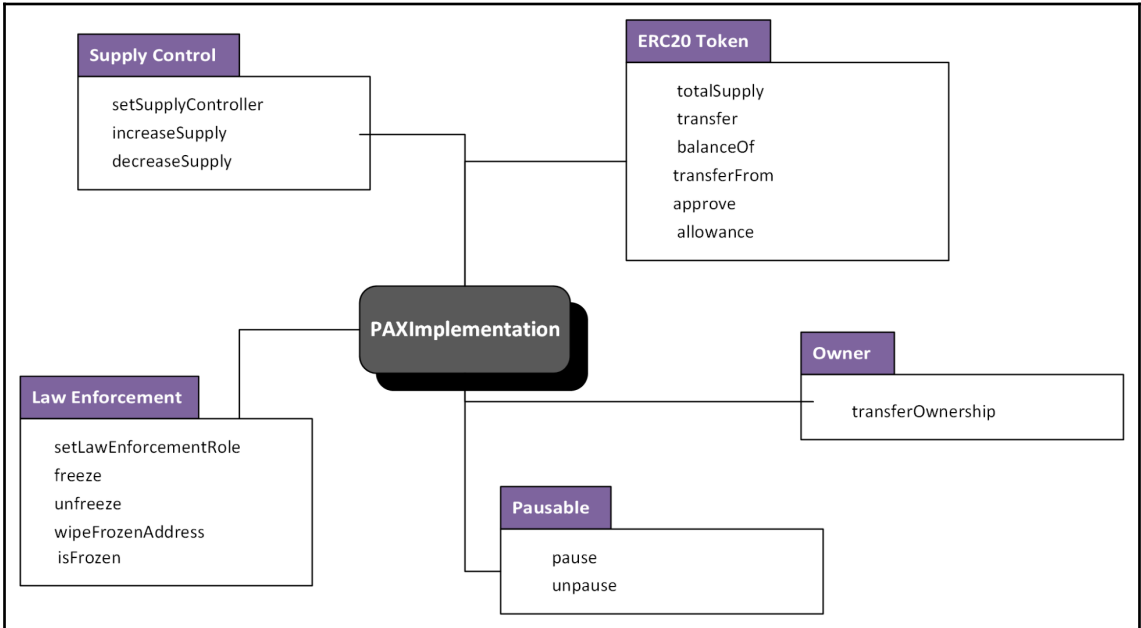
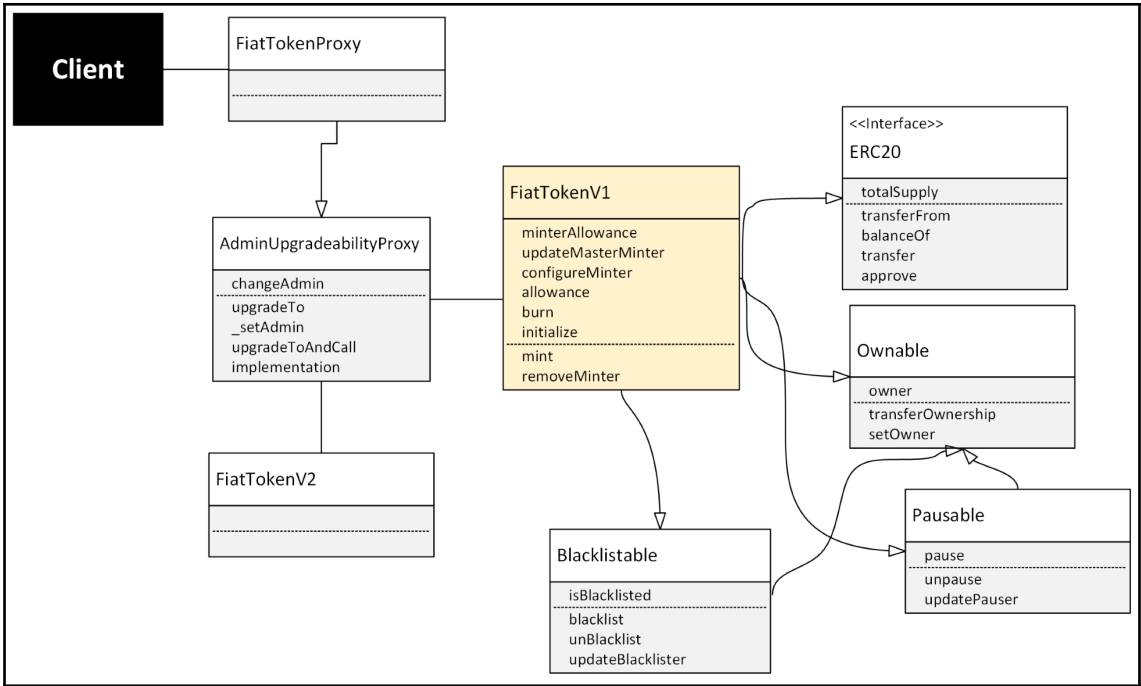
TOTAL TRANSACTIONS (24 hrs)
28321

OMNI PROPERTIES
713 (~446 test)

Blocks Jump to Block:

Height	Timestamp	Transactions	USD Value	Hash
566967	3/13/2019 9:24:02 PM	147	\$ 473,819	00...Sb
566966	3/13/2019 9:19:58 PM	152	\$ 668,127	00...08
566965	3/13/2019 9:16:53 PM	515	\$ 3,444,750	00...ee
566964	3/13/2019 8:55:29 PM	370	\$ 1,132,455	00...1a
566963	3/13/2019 8:44:31 PM	408	\$ 1,270,329	00...ba
566962	3/13/2019 8:32:01 PM	270	\$ 1,436,726	00...87
566961	3/13/2019 8:28:12 PM	438	\$ 848,437	00...31





```
sub
  ✓ subtracts correctly (46ms)
  ✓ throws an error if subtraction result would be negative (47ms)

Contract: PAX
  as a supply-controlled token
    after token creation
      ✓ sender should be token owner (38ms)
      ✓ sender should be supply controller (41ms)
      ✓ total supply should be zero (45ms)
      ✓ balances should be zero (70ms)
    increaseSupply
      ✓ reverts when sender is not supply controller (57ms)
      ✓ adds the requested amount (121ms)
      ✓ emits a SupplyIncreased and a Transfer event (73ms)
      ✓ cannot increaseSupply resulting in positive overflow of the totalSupply (282ms)
    decreaseSupply
      when the supply controller has insufficient tokens
        ✓ reverts (57ms)
      when the supply controller has sufficient tokens
        ✓ reverts when sender is not supply controller (47ms)
        ✓ removes the requested amount (133ms)
        ✓ emits a SupplyDecreased and a Transfer event (70ms)
    setSupplyController
      ✓ reverts if sender is not owner or supplyController (49ms)
      ✓ works if sender is supply controller (105ms)
      ✓ reverts if newSupplyController is address zero (50ms)
      ✓ enables new supply controller to increase and decrease supply (405ms)
      ✓ prevents old supply controller from increasing and decreasing supply (92ms)
      ✓ emits a SupplyControllerSet event

Contract: Pausable PAX
  ✓ can transfer in non-pause (143ms)
  ✓ cannot transfer in pause (166ms)
  ✓ cannot approve/transferFrom in pause (247ms)
  ✓ should resume allowing normal process after pause is over (247ms)
  ✓ cannot unpause when unpaused or pause when paused (169ms)

83 passing (1m)
```

