Linux Tutorial for BlockChain Development

CSE 510, University at Buffalo

1. **Download and install Ubuntu Linux**.
   Website: https://www.ubuntu.com/. However, you can also use CentOS, Arch Linux, OpenSUSE and other distributions.

2. **Install Node.JS and Truffle**.
   Website: https://nodejs.org/en/.
   ```
   npm install -g truffle
   ```
   Verify your installation, here we use Truffle v5.0.1:
   ```
   node -v
   npm -v
   truffle version
   ```

3. **Install Metamask (LTS)**.
   Website: https://metamask.io/.

4. **Build Voting Ballot DApp**.
   Built a voting ballot application to pick a winner among four dogs by voting, such that there is a chairperson who is authorized to register voters. Voters have the permission to vote only after the registration process.
   The smart contract used is based on the example in solidity documentation.

5. **File structures**.
   ballot-app: Contains the Node.js code for hosting the web page and communicating with the local blockchain.
   ballot-blockchain: Contains files to develop and deploy the smart contract using Truffle and Solidity.

6. **Business Logics handled**.
   1) Chairperson registers accounts to vote
   2) No other account can register accounts to vote
   3) Can't register already registered user
   4) Unregistered account can't vote
   5) Registered accounts cannot vote twice
   6) Can't vote a person who is not there

7. **Instruction for truffle testing**.
   1) Clone the repository to a local folder
   link: https://buffalo.box.com/s/yu176khtf50ul3qq8k1cqesxakpo5dod
   2) Go to the cloned folder using command line
   ```
   cd Ballot2
   ```
   3) Go to the ballot-blockchain folder
   ```
   cd ballot-blockchain
   ```
   4) Execute `truffle compile`

5) Open a new command line, go to the same directory and execute truffle develop to start the blockchain network
6) In the old terminal execute `truffle migrate --reset`
7) Execute `truffle test` to test the smart contract

This should print the following in the console:

Contract: BallotContract
✓ contract deployment
✓ valid users registration
✓ valid voting
✓ validate winner
✓ valid votes
✓ should NOT accept unauthorized registration
✓ should NOT register already registered user
✓ should NOT vote from unauthorized account
✓ should NOT vote twice
✓ should NOT vote unknown person

10 passing

8. **Instruction for DApp**.
   1) Now go to the ballot-app folder.
   2) To install node modules execute `npm install`
   3) Start the Node.js server execute `npm run dev`
   4) This should start the front end of the application at localhost:3000
   5) Open Metamask in your chrome browser and enter the key phrase you got after executing truffle develop
   6) Now connect to private network/custom RPC using http://127.0.0.1:9545
   7) Refresh the WebPage after logging into MetaMask and you should see the list of accounts.
   8) Now you should be in the first account in the metamask and register all other accounts
   9) Now to cast vote from the account 2 change the account in Metamask from account 1 to account 2 and then click vote.
   10) To vote from any account switch to that account in metamask and then click vote
   11) Finally, after voting you can click declare winner

9. **Note**.
   1) To deploy a new instance of the contract exit the npm server and then execute truffle migrate --reset and then start the server again.
   2) The contract is deployed from account[0] i.e the first account in the metamask.
   3) If the transactions are failing due to this error - "Account Nonce mismatched", try resetting the account in account settings, do "truffle migrate --reset" and restart the node server.