Lab 1: Setting up New Node on Ethereum Blockchain

November 7, 2018

1 Introduction

The first lab will guide you to set up a new node on an Ethereum blockchain for our class. We plan to use the same blockchain to conduct subsequent labs. Therefore, it is important to be successful on this one. This document gives you a step-by-step instruction for that purpose. Please be careful and follow it exactly. The procedure has been exhaustively tested by the TAs on Ubuntu 18.04. It should also work on other Linux distributions as well as Mac OS. Please direct your questions, if any, to You Li, our TA for the labs.

2 Install Golang

2.1

Install *Golang*.

Open a terminal.

sudo apt-get install golang

If the above command works on your machines, you can continue to step 2.2. Otherwise, you can download the Linux version from the official website: *https://golang.org/dl/*

Assuming you have downloaded the file *go1.11.1.linux-amd64.tar.gz*. Then open a terminal from you download directory, and execute the command:

tar -C /usr/local -xzf go1.11.1.linux-amd64.tar.gz

2.2

Add *Golang* to *PATH* environment variable.

Open *.bashrc* file in your system:

nano .bashrc

copy this line to clipboard:

export PATH=$PATH:/usr/local/go/bin

and paste it to the end of the opened *.bashrc* file. Save and exit by *ctrl+o*, *enter*, and *ctrl+x*. Close your terminal and open a new one.

The above procedure may not apply to all Linux distributions. If you are using MacOS, the file to open may be *.bash_profile* instead of *.bashrc*.

If none of the above work on your system, you can use *echo* command on *bash* shells, or *setenv* command on *tcsh* shells to temporarily set the *PATH* environmental variable.

2.3

Check your installation.

which go

A path like */usr/local/go/bin/go* is expected.

3 Install go-ethereum

3.1

go-ethereum is commonly refered to as *geth*. It provides a command line interface for an Ethereum node.

If you are using Ubuntu, do the following:

sudo apt-get install software-properties-common

sudo add-apt-repository -y ppa:ethereum/ethereum

sudo apt-get update

sudo apt-get install ethereum

If you are not using Ubuntu, download the source code:

git clone https://github.com/ethereum/go-ethereum

and compile it:

cd go-ethereum

make geth

Check details on Ethereum Wiki if you encounter any problem:

https://github.com/ethereum/go-ethereum/wiki/Building-Ethereum

3.2

Check your installation.

geth version

Some version number is expected.

4 Initialize a new node

4.1

Create and enter your work directory.

mkdir nucoin

cd nucoin

4.2

Create your account.

Substitute **yourname** with any word you like.

*geth --datadir node*yourname* account new*

Record your password and address, and keep them privately.

Save your password to the file. Substitute **password** with your password:

*echo *password* > node*yourname*/password*

4.3

Set up your own node.

Download *genesis.json* from Canvas, and put it in your work directory.

Load the genesis file:

*geth --datadir node*yourname* init genesis.json*

Start your node:

*geth --datadir node*yourname* --port 30000 --unlock '0' --password ./node*yourname*/password console*

5 Connect to permanent nodes

5.1

Synchronize your system time with a new terminal:

sudo apt-get install ntpdate

sudo ntpdate -s time.nist.gov

Try other ways to synchronize your system time if you are not using Ubuntu.

Return to original terminal.

5.2

Connect to permanent nodes provided by the TA group.

Download *static-nodes.json* from Canvas, and put it in the *node*yourname** directory. Next time when you start your node, it will automatically connect to our permanent nodes.

5.3

Check your connection to permanent or peer nodes.

Use *ctrl+d* to terminate the console. Then start your node again using "start your node" command in section 4.3.

admin.peers

Information of several nodes is expected.

6 Connect to peer nodes

6.1

There is a chance that your node automatically connect to some peer nodes.

6.2

You can share your *nodeInfo* to others, so that other nodes can connect to yours manually. You may need a public IP address.

nodeInfo takes the format: *"enode://publickey@ip:port"*.

Find your IP address with a new terminal:

ifconfig

Your can find your IP address as *inet addr*. Or you can simply search for *ip address* in *google* for your public IP address.

Return to the orignial terminal. You can find the remaining fields as *NodeUrl*:

admin.nodeInfo

Combine the two parts by substitute your IP address into *[::]* in *NodeUrl*.

Your result should looks like:

"enode://f4642fa65af50cf...fbaf6416c0@33.4.25.108:30303".

6.3

You can manually connect your node to peer nodes using their *nodeInfo*:

admin.addPeer("enode://publickey@ip:port")

Exchange your node information with other students in class!

7 Assignment

7.1

Tasks:
(1) Every student should use a unique machine to install Ethereum. Use *ifconfig* command to show your MAC address.
(2) Connect to at least 10 nodes. Show your result by using *admin.peers* command.
(3) Repeat section 4.2 and 4.3 with two exceptions: substitute **yourname** with some other word, and skip "load the genesis file" procedure.

7.2

Submission requests:
(1) Include your results of task (1) and task (2) in one screenshot.
(2) Describe your observation on task (3).