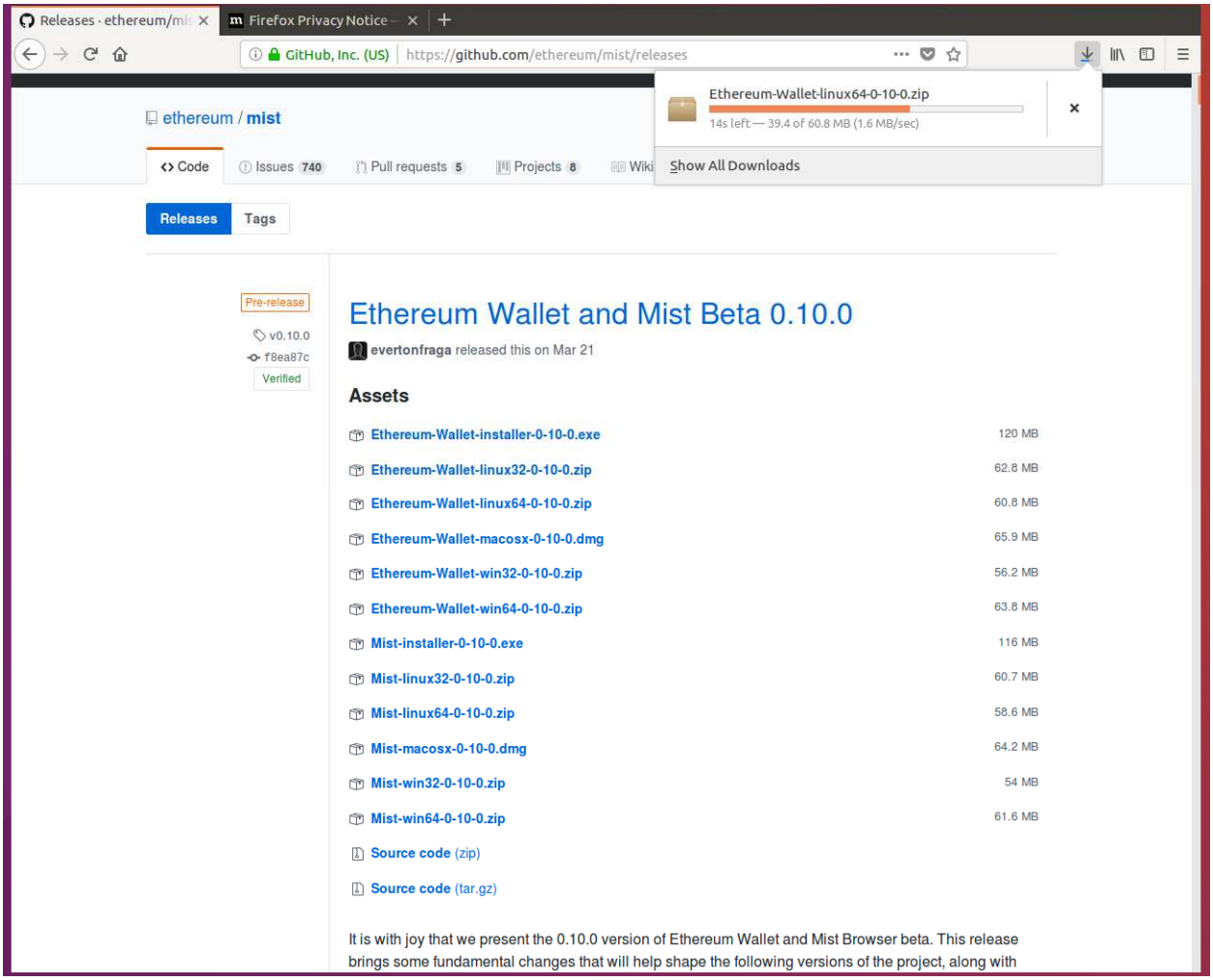
Q1: You will download Ethereum Wallet/MIST Browser

To access the full blockchain MIST should be downloaded. This is a taunting and time-consuming task. It also needs extensive disk space - currently around 20 GB of data.

Download the wallet here:

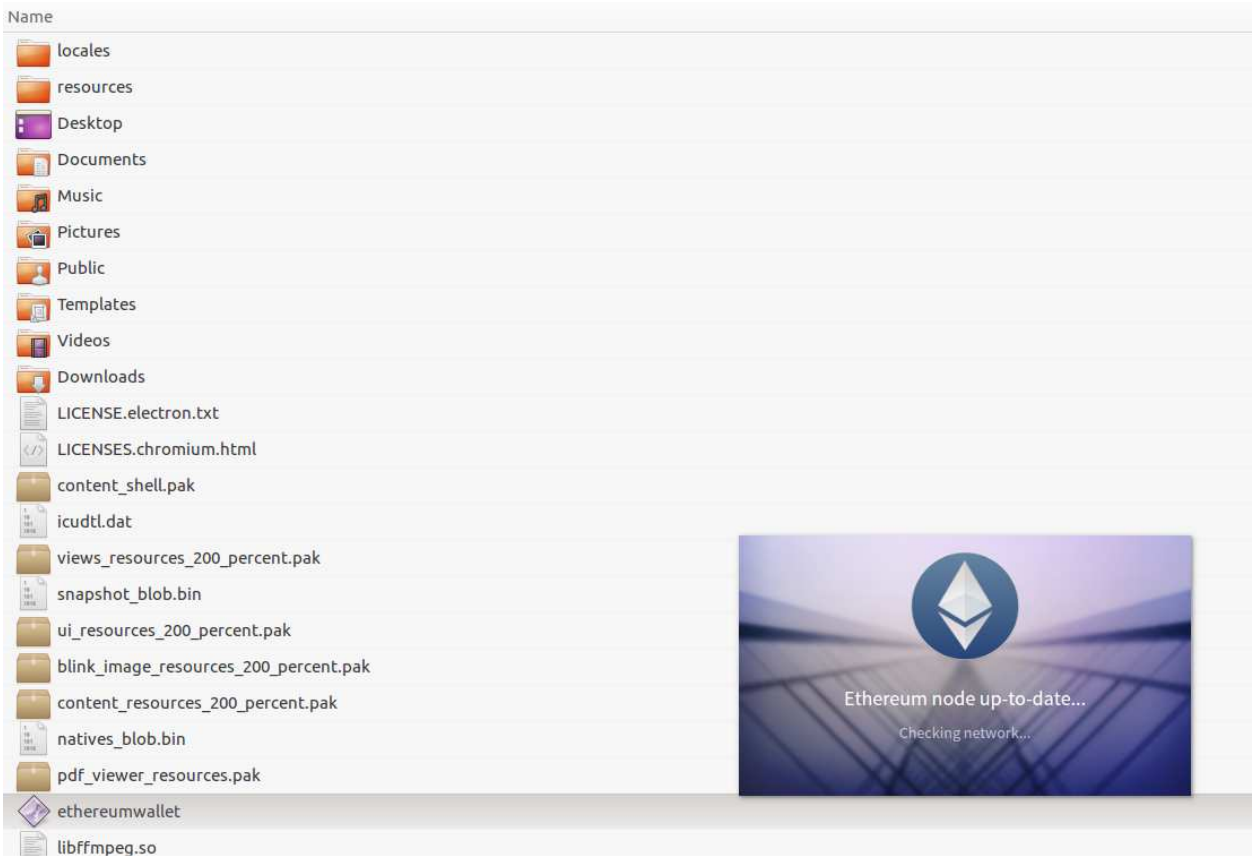
https://github.com/ethereum/mist/releases

➔ Download Ethereum Wallet and Mist

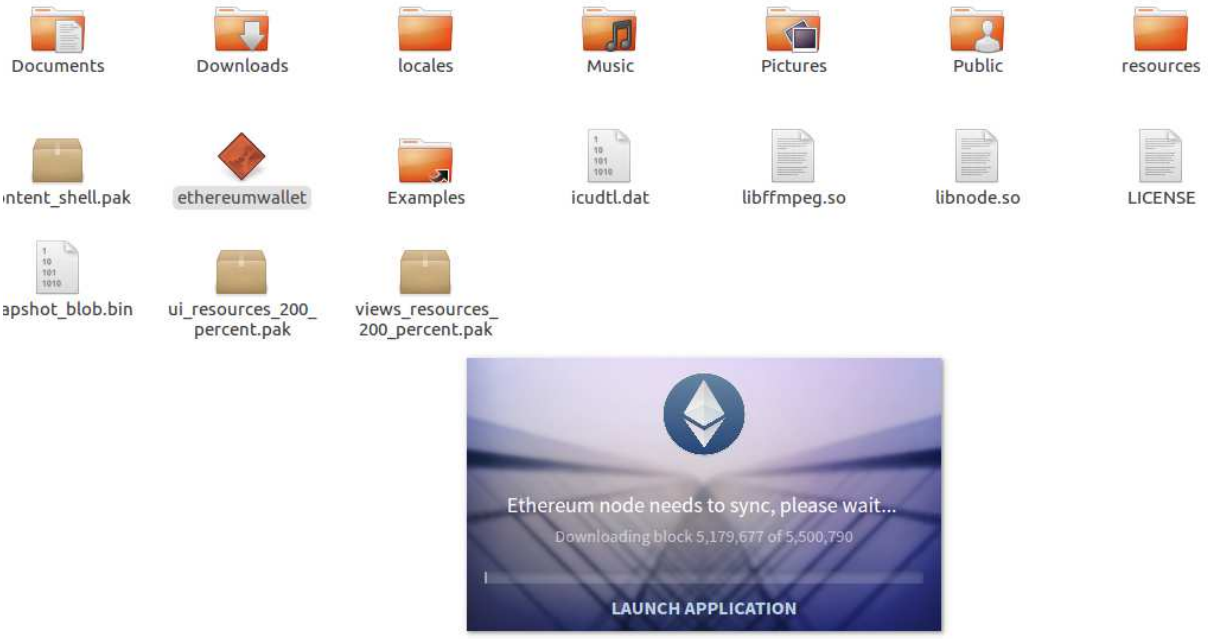


➔ Unizip the download file

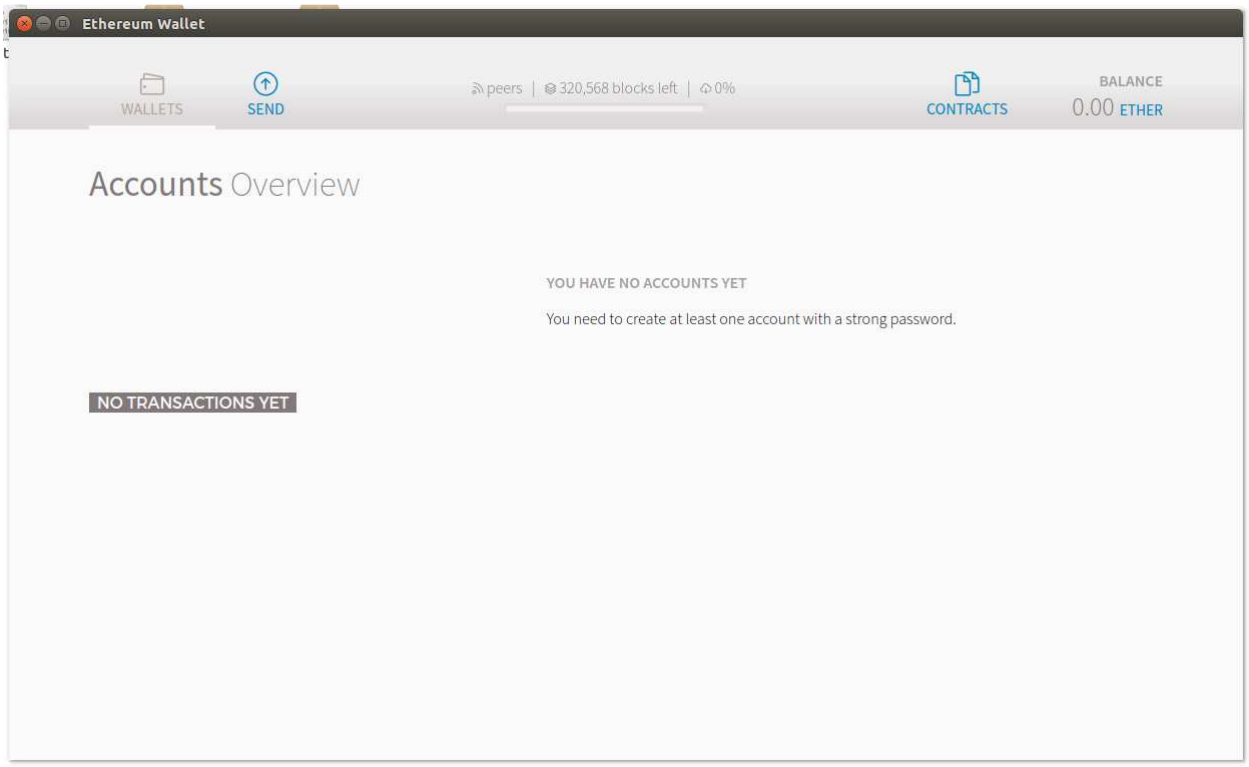
➔ Double click Ethereum wallet



It will download all blocks for this node to be sync in Ethereum network



Ethereum Wallet

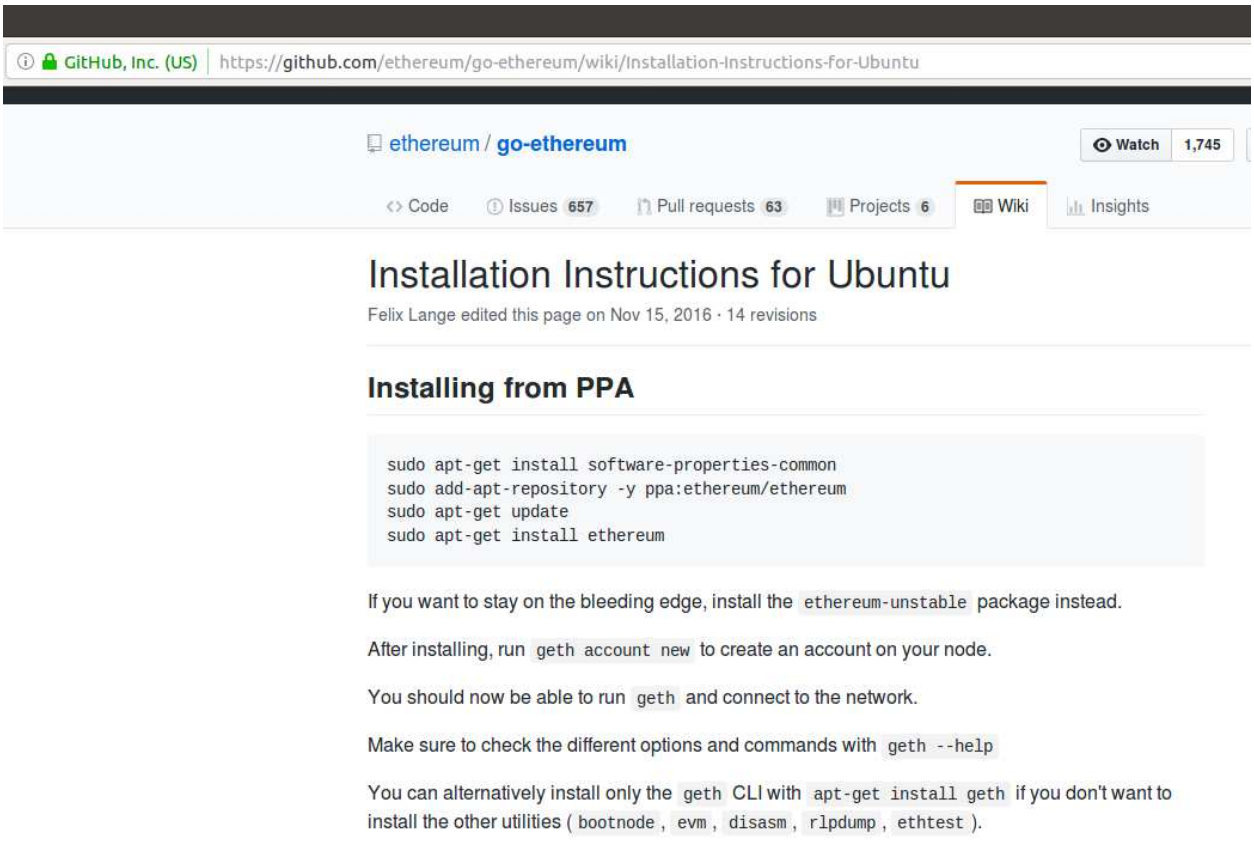


Q2: You will download and Install Go-Ethereum Client

Below link will help you to download the go

- Ethereum latest client
https://github.com/ethereum/go-ethereum/wiki/Installation-Instructions-for-Ubuntu

To install Go-Ethereum, browse above site on Ubuntu OS. There two options to install this. One is from PPA and another is building from the source. I am installing using second option.



Building from source

Building Geth (command line client)

Clone the repository to a directory of your choosing:

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

Install latest distribution of Go (v1.7) if you don't have it already:

See instructions

Building `geth` requires Go and C compilers to be installed:

```
sudo apt-get install -y build-essential golang
```

Finally, build the `geth` program using the following command.

```
cd go-ethereum
make geth
```

You can now run `build/bin/geth` to start your node.

```
golang <3
```

Steps to install Go-Ethereum by building from source.

1. Install git if it has not installed on Ubuntu using command `sudo apt install git`

```
rajendra@rajendra-VirtualBox: ~
To run a command as administrator (user "root"), use "sudo <command>".
See "man sudo_root" for details.

rajendra@rajendra-VirtualBox:~$ git clone https://github.com/ethereum/go-ethereum
The program 'git' is currently not installed. You can install it by typing:
sudo apt install git
rajendra@rajendra-VirtualBox:~$ clear
rajendra@rajendra-VirtualBox:~$ git clone https://github.com/ethereum/go-ethereum
The program 'git' is currently not installed. You can install it by typing:
sudo apt install git
rajendra@rajendra-VirtualBox:~$ sudo apt install git
[sudo] password for rajendra:
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following additional packages will be installed:
  git-man liberror-perl
Suggested packages:
  git-daemon-run | git-daemon-sysvinit git-doc git-el git-email git-gui gitk gitweb git-arch git-cvs
  git-mediawiki git-svn
The following NEW packages will be installed:
  git git-man liberror-perl
0 upgraded, 3 newly installed, 0 to remove and 90 not upgraded.
Need to get 3,857 kB of archives.
After this operation, 25.6 MB of additional disk space will be used.
Do you want to continue? [Y/n] y
Get:1 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 liberror-perl all 0.17-1.2 [19.6 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 git-man all 1:2.7.4-0ubuntu1.3 [736
 kB]
Get:3 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 git amd64 1:2.7.4-0ubuntu1.3 [3,102
 kB]
Fetched 3,857 kB in 0s (4,813 kB/s)
```

2. Clone Go-Ethereum from github using command `git clone https://github.com/ethereum/go-ethereum`

```
rajendra@rajendra-VirtualBox:~$ git clone https://github.com/ethereum/go-ethereum
Cloning into 'go-ethereum'...
remote: Counting objects: 69807, done.
remote: Total 69807 (delta 0), reused 0 (delta 0), pack-reused 69807
Receiving objects: 100% (69807/69807), 95.52 MiB | 1.16 MiB/s, done.
Resolving deltas: 100% (46466/46466), done.
Checking connectivity... done.
rajendra@rajendra-VirtualBox:~$
```

3. Since to build Go-Ethereum (Geth), we need to have Go and C compiler, so we need to install Go and C compiler before build Go-Ethereum. Use below command to install Go. If Curl command is not there, then run `sudo apt install curl`

   `curl -O https://storage.googleapis.com/golang/go1.10.1.darwin-amd64.tar.gz`

```
rajendra@rajendra-VirtualBox:~$ curl -O https://storage.googleapis.com/golang/go1.10.1.darwin-amd64.tar.gz
  % Total    % Received % Xferd  Average Speed   Time    Time     Time  Current
                                 Dload  Upload   Total   Spent    Left  Speed
 52  112M   52 58.5M    0     0  4383k      0  0:00:26  0:00:13  0:00:13 3475k
```

4. Unpack it to the `/usr/local`

   `Sudo tar -C /usr/local -xzf go1.10.1.darwin-amd64.tar.gz`

   Set GOPATH and PATH

   For Go to work properly, you need to set the following two environment variables:

   - Setup a go folder `mkdir -p ~/go; echo "export GOPATH=$HOME/go" >> ~/.bashrc`
   - Update your path `echo "export PATH=$PATH:$HOME/go/bin:/usr/local/go/bin" >> ~/.bashrc`
   - Read the environment variables into current session: `source ~/.bashrc`

```
rajendra@rajendra-VirtualBox:~$ sudo tar -C /usr/local -xzf go1.10.1.darwin-amd64.tar.gz
rajendra@rajendra-VirtualBox:~$ mkdir -p ~/go; echo "export GOPATH=$HOME/go" >> ~/.bashrc
rajendra@rajendra-VirtualBox:~$ echo "export PATH=$PATH:$HOME/go/bin:/usr/local/go/bin" >> ~/.bashrc
rajendra@rajendra-VirtualBox:~$ source ~/.bashrc
rajendra@rajendra-VirtualBox:~$
```

5. Next Run below command

```
sudo apt-get install -y build-essential golang
```

```
rajendra@rajendra-VirtualBox: ~
golang: command not found
rajendra@rajendra-VirtualBox:~$ golang <3
bash: 3: No such file or directory
rajendra@rajendra-VirtualBox:~$ sudo apt-get install -y build-essential golang
Reading package lists... Done
Building dependency tree
Reading state information... Done
build-essential is already the newest version (12.1ubuntu2).
The following additional packages will be installed:
  golang-1.6 golang-1.6-doc golang-1.6-go golang-1.6-race-detector-runtime golang-1.6-src golang-doc golang-go
  golang-race-detector-runtime golang-src
Suggested packages:
  bzr mercurial subversion
The following NEW packages will be installed:
  golang golang-1.6 golang-1.6-doc golang-1.6-go golang-1.6-race-detector-runtime golang-1.6-src golang-doc
  golang-go golang-race-detector-runtime golang-src
0 upgraded, 10 newly installed, 0 to remove and 90 not upgraded.
Need to get 29.7 MB of archives.
After this operation, 202 MB of additional disk space will be used.
Get:1 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 golang-1.6-src amd64 1.6.2-0ubuntu5~16.04.4 [6,416 kB]
Get:2 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 golang-1.6-go amd64 1.6.2-0ubuntu5~16.04.4 [20.5 MB]
Get:3 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 golang-1.6-doc all 1.6.2-0ubuntu5~16.04.4 [2,368 kB]
Get:4 http://us.archive.ubuntu.com/ubuntu xenial-updates/main amd64 golang-1.6 all 1.6.2-0ubuntu5~16.04.4 [16.8 kB]
Get:5 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang-src amd64 2:1.6-1ubuntu4 [3,066 B]
Get:6 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang-go amd64 2:1.6-1ubuntu4 [21.8 kB]
Get:7 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang-doc all 2:1.6-1ubuntu4 [2,808 B]
Get:8 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang all 2:1.6-1ubuntu4 [2,766 B]
Get:9 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang-1.6-race-detector-runtime amd64 0.0+svn252922-0ubuntu1 [404 kB]
Get:10 http://us.archive.ubuntu.com/ubuntu xenial/main amd64 golang-race-detector-runtime amd64 2:1.6-1ubuntu4 [2,854 B]
Fetched 29.7 MB in 4s (6,323 kB/s)
debconf: unable to initialize frontend: Dialog
debconf: (Dialog frontend requires a screen at least 13 lines tall and 31 columns wide.)
debconf: falling back to frontend: Readline
Selecting previously unselected package golang-1.6-src.
(Reading database ... 212027 files and directories currently installed.)
Preparing to unpack .../golang-1.6-src_1.6.2-0ubuntu5~16.04.4_amd64.deb ...
```

   `cd go-ethereum`

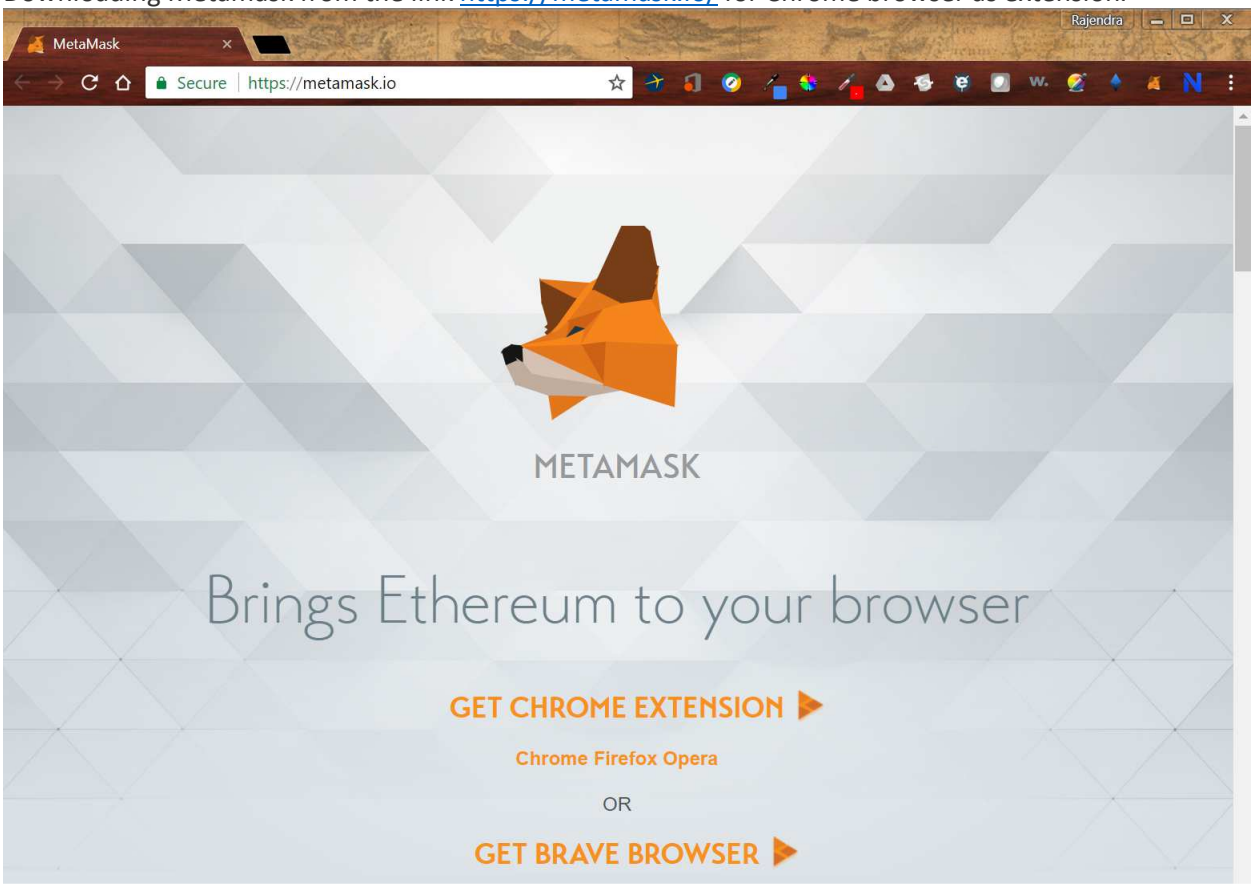
   `make geth`

   This will build the go-ethereum

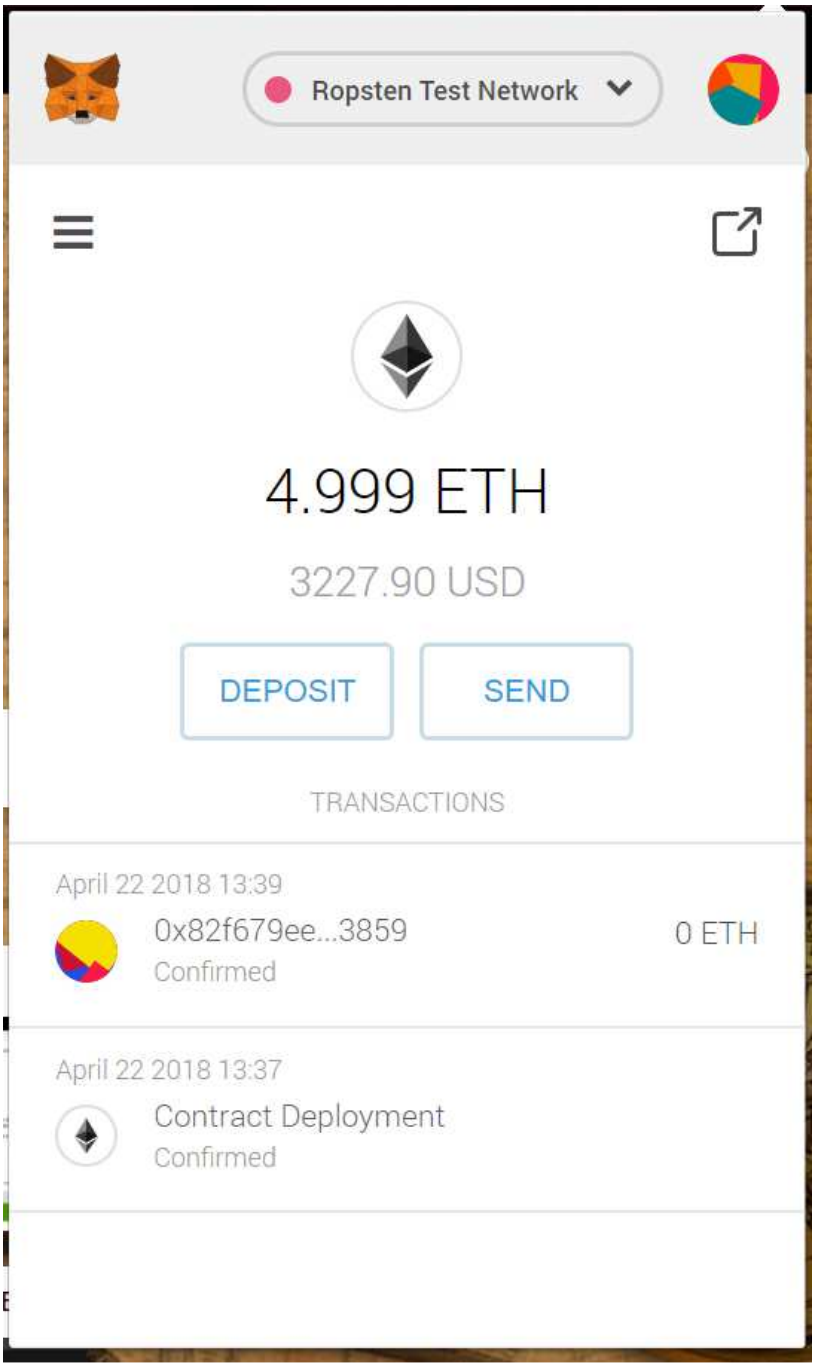
Q 3: Configure MetaMask

This is a chrome plugin and available in the below link https://metamask.io/

Downloading Metamask from the link https://metamask.io/ for Chrome browser as extension.



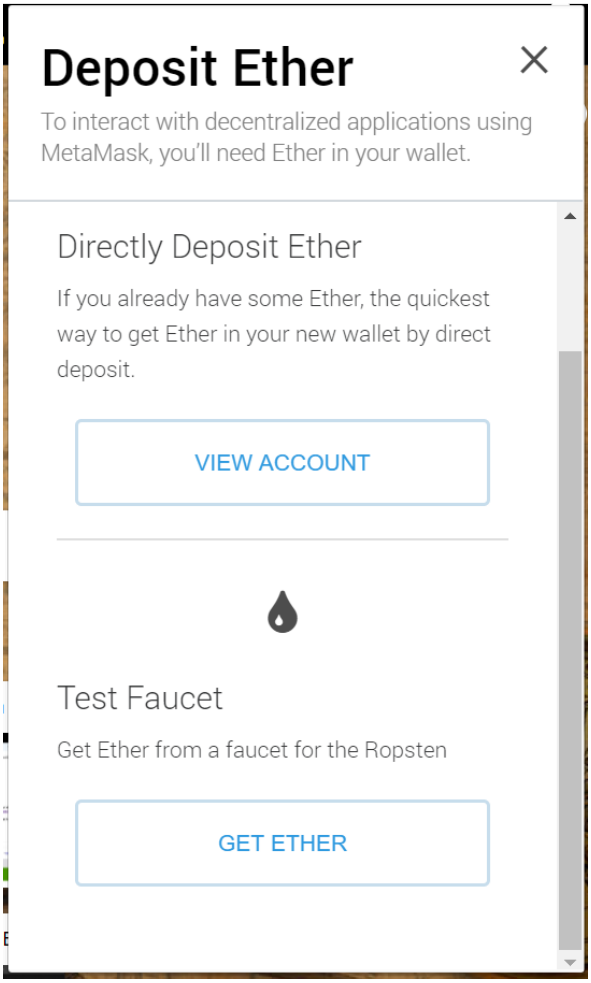
Downloaded, Installed and Login to Test Network


Ropsten Test Network
4.999 ETH
3227.90 USD
DEPOSIT
SEND
TRANSACTIONS
April 22 2018 13:39
0x82f679ee...3859
Confirmed
0 ETH
April 22 2018 13:37
Contract Deployment
Confirmed

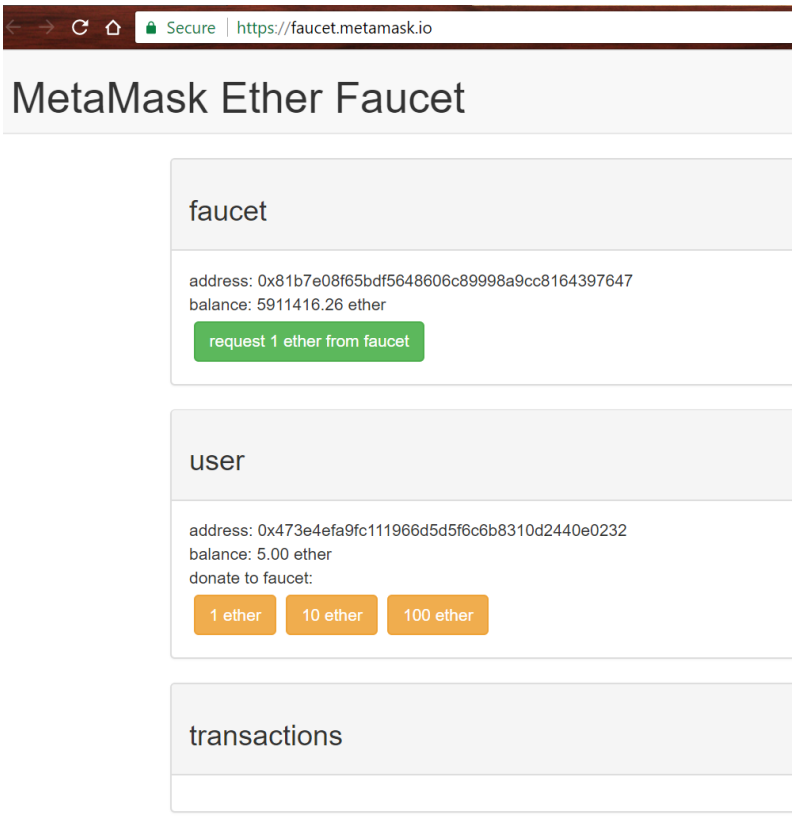
Q 4: Research on the below Ethereum Test Networks

• ROPSTEN - https://ropsten.etherscan.io/

To get some free ETH for testing in Ropsten network, please make sure you are in Ropsten Test Network, and then click on Deposit button. You will see following screen

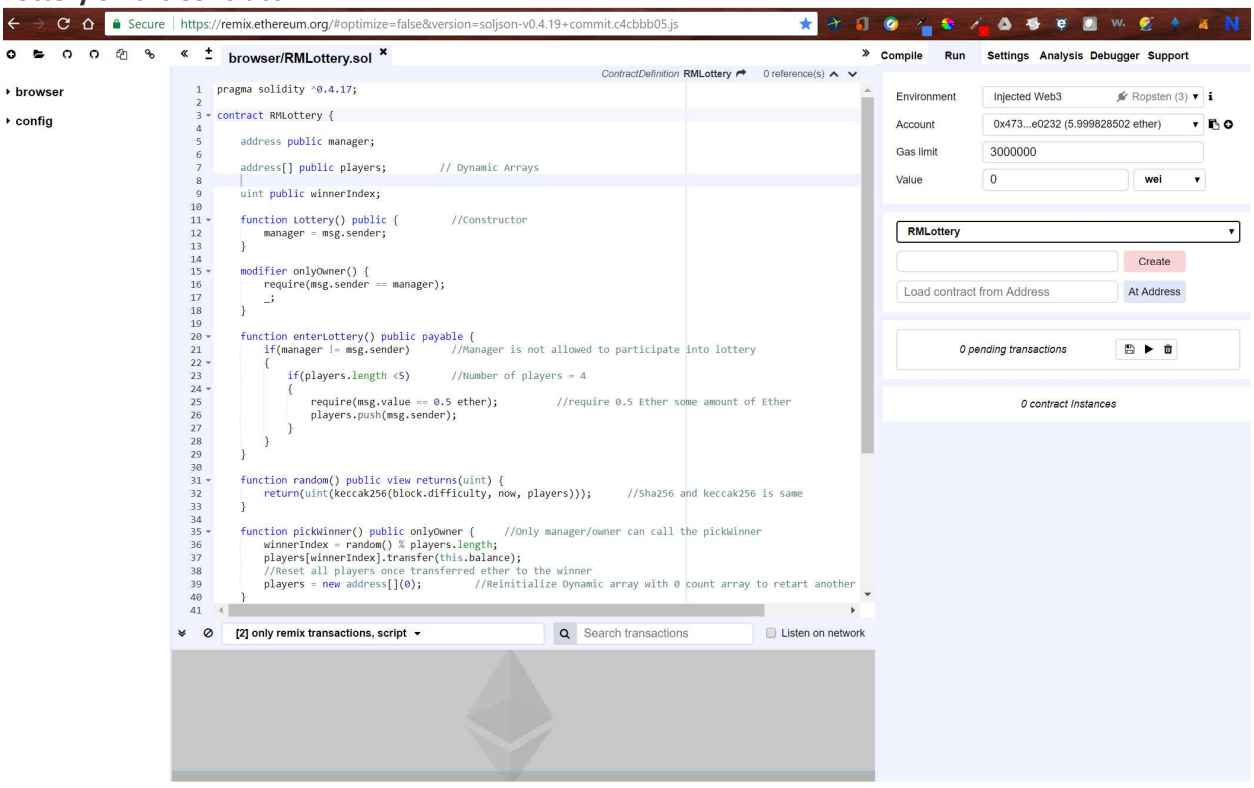


To get Ether, please click on Get Ether button. This will take you to MetaMask Ether Faucet, please click on **request 1 ether from faucet**. One clicks you will get 1 ether.

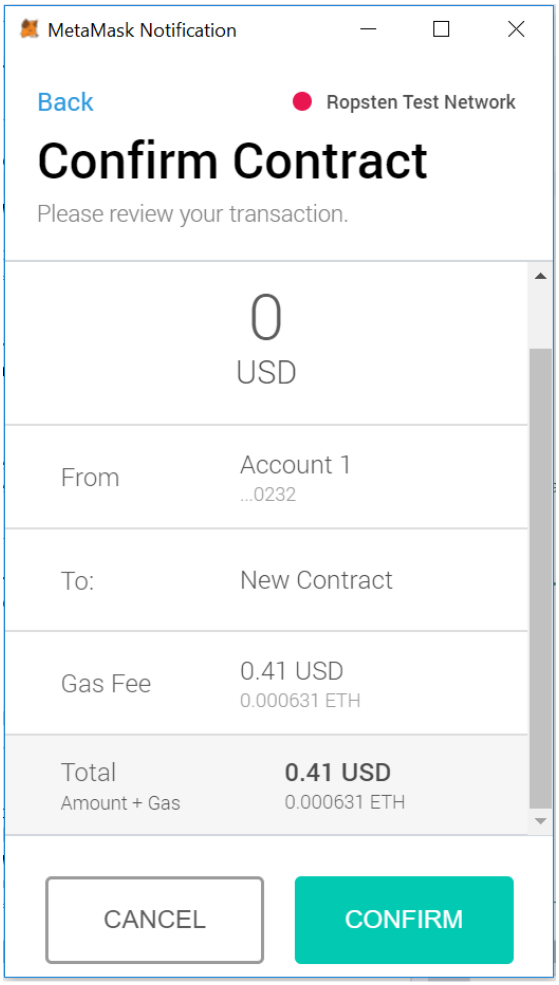


Smart Contract Deployment and testing in Ropsten Network

Lottery Smart Contract



Click on Run and make sure you relate to Ropsten network in Injected Web3 and first account (I have 5.999 ether in First account and all other 4 accounts have 3 ether). Here the RMLotery contract is going to deploy by using the first address (account) and then click the confirm button.



This will deploy the contract and the output display as below. Here the contract deployer is the manager of this lottery system.


Compile
Run
Settings
Analysis
Debugger
Support
Environment
Injected Web3
Ropsten (3)
Account
0x473...e0232 (5.999197139 ether)
Gas limit
3000000
Value
0
ether
RMLottery
Create
Load contract from Address
At Address
0 pending transactions
RMLottery at 0x6d2...f5587 (blockchain)
enterLottery
Lottery
pickWinner
getPlayers
manager
myArrayLength
players
uint256
printLastPlayer
random
winnerIndex

Now, lets go to connect this contract by other account one after another until all four participate with this contract by transferring 0.5 ether.

To change one Ropsten account to another, first change account in Metamask and then come back to Remix browser, select another item from Environment dropdown and change it back to Injected Web3

Same way we can use another Test network like KOVAN and RINKEBY

• KOVAN - https://kovan.etherscan.io/

• RINKEBY - https://rinkeby.etherscan.io/