



Duality[®]

Blockchain
Solutions

Dynode Setup Tutorial

Summary

Setting up a Dynode requires a basic understanding of Linux and blockchain technology, as well as an ability to follow instructions closely. It also requires regular maintenance and careful security, especially when it comes to updating the clients.

This tutorial should help set-up a cold Dynode on a remote webserver. “Cold” means that the server running the Dynode does not need a local wallet containing the Dynode collateral. Notice that setting up a Dynode requires some basic knowledge of the Linux shell. However, with this guide you should be fine.

Duality will be offering Dynode hosting services at a later time. There will be an announcement upon the release of this service so please check back for updates.

Before you start

This guide assumes you are setting up a single Dynode for the first time.

You will need:

- 1000 Dynamic
- A Dynamic client running on your local PC
- A VPS

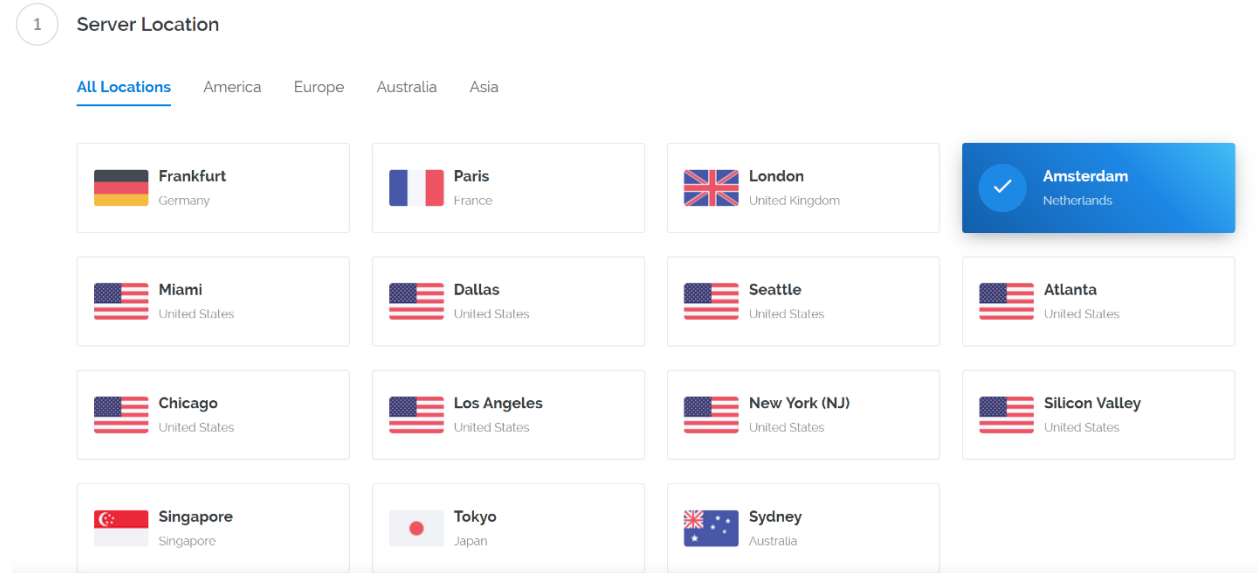
We also assume you will be working from a Windows computer. However, since most of the work is done on your Linux VPS, alternative steps for using macOS or Linux will be indicated where necessary.

Setting up your VPS

A VPS, also known as a cloud server, is fully functional installation of an operating system (usually Linux) operating within a virtual machine.

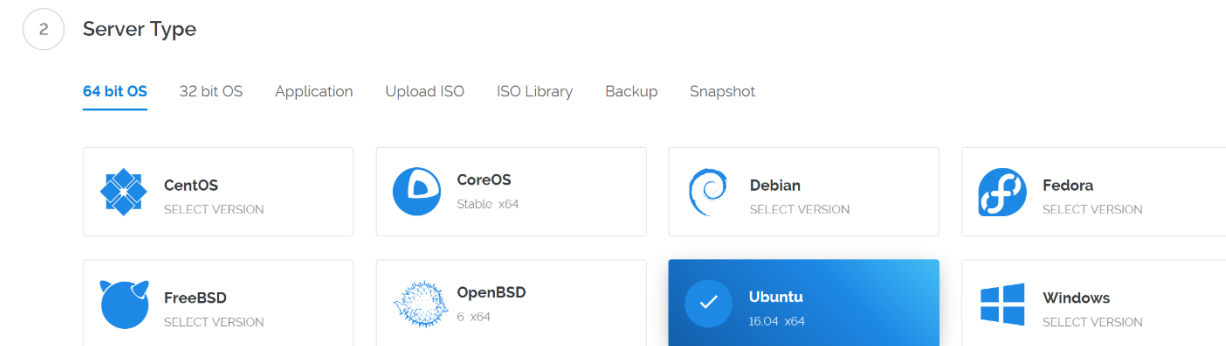
We will use Vultr hosting as an example of a VPS, although DigitalOcean, Amazon EC2, Google Cloud, Choopa and OVH are also popular choices. First create an account and add credit. Then go to the Servers menu item on the left and click + to add a new server. Select a location for

your new server on the following screen:



Vultr server location selection screen

Select Ubuntu 16.04 x64 as the server type. We use 16.04 instead of the latest version because 16.04 is an LTS release of Ubuntu, which will be supported with security updates for 5 years instead of the usual 9 months.



Vultr server type selection screen

Select a server size offering at least 1GB of memory.

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Server Size

IPv6 ONLY			
20 GB SSD \$2.50/mo \$0.004/h	20 GB SSD \$3.50/mo \$0.005/h	25 GB SSD \$5/mo \$0.007/h	40 GB SSD \$10/mo \$0.015/h
1 CPU 512MB Memory 500GB Bandwidth	1 CPU 512MB Memory 500GB Bandwidth	1 CPU 1024MB Memory 1000GB Bandwidth	1 CPU 2048MB Memory 2000GB Bandwidth
60 GB SSD \$20/mo \$0.03/h	100 GB SSD \$40/mo \$0.06/h	200 GB SSD \$80/mo \$0.119/h	300 GB SSD \$160/mo \$0.238/h
2 CPU 4096MB Memory 3000GB Bandwidth	4 CPU 8192MB Memory 4000GB Bandwidth	6 CPU 16384MB Memory 5000GB Bandwidth	8 CPU 32768MB Memory 6000GB Bandwidth

Vultr server size selection screen

Enter a hostname and label for your server. In this example we will use **Dynode1** as the hostname.




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Server Hostname & Label

Enter server hostname dynode1	Enter server label dynode1
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Vultr server hostname & label selection screen

Vultr will now install your server. This process may take a few minutes.

<input type="checkbox"/> Server	OS	Location	Charges	Status
<input type="checkbox"/> dynode1 1024 MB Server		 Atlanta	---	 Installing

Vultr server installation screen

Click **Manage** when installation is complete and take note of the IP address, username and password.

Location:  Atlanta
IP Address: 144.202.29.110 
Username: root
Password:  

Vultr server management screen

Setup your Operating System

We will begin by connecting to your newly provisioned server. On Windows, we will first download an app called mRemoteNG to connect to the server located at <https://mremoteng.org/>. You could also use the “PuTTY” program as well located at <https://www.putty.org/>. Go to the mRemoteNG download page and select the appropriate installer for your system. On Mac or Linux you can ssh directly from the terminal - simply type “ssh root@<server_ip>” and enter your password when prompted.

Double-click the downloaded file to install mRemoteNG, then run the app from your Start menu. Right click on the connections button and click “**New Connection**”. Right click on your new connection and “**Rename**” it to what you want. Enter your VPS IP address under the configuration screen at the bottom left under “**Hostname/IP**”. Enter your “**User name**” and “**Password**” as well. Change the “**Protocol**” to “**SSH version 2**”. Connect to your VPS by double clicking your new connection. Click on “**YES**” to the security screen pop up.

You have now successfully connected to your VPS.

For the following commands, please enter everything exactly as it is shown between the parentheses. Ex. “**COMMAND**”, you would type: COMMAND

You should immediately change the root password and store it in a safe place for security. You can do this by typing the following command:

“passwd root”

Enter and confirm a new password (preferably long and randomly generated).

Now, while still as root, we will update the system from the Ubuntu package repository:

“apt update”

“apt upgrade”

The system will show a list of upgradable packages. Press **Y** and **Enter** to install the packages.

We will now install a firewall (and some other packages we will use later), add swap memory and reboot the server to apply any necessary kernel updates, and then login to our newly secured environment as the new user:

(press **Y** and **Enter** to confirm)

“ufw allow ssh/tcp”

“ufw limit ssh/tcp”

“ufw allow 9999/tcp”

“ufw logging on”

“ufw enable”

(press **Y** and **Enter** to confirm)

Next, we need to add the swap file:

```
"apt-get -y install dphys-swapfile"  
"echo "CONF_SWAPSIZE=2048" >> /etc/dphys-swapfile"  
"echo "CONF_MAXSWAP=2049" >> /etc/dphys-swapfile"
```

Then reboot the server:

```
"reboot now"
```

Setting up your Dynamic Server Client

- Connect to your VPS, get the Dynamic binary archive from GitHub and extract it.
- **"wget https://github.com/duality-solutions/dynamic/releases/FILENAME"** - Replace **FILENAME** with the GitHub file you are downloading.
- To extract the client use this command: **"tar -xzf FILENAME"**
- Change into the Dynamic binary directory to see the binaries
- **cd dynamic-(CURRENT_VERSION)/bin** (Example: **dynamic-2.2.0/bin**)

Configuring your Dynode

- First, start the daemon by typing **"dynamicd"**. This creates an initial configuration file at **~/ .dynamic/dynamic.conf**. Now press **<CTRL>+c** to stop the daemon again.
- Now start the daemon in background mode by typing **"dynamicd --daemon"**
- The Dynamic node should now start syncing the blockchain automatically. You can check the progress using:
"dynamic-cli getblockcount" and comparing to the block explorer located at:
<https://dynexplorer.duality.international>
- Next, we need to create a private key for the Dynode. The controller wallet on your main machine will use that key to talk to start the Dynode:
"dynamic-cli dynode genkey"
- Write down the generated key as **<Dynodepairingkey>**
- After the wallet has synced, stop the daemon:
"dynamic-cli stop"
- Now we edit the configuration file
"nano ~/ .dynamic/dynamic.conf"
- Add the following lines (save with **<CTRL>+o**, close with **<CTRL>+x**):
dynode=1
dynodepairingkey=<dynodepairingkey>
- Now, starting the node you will have a Dynode ready to be controlled enter the following:
"dynamicd --daemon"

- You can check the status of your remote Dynode using the client:
“dynamic-cli dynode status”

Setting up the Controller Wallet

The wallet on your local machine acts as the controller wallet for your Dynodes. It contains the Dynode collateral and can activate your cold Dynode on your webserver. We will use the Dynamic QT Wallet.

Setting the Collateral Funds

- In the QT Wallet, go to the tab “Receive”, and create a new address. You may use a label like “Dynode collateral” for that. Copy the address just generated, which we will call <collateral address>.
- Go to “Send” and send exactly 1000 DYN to the address <collateral address> (You need to make sure fees are accounted for and it is exactly 1000).
- Now this should have created a Dynode compatible transaction output. You now have 2 options to find the <collateralTXID><TXINDEX>
- **Option 1** – Go to Tools/Debug Console and type Dynode outputs. You should see something like "<collateral TXID>" "<TXINDEX>"
- Example Output:
ce334e88a716b8bb7c51d8f817dd4bea3a3665be4b95361a0d486db7e8bf890f, “0”
- **Option 2** – Go to Settings then Options and make sure “Enable coin control features” is checked. Now go to Send tab, click on Inputs. Right click on the input and copy TX id. You should also see the output index.

Configuring the Dynode Configuration File on the Controller Wallet

- Now go to Tools/Edit Dynode Configuration File and enter the following line:
- <alias> <webserverIP>:33300 <dynodepairingkey> <collateralTXID> <TXINDEX>
- <alias>: The name you have given to your Dynode.
- <webserverIP>: The external IP of your webserver, something like 123.45.67.89
- <dynodepairingkey>: The key that you generated earlier and put into the dynode.conf file on your remote cold Dynode
- <collateralTXID>: The transaction ID you received from the above instructions.
- <TXINDEX>: The transaction index will be either a “1” or “0”
- Close the wallet and restart it. (**NOTE:** Please make sure your wallet is 100% synced.)
- Go to the “Dynodes” Tab. Your Dynode should be listed with its alias as “Missing”. Right-click on it and click Start Alias.
- If you did everything right, the Dynode will successfully start and become “PRE-ENABLED”
- The Dynodes should switch to “ENABLED” and stay like after a max of 20 minutes, as long as everything is fine on your remote webserver.

- Hint: You might need to restart your QT wallet to see the updated status
- When your Dynode earns a reward, it will be credited to the corresponding
- <collateral address>

Ensure your VPS has connected correctly

- Log back into your webserver.
- Check the status of your Dynode to ensure your webserver has connected:
“dynamic-cli dynode status”