PROJECT PAI

Building and Maintaining a PAI Coin Full Node

Hosting a PAI Coin full node is one of the best things you can do to support Project PAI. It's simple and affordable to do, and it helps to ensure good network performance and reliability for PAI Coin. This document outlines how to properly build and maintain a PAI Coin full node.

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What is a full node?

A full node is a server which stores a complete replica of the PAI Blockchain. A full node does not necessarily stake or mine, although it can. Its main purpose is to communicate with other peers in the network to forward pending transactions and provide redundancy. The addition of full nodes to the PAI Coin P2P network increases the decentralization, reliability, and efficiency of PAI Coin. This guide outlines how to properly setup and maintain a non-staking, non-mining full node. While you won't earn PAI Coin for hosting this type of full node, it is generally very affordable to maintain and is one of the best things you can do to support the PAI Blockchain.

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Obtain a computer or server to act as a node

The first step to running your own PAI Coin node is acquiring a device to use. For your node to best serve its purpose, it should be online 24/7, so it's not ideal to choose a personal device like a laptop or home computer that you use for other things.

Cloud computing

In today's age of cloud computing, the most obvious solution is to rent a remote server—often called an "instance"—from a cloud computing service provider. Depending on the provider you choose, a sufficiently powerful instance for running a PAI Coin full node can be obtained for $5-$10 per month. Here are some providers we recommend:

Provider	Based In	Instance Type	Monthly Cost	Notes	Link
Amazon Web Services (AWS)	USA	t2.micro	$8.50	-AWS is widely used, very reliable - Offers 1 year free	https://aws.amazon.com
DigitalOcean	USA	Basic (Smallest)	$5	-Console is very easy to use	https://digitalocean.com
Alibaba Cloud	China	ecs.t5-lc1m1.small	$6.40	-Mainland China regions available -Offers 1 year free	https://alibabacloud.com

Self-hosting

If you prefer not to use a cloud computing platform, you also have the option to self-host a PAI Coin node. This would require you to dedicate a physical computer or server that you own to running PAI Coin Core and keeping it online 24/7 with public accessibility. Self-hosting is beyond the scope of this tutorial.

Install PAI Coin Core

Once the computer you've chosen to use for your node is up and running, you'll need to install the latest version of PAI Coin Core. Currently, the best way to do that is by building the software from source. In order to do so, connect to your node via `ssh` and execute the following commands. These instructions assume you are using Ubuntu 18.04 or later and that you are logged in as a user with `sudo` (root) access.

First, clone the public PAI Coin repository[1].

git clone https://github.com/projectpai/paicoin.git

Installing dependencies and configuring your build

Next, install some dependencies.

sudo apt update
sudo apt-get install build-essential libtool autotools-dev automake pkg-config libssl-dev libevent-dev bsdmainutils python3 libboost-all-dev

If you are using an Alibaba Cloud server, install the following additional dependencies.

sudo apt install openssl libssl-dev libevent-dev

Generate the configuration script.

cd paicoin
./autogen.sh

Set the build parameters.

./configure --disable-tests --disable-wallet CXXFLAGS="--param ggc-min-expand=1 --param ggc-min-heapsize=32768"

If you are using a server with more than 1.5 GB of RAM, you can exclude the CXXFLAGS. You can also exclude the flag --disable-tests to build and run unit tests, but this will cause the installation to take longer.

./configure --disable-wallet

If you wish to enable the wallet, you will need to install additional dependencies. Please refer to doc/build-unix.md in the paicoin repository for more information. A wallet is not necessary to run a full node.

When you see the following output, you have successfully configured the build.

```
Options used to compile and link:
  with wallet   = no
  with gui / qt = no
  with zmq      = no
  with test     = no
  with bench    = yes
  with upnp     = auto
```

[1] On Alibaba Cloud, you may need to install git first with the following command: sudo apt install git

```
use asm      = yes
debug enabled = no
werror       = no

target os     = linux
build os      =

CC          = gcc
CFLAGS       = -g -O2
CPPFLAGS     =  -DHAVE_BUILD_INFO -D__STDC_FORMAT_MACROS
CXX         = g++ -std=c++11
CXXFLAGS     = --param ggc-min-expand=1 --param ggc-min-heapsize=32768
LDFLAGS      =
ARFLAGS      = cr
```

Compiling binaries

Now, all you need to do is compile the binaries. Just run[2]:

```
make
```

Once you see the following output, your installation is complete!

```
make[2]: Leaving directory '/home/ubuntu/paicoin/src'
make[1]: Leaving directory '/home/ubuntu/paicoin/src'
Making all in doc/man
make[1]: Entering directory '/home/ubuntu/paicoin/doc/man'
make[1]: Nothing to be done for 'all'.
make[1]: Leaving directory '/home/ubuntu/paicoin/doc/man'
make[1]: Entering directory '/home/ubuntu/paicoin'
make[1]: Nothing to be done for 'all-am'.
make[1]: Leaving directory '/home/ubuntu/paicoin'
```

Configure the node

With PAI Coin Core installed, you still need to do a few more configuration steps to run it as a full node that other peers can connect to.

Configuring PAI Coin Core

To configure PAI Coin Core before starting paicoind, follow these instructions.

```
mkdir ~/.paicoin
```

Then, in the ~/.paicoin directory, create a plain text file titled paicoin.conf which contains the following.

[2] This may take a while. You can use screen to run it in the background.

```
daemon=1
txindex=1
reindex=1
testnet=0
```

Configuring networking

You need to make sure that other peers can connect to your node. To do this, make port 8567 accessible from any IP address. This can be done by creating a Security Group (AWS, Alibaba Cloud) or Firewall (Digital Ocean) with the appropriate rule and attaching it to the instance (AWS, Alibaba Cloud) or droplet (Digital Ocean) that is running PAI Coin Core.

Launch PAI Coin Core

Running paicoind

With PAI Coin Core installed and the software and instance fully configured, we're ready to start the PAI Coin Daemon (paicoind). In ~/paicoin/src run the following command.

```
./paicoind
```

You will see:

```
PAI Coin server starting
```

Your node will begin to download a copy of the blockchain locally. To monitor the progress, you can run the following command.

```
tail -f ~/.paicoin/debug.log
```

When you see an output like this, the blockchain has fully synced and your node is running.

```
2020-09-21 17:52:16 receive version message: /Turing:0.16.1/: version 70015, blocks=152506,
us=188.166.183.62:57020, peer=10
```

Testing connectivity to the node

The simplest way to test that your node is accessible to other peers in the network is through PAI Up Mobile. In PAI Up, go to Menu → Preferences → PAI Coin Settings → PAI Coin Nodes → Switch to Manual Mode, then enter the IP address of your full node and click OK. If PAI Up successfully connects, then your full node is operating correctly.

https://media4.giphy.com/media/cSV3okAOI6pE6GXFHo/giphy.gif

Maintain the node

Ensuring sufficient disk space

The PAI Blockchain will continue to grow in size over time, so you should routinely check that the node has enough disk space. You can check the status of your node by running the following command in ~/paicoin/src:

```
./paicoin-cli getblockchaininfo
```

To see a list of other possible commands, run paicoin-cli help.

Updating to the latest PAI Coin Core version

You should regularly update your PAI Coin full node to use the latest software version. To update, execute the following commands in the paicoin directory.

First, stop the full node from running.

```
cd src
paicoin-cli stop
cd ..
```

Next, pull the latest software version.

```
git pull
```

If you are already running the latest version, you will see the message Already up to date.

Otherwise, proceed with the following commands to build the new version.

```
make clean
make
```

Once the build completes, you can restart your full node by executing ./paicoind in paicoin/src.