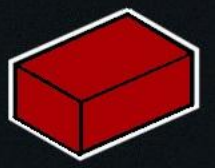
Building a Web Server

For fun, profit and [REDACTED]



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A word on conduct...

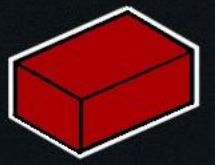
DON'T:

- Touch anyone else's shell. Seriously.
- Host anything illegal, offensive or otherwise immoral on your shiny new server.
- Intentionally disrupt or interrupt the talk. Raise a hand or wait for a pause to ask questions!

DO:

- Bring friends, roommates, pet rocks… All are welcome!
- Ask questions! Don't be shy, we're here to help you!
- Work together! Two heads are (often) better than one.
- Be respectful to us and those around you, everyone is here to have fun.

In short: *Be excellent to each other.*



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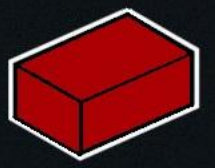
If you are not already booted into linux you should do that now



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GitHub Developer Pack

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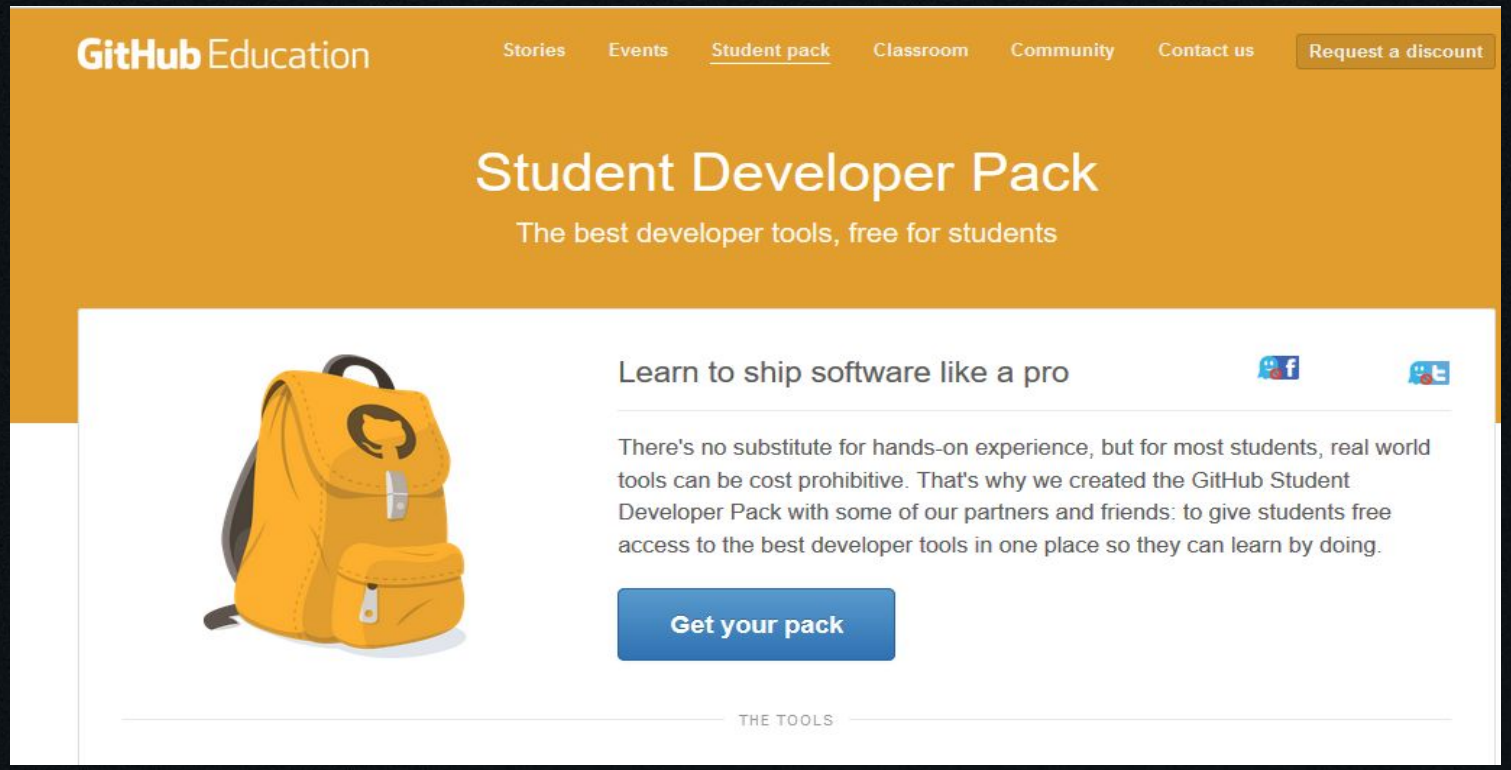
Did you git yours?



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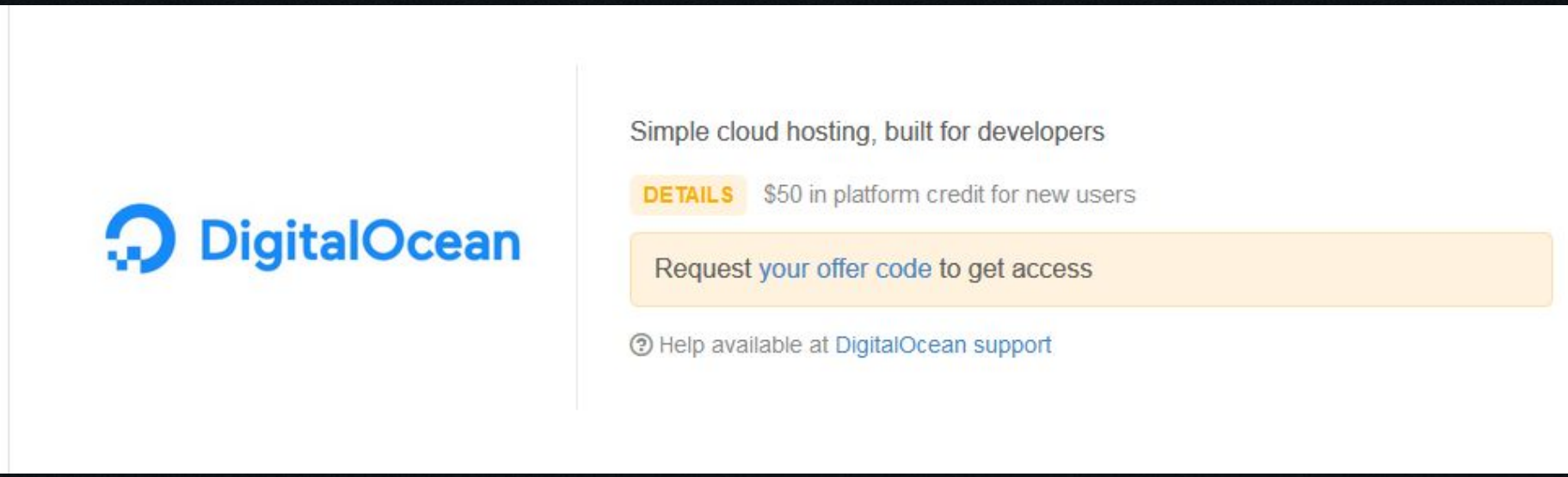
Find dis one! Click request



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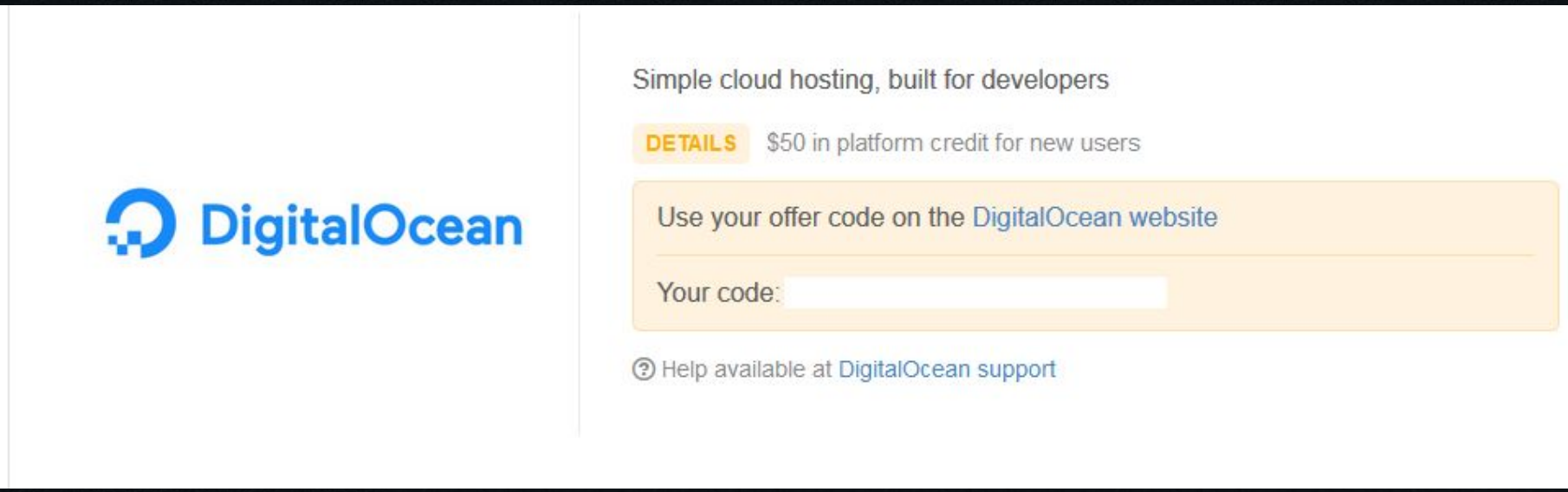
Copy code for later. Click on the website



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Follow the steps

Create an account and enter the promo code when asked for card details.

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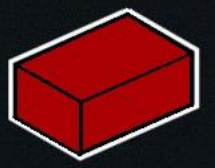
Ssh keys

So before we go any further lets create an ssh key.
P.s If you have one already this step can be skipped

```
ssh-keygen -t rsa -C "your_email@example.com"
```

- You'll be prompted to enter a passphrase if you'd like
- Two files are generated: 1) {name*you*chose} and 2) {name*you*chose}.pub
- We will need these later



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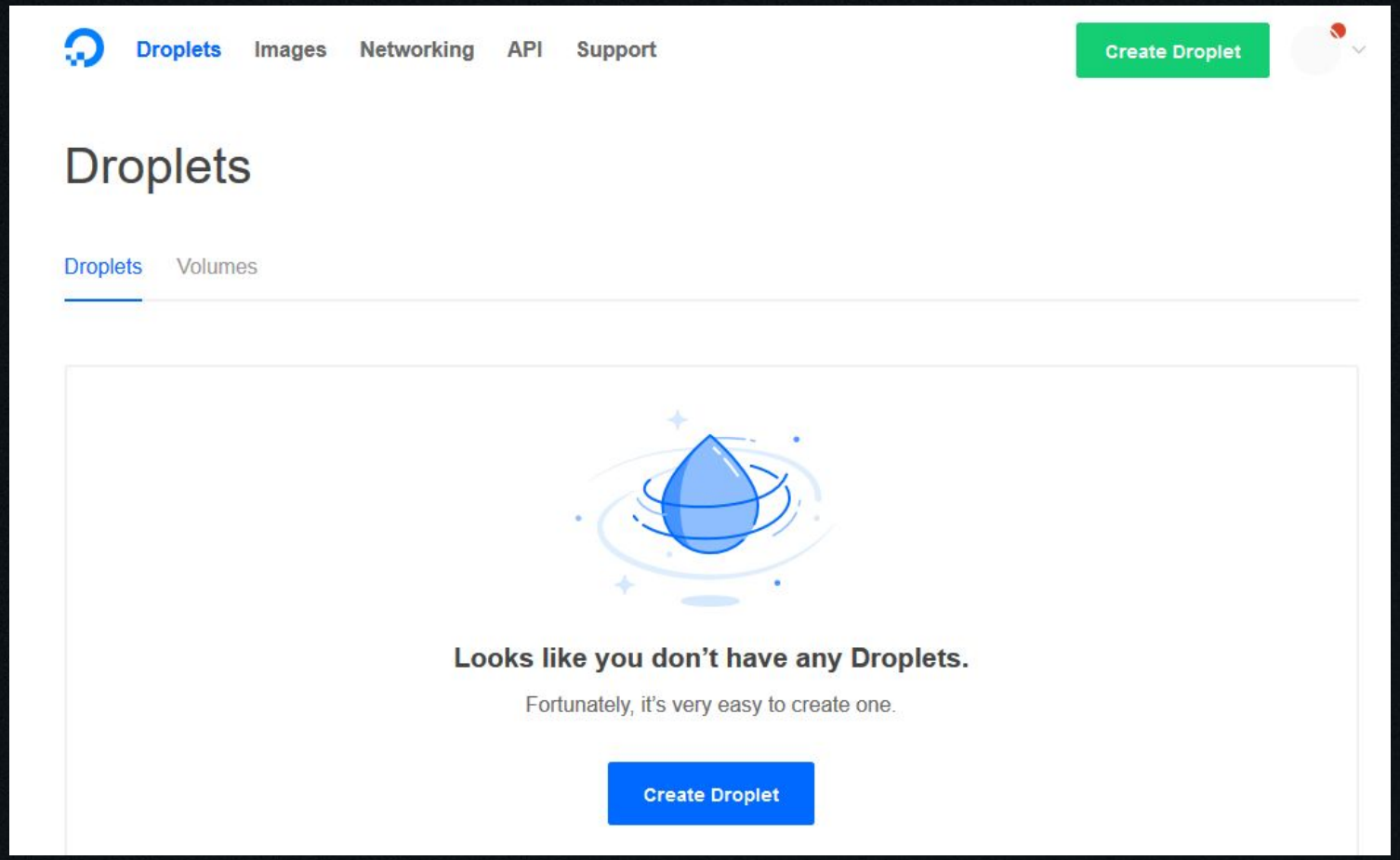
Now lets make a server



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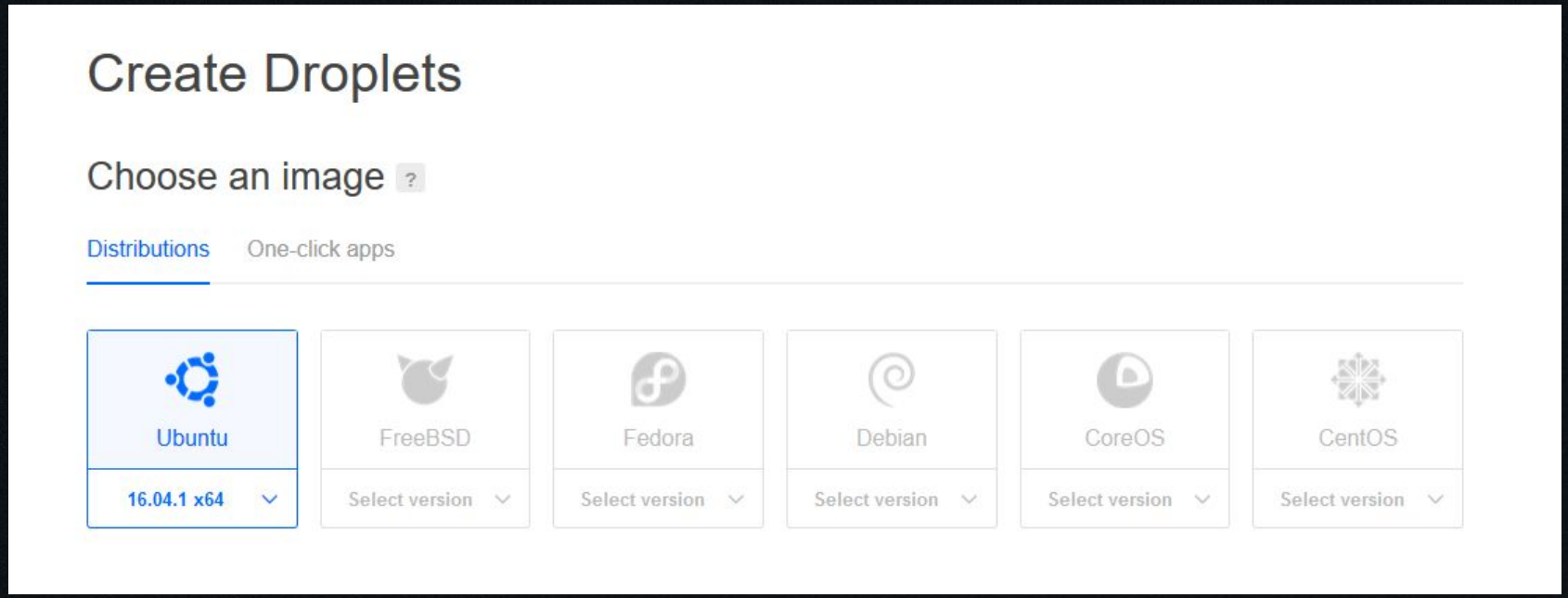
Choose an operating system

Today we are going to go with Ubuntu because we know it well

There are others operating systems available feel free to experiment later :D



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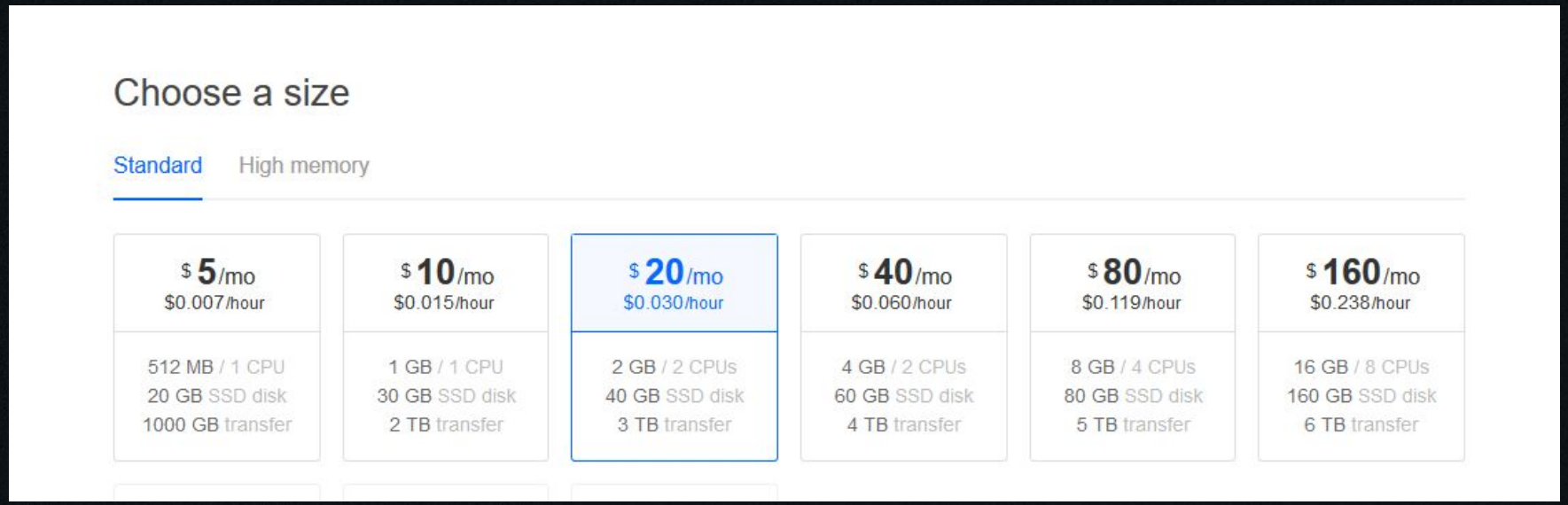
Big and shiny!

Chose any setting you like. Beware: the more money you spend per month the less time that free $50 will last you.

We opted for the $5/month, we don't need anything huge.



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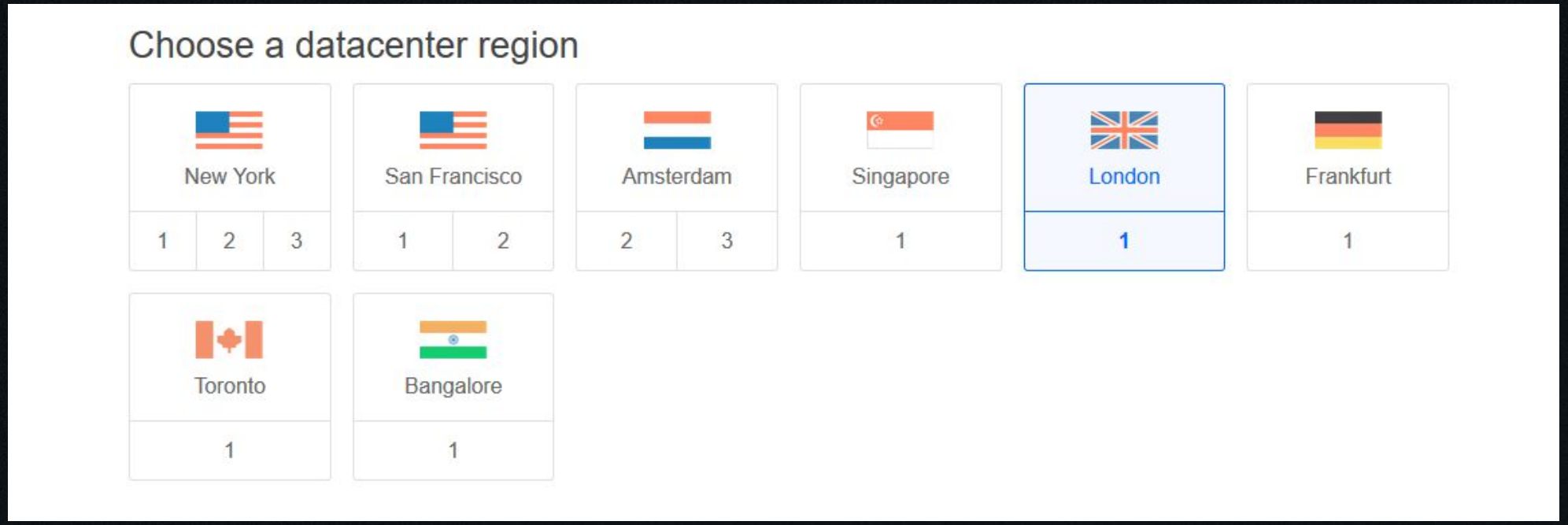
Give your server a home

The Further away it is the longer it will take to connect!



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Remember those keys we made earlier

- Click add SSH keys
- Copy the contents of the .pub part of your SSH keys
- Click save

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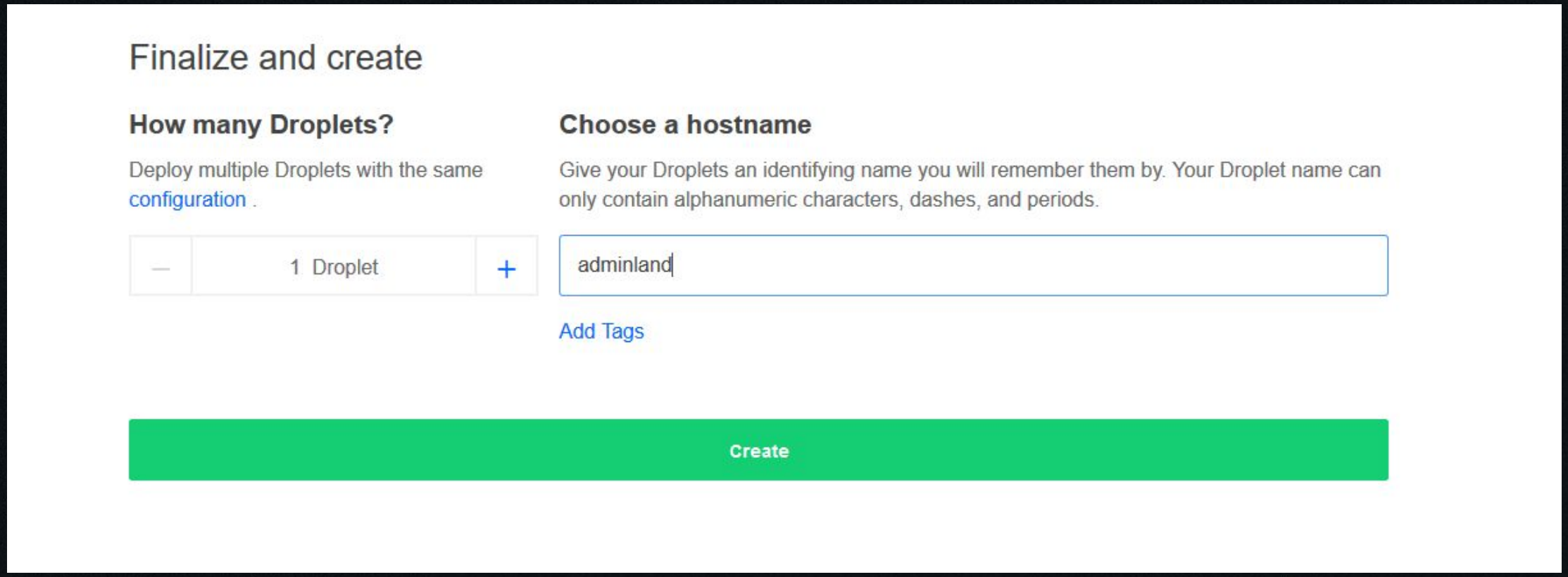
Naming things is hard



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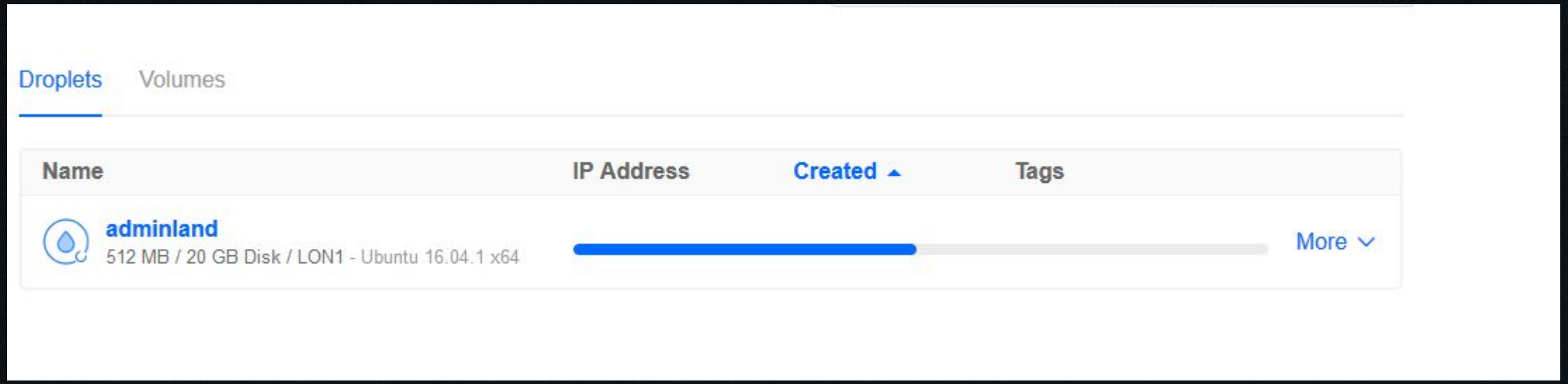
And now we wait!



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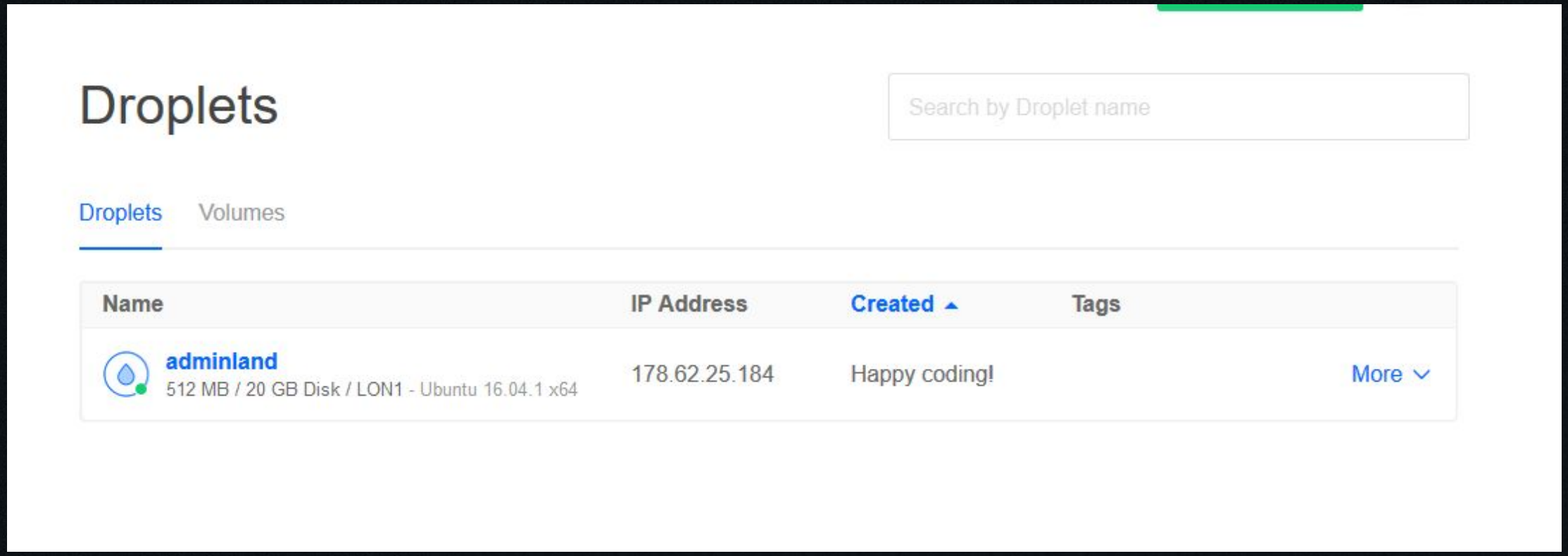
Well that was quick!



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Is anyone totally lost?

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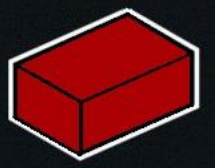
Now, onto the fun stuff!

First, let's login:

Replace 1.2.3.4 with your ip address from digital ocean.

```
ssh -i ~/.ssh/our_new_key root@1.2.3.4
```



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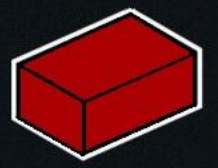
I don't like this root name I want my own

```
# Add new user "zergless"
sudo adduser zergless

# Copy our installed SSH key to the new user so we can login as them
sudo cp -R .ssh/ /home/zergless/

# Change ownership of evan's SSH directory so he actually has permission to access it
sudo chown -R zergless:zergless /home/zergless/.ssh

# Add zergless to the sudoers (admin) group so he can execute important commands later
sudo usermod -a -G sudo zergless

# Disable root login via password
sudo passwd -l root

# Disable root login via SSH
sudo rm -rf /root/.ssh
```



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Now let’s start installing things!

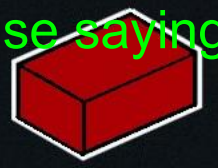
Update our package listing (apt-get is a package manager for ubuntu/debian systems)
```
sudo apt update
```

Install all necessary packages for a LAMP server
```
sudo apt install lamp-server^ libapache2-mod-python
```

You'll be asked to choose a MySQL password

Make sure MySQL is installed securely
```
mysql_secure_installation
```

#For the password plugin if you plan on using this server I would advise saying yes and then answer yes to everything else.



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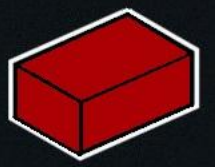
This was in the space of **1 second**.

```
Feb 13 06:38:17 paphos sshd[10739]: Failed password for root from 116.31.116.34 port 62458 ssh2
Feb 13 06:38:17 paphos sshd[10733]: Failed password for root from 116.31.116.34 port 48839 ssh2
Feb 13 06:38:17 paphos sshd[10745]: Failed password for root from 116.31.116.34 port 54107 ssh2
Feb 13 06:38:17 paphos sshd[10743]: Failed password for root from 116.31.116.34 port 18585 ssh2
Feb 13 06:38:17 paphos sshd[10734]: Failed password for root from 116.31.116.34 port 22850 ssh2
```



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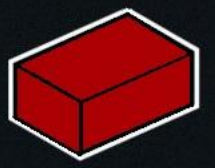
But does it *do* anything?

Let’s process some requests…

...with python!



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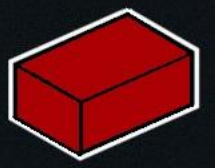
Python 3

```
# If python 2.7 is installed, delete it
sudo rm /usr/bin/python

# Make python3 the default for when we type the "python"
# command
sudo ln -s /usr/bin/python3 /usr/bin/python
```



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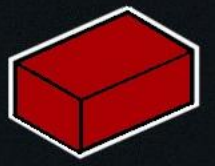
Pip - A python dependency manager

```
# Install pip
sudo apt-get install python3-pip

# Use pip to install the MySQL interface for python
sudo pip3 install pymysql
```



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Put yo scripts in places!

```
# Make a directory to hold all our python scripts
sudo mkdir /var/www/python_scripts

# Disable bad Python multithreading and enable CGI
sudo a2dismod mpm_event
sudo a2enmod mpm_prefork cgi

# Copy the default config and make a backup
sudo cp /etc/apache2/sites-available/000-default.conf
/etc/apache2/sites-available/000-default.conf.backup
```

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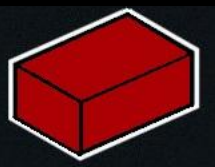
```
<VirtualHost *:80>
        # Our files will be located in /var/www/python_scripts
        DocumentRoot /var/www/python_scripts

        # Our server admin's email is zergless@redbrick.dcu.ie
        ServerAdmin zergless@redbrick.dcu.ie

        # The following directives ONLY APPLY to the /var/www/python_scripts directory
        <Directory /var/www/python_scripts>
                # Enable Common Gateway Interface execution
                Options +ExecCGI

                # If "index.py" is present, that's taken as the primary file to load first
                DirectoryIndex index.py

                # Allow everyone to access the scripts in this folder
                Require all granted

                AddHandler mod_python .py
                PythonHandler mod_python.publisher
                PythonDebug On
        </Directory>


        ErrorLog ${APACHE_LOG_DIR}/error.log
        CustomLog ${APACHE_LOG_DIR}/access.log combined

</VirtualHost>
```



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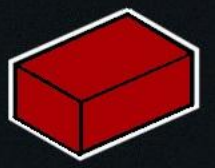
Now let’s enable our site!

```
# Reload apache's configuration
sudo systemctl apache2 reload
```



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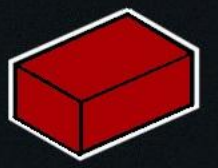
...maybe we should check if it works.

#Create a file ‘index.py’ to test our server

```
sudo vim /var/www/python/index.py
```

#A simple test request:

```
1 def index(req);
2     return "Hello, World! I am a python script!";
```



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So let’s recap

We made some SSH keys

We installed our server

We added our own user

We installed a lamp stack and hardened our mysql

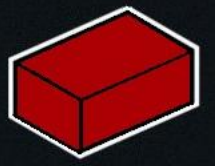
Installed python 3

Installd pip

Made a directory for our python scripts

Allowed apache to execute our scripts

And tested it and if all goes well that should work



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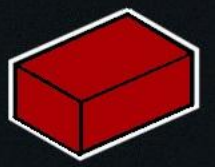
Well not quite

- We want to secure Apache and PHP
- Then we'll talk about SSL
- some useful programs
- DNS



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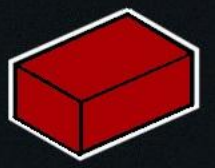
Securing apache

conf-available is where the modular configuration of apache happens (not related to domains/subdomains)

```
cd /etc/apache2/conf-available
```

Edit the security.conf file

```
sudo vim security.conf
```



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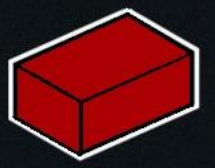
```
# Stop returning OS and version number
 ServerSignature Off
 ServerTokens Prod
```

Some other things to take look at later

```
# Some optional things to think of including (I'd advise googling these, I'd only confuse you with my explanations)
 TimeOut
 KeepAliveTimeout
 LimitRequestBody
 LimitRequestFields
 LimitRequestFieldSize
 LimitRequestLine
 LimitXMLRequestBody
```



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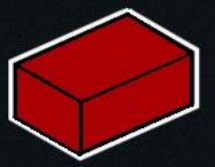
```
# Edit apache's core configuration
 cd /etc/apache2/
 sudo vim apache2.conf


# We'll add a domain name to the core of our server

 DocumentRoot /var/www/html

 <Directory /var/www/html>
   # Disable directory listings, following symbolic links and executing CGI scripts
   Options -Indexes -FollowSymLinks -ExecCGI
   # Don't let .htaccess files override configuration
   AllowOverride none
   # Let everyone access the files in /var/www/html through apache
   Require all granted
 </Directory>
```



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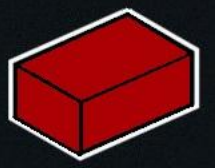
Securing PHP

```
# Open up the php config for apache
cd /etc/php5/apache2
sudo vim php.ini
```



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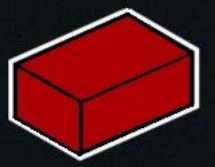
```
; Restrict PHP Information Leakage (i.e. don't send PHP info in HTTP request headers)
expose_php = Off

; Disable Remote Code Execution
allow_url_fopen = Off
allow_url_include = Off ; This one should be off by default but make sure

; Disabling Dangerous PHP Functions - These are just a list of things we disable by default on our servers
disable_functions =
exec,passthru,shell_exec,system,proc_open,popen,curl_exec,curl_multi_exec,show_source,pcntl_alarm,pcntl_fork,pcntl_waitpid
,pcntl_wait,pcntl_wifexited,pcntl_wifstopped,pcntl_wifsignaled,pcntl_wexitstatus,pcntl_wtermsig,pcntl_wstopsig,pcntl_signal,pcntl
_signal_dispatch,pcntl_get_last_error,pcntl_strerror,pcntl_sigprocmask,pcntl_sigwaitinfo,pcntl_sigtimedwait,pcntl_exec,pcntl_get
priority,pcntl_setpriority

; Limit PHP execution to the following directories
;   i.e. Any PHP script anywhere else does not get executed, ever
open_basedir = "/var/www/html"

; Set some limits
upload_max_filesize = 2M  ; Maximum 2MB of file size a user can upload
max_execution_time = 30   ; 30 seconds execution time
max_input_time = 60       ; 60 seconds to parse POST or GET data from request
```



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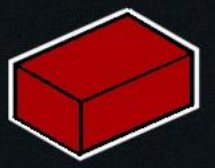
Some useful programs

```
sudo apt-get install fail2ban iotop htop iftop screen logwatch
```

- **fail2ban**: Manages IP banning for your server. The settings out of the box are generally pretty awesome and deflect something like 5% of all Netsoc's requests.
- **iotop**: For tracking input/output
- **htop**: For tracking CPU processes and a good overview of the system (load on CPUs + memory)
- **iftop**: For tracking Network traffic
- **screen**: Used to create multiple terminal windows server-side. Great for leaving unnattended/long-running programs going (EG: weechat or some IRC client)
- **logwatch**: Processes your logs and will email you some of the highlights and things you should look out for. You should have a look through the config for yourself, it's different for everyone. What you will have to do is create a cronjob for this to run and email you every so often. (we run it nightly)



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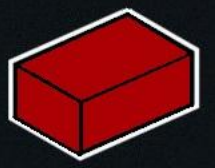
LetsEncrypt: Free SSL for everyone!

https://letsencrypt.org/ < find all the docs you want here



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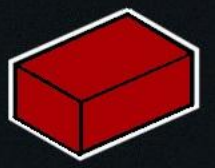
IP addresses are ugly, so…?

You will need to buy a domain or get a free one from one of the links below!

http://www.freenom.com/en/index.html?lang=en

Namecheap.com

The github education pack gives you a free DNS provider too!



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