#### Zero to Server in 20 minutes + \$5/month

Assaf Gordon https://github.com/agordon assafgordon@gmail.com

# Goal

- A Linux Server (w/ usable distro)
- Shell Access (w/ Root Access)
- Public IP + DNS record
- Apache Server (or NGINX)
- Developer-friendly (Perl/Python/PHP/Ruby/etc.)
- Infrastructure-friendly (Postgres/MySQL/Redis/MongoDB/Memcache/etc.)
- And also:
  - Cheap
  - Fast
  - Reliable
  - Easy to use

# **Common Solutions**

- Personal Computer at home + Dynamic DNS
- Work/School servers (BEST. EVER.)
- "Cloud" (??) services
  - Amazon (1-year Free-tier highly recommended)
  - Linnode
  - Digital-Ocean
  - Many many many others, YMMV

# **Digital Ocean**

- https://www.digitalocean.com
- "For Developers, By Developers"
  - (Lots of marketing fluff, but they certainly deliver)
  - Large community, many tutorials: https://www.digitalocean.com/community
- Cheap
  - \$5/month for 1CPU / 512MB RAM / 20GB DISK / 1TB transfer
  - Charged by the hour, for active instances (\$0.007/hour for above setup)
- Fast
  - New image start in 60 seconds. Really.
  - Support tickets answered within minutes. Really.
- Other niceties for developers
  - Snapshots + Periodic backups
  - Root password sent by email or pre-configured SSH key
  - Web-based VNC console access when sh\*t goes down
  - Start server from pre-made distros, or from your own snapshot
- Did not try, and cannot attest to
  - "Web Scale", API, Built-in DNS



https://twitter.com/digitalocean

# The Plan

- Create new Droplet (DigitalOcean's lingo for a running instance)
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#### Starting a new Droplet (1 of 5)



#### Starting a new Droplet (2 of 5)

Select Region New York 1 San Francisco 1 New York 2 Select Image FO Linux Distributions Applications My Images My Backups Arch Linux Debian Fedora Debian 7.0 x64 Debian 7.0 x32 Debian 6.0 x64 Debian 6.0 x32

# Starting a new Droplet (3 of 5)

٢	Add optional SSH Keys	
	gordon@rakis	
٥	Settings	
~	Enable VirtlO	
		Create Droplet
		Create Droplet Your root password will be emailed to you
		Create Droplet Your root password will be emailed to you

#### Starting a new Droplet (4 of 5)

We are now creating your droplet

Your Droplet is being created!

Approximately 58 seconds remaining

#### Starting a new Droplet (4 of 5)

We are now creating your droplet

Your Droplet is being created!

Approximately 19 seconds remaining

#### Starting a new Droplet (4 of 5)

We are now creating your droplet

Your Droplet is being created!

Approximately 6 seconds remaining

# Starting a new Droplet (5 of 5)

🛆 Droplets				Create Droplet		
Image	Name	IP Address	Status	Memory	Disk	Region
0	рууус	192.241.238.89	Active	512MB	20GB	sfo1

#### **Droplet Control Panel**



#### Root Password by Email

Your new Droplet is created! (simrock) – DigitalOcean – Icedove Mail/News	$\times$
From Digital Ocean Support <support@digitalocean.com> 🟠</support@digitalocean.com>	
Subject Your new Droplet is created! (simrock) - DigitalOcean	09:01 PM
Yay! Your new Droplet has been created!	
You can access it using the following credentials:	
IP Address: 192.241.238.89 Username: root Password: xsytjbxcdadf	
INSTRUCTIONS	
To login to your droplet, you will need to open a terminal window and copy and paste the following string	:
ssh root@192.241.238.89	
Once you've entered the string, copy and paste your password:	
xsytjbxcdadf	
If you're having trouble, please visit the following tutorial: https://www.digitalocean.com/community/articles/how-to-create-your-first-digitalocean-droplet-virtual-serv	ver
Happy coding, DigitalOcean	

#### **Connect to Droplet**

#### \$ ssh root@192.241.238.89

The authenticity of host '192.241.238.89 (192.241.238.89)' can't be established. key fingerprint is fc:45:20:9e:21:c3:d2:fa:b5:a0:29:fa:74:34:4f:4a. Are you sure you want to continue connecting (yes/no)? yes Warning: Permanently added '192.241.238.89' (ECDSA) to the list of known hosts. root@192.241.238.89's password: [ROOT PASSWORD FROM EMAIL]

Linux pyyyc 3.2.0-4-amd64 #1 SMP Debian 3.2.41-2+deb7u2 x86\_64

The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/\*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law.

root@pyyyc:~#

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#### Create non-root user

```
root@pyyyc:~# adduser gordon
Adding user `gordon' ...
Adding new group `gordon' (1000) ...
Adding new user `gordon' (1000) with group `gordon' ...
Creating home directory `/home/gordon' ...
Enter new UNIX password: [ENTER PASSWORD]
Retype new UNIX password: [REPEAT PASSWORD]
passwd: password updated successfully
Changing the user information for gordon
[...]
Is the information correct? [Y/n] y
root@pyyyc:~# adduser gordon sudo
Adding user `gordon' to group `sudo' ...
```

Adding user gordon to group sudo Done.

root@pyyyc:~# exit
Connection to 192.241.238.89 closed.

#### Connect as non-root user

\$ ssh gordon@192.241.238.89
gordon@192.241.238.89's password: [ENTER PASSWORD]

gordon@pyyyc:~\$ sudo date
We trust you have received the usual lecture from the local System
Administrator. It usually boils down to these three things:

- #1) Respect the privacy of others.
- #2) Think before you type.
- #3) With great power comes great responsibility.

[sudo] password for gordon: [ENTER PASSWORD] Fri Aug 23 03:52:41 UTC 2013

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#### Install Apache Web server

```
gordon@pyyyc: ~$ sudo apt-get update
Get:1 http://security.debian.org wheezy/updates Release.gpg [836 B]
[\ldots]
Fetched 10.1 MB in 18s (550 kB/s)
Reading package lists... Done
gordon@pyyyc: ~$ sudo apt-get install apache2 apache2-utils \
                           libapache2-mod-python libapache2-mod-wsgi
Reading package lists... Done
The following extra packages will be installed:
  apache2-mpm-prefork apache2.2-bin apache2.2-common
[...]
Do you want to continue [Y/n]? Y
[...]
To activate the new configuration, you need to run:
  service apache2 restart
gordon@pyyyc: ~$ sudo service apache2 restart
 ... waiting apache2: Could not reliably determine the server's fully
qualified domain name, using 127.0.0.1 for ServerName
. ok
```

#### **Test Apache Server**



gordon@pyyyc: ~\$ cat /var/www/index.html <html><body><h1>It works!</h1> This is the default web page for this server. The web server software is running but no content has been added, yet. </body></html>

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#### Install Python dev. tools

```
gordon@pyyyc: ~$ sudo apt-get install python-dev \
                                       python-setuptools python-pip
[...]
Reading package lists... Done
Building dependency tree
Reading state information... Done
The following extra packages will be installed:
[...]
Do you want to continue [Y/n]? Y
[...]
gordon@pyyyc: ~$ pip --help
Usage: pip COMMAND [OPTIONS]
Options:
                        show program's version number and exit
  --version
                        Show help
  -h, --help
[\ldots]
```

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#### Install Python Flask Module

```
gordon@pyyyc: ~$ sudo pip install --upgrade flask
[...]
Downloading/unpacking flask
  Downloading Flask-0.10.1.tar.gz (544Kb): 544Kb downloaded
  Running setup.py egg_info for package flask
[...]
Successfully installed flask
Cleaning up...
## Good
gordon@pyyyc: ~$ python -c 'import flask'
gordon@pyyyc: ~$
## Bad
gordon@pyyyc: ~$ python -c 'import flask'
Traceback (most recent call last):
  File "<string>", line 1, in <module>
ImportError: No module named flask
```

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#### **Minimal Flask Application**

# See http://flask.pocoo.org/

```
gordon@pyyyc: ~$ cat /home/gordon/webapp1/myapp.py
from flask import Flask
app = Flask( name )
app.debug = True
@app.route('/')
def hello world():
    return 'Hello World!'
   name == ' main ':
if
   app.run(host = '0.0.0.0')
gordon@pyyyc: ~$ python /home/gordon/webapp1/myapp.py
  Running on http://0.0.0.0:5000/
  Restarting with reloader
```

# **Test Minimal Flask Application**



```
gordon@pyyyc: ~$ python /home/gordon/webapp1/myapp.py
 * Running on http://0.0.0.0:5000/
 * Restarting with reloader
184.64.154.197 - - [23/Aug/2013 02:42:31] "GET / HTTP/1.1" 200 -
```

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# Apache + WSGI configuration

- Useful resources
  - WSGI
    - http://en.wikipedia.org/wiki/Web\_Server\_Gateway\_Interface
  - Flask Deployment (general) http://flask.pocoo.org/docs/deploying/
  - Flask + Apache + WSGI http://flask.pocoo.org/docs/deploying/mod\_wsgi/
  - Apache on Debian overview http://www.control-escape.com/web/configuring-apache2-debian.html
- Relevant Files (in Debian)
  - Sites configuration: /etc/apache2/sites-available/\*
  - Active sites (soft links): /etc/apache2/sites-enabled/\*
  - Enable/disable sites (w/ sudo): a2dissite , a2ensite

# Apache2 WSGI config. (1 of 4)

# WSGI wrapper script for Flask application
# (you'll need to create this file)

gordon@pyyyc: ~\$ cat /home/gordon/webapp1/myapp.wsgi
import sys

sys.path.append('/home/gordon/webapp1')

from myapp import app as application

# Apache2 WSGI config. (2 of 4)

# New Apache configuration file for our web site
# (you'll need to create this file, with sudo)

<Directory /home/gordon/webapp1/>
 WSGIProcessGroup test1
 WSGIApplicationGroup %{GLOBAL}
 WSGIScriptReloading On
 Order deny,allow
 Allow from all
 </Directory>
</VirtualHost>

# Apache2 WSGI config. (3 of 4)

# Disable the default site gordon@pyyyc: ~\$ sudo a2dissite default Site default disabled. To activate the new configuration, you need to run: service apache2 reload

# Enable our new site gordon@pyyyc: ~\$ sudo a2ensite webapp1 Enabling site webapp1. To activate the new configuration, you need to run: service apache2 reload

# Restart Apache
gordon@pyyyc: ~\$ sudo service apache2 restart
[....] Restarting web server: apache2apache2: Could not reliably
determine the server's fully qualified domain name, using 127.0.0.1
for ServerName
 ... waiting apache2: Could not reliably determine the server's fully
qualified domain name, using 127.0.0.1 for ServerName
 . ok

# Apache2 WSGI config. (4 of 4)

# In case of an error, restarting Apache will fail.
# Error message will appear on the screen ...

```
gordon@pyyyc: ~$ sudo service apache2 restart
Syntax error on line 5 of /etc/apache2/sites-enabled/webapp1:
Invalid command 'XXXXXX', perhaps misspelled or defined by a module
not included in the server configuration
Action 'configtest' failed.
The Apache error log may have more information.
Failed!
```

# ... or in Apache's error log file:

```
gordon@pyyyc: ~$ sudo tail /var/log/apache2/error.log
[ ... ]
```

#### Test Apache/WSGI/Flask Application

(* *) C @ [	192.241.238.89	යි <b>=</b>	
Hello World!			
P			

gordon@pyyyc: ~\$ sudo tail -f /var/log/apache2/access.log
173.183.194.88 - [22/Aug/2013:03:47:43 +0000] "GET / HTTP/1.1" 200
483 "-" "Mozilla/5.0 (X11; Linux x86\_64) AppleWebKit/537.36 (KHTML,
like Gecko) Chrome/27.0.1453.110 Safari/537.36

# Test Apache/WSGI/Flask Application (Troubleshooting)

404 Not Found	×				
🔄 🔊 C 🏠	192.241.238.89	☆ =			
Not Found					
The requested URL / was not found on this server.					
Apache/2.2.22 (Debian) Server at 192.241.238.89 Port 80					

gordon@pyyyc: ~\$ sudo tail -f /var/log/apache2/error.log
[Fri Aug 23 03:41:28 2013] [error] [client 173.183.194.88] Target WSGI
script not found or unable to stat: /home/gordon/webapp1/myapp.wsgi

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# Setup DNS record (1 of 4)

📀 🔊 🕝 🍙 🗋 freedns.afraid.org

#### FreeDNS - Free DNS - Dynamic DNS - Static DNS subdomain and domain hosting



Free DNS Hosting, Dynamic DNS Hosting, Static DNS Hosting, subdomain and domain hosting.

Why is it free? It's quite simple. We wanted a challenge... that's it.

Possible Uses:

- Host your own site on your own connection from home/work/school/etc
- Access your computer with a name (like zeus.afraid.org or yourdomain.com) instead of a numeric IP address
- Run your own http server, ftp server, or anything you want to install on your computer/server
- Fetchable URL to update your IP instantly on our network if you have a dynamic address
- Hosts even work for your LAN. If you have a LAN connected to the internet you can point hosts to private IP addresses (even private IPv6 addresses) and they will work within your network
- Let your friends point theirname.yourdomain.com to their own connection
- Use web forwarding to transparently redirect a hostname to another URL. Let our servers handle the redirection
- afraid.org has been un-interrupted for hundreds of days at a time
- afraid.org is operated from multiple redundant high capacity well connected servers



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#### Setup DNS record (2 of 4)



# Setup DNS record (3 of 4)

1.1					
A & & .		PS 25 18 1	- 100 L L 100 J	1 AN 1993	- 19 L 19 S
ALL	100		51.11.11		100

Type:	A <b>v</b> <u>explanation</u>	<u>l</u>	
Subdomain:	рууус		
Domain:	mooo.com (public)	Ŧ	
Destination:	192.241.238.89		
TTL:	For our premium suppo	seconds (o	ptional)
Wildcard:	Enabled for all sub	scribers ( <u>m</u>	ore info
			Savel

#### Setup DNS record (4 of 4)



#### **Testing DNS record**

NOTE: DNS record update takes several minutes.

\$ host pyyyc.mooo.com
Unknown host pyyyc.mooo.com

\$ host pyyyc.mooo.com
pyyyc.mooo.com has address 127.0.0.2

*#* Wait 5 minutes...

\$ host pyyyc.mooo.com
pyyyc.mooo.com has address 192.241.238.89

\$ ping pyyyc.mooo.com PING pyyyc.mooo.com (192.241.238.89) 56(84) bytes of data. 64 bytes from 192.241.238.89: icmp\_seq=1 ttl=52 time=73.1 ms 64 bytes from 192.241.238.89: icmp\_seq=2 ttl=52 time=73.0 ms ....

\$ ssh gordon@pyyyc.mooo.com gordon@pyyyc.mooo.com's password: [ENTER PASSWORD]

# Victory!

http://pyyyc.mc ×	- 0 X
🚱 🗞 🖸 pyyyc.mooo.com	☆ =
Hello World!	

# Automatic DNS updates (1 of 2)

Dynamic DNS Resources

Dynamic DNS Clients

This is the area where you can download one of the dynamic DNS clients which support FreeDNS

Programmer's XML API

For those who write their own update clients, this allows the downloading of account contents dynamic DNS URLs easily within custom applications for easy maintenance.

Rotate Authentication Token

If you suspect someone has gotten unauthorized access to your update URL, this utility will rotate **ALL** of your update URLs for security reasons. Your old update URLs will no longer be valid.

dynamic update candidates! (A records)				
mooo.com		<u>[ add ]</u>		
pyyyc.mooo.com	<u>Direct URL</u>   <u>Wget Script</u>   <u>Curl Script</u>   <u>Edit Record</u>   <u>quick cron example</u>	192.241.238.89		

#### Automatic DNS updates (2 of 2)

```
# Edit crontab with "crontab -e"
# Add the listed line, based on FreeDNS's "quick cron example"
# View crontab with "crontab -l"
gordon@pyyyc: ~$ crontab -l
# Edit this file to introduce tasks to be run by cron.
#
# m h dom mon dow command
3,8,13,18,23,28,33,38,43,48,53,58 * * * * sleep 28 ; wget -0 - \
    http://freedns.afraid.org/dynamic/update.php? \
    QLAORWFiVmpINWN2b1hNak5UU3pxNHkwOjEwMDExOTU4 >> \
```

/tmp/freedns\_pyyyc\_mooo\_com.log 2>&1 &

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#### Named Virtual Hosts (1 of 5)

Create multiple sub-domains on FreeDNS, pointing to the same IP.

subdomains		
ignorelist.com		<u>[ add ]</u>
yyc.ignorelist.com	A	192.241.238.89
mooo.com		<u>[ add ]</u>
pyyyc.mooo.com	A	192.241.238.89
vooodooo.mooo.com	A	192.241.238.89
delete selected		<u>Add</u>

#### Named Virtual Hosts (2 of 5)

Create multiple Flask applications. (don't forget to update paths in WSGI files.)

```
gordon@pyyyc: ~$ find -iname "*.py" -o -iname "*.wsgi"
./webapp2/myapp.py
./webapp2/myapp.wsgi
./webapp3/myapp.py
./webapp3/myapp.wsgi
./webapp1/myapp.py
./webapp1/myapp.wsgi
gordon@pyyyc:~$ cat webapp3/myapp.py
from flask import Flask
app = Flask( name )
@app.route('/')
def hello world():
    return '<b>Hello From YYC.ignoreList.com</b>(this is webapp3)'
```

#### Named Virtual Hosts (3 of 5)

# Create Apache sites configuration files with **ServerName** directive:

```
gordon@pyyyc: ~$ cat /etc/apache2/sites-enabled/webapp2
<VirtualHost *:80>
    ServerName vooodooo.mooo.com
```

```
<Directory /home/gordon/webapp2/>
    WSGIProcessGroup test2
    WSGIApplicationGroup %{GLOBAL}
    WSGIScriptReloading On
    Order deny,allow
    Allow from all
    </Directory>
</VirtualHost>
```

#### Named Virtual Hosts (4 of 5)

Create multiple Apache sites configuration files. (Don't forget to update the paths)

```
gordon@pyyyc: ~$ ls -l /etc/apache2/sites-*
/etc/apache2/sites-available:
total 24
-rw-r--r-- 1 692 Mar 3 11:14 default
-rw-r--r-- 1 7251 Mar 3 11:14 default-ssl
-rw-r--r-- 1 486 Aug 23 03:40 webapp1
-rw-r--r-- 1 520 Aug 22 19:56 webapp2
-rw-r--r-- 1 521 Aug 22 19:59 webapp3
/etc/apache2/sites-enabled:
total 0
lrwxrwxrwx 1 26 Aug 22 04:09 webapp1 -> ../sites-available/webapp1
lrwxrwxrwx 1 26 Aug 23 03:24 webapp2 -> ../sites-available/webapp2
lrwxrwxrwx 1 26 Aug 22 19:54 webapp3 -> ../sites-available/webapp3
```

# Named Virtual Hosts (4 of 5)

#### Restart Apache, and test!

/ 📄 pyyyc.mooo.com	× (				
(* *) C 6	pyyyc.mooo.com		☆ =		
Hello World!				-0%	
/	vooodooo.mooo.com ×				
	🗠 🔊 🕑 🖓 🗋 vood	dooo.mooo.com		☆ 〓	
I	Iello From V	oooDooo.Mood	o.Com		
(t	iis is webapp2)				
K=ſ	yyc.ignorelist.com	×			- [0] X
	🔄 🗞 🖸 🖓	c.ignorelist.com			☆ =
	Hello From YYC.ignoreLis	st.com(this is webapp3)			
le le					

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#### **Create Snapshot**



#### **Create Snapshot**



#### **Snapshots & Backups**



#### **Create Droplet from Snapshot**



# Thank you!



#### **Questions?**

# **Image Credits**

Dolphine http://www.flickr.com/photos/nathangibbs/6812478307/

DigitalOcean, FreeDNS screenshots - A. Gordon

DigitalOcean Shark Logo - Digital Ocean.