# **Servers and Deployment**

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Computation for Public Policy
Lecture 13: February 16, 2016
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#### **Announcements**

- We will be going through the proposals today/tomorrow and will be giving comments by email
- Homework 4 is on the course website due on the 23rd

# **Next Quarter**

CAPP / 30254 - 01	Machine Learning for Public Policy	100	Ghani Rayid	TR 10:30AM- 11:50AM
				W 3:30PM- 4:50PM

### **Today**

- Expanding your domain: using remote servers
- Amazon web services, DigitalOcean
- You are going to set up your own server today
- Web hosting using Github



#### **Deployment into Production**

- Process of moving your code from your development environment (your laptop)
   to a production environment is deployment
- Production environments should:
  - Have business class internet connection
  - Be up as much as possible (think power outages, hardware failures, etc.)
  - Be backed up
  - Be secure

### **Deployment Options**

- Your computer in your closet
- Your computer in someone else's (fancy) closet: colocation
- "The Cloud": Dedicated or virtualized servers
- Platform-as-a-Service: Heroku or similar service



# DigitalOcean

- One of many VPS (Virtual Private Servers) providers
- Can start a server in < 1 minute
- Inexpensive and lightweight way to run your own server



Simple cloud hosting, built for developers

DETAILS \$50 in platform credit for new users



#### DigitalOcean

Simple Cloud Hosting, Built for Developers.

We're Hiring!

Deploy an SSD cloud server in 55 seconds.

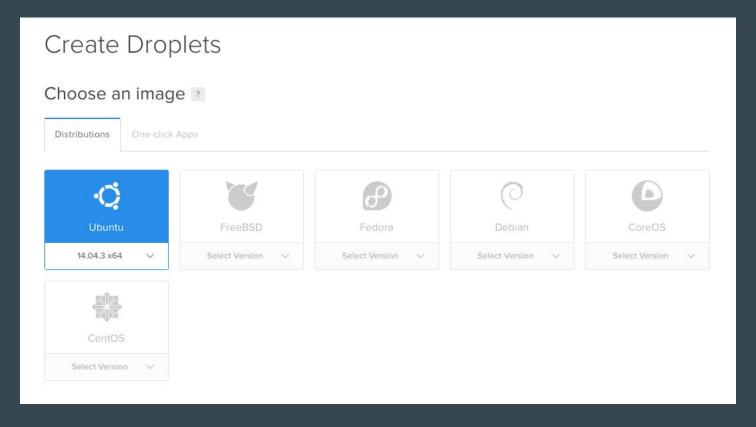
Email Address		
Password		
1	Create Account	

... Droplets Images Networking 0 -64 GB / 20 CPUs 16 GB / II CPU I 32 GB / 12 CPUs 48 GB / 16 CPUs 160 GB SSD DISK 320 GB 550 Disk 480 GB SSD Dtsk 640 68 350 Disk 6 TB Tourster 7 TB Transfer 8.18 Transfer 9 TB Transfer Choose a datacenter region X Amsterdam San Francisco Singapore London 2 1 + Frankfurt Toronto Select additional options Private Networking Backups IPv6 User Data Add your SSH keys New SSH Key imac-work

# Create a "droplet"!

- Let's create a VPS
- Can immediately destroy after the class if you want

# Select the VPS' operating system



#### Select the size (and cost) of the VPS

#### Choose a size

\$5/mo

\$0.007/hour

512 MB / 1 CPU 20 GB SSD Disk 1000 GB Transfer \$10/mo

\$0.015/hour

1 GB / 1 CPU 30 GB SSD Disk 2 TB Transfer \$20/mo

\$0.030/hour

2 GB / 2 CPUs 40 GB SSD Disk 3 TB Transfer \$40/mo

\$0.060/hour

4 GB / 2 CPUs 60 GB SSD Disk 4 TB Transfer \$80/mo

\$0.119/hour

8 GB / 4 CPUs 80 GB SSD Disk 5 TB Transfer

\$160/mo

\$0.238/hour

16 GB / 8 CPUs 160 GB SSD Disk 6 TB Transfer \$320/mo

\$0.476/hour

32 GB / 12 CPUs 320 GB SSD Disk 7 TB Transfer \$480/mo

\$0.714/hour

48 GB / 16 CPUs 480 GB SSD Disk 8 TB Transfer \$640/mo

\$0.952/hour

64 GB / 20 CPUs 640 GB SSD Disk 9 TB Transfer

### Choose where in physical space you want the VPS

#### Choose a datacenter region







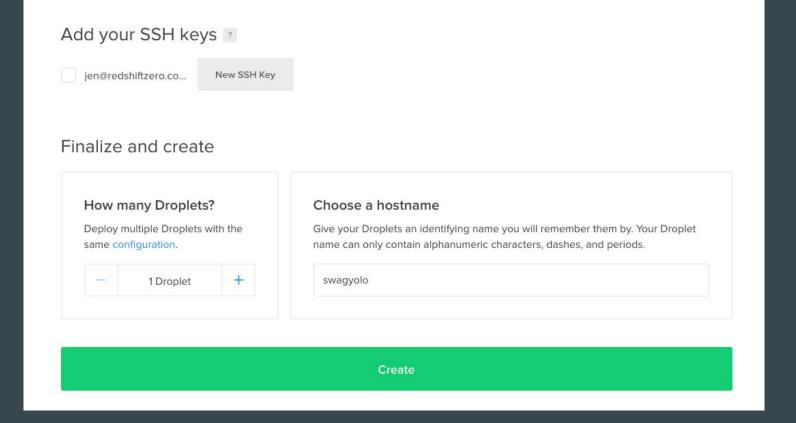




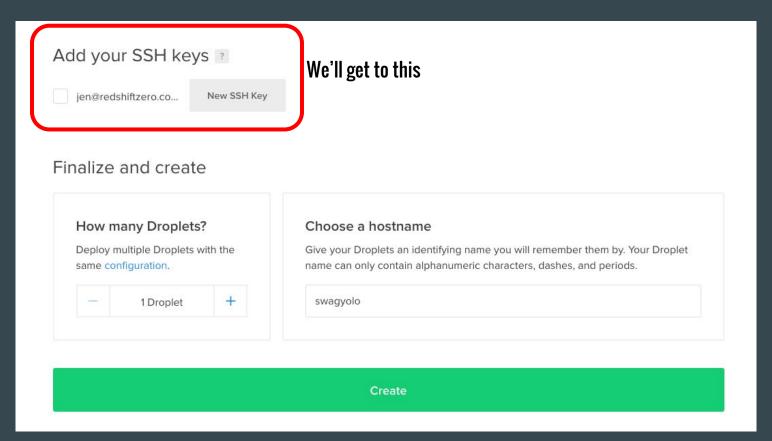




#### **Choose a hostname and Create!**



#### **Choose a hostname and Create!**



#### Droplets

Search By Droplet Name

Img Name IP Address Created A

Swagyolo
512 MB Memory / 20 GB Disk / FRA1

### Logging in with ssh (secure shell)

- SSH is the standard way to login to remote servers
- Digitalocean will have sent you the server's root password via email

```
$ ssh root@<your-ip-goes-here>
$ ssh root@127.0.0.1
```

Tue Feb 16 10:33 ♥ ~ (デワ・) ♥ \$ ssh root@46.101.149.144

The authenticity of host '46.101.149.144 (46.101.149.144)' can't be established.

RSA key fingerprint is df:80:65:6e:54:0b:64:60:e1:e3:e3:de:d6:d9:4f:0d.

Are you sure you want to continue connecting (yes/no)? yes

Tue Feb 16 10:33 � ~ (☞ ワ゚)☞ \$ ssh root@46.101.149.144

Tue Feb 16 10:33 � ~ (☞ ワ゚) ☞ \$ ssh root@46.101.149.144

The authenticity of host '46.101.149.144 (46.101.149.144)' can't be established.

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Are you sure you want to continue connecting (yes/no)? yes

Warning: Permanently added '46.101.149.144' (RSA) to the list of known hosts.

root@46.101.149.144's password:

```
The authenticity of host '46.101.149.144 (46.101.149.144)' can't be established.
RSA key fingerprint is df:80:65:6e:54:0b:64:60:e1:e3:e3:de:d6:d9:4f:0d.
Are you sure you want to continue connecting (yes/no)? yes
Warning: Permanently added '46.101.149.144' (RSA) to the list of known hosts.
root@46.101.149.144's password:
Warning: No xauth data; using fake authentication data for X11 forwarding.
X11 forwarding request failed on channel 0
You are required to change your password immediately (root enforced)
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.13.0-71-generic x86 64)
 * Documentation: https://help.ubuntu.com/
 System information as of Mon Feb 15 22:55:01 EST 2016
                                Memory usage: 9% Processes: 50
 System load: 0.0
 Usage of /: 10.6% of 19.56GB
                                Swap usage: 0% Users logged in: 0
 Graph this data and manage this system at:
   https://landscape.canonical.com/
Changing password for root.
(current) UNIX password:
Enter new UNIX password:
```

Tue Feb 16 10:33 � ~ (☞ ワ゚)☞ \$ ssh root@46.101.149.144

Retype new UNIX password:

root@swagvolo:~#

### You should always add at least one user account

- Only 1 user account here: root
- We should not run a program as root unless necessary for security reasons

# Let's set up another account

Add user with useradd <username>

```
root@swagyolo:~# useradd jhelsby
```

Set the new user's password with passwd <username>

```
root@swagyolo:~# passwd jhelsby
Enter new UNIX password:
Retype new UNIX password:
passwd: password updated successfully
```

# Let's set up another account (continued)

Create home directory with mkdir /home/<username>

```
root@swagyolo:~# mkdir /home/jhelsby
```

 Set the ownership of the new home directory to our new user with chown <username> /home/<username>

```
root@swagyolo:~# chown jhelsby /home/jhelsby
```

# Logging out of the server with exit

```
root@swagyolo:~# exit
logout
Connection to 46.101.149.144 closed.
```

### Logging back in using the new account

```
Tue Feb 16 11:05 � ~ (☞ ヮ゚)☞ $ ssh jhelsby@46.101.149.144
jhelsby@46.101.149.144's password:
Warning: No xauth data; using fake authentication data for X11 forwarding.
Welcome to Ubuntu 14.04.3 LTS (GNU/Linux 3.13.0-71-generic x86 64)
 * Documentation: https://help.ubuntu.com/
 System information as of Tue Feb 16 11:57:03 EST 2016
 System load: 0.0
                                  Processes:
                                                       69
 Usage of /: 11.0% of 19.56GB Users logged in: 1
 Memory usage: 12%
                                  IP address for eth0: 46.101.149.144
 Swap usage: 0%
 Graph this data and manage this system at:
   https://landscape.canonical.com/
O packages can be updated.
0 updates are security updates.
Last login: Tue Feb 16 11:57:04 2016 from nl11x.mullvad.net
/usr/bin/xauth: file /home/jhelsby/.Xauthority does not exist
```

# Transferring files with scp (secure copy)

• Transferring files (e.g. myprogram.py) across to your remote server

```
scp myprogram.py <username>@<ip>:<path>
```

Transferring files from the server back to your local machine:

```
scp <username>@<ip>:<path> ./resultsdirectory/
```

### Transferring files with scp

```
Tue Feb 16 11:20 & ~ (ŵヮ゚)☞ $ scp example.py jhelsby@46.101.149.144:/home/jhelsby/
jhelsby@46.101.149.144's password:
example.py
Tue Feb 16 11:21 & ~ (☞ヮ゚)☞ $
```

 Note that if you are using git for your project, you should instead git clone the repository to the server

# Leaving programs running after you log out

- Two options: use GNU Screen or tmux
- Both create sessions that you can detach (e.g. if you lose your internet connection or if you log out) and re-attach to later

# Leaving programs running after you log out

- Start a tmux session with tmux (or a named session with tmux new-s -s name)
- Do what you want in that session (e.g. start a process running) and then detach from that session with Ctrl-B D
- List available sessions with tmux list-s:

```
$ tmux list-s
0: 1 windows (created Tue Feb 16 12:08:48 2016) [111x29]
```

Attach to a given session with tmux attach -t name:

```
$ tmux attach -t 0
```

# Job scheduling and supervision

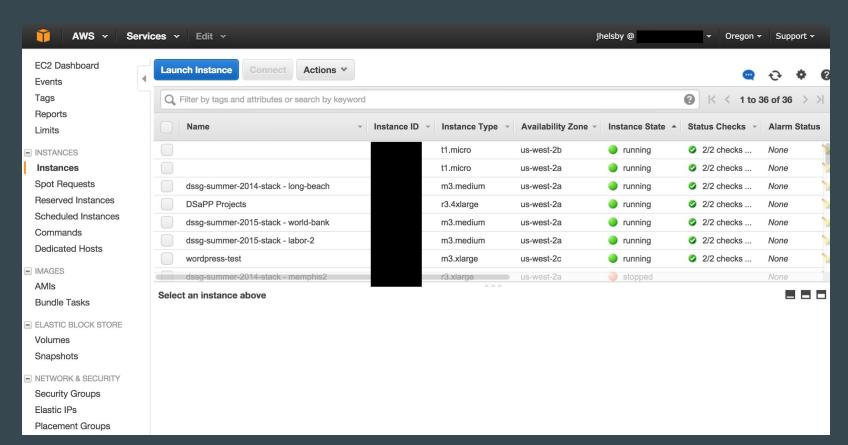
- Schedule tasks for every month, every week, etc. using cron
- As an alternative to tmux, run processes with supervisor

#### **Administration**

- Administering a server well does take some work
- Good guide to set up here:

http://feross.org/how-to-setup-your-linode/

#### **Amazon Web Services**



# Web Hosting

# Hosting websites with Github pages

pages.github.com

• Free to host one website for an account or an organization

username.github.io

Unlimited project sites

username.github.io/projectname

1. Create a new repository on github called username.github.io

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- 3. Create the index.html file:

```
cd username.github.io
echo "test" >> index.html
```

- 1. Create a new repository on github called username.github.io
- 2. git clone <a href="https://github.com/username/username.github.io">https://github.com/username/username.github.io</a>
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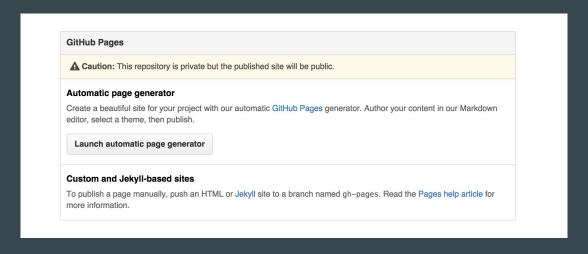
4. Commit and push the changes:

```
git add index.html
git commit -m "Initial commit"
git push -u origin master
```

### Hosting a project site

#### username.github.com/projectname

- Two options for creating a project site:
  - $\circ$  In that project's repository, create a branch gh-pages with the file index.html
  - Generate a page from markdown with Github's Automatic Page Generator



# **Automatic Page Generator**

#### New project site Create a new GitHub Pages site for your project. **Project name** Papbuddy **Tagline** Test and troubleshoot your PGP setup **Body** Markdown supported h1 h2 h3 © 🔝 $B i \leftrightarrow$ Load README.md Undo To create a paragraph, simply create a block of text that is not separated by one or more blank lines. Blocks of text Paragraphs & Breaks **Block Elements** separated by one or more blank lines will be parsed as paragraphs. **Span Elements** Headers If you want to create a line break, end a line with two or more spaces, then hit Return/Enter. Miscellaneous **Blockquotes** Lists Code Blocks **Horizontal Rules**

### Welcome to GitHub Pages.

This automatic page generator is the easiest way to create beautiful pages for all of your projects. Author your page content here [using GitHub Flavored Markdown](https://guides.github.com/features/mastering—markdown/), select a template crafted by a designer, and publish. After your page is generated, you can check out the new `gh—pages` branch locally. If you're using GitHub Desktop, simply sync your repository and you'll see the new branch.

#### **Additional References**

Deploying code with Python on Heroku:

https://devcenter.heroku.com/articles/getting-started-with-python