

Servers and Deployment

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Computation for Public Policy

Lecture 13: February 16, 2016

computationforpolicy.github.io

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



We're Hiring!

Pricing

Features

Community

Help

Log In

Sign Up

DigitalOcean

Simple Cloud Hosting,
Built for Developers.

Deploy an SSD cloud server
in 55 seconds.

Create Account

By signing up, you agree to the [Terms of Service](#)

[Droplets](#) [Images](#) [Networking](#) [API](#) [Support](#)

16 GB / 8 CPUs
160 GB SSD Disk
6 TB Transfer

32 GB / 12 CPUs
320 GB SSD Disk
7 TB Transfer

48 GB / 16 CPUs
480 GB SSD Disk
8 TB Transfer

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

Choose a datacenter region

New York

3 2 1

Amsterdam

3 2 1

San Francisco

1

Singapore

1

London

1

Frankfurt

1

Toronto

1

Select additional options

☒ Private Networking

☐ Backups

☐ IPv6

☐ User Data

Add your SSH keys

☐ imac-work

New SSH Key

Create a “droplet”!

Create Droplet

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

Select the VPS' operating system

Create Droplets

Choose an image ?


Distributions

One-click Apps




Ubuntu

14.04.3 x64 ▾




FreeBSD

Select Version ▾




Fedora

Select Version ▾




Debian

Select Version ▾



CoreOS

Select Version ▾



CentOS

Select Version ▾








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

<div></div> <div>New York</div> <div><div>3</div><div>2</div><div>1</div></div>	<div></div> <div>Amsterdam</div> <div><div>3</div><div>2</div><div>1</div></div>	<div></div> <div>San Francisco</div> <div><div>1</div></div>	<div></div> <div>Singapore</div> <div><div>1</div></div>	<div></div> <div>London</div> <div><div>1</div></div>
<div></div> <div>Frankfurt</div> <div><div>1</div></div>	<div></div> <div>Toronto</div> <div><div>1</div></div>			

Choose a hostname and Create!

Add your SSH keys ?

☐

jen@redshiftzero.co...

New SSH Key

Finalize and create

How many Droplets?

Deploy multiple Droplets with the same [configuration](#).

—

1 Droplet

+

Choose a hostname

Give your Droplets an identifying name you will remember them by. Your Droplet name can only contain alphanumeric characters, dashes, and periods.

swagyolo

Create

Choose a hostname and Create!

Add your SSH keys ?

☐

jen@redshiftzero.co...

New SSH Key

We'll get to this

Finalize and create

How many Droplets?

Deploy multiple Droplets with the same [configuration](#).

—

1 Droplet

+

Choose a hostname

Give your Droplets an identifying name you will remember them by. Your Droplet name can only contain alphanumeric characters, dashes, and periods.

swagyolo

Create

Droplets

Img

Name

IP Address

Created ▲



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 🍁 ~ (👉 °)👉 \$ ssh root@46.101.149.144

```
Tue Feb 16 10:33 ☸ ~ (👉 フ ° )👉 $ 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 🌐 ~ (👉 🌐) 👉 $ 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
Warning: Permanently added '46.101.149.144' (RSA) to the list of known hosts.
root@46.101.149.144's password:
```

```
Tue Feb 16 10:33 ☼ ~ (👉👈)👉 $ 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
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

System load: 0.0	Memory usage: 9%	Processes: 50
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:
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@swagyo1o:~# mkdir /home/jhelsby
```

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

```
root@swagyo1o:~# 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 ~ (👉🏻👈🏻) $ 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/

0 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 ~ (🐧) $ scp example.py jhelsby@46.101.149.144:/home/jhelsby/  
jhelsby@46.101.149.144's password:  
example.py                                100%    0    0.0KB/s    00:00  
Tue Feb 16 11:21 ~ (🐧) $
```

- 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

 **AWS** ▾ **Services** ▾ **Edit** ▾ jhelsby @ ▾ Oregon ▾ Support ▾

EC2 Dashboard

Events

Tags

Reports

Limits

INSTANCES

Instances

Spot Requests

Reserved Instances

Scheduled Instances

Commands

Dedicated Hosts

IMAGES

AMIs

Bundle Tasks

ELASTIC BLOCK STORE

Volumes

Snapshots

NETWORK & SECURITY

Security Groups

Elastic IPs

Placement Groups

Launch Instance

Connect

Actions ▾

Filter by tags and attributes or search by keyword

1 to 36 of 36

<input type="checkbox"/>	Name ▾	Instance ID ▾	Instance Type ▾	Availability Zone ▾	Instance State ▴	Status Checks ▾	Alarm Status
<input type="checkbox"/>			t1.micro	us-west-2b	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>			t1.micro	us-west-2a	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	dssg-summer-2014-stack - long-beach		m3.medium	us-west-2a	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	DSaPP Projects		r3.4xlarge	us-west-2a	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	dssg-summer-2015-stack - world-bank		m3.medium	us-west-2a	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	dssg-summer-2015-stack - labor-2		m3.medium	us-west-2a	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	wordpress-test		m3.xlarge	us-west-2c	● running	✓ 2/2 checks ...	None
<input type="checkbox"/>	dssg-summer-2014-stack - memphis2		r3.xlarge	us-west-2a	● stopped		None

Select an instance above

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`

Make a Website

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

Make a Website

1. Create a new repository on github called username.github.io
2. `git clone https://github.com/username/username.github.io`

Make a Website

1. Create a new repository on github called username.github.io
2. `git clone https://github.com/username/username.github.io`
3. Create the index.html file:

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

Make a Website

1. Create a new repository on github called username.github.io
2. `git clone https://github.com/username/username.github.io`
3. Create the index.html file:

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

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:
 - 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

GitHub Pages

⚠ Caution: This repository is private but the published site will be public.

Automatic page generator

Create a beautiful site for your project with our automatic [GitHub Pages](#) generator. Author your content in our Markdown editor, select a theme, then publish.

[Launch automatic page generator](#)

Custom and Jekyll-based sites

To publish a page manually, push an HTML or [Jekyll](#) site to a branch named gh-pages. Read the [Pages help article](#) for more information.

Automatic Page Generator

New project site

Create a new GitHub Pages site for your project.

Project name

Pgpbuddy

Tagline

Test and troubleshoot your PGP setup

Body

h1 **h2** **h3**   **B** ***i*** **<>**      **Load README.md** **Undo**

 Markdown supported

Block Elements	Paragraphs & Breaks	<p>To create a paragraph, simply create a block of text that is not separated by one or more blank lines. Blocks of text separated by one or more blank lines will be parsed as paragraphs.</p> <p>If you want to create a line break, end a line with two or more spaces, then hit Return/Enter.</p>
Span Elements Miscellaneous	Headers 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>