

# DevOps and Agile Methodologies

CSCI-GA 2820 - 001, 002

**Instructor:**

John Rofrano ([rofrano@cs.nyu.edu](mailto:rofrano@cs.nyu.edu))

Senior Technical Staff Member @ IBM T.J. Watson Research

# Welcome

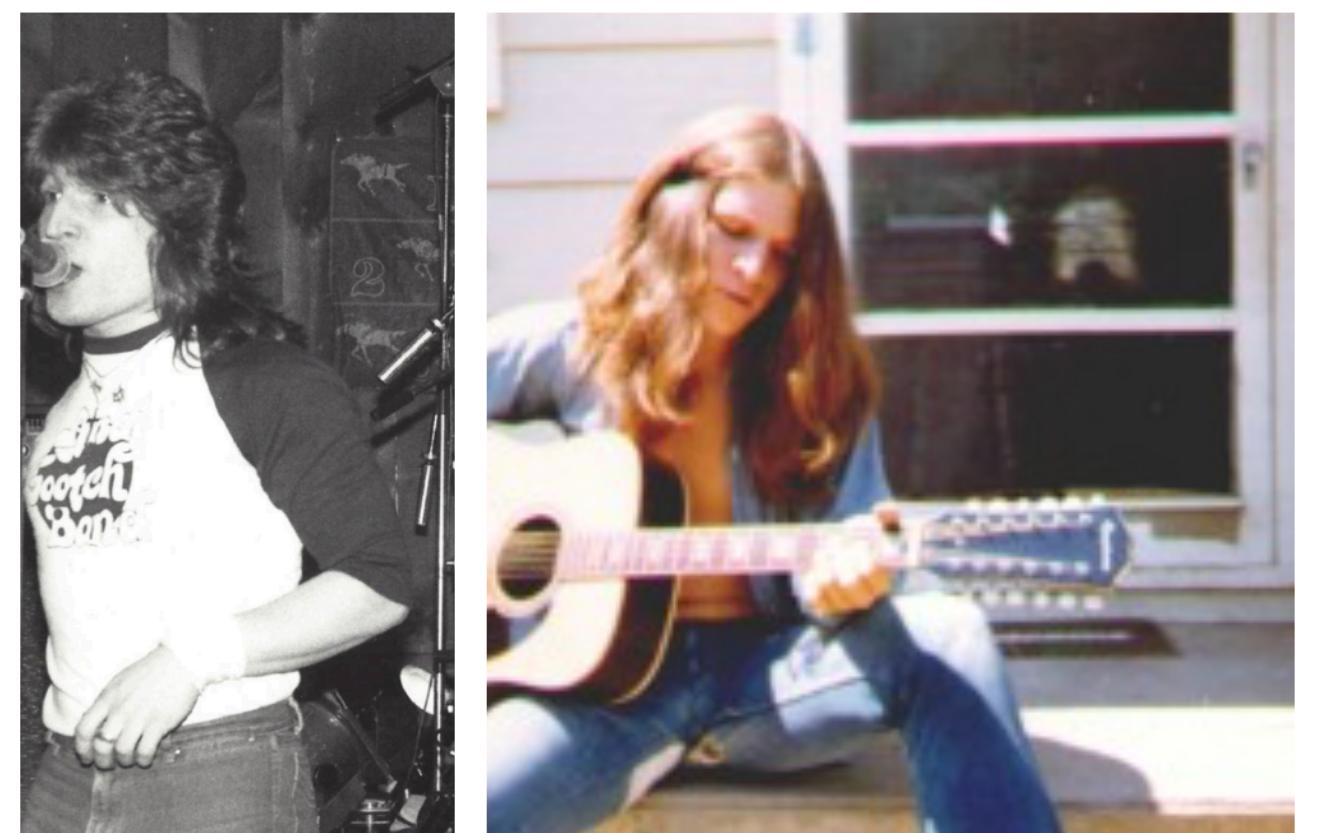
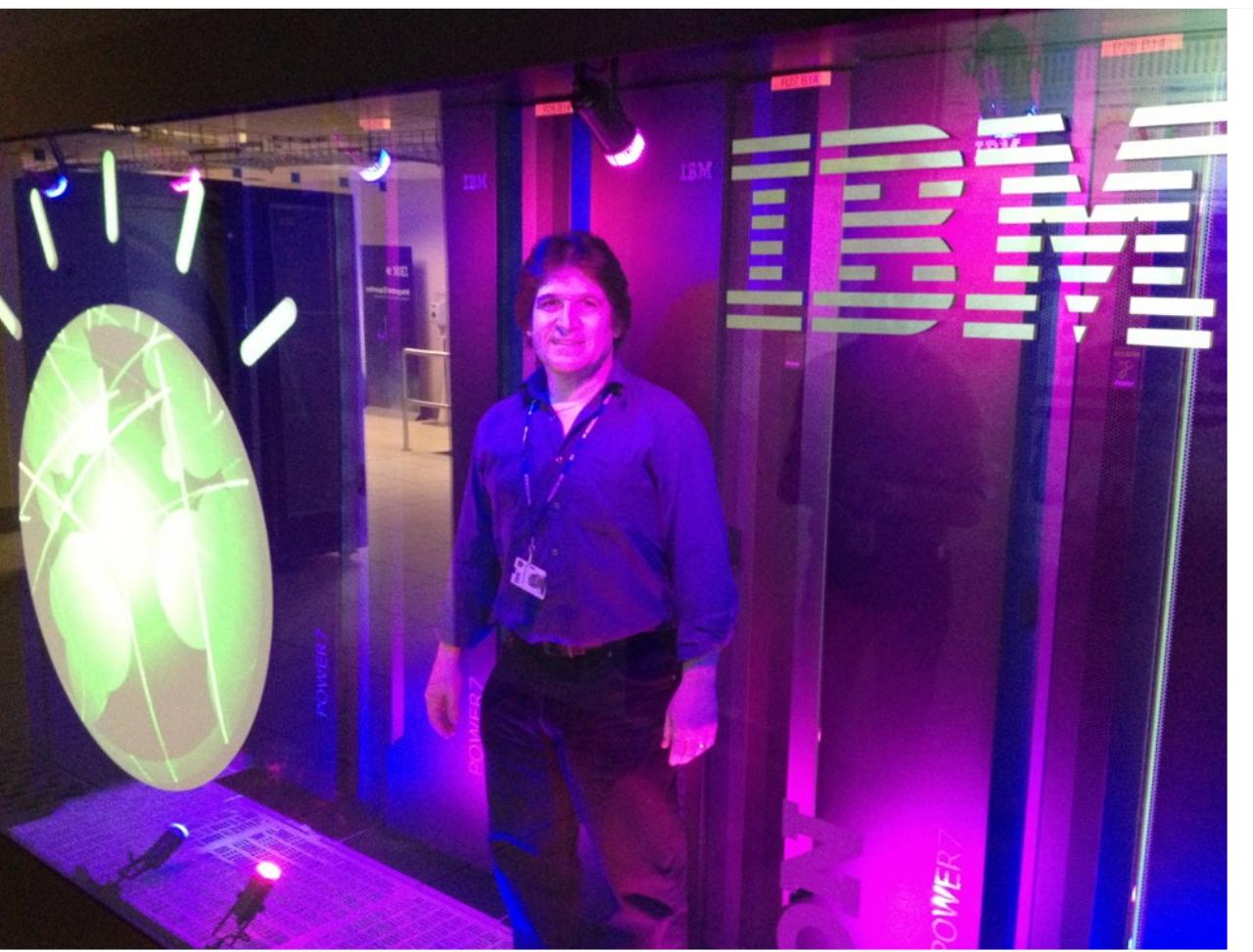
- \* Introductions
- \* Course Description
- \* Administrative Items
  - \* PreReqs, Course Web Page, Office Hours, Homework, Grading, etc.
- \* Syllabus
- \* Start covering material

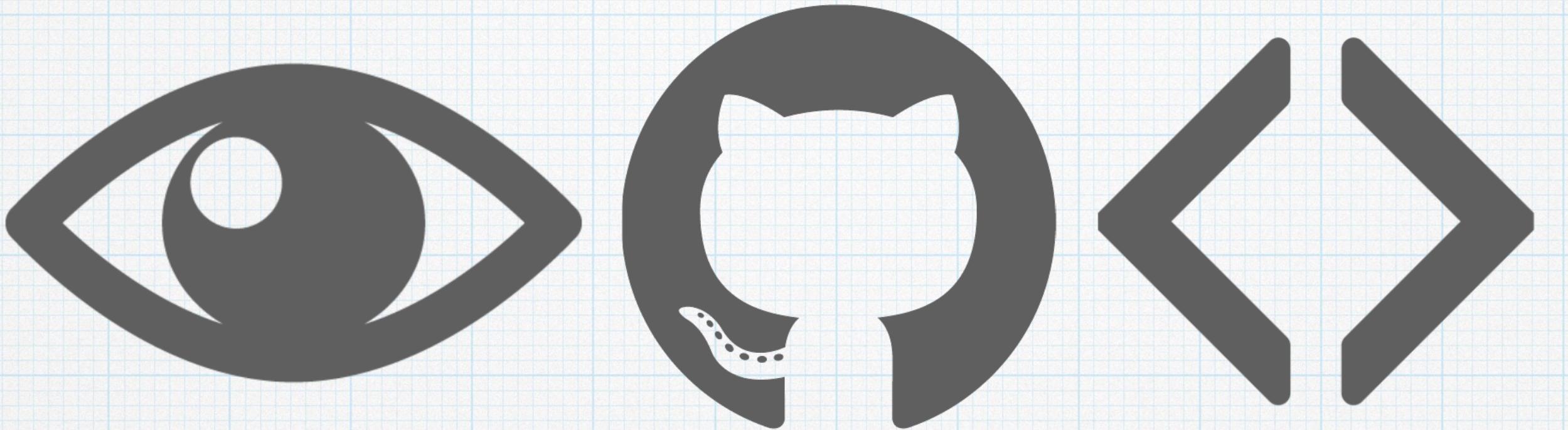
# Who is this guy?

# John Rofrano

(rofrano@cs.nyu.edu)

- \* Senior Technical Staff Member @ IBM T.J. Watson Research
- \* Research interests using AI for automating Application Modernization, and Cloud Native Workload Management on Kubernetes
- \* 36 Years @ IBM in Software Engineering and Research
- \* 10 years as a Musician playing Rock & Roll
- \* Also a Husband, Father, Videographer, Eucharistic Minister, Cantor, & Published Author





# Who Loves to Code?

# Advanced Software Engineering

- \* This is an advanced software engineering course
- \* Learning how to develop software according to DevOps principals is a primary goal
- \* Working as an Agile team is equally important
- \* You will be graded on your teamwork and understanding of DevOps culture and principals and the code you produce

# Course Description

<https://cs.nyu.edu/courses/fall20/CSCI-GA.2820-001/>

This course uses a **project-based** learning approach towards the study of DevOps as a **cultural change** in Information Technology organizations, and the supporting development **tools** and **automation** technologies required to implement it successfully.

In this class, students study the **principles of DevOps**, and as part of an **agile development team**, each student is involved in planning, designing, building, testing, and deploying one or more **cloud native microservices** into a Platform as a Service cloud by utilizing a **DevOps Pipeline** that they will create

# Prerequisites

- \* Introduction to Programming, Python or other high level language
  - \* e.g., CSCI-UA.0002-008 Intro To Computer Programming
- \* The course will be taught using Python 3
- \* You should be comfortable writing simple programs in Python
- \* You should understand PEP8 programming guidelines

# Coke-a-Cola Wars

*...I can't take it anymore*

- Pepsi - Coke
- Paper - Plastic
- Windows - Mac
- So many choices
- So little productivity



# We will be using Ubuntu Linux 18.04

A scene from the movie WarGames. Two young boys, Matt (Mathew Broderick) and Andrew (Ally Sheedy), are sitting in front of a computer monitor. Matt is on the left, wearing a brown leather jacket, and Andrew is on the right, wearing a dark t-shirt. They both have surprised or concerned expressions. The computer screen in front of them is bright and mostly washed out by light, but some blue and white graphical elements are visible. The background shows a room with a window and some furniture.

**It's a UNIX system.  
I know this.**

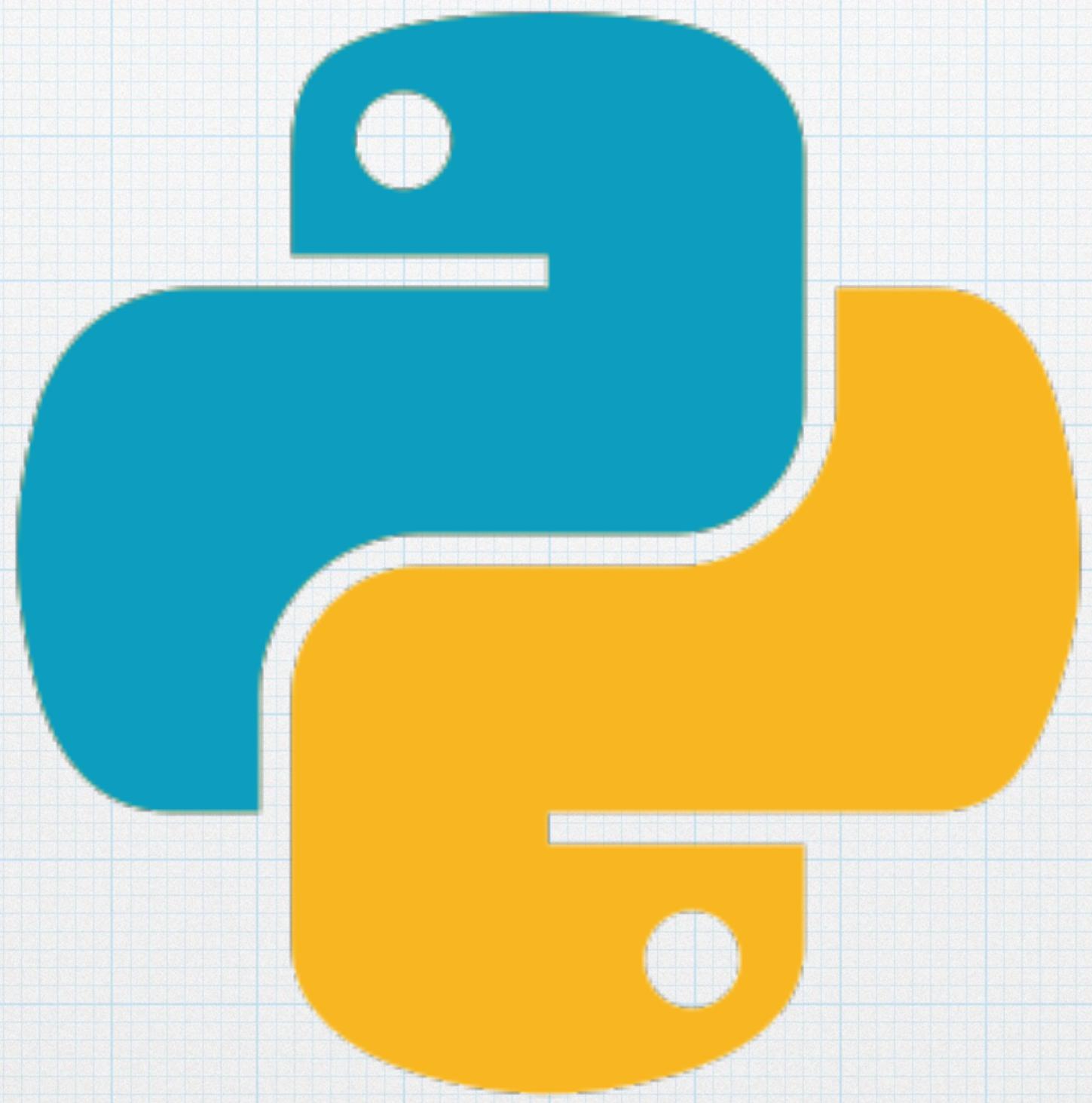
# Bring your laptop to class!

- \* This course contains a lot of hands-on labs
- \* You will retain the material better if you follow along
- \* We will also work in the cloud
  - \* You will get a free IBM Cloud account to use for ~6 months
  - \* You will need at least 4GB memory (8GB preferred)
  - \* Mac OS is preferred to Windows because it has more development tools built in and is based on Unix which is the basis for cloud computing

# Prerequisites (cont)

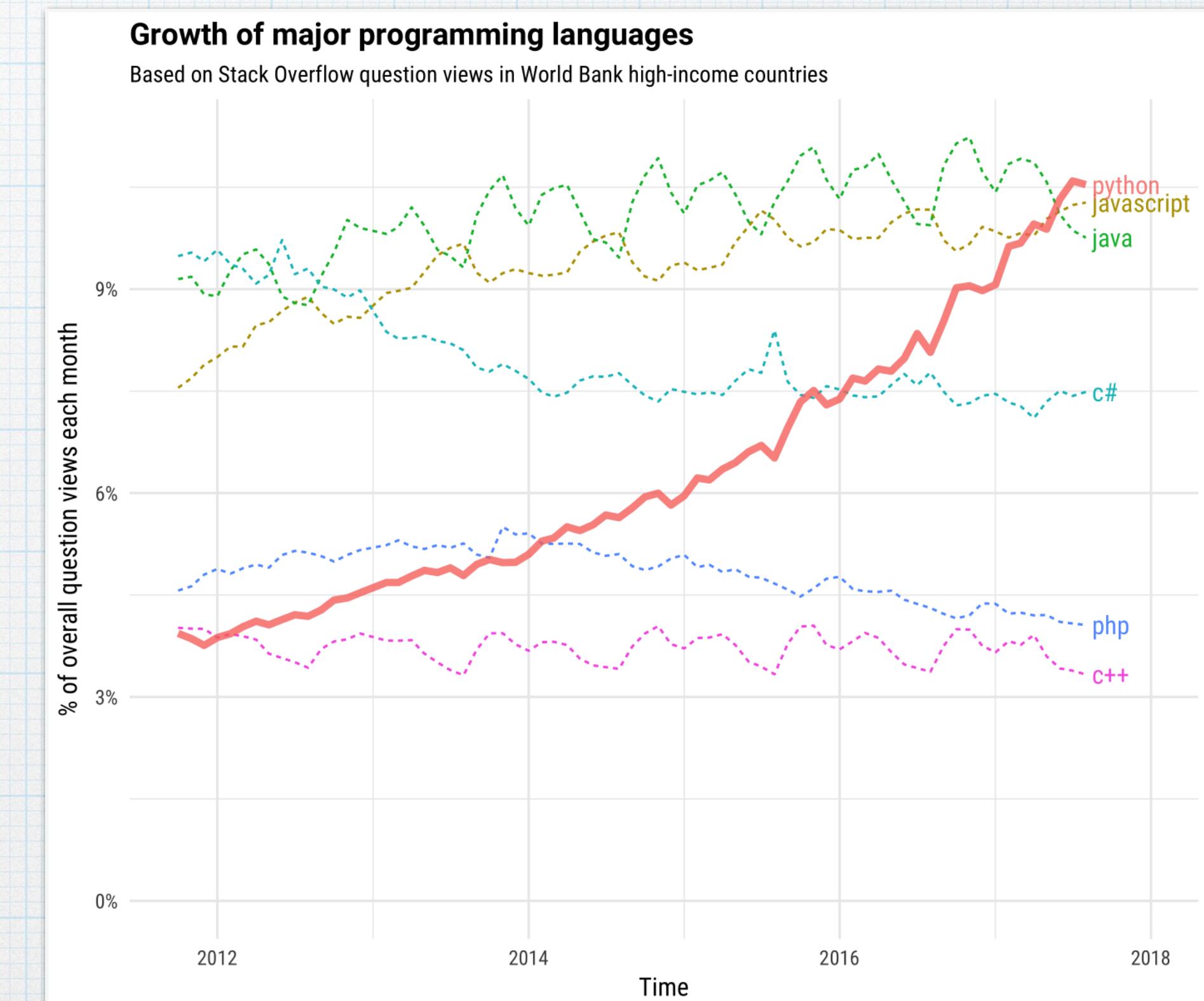
- \* A basic understanding of Unix / Linux will be helpful
- \* The course will be taught on Ubuntu 18.04 Bionic 64bit
- \* Understanding basic Unix file manipulation commands will be required
  - \* (e.g., cd, ls, mv, rm, cat)

# This class will be taught using Python



# Why Python?

- \* Python searched for on Google more often than for Kim Kardashian
- \* Python is currently the most popular language for teaching introductory computer science courses at top-ranked U.S. departments
- \* 8 of the top 10 CS departments (80%), and 27 of the top 39 (69%), teach Python in introductory CS0 or CS1 courses
- \* 40% of professional developers use it
- \* Python's simple syntax makes its code easy to learn and share, with good third-party packages making it a good general-purpose language



# Hello World - Python vs Java

## Python Code

```
print("Hello World!")
```

# Hello World - Python vs Java

## Python Code

```
print("Hello World!")
```

## Java Code

```
class HelloWorldApp {  
    public static void main(String[] args) {  
        System.out.println("Hello World!");  
    }  
}
```

# Hello World - Python vs Java

## Python Code

```
print("Hello World!")
```

## Python Execute

```
python hello_world.py
```

## Java Code

```
class HelloWorldApp {  
    public static void main(String[] args) {  
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## Java Code

```
class HelloWorldApp {  
    public static void main(String[] args) {  
        System.out.println("Hello World!");  
    }  
}
```

## Java Execute

```
javac HelloWorldApp.java  
java HelloWorldApp
```

# Hello World - Python vs Java

## Python Code

```
print("Hello World!")
```

## Python Execute

```
python hello_world.py
```



## Java Code

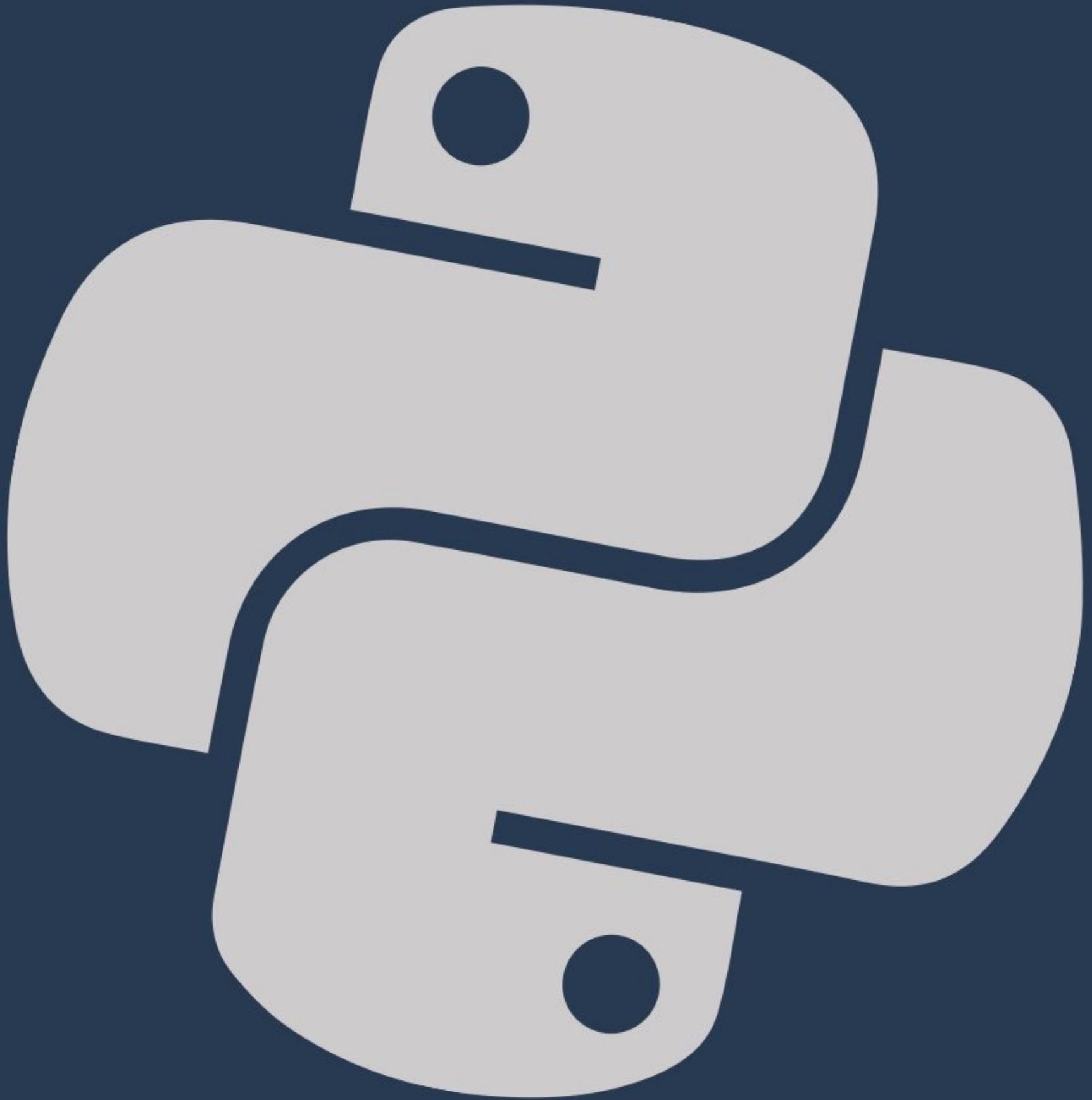
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}
```

## Java Execute

```
javac HelloWorldApp.java  
java HelloWorldApp
```



# Zen of Python



Beautiful is better than ugly.  
Explicit is better than implicit.  
Simple is better than complex.  
Complex is better than complicated.  
Flat is better than nested.  
Sparse is better than dense.  
Readability counts.  
Special cases aren't special enough to break the rules.  
Although practicality beats purity.  
Errors should never pass silently.  
Unless explicitly silenced.  
In the face of ambiguity, refuse the temptation to guess.  
There should be one-- and preferably only one --obvious way to do it.  
Although that way may not be obvious at first unless you're Dutch.  
Now is better than never.  
Although never is often better than \*right\* now.  
If the implementation is hard to explain, it's a bad idea.  
If the implementation is easy to explain, it may be a good idea.  
Namespaces are one honking great idea -- let's do more of those!

# Structure of the Course

- \* This course is 50% lecture and 50% hand-on so come prepared to **learn by doing**
- \* Each week we will introduce a new topic in a lecture and then participate in a hands-on exercise to reinforce the topic in the lab
- \* We will work on projects as small autonomous Agile teams (called Squads) using good Social Coding practices
- \* All homework / project work will be delivered via GitHub and/or the Cloud
- \* All classes are recorded so you can watch again (or time-shift)

# Grading

- \* Grades will be based on weekly contributions to team projects and the two exams
- \* 40% Project Assignments and teamwork (following the processes we learn in class)
- \* 30% Mid-term
- \* 30% Final Exam

# Attendance is Important

- \* This is all about teams building together. Therefore it is important that we are all here (...but I understand some people may have to time-shift)
- \* Each week will contain hands-on work that you will need to understand in order to complete the homework
- \* If you must miss a class, please watch the video as soon as possible to learn what you missed
- \* Also try the lab again on your own time to really understand the material

# Course Communications

- \* NYU Classes > DevOps: Fall 2020
  - \* Assignments and Grades
  - \* Lecture Material
  - \* Zoom Classes and Video Recordings
- \* Slack Team (I will invite you)
  - \* NYU DevOps Fall 2020 ([nyu-devops-fall20.slack.com](https://nyu-devops-fall20.slack.com))
  - \* Feel free to add your picture to your profile if you would like me to associate your name with your face. 😊

# Project

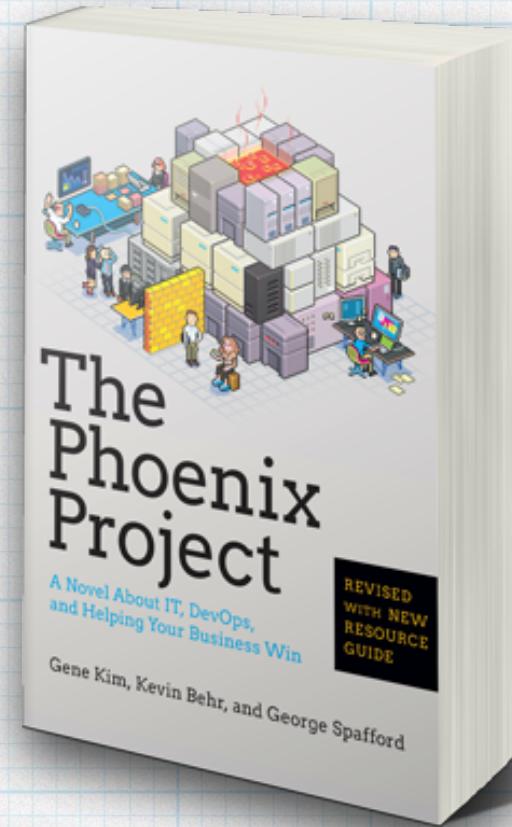
- \* The class will be divided into 9 teams with 5 students on a team
- \* Each team will design, plan, build, and deploy a cloud native microservice that is part of an eCommerce web site
  - \* e.g., users, shop carts, products, orders, recommendations, etc.
- \* Teams will collaborate in their own Slack channel and push code to the team's GitHub organization and IBM Cloud account
- \* You will be graded not only on what you produce, but how you produce it following good DevOps practices

# No TextBooks But...

these books will help your understanding

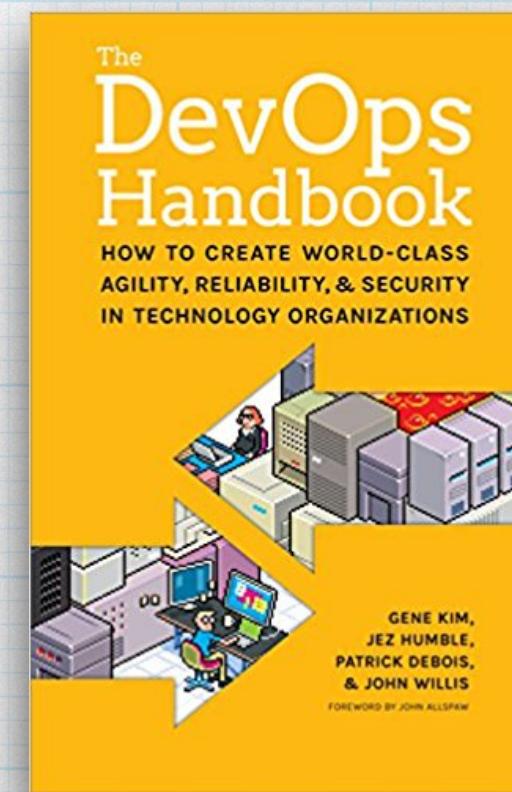
- \* **The Phoenix Project: A Novel About IT, DevOps, and Helping Your Business Win**

by Gene Kim, George Spafford, and Kevin Behr



- \* **The DevOps Handbook: How to Create World-Class Agility, Reliability, and Security in Technology Organizations,**

by Gene Kim, Jez Humble, Patrick Debois, and John Willis



# Office Hours

- \* There are no fixed office hours
- \* I am available on our Slack workgroup
- \* We will be collaborating as much as you need on Slack
- \* I often interact with teams in their channels
- \* You can always direct message me

# Syllabus Fall 2020

Class Date	Class Topic	Sprint
Sep 2	DevOps: It's all about the Culture	
Sep 9	Monday Schedule (no class)	
Sep 16	Social Coding with GitHub, and Automating Dev Environments with Vagrant and Docker	0
Sep 23	Agile Development and Planning	0
Sep 30	Microservices Architecture and RESTful API's	1
Oct 7	Test Driven Development: If it's worth building, it's worth testing	1
Oct 14	Creating a DevOps Pipeline using Travis CI for Continuous Integration	HW1 Due
Oct 21	Mid-term Exam	
Oct 28	Using Platform as a Service for Continuously Delivery of Cloud Native Workloads	2
Nov 4	Staying Customer Focused with Behavior Driven Development	2
Nov 11	Diving Deeper into Docker	3
Nov 18	Container Clouds and Kubernetes	3
Nov 25	Security and Swagger: Any service worth writing, is worth documenting and securing	4
Dec 2	Automating Deployment using Chef, Puppet, and Ansible	4
Dec 9	Final Playback & Retrospective	Project Due
Dec 16	Final Exam	

# DevOps Engineering

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Senior DevOps Engineer (\$200,000 - \$240,000)  
Harrison Clarke International · Greater New York City Area  
New · Posted 23 hours ago · 543 views

Save in Easy Apply

Job description

HCI is proud to be working with one of the most talked about VC Funded Artificial Intelligence Companies in the world. They are Headquartered in the heart of New York City, after recently going through a Series D investment of \$40million, they are re-investing in bleeding edge technology and putting a DevOps first culture in place to scale. We are working direct with CTO on creating and building one of the most exciting DevOps teams out there with a focus on Containerization (Docker or Kubernetes).

The successful DevOps Engineer will be designing, implementing, and deploying the custom tooling across platforms on APIs and will be responsible for the implementation, and management of CI/CD platforms. Working closely with the CTO, the DevOps Engineer will, drive organizational migration to container-based environments and support high-availability. The strategy is to provide long-term vision for containers for both legacy and greenfield applications in production.

To be considered for the DevOps Engineer position you will be need:

- Extensive experience with containerization (Docker, Docker Swarm or Kubernetes)

Contact the job poster

Firas Sozan - We are hiring 2nd  
Chief Executive Officer | Harrison...  
New York, New York

PREMIUM  
[Send InMail](#)

Seniority Level  
Mid-Senior level

Industry  
Information Technology and Services,  
Information Services

Employment Type

People also viewed

DevOps Engineer  
Explore Group  
New York, New York  
2 weeks ago · in Easy Apply

DevOps Engineer  
Explore Group  
New York, New York  
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Principal Dev Ops Engineer,  
Serverless Team  
Oracle  
San Francisco Bay Area  
2 connections work here  
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Java or Python Developer -  
Big Data  
Connections of New York  
Greater New York City Area  
1 company works here ● Messaging

# DevOps Engineering

LinkedIn Job Listing:

**Senior DevOps Engineer**  
Harrison Clarke International  
(\$200,000 - \$240,000) · Greater New York City Area

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**People also viewed**

- DevOps Engineer**  
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New York, New York  
2 weeks ago · [in Easy Apply](#)
- DevOps Engineer**  
Explore Group  
New York, New York  
2 weeks ago · [in Easy Apply](#)
- Principal Dev Ops Engineer, Serverless Team**  
Oracle  
San Francisco Bay Area  
2 connections work here  
1 week ago · [in Easy Apply](#)
- Java or Python Developer - Big Data**  
Connections of New York  
Greater New York City Area  
1 company works here · [Messaging](#)

# What Skills does this Job Want?

To be considered for the DevOps Engineer position you will be need:

- Extensive experience with containerization (Docker, Docker Swarm or Kubernetes)
- Strong understanding of CI/ CD strategy
- Automation tools – Ansible or Chef or Puppet or Salt
- Hands on work with programming such as Python, Go or Ruby or Node.js Or Java
- Extensive experience with either / or Azure, Google Cloud Or AWS
- Strong commercial experience within Containerization environments
- Extensive experience within Linux/ Unix based environments

Information Services

Employment Type

Full-time

Job Functions

Information Technology

The DevOps Engineer will be part of the most exciting long term Containerization implementation in recent years, this team has won accolades for their vision and contribution to the Open Source community and have love for what they do.

Salary: \$200,000 - \$240,000 + Bonus + 401K + Healthcare and more

# What Skills does this Course Teach?

To be considered for the DevOps Engineer position you will be need:

- Extensive experience with containerization [Docker, Docker Swarm or Kubernetes)
- Strong understanding of CI/ CD strategy
- Automation tools - Ansible [Chef or Puppet or Salt]
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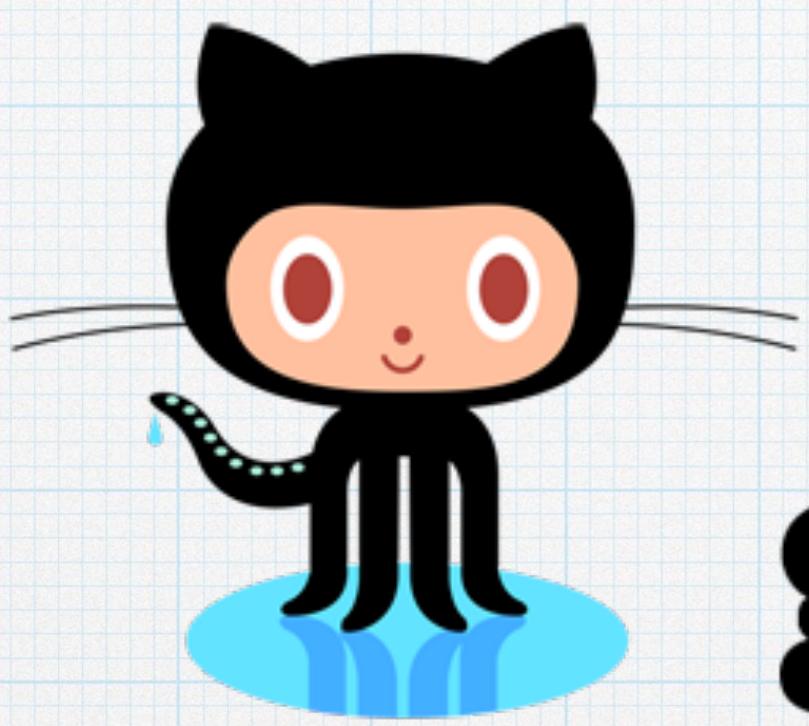
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Information Services

Docker  
Kubernetes  
CI/CD Strategies  
Ansible  
Python  
Cloud  
Containerization  
Linux

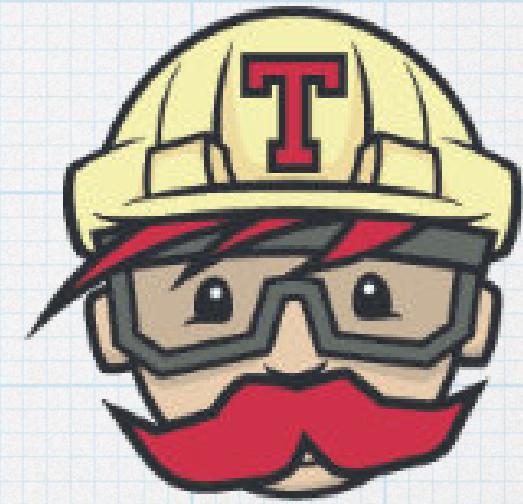
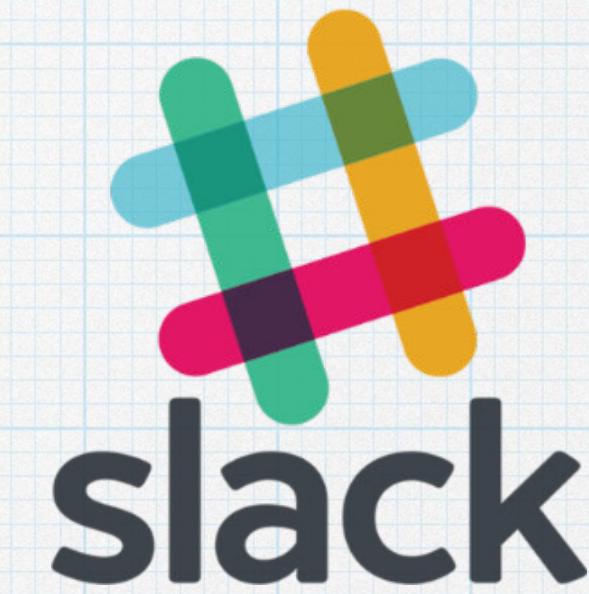
# Course Tools & Technology

- \* Slack
- \* GitHub
- \* ZenHub
- \* Travis CI
- \* Vagrant + VirtualBox
- \* Docker + Kubernetes
- \* IBM Cloud



**github**  
SOCIAL CODING

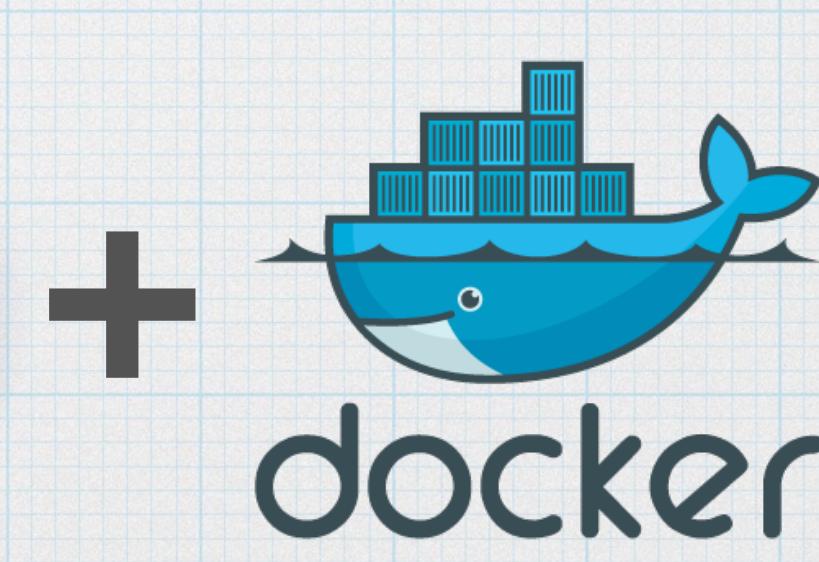
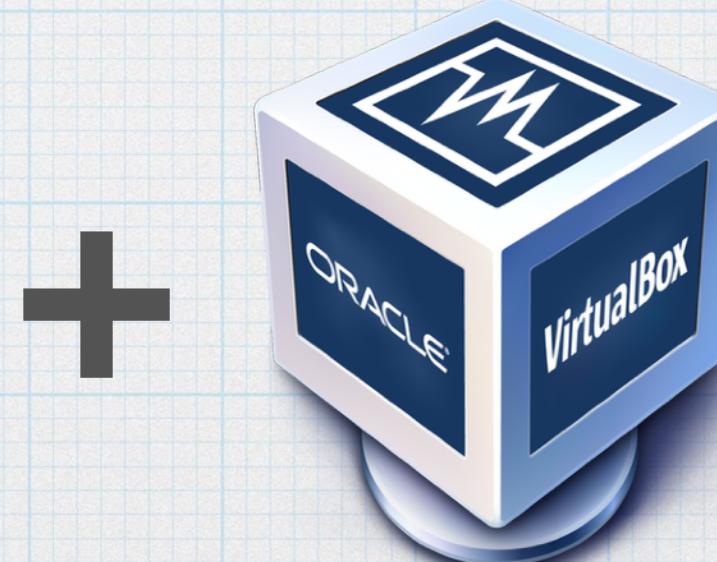
**Z** ZenHub.io



**IBM Cloud**



28



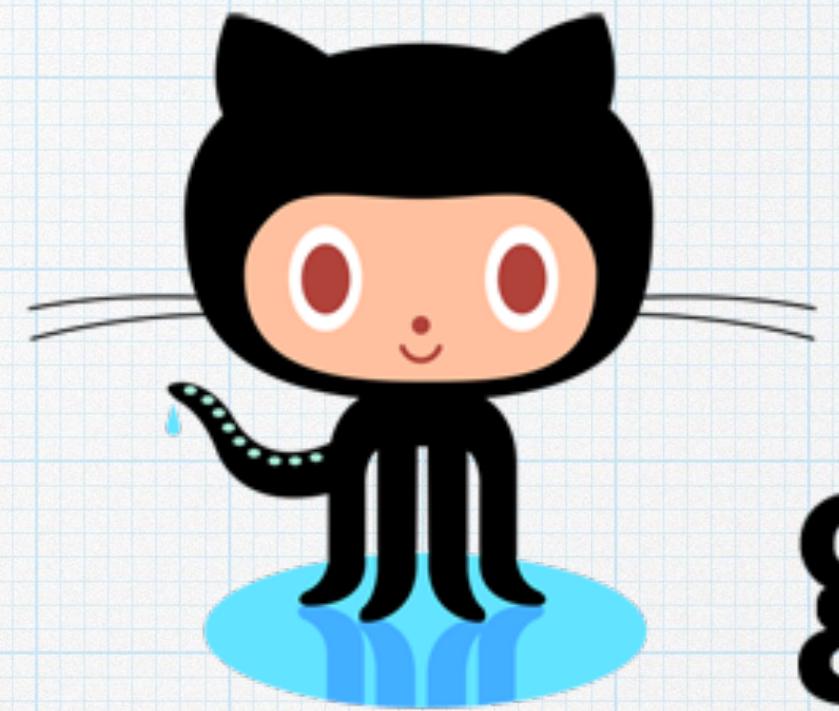
**docker**

# Slack

- \* Collaboration for project teams
- \* Channels
  - \* Can be Public or Private (we use Public)
  - \* Private Messages
    - \* Use only for truly private conversations
  - \* All interactions should take place in public channels



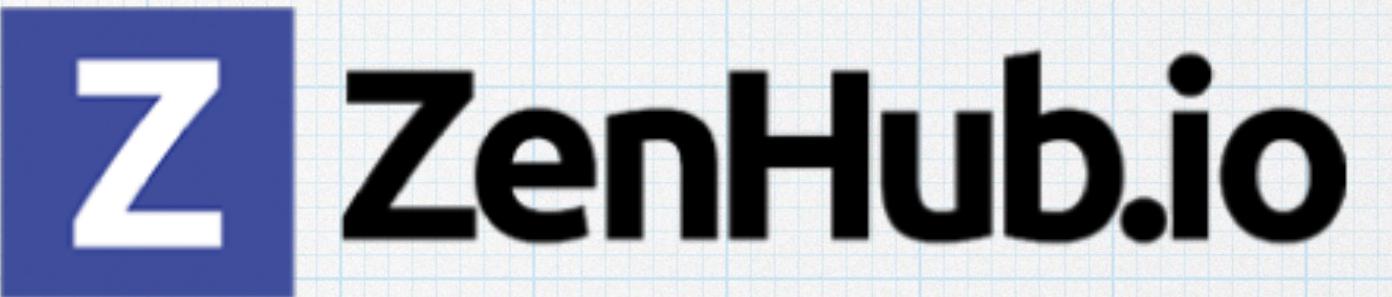
# GitHub



**github**  
SOCIAL CODING

- \* Repository for all project code
- \* Create a free account if you don't have one
- \* We will create Organizations and invite members to them
- \* Nothing gets deployed into production unless it's in GitHub

# ZenHub



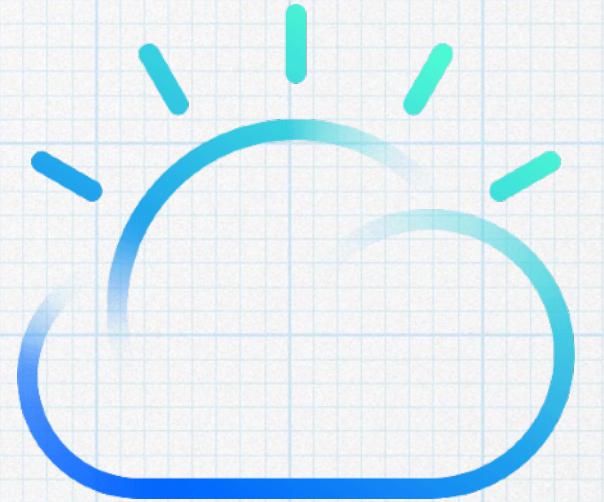
- \* Free extension to GitHub
- \* Kanban board for your Story development
- \* All Agile Planning will be done in ZenHub
- \* Homework will be graded by your agile planning

# Vagrant, VirtualBox, & Docker



- \* This will be your common dev environment
- \* Everyone will work in a Linux virtual machine to ensure that what works on your workstation works on others
- \* Docker is used for all middleware requirements

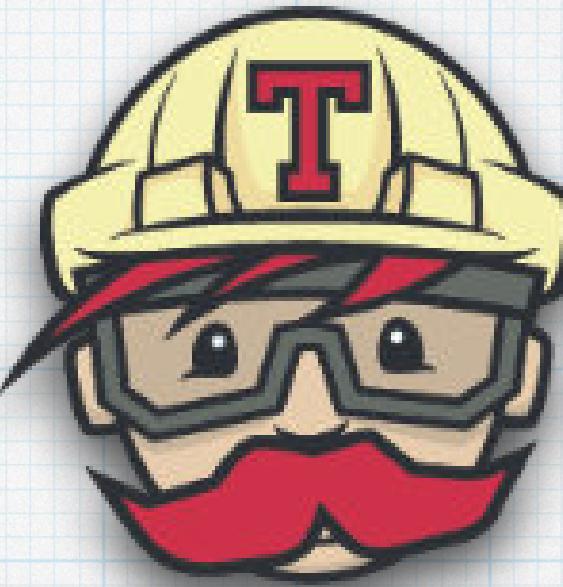
# IBM Cloud



IBM Cloud

- \* Everyone will get a 1/2 year free IBM Cloud account
- \* You will work as a team in the Cloud
- \* Please experiment on your own outside the team
- \* Your project will be delivered on the Cloud

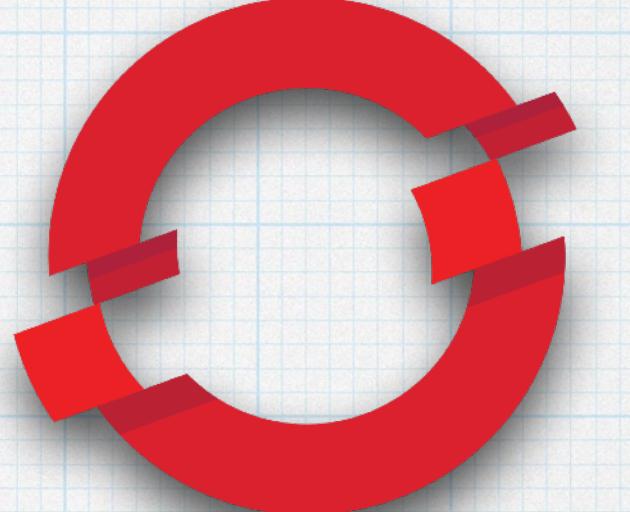
# Travis CI



- \* Used for Continuous Integration with GitHub
- \* All Pull Requests will be tested in Travis before merging
- \* You will wonder how you lived without this tool once you start using it



# Kubernetes / OpenShift



OPENSIFT

- \* Platform for running Docker containers
- \* OpenShift adds a better developer experience to Kubernetes
- \* Supports Infrastructure as Code
- \* We will deploy our code into Kubernetes in the 2nd half of the semester



# Questions?