

# Heroku

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## Objectives

- The lecture will provide a taste of...
- The **Heroku** cloud service
  - And how to deploy Flask apps to Heroku

# Goals

- Goal of this lecture
  - Give you enough info about Heroku to:
    - Help you decide if you want to use it
    - Help you get started with it

## Agenda

- **Deployment options**
- Heroku overview
- Creating Git repos
- Defining a Heroku app
- Deploying to Heroku

## Deployment Options

- **Question:**

- Where/how might I run Penny app so it's constantly available to other people...
- Via a production-quality HTTP server?

## Deployment Options

- **Answer 1:** My local computer

## Deployment Options

- Install and configure a production-quality HTTP server
  - Examples: Nginx, Apache HTTP Server

## Deployment Options

- . Then: Make sure local computer is available
  - Make sure local computer is running constantly
  - Make sure local computer is connected to the Internet constantly
  - Configure your router such that local computer has a stable accessible IP address
  - Etc.



## Deployment Options

- **Answer 2:** Princeton OIT *cPanel*
  - (pro) XXX.princeton.edu address
  - (pro) Can charge against Princeton accounts
  - (con) Requires OIT approval
  - (con) Documentation is lacking

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### Deployment Options

[see slide]

Some project teams have deployed to cPanel  
See me if you need instructions

## Deployment Options

- **Answer 3:** Princeton CS Dept HTTP servers

- (pro) XXX.cs.princeton.edu address
- (con) Requires CS Dept approval
- (con) Must be related to CS Dept!
- (con) No access to server logs

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### Deployment Options

[see slide]

I deployed the Survey and ProjectFinder applications to the CS Dept HTTP server

## Deployment Options

- **Answer 4:** Cloud service
- Three cloud service types...

## Deployment Options

- **Software as a Service (SaaS)**
  - “The capability provided to the consumer is to use the provider’s applications running on a cloud infrastructure.”
    - [https://en.wikipedia.org/wiki/Cloud\\_computing](https://en.wikipedia.org/wiki/Cloud_computing)
  - Examples: Google Docs, Microsoft Word Online

# Deployment Options

- **Platform as a Service (PaaS)**
  - “The capability provided to the consumer is to deploy onto the cloud infrastructure consumer-created or acquired applications created using programming languages, libraries, services, and tools supported by the provider.”
    - [https://en.wikipedia.org/wiki/Cloud\\_computing](https://en.wikipedia.org/wiki/Cloud_computing)
  - Examples: Heroku, Google App Engine

# Deployment Options

- ***Infrastructure as a Service (IaaS)***
  - “The capability provided to the consumer is to provision processing, storage, networks, and other fundamental computing resources where the consumer is able to deploy and run arbitrary software, which can include operating systems and applications.”  
-- [https://en.wikipedia.org/wiki/Cloud\\_computing](https://en.wikipedia.org/wiki/Cloud_computing)
  - Examples: Amazon Web Services (AWS), Google Cloud Platform, Microsoft Azure

## Deployment Options

- Which **cloud service type** for Penny?
  - SaaS: impossible; too narrow
  - IaaS: possible, but too broad
  - **PaaS**: just right!

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### Deployment Options

[see slide]

IaaS: must hire system administrators

## Deployment Options

- Which **PaaS cloud service** for Penny?
- I chose **Heroku**
  - Simple
  - Free
  - Popular

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### Deployment Options

[see slide]

Heroku

Simple

Built on AWS

Free

But beware of pricing model

Popular

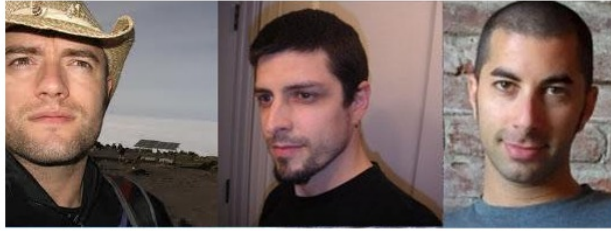
Well supported



## Agenda

- Deployment options
- **Heroku overview**
- Creating Git repos
- Defining a Heroku app
- Deploying to Heroku

## Heroku Overview



**Who:** Orion Henry, Adam Wiggins, James Lindenbaum

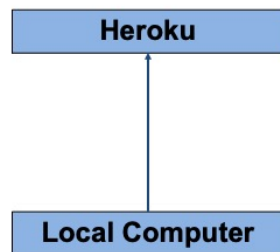
**When:** 2007

**Why:** Cloud platform initially for Ruby apps,  
and now for Java, Scala, Clojure, Python, PHP,  
and Go apps

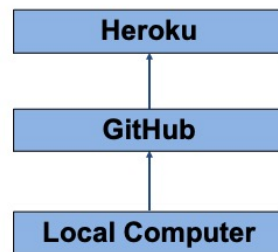
# Heroku Overview

- Deployment options:

## Option 1



## Option 2



**Recommended**

## Heroku Overview

- The procedure that I followed
  - You must change names as appropriate!
  - ...

## Agenda

- Deployment options
- Heroku overview
- **Creating Git repos**
- Defining a Heroku app
- Deploying to Heroku

## Creating Git Repos

- After performing setup steps in *Git and GitHub Primer* document...
- Create a GitHub repo
  - Browse to <https://github.com>
    - Click the *New* button
      - For *Repository name* enter pennyheroku
      - Click the *Private* radio button
      - Check the *Add a README file* check button
      - Click the *Create Repository* button

## Creating Git Repos

- Clone the GitHub repo to my local computer

```
$ git clone https://github.com/rdondero/pennyheroku.git
```

- Creates pennyheroku dir on local computer

## Agenda

- Deployment options
- Heroku overview
- Creating Git repos
- **Defining a Heroku app**
- Deploying to Heroku



## Defining a Heroku App

- Create these files (from **PennyFlaskJinja** app) in pennyheroku dir:
  - runserver.py (irrelevant)
  - penny.sql, penny.sqlite
  - book.py, database.py
  - header.html, footer.html, index.html, searchform.html, searchresults.html
  - penny.py

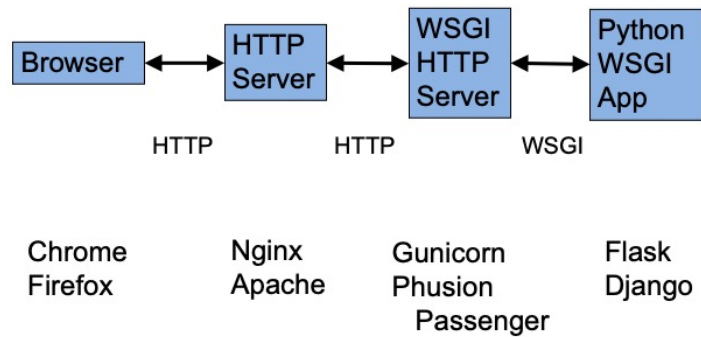
## Defining a Heroku App

- Also create in pennyheroku dir:
  - **Procfile**

```
web: gunicorn penny:app
```

- Tells Heroku the app's process type
  - It's a web app
- Tells Heroku the command to start the process
  - Gunicorn (<https://gunicorn.org/>)

## Defining a Heroku App



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### Defining a Heroku App

[see slide]

Quoting the Gunicorn website...

“Gunicorn 'Green Unicorn' is a Python WSGI HTTP Server for UNIX.”

## Defining a Heroku App

- Also create in pennyheroku dir:
  - **runtime.txt**

```
python-3.8.10
```

- Tells Heroku which version of Python it should use

## Defining a Heroku App

- Also create in pennyheroku dir:
  - **requirements.txt**

```
Flask==1.0.2  
gunicorn==20.1.0
```

- Tells Heroku what additional modules the app uses
- Create manually, or...
- Issue command  

```
python -m pip freeze >  
requirements.txt
```

## Defining a Heroku App

- Commit the app to the local git repo, and push it to the GitHub repo

```
$ git add .  
$ git commit -m "initial load"  
$ git push origin main
```

## Agenda

- Deployment options
- Heroku overview
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- Defining a Heroku app
- **Deploying to Heroku**

## Deploying to Heroku

- Create a Heroku account
  - Browse to <http://signup.heroku.com>
    - For *first name* enter Robert
    - For *last name* enter Dondero
    - For *Email address* enter rdondero@cs.princeton.edu
    - For *role* select student
    - For *country* select United States
    - For *Primary development language* select Python
    - Check *I'm not a robot*
    - Click *Create Free Account* button



## Deploying to Heroku

- . Create a Heroku account (cont.)
  - Heroku sends an email
  - Click on the provided link
  - In the resulting web page...
  - Choose a password
  - Submit the page

## Deploying to Heroku

- Log into Heroku
  - Browse to <https://id.heroku.com/login>
    - For *Email address* enter `rdontero@cs.princeton.edu`
    - For *Password* enter `<mypassword>`

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### Deploying to Heroku

Start live demo here

[see slide]

## Deploying to Heroku

- Create a new app
  - In resulting page:
    - Click *New* → *Create new app* button
  - In resulting page:
    - For *App name* enter pennyheroku
    - For *Choose a region* choose United States
    - Click *Create app* button

## Deploying to Heroku

- Deploy the app
  - In resulting page:
    - Click *GitHub: Connect to GitHub*
    - For *Search for repository to connect to* enter rdondero and pennyheroku
    - Click on the *Search* button
    - Click on the *Connect* button

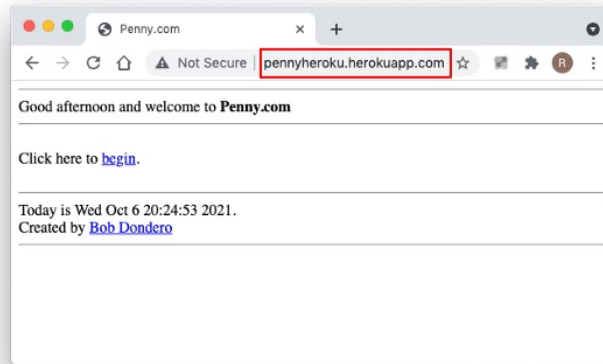
## Deploying to Heroku

- Deploy the app (cont.)
  - Options:
    - Deploy **automatically** from GitHub to Heroku
      - Each push to GitHub causes a deployment to Heroku
      - Not shown
    - Deploy **manually** from GitHub to Heroku
      - Deployment from GitHub to Heroku occurs at your command
      - Shown...

## Deploying to Heroku

- In the *Manual deploy* area...
  - For *Choose a branch to deploy* select main
  - Click the *Deploy Branch* button
  - Observe the build log

# Deploying to Heroku



Penny is available to the world!  
(Beware of time zone problems)

## Summary

- The lecture has provided a taste of...
- The **Heroku** cloud service
  - And how to deploy Flask apps to Heroku