

Django 9: Deployment

IN608: Intermediate Application Development Concepts

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Last Session's Content

- Django REST framework
 - Permissions
 - Serialization
 - Viewsets
 - Routers

Today's Content

- Heroku
 - Heroku CLI
- Postgres on Heroku
- Deploy a Django application to Heroku

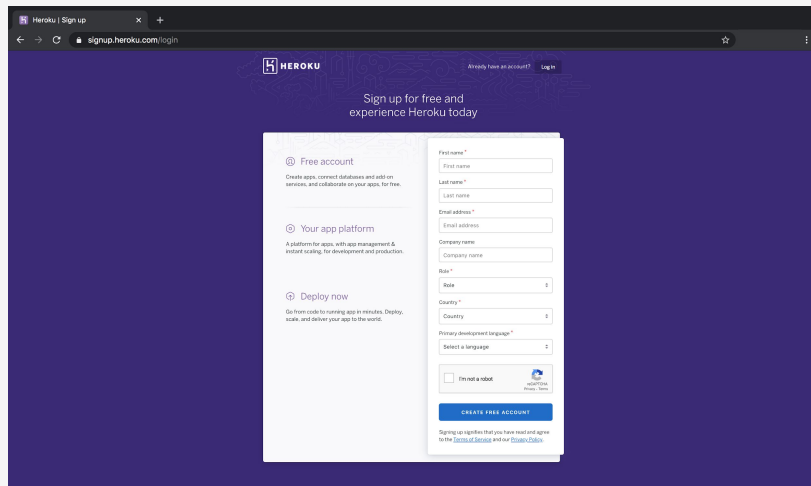
Heroku Deployment

Heroku Deployment

- Heroku lets you build, deploy & manage applications written in a variety of Ruby, Node.js, Java, Python, Clojure, Scala, Go & PHP
- An application's source code & dependency file, i.e., `Pipfile.lock` should provide enough information for the Heroku platform to build your application
- How does Heroku know what command(s) to run?
 - If you are using a framework, i.e., Django or Ruby on Rails, Heroku can figure out what command(s) to run, i.e., `python manage.py runserver` or `rails server`
- You may need to explicitly declare what can be executed. To do this, you need to create a `Procfile`. We will look at this soon

Heroku Signup

- Sign up to Heroku - <https://www.heroku.com>



The screenshot shows the Heroku Signup page in a web browser. The browser's address bar displays 'signup.heroku.com/login'. The page has a dark purple background with the Heroku logo at the top left. A navigation link 'Already have an account? Log in' is at the top right. The main heading is 'Sign up for free and experience Heroku today'. Below this, there are three options for signing up: 'Free account', 'Your app platform', and 'Deploy now'. The 'Free account' option is selected and highlighted. To the right of these options is a form with fields for 'First name', 'Last name', 'Email address', 'Company name', 'Role', 'Country', and 'Primary development language'. There is also a checkbox for 'I'm not a robot' and a 'CREATE FREE ACCOUNT' button. At the bottom, there is a link to the 'Terms of Service' and 'Privacy Policy'.

Heroku | Signup

signup.heroku.com/login

HEROKU

Already have an account? [Log in](#)

Sign up for free and experience Heroku today

Free account

Create apps, connect databases and add on services, and collaborate on your apps for free.

Your app platform

A platform for apps, with app management & instant scaling, for development and production.

Deploy now

Get from code to running app in minutes. Deploy, scale, and deliver your app to the world.

First name*

Last name*

Email address*

Company name

Company name

Role*

Country*

Country*

Primary development language*

Select a language

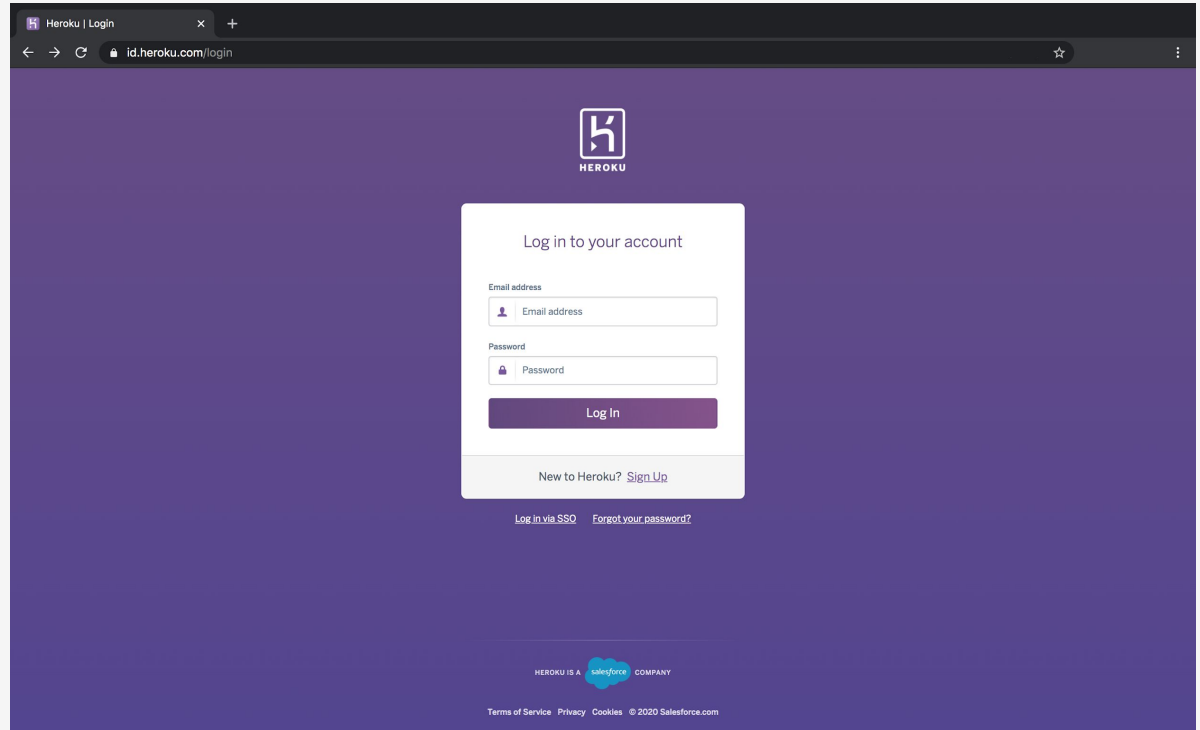
☐ I'm not a robot


CREATE FREE ACCOUNT

Signing up signifies that you have read and agree to the [Terms of Service](#) and our [Privacy Policy](#).

Heroku Signup

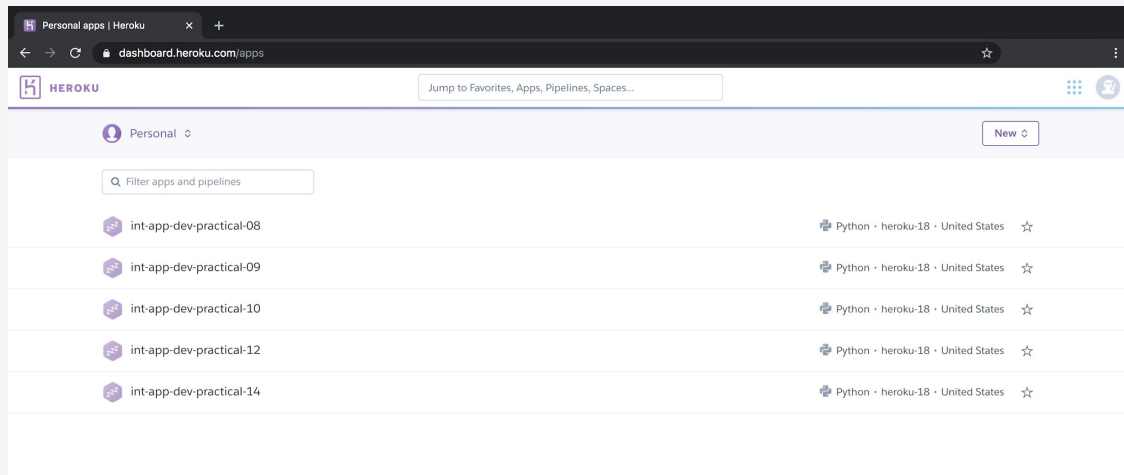
- Login to Heroku



A screenshot of the Heroku login page in a web browser. The browser's address bar shows the URL `id.heroku.com/login`. The page has a dark purple background. At the top center is the Heroku logo, which consists of a white 'H' inside a square, with the word 'HEROKU' in white capital letters below it. Below the logo is a white rectangular box containing the text 'Log in to your account'. Inside this box are two input fields: 'Email address' with a person icon and 'Password' with a lock icon. Below these fields is a purple 'Log In' button. At the bottom of the white box is the text 'New to Heroku? [Sign Up](#)'. Below the white box, on the purple background, are two links: 'Log in via SSO' and 'Forgot your password?'. At the very bottom of the page, there is a small line of text that reads 'HEROKU IS A  COMPANY' and 'Terms of Service Privacy Cookies © 2020 Salesforce.com'.

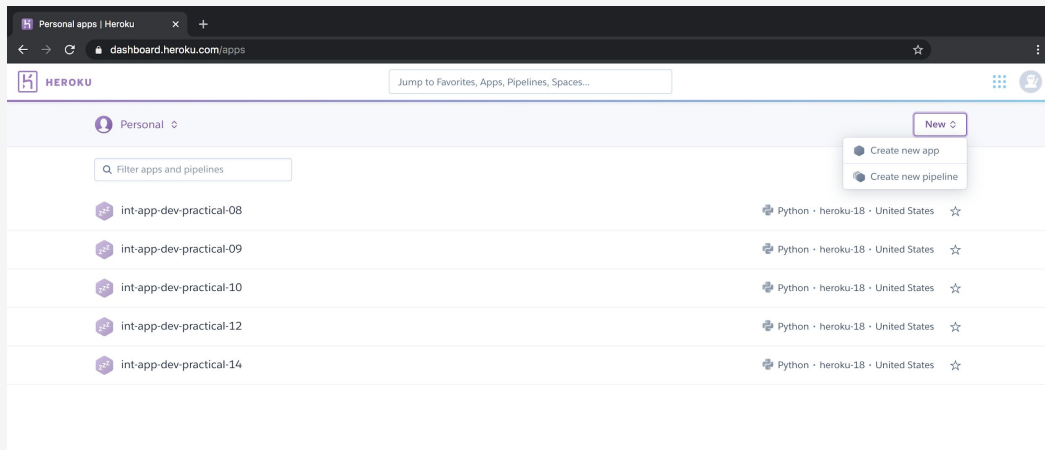
Heroku Dashboard

- Displays all applications



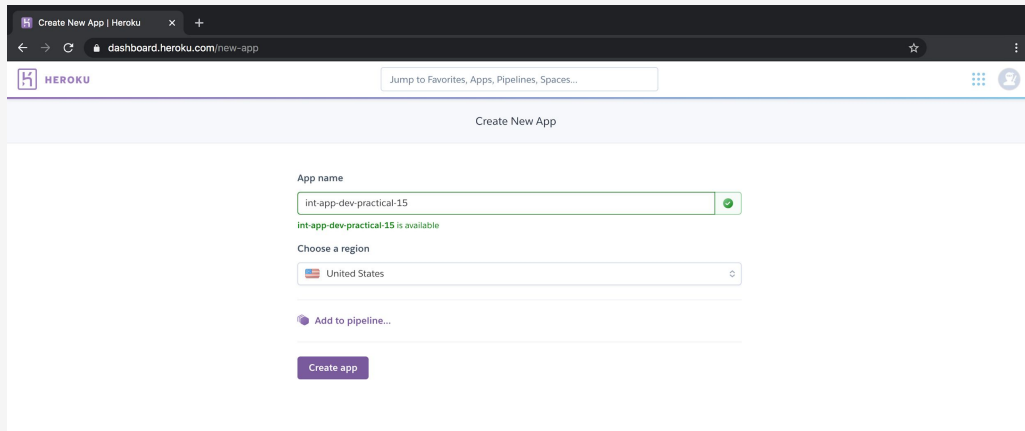
Create an App on Heroku

- New > Create new app
- You can also create a new application using Heroku CLI



Create an App on Heroku

- Create a new application via GUI



Create an App on Heroku

The screenshot shows the Heroku dashboard for an application named "int-app-dev-practical-15". The browser address bar shows the URL "dashboard.heroku.com/apps/int-app-dev-practical-15/deploy/heroku-git". The dashboard has a top navigation bar with "Personal" and the app name, and a secondary navigation bar with links for Overview, Resources, Deploy, Metrics, Activity, Access, and Settings. The main content area is divided into two columns. The left column has a section "Add this app to a pipeline" with instructions to create a new pipeline or choose an existing one. The right column has a section "Add this app to a stage in a pipeline to enable additional features" with information about connecting multiple apps and GitHub. Below these is a "Deployment method" section with three options: Heroku Git (selected), GitHub, and Container Registry. The "Deploy using Heroku Git" section provides instructions and terminal commands for installing the Heroku CLI, logging in, creating a new repository, and deploying the application. A note indicates that the main deployment branch can be changed from "master" to "main". The "Existing Git repository" section provides a terminal command to add the Heroku remote.

int-app-dev-practical-15 · Heroku

dashboard.heroku.com/apps/int-app-dev-practical-15/deploy/heroku-git

HEROKU

Personal > int-app-dev-practical-15

Overview Resources Deploy Metrics Activity Access Settings

Add this app to a pipeline
Create a new pipeline or choose an existing one and add this app to a stage in it.

Add this app to a stage in a pipeline to enable additional features
Pipelines let you connect multiple apps together and promote code between them. [Learn more](#)
Pipelines connected to GitHub can enable review apps, and create apps for new pull requests. [Learn more](#)

Choose a pipeline

Deployment method

Heroku Git
Use Heroku CLI

GitHub
Connect to GitHub

Container Registry
Use Heroku CLI

Deploy using Heroku Git
Use `git` in the command line or a GUI tool to deploy this app.

Install the Heroku CLI
Download and install the [Heroku CLI](#).
If you haven't already, log in to your Heroku account and follow the prompts to create a new SSH public key.

```
$ heroku login
```

Create a new Git repository
Initialize a git repository in a new or existing directory

```
$ cd my-project/  
$ git init  
$ heroku git:remote -a int-app-dev-practical-15
```

Deploy your application
Commit your code to the repository and deploy it to Heroku using Git.

```
$ git add .  
$ git commit -m "make it better"  
$ git push heroku master
```

You can now change your main deploy branch from "master" to "main" for both manual and automatic deploys, please follow the [instructions here](#).

Existing Git repository
For existing repositories, simply add the `heroku` remote

```
$ heroku git:remote -a int-app-dev-practical-15
```

Heroku CLI

- Heroku CLI (Command Line Interface) makes it easy to build, deploy & manage your Heroku applications from the terminal
- Installation available for macOS, Windows & Linux
 - The Windows installer may display a warning - "Windows protected your PC"
 - To run the installation, click "More info", verify the publisher as "Heroku, Inc.", then click the "Run anyway" button
- To verify your installation, run the command: `heroku --version`
 - In the output, you should see `heroku/x.x.x`
- After you install Heroku CLI, run the command: `heroku login`
 - You will be prompted to enter any key. This will navigate you to your web browser to complete your login
 - Heroku CLI will then automatically log you in
- Resource: <https://devcenter.heroku.com/articles/heroku-cli>

Create an App with the Heroku CLI

- Suppose we have been developing a Django app and using Git. From the project's root directory, use the following commands:
- Create an application without a name `heroku create`. A random name will be generated
- Add a remote to your local repository by running the command:
`heroku git:remote -a <heroku project name>`
- To deploy the application:
 - Add changes in the working directory to the staging area - `git add .`
 - Capture the state of the project at that point of time - `git commit -m "<some message>"`
 - Upload content in the local repository to the remote repository - `git push heroku master`
- To view your application, run the command: `heroku open`

Local Heroku app

- To run our Heroku application locally, run the command: `heroku local:start`
- Navigate <http://0.0.0.0:5000/practical15heroku>

Heroku Logs

- An application's logs are collected from output streams of all of its running processes, system components & backing services
- Two types of logs:
 - Runtime logs, i.e., application, system, API & add-on logs
 - Build logs - separate from runtime logs while building & deploying your application
- There are various ways to view your logs:
 - Retrieves 100 recent log entries - `heroku logs`
 - `heroku logs --num 200`
 - Displays recent logs & leaves the session open - `heroku logs --tail`
- Resource: <https://devcenter.heroku.com/articles/logging>

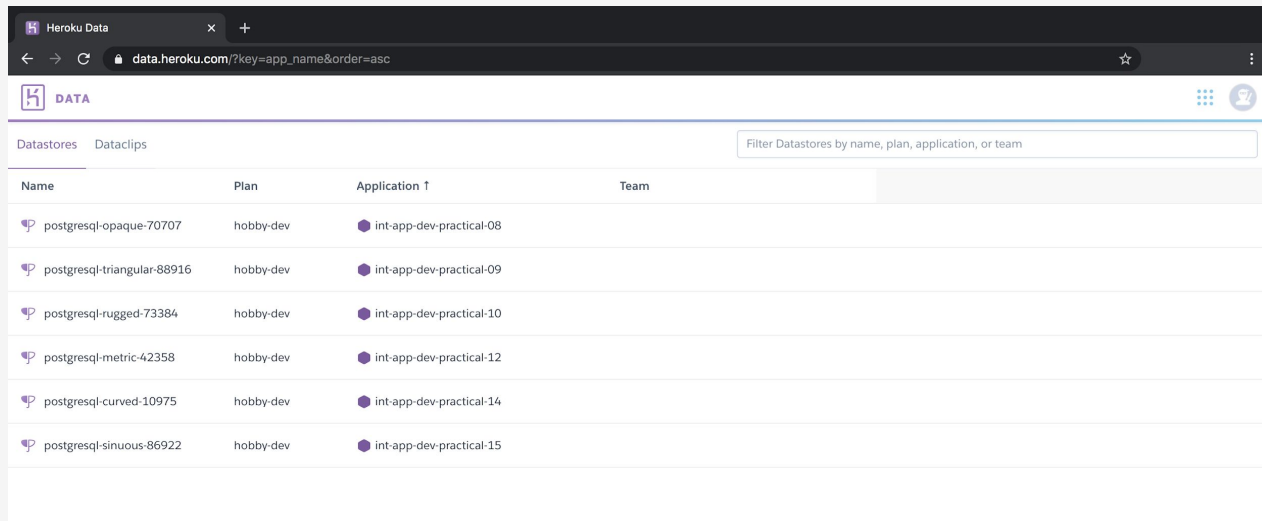
PostgreSQL on Heroku

Postgres on Heroku

- Heroku Postgres is a managed SQL database service provided directly by Heroku
- Accessible from any language with a PostgreSQL driver
- To check if Heroku Postgres has been provided, run the command: `heroku addons`
- If `heroku-postgresql` is not in the application's list of add-ons, run the command: `heroku addons:create heroku-postgresql:hobby:dev`
- We will need to apply migrations - `heroku run python manage.py migrate`
- Resource: <https://devcenter.heroku.com/articles/heroku-postgresql>

Postgres on Heroku

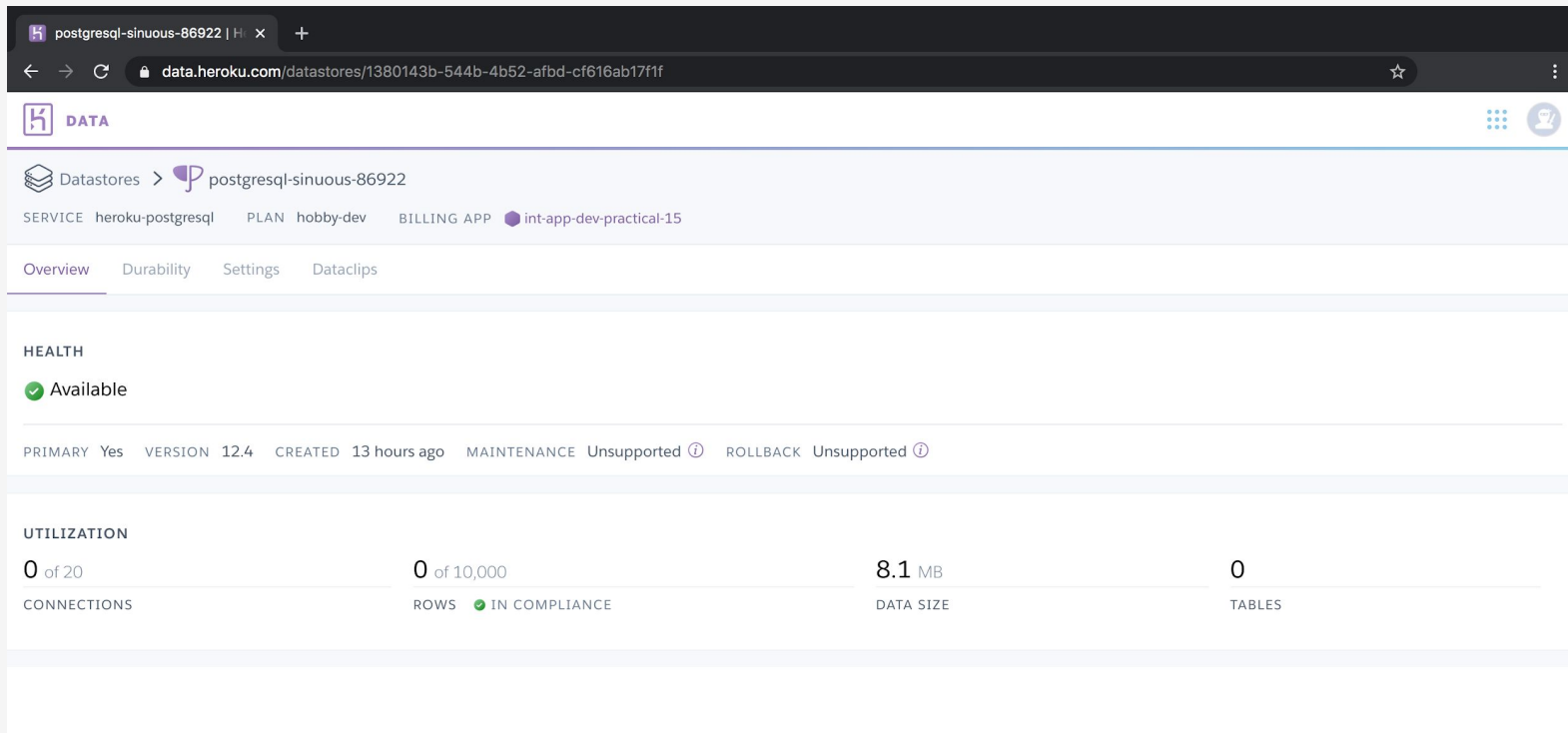
- List of datastores



The screenshot shows the Heroku Data dashboard in a web browser. The address bar displays the URL `data.heroku.com/?key=app_name&order=asc`. The page header includes the Heroku logo and the word "DATA". Below the header, there are tabs for "Datastores" and "Dataclips", with "Datastores" being the active tab. A search bar on the right allows filtering by name, plan, application, or team. The main content area is a table with the following columns: Name, Plan, Application ↑, and Team. The table lists six PostgreSQL datastores, all on the "hobby-dev" plan, associated with the application "int-app-dev-practical-08" through "int-app-dev-practical-15".

Name	Plan	Application ↑	Team
postgresql-opaque-70707	hobby-dev	int-app-dev-practical-08	
postgresql-triangular-88916	hobby-dev	int-app-dev-practical-09	
postgresql-rugged-73384	hobby-dev	int-app-dev-practical-10	
postgresql-metric-42358	hobby-dev	int-app-dev-practical-12	
postgresql-curved-10975	hobby-dev	int-app-dev-practical-14	
postgresql-sinuous-86922	hobby-dev	int-app-dev-practical-15	

Postgres on Heroku



The screenshot shows the Heroku Datastores interface for a PostgreSQL instance named 'postgresql-sinuous-86922'. The browser address bar shows the URL 'data.heroku.com/datastores/1380143b-544b-4b52-afbd-cf616ab17f1f'. The page header includes the Heroku logo and 'DATA'. The breadcrumb navigation shows 'Datastores > postgresql-sinuous-86922'. Below this, there are links for 'SERVICE heroku-postgresql', 'PLAN hobby-dev', 'BILLING APP', and 'int-app-dev-practical-15'. The 'Overview' tab is selected, with other tabs being 'Durability', 'Settings', and 'Dataclips'. The 'HEALTH' section shows a green checkmark and 'Available'. Below this, a row of metadata includes 'PRIMARY Yes', 'VERSION 12.4', 'CREATED 13 hours ago', 'MAINTENANCE Unsupported ⓘ', and 'ROLLBACK Unsupported ⓘ'. The 'UTILIZATION' section displays four metrics: '0 of 20' for CONNECTIONS, '0 of 10,000' for ROWS (with a green checkmark and 'IN COMPLIANCE'), '8.1 MB' for DATA SIZE, and '0' for TABLES.

postgresql-sinuous-86922 | H x +

data.heroku.com/datastores/1380143b-544b-4b52-afbd-cf616ab17f1f

DATA

Datastores > postgresql-sinuous-86922

SERVICE heroku-postgresql PLAN hobby-dev BILLING APP int-app-dev-practical-15

Overview Durability Settings Dataclips

HEALTH

✓ Available

PRIMARY Yes VERSION 12.4 CREATED 13 hours ago MAINTENANCE Unsupported ⓘ ROLLBACK Unsupported ⓘ

UTILIZATION

0 of 20	0 of 10,000	8.1 MB	0
CONNECTIONS	ROWS ✓ IN COMPLIANCE	DATA SIZE	TABLES

Postgres on Heroku

The screenshot shows the Heroku PostgreSQL administration interface in a web browser. The browser's address bar displays the URL `data.heroku.com/datastores/1380143b-544b-4b52-afbd-cf616ab171f1#administration`. The page header includes the Heroku logo and the word "DATA". Below the header, a breadcrumb trail shows "Datastores > postgresql-sinuuous-86922". A navigation bar contains links for "SERVICE heroku-postgresql", "PLAN hobby-dev", "BILLING APP", and "int-app-dev-practical-15". A secondary navigation bar has tabs for "Overview", "Durability", "Settings" (which is active), and "Dataclips". The main content area is titled "ADMINISTRATION" and contains three sections: "Database Credentials" with a "View Credentials..." button, "Reset Database" with a "Reset Database..." button, and "Destroy Database" with a "Destroy Database..." button. Each section includes a brief description of the action.

postgresql-sinuuous-86922 | H x +

data.heroku.com/datastores/1380143b-544b-4b52-afbd-cf616ab171f1#administration

DATA

Datastores > postgresql-sinuuous-86922

SERVICE heroku-postgresql PLAN hobby-dev BILLING APP int-app-dev-practical-15

Overview Durability **Settings** Dataclips

ADMINISTRATION

Database Credentials

Get credentials for manual connections to this database.

[View Credentials...](#)

Reset Database

Reset the database to its originally-provisioned state, deleting all data inside it.

[Reset Database...](#)

Destroy Database

Destroys the database and all of the data inside it.

[Destroy Database...](#)

Postgres on Heroku

ADMINISTRATION

Database Credentials

Get credentials for manual connections to this database.

Cancel

Please note that **these credentials are not permanent**.

Heroku rotates credentials periodically and updates applications where this database is attached.

Host	ec2-54-91-178-234.compute-1.amazonaws.com	
Database	d8ka852e4ab2fu	
User		
Port	5432	
Password		
URI	postgres://fivgqmxqetjwr:063fa9703ff3ef39181d1c76f220f2596fa1a28fd399e88baa7c47d244be8d1f@ec2-54-91-178-234.compute-1.amazonaws.com:5432/d8ka852e4ab2fu	
Heroku CLI	heroku pg:psql postgresql-sinuous-86922 --app int-app-dev-practical-15	

Deploy a Django Application

Deploy a Django Application

We need to make some adjustments to our Django app before it can be run on Heroku

- Create a `.env` file for local development
- Create a config var on Heroku
- Configure database in `settings.py`
- Declare the `STATIC_ROOT` configuration in `settings.py`
- Add `WhiteNoiseMiddleware` to the `MIDDLEWARE` configuration
- Create a `Procfile`

Deploy a Django Application - Settings

- Some settings will differ between development and production versions of our app
- Environment-specific configurations should be stored in environment variables & not in the application's source code, i.e., `SECRET_KEY` in `settings.py`
- In the root directory of your Django project, create a file called `.env`
 - Used for local development
 - Do not store in version control
- Set `SECRET_KEY` in `.env`, i.e., `SECRET_KEY=<some value>`
- Install the `dotenv` Python module by running the command `pipenv install dotenv`
- To use environment variables locally:
 - In `settings.py`, declare the following:
 - `from dotenv import load_dotenv`
 - `load_dotenv()`
 - `SECRET_KEY = os.environ.get('SECRET_KEY')`

Deploy a Django Application - Settings





- Navigate to you Heroku app's settings page
- Heroku sets environments variables using config vars
- The `DATABASE_URL` config variable is automatically created when Heroku Postgres is added
- Set `SECRET_KEY` in config vars
- Resource: <https://devcenter.heroku.com/articles/config-vars>

Config Vars

Config vars change the way your app behaves. In addition to creating your own, some add-ons come with their own.

Config Vars

Hide Config Vars

DATABASE_URL	postgres://fivgqmxfqetjwr:063fa9703ff:	 
SECRET_KEY	2vnv(eross&lywn-yz&yjc67ac04lv\$mf*it1:	 
KEY	VALUE	Add

Deploy a Django Application - DB Config

How do we connect to Postgres?

- Install the dj-database-url and psycopg2 Python modules
- In settings.py, declare the following:

```
from dj_database_url import config
db_from_env = config(conn_max_age=600)
DATABASES['default'].update(db_from_env) # Put this under the DATABASES config
```

- What is happening?
 - Converts the DATABASE_URL config var from Heroku into a Python dictionary
 - The dictionary is injected into the DATABASES configuration in settings.py
 - We do not have to explicitly set up Heroku Postgres in settings.py
- Don't forget to run your migrations: `heroku run python manage.py migrate`

Deploy Django Application - Static Assets

- In Django, static assets can be difficult to configure & debug
- Django does not automatically create `STATIC_ROOT` - the directory in which `collectstatic` uses
- You will need to create this directory so it will be available when `collectstatic` is run
- **Note:** Git does not support empty directories - you will need to create at least one file
- In `settings.py`, declare the following:

```
STATIC_ROOT = os.path.join(BASE_DIR, 'staticfiles')
```

Deploy Django Application - Static Assets

- Django does not support serving static files in production
- `White Noise` is a Python module designed with the purpose of serving static files in production
- To install `White Noise`, run the command: `pipenv install whitenoise`
- Add `whitenoise.middleware.WhiteNoiseMiddleware` to the `MIDDLEWARE` configuration

Deploy a Django Application

- Heroku applications require a `Procfile`
- Explicitly declares an application's process types & entry points
- In the root directory of your Django project, create a file called `Procfile`
- In `Procfile`, declare the following: `web: gunicorn <Django project name>.wsgi`
- This `Procfile` requires `Gunicorn` - recommended production web server for Django applications
- To install `Gunicorn`, run the command: `pipenv install gunicorn`

Programming Activity

- Checkout to master - `git checkout master`
- Create a new branch called 15-practical - `git checkout -b 15-practical`
- **Task:** Deploy your `dog` Django project from **Practical 10 Django 4: Template Inheritance, Static Files & CDNs** to Heroku