Session 1: Preparing the workspace

Xander Warszawski

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Contents of this session

1. Introduction
2. Installing tools
3. Git and GitHub
4. Django setup
5. Docker setup

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1. Introduction

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Goals

- Be able to ***create and maintain*** a ***Django webapp in production***
  - With ***integrated payments*** by ***Mollie***
  - With ***error monitoring*** by ***Sentry***
- Be able to ***use Git*** and ***GitHub***
- Be able to ***deploy*** the webapp ***using DigitalOcean***

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Who am I?

- Xander Warszawski
- Master student Engineering Technology ICT
- IEEE SB KU Leuven Campus Bruges Chair
- GitHub Campus Expert

- Pythonista since +/- 2017
- Django for side projects
- Last year: worked on C# Web API
- For any questions: **xander@xdoubleu.com**

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Slides

- Can be fetched from https://xdoubleu.com/webdev-4-dummies-workshop/
- Code is also available here

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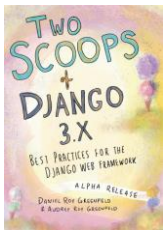
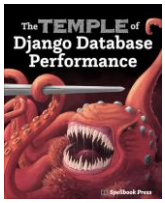
Slides

- Slides are based on:
  - '***Django for Professionals 4.0***' by William S. Vincent
  - '***Speed Up Your Django Tests***' by Adam Johnson
  - '***Two Scoops of Django***' by Audrey R. Greenfeld and Danny R. Greenfeld
  - '***The Temple of Django Database Performance***' by Andrew Brookins





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Scope of this workshop series

- Web applications / web apps:
  - App stored on remote server
  - Delivered over internet through browser interface
- Front-end / client-side:
  - HTML
  - CSS
  - JS
- Back-end / server-side:
  - In this case: Python
  - Other options:
    - JS/TS
    - Ruby
    - PHP
- I'll try to cover both, but back-end is my 'expertise'

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What is Django?

- From the Django docs:
  - ***Django*** *is a* ***high-level Python web framework*** *that encourages* ***rapid development*** *and* ***clean***, ***pragmatic design***. *Built by experienced developers, it* ***takes care of much of the hassle of web development***, *so* ***you can focus on writing your app without needing to reinvent the wheel***. *It's* ***free and open source***.
- Used by:
  - Instagram
  - Spotify
  - Pinterest
  - Bitbucket

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Why use Django?

- Features (from Django docs):
  - ***Ridiculously fast***: devs can take applications from concept to completion very fast
  - ***Fully loaded***: handles lots of overhead out of the box (e.g. user authentication)
  - ***Reassuringly secure***: lots of security features out of the box
  - ***Exceedingly scalable***: can flexibly scale to meet the heaviest traffic demands
  - ***Incredibly versatile***: lots of different use cases and uses

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Python cheat sheet

- Django uses specific code that doesn't contain a lot of logic
  - Basic Python knowledge is sufficient
  - https://www.pythoncheatsheet.org/
- If you want to practice programming (in Python):
  - https://www.hackerrank.com/
  - https://leetcode.com/

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Timing

- 05/10: Introduction + setup
- 12/10: Basics of Django
- 19/10: Varia
- 26/10: Preparing for Deployment
- 02/11: Deployment
- 09/11: Practice everything on your own

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2. Installing tools

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Python install

- https://www.python.org/downloads/
- Install now:
  - For all users
  - Add to PATH

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VSCode install

- https://code.visualstudio.com/
- Recommended extensions:
  - Todo Tree
  - GitLens
  - IntelliCode
  - Python
  - Django

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Git install

- https://git-scm.com/download
- Default everything

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Sourcetree install

- https://www.sourcetreeapp.com/
- Skip registration
- Install git
- SSH Key: No

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Docker install

- https://www.docker.com/

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DBeaver install

- https://dbeaver.io/download/

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GitHub Student Developer Pack

- https://education.github.com/discount_requests/student_application?utm_source=2022-10-05-Webapp-dev-4-dummies

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3. Git and GitHub

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Introduction

- ***Git*** is a ***VCS*** (***V***ersion ***C***ontrol ***S***ystem)
  - Allows developers to store all versions of their code as one (= repository)
  - *Branching* and *merging*
- ***GitHub*** is a ***Hub***
  - Hub? ***A hub*** airport is an airport used by one or more airlines ***to concentrate*** passenger ***traffic and*** flight ***operations***.
  - So? GitHub is a ***concentration of Git repositories***
    - Also publishing & collaboration tool

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Terminology

- ***Repo***(sitory): project 'folder' (code, docs); has all versions
- ***Branch***: parallel version in repo
- ***Commit***: saving changes in branch
- ***Merge***: merge branches or repo
- ***Pull Request*** (GH) / Merge Request (GL): request to merge branch or fork
- ***Clone***: copy of repo, mostly offline
- ***Fetch***: getting last version of online repo
- ***Pull***: 'download' latest commits from remote repo to clone
- ***Push***: 'upload' committed changes to remote repo
- ***Reverse***: undo changes made in commit(s), useful for when application breaks in production
- ***Cherry pick***: pick a certain commit out of the change history
- ***Fork***: start new project from existing

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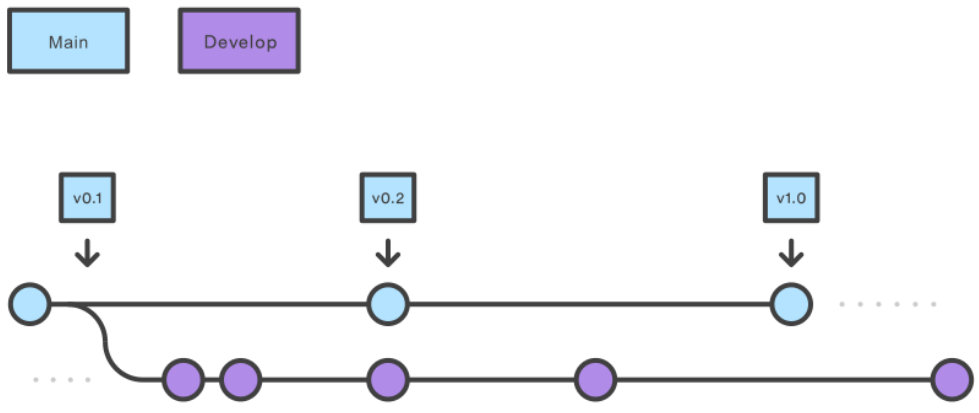
GitFlow: main & dev



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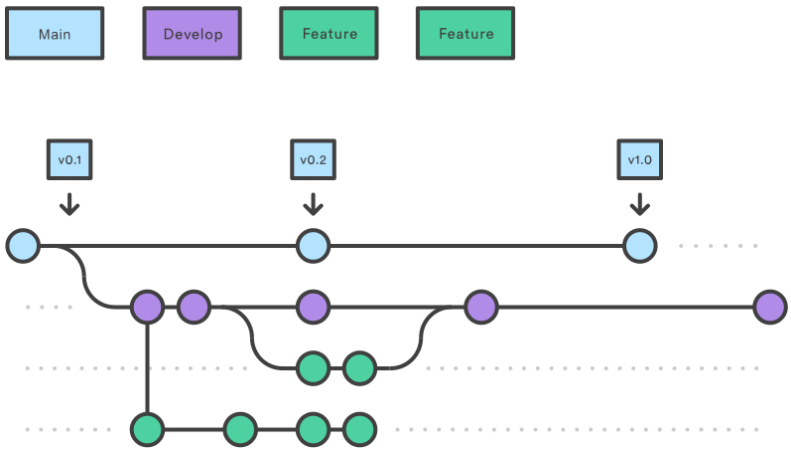
GitFlow: feature



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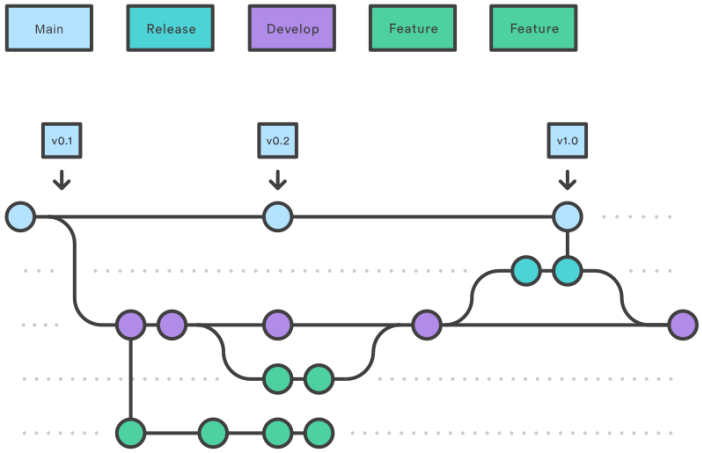
GitFlow: release



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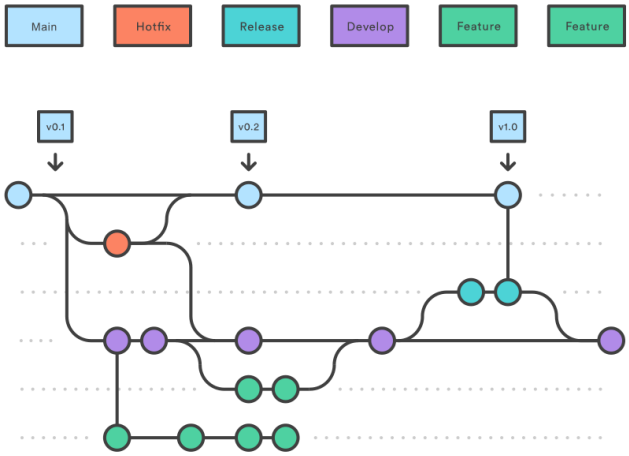
GitFlow: hotfix



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Pros & cons of GitFlow

- Pros:
  - Lots of control on which code gets in the codebase
- Cons:
  - Slow & complex flow

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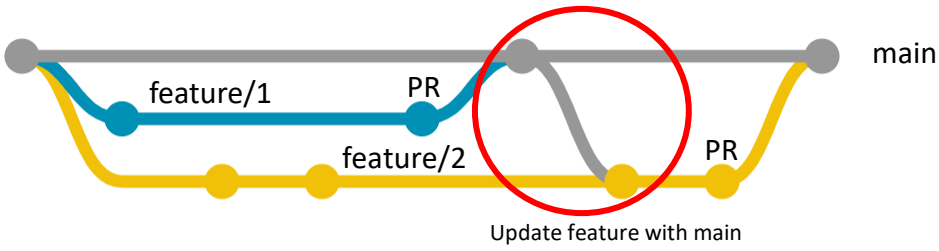
GitHub Flow/feature branching



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Pros & cons of GitHub Flow

- Pros:
  - Fast & streamlined
  - Continuous delivery
- Cons:
  - Pull requests with reviews can slow down flow

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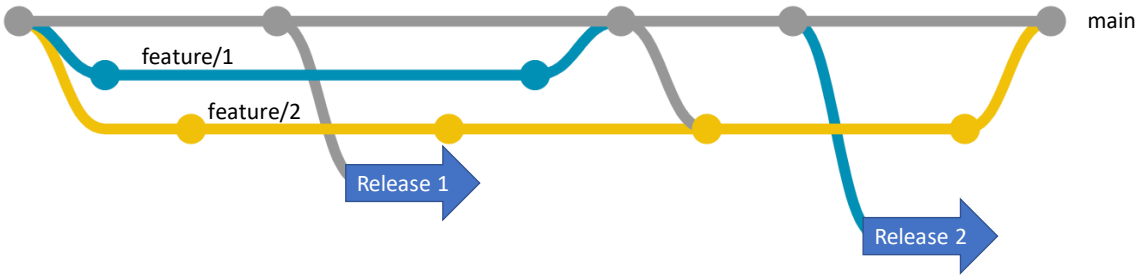
Trunk-based development



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Difference between trunk-based & GitHub Flow?

- GitHub Flow:
  - Released from main branch
  - When merging developers create a pull request
- Trunk-based:
  - Feature branches aren't necessary, developers commit directly in main
  - Released from release branches made of main branch
  - Developers don't commit in these release branches
  - No pull requests when merging

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Pros & cons of trunk-based development

- Pros:
  - Very simple
  - Scales
- Cons:
  - No code reviews before merge

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Recommended flow?

- GitHub flow with code reviews and build automation on pull request

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Practice

1. Create repo:
   1. '+'-icon right upper corner > new repo;
   2. public or private up to you
   3. no readme
   4. no gitignore
2. Automatically delete head branches (Settings > General > Pull Requests)
3. Go to actions:
   1. Search for 'Django', click configure
   2. Remove run on push
   3. Make sure python versions are: 3.8, 3.9, 3.10
   4. Start commit

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Practice

1. Add branch protection rule for main:
   1. Settings > branches
   2. Require PR
   3. Disable require approvals
2. Clone using SourceTree
3. Add file:
   1. Checkout main branch from remotes
   2. Create feature branch from main
   3. Add file, commit file
   4. Create PR to main
4. Django action will fail, merge anyways

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Questions?

- If you want to practice git:
  - https://learngitbranching.js.org/

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4. Django setup

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Git checkpoint

1. Create new feature branch

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Django installation

1. Make sure you have a GitHub repo on your pc and you're on a feature branch
2. Open the folder in VSCode, open a new terminal
3. ***python -m venv .venv***
4. **.venv\Scripts\activate**
5. **pip install django**
6. Optional: **pip install --upgrade pip**
7. **pip freeze > requirements.txt**
8. **django-admin startproject config . (!! Don't forget dot at the end)**
9. **python manage.py migrate**
10. **python manage.py runserver**

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Git checkpoint

1. Add gitignore (https://www.toptal.com/developers/gitignore)
2. Commit changes + do a PR
3. Add require checks to branch protection
    1. ''build 3.10'' by example

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Questions?

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5. Docker setup

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Introduction

- Docker:
  - Type of virtualization that only uses Linux containers
    - Containers are created from images
  - Everything above the OS is virtualized
- Virtual environments:
  - Can only isolate Python packages
- We will use Docker to facilitate local runs only, not in deployment

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Git checkpoint

1. Create new feature branch

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Add Docker

1. Create a ***Dockerfile*** next to ***manage.py***

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Dockerfile (1)

```
# Pull base image
FROM python:3.10.4-slim-bullseye

# Set environment variables
ENV PIP_DISABLE_PIP_VERSION_CHECK 1
ENV PYTHONDONTWRITEBYTECODE 1
ENV PYTHONUNBUFFERED 1
```


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Dockerfile (2)

```
# Set work directory
WORKDIR /code

# Install dependencies
COPY ./requirements.txt .
RUN pip install -r requirements.txt

# Copy project
COPY . .
```


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Add Docker

1. Create a ***Dockerfile*** next to ***manage.py***
2. Add ***.dockerignore*** (similar to .gitignore)

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.dockerignore

```
.venv
.git
.gitignore
```


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Add Docker

1. Create a ***Dockerfile*** next to ***manage.py***
2. Add ***.dockerignore*** (similar to .gitignore)
3. Add ***docker-compose.yml***

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docker-compose.yml

```
version: "3.9"

services:
  web:
    build: .
    command: python manage.py runserver 0.0.0.0:8000
    volumes:
      - .:/code
    ports:
      - "8000:8000"
```


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Add Docker

1. Create a ***Dockerfile*** next to ***manage.py***
2. Add ***.dockerignore*** (similar to .gitignore)
3. Add ***docker-compose.yml***
4. Execute: ***docker-compose up -d --build***
5. To stop***:***
    1. ***docker-compose down***

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Database

- Django has built-in support for five databases:
    - PostgreSQL
    - MariaDB / MySQL
    - Oracle
    - SQLite
- Code is the same for each one, Django ORM & drivers handle the differences

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Add database

1. Pip install ***psycopg2-binary*** & freeze
2. Update ***docker-compose.yml***

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docker-compose.yml (1)

```
version: "3.9"

services:
  web:
    build: .
    command: python manage.py runserver 0.0.0.0:8000
    volumes:
      - .:/code
    ports:
      - "8000:8000"
    depends_on:
      - db
```


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docker-compose.yml (2)

```
  db:
    image: postgres:13
    volumes:
      - postgres_data:/var/lib/postgresql/data
    ports:
      - "5432:5432"
    environment:
      - "POSTGRES_HOST_AUTH_METHOD=trust"

volumes: #level of services
  postgres_data:
```


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Add database

1. Pip install ***psycopg2-binary*** & freeze
2. Update ***docker-compose.yml***
3. Update ***config/settings.py***

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config/settings.py

```
DATABASES = {
    'default': {
        'ENGINE': 'django.db.backends.postgresql',
        'NAME': 'postgres',
        'USER': 'postgres',
        'PASSWORD': 'postgres',
        'HOST': 'db', # set in docker-compose.yml
        'PORT': 5432 # default port
    }
}
```


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Spin up containers

docker-compose up -d --build:

docker-compose exec web python manage.py migrate

docker-compose exec web python manage.py createsuperuser

docker-compose down

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Git checkpoint

1. Commit changes
2. Create PR

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Questions?

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