Web Programming in Python with Django

IAP 2013

Student Information Processing Board
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Overview

1. Install Django
2. Website Architecture
3. The “10,000 foot view” of Django
4. Running a Django Server Locally
5. Django Project Structure
6. Adding a Web Page, Creating a Model, and Developing an API
7. Creating a Django App
8. Admin Capabilities, Templating, and Form Generation
9. scripts.mit.edu

Class Material

mit.edu/omalley1/django

Install Django

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Django is a Python module:

```
<your terminal>$ pip install django
```

```
<your terminal>$ easy_install django
```

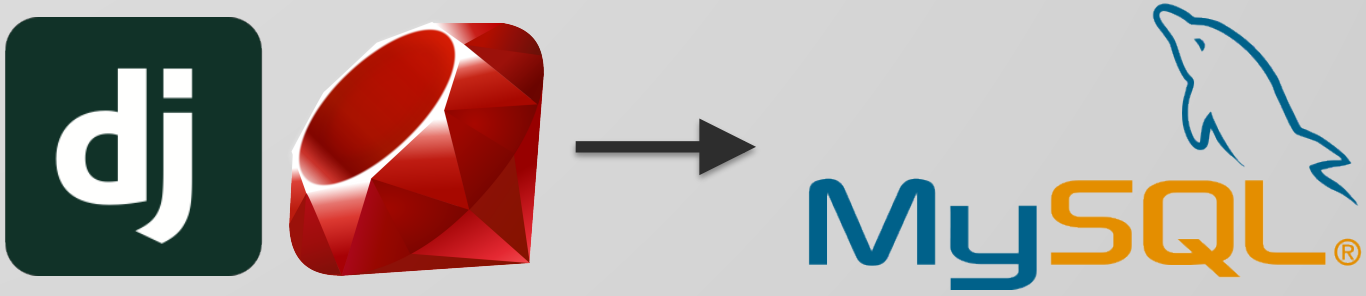
Websites and Their Pieces

Front-end:

- Broadly, it is what the user interacts with
- Where data is entered and displayed
- Often sends information to backend for processing and storage

Back-end:

- Broadly, it receives data from front-end and processes and stores it
- Responsible for “serving” content
- Often composed of a database and management layer



frameworks database

The “10,000 foot view” of Django

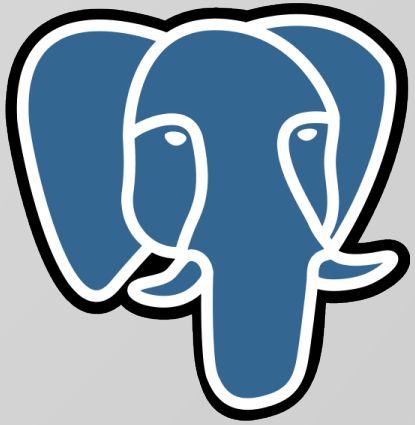
What is Django?

What is Django?

- Bridges the gap between what the user sees and the database
- Databases are hard, but Django makes it easy to work with them
- Databases include:

MySQL®

ORACLE®



Why Django?

Why Django?

- Python, easy to read and understand
- Don’t Repeat Yourself (DRY) Philosophy!
- The community has done a lot of the thinking for you, including security

How Does Django Work?

Model-Template-View (MTV)

- Model
  - Anything dealing with data and its representation (i.e. a user or a car or even data validation)
- Template
  - How data is displayed, what it looks like, this is the presentation layer
- View
  - What data is presented to the template, the control logic, bridging models and template

Django gives you:

- Object-relational mapper
  - Define Python classes
  - Rich way of interacting with database
- Automatic admin interface
  - Don’t waste your time creating an admin page, Django does this for you
- Elegant URL design
  - Regex matching
- Templating system
  - Fill in web pages on the fly!

Diving in!

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In your terminal type, from the website directory:

```
<your terminal>$ python manage.py runserver

Validating models...

0 errors found
Django version 1.4, using settings 'rsvp.settings'
Development server is running at http://
127.0.0.1:8000/
Quit the server with CONTROL-C
```

Open your browser and visit:

```
localhost:8000
```

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To start your own project later on:

```
<your terminal>$ django-admin.py startproject <name>
```

Creates following project structure:

```
<name>/
    manage.py
    <name>/
        __init__.py
        settings.py
        urls.py
        wsgi.pyls
```

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Our Django project:

```
event/ <- developer added app
    __init__.py
    models.py
    test.py
    views.py
manage.py
rsvp/
    __init__.py
    settings.py
    static/ <- developer added
    templates/ <- developer added
    urls.py
    wsgi.pyls
```

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Adding a module:

```
<your terminal>$ python manage.py startapp <name>
```

I added events by typing (I ran ‘ls’ just to show results):

```
<your terminal>$ python manage.py startapp event
<your terminal>$ ls event/
__init__.py
models.py
tests.py
views.py
```

From URL to Page Render

What happens when a user enters this in the browser?

```
www.your-site-domain.com
```

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    __init__.py
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rsvp/
    __init__.py
    settings.py
    static/ <- developer added
    templates/ <- developer added
    urls.py
    wsgi.pyls
```

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‘rsvp/settings.py’ stores location of our URL config file

```
ROOT_URLCONF = 'rsvp.urls'
```

We then reference ‘rsvp/urls.py’

```
from django.conf.urls import patterns, include, url

urlpatterns = patterns('',
    url(r'^$', 'event.views.home', name='home'),
)
```

```
www.your-site-domain.com <- matches r’^$’
```

We then reference ‘events/views.py’

```
from django.shortcuts import render

def home(request):
    return render(request, 'index.html')
```

Django knows where to find template directory because of ‘rsvp/settings.py’

```
TEMPLATE_DIRS = (
    os.path.join(PROJECT_ROOT, 'templates/'),
)
```

What we've covered so far:

- How to run a server locally
- How to start a Django project
- How to add an app
- How Django goes from URL to web page

Work with Data

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Define a model for events:

```
from django.db import models

class Event(models.Model):
    title = models.CharField(max_length=128)
    description   = models.TextField()
    date = models.DateTimeField()

    def __unicode__(self):
        return self.title
```

Manually manipulate data using Django shell:

```
<your terminal>$ python manage.py shell
    >>> from event.models import Event
    >>> Event.objects.all()
    []
    >>> e = Event(title="Birthday", date="2013-01-13
    07:00")
    >>> e.save()
```

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Render a template with data:

```
# View to return all events
def all_events(request):
    events = Event.objects.all()
    return render(request, 'events.html', {'events':
events})
```

Create a template for the events:

```
{% extends "base.html" %}

{% block content %}
      <h1>All Events</h1>

      {% for event in events %}
      <h3>{{ event.title }}</h3>
      <p>{{ event.description }}</p>
      {% endfor %}

{% endblock%}
```

Adding Admin Capabilities

What next?

- work on personal projects
- learn algorithms (CLRS)
  - performance and memory management
- grab a Python book
- active online community, dive in!
- SIPB, you can get involved with out projects!