For the minimalists

Like we said above, the default applications are included for the common case, but not everybody needs them. If you don't need any or all of them, feel free to comment-out or delete the appropriate line(s) from **INSTALLED_APPS** before running **migrate**. The **migrate** command will only run migrations for apps in **INSTALLED_APPS**.

Creating models ¶

Now we'll define your models – essentially, your database layout, with additional metadata.

Philosophy

A model is the single, definitive source of information about your data. It contains the essential fields and behaviors of the data you're storing. Django follows the DRY Principle. The goal is to define your data model in one place and automatically derive things from it.

This includes the migrations - unlike in Ruby On Rails, for example, migrations are entirely derived from your models file, and are essentially a history that Django can roll through to update your database schema to match your current models.

In our poll app, we'll create two models: **Question** and **Choice**. A **Question** has a question and a publication date. A **Choice** has two fields: the text of the choice and a vote tally. Each **Choice** is associated with a **Question**.

These concepts are represented by Python classes. Edit the **polls/models.py** file so it looks like this:

polls/models.py ¶

```
from django.db import models


class Question(models.Model):
    question_text = models.CharField(max_length=200)
    pub_date = models.DateTimeField("date published")


class Choice(models.Model):
    question = models.ForeignKey(Question, on_delete=models.CASCADE)
    choice_text = models.CharField(max_length=200)
    votes = models.IntegerField(default=0)
```

Here, each model is represented by a class that subclasses **django.db.models.Model**. Each model has a number of class variables, each of which represents a database field in the model.

Each field is represented by an instance of a **Field** class – e.g., **CharField** for character fields and **DateTimeField** for datetimes. This tells Django what type of data each field holds.

The name of each **Field** instance (e.g. **question_text** or **pub_date**) is the field's name, in machine-friendly format. You'll use this value in your Python code, and your database will use it as the column name.

You can use an optional first positional argument to a **Field** to designate a human-readable name. That's used in a couple of introspective parts of Django, and it doubles as documentation. If this field isn't provided, Django will use the machine-readable name. In this example, we've only defined a human-readable name for **Question.pub_date**. For all other fields in this model, the field's machine-readable name will suffice as its human-readable name.

Some **Field** classes have required arguments. **CharField**, for example, requires that you give it a **max_length**. That's used not only in the database schema, but in validation, as we'll soon see.

A **Field** can also have various optional arguments; in this case, we've set the **default** value of **votes** to 0.

Finally, note a relationship is defined, using **ForeignKey**. That tells Django each **Choice** is related to a single **Question**. Django supports all the common database relationships: many-to-one, many-to-many, and one-to-one.

Activating models ¶

That small bit of model code gives Django a lot of information. With it, Django is able to:

- Create a database schema (**CREATE TABLE** statements) for this app.
- Create a Python database-access API for accessing **Question** and **Choice** objects.

But first we need to tell our project that the **polls** app is installed.

Philosophy

Playing with the API ¶

Now, let's hop into the interactive Python shell and play around with the free API Django gives you. To invoke the Python shell, use this command:

```
$ python manage.py shell
```

We're using this instead of simply typing "python", because **manage.py** sets the **DJANGO_SETTINGS_MODULE** environment variable, which gives Django the Python import path to your **mysite/settings.py** file.

Once you're in the shell, explore the database API:

```
>>> from polls.models import Choice, Question  # Import the model classes we just wrote.

# No questions are in the system yet.
>>> Question.objects.all()
<QuerySet []>

# Create a new Question.
# Support for time zones is enabled in the default settings file, so
# Django expects a datetime with tzinfo for pub_date. Use timezone.now()
# instead of datetime.datetime.now() and it will do the right thing.
>>> from django.utils import timezone
>>> q = Question(question_text="What's new?", pub_date=timezone.now())

# Save the object into the database. You have to call save() explicitly.
>>> q.save()

# Now it has an ID.
>>> q.id
1

# Access model field values via Python attributes.
>>> q.question_text
"What's new?"
>>> q.pub_date
datetime.datetime(2012, 2, 26, 13, 0, 0, 775217, tzinfo=datetime.timezone.utc)

# Change values by changing the attributes, then calling save().
>>> q.question_text = "What's up?"
>>> q.save()

# objects.all() displays all the questions in the database.
>>> Question.objects.all()
<QuerySet [<Question: Question object (1)>]>
```

Wait a minute. **<Question: Question object (1)>** isn't a helpful representation of this object. Let's fix that by editing the **Question** model (in the **polls/models.py** file) and adding a **__str__()** method to both **Question** and **Choice**:

polls/models.py ¶

```
from django.db import models


class Question(models.Model):
    # ...
    def __str__(self):
        return self.question_text


class Choice(models.Model):
    # ...
    def __str__(self):
        return self.choice_text
```

It's important to add **__str__()** methods to your models, not only for your own convenience when dealing with the interactive prompt, but also because objects' representations are used throughout Django's automatically-generated admin.

Let's also add a custom method to this model:

polls/models.py ¶

```
import datetime

from django.db import models
from django.utils import timezone


class Question(models.Model):
    # ...
    def was_published_recently(self):
        return self.pub_date >= timezone.now() - datetime.timedelta(days=1)
```

Note the addition of **`import datetime`** and **`from django.utils import timezone`**, to reference Python's standard **`datetime`** module and Django's time-zone-related utilities in **`django.utils.timezone`**, respectively. If you aren't familiar with time zone handling in Python, you can learn more in the time zone support docs.

Save these changes and start a new Python interactive shell by running **`python manage.py shell`** again:

```
>>> from polls.models import Choice, Question

# Make sure our __str__() addition worked.
>>> Question.objects.all()
<QuerySet [<Question: What's up?>]>

# Django provides a rich database lookup API that's entirely driven by
# keyword arguments.
>>> Question.objects.filter(id=1)
<QuerySet [<Question: What's up?>]>
>>> Question.objects.filter(question_text__startswith="What")
<QuerySet [<Question: What's up?>]>

# Get the question that was published this year.
>>> from django.utils import timezone
>>> current_year = timezone.now().year
>>> Question.objects.get(pub_date__year=current_year)
<Question: What's up?>

# Request an ID that doesn't exist, this will raise an exception.
>>> Question.objects.get(id=2)
Traceback (most recent call last):
    ...
DoesNotExist: Question matching query does not exist.

# Lookup by a primary key is the most common case, so Django provides a
# shortcut for primary-key exact lookups.
# The following is identical to Question.objects.get(id=1).
>>> Question.objects.get(pk=1)
<Question: What's up?>

# Make sure our custom method worked.
>>> q = Question.objects.get(pk=1)
>>> q.was_published_recently()
True

# Give the Question a couple of Choices. The create call constructs a new
# Choice object, does the INSERT statement, adds the choice to the set
# of available choices and returns the new Choice object. Django creates
# a set (defined as "choice_set") to hold the "other side" of a ForeignKey
# relation (e.g. a question's choice) which can be accessed via the API.
>>> q = Question.objects.get(pk=1)

# Display any choices from the related object set -- none so far.
>>> q.choice_set.all()
<QuerySet []>

# Create three choices.
>>> q.choice_set.create(choice_text="Not much", votes=0)
<Choice: Not much>
>>> q.choice_set.create(choice_text="The sky", votes=0)
<Choice: The sky>
>>> c = q.choice_set.create(choice_text="Just hacking again", votes=0)

# Choice objects have API access to their related Question objects.
>>> c.question
<Question: What's up?>

# And vice versa: Question objects get access to Choice objects.
>>> q.choice_set.all()
<QuerySet [<Choice: Not much>, <Choice: The sky>, <Choice: Just hacking again>]>
>>> q.choice_set.count()
3

# The API automatically follows relationships as far as you need.
# Use double underscores to separate relationships.
# This works as many levels deep as you want; there's no limit.
# Find all Choices for any question whose pub_date is in this year
# (reusing the 'current_year' variable we created above).
>>> Choice.objects.filter(question__pub_date__year=current_year)
<QuerySet [<Choice: Not much>, <Choice: The sky>, <Choice: Just hacking again>]>

# Let's delete one of the choices. Use delete() for that.
>>> c = q.choice_set.filter(choice_text__startswith="Just hacking")
>>> c.delete()
```

For more information on model relations, see Accessing related objects. For more on how to use double underscores to perform field lookups via the API, see Field lookups. For full details on the database API, see our Database API reference.

Introducing the Django Admin ¶

Philosophy

Generating admin sites for your staff or clients to add, change, and delete content is tedious work that doesn't require much creativity. For that reason, Django entirely automates creation of admin interfaces for models.

Django was written in a newsroom environment, with a very clear separation between "content publishers" and the "public" site. Site managers use the system to add news stories, events, sports scores, etc., and that content is displayed on the public site. Django solves the problem of creating a unified interface for site administrators to edit content.

The admin isn't intended to be used by site visitors. It's for site managers.

Creating an admin user ¶

First we'll need to create a user who can login to the admin site. Run the following command:

```
$ python manage.py createsuperuser
```

Enter your desired username and press enter.

```
Username: admin
```

You will then be prompted for your desired email address:

```
Email address: admin@example.com
```

The final step is to enter your password. You will be asked to enter your password twice, the second time as a confirmation of the first.

```
Password: **********
Password (again): *********
Superuser created successfully.
```

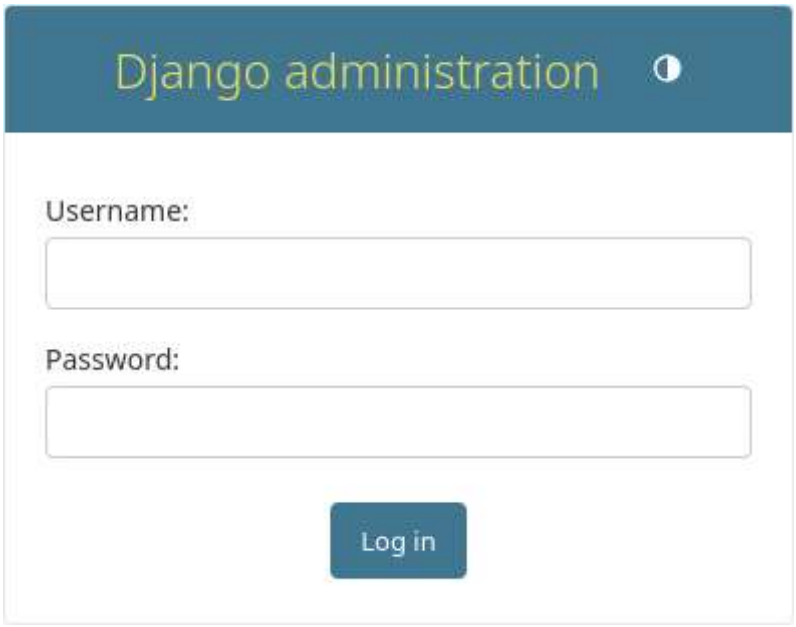
Start the development server ¶

The Django admin site is activated by default. Let's start the development server and explore it.

If the server is not running start it like so:

```
$ python manage.py runserver
```

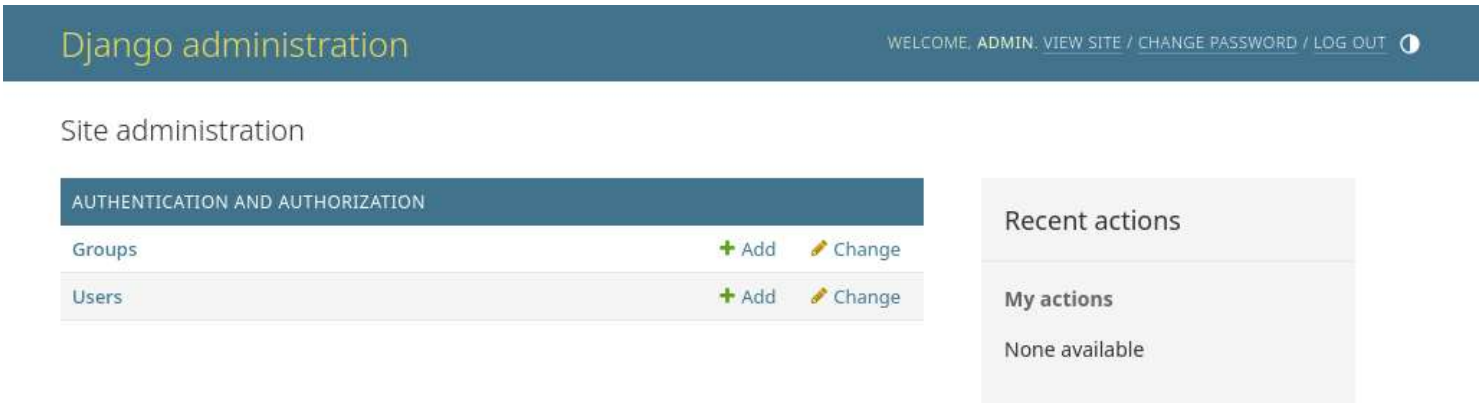
Now, open a web browser and go to "/admin/" on your local domain – e.g., http://127.0.0.1:8000/admin/. You should see the admin's login screen:



Since translation is turned on by default, if you set **LANGUAGE_CODE**, the login screen will be displayed in the given language (if Django has appropriate translations).

Enter the admin site ¶

Now, try logging in with the superuser account you created in the previous step. You should see the Django admin index page:



You should see a few types of editable content: groups and users. They are provided by **django.contrib.auth**, the authentication framework shipped by Django.

Make the poll app modifiable in the admin ¶

But where's our poll app? It's not displayed on the admin index page.

Only one more thing to do: we need to tell the admin that **Question** objects have an admin interface. To do this, open the **polls/admin.py** file, and edit it to look like this:

polls/admin.py ¶

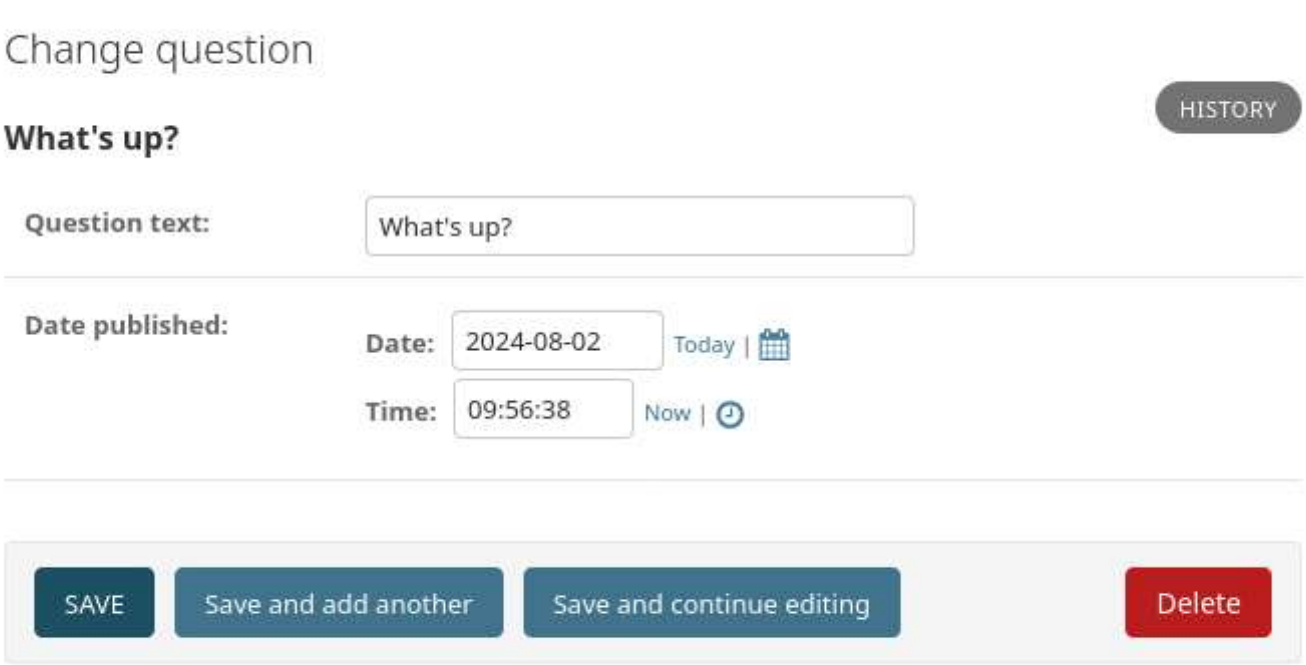
```
from django.contrib import admin

from .models import Question

admin.site.register(Question)
```

Explore the free admin functionality ¶

Now that we've registered **Question**, Django knows that it should be displayed on the admin index page:

Click “Questions”. Now you’re at the “change list” page for questions. This page displays all the questions in the database and lets you choose one to change it. There’s the “What’s up?” question we created earlier:

Click the “What’s up?” question to edit it:



Things to note here:

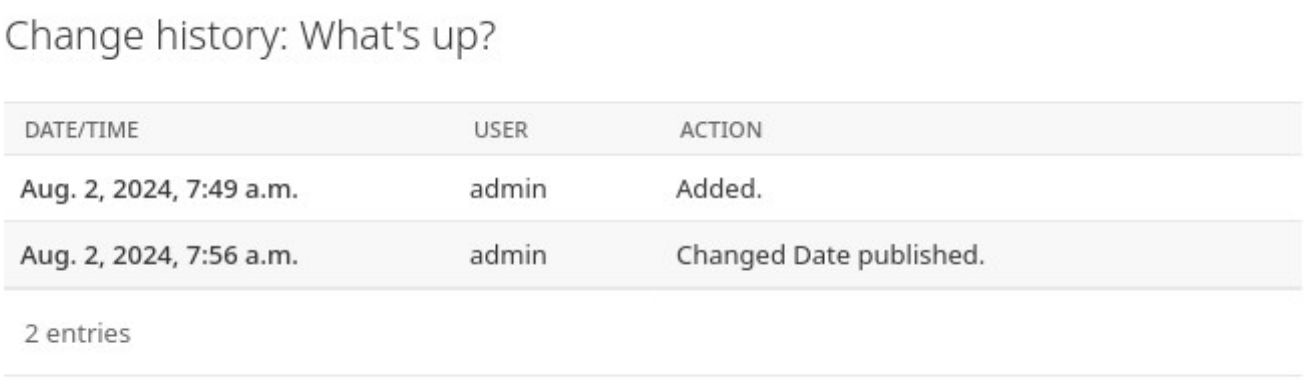
- The form is automatically generated from the **`Question`** model.
- The different model field types (**`DateTimeField`**, **`CharField`**) correspond to the appropriate HTML input widget. Each type of field knows how to display itself in the Django admin.
- Each **`DateTimeField`** gets free JavaScript shortcuts. Dates get a “Today” shortcut and calendar popup, and times get a “Now” shortcut and a convenient popup that lists commonly entered times.

The bottom part of the page gives you a couple of options:

- Save – Saves changes and returns to the change-list page for this type of object.
- Save and continue editing – Saves changes and reloads the admin page for this object.
- Save and add another – Saves changes and loads a new, blank form for this type of object.
- Delete – Displays a delete confirmation page.

If the value of "Date published" doesn't match the time when you created the question in Tutorial 1, it probably means you forgot to set the correct value for the **`TIME_ZONE`** setting. Change it, reload the page and check that the correct value appears.

Change the "Date published" by clicking the "Today" and "Now" shortcuts. Then click "Save and continue editing." Then click "History" in the upper right. You'll see a page listing all changes made to this object via the Django admin, with the timestamp and username of the person who made the change:



When you're comfortable with the models API and have familiarized yourself with the admin site, read part 3 of this tutorial to learn about how to add more views to our polls app.

Writing your first Django app, part 1

Writing your first Django app, part 3

Support Django!

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