Django Forms

COMP 8347

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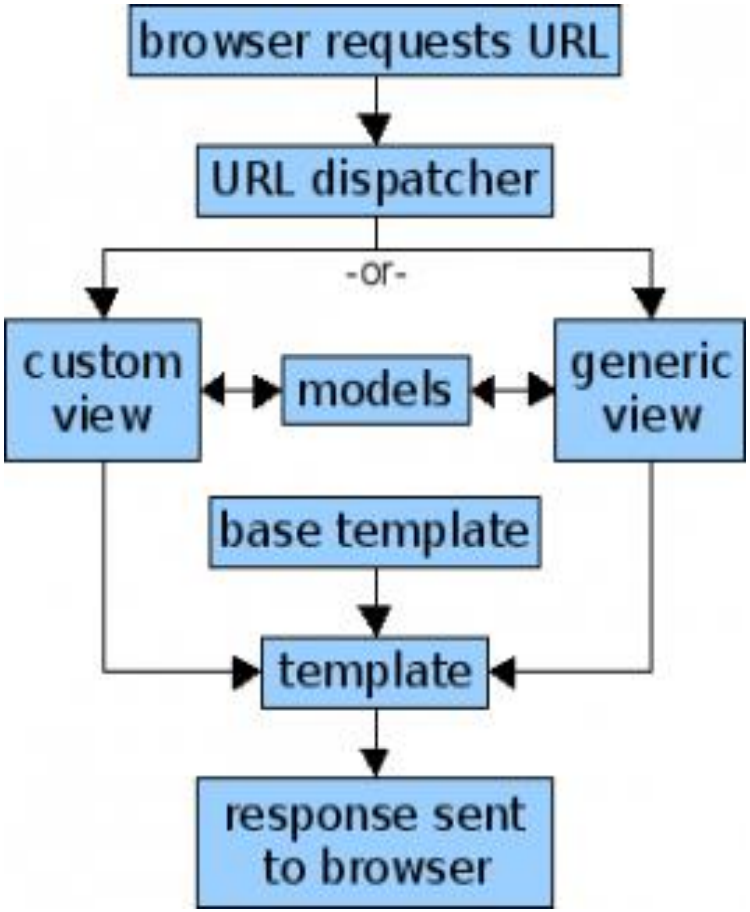
Django Forms

- Topics
  - Django Forms
    - The Form Class
    - Fields and Widgets
  - Rendering Forms
    - Validating Forms
  - ModelForm

Review MTV Architecture

- Represent data organization; defines a table in a database.
- Contain information to be sent to client; help generate final HTML.
- Actions performed by server to generate data.



www.tikalk.com/files/intro-to-**django**.**ppt**

HTML Forms

- *Form*: A collection of elements inside <form>...</form>
  - allow user to enter text, select options, manipulate objects etc.
  - send information back to the server.
- In addition to <input> elements, a form must specify:
  - *where*: the URL to which the data corresponding to the user's input should be returned
  - *how*: the HTTP method to be used to return data.
    - **<form action="/your-name/" method="post">**

GET and POST

- ***GET***: bundles the submitted data into a string, and uses this to compose a URL.
  - The URL contains the address where the data must be sent, as well as the data keys and values.
- ***POST***: Form data is transmitted in body of request, not in URL.
  - Any request that could be used to change the state of the system should use POST method.

GET and POST

- GET should be used **only** for requests that **do not** affect the state of the system.
  - Not suitable for large quantities of data, or for binary data, such as an image.
  - Unsuitable for a password form, because the password would appear in the URL.
  - GET is suitable for things like a web search form
    - the URLs that represent a GET request can easily be bookmarked, shared, or resubmitted

Django's Functionality

- Form processing involves many tasks:
  - Example: prepare data for display, render HTML, validate data, and save data
- Django can automate and simplify much of this work. Handles 3 main areas:
  - preparing and restructuring data ready for rendering
  - creating HTML forms for the data
  - receiving and processing submitted forms and data from the client

Building a Form

- Sample HTML form, to input your name.

```
<form action="/inp/" method="post">
    <label for="your_name">Username: </label>
    <input id="your_name" type="text" name="your_name"
        maxlength="100" >
    <input type="submit" value="OK">
</form>
```

- Components:
  - Data returned to URL /inp/ using POST
  - Text field labeled Username:
  - Button marked "OK"

Building a Django Form

- Create a Form subclass:

  from django import forms
  class NameForm(forms.Form):
  your_name = forms.CharField(max_length=100)

  – This defines a Form class with a single field (your_name).
    - Creates a text input field
    - Associates a label with this field
    - Sets a maximum length of 100 for the input field.

  – When rendered it will create the following HTML

  <label for="id_your_name">Your name: </label>
  <input id="id_your_name" type="text" name="your_name" maxlength="100" >

- NOTE: It does not include <form> </form> tags or submit button.

The Form Class

- ***Form class***: describes a form and determines how it works and appears.
  - Similar to how a model describes the logical structure of an object
- ***Form Field***: a form class's fields map to HTML form <input> elements.
  - A form's fields are themselves classes;
  - Fields manage form data and perform validation when a form is submitted.
  - A form field is represented in the browser as a HTML "widget"

Field Arguments

- ***Field.required*:** By default, each Field class assumes the value is required
  - empty value raises a ValidationError exception
- ***Field.label***: Specify the “human-friendly” label for this field.

  name = forms.CharField(label='Your name')
- ***Field.initial***: Specify initial value to use when rendering this Field in an unbound Form.

  name = forms.CharField(initial='John')
- ***Field.widget*:** Specify a Widget class to use when rendering this Field.
- ***Field.error_messages***: Override the default messages that the field will raise.
  - Pass in a dictionary with keys matching the error messages you want to override.

  name = forms.CharField(error_messages={'required': 'Please enter your name'})

  …

  ValidationError: [u'Please enter your name']
  - The default error message is: [u'This field is required.']

Form Fields

```
from django import forms
class NameForm(forms.Form):
    your_name =
            forms.CharField(max_length
            =100)
```

- You can access or alter the fields of a Form instance from its fields attribute.
  - Myname = f.fields[‘your_name']
  - f.fields[‘your_name'].label = "Username "

```
<label for=“id_your_name">Your name:
</label>
<input id=“id_your_name" type="text"
        name="your_name"
        maxlength="100" >
```

```
<label
for=“id_your_name">Username:
</label>
<input id=“id_your_name"
        type="text"
        name="your_name"
        maxlength="100" >
```

Widgets

- Each form field has associated Widget class
  - Corresponds to an HTML input element, such as **<input type="text">.**
  - Handles rendering of the HTML
  - Handles extraction of data from a GET/POST dictionary
  - Each field has a sensible default widget.
  - Example: CharField has default TextInput widget → produces an **<input type="text">** in the HTML.
  - BooleanField is represented by **<input type="checkbox">**
  - You can override the default widget for a field.

- *BooleanField*: Default widget: CheckboxInput; Empty value: False
- *CharField*: Default widget: TextInput; Empty value: ‘ ’ (empty string)
- *ChoiceField*: Default widget: Select; Empty value: ‘ ’ (empty string)
- *EmailField*: Default widget: EmailInput; Empty value: ‘ ’ (empty string).
- *IntegerField*: Default widget: TextInput (typically); Empty value: None
- *MultipleChoiceField*: Default widget: SelectMultiple; Empty value: [] (empty list).

Create ContactForm Class

- **Create** forms in your app's ***forms.py*** file.
- **Instantiate** the form in your app's ***views.py*** file;
  - In view function corresponding to URL where form to be published
- **Render** the form by passing it as context to a template.
- Consider a form with four fields:
  - **subject, message, sender, cc_myself.**
  - Each field has an associated field type.
    - Example: CharField, EmailField and BooleanField

```
from django import forms
class ContactForm(forms.Form):
  subject = forms.CharField(max_length=100)
  message = forms.CharField(widget=forms.Textarea)
  sender = forms.EmailField()
  cc_myself = forms.BooleanField(required=False)
```

Instantiate and Render a Form

- Steps in rendering an object:
  1. retrieve it from the *database* in the view
  2. pass it to the template ***context***
  3. create HTML using template variables
- Rendering a form is similar, except:
  - It makes sense to render an ***unpopulated*** form
  - When dealing with a form we typically instantiate it in the *view.*
    - process form if needed
  - Render the form:
    - pass it to the template ***context***
    - create HTML using template variables

Bound and Unbound Forms

- A Form instance can be i) **bound** to a set of data, or ii) **unbound**.
  - is_bound() method will tell you whether a form has data bound to it or not.
- An unbound form has no data associated with it.
  - When rendered, it will be empty or contain default values.
  - To create simply instantiate the class. e.g. **f = NameForm()**
- A bound form has submitted data,
    - Can render the form as HTML with the data displayed in the HTML.
  - To bind data to a form: Pass the data as a dictionary as the first parameter to your Form class constructor
    - The keys are the field names, correspond to the attributes in Form class.
    - The values are the data you're trying to validate.

      data = {'your_name': 'Saja'}

      form = NameForm (data)

    or

    form = ContactForm(request.POST)

The View

- Data sent back typically processed by same view which published the form
  - If form is submitted using POST: populate it with data submitted
  - If arrived at view with GET request: create an empty form instance;

```
from django.shortcuts import render
from django.http import HttpResponseRedirect
from myapp.forms import ContactForm

def contact(request):
    if request.method == 'POST': # if POST process submitted data

    # create a form instance;  populate with data from the request:
            form = ContactForm(request.POST)
            if form.is_valid():   # check whether it's valid:
              # process the data in form
               # ... return render(request, 'response.html', {'myform': form})
    else:
            form = ContactForm()  # if a GET  create a blank form
            return render(request, 'contact.html', {'myform': form})
```

A Sample Template

- Get your form into a template, using the context.
  - **return** render(request, 'contact.html', {'myform': form})
- If the form is called 'myform' in the context, use {{myform}} in template.
- NOTE: This will **not** render the <form> tags or the submit button
- The form can be rendered manually or using one of the options:
  - **form.as_table, form.as_p** or **form.as_ul**

```
<form action="/your-name/" method="post">
    {% csrf_token %}
    {{ myform }}
    <input type="submit" value="Submit" />
</form>
```

- The form's fields and their attributes will be unpacked into HTML markup from the {{ myform }} form variable.
- The csrf_token template tag provides an easy-to-use protection against Cross Site Request Forgeries

Rendering Options

```
from django import forms
class ContactForm(forms.Form):
    subject = forms.CharField(max_length=100)
    message = forms.CharField(widget=forms.Textarea)
    sender = forms.EmailField()
    cc_myself = forms.BooleanField(required=False)
```

- The name for each tag is from its attribute name.
  - The text label for each field is generated from the field name by converting all underscores to spaces and upper-casing the first letter. Default suffix is ':'
  - Example: cc_myself → 'Cc myself:'
  - These are defaults; you can also specify labels manually.
- Each text label is surrounded in an HTML <label> tag, which points to a form field via its id.
  - Its id is generated by prepending 'id_' to the field name.
- The id attributes and <label> tags are included in the output by default.
  - To change this, **set auto_id=False**

Rendering Forms

```
from django import forms
Class ContactForm(forms.Form):
  subject =
  forms.CharField(max_length=1
  00)
  message =
  forms.CharField(widget=forms.
  Textarea)
  sender = forms.EmailField()
  cc_myself =
  forms.BooleanField(required=F
  alse)
```

- Output of {{myform.as_p}}

```
<form action="/myapp/contact/" method="post">
  <p><label for="id_subject">Subject:</label>
    <input id="id_subject" type="text“ name="subject"
        maxlength="100" /></p>
  <p><label for="id_message">Message:</label>
    <input type="text" name="message" id=
        "id_message" /></p>
  <p><label for="id_sender">Sender:</label>
    <input type="email" name="sender"
        id="id_sender"/></p>
  <p><label for="id_cc_myself">Cc myself:</label>
    <input type="checkbox" name="cc_myself"
        id="id_cc_myself" /></p>
<input type="submit" value="Enter Contact Info" />
</form>
```

Form Validation

- ***Form.is_valid()*** : A method used to validate form data.
  - bound form: runs validation and returns a boolean (**True** or **False**) designating whether the data was valid. Generates myform.errors attribute.
  - unbound form: always returns **False**; myform.errors = { }

- The validated form data will be in the myform.cleaned_data dictionary.
  - includes a key-value for ***all*** fields; even if the data didn't include a value for some optional fields.
  - Data converted to appropriate Python types
    - Example: IntegerField and FloatField convert values to Python int and float respectively.

Validated Field Data

```
>>> data = {'subject': 'hello',
            'message': 'Hi there',
            'sender': 'foo@example.com',
            'cc_myself': True}
>>> myform = ContactForm(data)
>>> myform.is_valid()
True
>>> myform.cleaned_data
{'cc_myself': True,
 'message': u'Hi there',
 'sender': u'foo@example.com',
 'subject': u'hello'}
```

- The values in **cleaned_data** can be assigned to variables and used in the view function.

```
if myform.is_valid():
    subj= myform.cleaned_data['subject']
    msg= myform.cleaned_data['message']
    sender = myform.cleaned_data['sender']
    cc = myform.cleaned_data['cc_myself']

    return HttpResponseRedirect('/thanks/')
```

Form Validation – if Errors Found

- Django automatically displays suitable error messages.
  - ***f.errors*:** An attribute consisting of a ***dict*** of error messages.

    form's data validated first time either you call is_valid() or access errors attribute.
  - ***f.non_field_errors()*:** A method that returns the list of errors from f.errors not associated with a particular field.
  - ***f.name_of_field.errors***: a list of form errors for a specific field, rendered as an unordered list.

    E.g. form.sender.errors() → [u'Enter a valid email address.']

Displaying Errors

- Rendering a *bound* **Form** object automatically runs the form's validation
  - HTML output includes validation errors as a <ul class="errorlist"> near the field.
  - The particular positioning of the error messages depends on the output method.

```
>>> data = {'subject': '', 'message': 'Hi there', 'sender': 'invalid email format',
                                   'cc_myself': True}
>>> f = ContactForm(data, auto_id=False)
>>> print(f.as_p ())
```

```
<p><ul class="errorlist"><li>This field is required.</li></ul></p>
<p>Subject: <input type="text" name="subject" maxlength="100" /></p>
<p>Message: <input type="text" name="message" value="Hi there" /></p>
<p><ul class="errorlist"><li>Enter a valid email address.</li></ul></p>
<p>Sender: <input type="email" name="sender" value="invalid email address"
    /></p>
<p>Cc myself: <input checked="checked" type="checkbox" name="cc_myself"
    /></p>
```

ModelForm

- ***ModelForm*:** a helper class to create a **Form** class from a Django **Model**.
  - –The generated Form class will have a form field for every model field
    - –the order specified in the fields attribute.
  - –Each model field has a corresponding default form field.
    - –Example: **CharField** on model → **CharField** on form.
    - – **ForeignKey** represented by **ModelChoiceField:** a ChoiceField whose choices are a model QuerySet.
    - – **ManyToManyField** represented by **ModelMultipleChoiceField:** a MultipleChoiceField whose choices are a model QuerySet.
    - – If the model field has blank=True, then required = False .
    - – The field's label is set to the verbose_name of the model field, with the first character capitalized.
    - – If the model field has choices set, then the form field's widget will be set to Select, with choices coming from the model field's choices.

ModelForm Example

```
class Book(models.Model):
    title = models.CharField(max_length=100)
    length = models.IntegerField()
    pub_date = models.DateField()

from django.forms import ModelForm
from myapp.models import  Book

# Create the form class.
class BookForm(ModelForm):
        class Meta:
                model = Book
                fields = ['title', 'pub_date', 'length']

# Creating a form to add a book
form = BookForm()

# Create form to change book in db.
book = Book.objects.get(pk=1)
form = BookForm(instance=book)
```

ModelForm Example

```
from django.db import models
PROV_CHOICES = ( (‘ON', ‘Ontario.'), (‘AB', ‘Alberta.'), (‘QC', ‘Quebec.'), )
class Author(models.Model):
    name = models.CharField(max_length=100)
    prov = models.CharField(max_length=3, choices=PROV_CHOICES)
    birth_date = models.DateField(blank=True, null=True)

class Book(models.Model):
title = models.CharField(max_length=100)
authors =models.ManyToManyField(Author)
```

```
from django.forms import ModelForm
class AuthorForm(ModelForm):
    class Meta:
        model = Author
        fields = ['name', ‘prov', 'birth_date']

class BookForm(ModelForm):
    class Meta:
        model = Book
        fields = [‘title', 'authors']
```

Form vs ModelForm Examples

```
from django.forms import
    ModelForm
class AuthorForm(ModelForm):
    class Meta:
        model = Author
        fields = ['name', ‘prov',
        'birth_date']

class BookForm(ModelForm):
    class Meta:
         model = Book
        fields = [‘title', 'authors']
```

```
from django import forms
class AuthorForm(forms.Form):
    name =
    forms.CharField(max_length=100)
    prov = forms.CharField(max_length=3,
        widget=forms.Select(choices=PROV
        _CHOICES))
    birth_date =
    forms.DateField(required=False)

class BookForm(forms.Form):
    title =
        forms.CharField(max_length=100)
    authors =
        forms.ModelMultipleChoiceField(
        queryset=Author.objects.all())
```

save() Method

- ***save() method:*** This method creates and saves a database object from the data bound to the form.
  - can accept an existing model instance as the keyword argument instance.
    - If this is supplied, save() will update that instance.
    - Otherwise, save() will create a new instance of the specified model
  - accepts an optional commit keyword argument (either True or False); commit=True by default.
    - If commit=False, then it will return an object that hasn't yet been saved to the database.
    - In this case, it's up to you to call save() on the resulting model instance.

ModelForm Validation

- Validation is triggered
  - implicitly when calling is_valid() or accessing the errors attribute
- Calling save() method can trigger validation, by accessing errors attribute
  - A ValueError is raised if form.errors is True.

Summary

- Django Forms
  - The Form Class
  - Fields and Widgets
- Rendering Forms
  - Validating Forms
  - Error messages
- ModelForm
  - Saving and validating ModelForms

- [1] https://docs.djangoproject.com/en/3.0/topics/forms/