

AN INTRODUCTION TO SYMFONY 3
(for people that already know OO-PHP and some MVC stuff)

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Acknowledgements

Thanks to ...

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Part I

Introduction to Symfony

1

Introduction

1.1 What is Symfony 3?

It's a PHP 'framework' that does loads for you, if you're writing a secure, database-drive web application.

1.2 How to I need on my computer to get started?

I recommend you install the following:

- PHP 7 (on windows [Laragon](#) works pretty well)
- a MySQL database server (on windows [Laragon](#) works pretty well)
- a good text editor (I like [PHPStorm](#), but then it's free for educational users...)
- [Composer](#) (PHP package manager - on windows [Laragon](#) works pretty well)

or ... you could use something like [Cloud9](#), web-based IDE. You can get started on the free version and work from there ...

1.3 How to I get started?

Either:

- install the Symfony command line installed, then create a project like this (to create a new project in a directory named `project01`):

```
$ symfony new project01
```

or

- use Composer to create a new blank project for you, like this (to create a new project in a directory named `project01`):

```
$ composer create-project symfony/framework-standard-edition project01
```

Learn about both these methods at the [Symfony download-installer page](#) and the [Symfony setup page](#)

or

- download one of the projects accompanying this book

1.4 Where are the projects accompanying this book?

There are on Github:

- <https://github.com/dr-matt-smith/php-symfony3-book-codes>

Download a project (e.g. `git clone URL`), then type `composer update` to download 3rd-party packages into a `/vendor` folder.

1.5 How to I run a Symfony webapp?

1.5.1 From the CLI

If you're not using a database engine like MySQL, then you can use the Symfony console command to 'serve up' your Symfony project from the command line

At the CLI (command line terminal) ensure you are at the base level of your project (i.e. the same directory that has your `composer.json` file), and type the following:

```
$ php bin/console server:run
```

1.5.2 Webserver

If you are running a webserver (or combined web and database server like XAMPP or Laragon), then point your web server root to the `/web` folder - this is where public files go in Symfony projects.

1.5.3 Problem Solving

If you have trouble with running Symfony, take a look at Appendix [?], which lists some common issues and how to solve them.

2

First steps

2.1 It isn't working

If you don't get the default Symfony home page, try this:

- copy the contents of `/web/app_dev.php` into `/web/app.php`

WARNING - this is just for now (we'll learn property Symfony configuration later). But this should get you going for now. You should NEVER do this for a project that might actually end up as a public production site!

2.2 All I get is the symfony home page (project01)

Figure 2.1 is your basic, default Symfony home page if everything is up and running for a new Symfony project.

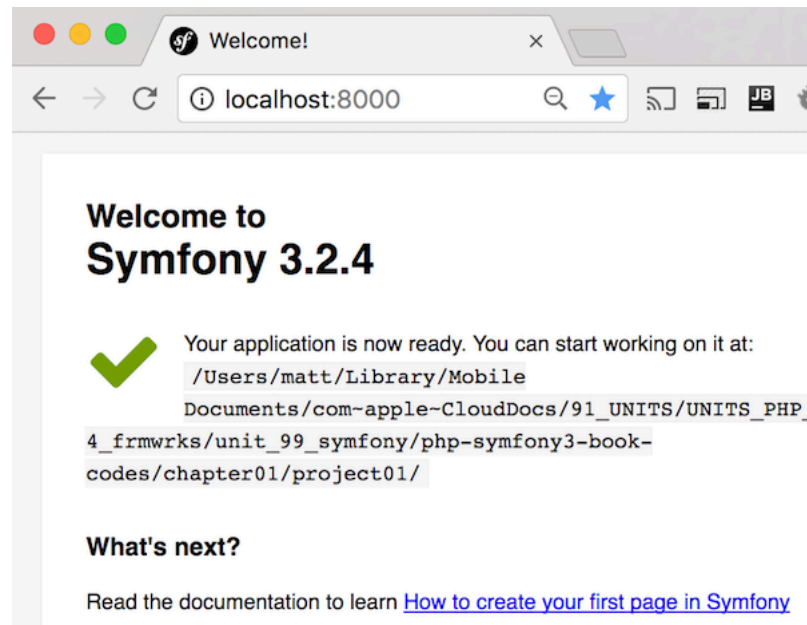


Figure 2.1: New Symfony project home page.

2.3 What we'll make (project02)

See Figure 2.2 for a screenshot of the new homepage we'll create this chapter.

There are 3 things Symfony needs to serve up a page (with the Twig templating system):

1. a route
2. a controller class and method
3. a Twig template

The first 2 can be combined, through the use of 'Annotation' comments, which declare the route in a comment immediately before the controller method defining the 'action' for that route, e.g.:

```
/**
 * @Route("/students/list")
 */
public function listAction(Request $request)
{
    $studentRepository = new StudentRepository();
    $students = $studentRepository->getAll();

    $argsArray = [
        'students' => $students
    ];
}
```

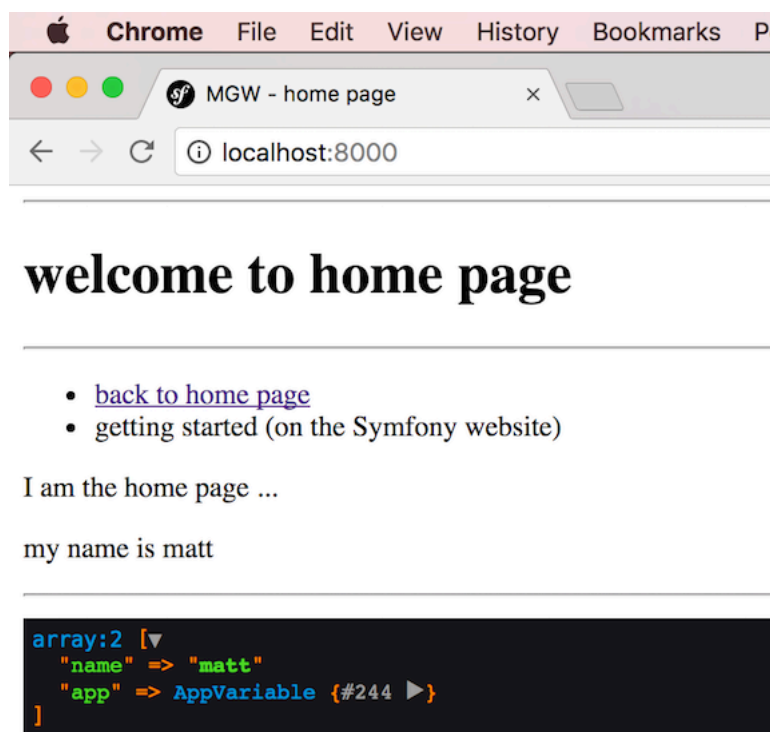


Figure 2.2: New home page.

```

$templateName = 'students/list';
return $this->render($templateName . '.html.twig', $argsArray);
}

```

The last (Twig template) can be a single file, and a simpler template that ‘extends’ a base template (which has all the standard doctype, css, js and core HTML structure in it).

If don’t know much about Twig then go off and learn it (you can learn it stand alone, with a simple micro-framework like Silex, and as part of learning Symfony).

2.4 First - get rid of all that default page stuff

We’ll stick with the single `AppBundle` that we get provided with a new Symfony project (most logic goes into a ‘bundle’, we only need one for now).

A new Symfony project places its `DefaultController` at this location:

```
/src/AppBundle/Controller/DefaultController.php
```

Figure 2.3 shows the `DefaultController.php` in this location.

Let’s clear out the content of the controller, so there is no code in the body of the `indexAction()` method:

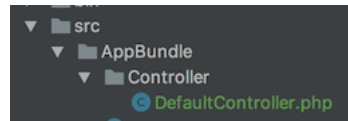


Figure 2.3: Location of Controller classes.

```

class DefaultController extends Controller
{
    /**
     * @Route("/", name="homepage")
     */
    public function indexAction(Request $request)
    {
    }
}

```

NOTES: - leave all the ‘uses’ statements and the namespace, since they mean any classes we refer to, or annotations we use, all work correctly - leave the `Route` annotation comment there, since what we are about to write will be what we want to happen for a request for the website home page (i.e. the web root URL of / for our webapp) - also leave the `name="homepage"` part of the annotation route comment, since naming routes is very handy since it makes getting Twig to create links very easy

We want to use the template `index.html.twig`, since they all end in `.html.twig` let’s concatenate that on later

```
$templateName = 'index';
```

Twig templates expect to be given an associative array of any special data for the template, so let’s illustrate this by passing a parameter `name` with your name (I’m Matt, so that will be my name parameter’s value!):

```

$argsArray = [
    'name' => 'matt'
];

```

There is nothing magic about the array identifier `$argsArray` - it’s just a habit I’ve got into when teaching Twig to my students - so change this (and anything - it’s **your** project) to become more confident with working with the different bits of Symfony.

Symfony’s `Controller` class offers a handy method `render()` with accesses the Twig service in the Symfony application, so we can just invoke this method passing the template name (and appending the `.html.twig` string), and the array of arguments:

```

/**
 * @Route("/", name="homepage")
 */

```

```

public function indexAction(Request $request)
{
    $argsArray = [
        'name' => 'matt'
    ];

    $templateName = 'index';
    return $this->render($templateName . '.html.twig', $argsArray);
}

```

Note that this final statement is a **return** statement. Basically any web application received (and interprets the contents of) an HTTP ‘request’, and builds and sends back an HTTP ‘response’. The way Symfony (and most MVC webapps) work is that the controller method invoked for a given route has the responsibility of building and returning a ‘response’ (or sometimes just the text ‘content’ of a response, and the MVC application will build an HTTP response around that text content).

2.5 Our 2 Twig templates (`_base.html.twig` and `index.html.twig`)

Twig templates are located in this directory:

```
/app/Resources/views
```

Delete everything in this directory (more of that default homepage stuff that we get with a new Symfony project). We’ll create our own Twig templates from scratch in this location next.

Figure 2.4 shows the 2 templates we are about to create in this location.

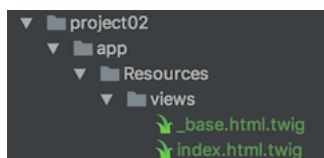


Figure 2.4: Location of Twig templates.

Here is our `_base.html.twig` template for a well-formed HTML 5 page¹:

```

<!DOCTYPE html>
<html>
  <head>
    <meta charset="UTF-8" />
    <title>MGW - {% block pageTitle %}{% endblock %}</title>
    {% block stylesheets %}{% endblock %}

```

¹NOTE - if you want to see the FANTASTICALLY useful Symfony debug toolbar, your pages must render a well-formed HTML document (with doctype, head, body etc.). Using a base Twig template is the simplest way to do this usually.

```
</head>
<body>

<hr>
    {% block body %}
    {% endblock %}

    {% block javascripts %}{% endblock %}
</body>
</html>
```

There is nothing magic about the array identifier `_base.html.twig` - a habit (I've copied from some project I saw years ago) is to prefix Twig templates if they are a base template (such as this one), or if they are a 'partial' page template (e.g. generating a navbar or side bar). Giving a bunch of files the same preix character means that they'll all be grouped together when listed alphabetically. Another approach is to create a directory (e.g. `/partials`) and put them all in there...

Here is the template for our index page, `index.html.twig`:

```
{% extends '_base.html.twig' %}
{% block pageTitle %}home page{% endblock %}

{% block body %}
    <h1>welcome to home page</h1>
    <ul>
        <li>
            <a href="{{ path('homepage') }}">back to home page</a>
        </li>
        <li>
            <a href="http://symfony.com/doc/current/page_creation.html">
                getting started (on the Symfony website)</a>
        </li>
    </ul>

    <p>
        I am the home page ...
    <br>
        my name is {{ name }}
    </p>
    {{ dump() }}
{% endblock %}
```

Some interesting bits in this template:

- the Twig dump command `{{ dump() }}` is very handy, it let's us see a full dump of all the variables Twig has been passed. Both those we explicitly pass like `name`, plus the `app` variable, that let's Twig get access to things like the sessions variables etc.a
- also we see how we can use the route 'name' in Twig to generate an URL for that route. The example in this template is

2.6 See list of all routes

We can use another of Symfony's CLI commands to see a list of all routes - we should see our `homepage` root in that list: ``. Twig can also pass values for routes that expect parameters such as object IDs etc.

```
php bin/console debug:router
```

We can see there are lots of special routes (many to do with the debugging Symfony profiler). At the end is our homepage route - yah!

Figure 2.5 shows the list of routes we get after entering this statement at the command line.

```
matt@matts-MacBook-Pro project01 (master) $ php bin/console debug:router
```

Name	Method	Scheme	Host	Path
_wdt	ANY	ANY	ANY	/_wdt/{token}
_profiler_home	ANY	ANY	ANY	/_profiler/
_profiler_search	ANY	ANY	ANY	/_profiler/search
_profiler_search_bar	ANY	ANY	ANY	/_profiler/search_bar
_profiler_info	ANY	ANY	ANY	/_profiler/info/{about}
_profiler_phpinfo	ANY	ANY	ANY	/_profiler/phpinfo
_profiler_search_results	ANY	ANY	ANY	/_profiler/{token}/search/results
_profiler_open_file	ANY	ANY	ANY	/_profiler/open
_profiler	ANY	ANY	ANY	/_profiler/{token}
_profiler_router	ANY	ANY	ANY	/_profiler/{token}/router
_profiler_exception	ANY	ANY	ANY	/_profiler/{token}/exception
_profiler_exception_css	ANY	ANY	ANY	/_profiler/{token}/exception.css
_twig_error_test	ANY	ANY	ANY	/_error/{code}.{_format}
homepage	ANY	ANY	ANY	/

Figure 2.5: List of all routes.

3

Creating our own classes

3.1 What we'll make (project03)

See Figure 3.1 for a screenshot of the students list page we'll create this chapter.

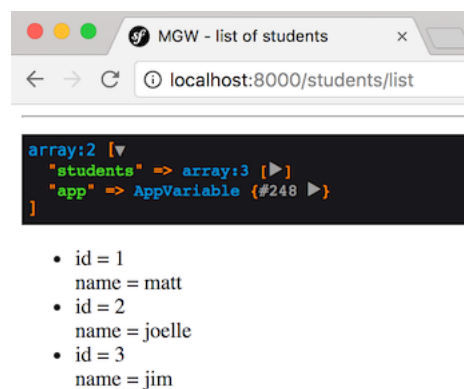


Figure 3.1: Students lists page.

3.2 A collection of Student records

Although we'll be moving on to use a MySQL database soon for persistent data storage, let's start off with a simple DIY (Do-It-Yourself) situation of an entity class (**Student**) and a class to work with collections of those entities (**StudentRepository**).

We can then pass an array of `Student` records to a Twig template and loop through to display them one-by-one.

Here is our `Student.php` class:

```
class Student
{
    private $id;
    private $name;

    public function __construct($id, $name){
        $this->id = $id;
        $this->name = $name;
    }

    public function getId()
    {
        return $this->id;
    }

    public function getName()
    {
        return $this->name;
    }
}
```

So each student has simply an 'id' and a 'name', with public getters for each and a constructor.

Here is our `StudentRepository` class:

```
class StudentRepository
{
    private $students = [];

    public function __construct()
    {
        $s1 = new Student(1, 'matt');
        $s2 = new Student(2, 'joelle');
        $s3 = new Student(3, 'jim');
        $this->students[] = $s1;
        $this->students[] = $s2;
        $this->students[] = $s3;
    }
}
```

```
public function getAll()
{
    return $this->students;
}
}
```

So our repository has a constructor which hard-codes 3 `Student` records and adds them to its array. There is also the public method `getAll()` that returns the array.

The simplest location for our own classes at this point in time, is in the onl ‘bundle’ we have, the `AppBundle`. So we can declare our PHP class files in directry `/src/AppBundle`. Figure 3.2 shows the `DefaultController.php` in this location.

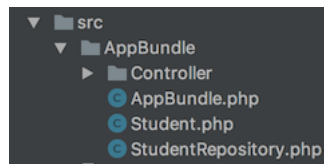


Figure 3.2: Location of `Student` and `StudentRepository` classes.

Following the way Symfonhy projects use the PSR-4 namespacing system, we will namespace the class with exactly the same name as the directory they are located in.

```
namespace AppBundle;

class Student
{
    ... etc.
}
```

3.3 Using `StudentRepository` in a controller

Since we now have created our namespaced classes we can use them in a controller. Let’s create a new controller to work with requests relating to `Student` objects. We’ll name this `StudentController` and locate it in `/src/AppBundle/Controller` (next to our existing `DefaultController`).

Here is the listing for `StudentController.php` (note we need to add a `use` statement so that we can refer to class `StudentRepository`):

```
use AppBundle\StudentRepository;

class StudentController extends Controller
{
    /**
     * @Route("/students/list")
```

```

    */
    public function listAction(Request $request)
    {
        $studentRepository = new StudentRepository();
        $students = $studentRepository->getAll();

        $argsArray = [
            'students' => $students
        ];

        $templateName = 'students/list';
        return $this->render($templateName . '.html.twig', $argsArray);
    }
}

```

We can see from the above that we have declared a controller method `listAction` in our `StudentController`. We can also see that this controller action will be invoked when the webapp receives a HTTP request with the route pattern `/students/list`.

The logic executed by the method is to get the array of `Student` records from an instance of `StudentRepository`, and then to pass this array to be rendered by the Twig template `students/list.html.twig`.

3.4 Creating the Twig template to loop to display all students

We will now create the Twig template `list.html.twig`, in location `app/Resources/views/students`.

Figure 3.3 shows the 2 templates we are about to create in this location.

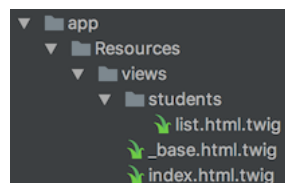


Figure 3.3: Location of Twig template `list.html.twig`.

```

{% extends '_base.html.twig' %}

{% block pageTitle %}list of students{% endblock %}

{% block body %}

```

```
{% dump() %}  
  
<ul>  
  {% for student in students %}  
    <li>  
      id = {% student.id %}  
      <br>  
      name = {% student.name %}  
    </li>  
  {% endfor %}  
</ul>  
  
{% endblock %}
```


Part II

Symfony and Databases

4

Doctrine the ORM

4.1 What is an ORM?

The acronym ORM stands for:

- O: Object
- R: Relational
- M: Mapping

In a nutshell projects using an ORM mean we write code relating to collections of related **objects**, without having to worry about the way the data in those objects is actually represented and stored via a database or disk filing system or whatever. This is an example of ‘abstraction’ - adding a ‘layer’ between one software component and another. DBAL is the term used for separating the database interactions completed from other software components. DBAL stands for:

- DataBase
- Abstraction
- Layer

With ORMs we can interactive (CRUD¹) with persistent object collections either using methods of the object repositories (e.g. `findAll()`, `findOneById()`, `delete()` etc.), or using SQL-lite languages. For example Symfony uses the **Doctrine** ORM system, and that offers **DQL**, the Doctrine Query Language.

You can read more about ORMs and Symfony at:

¹CRUD = Create-Read-Update-Delete

- [Doctrine project's ORM page](#)
- [Wikipedia's ORM page](#)
- (Symfony's Doctrine help pages)[<http://symfony.com/doc/current/doctrine.html>]

4.2 Quick start

Once you've learnt how to work with Entity classes and Doctrine, these are the 3 commands you need to know:

1. `doctrine:database:create`
2. `doctrine:database:migrate` (or possibly `doctrine:schema:update --force`)
3. `doctrine:fixtures:load`

This should make sense by the time you've reached the end of this chapter.

4.3 Setting up the database credentials

The simplest way to connect your Symfony application to a MySQL database is by creating/editing the `parameters.yml`

```
# This file is auto-generated during the composer install
parameters:
    database_host: 127.0.0.1
    database_port: null
    database_name: symfony_book
    database_user: root
    database_password: null
```

This file is located in:

```
/app/config/parameters.yml
```

Note that this file is include in the `.gitignore`, so it is **not** archived in your Git folder. Usually we need different parameter settings for different deployments, so while on your local, development machine you'll have certain settings, you'll need different settings for your public production 'live' website. Plus you don't want to accidently publically expose your database credentials on a open source Github page :-)

If there isn't already a `parameters.yml` file, then you can copy the `parameters.yml.dist` file and edit it as appropriate. You can replace `127.0.0.1` with `localhost` if you wish. If your code cannot connect to the database check the 'port' that your MySQL server is running at (usually 3306 but may be different, for example my Mac MAMP server uses 8889 for MySQL for some reason). So my parameters look like this:

```
parameters:
    database_host:    127.0.0.1
    database_port:    8889
    database_name:    symfony_book
    database_user:    symfony
    database_password: pass
```

We can now use the Symfony CLI to **generate** the new database for us. You've guessed it, we type:

```
$ php bin/console doctrine:database:create
```

You should now see a new database in your DB manager. Figure 4.1 shows our new `symfony_book` database created for us.

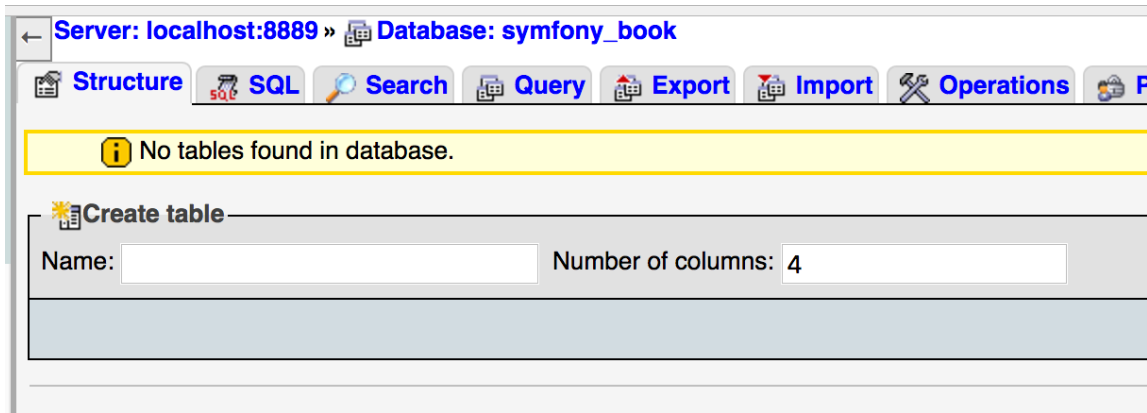


Figure 4.1: CLI created database in PHPMysqlAdmin.

NOTE Ensure your database server is running before trying the above, or you'll get an error like this:

```
[PDOException] SQLSTATE[HY000] [2002] Connection refused
```

now we have a database it's time to start creating tables and populating it with records ...

5

Working with Entity classes

5.1 A Student entity class

Doctrine expects to find entity classes in a directory named **Entity**, so let's create one and move our **Student** class there. We can also delete class **StudentRepository** since Doctrine will create repository classes automatically for our entities (which we can edit if we need to later to add project-specific methods).

Do the following:

1. create directory `/src/AppBundle/Entity`
2. move class **Student** to this new directory
3. delete class **StudentRepository**

We also need to add to the namespace inside class **Student**, changing it to **AppBundle\Entity**. We also need to remove all methods, since Doctrine will create getter and setters etc. automatically. So edit class **Student** to look as follows, i.e. just listing the properties 'id' and 'name':

```
namespace AppBundle\Entity;

class Student
{
    private $id;
    private $name;
}
```

5.2 Using annotation comments to declare DB mappings

We need to tell Doctrine what table name this entity should map to, and also confirm the data types of each field. We'll do this using annotation comments (although this can be also be declare in separate YAML or XML files if you prefer). We need to add a `use` statement and we define the namespace alias `ORM` to keep our comments simpler.

Our first comment is for the class, stating that it is an ORM entity and mapping it to database table `students`:

```
namespace AppBundle\Entity;

use Doctrine\ORM\Mapping as ORM;

/**
 * @ORM\Entity
 * @ORM\Table(name="students")
 */
class Student
```

5.3 Declaring types for fields

We now use annotations to declare the types (and if appropriate, lengths) of each field. Also for the 'id' we need to tell it to `AUTO_INCREMENT` this special field.

```
/**
 * @ORM\Column(type="integer")
 * @ORM\Id
 * @ORM\GeneratedValue(strategy="AUTO")
 */
private $id;

/**
 * @ORM\Column(type="string", length=100)
 */
private $name;
```

5.4 Valdiate our annotations

We can now validate these values. This command performs 2 actions, it checks our annotation comments, it also checks whether these match with the structure of the table the database system.

Of course, since we haven't yet told Doctrine to create the actual database table, this second check will fail at this point in time.

```
$ php bin/console doctrine:schema:validate
```

The output should be something like this (if our comments are valid):

```
[Mapping] OK - The mapping files are correct.
[Database] FAIL - The database schema is not in sync with the current mapping file.
```

5.5 Generating getters and setters

We can tell Doctrine to complete the creation of the entity class with the `generate:entities` command:

```
php bin/console doctrine:generate:entities AppBundle/Entity/Student
```

We can also add our **own** logic to the entity class, for any special getters etc.

You can tell Doctrine to generate all entities for a given 'bundle' (but ?? it may overwrite any edits you've made to entites¹)

```
$ php bin/console doctrine:generate:entities AppBundle
```

So we now have getters and setters (no setter for ID since we don't change the AUTO INCREMENTED db ID value) added to our class `Student`:

```
/**
 * Get id
 *
 * @return integer
 */
public function getId()
{
    return $this->id;
}

/**
 * Set name
 *
 * @param string $name
 *
 * @return Student
 */
```

¹NOTE TO SELF - CHECK THIS WHEN YOU HAVE A CHANCE

```

public function setName($name)
{
    $this->name = $name;
    return $this;
}

/**
 * Get name
 *
 * @return string
 */
public function getName()
{
    return $this->name;
}

```

5.6 Creating tables in the database

Now our entity `Student` is completed, we can tell Doctrine to create a corresponding table in the database (or ALTER the table in the database if one previously existed):

```
$ php bin/console doctrine:schema:update --force
```

if all goes well you'll see a couple of confirmation messages after entering the command above:

```

Updating database schema...
Database schema updated successfully! "1" query was executed
$

```

You should now see a new table in the database in your DB manager. Figure 5.1 shows our new `students` table created for us.

	#	Name	Type	Collation	Attributes	Null	Default	Extra
<input type="checkbox"/>	1	id	int(11)			No	None	AUTO_INCREMENT
<input type="checkbox"/>	2	name	varchar(100)	utf8_unicode_ci		No	None	

Figure 5.1: CLI created table in PHPMYAdmin.

5.7 Generating entities from an existing database

Doctrine allows you to generate entities matching tables in an existing database. Learn about that from the Symfony documentation pages:

- [Symfony docs on inferring entities from existing db tables](#)

6

Symfony approach to database CRUD

6.1 Creating new student records

Let's add a new route and controller method to our `StudentController` class. This will define the `createAction()` method that receives parameter `$name` extracted from the route `/students/create/{name}`. Write the method code as follows:

```
/**
 * @Route("/students/create/{name}")
 */
public function createAction($name)
{
    $student = new Student();
    $student->setName($name);

    // entity manager
    $em = $this->getDoctrine()->getManager();

    // tells Doctrine you want to (eventually) save the Product (no queries yet)
    $em->persist($student);

    // actually executes the queries (i.e. the INSERT query)
    $em->flush();
}
```

```

return new Response('Created new student with id '.$student->getId());
}

```

The above now means we can create new records in our database via this new route. So to create a record with name **matt** just visit this URL with your browser:

`http://localhost:8000/students/create/matt`

Figure 6.1 shows how a new record **freddy** is added to the database table via route `/students/create/{name}`.

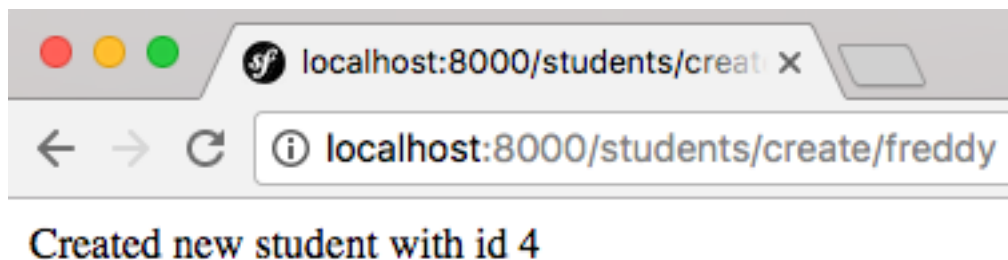


Figure 6.1: Creating new student via route `/students/create/{name}`.

We can see these records in our database. Figure 6.2 shows our new **students** table created for us.

				id	name
<input type="checkbox"/>	Edit	Copy	Delete	1	matt
<input type="checkbox"/>	Edit	Copy	Delete	2	joelle
<input type="checkbox"/>	Edit	Copy	Delete	3	joe
<input type="checkbox"/>	Edit	Copy	Delete	4	freddy

Figure 6.2: Controller created records in PHPMYAdmin.

6.2 Updating the `listAction()` to use Doctrine

Doctrine creates repository objects for us. So we change the first line of method `listAction()` to the following:

```

$studentRepository = $repository = $this->getDoctrine()->getRepository('AppBundle:Student');

```

Doctrine repositories offer us lots of useful methods, including:

```

// query for a single record by its primary key (usually "id")
$student = $repository->find($id);

```

```
// dynamic method names to find a single record based on a column value
$student = $repository->findOneById($id);
$student = $repository->findOneByName('matt');

// find *all* products
$students = $repository->findAll();

// dynamic method names to find a group of products based on a column value
$products = $repository->findByPrice(19.99);
```

So we need to change the second line of our method to use the `findAll()` repository method:

```
$students = $studentRepository->findAll();
```

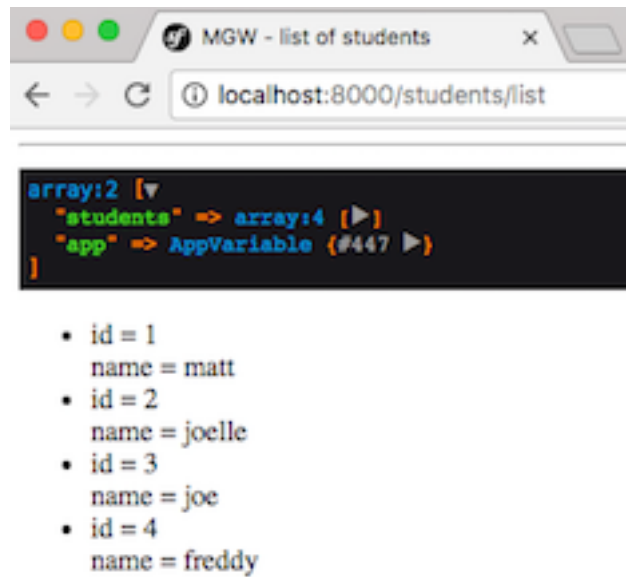
Our `listAction()` method now looks as follows:

```
public function listAction(Request $request)
{
    $studentRepository = $this->getDoctrine()->getRepository('AppBundle:Student');
    $students = $studentRepository->findAll();

    $argsArray = [
        'students' => $students
    ];

    $templateName = 'students/list';
    return $this->render($templateName . '.html.twig', $argsArray);
}
```

Figure 6.3 shows how a new record `freddy` is added to the database table via route `/students/create/{name}`.

Figure 6.3: Listing all database student records with route `/students/list`.

6.3 Deleting by id

Let's define a delete route `/students/delete/{id}` and a `deleteAction()` controller method. This method needs to first retrieve the object (from the database) with the given ID, then ask to remove it, then flush the changes to the database (i.e. actually remove the record from the database). Note in this method we need both a reference to the entity manager `$em` and also to the student repository object `$studentRepository`:

```
/**
 * @Route("/students/delete/{id}")
 */
public function deleteAction($id)
{
    // entity manager
    $em = $this->getDoctrine()->getManager();
    $studentRepository = $this->getDoctrine()->getRepository('AppBundle:Student');

    // find thge student with this ID
    $student = $studentRepository->find($id);

    // tells Doctrine you want to (eventually) delete the Student (no queries yet)
    $em->remove($student);

    // actually executes the queries (i.e. the INSERT query)
```

```
$em->flush();

return new Response('Deleted student with id '.$id);
}
```

6.4 Updating given id and new name

We can do something similar to update. In this case we need 2 parameters: the id and the new name. We'll also follow the Symfony examples (and best practice) by actually testing whether or not we were successful retrieving a record for the given id, and if not then throwing a 'not found' exception.

```
/**
 * @Route("/students/update/{id}/{newName}")
 */
public function updateAction($id, $newName)
{
    $em = $this->getDoctrine()->getManager();
    $student = $em->getRepository('AppBundle:Student')->find($id);

    if (!$student) {
        throw $this->createNotFoundException(
            'No student found for id '.$id
        );
    }

    $student->setName($newName);
    $em->flush();

    return $this->redirectToRoute('homepage');
}
```

Until we write an error handler we'll get Symfony style exception pages, such as shown in Figure 6.4 when trying to update a non-existent student with id=99.

Note, to illustrate a few more aspects of Symfony some of the coding in `updateAction()` has been written a little differently:

- we are getting the reference to the repository via the entity manager `$em->getRepository('AppBundle:Student')`
- we are 'chaining' the `find($id)` method call onto the end of the code to get a reference to the repository (rather than storing the repository object reference and then invoking `find($id)`). This is an example of using the 'fluent' interface¹ offered by Doctrine (where methods finish

¹read about it at [Wikipedia](#)

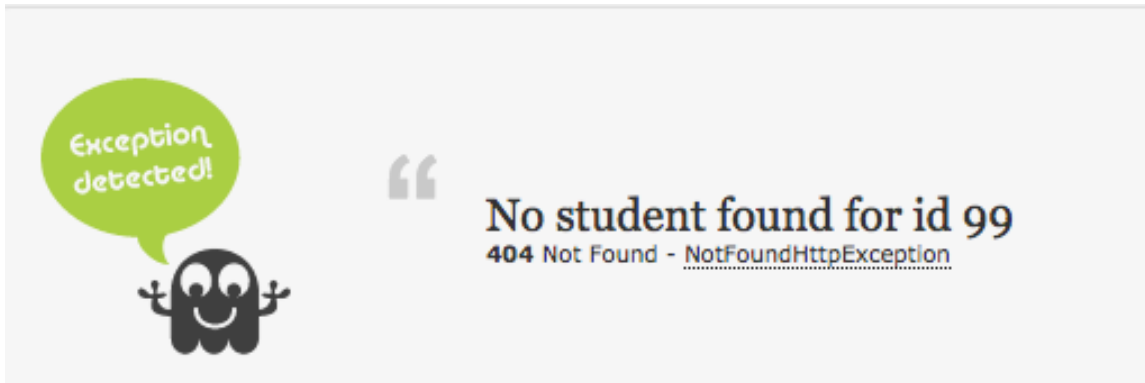


Figure 6.4: Listing all database student records with route `/students/list`.

by returning an reference to their object, so that a sequence of method calls can be written in a single statement.

- rather than returning a `Response` containing a message, this controller method redirect the webapp to the route named `homepage`

We should also add the ‘no student for id’ test in our `deleteAction()` method ...

6.5 Creating the CRUD controller automatically from the CLI

Here is something you might want to look into ...

```
$ php app/console generate:doctrine:crud --entity=AppBundle:Student --format=annotation --wi
```


7

Completing CRUD and linking things together

7.1 Show one record (given id)

Let's add a final method to read (the 'R' in CRUD!) and show a single record to the user.

```
/**
 * @Route("/students/show/{id}", name="students_show")
 */
public function showAction($id)
{
    $em = $this->getDoctrine()->getManager();
    $student = $em->getRepository('AppBundle:Student')->find($id);

    if (!$student) {
        throw $this->createNotFoundException(
            'No student found for id '.$id
        );
    }

    $argsArray = [
        'student' => $student
    ];

    $templateName = 'students/show';
    return $this->render($templateName . '.html.twig', $argsArray);
}
```

```
}
```

We have named the route `students_show`. In fact we should go back and name *all* the routes we've just created controller methods for.

Our show method does the following:

- attempts to find a record for the given id (we get since we've an id in the route pattern, and a correspondingly named parameter for our method)
- throws an exception if no record could be found for that id
- creates a Twig argument array containing a single item containing our student record
- returns the Response created by rendering the `students/show.html.twig` template

7.2 Our template

We now need to create the `students/show.html.twig` template. This will be created in `app/Resources/views/students`:

```
{% extends '_base.html.twig' %}

{% block pageTitle %}show one student{% endblock %}

{% block body %}

<h1>Show one student</h1>

<p>
id = {{ student.id }}

<p>
name = {{ student.name }}

<hr>
<a href="{{ path('students_list') }}">list of students</a>

{% endblock %}
```

This template does the following:

- extends the base template and defines a page title
- shows a level 1 heading, and paragraphs for the id and name
- offers a link back to the list of students (using the route name `students_list`)

So we'd better ensure the `listAction()` controller method names its path with this identifier:

```
/**
 * @Route("/students/list", name="students_list")
 */
public function listAction(Request $request)
{
    ... etc
}
```

7.3 Making each name in the list be a link to its show page

Let's update our list template so that each name is itself a link to the show page (giving the id of each record).

A first attempt could be like this:

```
<a href="{{ path('students_show') }}/{{ student.id }}">
    {{ student.name }}
</a>
```

But we get a Symfony error when we attempt to display this list page, complaining:

An exception has been thrown during the rendering of a template ("Some mandatory parameters are missing ("). Symfony can't see that we're trying to add on the id after the show route. So we need to pass the id parameter inside the Twig `path()` function as follows:

```
<a href="{{ path('students_show', {id:student.id}) }}">
    {{ student.name }}
</a>
```

There are lots of round and curly brackets all over the place, but try to remember that `path()` is a Twig function, taking the route name as the first parameter and the id (from `student.id`) as the second parameter.

Figure 7.1 shows our list of students with the names as links.

List of students

- id = 1
name = [matt](#)
- id = 2
name = [joelle](#)
- id = 4
name = [fred](#)

Figure 7.1: List of students with names as link to show pages.

Part III

Froms and form processing

8

DIY forms

8.1 Adding a form for new Student creation (project05)

Let's create a DIY (Do-It-Yourself) HTML form to create a new student. We'll need:

- a controller method (and template) to display our new student form
 - route `/students/new`
- a controller method to process the submitted form data
 - route `/students/processNewForm`

The form will look as show in Figure 8.1.

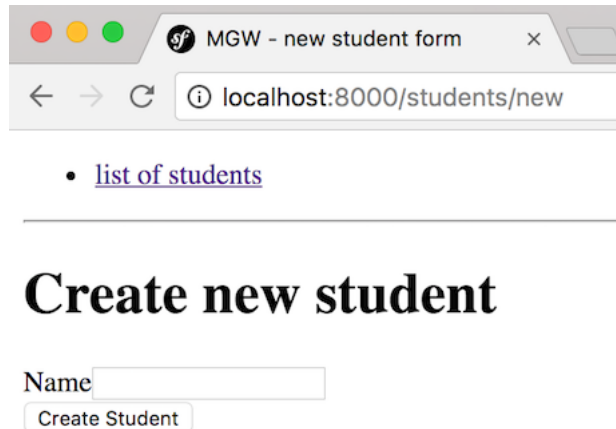


Figure 8.1: Form for a new student

8.2 Twig new student form

Here is our new student form ‘/app/views/students/new.html.twig’:

```
{% extends '_base.html.twig' %}
{% block pageTitle %}new student form{% endblock %}

{% block body %}
    <h1>Create new student</h1>

    <form action="/students/processNewForm" method="POST">
        Name:
        <input type="text" name="name">
        <p>
        <input type="submit" value="Create new student">
    </form>
{% endblock %}
```

8.3 Controller method (and annotation) to display new student form

Here is our StudentController method to display our Twig form:

```
/**
 * @Route("/students/new", name="students_new_form")
 */
public function newFormAction(Request $request)
```



```
{
    $argsArray = [
    ];

    $templateName = 'students/new';
    return $this->render($templateName . '.html.twig', $argsArray);
}
```

We'll also add a link to this form route in our list of students page. So we add to the end of `/app/Resources/views/students/list.html.twig` the following link:

```
(... existing Twig code to show list of students here ...)

<hr>
<a href="{ path('students_new_form') }">
    create NEW student
</a>
{% endblock %}
```

8.4 Controller method to process POST form data

We can access POST submitted data using the following expression:

```
$request->request->get(<POST_VAR_NAME>)
```

So we can extract and store in `$name` the POST name parameter by writing the following:

```
$name = $request->request->get('name');
```

Our full listing for `StudentController` method `processNewForm()` looks as follows:

```
/**
 * @Route("/students/processNewForm", name="students_process_new_form")
 */
public function processNewFormAction(Request $request)
{
    // extract 'name' parameter from POST data
    $name = $request->request->get('name');

    // forward this to the createAction() method
    return $this->createAction($name);
}
```

Note that we then invoke our existing `createAction()` method, passing on the extracted `$name` string.

8.5 Validating form data, and displaying temporary ‘flash’ messages in Twig (project06)

What should we do if an empty name string was submitted? We need to **validate** form data, and inform the user if there was a problem with their data.

Symfony offers a very useful feature called the ‘flash bag’. Flash data exists for just 1 request and is then deleted from the session. So we can create an error message to be display (if present) by Twig, and we know some future request to display the form will no have that error message in the session any more.

8.6 Three kinds of flash message: notice, warning and error (project06)

Typically we create 3 differnt kinds of flash notice:

- notice
- warning
- error

Our Twig template would style these differntly (e.g. pink background for errors etc.). Here is how to creater a flash message and have it stored (for 1 request) in the session:

```
$this->addFlash(
    'error',
    'Your changes were saved!'
);
```

In Twig we can attempt to retrieve flash messages in the following way:

```
{% for flash_message in app.session.flashBag.get('notice') %}
    <div class="flash-notice">
        {{ flash_message }}
    </div>
{% endfor %}
```

8.7 Adding validation in our ‘processNewFormAction()z method

So let’s add some validation logic to our processing of the new student form data:

8.8 Adding flash display (with CSS) to our Twig template

First let's create a CSS stylesheet and ensure it is always loaded by adding its import into our `_base.html.twig` template.

First create the directory `css` in `/web` - remember that `/web` is the Symfony public folder, where all public images, CSS, javascript and basic front controllers (`app.php` and `app_dev.php`) are served from).

Now create CSS file `/web/css/flash.css` containing the following:

```
.flash-error {  
    padding: 1rem;  
    margin: 1rem;  
    background-color: pink;  
}
```

Next we need to edit our `/app/Resources/views/_base.html.twig` so that every page in our webapp will have imported this CSS stylesheet. Edit the `<head>` element in `_base.html.twig` as follows:

```
<!DOCTYPE html>  
<html>  
    <head>  
        <meta charset="UTF-8" />  
        <title>MGW - {% block pageTitle %}{% endblock %}</title>  
  
        <style>  
            @import '/css/flash.css';  
        </style>  
        {% block stylesheets %}{% endblock %}  
    </head>
```

8.9 Adding validation logic to our form processing controller method

Now we can add the empty string test (and flash error message) to our `processNewFormAction()` method:

```
public function processNewFormAction(Request $request)  
{  
    // extract 'name' parameter from POST data  
    $name = $request->request->get('name');
```

```
if(empty($name)){
    $this->addFlash(
        'error',
        'student name cannot be an empty string'
    );

    // forward this to the createAction() method
    return $this->newFormAction($request);
}

// forward this to the createAction() method
return $this->createAction($name);
}
```

So if the `$name` we extracted from the POST data is an empty string, then we add an **error** flash message into the session ‘flash bag’, and forward on processing of the request to our method to display the new student form again.

Finally, we need to add code in our new student form Twig template to display any error flash messages it finds. So we edit `/app/Resources/views/students/new.html.twig` as follows:

```
{% extends '_base.html.twig' %}
{% block pageTitle %}new student form{% endblock %}

{% block body %}

    <h1>Create new student</h1>

    {% for flash_message in app.session.flashBag.get('error') %}
        <div class="flash-error">
            {{ flash_message }}
        </div>
    {% endfor %}

    (... show HTML form as before ...)
```

9

Automatic forms generated from Entities

9.1 Using the Symfony form generator (project07)

Given an object of an Entity class, Symfony can analyse its property names and types, and generate a form (with a little help).

So in a controller we can create a `$form` object, and pass this as a Twig variable to the template form. Twig offers 3 special functions for rendering (displaying) forms, these are:

- `form_start()`
- `form_widget()`
- `form_end()`

So we can simplify the body block of our Twig template (`/app/Resources/views/students/new.html.twig`) for the new `Student` form to the following:

```
{% block body %}
    <h1>Create new student</h1>
    {{ form(form) }}
{% endblock %}
```

That's it! No `<form>` element, no `<input>`s, no submit button, no labels! Even flash messages (relating to form validation errors) will be displayed by this function Twig function (global form errors at the top, and field specific errors by each form field).

The 'magic' happens in the controller method...

9.2 Updating StudentController->newFormAction()

Let's refactor `newFormAction()` to use Symfony's FormBuilder to create the form for us, based on an instance of class `Student`:

```
public function newFormAction(Request $request)
{
    // create a task and give it some dummy data for this example
    $student = new Student();

    $form = $this->createFormBuilder($student)
        ->add('name', TextType::class)
        ->add('save', SubmitType::class, array('label' => 'Create Student'))
        ->getForm();

    $argsArray = [
        'form' => $form->createView(),
    ];

    $templateName = 'students/new';
    return $this->render($templateName . '.html.twig', $argsArray);
}
```

Note - for the above code to work we also need to add two `use` statements so that PHP knows about the classes `TextType` and `SubmitType`. These can be found in the form extension Symfony component:

```
use Symfony\Component\Form\Extension\Core\Type\TextType;
use Symfony\Component\Form\Extension\Core\Type\SubmitType;
```

We can see that the method does the following:

1. creates a new (empty) `Student` records `$students`
2. creates a new form builder, passing in `$student`, and stating that we want it to create a HTML form input element for the `name` field, and also a submit button (`SubmitType`) with the label `Create Student`. We chain these method calls in sequence, making use of the form builder's 'fluent' interface, and store the created form object in PHP variable `$form`.
3. Finally, we create a Twig argument array, passing in the form object `$form` with Twig variable name `form`, and tell Twig to render the template `students/new.html.twig`.

Figure 9.1 shows a screenshot of the resulting form:

If we look further down (see Figure 9.2) we can see that the Symfony debug profiler bar footer (and the Chrome HTTP request information) shows that we are looking at an HTTP GET request to `localhost:8000/students/new` that received a 200 OK HTTP response code.

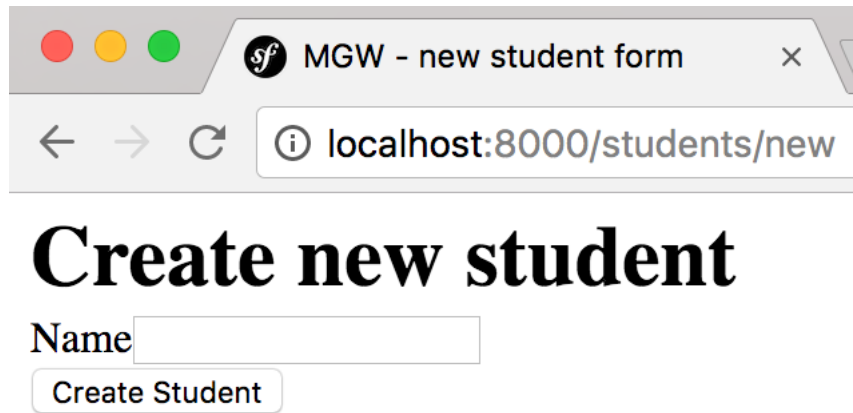


Figure 9.1: Symfony generated new student form (showing footer profiler bar).

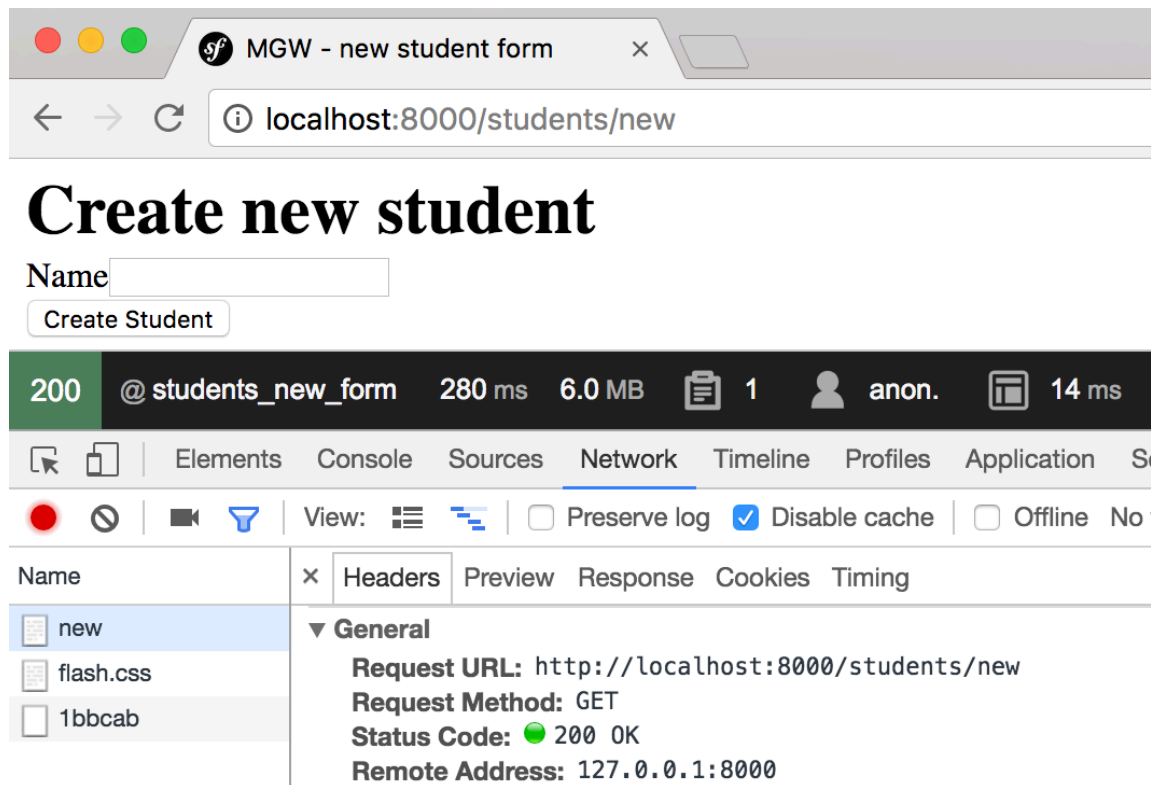


Figure 9.2: Generated student form - showing footer profiler bar.

9.3 Entering data and submitting the form

We find, however, that we haven't done enough if we actually enter a name (e.g. `joe-smith`) and submit the form via the submit button. Figure 9.3 shows that we just see a new empty form again! What we expect when we click a form submit button is for the entered values to be submitted to the server as an HTTP POST method. This is what has happened, **but** this request has been sent to the same URL as we used to display the form, i.e. `localhost:8000/students/new`. At present, our controller method does not distinguish between GET and POST methods, so simply responds by rendering the form again based on, another, new empty `Student` object. The Symfony footer profile bar shows us that it was a POST HTTP method request by writing `POST@students_new_form` (the name of the matched route, as defined in the controller annotation comment).

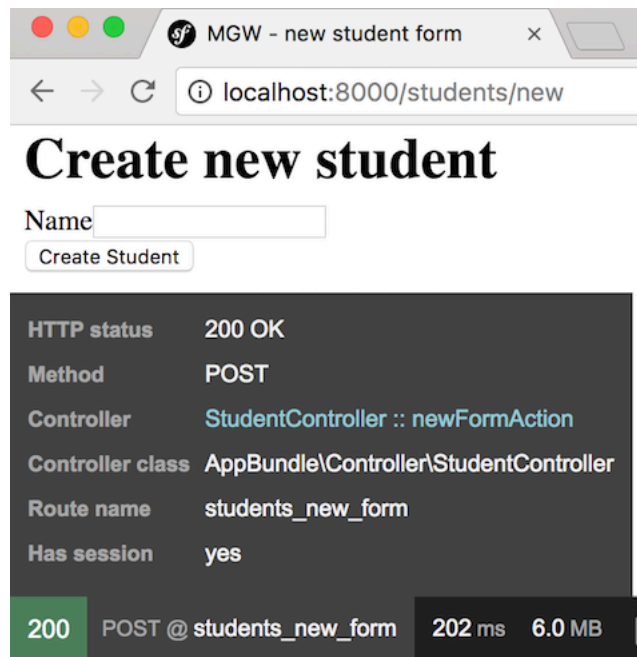


Figure 9.3: Form re-displayed despite POST submission of name `joe-smith`.

We can see **why** the form submits to the same request URL as was used to display the form, if we look at the generated HTML (Chrome right-click `View Page Source`):

```
<h1>Create new student</h1>
```

```
<form name="form" method="post">
```

```
<div id="form"><div><label for="form_name" class="required">Name</label>
```

```
<input type="text" id="form_name" name="form[name]" required="required" /></div>
```

```
<div>
```

```
<button type="submit" id="form_save" name="form[save]">Create Student</button></div>
```

```
<input type="hidden" id="form__token" name="form[_token]" value="TJM9iQSmrWdYLVcbf1J15-
```



```
</form>
```

Because there is no `action` attribute in the `<form>` tag, then browsers automatically submit back to the same URL. This is known in web development as a **postback** and is very common¹.

If we use the Chrome developer tools again, after submitting name `joe-smith` we can see that the name has been sent in the body of the POST request to our webapp, as `form[name]`. We can see these details in Figure 9.4.

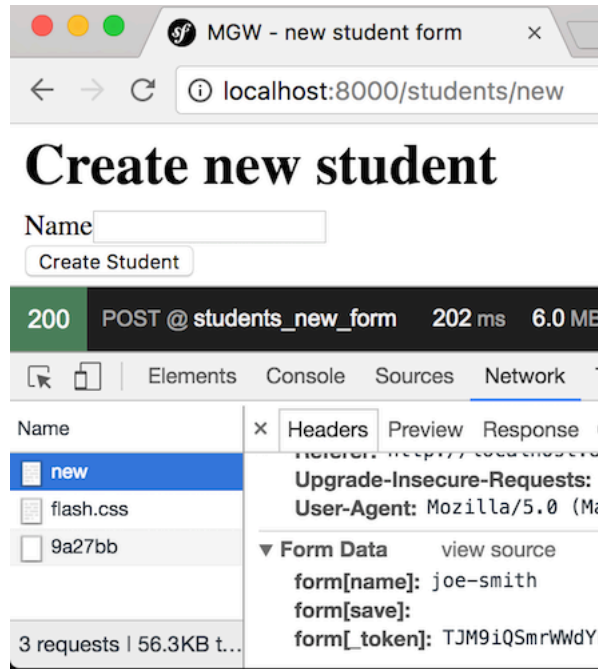


Figure 9.4: Chrome developer tools showing POST submitted variable `joe-smith`.

We can also delve further into the details of the request and our Symfony applications handling of the request by clicking on the Symfony debug toolbar, and, for example, clicking the **Request** navigation link on the left. Figure 9.5 shows us the POST variables received.

¹read more at the [Wikipedia postback page](#)

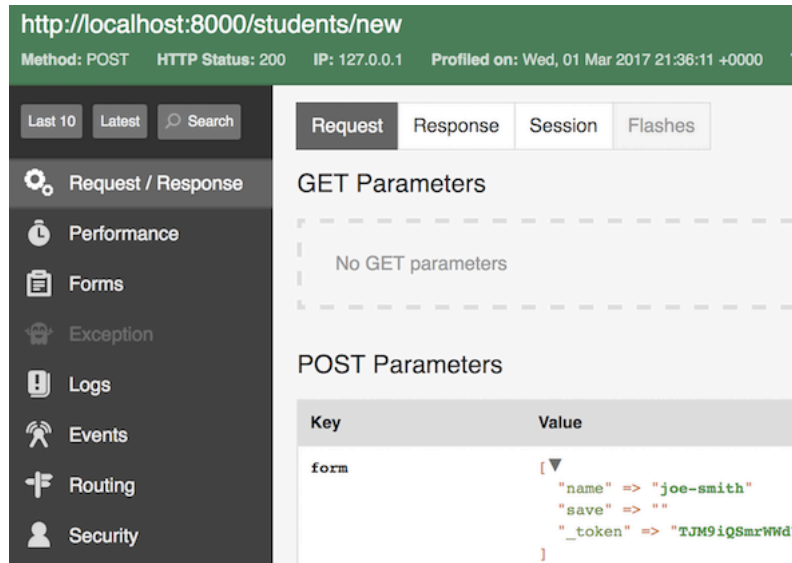


Figure 9.5: Chrome developer tools showing POST submitted variable joe-smith.

9.4 Detecting and processing postback form submission (and validation) (project08)

Since the form is posted back to the same URL as to display the form, then the same controller will be invoked. So we need to add some conditional logic in our controller to decide what to do. This logic will look like this:

```

prepare the form
tell the form to handle the request (i.e. get data from the Request into the form if its a postback)

IF form has been submitted (POST method) AND values submitted are all valid THEN
    process the form data appropriately
    return an appropriate Response (or redirect appropriately)

OTHERWISE
    return a Response that renders the form

```

First let's do something really simply, if we detect the form has been submitted, let's just `var_dump()` the name received in the request and `die()`.

```

public function newFormAction(Request $request)
{
    // create a task and give it some dummy data for this example
    $student = new Student();

    $form = $this->createFormBuilder($student)

```

```
->add('name', TextType::class)
->add('save', SubmitType::class, array('label' => 'Create Student'))
->getForm();

/// ---- start processing POST submission of form
$form->handleRequest($request);

if($form->isSubmitted()){
    $student = $form->getData();
    $name = $student->getName();

    print "name received from form is '$name'";
    die();
}

$argsArray = [
    'form' => $form->createView(),
];

$templateName = 'students/new';
return $this->render($templateName . '.html.twig', $argsArray);
}
```

So as we can see above, after creating the form, we tell the form to examine the HTTP request to determine if it was a postback (i.e. POST method), and if so, to extract data from the request and store that data in the `Student` object inside the form:

```
$form->handleRequest($request);
```

Next, we can now test (with form method `isSubmitted()`) whether this was a POST request, and if so, we'll extract the `Student` object into `$student`, then get the name from this object, into `$name`, then print out the name and `die()`:

```
if($form->isSubmitted()){
    $student = $form->getData();
    $name = $student->getName();

    print "name received from form is '$name'";
    die();
}
```

However, if the form was not a postback submission (i.e. `isSubmitted()`), then we continue to create our Twig argument array and render the template to show the form.

The output we get, when submitting the name `joe-smith` with the above is shown in Figure 9.6.

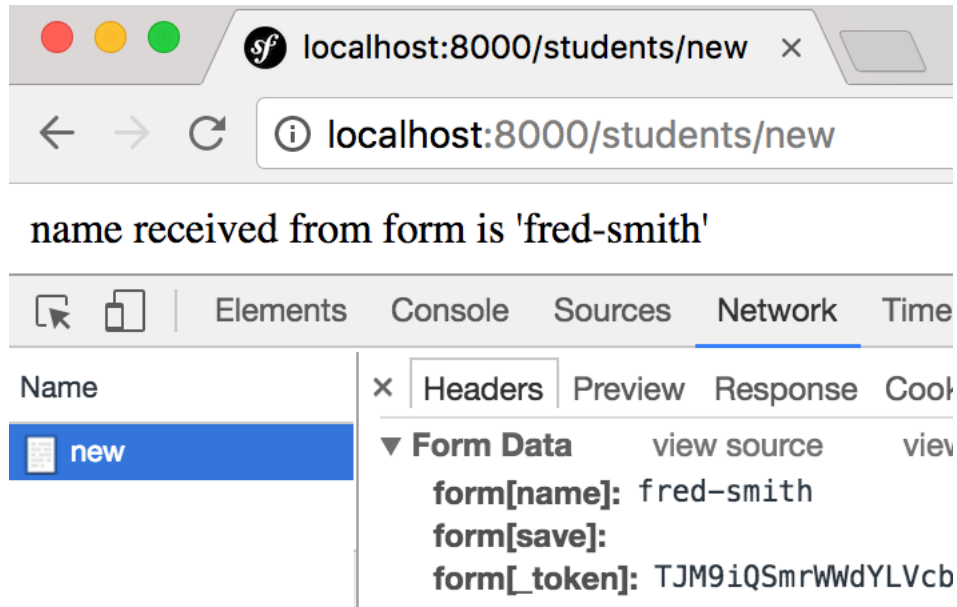


Figure 9.6: Confirmation of postback received namejoe-smith.

9.5 Invoking the `createAction(...)` method when valid form data submitted

Let's write code to submit the extracted name property of the `Student` object in the form, to our existing `createAction(...)` method. So our conditional block, for the condition that if the form has been submitted **and** its data is valid will be:

```
if ($form->isSubmitted() && $form->isValid()) {
    $student = $form->getData();
    $name = $student->getName();
    return $this->createAction($name);
}
```

Here is a reminder of our `createAction($name)` method. Note that the final statement has been to redirect to the list of students route, after successful creation (and database persistence) of a new student object:

```
public function createAction($name)
{
    $student = new Student();
    $student->setName($name);

    // entity manager
    $em = $this->getDoctrine()->getManager();
```

```

        // tells Doctrine you want to (eventually) save the Student (no queries yet)
        $em->persist($student);

        // actually executes the queries (i.e. the INSERT query)
        $em->flush();

        return $this->redirectToRoute('students_list');
    }

```

9.6 Final improvements (project09)

The final changes we might make include:

- to **remove** the route annotation for method `createAction(...)` - so it can only be invoked through our postback new student form route
- refactor method `createAction(...)` to receive a `Student` object - simplyfying the code in each method

So the refactored listing for method `createAction(...)` is:

```

/**
 * @param Student $student
 *
 * @return \Symfony\Component\HttpFoundation\RedirectResponse
 */
public function createAction(Student $student)
{
    // entity manager
    $em = $this->getDoctrine()->getManager();

    // tells Doctrine you want to (eventually) save the Student (no queries yet)
    $em->persist($student);

    // actually executes the queries (i.e. the INSERT query)
    $em->flush();

    return $this->redirectToRoute('students_list');
}

```

And our refactored method `newFormAction()` is:

```

public function newFormAction(Request $request)

```

```
{  
    // create a task and give it some dummy data for this example  
    $student = new Student();  
  
    $form = $this->createFormBuilder($student)  
        ->add('name', TextType::class)  
        ->add('save', SubmitType::class, array('label' => 'Create Student'))  
        ->getForm();  
  
    /// ---- start processing POST submission of form  
    $form->handleRequest($request);  
  
    if ($form->isSubmitted() && $form->isValid()) {  
        $student = $form->getData();  
        return $this->createAction($student);  
    }  
  
    $argsArray = [  
        'form' => $form->createView(),  
    ];  
  
    $templateName = 'students/new';  
    return $this->render($templateName . '.html.twig', $argsArray);  
}
```

10

Customising the display of generated forms

10.1 Understanding the 3 parts of a form (project10)

In a controller we create a `$form` object, and pass this as a Twig variable to the template `form`. Twig renders the form in 3 parts:

- the opening `<form>` tag
- the sequence of form fields (with labels, errors and input elements)
- the closing `</form>` tag

This can all be done in one go (using Symfony/Twig defaults) with the Twig `form()` function, or we can use Twig's 3 form functions for rendering (displaying) each part of a form, these are:

- `form_start()`
- `form_widget()`
- `form_end()`

So we could write the body block of our Twig template (`/app/Resources/views/students/new.html.twig`) for the new `Student` form to the following:

```
{% block body %}
    <h1>Create new student</h1>
    {{ form_start(form) }}
    {{ form_widget(form) }}
    {{ form_end(form) }}
{% endblock %}
```

Although since we're not adding anything between these 3 Twig functions' output, the result will be the same form as before.

10.2 Using a Twig form-theme template

Symfony provides several useful Twig templates for common form layouts.

These include:

- wrapping each form field in a `<div>`
 - `form_div_layout.html.twig`
- put form inside a table, and each field inside a table row `<tr>` element
 - `form_table_layout.html.twig`
- Bootstrap CSS framework div's and CSS classes
 - `bootstrap_3_layout.html.twig`

10.3 DIY (Do-It-Yourself) form display customisations

Each form field can be rendered all in one go in the following way:

```
{{ form_row(form.<FIELD_NAME>) }}
```

For example, if the form has a field `name`:

```
{{ form_row(form.name) }}
```

So we could display our new student form this way:

```
{% block body %}
    <h1>Create new student</h1>
    {{ form_start(form) }}

    {{ form_row(form.name) }}
    {{ form_row(form.save) }}

    {{ form_end(form) }}
{% endblock %}
```

10.4 Customising display of parts of each form field

Alternatively, each form field can have its 3 constituent parts rendered separately:

- label (the text label seen by the user)
- errors (any validation error messages)

- widget (the form input element itself)

For example:

```
<div>
    {{ form_label(form.name) }}

    <div class="errors">
        {{ form_errors(form.name) }}
    </div>

    {{ form_widget(form.name) }}
</div>
```

So we could display our new student form this way:

```
{% block body %}
    <h1>Create new student</h1>
    {{ form_start(form) }}

    <div>
        <div class="errors">
            {{ form_errors(form.name) }}
        </div>

        {{ form_label(form.name) }}

        {{ form_widget(form.name) }}
    </div>

    <div>
        {{ form_row(form.save) }}
    </div>

    {{ form_end(form) }}
{% endblock %}
```

The above would output the following HTML (if the errors list was empty):

```
<div>
    <div class="errors">

    </div>
```

```

<label for="form_name" class="required">Name</label>

<input type="text" id="form_name" name="form[name]" required="required" />
</div>

```

10.5 Adding some CSS style to the form

We could, of course add some CSS so style labels nicely. We can add a `stylesheets` block to our Twig template:

```

{% block stylesheets %}
<style>
    label {
        display: inline-block;
        float: left;
        width: 10rem;
        padding-right: 0.5rem;
        font-weight: bold;
        color: blue;
        text-align: right;
    }

    .form-field {
        padding-bottom: 1rem;
    }
</style>
{% endblock %}

```

We can edit our body block to add the CSS class `form-field` to the `<div>` containing our name form field elements:

```

{% block body %}
    <h1>Create new student</h1>
    {{ form_start(form) }}

    <div class="form-field">
        <div class="errors">
            {{ form_errors(form.name) }}
        </div>

        {{ form_label(form.name) }}
    </div>

```

```

        {{ form_widget(form.name) }}
    </div>

    <div>
        {{ form_row(form.save) }}
    </div>

    {{ form_end(form) }}
{% endblock %}

```

Note - by displaying errors for field `name` before the label, we ensure the label will always ‘float’ left of the text input box from the form widget.

Figure 10.1 shows what our CSS styled form looks like to the user.



Figure 10.1: Browser rendering of generated form with CSS.

Learn more at:

- [The Symfony form customisation page](#)

10.6 Specifying a form’s method and action

While Symfony forms default to POST submission and a postback to the same URL, it is possible to specify the method and action of a form created with Symfony’s form builder. For example:

```

$formBuilder = $formFactory->createBuilder(FormType::class, null, array(
    'action' => '/search',
    'method' => 'GET',
));

```

Learn more at:

- [Introduction to the Form component](#)

Part IV

Symfony code generation

11

Generating entities from the CLI

11.1 Generating an ‘elective’ module entity from the CLI

Continuing our student/college example project, let’s consider the case where students can select several subject elective ‘modules’, and store them in a ‘basket’ of electives. We’ll learn about sessions for the shopping basket functionality in the next part, so for now let’s create the **Elective** entity and use some CRUD to enter some records in the database.

We are going to use Doctrine’s interactive CLI command to create class `AppBundle/Entity.php` for us. Entities have an integer `id` AUTO-INCREMENT primary key by default, so we just need to ask Doctrine to add string fields for `moduleCode` and `moduleTitle`, and an integer number of academic `credits` field - ensure your Webserver is running before working with Doctrine ...

```
php bin/console generate:doctrine:entity --entity=AppBundle:Elective
```

First let’s tell Doctrine that we want to create a new entity **Elective** in our **AppBundle**:

```
$ php bin/console generate:doctrine:entity --entity=AppBundle:Elective
```

Doctrine then tells us what is doing:

```
Welcome to the Doctrine2 entity generator
```

```
This command helps you generate Doctrine2 entities.
```

Then Doctrine tells us we need an entity ‘shortcut name’, but it also offers us one in square brackets, which we can accept by pressing **<Return>**:

First, you need to give the entity name you want to generate.

You must use the shortcut notation like `AcmeBlogBundle:Post`.

The Entity shortcut name `[AppBundle:Elective]`:

Next Doctrine asks us how we will declare the mapping information between this entity and the database table, again it offers us a default (annotation) in square brackets, we we accept by pressing `<Return>`:

Determine the format to use for the mapping information.

Configuration format (yml, xml, php, or annotation) `[annotation]`:

Finally Doctrine asks us to start describing each field we want.

Instead of starting with a blank entity, you can add some fields now.

Note that the primary key will be added automatically (named `id`).

Available types: `array`, `simple_array`, `json_array`, `object`,
`boolean`, `integer`, `smallint`, `bigint`, `string`, `text`, `datetime`, `datetimetz`,
`date`, `time`, `decimal`, `float`, `binary`, `blob`, `guid`.

Each field needs:

- field name
- field type
- field length (if string, not needed for some fields, like integer)
- Is nullable
- Unique

In most cases all we need to do is name the field, and either accept the default `string` data type (or correct it to integer or decimal), and then accept the defaults for the remaining field properties.

So let's create a string field `moduleCode`. Since `string` is the default, all we need to type is the field name and then press `<Return>` to accept the remaining defaults:

```
New field name (press <return> to stop adding fields): moduleCode
Field type [string]:
Field length [255]:
Is nullable [false]:
Unique [false]:
```

Let's do the same for string field `moduleCode`:

```
New field name (press <return> to stop adding fields): moduleTitle
Field type [string]:
Field length [255]:
```



```
Is nullable [false]:  
Unique [false]:
```

Now we'll declare `integer` field `credits`. Don't worry, you don't have to type out the whole word `integer` - the CLI command will spot what you're typing after a couple of characters and you can accept it by pressing, you've guessed it, `<Return>`:

```
New field name (press <return> to stop adding fields): credits  
Field type [string]: integer  
Is nullable [false]:  
Unique [false]:
```

When we've declared all the fields we wish to at this time, we just press `<Return>` when asked for the next field's name:

```
New field name (press <return> to stop adding fields):
```

Doctrine then goes off to create our Entity class, with all its getters and setters. and prints out a confirmation message of success, and telling us it created both an Entity class `Entity/Elective.php` and an associated Repository class `Repository/ElectiveRepository.php` for Bundle `AppBundle`:

```
Entity generation  
  
created ./src/AppBundle/Entity/Elective.php  
> Generating entity class src/AppBundle/Entity/Elective.php: OK!  
> Generating repository class src/AppBundle/Repository/ElectiveRepository.php: OK!  
  
Everything is OK! Now get to work :).
```

See Appendix E for another example of interactive CLI entity generation with the Doctrine command line tool.

11.2 Creating tables in the database

Now our entity `Elective` is completed, we can tell Doctrine to create a corresponding table in the database (or ALTER the table in the database if one previously existed):

```
$ php bin/console doctrine:schema:update --force
```


12

CLI generation of CRUD controller and templates

12.1 Symfony's CRUD generator

Symfony offers a very powerful CRUD generator command:

```
php bin/console generate:doctrine:crud --entity=AppBundle:Elective --format=annotation --with-write
```

With the single command above Symfony will generate a CRUD controller (`ElectiveController`) and also create a directory containing Twig templates (`app/Resources/views/elective/index.html.twig` etc.).

12.2 The generated CRUD controller

Let's first look at the namespaces and class declaration line:

```
<?php

namespace AppBundle\Controller;

use AppBundle\Entity\Elective;
use Symfony\Bundle\FrameworkBundle\Controller\Controller;
use Sensio\Bundle\FrameworkExtraBundle\Configuration\Method;
use Sensio\Bundle\FrameworkExtraBundle\Configuration\Route;use Symfony\Component\HttpFoundation\Request;
```

```
/**
 * Elective controller.
 *
 * @Route("elective")
 */
class ElectiveController extends Controller
{
```

Above we see a set of `use` statements, and then an interesting class comment. The `@Route` annotation comment declares a route ‘prefix’ which will at the beginning of any `@Route` annotations for individual controller methods. So, for example, the new action will have the route `/elective/new`.

If we look in directory `app/Resources/views/elective/` we’ll see the following generated templates:

```
edit.html.twig
index.html.twig
new.html.twig
show.html.twig
```

Note that all these generated templates extend Twig class `base.html.twig`. If we want to continue using the identifier `_base.html.twig`, then we’ll need to edit each of these generated templates to correct the extended Twig class name.

12.3 The generated index (a.k.a. list) controller method

Below we can see the code for `indexAction()` that retrieves and then passes an array of `Elective` objects to template `elective/index.html.twig`.

```
/**
 * Lists all elective entities.
 *
 * @Route("/", name="elective_index")
 * @Method("GET")
 */
public function indexAction()
{
    $em = $this->getDoctrine()->getManager();

    $electives = $em->getRepository('AppBundle:Elective')->findAll();

    return $this->render('elective/index.html.twig', array(
        'electives' => $electives,
```

```
    ));
}
```

If you prefer, you can re-write the last statement in the more familiar form:

```
$argsArray = [
    'electives' => $electives,
];

$templateName = 'elective/index';
return $this->render($templateName . '.html.twig', $argsArray);
```

Twig template `elective/index.html.twig` loops through array `electives`, wrapping HTML table row tags around each entity's content:

```
{% for elective in electives %}
    <tr>
        <td><a href="{ path('elective_show', { 'id': elective.id }) }">{{ elective.id }}</a></td>
        <td>{{ elective.moduleCode }}</td>
        <td>{{ elective.moduleTitle }}</td>
        <td>{{ elective.credits }}</td>
        <td>
            <ul>
                <li>
                    <a href="{ path('elective_show', { 'id': elective.id }) }">show</a>
                </li>
                <li>
                    <a href="{ path('elective_edit', { 'id': elective.id }) }">edit</a>
                </li>
            </ul>
        </td>
    </tr>
{% endfor %}
```

Let's create a CSS file for table borders and padding in `/web/css/table.css`;

```
table, tr, td {
    border: 0.1rem solid black;
    padding: 0.5rem;
}
```

Remember in `/_base.html.twig` we have defined a block for style sheets:

```
<!DOCTYPE html>
<html>
    <head>
```

```
<meta charset="UTF-8" />
<title>MGW - {% block pageTitle %}{% endblock %}</title>

<style>
    @import '/css/flash.css';
    {% block stylesheets %}
    {% endblock %}
</style>
```

So now we can edit template `elective/index.html.twig` to add a stylesheet block import of this CSS stylesheet:

```
{% block stylesheets %}
    @import '/css/table.css';
{% endblock %}
```

Figure 12.1 shows a screenshot of how our list of electives looks, rendered by the `elective/index.html.twig` template.

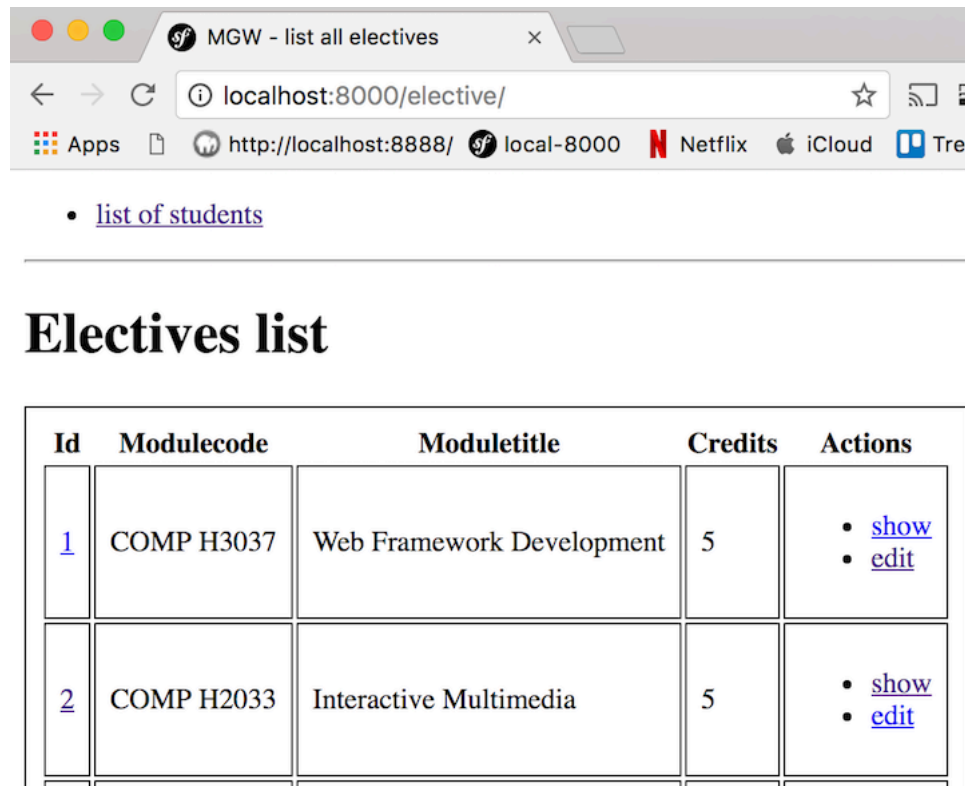


Figure 12.1: List of electives in HTML table.

12.4 The generated `newAction()` method

The method and Twig template for a new `Elective` work just as you might expect. An empty form will be displayed and upon valid submission the user will be redirected to the `show` action form for the newly created entity.

```
/**
 * Creates a new elective entity.
 *
 * @Route("/new", name="elective_new")
 * @Method({"GET", "POST"})
 */
public function newAction(Request $request)
{
    $elective = new Elective();
    $form = $this->createForm('AppBundle\Form\ElectiveType', $elective);
    $form->handleRequest($request);

    if ($form->isSubmitted() && $form->isValid()) {
        $em = $this->getDoctrine()->getManager();
        $em->persist($elective);
        $em->flush($elective);

        return $this->redirectToRoute('elective_show', array('id' => $elective->getId()));
    }

    return $this->render('elective/new.html.twig', array(
        'elective' => $elective,
        'form' => $form->createView(),
    ));
}
```

12.5 The generated `showAction()` method

Initially, the generated ‘show’ method looks fine as just as we might write:

```
/**
 * Finds and displays a elective entity.
 *
 * @Route("/{id}", name="elective_show")
```

```

* @Method("GET")
*/
public function showAction(Elective $elective)
{
    $deleteForm = $this->createDeleteForm($elective);

    return $this->render('elective/show.html.twig', array(
        'elective' => $elective,
        'delete_form' => $deleteForm->createView(),
    ));
}

```

But looking closely, we see that while the route specifies parameter `{id}`, the method declaration species a parameter of `Elective $elective`. Also the code in the method makes no reference to the `Elective` entity repository. So by some **magic** the numeric ‘id’ in the request path has used to retrieve the corresponding `Elective` record from the database!

This magic is the work of the Symfony ‘param converter’. Also, of course, if there is no record found in table `elective` that corresponds to the received ‘id’, then a 404 not-found-exception will be thrown.

Learn more about the ‘param converter’ at the Symfony documentation pages:

-

12.6 The generated `editAction()` and `deleteAction()` methods

The ‘edit’ and ‘delete’ generated methods are as you might expect. The show method creates a form, and also include code to process valid submission of the edited entity. Note that it redirects to itself upon successful save of edits.

```

/**
 * Displays a form to edit an existing elective entity.
 *
 * @Route("/{id}/edit", name="elective_edit")
 * @Method({"GET", "POST"})
 */
public function editAction(Request $request, Elective $elective)
{
    $deleteForm = $this->createDeleteForm($elective);
    $editForm = $this->createForm('AppBundle\Form\ElectiveType', $elective);
    $editForm->handleRequest($request);
}

```



```

        if ($editForm->isSubmitted() && $editForm->isValid()) {
            $this->getDoctrine()->getManager()->flush();

            return $this->redirectToRoute('elective_edit', array('id' => $selective->getId()));
        }

        return $this->render('elective/edit.html.twig', array(
            'elective' => $selective,
            'edit_form' => $editForm->createView(),
            'delete_form' => $deleteForm->createView(),
        ));
    }

```

The ‘delete’ method deletes the entity and redirects back to the list of electives for the ‘index’ action. Notice that an annotation comment states that this controller method is in response to DELETE method requests (more about this below).

```

/**
 * Deletes a elective entity.
 *
 * @Route("/{id}", name="elective_delete")
 * @Method("DELETE")
 */
public function deleteAction(Request $request, Elective $selective)
{
    $form = $this->createDeleteForm($selective);
    $form->handleRequest($request);

    if ($form->isSubmitted() && $form->isValid()) {
        $em = $this->getDoctrine()->getManager();
        $em->remove($selective);
        $em->flush($selective);
    }

    return $this->redirectToRoute('elective_index');
}

```

12.7 The generated method `createDeleteForm()`

To avoid the delete method becoming too long and complicated, a separate method `createDeleteForm()` was generated that creates and returns a Symfony form-builder form with a ‘DELETE’ button simulating an HTTP DELETE method.

```
/**
 * Creates a form to delete a elective entity.
 *
 * @param Elective $elective The elective entity
 *
 * @return \Symfony\Component\Form\Form The form
 */
private function createDeleteForm(Elective $elective)
{
    return $this->createFormBuilder()
        ->setAction($this->generateUrl('elective_delete', array('id' => $elective->getId()))
        ->setMethod('DELETE')
        ->getForm()
    ;
}
```

If we actually look at the HTML source of this button-form, we can see that it is actually submitted with the HTTP `post` action, along with a hidden form field named `_method` with the value `DELETE`. This kind of approach means we can write our controllers as if they are responding to the full range of HTTP methods (GET, POST, PUT, DELETE and perhaps PATCH).

```
<form name="form" method="post" action="/elective/3">
    <input type="hidden" name="_method" value="DELETE" />
    <input type="submit" value="Delete">
    <input type="hidden" id="form__token" name="form[_token]" value="YayBB5j6Yjiyps-c6MJRxn8" />
</form>
```

Part V

Sessions

13

Introduction to Symfony sessions

13.1 Remembering foreground/background colours in the session (project12)

Let's start out Symfony sessions learning with the ability to store (and remember) foreground and background colours¹. First let's add some HTML in our `index.html.twig` page to display the value of our 2 stored values.

We will assume we have 2 Twig variables:

- `colours` - an associative array in the form:

```
colours = [  
    'foreground' => 'blue',  
    'background' => 'pink'  
]
```

- `default_colours` - a string ('yes' / 'no') value, telling us whether or not our colours came from the session, or are defaults due to no array being found in the session

here is the Twig HTML to output the values of these variables:

```
<p>  
    using default colours = {{ default_colours }}  
</p>
```

¹I'm not going to get into a colo[u]rs naming discussion. But you may prefer to just always use US-English spelling (*sans* 'u') since most computer language functions and variables are spelt the US-English way

```
<ul>
    {% for property, colour in colours %}
        <li>
            {{ property }} = {{ colour }}
        </li>
    {% endfor %}
</ul>
```

Note that Twig offers a key-value array loop just like PHP, in the form:

```
{% for <key>, <value> in <array> %}
```

13.2 Twig default values (in case nothing in the session)

Let's write some Twig code to attempt to read the `colours` array from the `SESSION`, but failing that, then setting default values into Twig variable `colours`.

First we assume we'll get a value from the session (so we set `default_colours` to `no`), and we attempt to read the session variable array `colours` and store it in Twig variable `colours`. To read a value from the Symfony `app` variable's `session` property we write a Twig expression in the form `app.session.get('<attribute_key>')`:

```
{% set default_colours = 'no' %}

{% set colours = app.session.get('colours') %}
```

Now we test whether or not `colours` is `NULL` (i.e. we could not read anything in the session for the given key). We test if a variable is `null` with Twig expression `if <variable> is null`:

```
{% if colours is null %}
    {% set default_colours = 'yes' %}

    {% set colours = {
        'foreground': 'black',
        'background': 'white'
    }
    %}
{% endif %}
```

As we can see, if `colours` was `NULL` then we set `default_colours` to `yes`, and we use Twig's JSON-like format for setting key-value pairs in an array.

13.3 Working with sessions in Symfony Controller methods

All we need to write to work with the current session object in a Symfony controller method is the following statement:

```
$session = new Session();
```

Note, you also need to add the following `use` statement for the class using this code:

```
use Symfony\Component\HttpFoundation\Session\Session;
```

Note - do **not** use any of the standard PHP command for working with sessions. Do all your Symfony work through the Symfony session API. So, for example, do not use either of these PHP functions:

```
session_start();
session_destroy();
```

You can now set/get values in the session by making reference to `$session`.

Note: You may wish to read about **how to start a session in Symfony**².

13.4 Symfony's 2 session 'bags'

We've already met sessions - the Symfony 'flash bag', which stores messages in the session for one request cycle.

Symfony also offers a second kind of session storage, session 'attribute bags', which store values for longer, and offer a namespacing approach to accessing values in session arrays.

We store values in the attribute bag as follows using the `session->set()` method:

```
$session->set('<key>', <value>);
```

Here's how we store our colours array in the Symfony application session from our controllers:

```
// create colours array
$colours = [
    'foreground' => 'blue',
    'background' => 'pink'
];

// store colours in session 'colours'
```

²While a session will be started automatically if a session action takes places (if no session was already started), the Symfony documentation recommends your code starts a session if one is required. Here is the code to do so: `$session->start()`, but to be honest it's simpler to rely on Symfony to decide when to start a new session, since sometimes integrating this into your controller logic can be tricky (especially with controller redirects). You'll get errors if you try to start an already started session ...

```
$session = new Session();  
$session->set('colours', $colours);
```

We can clear everything in a session by writing:

```
$session = new Session();  
$session->remove('electives');  
  
$session->clear();
```

13.5 Storing values in the session in a controller action

We'll add code to store colours in the session to our `DefaultController->indexAction()` method (i.e. the website home page controller):

```
public function indexAction(Request $request)  
{  
    // create colours array  
    $colours = [  
        'foreground' => 'blue',  
        'background' => 'pink'  
    ];  
  
    // store colours in session 'colours'  
    $session = new Session();  
    $session->set('colours', $colours);  
  
    $argsArray = [  
        'name' => 'matt'  
    ];  
  
    $templateName = 'index';  
    return $this->render($templateName . '.html.twig', $argsArray);  
}
```

Figure 13.1 shows the output of the colours from the session array when visiting the website home-page.

Learn more at about Symfony sessions at:

- [Symfony and sessions](#)

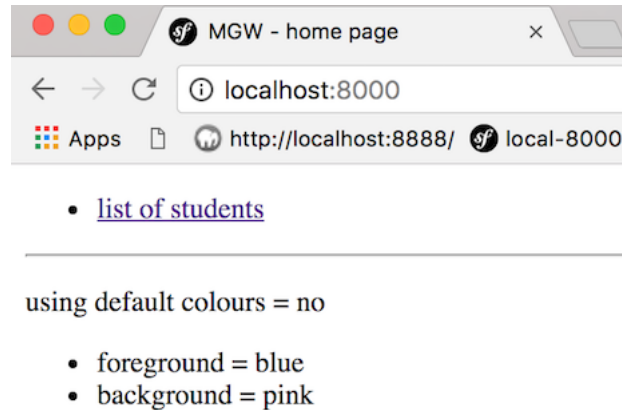


Figure 13.1: Homepage showing colours from session array.

13.6 Getting the colours into the HTML head <style> element (project13)

Since we have an array of colours, let's finish this task logically by moving our code into `_base.html.twig` and creating some CSS to actually set the foreground and background colours using these values.

So we remove the Twig code from template `index.html.twig` and paste it, slightly edited, into `_base.html.twig` as follows.

Add the following **before** we start the HTML doctype etc.

```
{% set colours = app.session.get('colours') %}

{# default = blue #}
{% if colours is null %}
    {% set colours = {
        'foreground': 'black',
        'background': 'while'
    }
    %}
{% endif %}
```

So now we know we have our Twig variable `colours` assigned values (either from the session, or from the defaults. Now we can update the `<head>` of our HTML to include a new `body {}` CSS rule, that pastes in the values of our Twig array `colours['foreground']` and `colours['background']`:

```
<!DOCTYPE html>
<html>
<head>
```

```

<meta charset="UTF-8" />
<title>MGW - {% block pageTitle %}{% endblock %}</title>

<style>
    @import '/css/flash.css';
    {% block stylesheets %}
    {% endblock %}

    body {
        color: {{ colours['foreground'] }};
        background-color: {{ colours['background'] }};
    }
</style>
</head>

```

Figure 13.2 shows our text and background colours applied to the CSS of the website homepage.

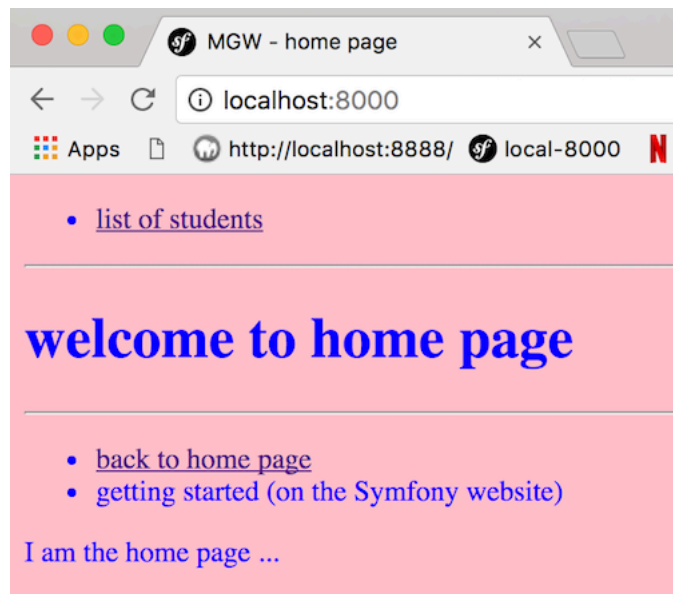


Figure 13.2: Homepage with session colours applied via CSS.

13.7 Testing whether an attribute is present in the current session

Before we work with a session attribute in PHP, we may wish to test whether it is present. We can test for the existence of an attribute in the session bag as follows:

```
if($session->has('<key>')){  
    //do something  
}
```

13.8 Removing an item from the session attribute bag

To remove an item from the session attribute bag write the following:

```
$session->remove('<key>');
```

13.9 Clearing all items in the session attribute bag

To remove all items from the session attribute bag write the following:

```
$session->clear();
```


14

Working with a session ‘basket’ of electives

14.1 Shopping cart session attribute bag example (project14)

When you’re leaning sessions, you need to build a ‘shopping cart’! Let’s imagine our students can select several subject elective ‘modules’, and store them in a ‘basket’ of electives.

We’ve created an **Elective** entity, and its CRUD controller and templates. So now let’s add the ‘shopping basket’ functionality to add elective modules into a session basket.

We will have an **basket** item in the session, containing an array of **Elective** objects adding the the basket. This array will be indexed by the **id** property of each **Elective** (so we won’t add the same module twice to the array), and items are easy to remove by unsetting.

14.2 Debugging sessions in Twig

As well as the Symfony profiler, there is also the powerful Twig functiond `dump()`. This can be used to interrogate values in the session.

You can either dump **every** variable that Twig can see, with `dump()`. This will list arguments passed to Twig by the controller, plus the **app** variable, containing session data and other applicaiton object properties. Or you can be more specific, and dump just a particular object or variable. For example we’ll be building an attribute stack session array named **basket**, and the contents of this array can be dumped in Twig with the following statement:

```
{{ dump(app.session.get('basket')) }}
```

Figure 14.1 shows our `basket[]` array in the session `Attribute Bag`, navigating through the Twig `dump()` output as follows:

```
app> requestStack> requests[0]> session> storage> bags> attributes> basket[]
```

```

array:2 [▼
  "students" => array:4 [▶]
  "app" => AppVariable {#313 ▼
    -tokenStorage: TokenStorage {#219 ▶}
    -requestStack: RequestStack {#216 ▼
      -requests: array:1 [▼
        0 => Request {#9 ▼
          +attributes: ParameterBag {#12 ▶}
          +request: ParameterBag {#10 ▶}
          +query: ParameterBag {#11 ▶}
          +server: ServerBag {#15 ▶}
          +files: FileBag {#14 ▶}
          +cookies: ParameterBag {#13 ▶}
          +headers: HeaderBag {#16 ▶}
          #content: null
          #languages: null
          #charset: null
          #encodings: null
          #acceptableContentTypes: null
          #pathInfo: "/students/list"
          #requestUri: "/students/list"
          #baseUrl: ""
          #basePath: null
          #method: "GET"
          #format: null
          #session: Session {#174 ▼
            #storage: NativeSessionStorage {#173 ▼
              #bags: array:2 [▼
                "attributes" => AttributeBag {#169 ▼
                  -name: "attributes"
                  -storageKey: "_sf2_attributes"
                  #attributes: & array:2 [▼
                    "electives" => array:2 [▼
                      1 => Elective {#117 ▼
                        -id: 1
                        -moduleCode: "COMP H3037"
                        -moduleTitle: "Web Framework Development"
                        -credits: 5
                      }
                      2 => Elective {#116 ▼
                        -id: 2
                        -moduleCode: "COMP H2033"
                        -moduleTitle: "Interactive Multimedia"
                        -credits: 5
                      }
                    ]
                  }
                ]
              }
            }
          }
        ]
      ]
    }
  }
]

```

Figure 14.1: Twig dump of session attribute bag.

14.3 Basket index route, to list contents of electives basket

We’ll write our code in a new controller class `ElectiveBasketController.php` in directory `/src/AppBundle/Controller/`. Note that we have added the `@Route` prefix `/basket/` to all controller actions in this class by writing a `@Route` annotation comment for the class declaration:

```
namespace AppBundle\Controller;

use Sensio\Bundle\FrameworkExtraBundle\Configuration\Route;
use Symfony\Bundle\FrameworkBundle\Controller\Controller;
use AppBundle\Entity\Elective;
use Symfony\Component\HttpFoundation\Session\Session;

/**
 * Elective controller.
 *
 * @Route("/basket")
 */
class ElectiveBasketController extends Controller
{
```

Our electives basket controller index action is very simple, since all the work extracting values from the session will be done by our Twig template. So our index action simply returns the Twig rendering of template `basket/index.html.twig`:

```
/**
 * @Route("/", name="electives_basket_index")
 */
public function indexAction()
{
    // no need to put electives array in Twig argument array - Twig can get data direct from
    $argsArray = [
    ];

    $templateName = 'basket/list';
    return $this->render($templateName . '.html.twig', $argsArray);
}
```

14.4 Controller method - `clearAction()`

Let’s write another simple method next - a method to remove any `basket` attribute from the session. We can achieve this with the statement `$session->remove('basket')`:


```
/**
 * @Route("/clear", name="electives_basket_clear")
 */
public function clearAction()
{
    $session = new Session();
    $session->remove('basket');

    return $this->redirectToRoute('electives_basket_index');
}
```

Note that we are redirecting to route `electives_basket_index`.

14.5 Adding an Elective object to the basket

The logic to add an object into our session `basket` array requires a little work. First we need to get a PHP array `$electives`, that is either what is currently in the session, or a new empty array if no such array was found in the session:

```
/**
 * @Route("/add/{id}", name="electives_basket_add")
 */
public function addToElectiveCart(Elective $elective)
{
    // default - new empty array
    $electives = [];

    // if no 'electives' array in the session, add an empty array
    $session = new Session();
    if($session->has('basket')){
        $electives = $session->get('basket');
    }
}
```

Note above, that we are relying on the ‘magic’ of the Symfony param-converter here, so that the integer ‘id’ received in the request is converted into its corresponding Elective object for us.

Next we get the ‘id’ of the Elective object, and see whether it can be found already in array `$electives`. If it is not already in the array, then we add it to the array (with the ‘id’ as key), and store the updated array in the session under the attribute bag key `basket`:

```
// get ID of elective
$id = $elective->getId();
```

```

// only try to add to array if not already in the array
if(!array_key_exists($id, $selectives)){
    // append $elective to our list
    $selectives[$id] = $elective;

    // store updated array back into the session
    $session->set('basket', $selectives);
}

```

Finally (whether we changed the session `basket` or not), we redirect to the basket index route:

```
return $this->redirectToRoute('electives_basket_index');
```

14.6 The delete action method

The delete action method is very similar to the add action method. In this case we never need the whole Elective object, so we can keep the integer `id` as the parameter for the method.

We start (as for add) by ensuring we have a PHP variable array `$selectives`, whether or not one was found in the session.

```

/**
 * @Route("/delete/{id}", name="electives_basket_delete")
 */
public function deleteAction(int $id)
{
    // default - new empty array
    $selectives = [];

    // if no 'electives' array in the session, add an empty array
    $session = new Session();
    if($session->has('basket')){
        $selectives = $session->get('basket');
    }
}

```

Next we see whether an item in this array can be found with the key `$id`. If it can, we remove it with `unset` and store the updated array in the session attribute bag with key `basket`.

```

// only try to remove if it's in the array
if(array_key_exists($id, $selectives)){
    // remove entry with $id
    unset($selectives[$id]);
}

```

```

        if(sizeof($electives) < 1){
            return $this->redirectToRoute('electives_basket_clear');
        }

        // store updated array back into the session
        $session->set('basket', $electives);
    }

```

Finally (whether we changed the session `basket` or not), we redirect to the basket index route:

```

return $this->redirectToRoute('electives_basket_index');

```

14.7 The Twig template for the basket index action

The work extracting the array of electives in the basket and displaying them is the task of template `index.html.twig` in `/app/Resources/views/basket`.

First, we attempt to retrieve item `basket` from the session, and also Twig `dump()` this session attribute:

```

{% set basket_electives = app.session.get('basket') %}

{{ dump(app.session.get('basket')) }}

```

Next we have a Twig `if` statement, displaying an empty basket message if `basket_electives` is null (i.e.

```

{% if basket_electives is null %}
    <p>
        you have no electives in your basket
    </p>

```

The we have an `else` statement (for when we did retrieve an array), that loops through creating an unordered HTML list of the basket items:

```

{% else %}
    <ul>
        {% for elective in basket_electives %}
            <li>
                <hr>
                id = {{ elective.id }}
                <br>
                module code = {{ elective.moduleCode }}
                <br>
                module title = {{ elective.moduleTitle }}
            </li>
        {% endfor %}
    </ul>

```

```

        <br>
        credits = {{ elective.credits }}
        <br>
        <a href="{{ path('electives_basket_delete', { 'id': elective.id }) }}">(remove)</a>
    </li>
    {% endfor %}
</ul>
{% endif %}

```

Note that a link to the `delete` action is offered at the end of each list item.

Finally, a paragraph is offered, containing a list to clear all items from the basket:

```

<p>
    <a href="{{ path('electives_basket_clear') }}">CLEAR all items in basket</a>
</p>

```

Figure 14.2 shows a screenshot of the basket index page, listing each item in the session array.

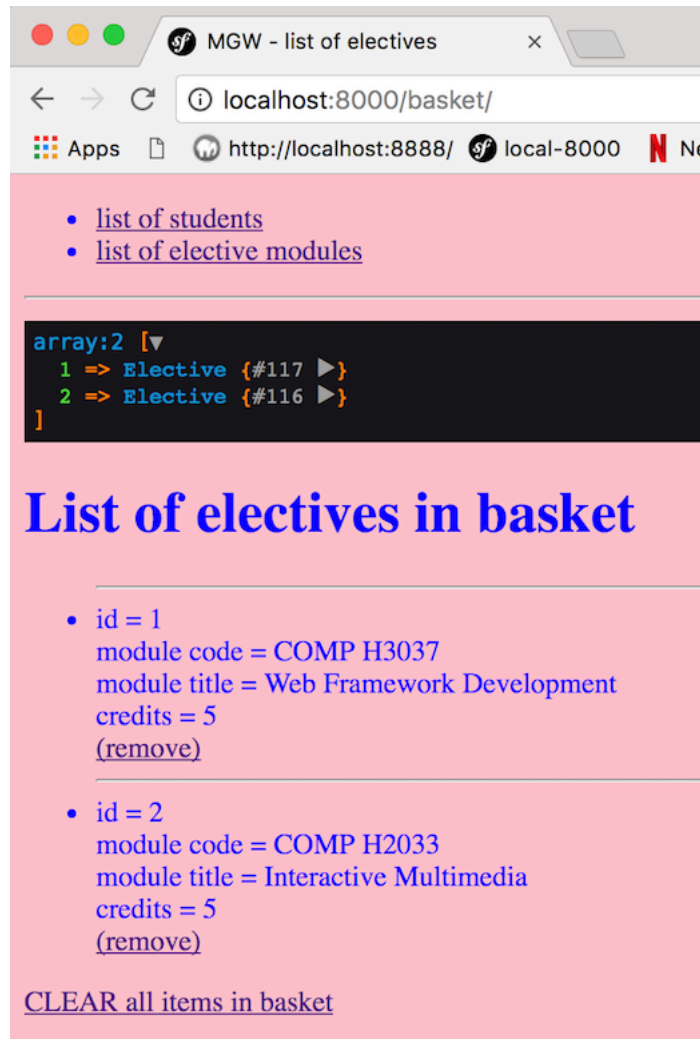


Figure 14.2: Shopping basket of elective modules.

14.8 Adding the ‘add to basket’ link in the list of electives

To link everything together, we can now add a link to ‘add to basket’ in our electives index template. So when we see a list of electives we can add one to the basket, and then be redirected to see the updated basket of elective modules. We see below an extra list item for path `electives_basket_add` in template `index.html.twig` in directory `/app/Resources/views/elective/`:

```
{% for elective in electives %}
    <tr>
        <td><a href="{{ path('elective_show', { 'id': elective.id }) }}">{{ elective.id }}</a>
        <td>{{ elective.moduleCode }}</td>
        <td>{{ elective.moduleTitle }}</td>
        <td>{{ elective.credits }}</td>
        <td>
            <ul>
                <li>
                    <a href="{{ path('elective_show', { 'id': elective.id }) }}">show</a>
                </li>
                <li>
                    <a href="{{ path('elective_edit', { 'id': elective.id }) }}">edit</a>
                </li>
                <li>
                    <a href="{{ path('electives_basket_add', { 'id': elective.id }) }}">add
                </li>
            </ul>
        </td>
    </tr>
{% endfor %}
```

Figure 14.3 shows a screenshot of the list of elective modules page, each with an ‘add to basket’ link.

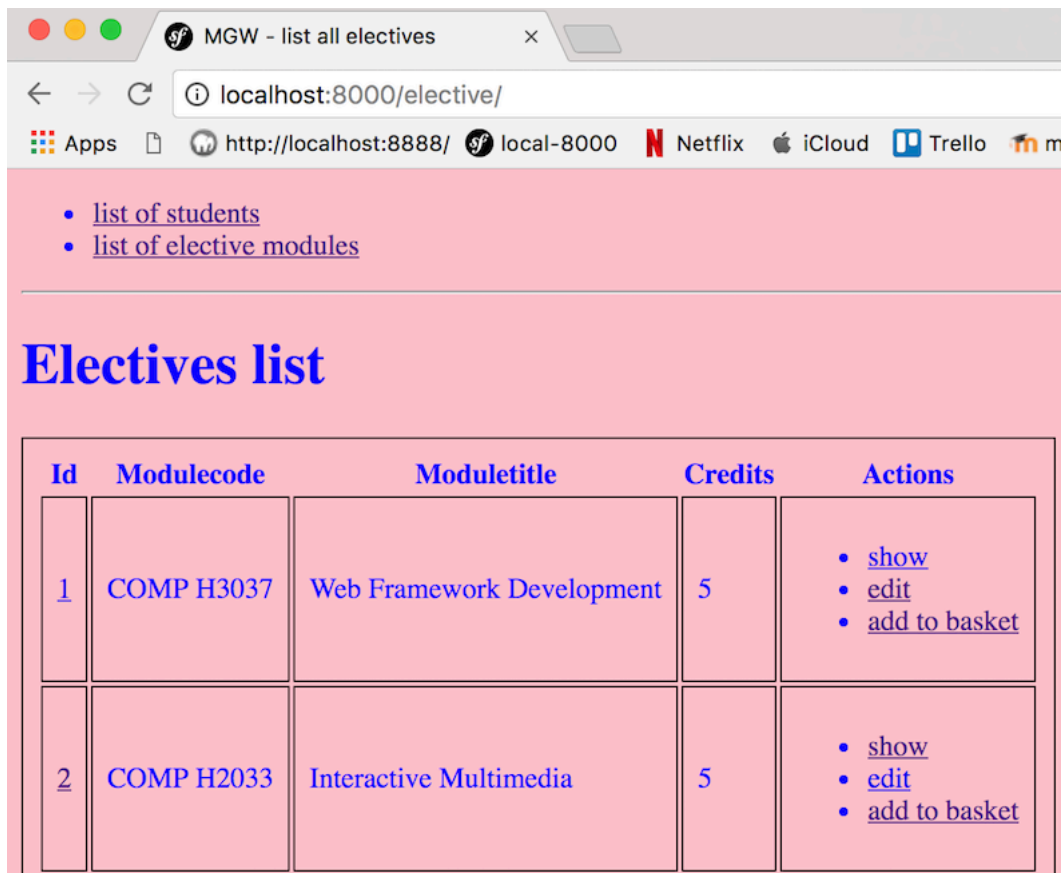


Figure 14.3: List of electives with ‘add to basket’ link.

Part VI

Security and Authentication

15

Simple authentication (logins!) with Symfony sessions

15.1 Create a User entity (project15)

Let's use the CLI to generate a `User` entity for us. We'll use the `--no-interaction` option and specify 2 string fields (each with length 255) for `username` and `password`:

```
php bin/console generate:doctrine:entity --no-interaction --entity=AppBundle:User  
--fields="username:string(255) password:string(255)"
```

For now we won't worry about hashing the password - we'll learn how to do that later.

15.2 Create Database table for our entity

Now let's use the CLI to update our Database schema and create a table corresponding to our new entity:

```
$ php bin/console doctrine:schema:update --force
```

15.3 Create User CRUD from CLI

Now let's create a CRUD controller for users:

```
php bin/console generate:doctrine:crud --entity=AppBundle\User --format=annotation
--with-write --no-interaction
```

We now have a new controller class `UserController`, and also new view templates¹:

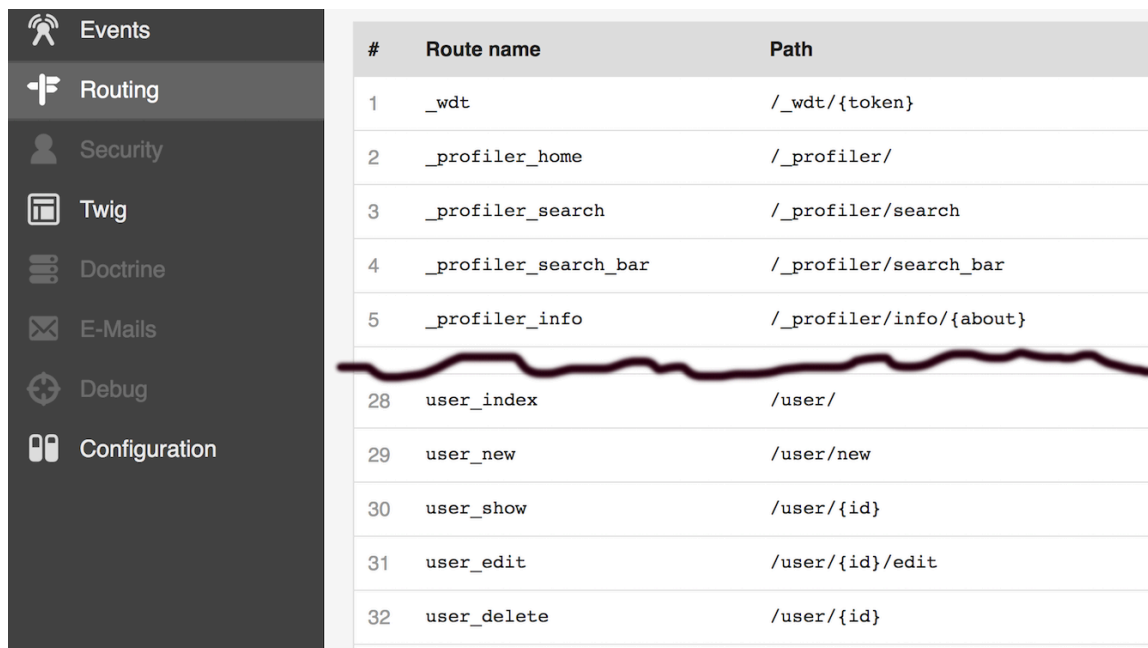
```
/app/Resources/views/user/edit.html.twig
/app/Resources/views/user/index.html.twig
/app/Resources/views/user/new.html.twig
/app/Resources/views/user/show.html.twig
```

15.4 New routes (from annotations of controller methods)

Let's look at the new routes added by our generated CRUD controller. We can do this two ways:

- from the CLI command `php bin/console debug:router`
- selecting 'Routes' from the Symfony profiler page

Figure 15.1 shows a screenshot the Symfony of the profiler page listing all routes (hint - enter an invalid route and it will list them all, e.g. `/user99`).



#	Route name	Path
1	<code>_wdt</code>	<code>/_wdt/{token}</code>
2	<code>_profiler_home</code>	<code>/_profiler/</code>
3	<code>_profiler_search</code>	<code>/_profiler/search</code>
4	<code>_profiler_search_bar</code>	<code>/_profiler/search_bar</code>
5	<code>_profiler_info</code>	<code>/_profiler/info/{about}</code>
28	<code>user_index</code>	<code>/user/</code>
29	<code>user_new</code>	<code>/user/new</code>
30	<code>user_show</code>	<code>/user/{id}</code>
31	<code>user_edit</code>	<code>/user/{id}/edit</code>
32	<code>user_delete</code>	<code>/user/{id}</code>

Figure 15.1: List of CRUD-generated user routes.

We can see that these automatically generated routes are very 'succinct' (using as few words as possible). The sequence is important, also the HTTP methods (or simulated methods like `DELETE`).

¹If you use `_base.html.twig` you'll have to edit the `extends` statement for each of these templates, since `base.html.twig` is assumed and automatically coded.

15.5 WARNING - watch out for ‘verbs’ being interpreted as entity ‘id’s ...

Imagine we write a new method, `loginAction()` at the **end** of our `UserController`, with the route annotation `/user/login`. When requested with the HTTP GET method, the show route `/user/{id}` will match before it gets down to the `/user/login` route pattern. The Symfony param-converted will then attempt to retrieve a `User` record from the database with an ‘id’ value of `login`, and will fail. This will result in the param-converted throwing a 404-not found exception.

Figure 15.2 shows a screenshot of the exception thrown.

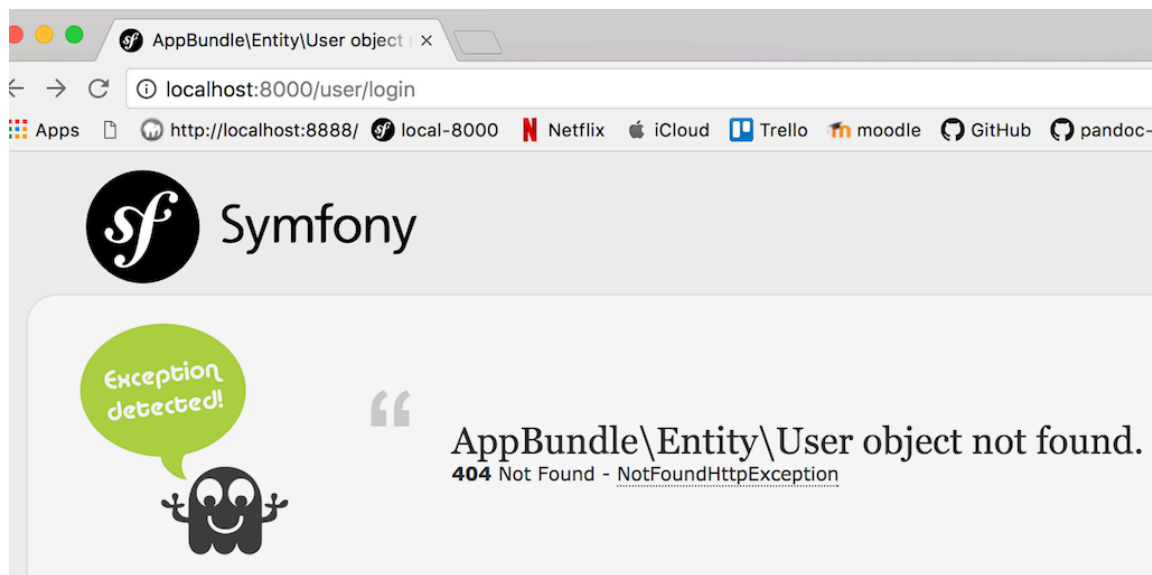


Figure 15.2: 404 not found exception for `/user/login`.

If we look in the profiler it will tell us which route it matched with. Figure 15.3 shows the profiler telling us it matched route `/user/{id}`.

25	<code>students_show</code>	<code>/students/show/{id}</code>	Path does not match
26	<code>students_process_new_form</code>	<code>/students/processNewForm</code>	Path does not match
27	<code>students_new_form</code>	<code>/students/new</code>	Path does not match
28	<code>user_index</code>	<code>/user/</code>	Path does not match
29	<code>user_new</code>	<code>/user/new</code>	Path does not match
30	<code>user_show</code>	<code>/user/{id}</code>	Route matches!

Figure 15.3: Profiler showing route matches `/user/{id}`.

We can solve this problem in several different ways. Let’s solve it by creating a separate

`LoginController` class, with routes `/login` and `/logout`. Since these routes will not be prefixed by `/user` neither word ‘login’ or ‘logout’ will be interpreted as an ‘id’ for a user. Other solutions include:

- locating the `loginAction()` method, and its associated route, earlier in the `UserController` than the `showAction()`. Although the less we have to rely on the **sequence** of methods in a class, the less chance we’ll encounter issues like this.
- adding a ‘verb’ for each action’s route. So the `showAction()` method will have route `/user/show/{id}` and the `deleteAction()` method will have route `/user/delete/{id}`, and so on. This is why the `editAction()` route ends with `/edit` (although putting the verb after the parameter seems odd to me ...).

15.6 Create a ‘login’ Twig template (project16)

Before we create the `LoginController` PHP class let’s first create the Twig template to display the login form.

Let’s just copy the `/user/new.html.twig` template (in directory `/app/Resources/views`) created with our CRUD - since a login (just as with new user) needs a form asking for ‘username’ and ‘password’. We’ll copy that to `/login.html.twig` (in the root views directory of `/app/Resources/views`). We’ll change the level 1 heading and button label to `Login`, and remove the `Back to the list` link: , and change the name of the submit button to ‘l

```
{% extends '_base.html.twig' %}

{% block body %}
    <h1>Login</h1>
    {{ form_start(form) }}
        {{ form_widget(form) }}
        <input type="submit" value="Login" />
    {{ form_end(form) }}
{% endblock %}
```

As we can see above, this Twig template is now basically a level 1 HTML heading `Login`, the start and end form tags (via Twig functions `form_start` and `form_end`), and then the form widget (input fields and labels etc.), plus a regular `Login` submit button.

Since we can anticipate that we may wish to display flash login error messages to the user, we’ll add a `<div>` with CSS class `flash-error` (pink background and some padding) after the level 1 heading:

```
{% extends '_base.html.twig' %}

{% block body %}
```

```
<h1>Login</h1>

{% if app.session.flashBag.has('error') %}
    <div class="flash-error">
        {% for msg in app.session.flashBag.get('error') %}
            {{ msg }}
        {% endfor %}
    </div>
{% endif %}

{{ form_start(form) }}
    {{ form_widget(form) }}
    <input type="submit" value="Login" />
{{ form_end(form) }}
{% endblock %}
```

15.7 A loginAction() in a new SecurityController

Now we'll create a new controller class to handle login/logout/authentication etc. In directory `/src/AppBundle/Controllers` create new class `SecurityController`. We can base method `loginAction()` for route `/login` on a copy of method `UserController->newAction()`.

We need to do the following:

- change the route annotation comment to `@Route("/login", name="login")`
- change method name to `loginAction()`
- for now just delete all the statements inside the `if` statement for a successfully submitted form (so after submission of the form, we just see the form again - note the form is 'sticky' since the `$user` object is rem
- the name of the Twig template is simply `login`

```
/**
 * login form
 *
 * @Route("/login", name="login")
 * @Method({"GET", "POST"})
 */
public function loginAction(Request $request)
{
    $user = new User();
    $form = $this->createForm('AppBundle\Form\UserType', $user);
    $form->handleRequest($request);
}
```

```

if ($form->isSubmitted() && $form->isValid()) {
}

$argsArray = [
    'user' => $user,
    'form' => $form->createView(),
];

$templateName = 'login';
return $this->render($templateName . '.html.twig', $argsArray);
}

```

15.8 Problem - the Symfony User form renders password as visible plain text

While we saved a little time and energy re-using the new User form for our login form, we can see from the screenshot in Figure 15.4 that the password field is rendered in HTML as visible plain text.

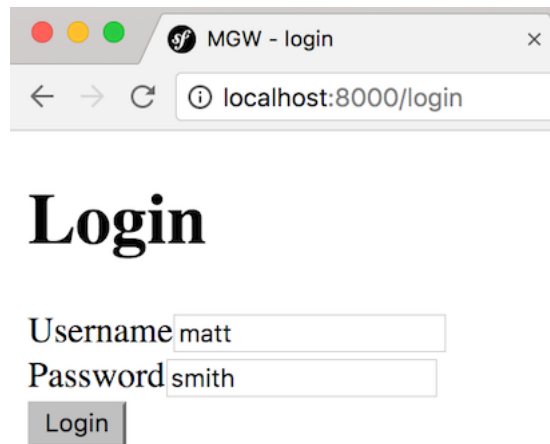


Figure 15.4: Login form with visible plain text password HTML form field.

This is because the default `UserType` form, that was created as part of the CRUD generation, saw that `password` was a text field in the Entity `User`, so by default generates a plain text HTML input field.

**** Huh?? the `UserType` form?? ****

Yes, part of the CRUD generation also involves creating a class for each entity's Form. So in

/src/AppBundle/Form the UserType form class that was created. If we look carefully at the code we copied from UserController->newAction() we see that to create the form from a User object we are Symfony to use class AppBundle\Form\UserType:

```
$form = $this->createForm('AppBundle\Form\UserType', $user);
```

We can change this by specifying that we want any forms displaying the User password field to be rendered using the PasswordType Symfony form type. We just have to add this in to the UserType form class that was created in /src/AppBundle/Form/UserType.php:

```
class UserType extends AbstractType
{
    /**
     * {@inheritdoc}
     */
    public function buildForm(FormBuilderInterface $builder, array $options)
    {
        $builder->add('username')->add('password');
    }
}
```

We need to add PasswordType::class to the part where the 'password field is added to the form:

```
class UserType extends AbstractType
{
    /**
     * {@inheritdoc}
     */
    public function buildForm(FormBuilderInterface $builder, array $options)
    {
        $builder->add('username')->add('password', PasswordType::class);
    }
}
```

We also need to add the corresponding use statement so that this class knows about the PasswordType class we are using:

```
use Symfony\Component\Form\Extension\Core\Type\PasswordType;
```

Figure 15.5 shows a wildcarded password HTML form field now.

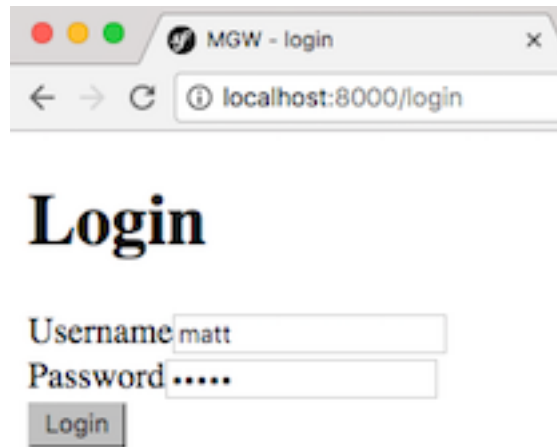


Figure 15.5: Login form with obscured wildcard password HTML form field.

15.9 Handling login form submission

We can now begin our work on handling the POST submission of login details. Let us abstract away the task of authentication to a method (we'll write in a minute) `authenticate()`. So we can now write the content of our `if(submitted and valid)` statement block to do the following:

- IF successful authentication for contents of `$user`
- THEN store `$user` in the session and redirect to a secure admin home page
- ELSE
 - add an error to the flash bag
 - clear the password field (login forms should not have 'sticky' passwords) and recreate the form with this updated user object
 - then fall through to display the form again

Here is this login implemented in our `loginAction()` method:

```
if ($form->isSubmitted() && $form->isValid()) {  
    if($this->canAuthenticate($user)) {  
        // store user in session  
        $session->set('user', $user);  
  
        // redirect to ADMIN home page  
        return $this->redirectToRoute('admin_index');  
    } else {  
        $this->addFlash(  
            'error',
```

```
        'bad username or password, please try again'
    );

    // create new form with user that has no password - password should not be 'sticky'
    $user->setPassword('');
    $form = $this->createForm('AppBundle\Form\UserType', $user);

    // fall through to login form at end of this method
}
}
```

15.10 An Admin home page (to test authentication)

Let's add the admin controller, with an action for an admin homepage (the route named `admin_index` which we redirect to after a valid login). Figure 15.6 shows this admin home page. At present we can visit this page with no login authentication with request URL `/admin/`.

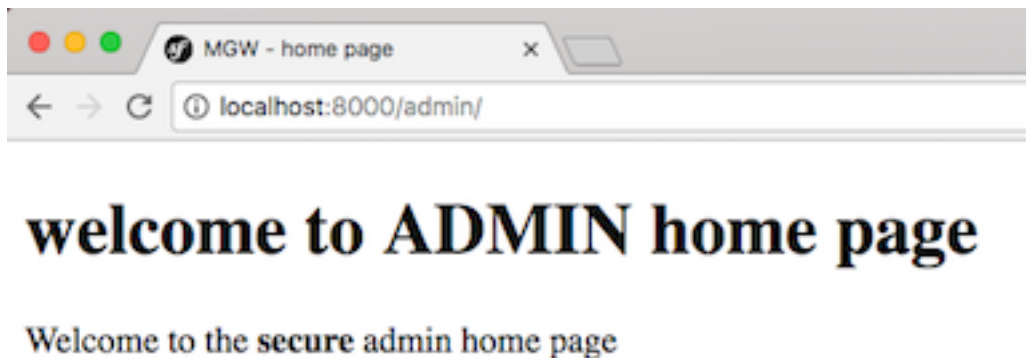


Figure 15.6: Unsecured admin home page.

```
/**
 * Class AdminController
 * @package AppBundle\Controller
 *
 * @Route("/admin")
 */
class AdminController extends Controller
{
    /**
     * @Route("/", name="admin_index")
     */
}
```

```
public function indexAction(Request $request)
{
    $templateName = '/admin/index';
    return $this->render($templateName . '.html.twig', []);
}
}
```

NOTE: Why have route prefix for a class when there is only one route? Well, having a route prefix means Symfony resolves `/admin` with no trailing slash as `/admin/` with no complaining! Figure 15.7 shows how a trailing forward slash is automatically added to a request to `/admin`.

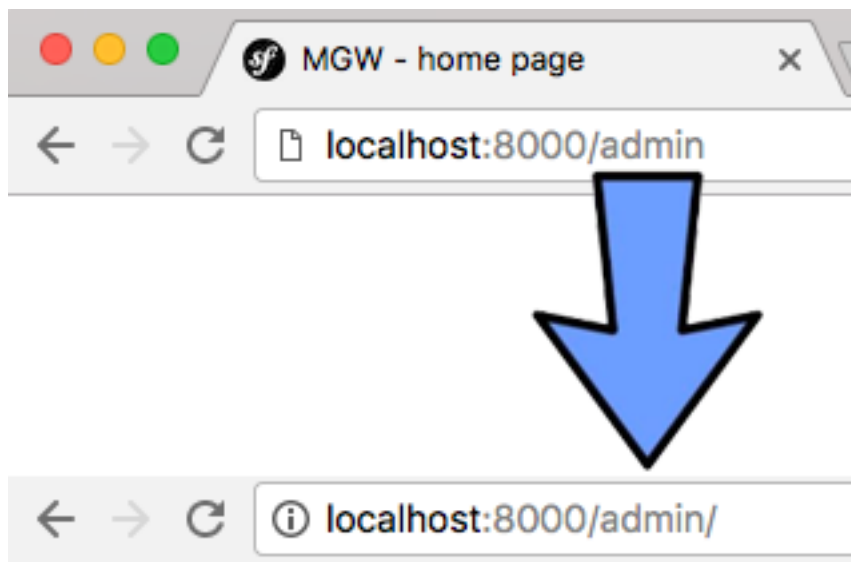


Figure 15.7: Symfony adding trailing slash to admin home page request.

Let's add a Twig template `app/Resources/views/admin/index.html.twig` for a simple admin home page:

```
{% extends '_base.html.twig' %}

{% block pageTitle %}home page{% endblock %}

{% block body %}
    <h1>welcome to ADMIN home page</h1>

    <p>
        Welcome to the <strong>secure</strong> admin home page
    </p>
{% endblock %}
```

15.11 Authenticating against hard-coded credentials and storing User object in the session

We can now complete our session-based security, by implementing our `authenticate()` method in the `SecurityController`, and storing a `User` object in the session after successful login. Here is the code for that method (where we hardcode valid username and password 'admin'):

```
/**
 * @param User $user
 * @return bool
 *
 * return whether or not contents of $user is a valid username/password combination
 */
public function canAuthenticate(User $user)
{
    $username = $user->getUsername();
    $password = $user->getPassword();

    return ('admin' == $username) && ('admin' == $password);
}
```

We can now add `SESSION` logic to our `AdminController->indexAction()` method, testing for a `user` token in the `SESSION` before allowing display of the admin home page. We need to:

- get a reference to the current session
- test whether there is a token user in the current session (if yes, we can go ahead and render the admin home page)
- if no user token in the session, then we'll add a flash error to the session Flash bag, and redirect to the login page

NOTE Due to the way redirects work in Symfony 3, flash messages live for 2 requests during a redirect, so we need to clear the flash bag before adding the message, otherwise we'll see the message twice ... a bit odd but this approach seems to work ...

```
public function indexAction(Request $request)
{
    $session = new Session();

    if ($session->has('user')){
        $templateName = '/admin/index';
        return $this->render($templateName . '.html.twig', []);
    }
}
```

```
// if get here, not logged in,  
// empty flash bag and create flash login first message then redirect  
$session->getFlashBag()->clear(); // avoids seeing message twice ...  
$this->addFlash(  
    'error',  
    'please login before accessing admin'  
);  
  
return $this->redirectToRoute('login');  
}
```

Figure 15.8 shows automatic redirection to the login page, when user attempts to view admin home page when not logged in.

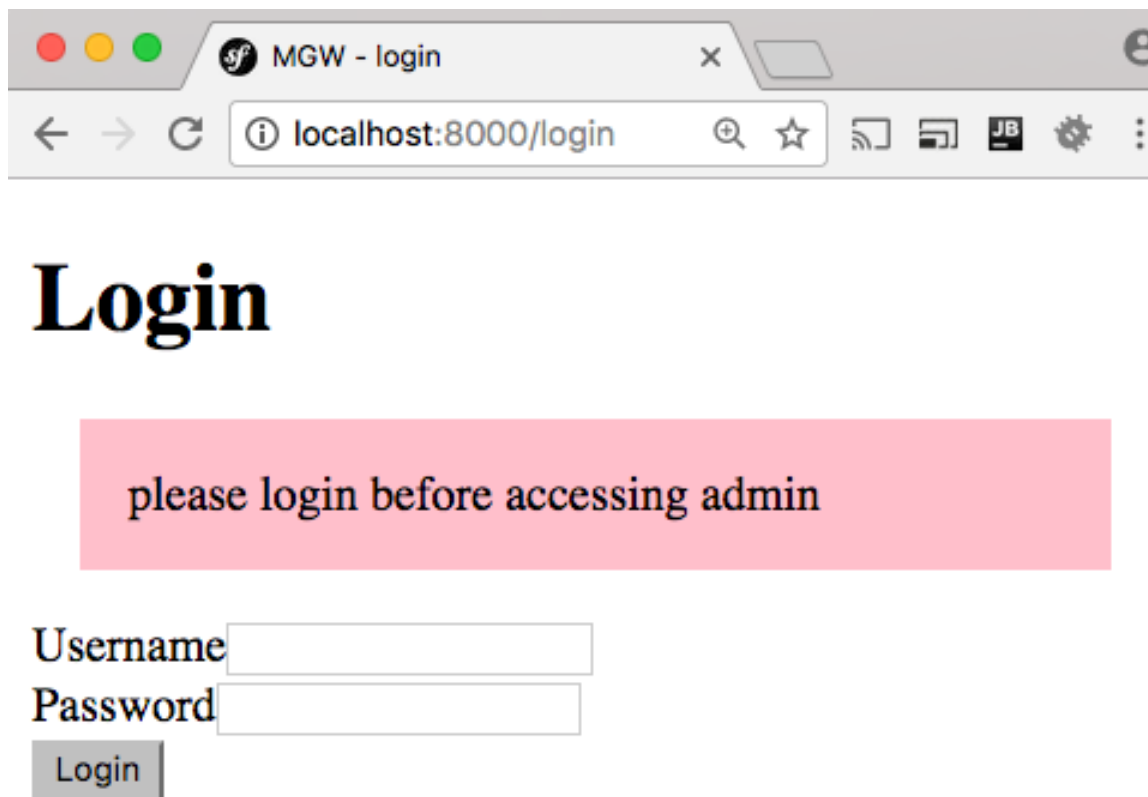


Figure 15.8: User redirected to login page after requesting `/admin`, with flash error (when not logged-in).

If we login with the credentials `username='admin'` and `password='admin'`, we get to see the admin home page, and we can see, from the Symfony profiler, that a user object is stored in the session (See Figure 15.9).

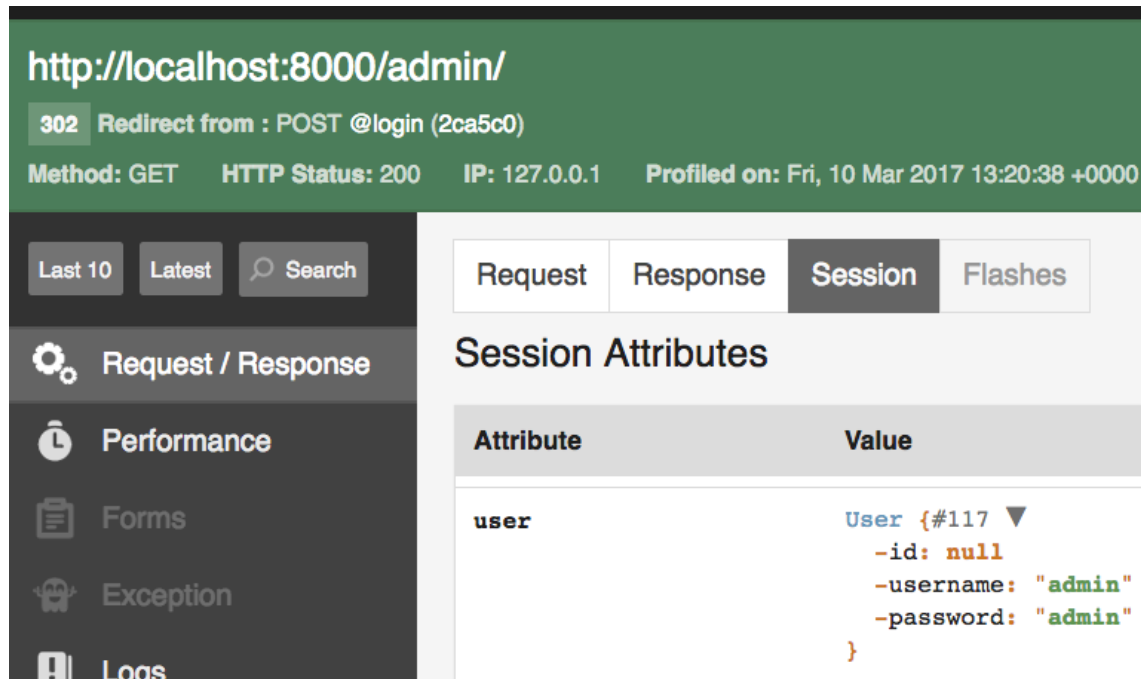


Figure 15.9: User token in session, after requesting admin home (when logged in).

15.12 Informing user if logged in

If the user is accessing the admin pages, let's inform them of the user they are logged-in as, and offer them a logout link. We can add some CSS for a page header in `/web/css/header.css` to show a grey shaded header with some padding and right aligned text (and add an import statement for this stylesheet to `_base.html.twig`):

```
header {  
    text-align: right;  
    padding: 0.5rem;  
    border-bottom: 0.1rem solid black;  
    background-color: darkgray;  
}
```

We can also add some Twig logic to our `_base.html.twig` template to display (on every page) login details, and login/logout link as appropriate:

```
{% set user = app.session.get('user') %}  
  
{% if user is null %}  
    <p>  
        you are not logged in: <a href="{{ path('login') }}">login</a>  
    </p>
```

```
{% else %}
    <header>
        You are logged in as: {{ user.username }}
        <br>
        <a href="{{ path('logout') }}">logout</a>
    </header>
{% endif %}
```

Figure 15.10 shows automatic redirection to the login page, when user attempts to view admin home page when not logged in.

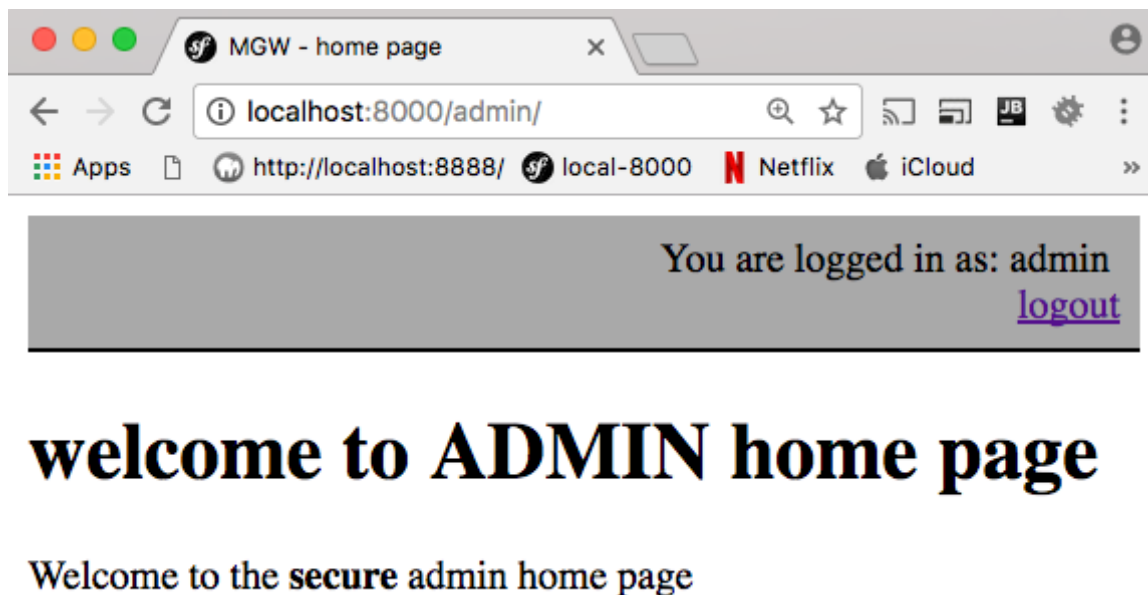


Figure 15.10: Page header with CSS, username and logout link.

15.13 Working with different user roles

Often we need to identify **which** kind of user has logged in. This can be done by extending our User entity to have a 'role' property. Either make this an integer (foreign key to a Role Entity), or just have text values. Symfony's own security system follows the PHP constant naming convention of upper case, underscore separated names for roles, such as:

- ROLE_USER
- ROLE_ADMIN
- ROLE_MODERATOR
- etc.

So I suggest you follow this. The steps you'd need to take would include:

1. update the `User` entity to have a string 'role' property
2. regenerate the getters and setters
3. regenerate the CRUD (and Form)
4. update the form, so that passwords are rendered as password fields
5. edit your secure page controller methods to check for user roles (e.g. admin home page may require `ROLE_ADMIN` in the user object in the session)

15.14 Moving on ... the Symfony security system

Rather than this D.I.Y. (Do-It-Yourself) approach to security with sessions, it may be wise to move forward and learn about Symfony's powerful security component:

- [The Symfony Security system](#)

16

Introduction to Symfony security features

16.1 Create a new blog project (project17)

Create a brand new project named `blog` (or whatever you want). See Appendix B for a quick list of actions to create a new Symfony project.

16.2 Adding an unsecured admin home page

Now let's create an `AdminController` in `/src/AppBundle/Controller`, with an index route for route `/admin`. At some later point you add a nice Twig template to create the page, but for now we'll settle for a one-line hardcoded `Response` of `<html><body>Admin page!</body></html>`:

```
namespace AppBundle\Controller;

use Sensio\Bundle\FrameworkExtraBundle\Configuration\Route;
use Symfony\Bundle\FrameworkBundle\Controller\Controller;
use Symfony\Component\HttpFoundation\Response;

/**
 * @Route("/admin")
 */
class AdminController extends Controller
{
```

```

/**
 * @Route("/", name="admin_index")
 */
public function adminAction()
{
    return new Response('<html><body>Admin page!</body></html>');
}
}

```

As we can see in Figure 16.1, at present this is unsecured and we can access it in our browser via URL.

`http://localhost:8000/app_dev.php/admin`

We can see the route is unsecured by looking at the user information from the Symfony debug bar when visiting the default home page.

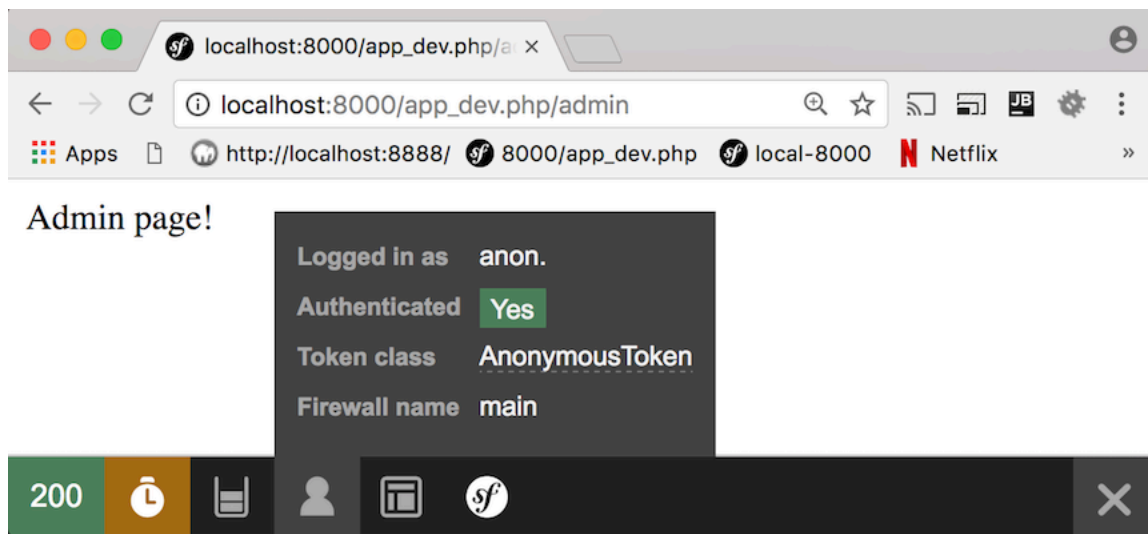


Figure 16.1: Admin home page, with anonymous user access (access not secured).

16.3 Security a route with annotation comments

We are going to add a security annotation comment to declare that the admin index route is only permitted for users with `ROLE_ADMIN`. We need to add a `use` statement, so that the annotation comments for `@Security` are parsed correctly:

```
use Sensio\Bundle\FrameworkExtraBundle\Configuration\Security;
```

We can now add an annotation comment in the same comment DOCBLOCK as the route annotation (immediately before the controller method), requiring users to have `ROLE_ADMIN` to be permitted to access this route:

```

<?php
namespace AppBundle\Controller;

use Sensio\Bundle\FrameworkExtraBundle\Configuration\Route;
use Symfony\Bundle\FrameworkBundle\Controller\Controller;
use Symfony\Component\HttpFoundation\Response;
use Sensio\Bundle\FrameworkExtraBundle\Configuration\Security;

/**
 * @Route("/admin")
 */
class AdminController extends Controller
{
    /**
     * @Route("/admin")
     * @Security("has_role('ROLE_ADMIN')")
     */
    public function adminAction()
    {
        return new Response('<html><body>Admin page!</body></html>');
    }
}

```

Now if we try to access `http://localhost:8000/app_dev.php/admin` we'll see (as in Figure 16.2) an error stating that full authentication is required to access this resource - which is impressive since we have not yet defined any users or authentication methods for users!

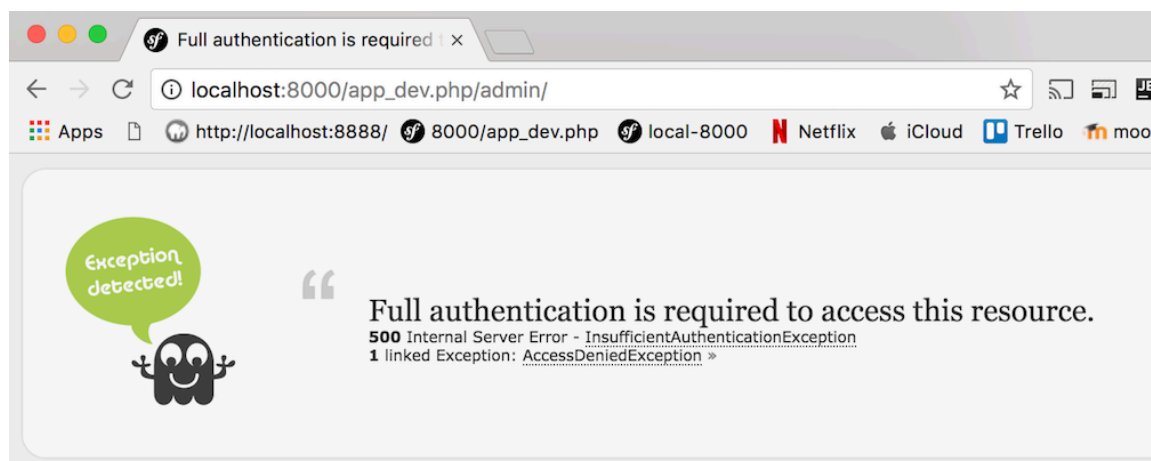


Figure 16.2: Not authenticated access denied for `/admin`.

16.4 Read some of the Symfony security documents

There are several key Symfony reference pages to read when starting with security. These include:

- [Introduction to security](#)
- [How to build a traditional login form](#)
- [Using CSRF protection](#)

16.5 Core features about Symfony security

There are several related features and files that need to be understood when using the Symfony security system. These include:

- **firewalls**
- **providers** and **encoders**
- **route protection**
- **user roles**

Core to Symfony security are the **firewalls** defined in `app/config/security.yml`. Symfony firewalls declare how route patterns are protected (or not) by the security system. Here is its default contents (less comments - lines starting with hash `#` character):

```
security:
  providers:
    in_memory:
      memory: ~

  firewalls:
    dev:
      pattern: ^/(_(profiler|wdt)|css|images|js)/
      security: false

  main:
    anonymous: ~
```

Symfony considers **every** request to have been authenticated, so if no login action has taken place then the request is considered to have been authenticated to be **anonymous** user **anon**. We can see in this **anon** user in Figure 16.3 this looking at the user information from the Symfony debug bar when visiting the default home page.

A Symfony **provider** is where the security system can access a set of defined users of the web application. The default is simply **in_memory** - although usually larger applications have users in a database or from a separate API. We see that the **main** firewall simply states that users are

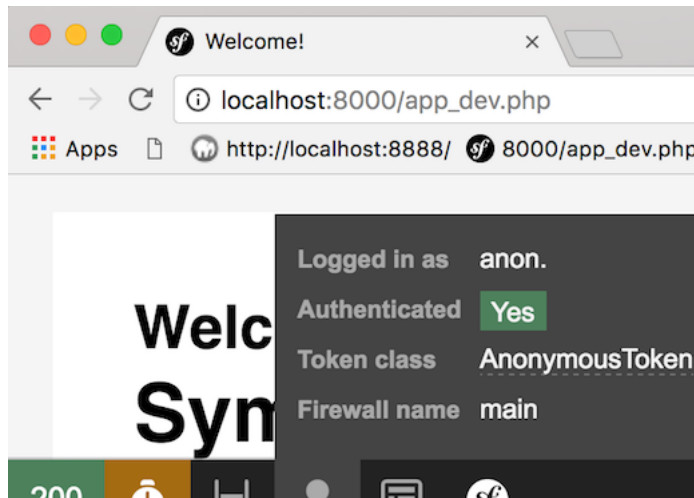


Figure 16.3: Symfony profiler showing anonymous user authentication.

permitted (at present) any request route pattern, and anonymous authenticated users (i.e. ones who have not logged in) are permitted.

NOTE In some Symfony documentation you'll see `default` instead of `main` for the default firewall. Both seem to work the same way (i.e. as the default firewall settings). So choose one and stick with it. Since my most recent new Symfony project called this `main` in the `security.yml` file I'll stick with that one for now ...

The `dev` firewall allows Symfony development tools (like the profiler) to work without any authentication required. Leave it in `security.yml` and just ignore the `dev` firewall from this point onwards.

16.6 Using default browser basic HTTP authentication

Let's tell Symfony to use the web browser's built-in HTTP login form to handle username/password input for us (we'll add a custom login form later). We do this by adding a line¹ at the end of our `security.yml` file, stating that authentication will be via the `http_basic` method:

```
security:
  providers:
    in_memory:
      memory: ~

  firewalls:
    dev:
      pattern: ^/(_(profiler|wdt)|css|images|js)/
```

¹In fact we can simply uncomment the provided line - just remove the has `#` symbol

```

security: false

main:
  anonymous: ~
  http_basic: ~

```

If we try to access `http://localhost:8000/app_dev.php/admin` again we'll see the browser default username/password login form, as shown in Figure 16.4.

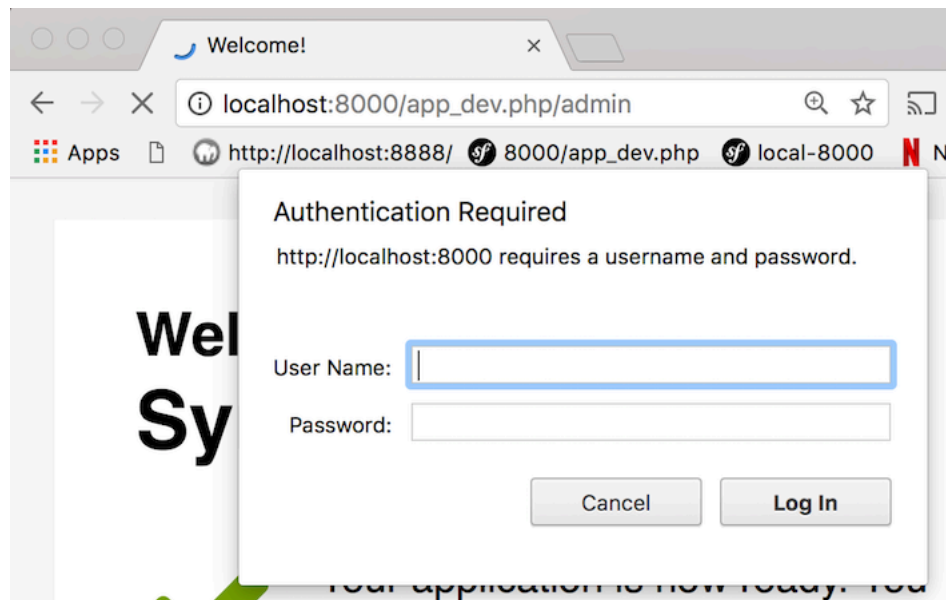


Figure 16.4: Admin home page, requiring HTTP basic browser login.

16.7 Defining some users and their roles

Let's hard-code some users. Symfony looks at the **user providers** for where to find users and their credentials. We can hard code some users in the **memory** provider in `security.yml`. Let's define the following users:

- **user** (password **user**) with **ROLE_USER**
- **admin** (password **admin**) with **ROLE_ADMIN**
- **matt** (password **smith**) with **ROLE_ADMIN**

We add these users in the **memory** section of the **providers** section of `security.yml`. Note we also must also define the **encoder** that user's passwords are encoded with. For now we'll just use un-encoded **plaintext**. So we add an **encoders** section to `security.yml` too².

²If you don't declare an encoder you'll get a `No encoder has been configured` Exception error message.


```
security:
  encoders:
    Symfony\Component\Security\Core\User\User: plaintext

  providers:
    in_memory:
      memory:
        users:
          user:
            password: user
            roles: 'ROLE_USER'
          admin:
            password: admin
            roles: 'ROLE_ADMIN'
          matt:
            password: smith
            roles: 'ROLE_ADMIN'

  firewalls:
    dev:
      pattern: ^/(_(profiler|wdt)|css|images|js)/
      security: false

    default:
      anonymous: ~
      http_basic: ~
```

Figure 16.5 shows successful access to the admin home page after a login of `username=admin` and `password=admin`. Figure 16.6 shows us in the Symfony profiler that the user `admin` has the security token `USER_ADMIN`.

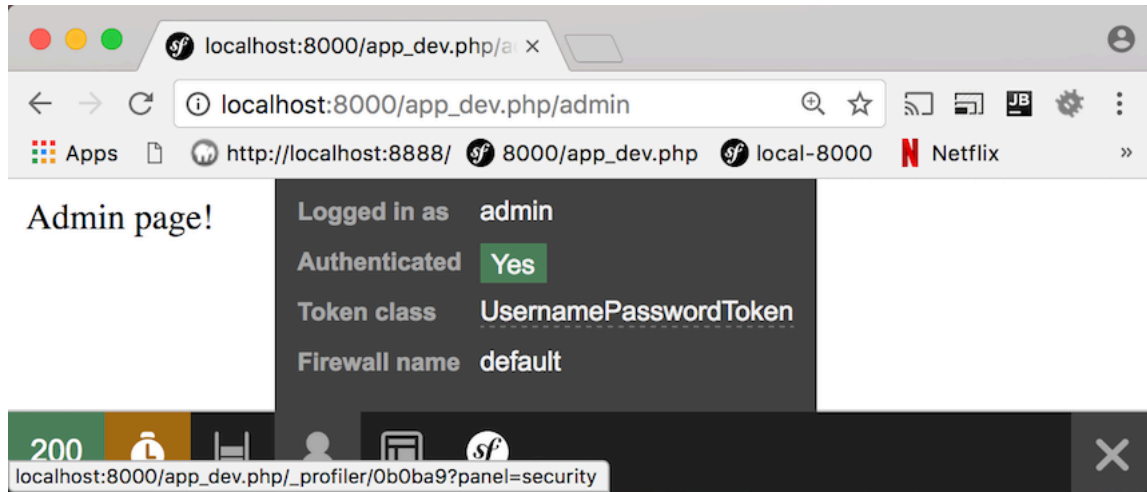


Figure 16.5: Admin home page, with profiling showing 'admin' login.

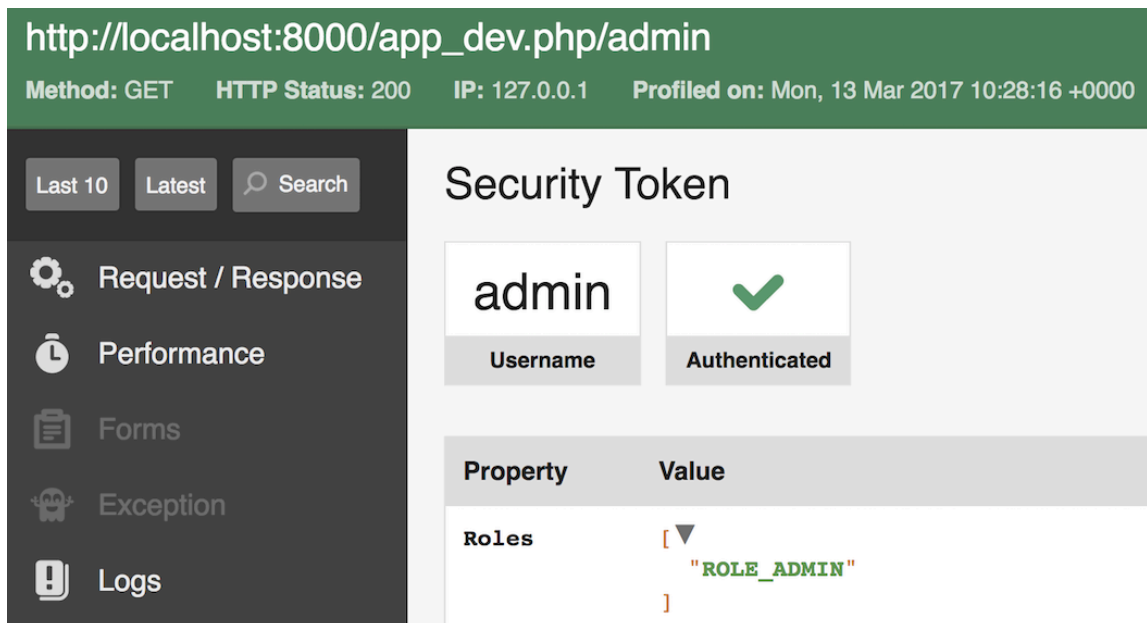


Figure 16.6: Symfony profiler showing ROLE_ADMIN token.

16.8 Security a route - method 2 - security.yml access control

The Symfony security examples offer a second method of securing routes, by adding an `access_control` section to `security.yml`. Just as with the annotation comment, we declare that route `/admin` requires the user to have `ROLE_ADMIN`:

```
access_control:
    - { path: ^/admin, roles: ROLE_ADMIN }
```

So having added this to the default `security.yml` we would now have the following:

```
security:

    providers:
        in_memory:
            memory: ~

    firewalls:
        dev:
            pattern: ^/(_(profiler|wdt)|css|images|js)/
            security: false

    main:
        anonymous: ~

    access_control:
        - { path: ^/admin, roles: ROLE_ADMIN }
```

And we'd have to add the `http_basic` authentication, and users and encoders etc. just as previously.

Important NOTE The `access_control` section of `security.yml` is **NOT** part of the `firewalls` section. Indentation is very important in YAML files, so ensure the `access_control` section start at the same level of indentation as `firewalls`. Otherwise you'll get the rather unhelpful `Access level "0" unknown` error message :-)

16.9 Hard to logout with http_basic

Apart from clearing the recent browser history, it seems that basic HTTP authentication (via the browser's built-in login page) doesn't provide any simple way to logout:

- [Symfony logout section](#)

So next we'll add a custom (Twig) login form, then we'll add a logout route to our application...

17

Custom login page and a logout route

17.1 Custom login form controller (project18)

The Symfony documentation tell's us how to create a custom login form, with CSRF protection, so let's do that.

- [How to build a Traditional Login form](#)
- [CSRF protection in the Login form](#) (NOTE the default settings work fines for this - we just need to make sure any Twig templates we write display the appropriate hidden CSRF form fields...)

First we need to replace out `http_basic` login authentication with our own, custom login form. We do this by replacing `http_basic: ~` in our `main` firewall with the a `form_login` entry.

NOTE Below I have commented-out the `http_basic` entry, to make it clear where we are replacing its entry:

```
security:
    encoders:
        Symfony\Component\Security\Core\User\User: plaintext

    providers:
        in_memory:
            memory:
                users:
```

```
        user:
            password: user
            roles: 'ROLE_USER'
        admin:
            password: admin
            roles: 'ROLE_ADMIN'
        matt:
            password: smith
            roles: 'ROLE_ADMIN'

firewalls:
    dev:
        pattern: ^/(_(profiler|wdt)|css|images|js)/
        security: false

    main:
        anonymous: ~
#        http_basic: ~
        form_login:
            login_path: login
            check_path: login
```

The above declares that the route for an authentication login form is named `login` (we'll add a controller naming that route next). We are defining 2 important properties for the security system¹:

- `login_path` - this is the route users will be redirected to if they attempt to access a resource but are do not have the authentication permitted to do so
- `check_path` - this is the route which the login form will submit a POST request to

You can read more about these paths, and other customisable features of the Symfony login system in the Symfony documentation:

- [Symfony login and check_path reference](#)

Let's create a new `SecurityController` in `src/AppBundle/Controller/` which declares the login route, and also tells our application to render a Twig custom login form template.

```
namespace AppBundle\Controller;

use Symfony\Bundle\FrameworkBundle\Controller\Controller;
use Symfony\Component\HttpFoundation\Request;
use Sensio\Bundle\FrameworkExtraBundle\Configuration\Route;
```

¹Note - we could also specific CSRF token settings here, but the Symfony security defaults all work fine [Symfony default security settings](#)

```
class SecurityController extends Controller
{
    /**
     * @Route("/login", name="login")
     */
    public function loginAction(Request $request)
    {
        // logic to show login form goes here
    }
}
```

NOTE We have broken-down the final steps of naming the Twig template and building the Twig argument array (simplifying the one-liner code from the Symfony documentation):

```
public function loginAction(Request $request)
{
    $authenticationUtils = $this->get('security.authentication_utils');

    // get the login error if there is one
    $error = $authenticationUtils->getLastAuthenticationError();

    // last username entered by the user
    $lastUsername = $authenticationUtils->getLastUsername();

    // Twig stuff
    $templateName = 'security/login';
    $argsArray = [
        'last_username' => $lastUsername,
        'error'         => $error,
    ];

    return $this->render($templateName . '.html.twig', $argsArray);
}
```

Looking at the above we can note the following:

- the first statement get a reference to the Symfony security utilities service `$authenticationUtils`
- the next 2 statements get any stored error `$error`, and the previous username `$last_username` (for repeated login attempts)
- finally we have our Twig statements, declaring that the login template is in views directory `security`, and building and then passing to Twig an arguments array containing the error and last username

We also can see that there is no logic in this method to **process** the submission of the form. The

Symfony security system will process login form submission by looking through all its **providers** to see if it can match with a username/password pair, and acting accordingly.

17.2 Creating the login form Twig template

Let's write our Twig template for the login form (copied from the Symfony documentation pages). A heading 1 and some paragraph tags have been added, also the special form hidden element for CSRF protection.

Figure 17.1 shows the login form we'll create.

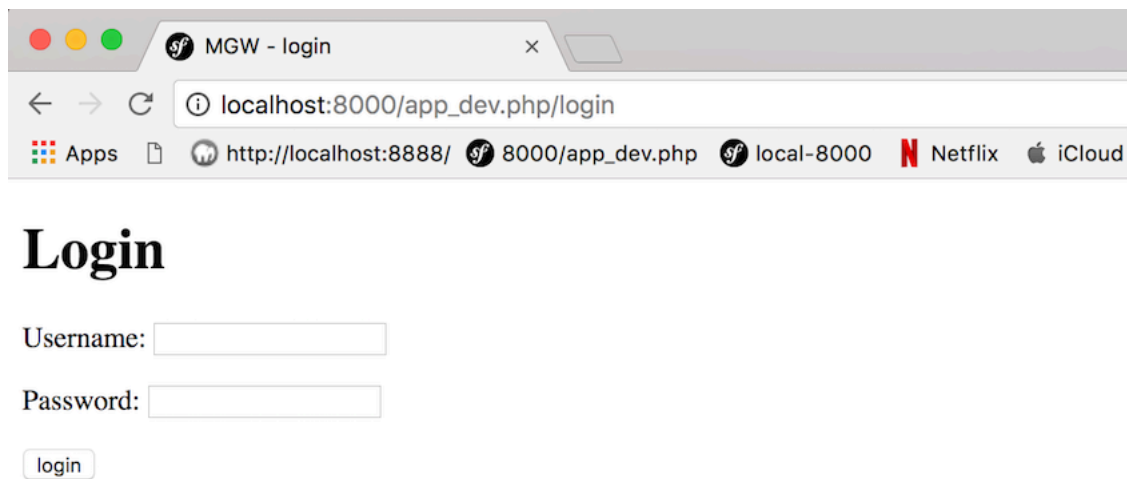


Figure 17.1: Customer login form.

Here is `app/Resources/views/security/login.html.twig`:

```
{% extends 'base.html.twig' %}

{% block pageTitle %} login page {% endblock %}

{% block body %}
    <h1>Login</h1>

    {% if error %}
        <div>{{ error.messageKey|trans(error.messageData, 'security') }}</div>
    {% endif %}

    <form action="{{ path('login') }}" method="post">

        <input type="hidden" name="_csrf_token"
```



```
        value="{{ csrf_token('authenticate') }}"
    >

    <p>
    <label for="username">Username:</label>
    <input type="text" id="username" name="_username" value="{{ last_username }}" />

    <p>
    <label for="password">Password:</label>
    <input type="password" id="password" name="_password" />

    <p>
    <button type="submit">login</button>
</form>

{% endblock %}
```

Above we can see the following in our Login Twig template:

- a level 1 heading
- display of any Twig `error` variable received
- the HTML `<form>` open tag, which we see submits via HTTP POST method to the route named `login`
- a hidden form field with the `_csrf_token` to protect against forged request attacks one (CSRF tokens help protect web applications against cross-site scripting request forgery attacks and forged login attacks²).
- the `username` label and text input field (and value of the `last_username` if any)
- the `password` label and password input field
- the submit button named `login`

17.3 Adding a `/logout` route

We can define a route to logout very easily in Symfony, with no need for any controller method. In `app/config/routing.yml` we add our login route, and its redirect to the website home page `/`. We add our 2 lines to the end of this existing configuration file, since the default contents of this file tell Symfony to look for route annotation comments in our controllers:

```
app:
    resource: '@AppBundle/Controller/'
```

²More about forged login attacks on [Wikipedia](#)

```
type: annotation
```

```
logout:  
  path: /logout
```

We also need to define the logout route as part of our security firewall. So in `security.yml` we add the following to the default firewall:

```
logout:  
  path: /logout  
  target: /
```

So our full `security.yml` now looks as follows:

```
security:  
  encoders:  
    Symfony\Component\Security\Core\User\User: plaintext  
  
  providers:  
    in_memory:  
      memory:  
        users:  
          user:  
            password: user  
            roles: 'ROLE_USER'  
          admin:  
            password: admin  
            roles: 'ROLE_ADMIN'  
          matt:  
            password: smith  
            roles: 'ROLE_ADMIN'  
  
  firewalls:  
    dev:  
      pattern: ^/(_(profiler|wdt)|css|images|js)/  
      security: false  
  
    default:  
      anonymous: ~  
      form_login:  
        login_path: login  
        check_path: login
```

```
logout:
    path:    /logout
    target:  /
```

Figure 17.2 shows that we can see the logout route is available from the Symfony profile toolbar. We can, of course, also enter the route directly in the browser address bar, e.g. via URL:

```
http://localhost:8000/app_dev.php/logout
```

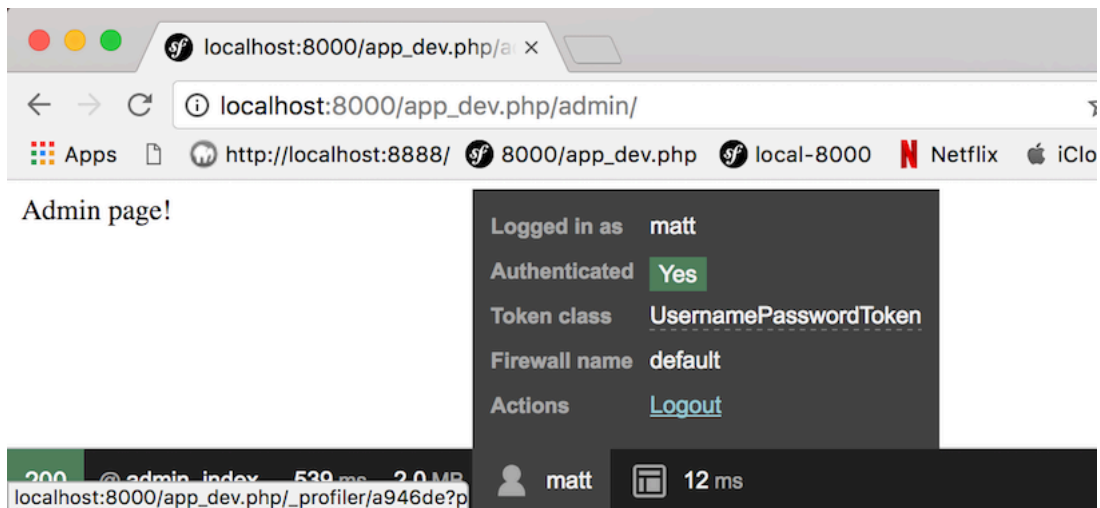


Figure 17.2: Symfony profiler user logout action.

In either case we'll logout any currently logged-in user, and return the anonymously authenticated user `anon` with no defined authentication roles.

18

Encoding the user passwords

18.1 Encoding the user passwords (project19)

It is **not** good practice to store user passwords as plain text, so let's change the encoder and store hashed passwords instead. The Symfony introduction to security documentation page tells us how to encode user passwords:

- (Encoding user passwords)[<http://symfony.com/doc/current/security.html#c-encoding-the-user-s-password>]

First, in `security.yml` we need to change the encoder from `plaintext` to `BCrypt` as follows:

```
encoders:
    Symfony\Component\Security\Core\User\User:
        algorithm: bcrypt
        cost: 12
```

Now we need to replace the plaintext passwords for our 3 users (`user`, `admin` and `matt`) with their BCrypted passwords. We can do this by using the Symfony command line tool that will tell us the encoded string for a given password (using the encoder specified in `security.yml`). So we'll need to run this 3 times:

```
$ php bin/console security:encode-password
```

Figure 18.1 shows the interactive password encoding session for password `user`:

So the full listing for our `security.yml` configuration, stating the encoder and the encrypted passwords looks like this:

```

matt@matts-MacBook-Pro passwords $ php bin/console security:encode-password

Symfony Password Encoder Utility
=====

Type in your password to be encoded:
>

-----
Key                Value
-----
Encoder used       Symfony\Component\Security\Core\Encoder\BCryptPasswordEncoder
Encoded password   $2y$12$fd/p4fqK0x42BXabn1e41u6UFgcBwqY0dKr8ViBJonQDMJjfWcCj.
-----

! [NOTE] Bcrypt encoder used: the encoder generated its own built-in salt.

[OK] Password encoding succeeded

```

Figure 18.1: CLI password encoding (for password user).

```

security:
    encoders:
        Symfony\Component\Security\Core\User\User:
            algorithm: bcrypt
            cost: 12

    providers:
        in_memory:
            memory:
                users:
                    user:
                        password: $2y$12$pUaaC6cwub1NkwNvSm/FnuR3rli8YgjIg1Di68hqX4J1TnGpLc2
                        roles: 'ROLE_USER'
                    admin:
                        password: $2y$12$ROCN/MhD6U0Rsr0xsrHT/.RETqtm8nQmdb0sC2o4w4RyHrUhXc
                        roles: 'ROLE_ADMIN'
                    matt:
                        password: $2y$12$4Uwrrc1pkskcCMDpcj4XzeLVsn5Tlk4zkQJAyrSaoDnOnY1wgHU
                        roles: 'ROLE_ADMIN'

    firewalls:
        dev:

```

```
pattern: ^/(_(profiler|wdt)|css|images|js)/
security: false

default:
  anonymous: ~
  form_login:
    login_path: login
    check_path: login

  logout:
    path: /logout
    target: /
```

18.2 Those nice people at KnpUniversity...

If you want to go further and really learn Symfony security, with your own User entity and database storage etc. then a great place to start would be the KnpUniversity video tutorial at:

- [KnpUniversity - Symfony Security: Beautiful Authentication, Powerful Authorization](#)

Part VII

Symfony Testing

19

Introduction to testing in Symfony

19.1 Using PHPUnit latest stable release

It's always recommend that you use the most recent **stable** release of any software tool or package. Therefore when testing with PHPUnit you should ensure you have the latest stable version. Check at the PHPUnit home page (see Figure 19.1:

`https://phpunit.de/`

The current stable release can be downloaded as a PHAR (PHp-ARchive) - it's usually the green one on the left...

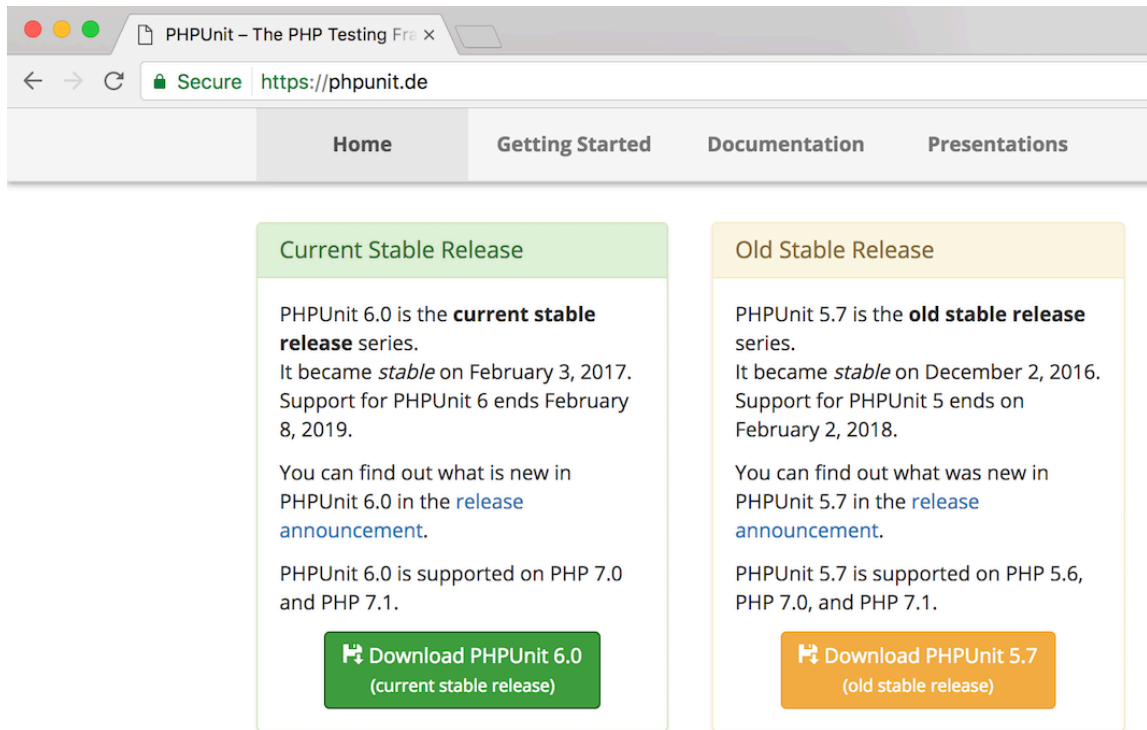


Figure 19.1: Current stable release on PHPUnit website.

19.2 Issue (and solution) with polyfills (namespacing change)

The **PROBLEM**:

Due to an issue of the difference between `PHPUnit_Framework_TestCase` (pre-namespacing class naming convention) and `PHPUnit\Framework\TestCase` (namespacing convention), and a core PHP bridge tool, currently PHPUnit 6.x does not work with Symfony 3 without some tinkering with a kernel test case. You can read more about this here:

<https://github.com/symfony/symfony/issues/21534>

So if we try to run PHPUnit we get this error message:

```
PHP Fatal error: Class 'PHPUnit_Framework_TestCase' not found in
/home/user/project/vendor/symfony/symfony/src/Symfony/Bundle/FrameworkBundle/Test/KernelTestC
on line 23
```

So for now download and use PHPUnit 5.7 (the orange, old stable release)

This issue will probably be solved in the next month or two, since both Symfony and PHPUnit are open source community projects and so people work hard and fast to solve compatibility issues with new releases.

The **SOLUTION**:

We need to change one line, in file `KernelTestCase.php`:

```
use PHPUnit\Framework\TestCase;
```

to this line:

```
use PHPUnit\Framework\TestCase as TestCase;
```

The location of `KernelTestCase.php` is:

```
/vendor
  /symfony
    /symfony
      /src
        /Symfony
          /Bundle
            /FrameworkBundle
              /Test
```

Figure 19.2 shows the code having been corrected for `project20`.

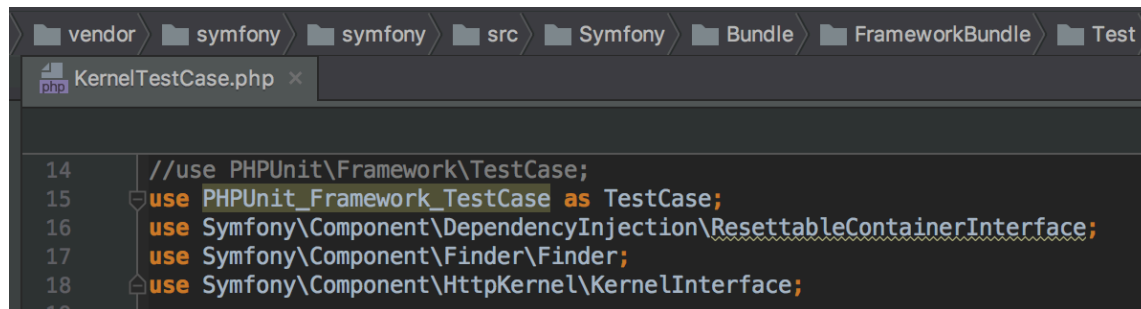


Figure 19.2: Fixed namespace so Symfony 3 works with PHPUnit 6.

19.3 Testing in Symfony

Symfony is built by a test-test open source community. There is a lot of information about how to test Symfony in the official documentation pages:

- [Symfony testing](#)
- [Testing with user authentication tokens](#)
- [How to Simulate HTTP Authentication in a Functional Test](#)

Part VIII

Appendices



Solving problems with Symfony

A.1 No home page loading

Ensure web server is running (either from console, or a webserver application with web root of the project's `/web` directory).

Point your web browser to the `app_dev.php` front controller script, e.g.:

```
http://localhost:8000/app_dev.php
```

A.2 “Route not Found” error after adding new controller method

If you have issues of Symfony not finding a new route you've added via a controller annotation comment, try this:

- delete directory `/var/cache`

Symfony caches (stores) routing data and also rendered pages from Twig, to speed up response time. But if you have changed controllers and routes, sometimes you have to manually delete the cache to ensure all new routes are checked against new requests.

A.3 Issues with timezone

Try adding the following construction to `/app/AppKernel.php` to solve timeszone problems:

```
public function __construct($environment, $debug)
{
    date_default_timezone_set( 'Europe/Dublin' );
    parent::__construct($environment, $debug);
}
```



Quick setup for new ‘blog’ project

B.1 Create a new project, e.g. ‘blog’

Use the Symfony command line installer (if working for you) to create a new project named ‘blog’ (or whatever you want!)

```
$ symfony new blog
```

Or use Composer:

```
$ composer create-project symfony/framework-standard-edition blog
```

Read more at:

- [Symfony create project reference](#)

B.2 Set up your localhost browser shortcut to for `app_dev.php`

Set your web browser shortcut to the `app_dev.php`, i.e.:

```
http://localhost:8000/app_dev.php
```

B.3 Add run shortcut to your `Composer.json` scripts

Make life easier - add a “run” `Composer.json` script shortcut to run web server from command line:

```
"scripts": {  
    "run": "php bin/console server:run",  
    ...  
}
```

B.4 Change directories and run the app

Change to new project directory and run the app

```
/~user/$ cd blog  
/~user/blog/$ composer run
```

Now visit: http://localhost:8000/app_dev.php in your browser to see the welcome page

B.5 Remove default content

If you want a **completely blank** Symfony project to work with, then delete the following:

```
/src/AppBundle/Controller/DefaultController.php  
/app/Resources/views/default/  
/app/Resources/views/base.html.twig
```

Now you have no controllers or Twig templates, and can start from a clean slate...



Steps to download code and get website up and running

C.1 First get the source code

First you need to get the source code for your Symfony website onto the computer you want to use

C.1.1 Getting code from a zip archive

Do the following:

- get the archive onto the desired computer and extract the contents
- if there is no `/vendor` folder then run CLI command `composer update`

C.1.2 Getting code from a Git repository

Do the following:

- on the computer to run the server `cd` to the web directory
- clone the repository with CLI command `git clone <REPO-URL>`
- populate the `/vendor` directory by running CLI command `composer update`

C.2 Once you have the source code (with vendor) do the following

- update `/app/config/parameters.yml` with your DB user credentials and name and host of the Database to be used
- start running your MySQL database server (assuming your project uses MySQL)
- create the database with CLI command `php bin/console doctrine:database:create`
- create the tables with CLI command `php bin/console doctrine:schema:update --force`

C.3 Run the webserver

Either run your own webserver (pointing web root to `/web`, or

- run the webserver with CLI command `php bin/console server:run`
- visit the website at `http://localhost:8000/`

D

Avoiding issues of SQL reserved words in entity and property names

Watch out for issues when your Entity name is the same as SQL keywords.

Examples to **avoid** for your Entity names include:

- user
- group
- integer
- number
- text
- date

If you have to use certain names for Entities or their properties then you need to ‘escape’ them for Doctrine.

- [Doctrine identifier escaping](#)

You can ‘validate’ your entity-db mappings with the CLI validation command:

```
$ php bin/console doctrine:schema:validate
```




Transcript of interactive entity generation

The following is a transcript of an interactive session in the terminal CLI to create an `Item` entity class (and related `ItemRepository` class) with these properties:

- title (string)
- price (float)

You start this interactive entity generation dialogue with the following console command:

```
php bin/console doctrine:generate:entity
```

Here is the full transcript (note all entities are automatically given an 'id' property):

```
$ php bin/console doctrine:generate:entity
```

```
Welcome to the Doctrine2 entity generator
```

```
This command helps you generate Doctrine2 entities.
```

```
First, you need to give the entity name you want to generate.  
You must use the shortcut notation like AcmeBlogBundle:Post.
```

```
The Entity shortcut name: AppBundle:Product/Item
```

```
Determine the format to use for the mapping information.
```

```
Configuration format (yaml, xml, php, or annotation) [annotation]:
```

Instead of starting with a blank entity, you can add some fields now.
Note that the primary key will be added automatically (named id).

Available types: array, simple_array, json_array, object,
boolean, integer, smallint, bigint, string, text, datetime, datetimetz,
date, time, decimal, float, binary, blob, guid.

New field name (press <return> to stop adding fields): description
Field type [string]:
Field length [255]:
Is nullable [false]:
Unique [false]:

New field name (press <return> to stop adding fields): price
Field type [string]: float
Is nullable [false]:
Unique [false]:

New field name (press <return> to stop adding fields):

Entity generation

```
created ./src/AppBundle/Entity/Product/  
created ./src/AppBundle/Entity/Product/Item.php  
> Generating entity class src/AppBundle/Entity/Product/Item.php: OK!  
> Generating repository class src/AppBundle/Repository/Product/ItemRepository.php: OK!
```

Everything is OK! Now get to work :).

\$

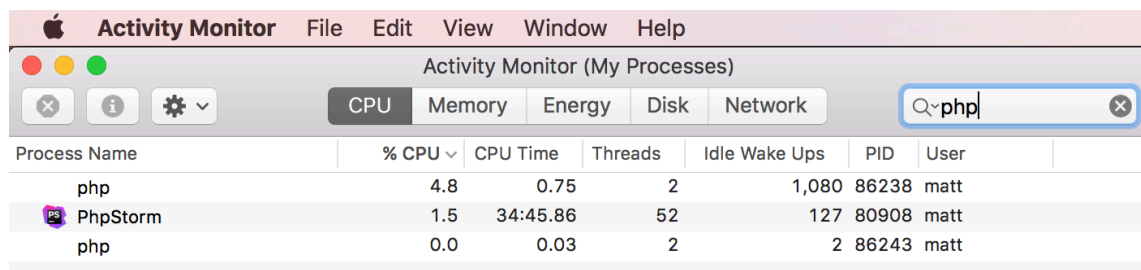


Killing ‘php’ processes in OS X

Do the following:

- run the **Activity Monitor**
- search for Process Names that are **php**
- double click them and choose **Quit** to kill them

voila!



The screenshot shows the macOS Activity Monitor window with the title bar 'Activity Monitor (My Processes)'. The 'CPU' tab is selected. A search bar in the top right corner contains the text 'php'. Below the search bar, a table lists the processes found:

Process Name	% CPU	CPU Time	Threads	Idle Wake Ups	PID	User
php	4.8	0.75	2	1,080	86238	matt
PhpStorm	1.5	34:45.86	52	127	80908	matt
php	0.0	0.03	2	2	86243	matt

List of References