MVC And Frameworks in a PHP Web Application

Internet Applications, ID1354

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- MVC in a PHP Web Application
- The id1354-fw Framework

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- Encapsulation, Objects and subsystems do not reveal their internals.

The MVC Architectural Pattern

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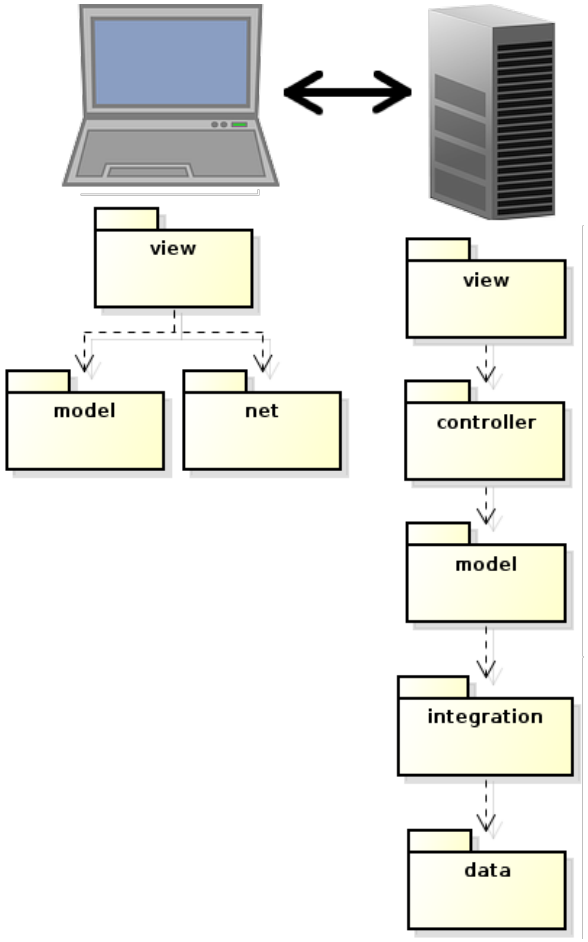
- Model contains all data and methods that operate on the data. This is the actual functionality of the application.
- Controller is an intermediary between View and Model. Each user action should correspond to one method call from view to controller. It is the task of the controller to know in detail which objects and methods in the model should be called (and in which order) to perform a particular task.

Remember: Server-Side Layers



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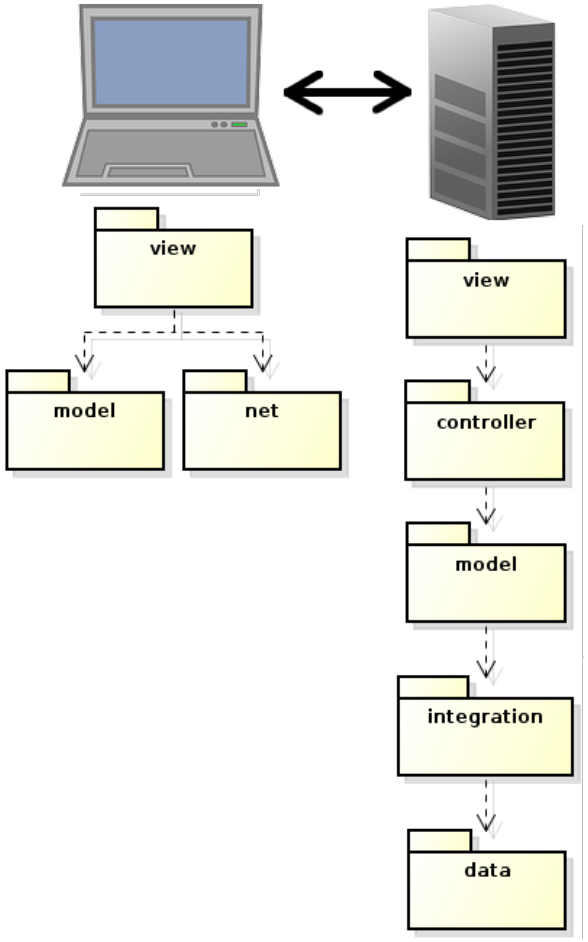

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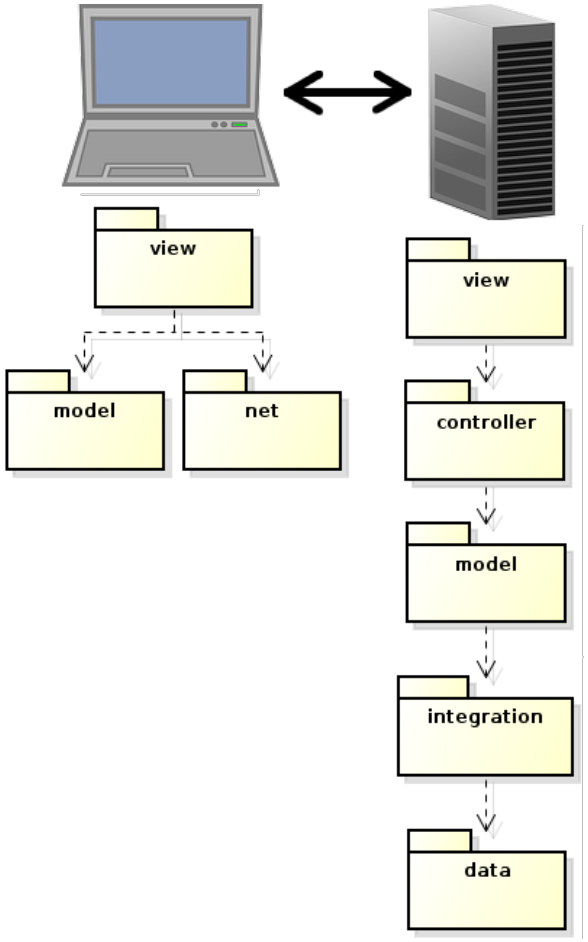

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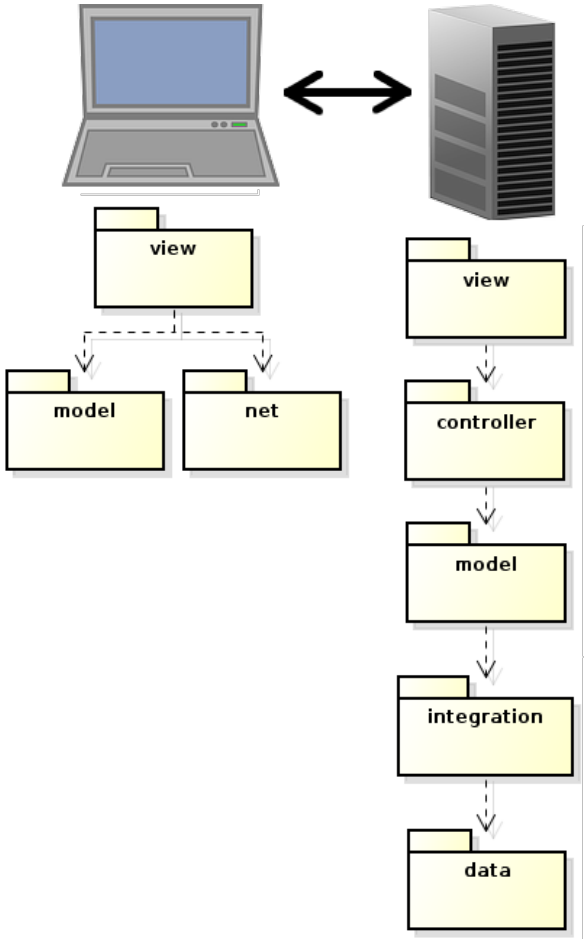

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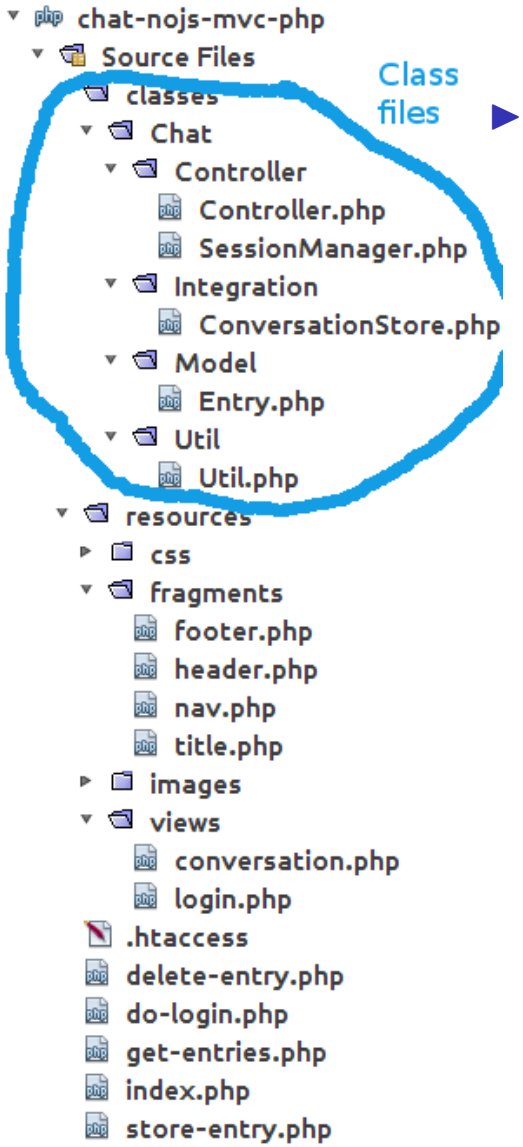
- The server's view layer gets HTTP requests and creates HTTP responses.
- The MVC pattern states that all UI related code shall be in the view. From controller and down there is only plain object-oriented code.

- This means that controller and lower layers are coded exactly as for a stand-alone application. Only the view is specific for a web application.

Class Files



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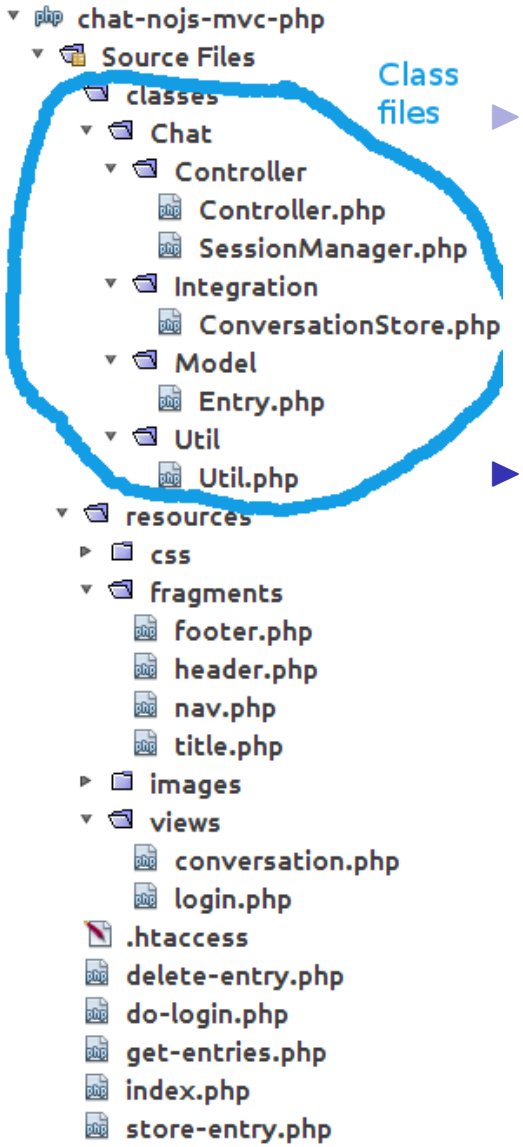

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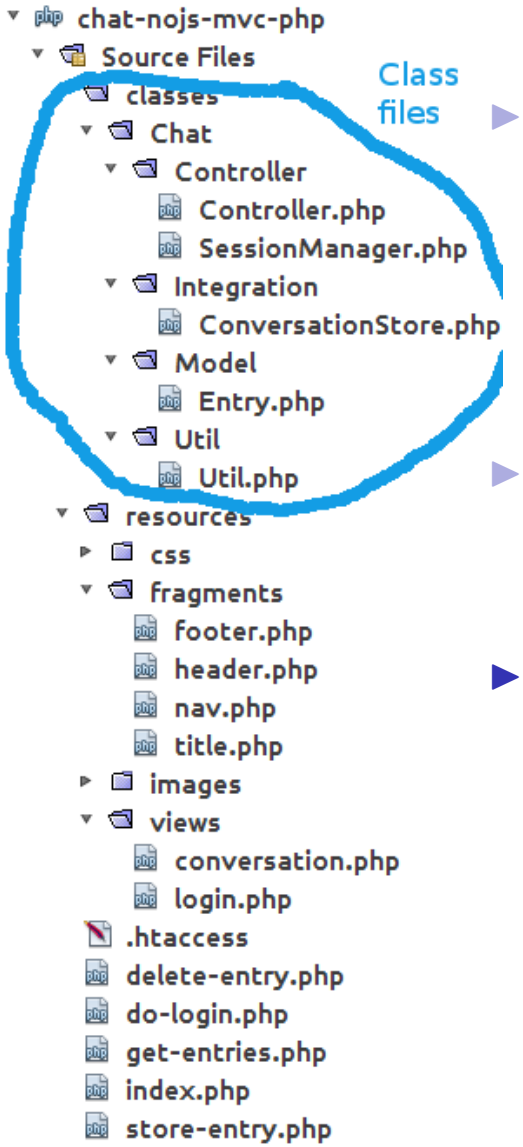

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- Protect classes from direct HTTP access by denying access to the **`classes`** directory.

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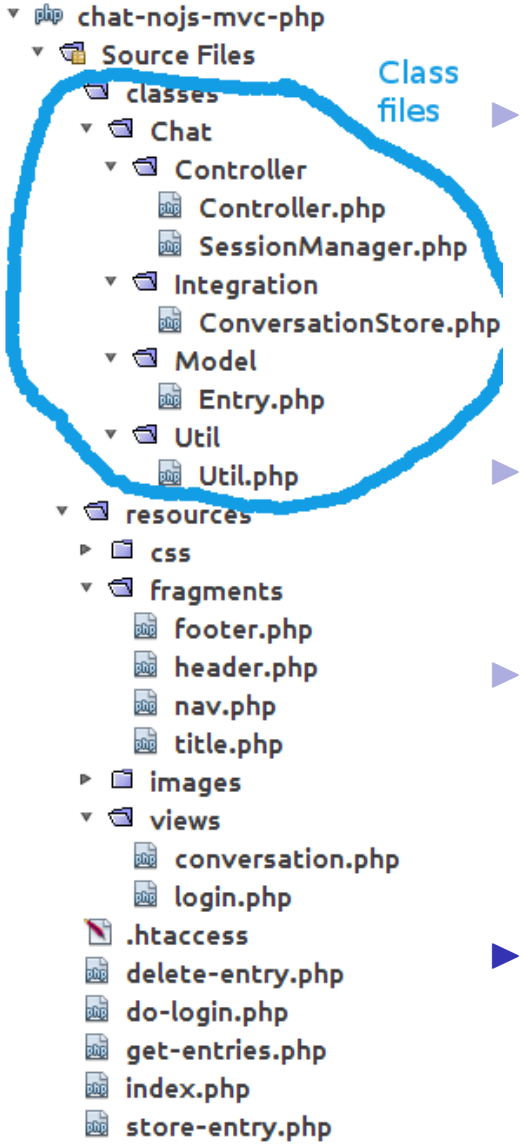

- It is a good practice to organize server-side code as in a Java application. One file per class and one directory per namespace.
- Place all classes in a separate directory, for example **`classes`**.
- Protect classes from direct HTTP access by denying access to the **`classes`** directory.
- Enable autoloading classes, see below. This relieves us of **`include`** and **`require`** statements.

```
spl_autoload_register(function ($class) {
    include 'classes/' . \str_replace('\\', '/', $class) . '.php';
});
```

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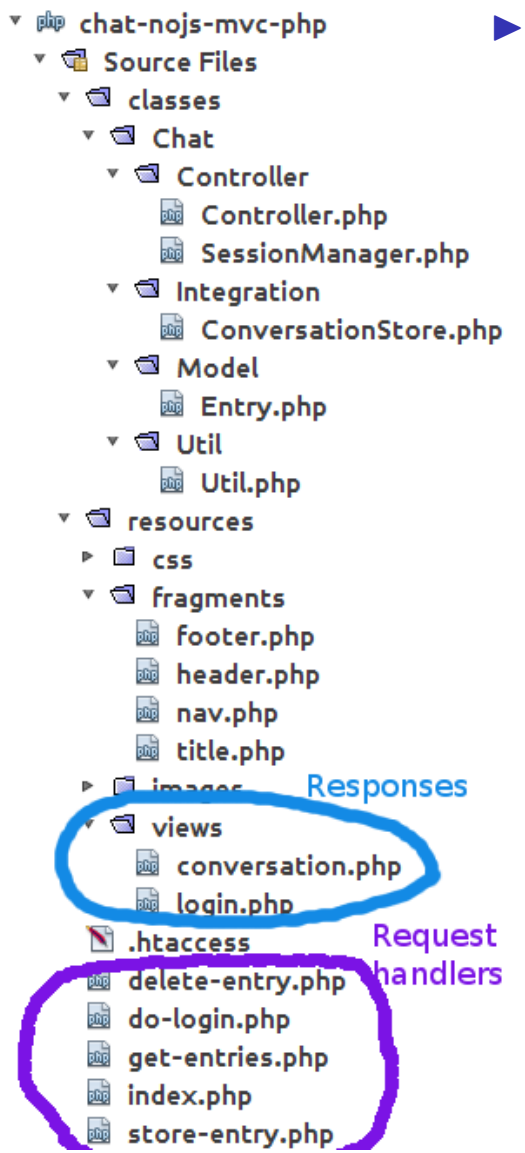

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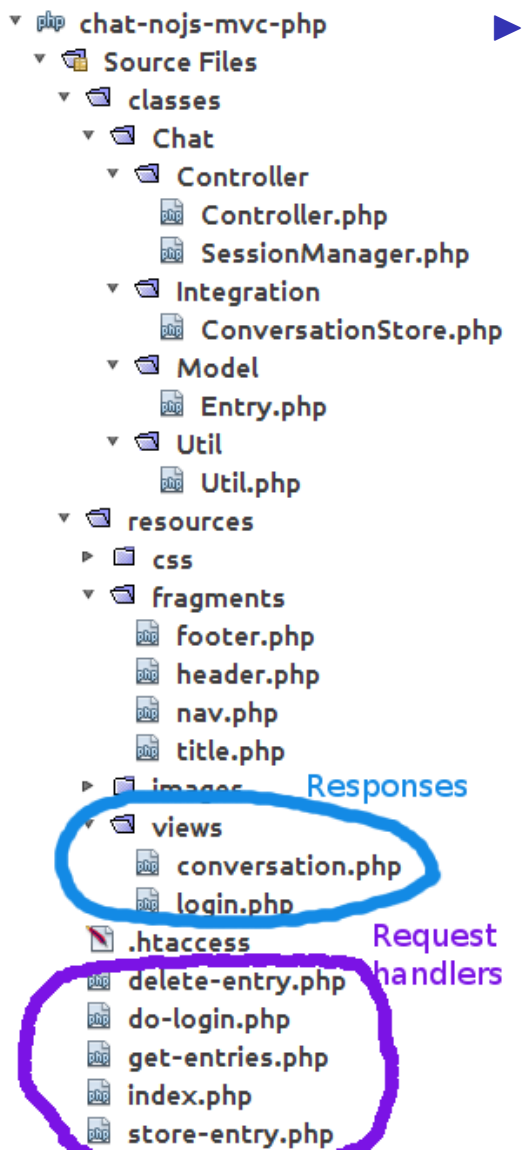

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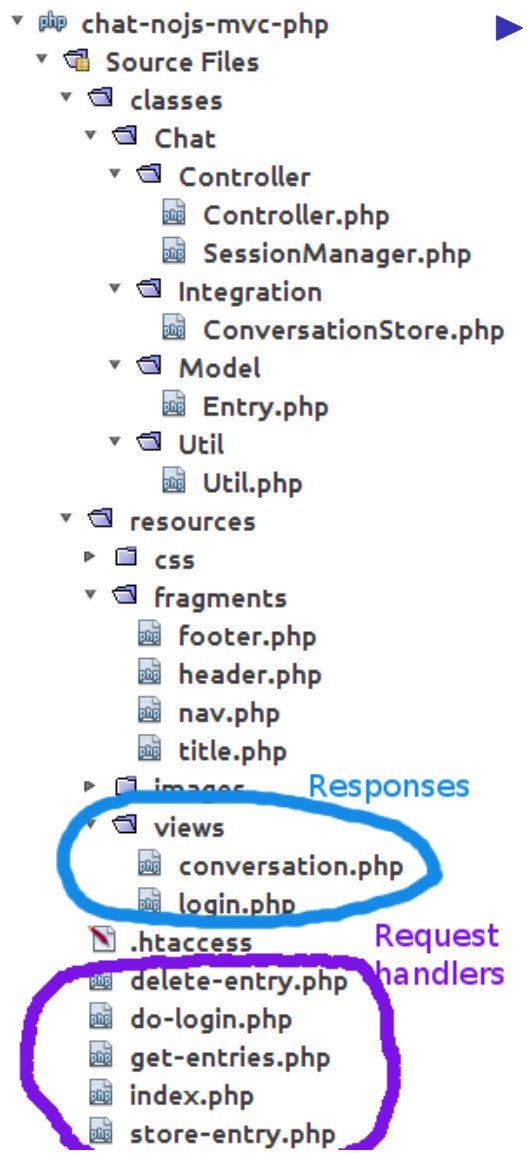

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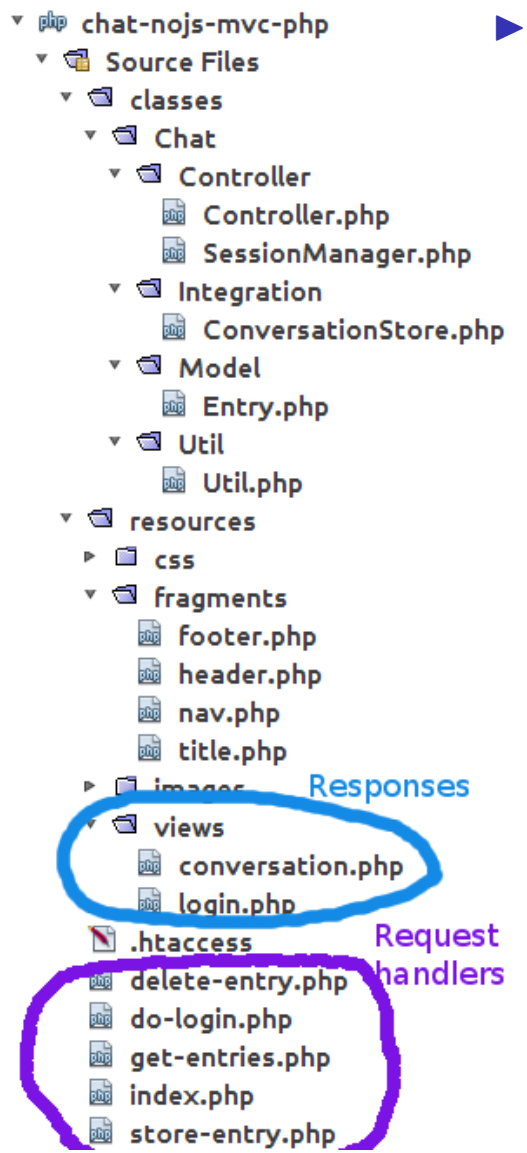

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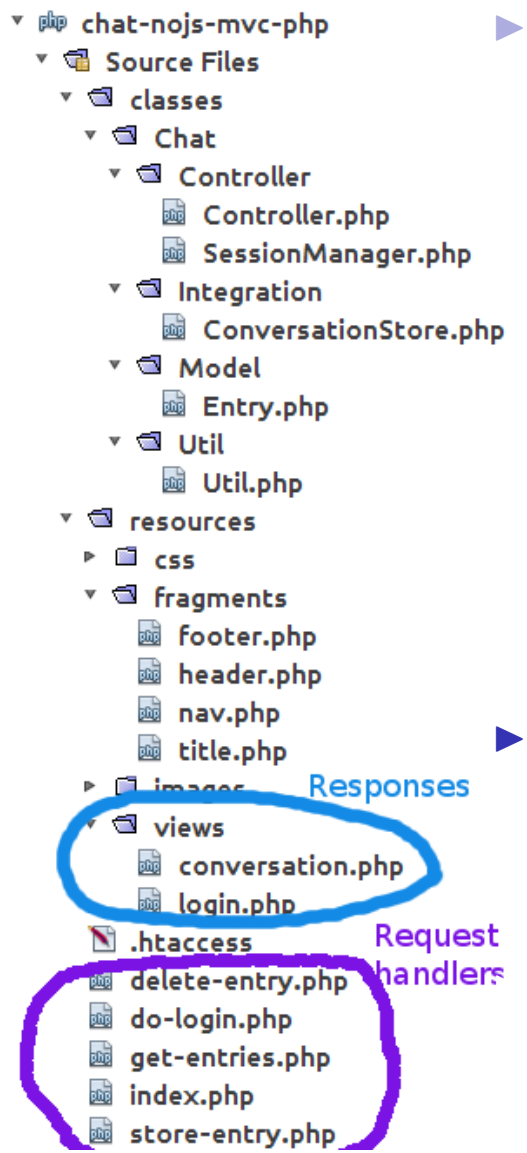

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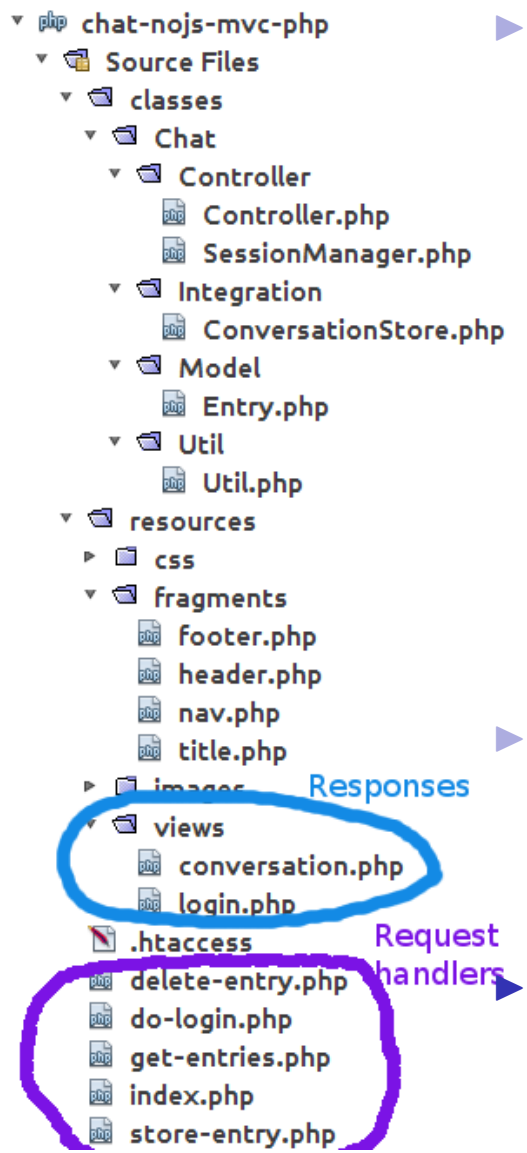

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  - We can not write a URL that addresses a method in a class. A URL can only address a file.
- Therefore, we need a PHP file without classes to interpret the HTTP request and direct it to the correct classes.
- If the response is a HTML document, we also need to include a HTML file, since we do not want to mix the HTML document with the PHP classes.

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  - Read HTTP parameters.
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  - Include fragments (header, footer, etc) in the view.
- This is called infrastructure code and is a strong call for a framework.

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  - Lots of documentation, easy to get help.
  - Infrastructure code is difficult to write.
  - Preferably, the framework should use callbacks, i.e., the framework calls our code. Thus, the framework also handles flow control.

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- Then, we will identify what we need the framework to do.
- Third, we will look at the chat with a framework.

New Entry, `store-entry.php`

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2  use \Chat\Util\Util;
3  use \Chat\Model\Entry;
4  use Chat\Controller\SessionManager;
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6  require_once 'classes/Chat/Util/Util.php';
7  Util::initRequest();
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9  if (empty($_POST[CHAT_MSG_KEY])) {
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- Line 7 calls the **`initRequest`** method, which performs tasks similar for all requests.

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- Lines 9-13 sets `$msg` to the value of the HTTP parameter with the new entry. If there is no such parameter, it is set to the empty string.
- Line 15 gets the controller of the current session. Remember that all state is lost after a request. We have to store the controller, with its references to the model, in the session.

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- Line 19 again stores the controller in the session, for use in the next request.

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- Line 21 includes the file with the next view. Note that the variables **`$entries`** and **`$username`** are available in that file.

Util.php

```
1  public static function initRequest() {
2      spl_autoload_register(function ($class) {
3          require_once 'classes/' .
4                       \str_replace('\\', '/', $class) .
5                       '.php';
6      });
7
8      session_start();
9      self::defineConstants();
10 }
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- Lines 2-6 registers the autoloader.

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- Lines 2-6 registers the autoloader.
- Line 8 starts a session if there is none.
- Line 9 creates constants for HTTP parameter keys:

```
1  const SYMBOL_PREFIX = "CHAT_";
2  private static function defineConstants() {
3      self::defineConstant('MSG_KEY', 'msg');
4      self::defineConstant('NICK_KEY', 'nickName');
5      self::defineConstant('TIMESTAMP_KEY', 'timestamp');
6      self::defineConstant('VIEWS', 'resources/views/');
7      self::defineConstant('FRAGMENTS', 'resources/fragments/');
8  }
9  private static function defineConstant($param, $value) {
10     define(self::SYMBOL_PREFIX . $param, $value);
```

SessionManager.php

```
1  const CONTROLLER_KEY = 'controller';
2
3  public static function getController() {
4      if (isset($_SESSION[self::CONTROLLER_KEY])) {
5          return unserialize($_SESSION[self::CONTROLLER_KEY]);
6      } else {
7          return new Controller();
8      }
9  }
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11 public static function storeController(Controller $controller) {
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- Line 4 checks if a **`Controller`** object is stored in the session.

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- Line 4 checks if a **`Controller`** object is stored in the session.
- Line 5 reads the stored **`Controller`**.

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3  public static function getController() {
4      if (isset($_SESSION[self::CONTROLLER_KEY])) {
5          return unserialize($_SESSION[self::CONTROLLER_KEY]);
6      } else {
7          return new Controller();
8      }
9  }
10
11 public static function storeController(Controller $controller) {
12     $_SESSION[self::CONTROLLER_KEY] = serialize($controller);
13 }
```

- Line 4 checks if a **`Controller`** object is stored in the session.
- Line 5 reads the stored **`Controller`**.
- Line 7 creates a new **`Controller`**.

SessionManager.php

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- Line 4 checks if a **Controller** object is stored in the session.
- Line 5 reads the stored **Controller**.
- Line 7 creates a new **Controller**.
- Line 12 stores the **Controller** in the session.

The view, `conversation.php`

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The view, `conversation.php`

- The view should consist of only HTML. Unfortunately, this goal is not reached:
- First, since there are header, footer and navigation fragments that appear on each page, we have to include them to avoid duplicated code. These inclusions are PHP statements, see lines 2 and 6 below.

```
1  ...
2  <header class="section group">
3      <?php include CHAT_FRAGMENTS . 'header.php' ?>
4  </header>
5
6  <main class="section group">
7      <nav class="section group">
8          <?php include CHAT_FRAGMENTS . 'nav.php' ?>
9      </nav>
10 ...
```

The view (Cont'd)

- Second, to generate the conversation view from the **`$entries`** variable is also PHP code.

```
1   ...
2 <div class="col span_4_of_4">
3     <?php
4     foreach ($entries as $entry) {
5         if (!$entry->isDeleted()) {
6             echo ("<p class='author'>" . $entry->getNickName() . ":</p>")
7             echo("<p class='entry'>");
8             echo(nl2br($entry->getMsg()));
9             echo ("</p>");
10            if ($entry->getNickName() === $username) {
11                echo("<form action='delete-entry.php'>");
12                echo("<input type='hidden' name='timestamp' value='" .
13                $entry->getTimestamp() . "'/>");
14                echo("<input type='submit' value='Delete'/>");
15                echo("</form>");
16            }
17        }
18    }
19    ?>
20 </div>
21   ...
```

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- Now we have seen all view code related to creating a new entry in the conversation. The view is normally the hardest part of a web application.

Other Layers, No Problem

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- Controller and lower layers are plain PHP code, created with normal object-oriented analysis, design and programming methodologies.

Question 1

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- One could also argue that the names of the HTTP parameters are application specific.
  - But, most frameworks enable specifying those as method parameters in the URL-to-method-mapping!

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  - HTTP parameters, it should be possible to specify how parameters are passed as arguments to the methods specified by the routing rules.
  - HTTP sessions, all objects in controller and lower layers should be stored in the `$_SESSION` superglobal.
  - Templating, to generate a view from data, we need something to replace the PHP code looping through the **`$conversation`** variable.

The Framework's tasks, Cont'd

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  - Not only should it be possible to reuse the fragments, also the page layout should be reused. This means only the content of the main area should be specific for a page.
- There are many other requirements that should be managed by a framework, but which we have skipped in this small example.

Section

- MVC in a PHP Web Application
- The id1354-fw Framework

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- Here, we will have a look at a framework written specifically for this course, the id1354-fw framework.

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- Now, we will look at the id1354-fw framework and how it changes the Chat application.
- The full documentation, including installation instructions, is included in the **`id1354-fw.zip`** file available at the course web.

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- Use a directory structure matching the namespaces and name each file after the class in the file.
  - For example, the class **`MyClass`** in the namespace **`\MyApp\Model`** shall be in the file **`classes/MyApp/Model/MyClass.php`**.

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- This class shall have the method `protected function doExecute()`, which performs all work needed to handle the http request.
- If this class is called `\MyApp\View\Something`, the doExecute method is called when the user requests the url `http://<yourserver>/<yourwebapp>/Myapp/View/Something`.

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- If the parameter is called **`myParam`**, the set method must be `public function setMyParam($value)`.
- This function will be called with the value of the http parameter before the **`doExecute`** method is called.

Question 2

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  - **`set`** ,stores a key/value pair in the session.
  - **`get`**, reads a value stored in the session.

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- This will make the parameter **`$value`** available in the next view, in a variable called **`$name`**.
- The **`doExecute`** method shall return the path to the file with the next view. **`views/`** is prepended to the returned path and **`.php`** is appended to the path.

Question 3

Composite Views and Templates

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- Unfortunately, composite views and templates are not handled by the id1354-fw framework.
- Therefore, we still have to mix PHP in the HTML code to include data and fragments in the view.

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- Adding more functionality involves only new implementations of `AbstractRequestHandler`, and ordinary object-oriented code in controller and lower layers.
- All this is application specific!
- But there is still PHP in the HTML code...