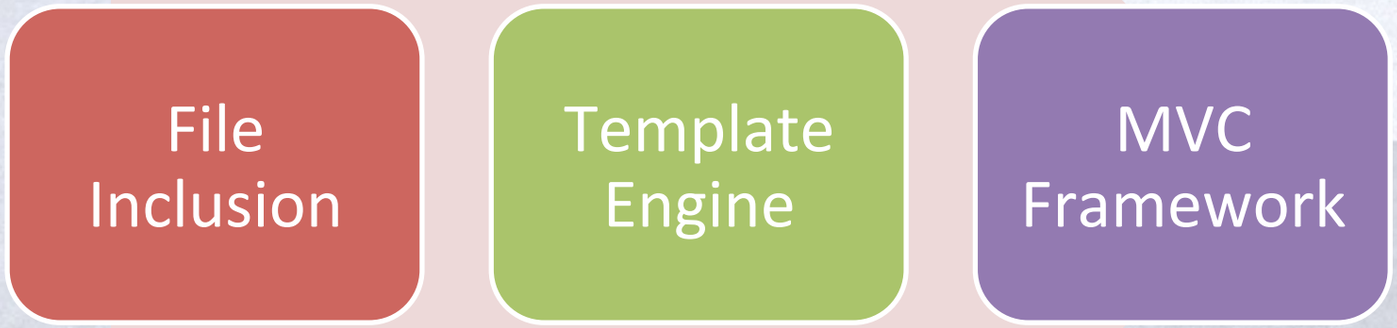
Lecture 9
Web Framework

Play

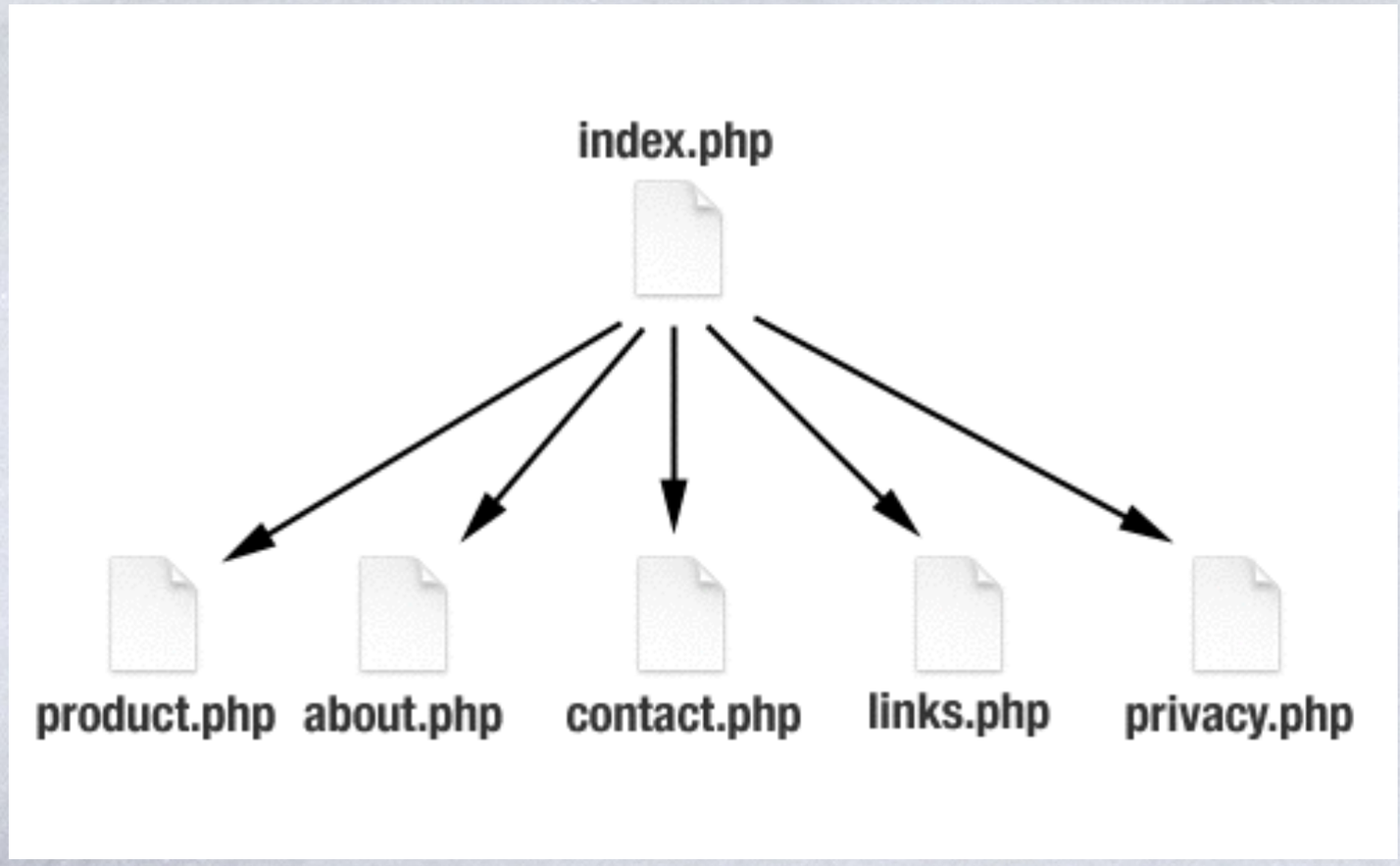
Outline

- Evolution Of Web Development
- Web Framework
- Zend Framework

Evolution of Web Development



Evolution of Web Development



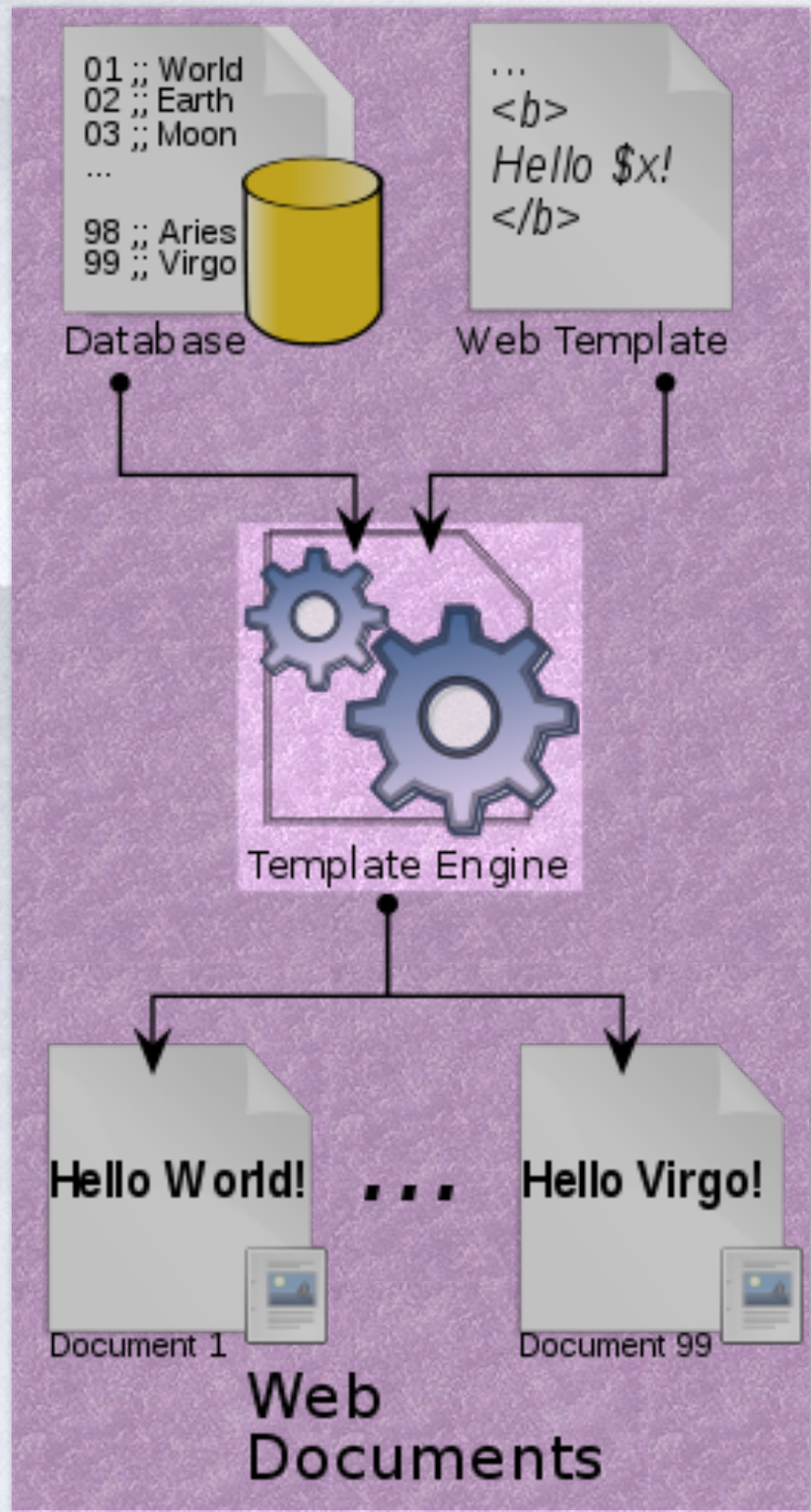
How you first started building websites.

Evolution of Web Development

How you're building websites now.

Evolution of Web Development

- Separate the presentation from business logic on the web design.
- Suitable for websites often require regular content updates, and standardization of appearance.



Web template system

- This makes a website easier to maintain/update & creates a better development environment by enabling developers & designers to work together easier.
- It sure has some drawbacks which is generally the performance (most libraries offer great solutions there) & need to learn a new syntax (not always).
- To mention, using a template engine may not be suitable for every project. A website with few pages will probably won't need it. But it can improve the development process of a portal, an e-commerce site or another web application easily.

Smarty example

```
<!DOCTYPE html PUBLIC "-//W3C//DTD
XHTML 1.0 Strict//EN" "DTD/xhtml1-
strict.dtd">
<html>
<head>
   <title>{$title_text|escape}</title>
   <meta http-equiv="content-type"
content="text/html; charset=utf-8" />
</head>

<body> {* This is a little comment that won't
be visible in the HTML source *}

{$body_html}

</body><!-- this is a little comment that will
be seen in the HTML source -->
</html>
```

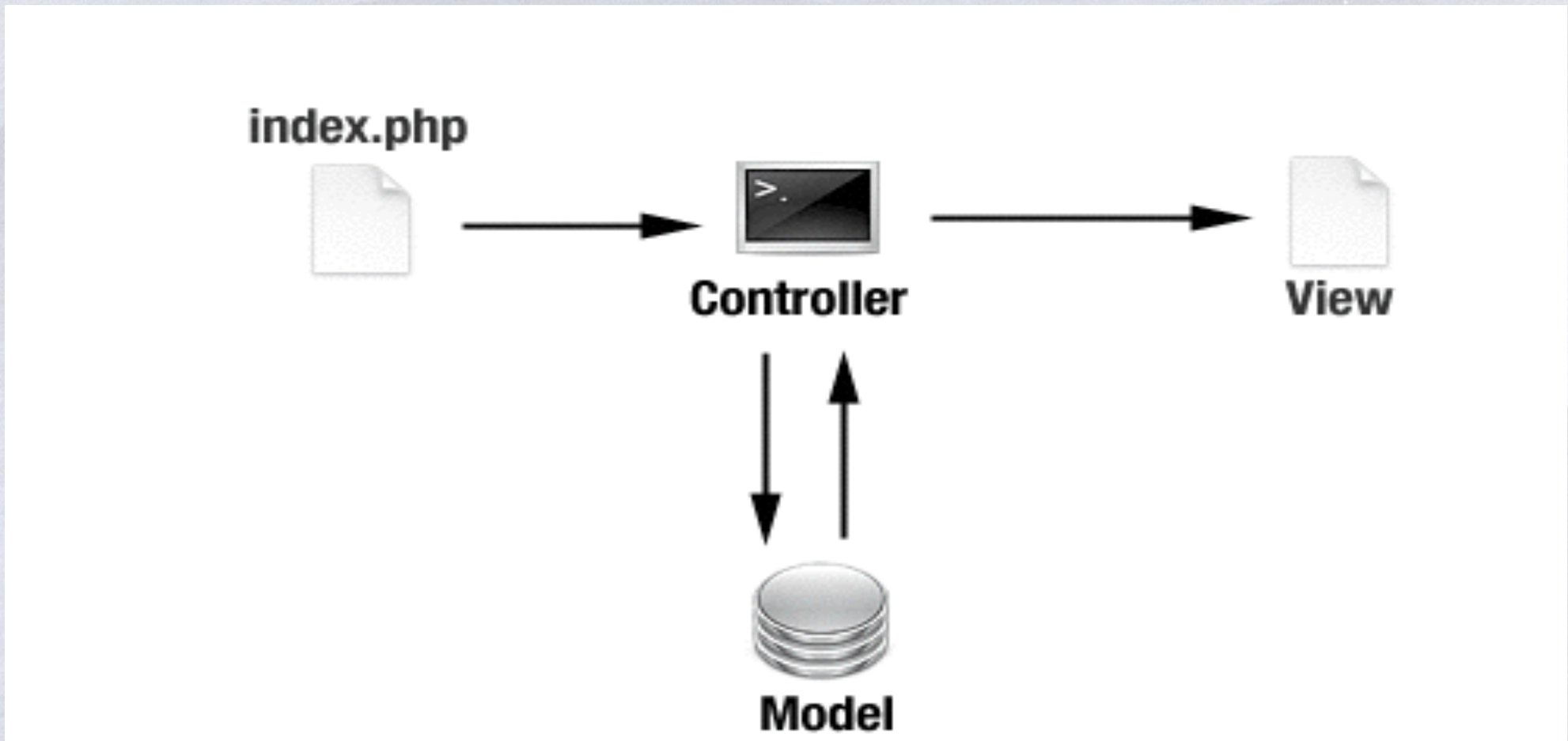
```
define('SMARTY_DIR', 'smarty-2.6.22/' );
require_once(SMARTY_DIR .
'Smarty.class.php');

$smarty = new Smarty();
$smarty->template_dir = './templates/';
$smarty->compile_dir = './templates/compile/';

$smarty->assign('title_text', 'TITLE: This is the
Smarty basic example ...');
$smarty->assign('body_html', '<p>BODY: This
is the message set using assign()</p>');

$smarty->display('index.tpl');
```

Evolution of Web Development



How you build websites with a framework

MVC Is...

- Model, View, Controller
- Object Oriented
  - Is communication between Model, View, and Controller Objects
- Organization
- RAD
  - Code reuse!

MVC And The Web

- Made popular by Ruby on Rails
  - A good number of PHP MVC frameworks are Rails inspired
- lists of PHP MVC frameworks
  - CakePHP
  - Symphony
  - Code Igniter
  - Zend Framework
  - Make your own

Model

- Wikipedia:
  - “The domain-specific representation of the information that the application operates.”
- Data Storage/Access
  - Often Data source backed
    - MySQL, MSSQL, Web Service, it doesn’t matter…
  - Abstraction, Abstraction, Abstraction!

View

- Wikipedia:
  - “Renders the model into a form suitable for interaction, typically a user interface element. Multiple views can exist for a single model for different purposes.”
- HTML Templates
  - All formatting related code belongs here
  - A Smarty object is a good example
    - Any template engine works, however…
  - Abstraction, Abstraction, Abstraction!

Controller

- Wikipedia:
  - "Processes and responds to events, typically user actions, and may invoke changes on the model."
- A BIG DEAL
  - Process user inputs, communicate with Models and Views
    - The Go-Between
  - Much of the application's core logic
  - Utilize the abstraction of before!
    - Invoke model, assign values to views

Why MVC?

- Good architectural design
  - Code is organized and structure
  - Code structure lends itself to an easy to understand directory structure
- Easy code maintenance
  - Because of abstraction, better strategic positioning of code will minimize the hunt for places to change
- Easy to extend and grow
  - Modify parent classes, drop in new controller, etc.

Outline

- Evolution Of Web Development
- **Web Framework**
- Zend Framework

Basic Idea Of Web Framework

- A web application framework
  - Is a Software framework
  - Designed to support the development of
    - Dynamic websites
    - Web applications
    - Web services
  - Aims to alleviate the overhead associated with common activities used in Web development.
    - Libraries for database access
    - Templating frameworks
    - Session management
    - Often promote code reuse
    - Many more .....

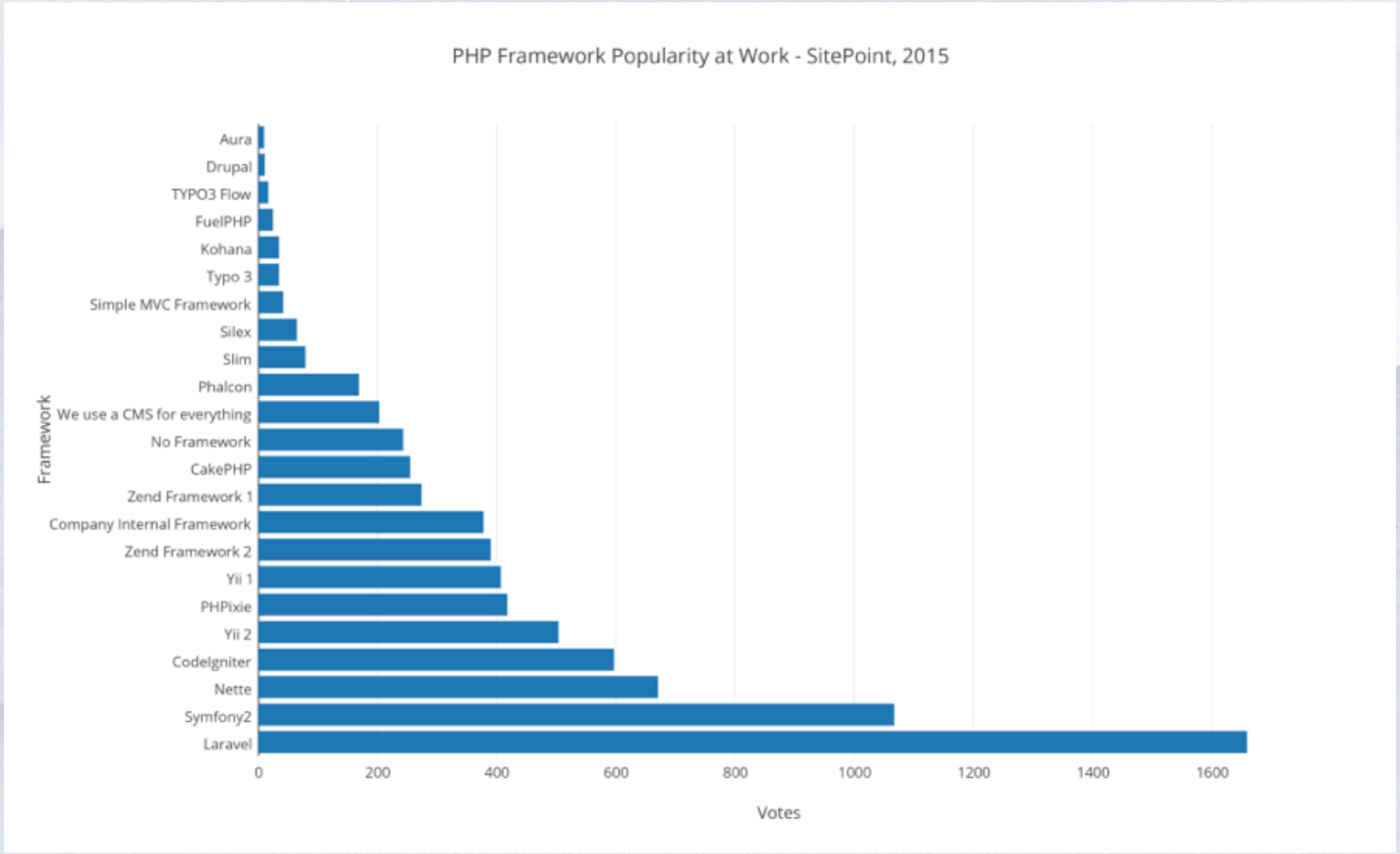
Framework vs. Library / Toolkit

- A software framework, in computer programming, is an abstraction in which common code providing generic functionality can be selectively overridden or specialized by user code providing specific functionality
- A Library is a collection of useful material for common use, and it is defined as a collection of related software constructs such as classes, functions and subroutines used to develop software.
- Toolkit is an alias of Library in software engineering.
- A framework calls your code, but a library is called by your code.

Why Framework Not Scratch ?

- Key Factors of a Development
  - Interface Design
  - Business Logic
  - Database Manipulation
  - User Access Control
- Advantage of Framework
  - Templating
  - Provide Solutions to Common problems
  - Abstract Levels of functionality
  - Make Rapid Development Easier
- Disadvantage of Scratch Development
  - Make your own Abstract Layer
  - Solve Common Problems Yourself
  - The more Typing Speed the more faster

The Best PHP Framework for 2015: SitePoint Survey Results



http://www.sitepoint.com/best-php-framework-2015-sitepoint-survey-results/

Common Traits

- index.php
  - Parses the URL
    - Often mod_rewrite used:
      - /controller/method/arg0/value0/arg1/.../valuen
  - Initializes proper controller
  - Executes correct method
  - Facilitates communication from controller to view
  - Signals view to render

Directory Structure

- Outside of web root. More secure! (generally)
- config/
- controllers/
- models/
- views/
  - Usually not PHP files
- includes/
  - Any extra libraries, e.g. PHPMailer
- framework/
  - Framework system files (do not have to reside in application)

Helpers and Plug-ins

- Usually common functions used by Views
  - E.g. format_phone(), create_calendar(), etc.
- Some loaded through index.php, some loaded specifically by controller
- Do not allow direct manipulation of models or controllers
  - Any code requiring access to models should be in the controller, not view

Why would you Like to Create your Own Framework?

- Firstly, it is a great learning experience. You will get to learn PHP inside-out. You will get to learn object-oriented programming, design patterns and considerations.
- More importantly, you have complete control over your framework. Your ideas can be built right into your framework. Although always not beneficial, you can write coding conventions/functions/ modules the way you like.

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- Zend Framework

Tonight we will cover:

- Zend Framework (ZF) basics
  - What, why, how
- ZF's flexible model-view-controller (MVC) implementation
  - Keeps your code organized logically and handles "plumbing"
- Components (libraries)
  - Including classes to access web services
- What's new and what's next

What is ZF?

- An open source, MVC-based PHP framework
- Is it a framework? Yes
  - "Glue" to build applications
  - Components developed, tested, distributed together
- But loosely coupled
  - “Use at will” architecture
  - Dependencies documented in manual

Birth and early years

- 2005: PHP Collaboration Project at ZendCon
  - Started as collection of components but coalesced
  - PHP 5, object oriented (OO) from the start
  - Set example of OO design patterns and practices
- July 2007: GA version 1.0
- February 17, 2009: version 1.75
- Sep, 2012： 2.0
- Frequent minor releases

What's it made of?

- Robust, high quality object-oriented PHP 5 libraries
  - Test-driven development
    - 80+% code coverage
  - Peer review of all code
  - Coding standards
    - http://framework.zend.com/manual/en/coding-standard.html
  - Components not released until documented in manual and inline
    - phpDocumentor format: http://phpdoc.org

Flexible License

- "New BSD" license
  - http://framework.zend.com/license
  - Use code however you like
- Apache-like contributor license agreement (CLA)
  - Safety for users/corporations
  - All original code; no patent claims

Why I use it

- As I learn what it can do, the less boring code I write
  - At first, I reinvented the wheel
  - Realized that ZF already provided functionality
  - I can write less “plumbing” code
- Can customize and extend
  - Numerous integration points
  - Interfaces and small methods give you control
- It keeps up with trends and APIs
  - Compatibility with diverse database systems, authentication and other APIs
  - Web services

Community

- Contributors include individuals and companies. Companies include:
  - Zend (of course)
  - IBM
  - OmniTI
- Technology partners:
  - Adobe, Google, IBM, Microsoft, nirvanix, StrikeIron
- Help available at zfforum.com, e-mail lists, IRC

Model-View-Controller

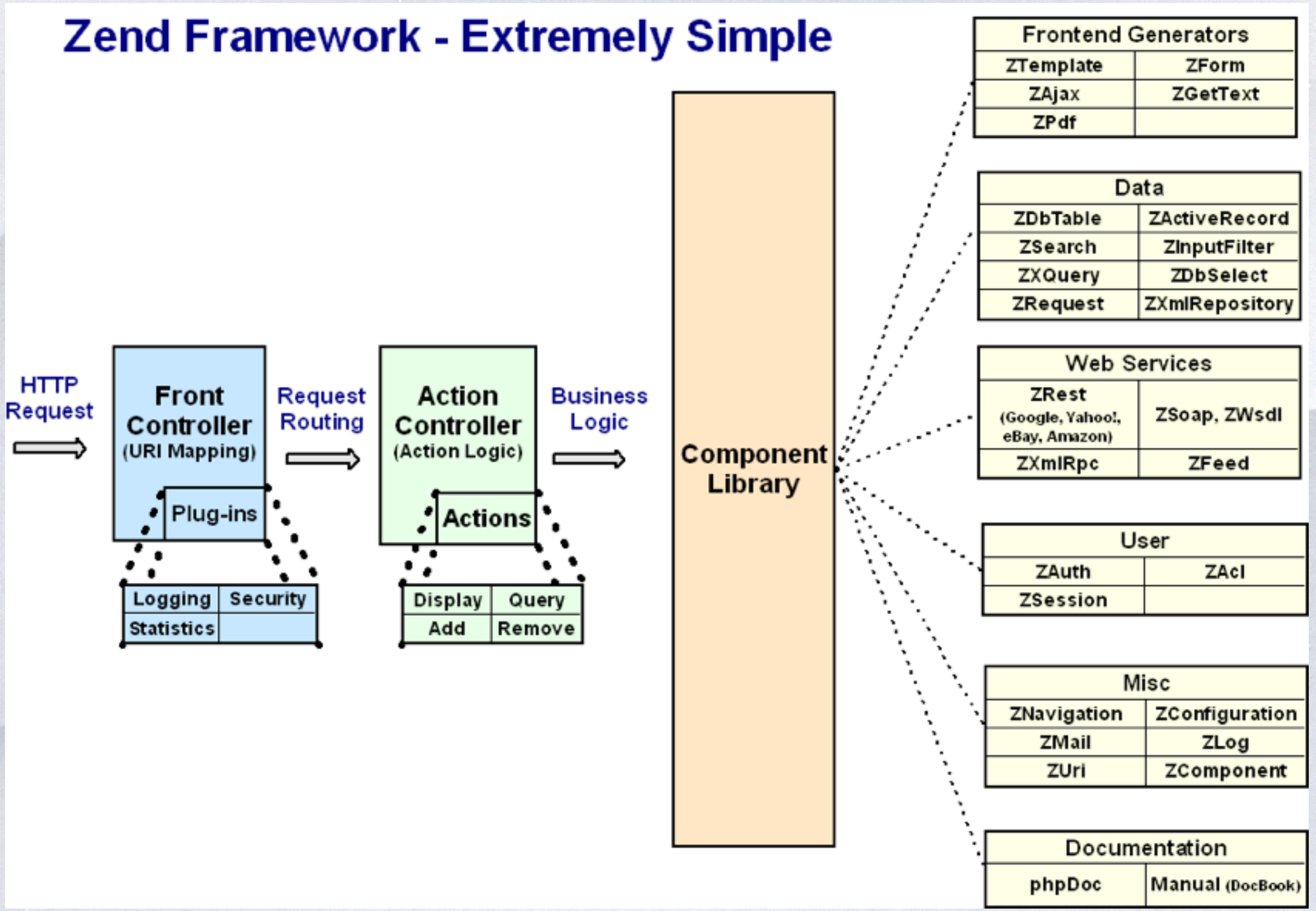
Model – View – Controller design pattern

- Model
  - Classes that access your data
- View
  - Templates to present that data (e.g. HTML for browser)
- Controller (action controller)
  - Application flow
  - Connects model and view
- (Bonus: front controller!)

Front controller pattern

- Front controller sits in front of MVC
- All PHP requests funneled through index.php (bootstrap file)
- Front controller gets your application started
  - Initializes request/response objects
  - Can handle common settings and functionality
    - “Include” paths
    - Configurations
    - Location of MVC components (if necessary)
    - Logging, db (perhaps), authentication/authorization
  - Converts URL to a “request” object with distinct parts
  - Routes requests to appropriate action controllers
- Receives exceptions

Front controller to action controller



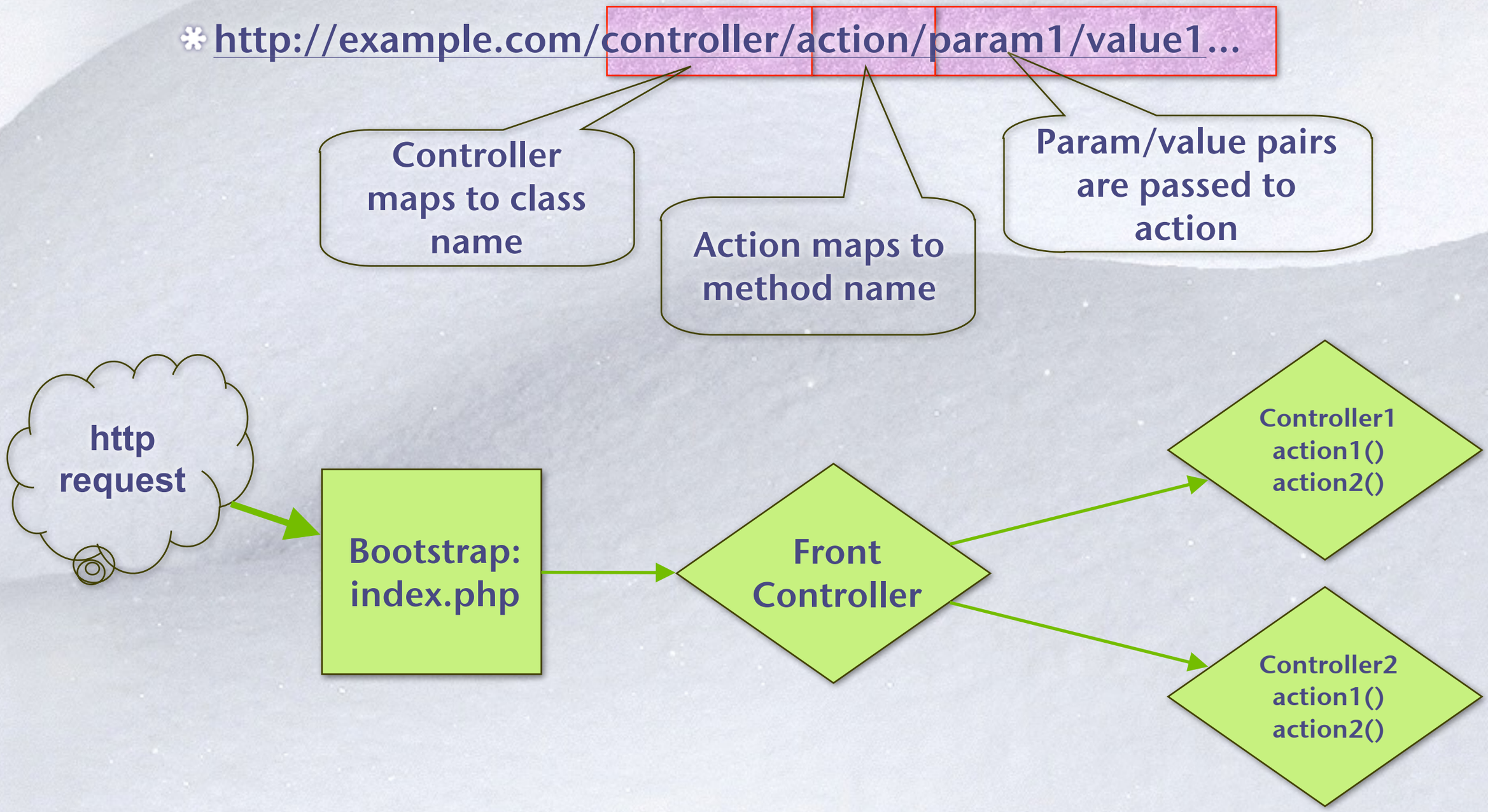
Routes URL request

- Default routing convention:
  - http://example.com/controller/action/param1/value1...

Controller maps to class name

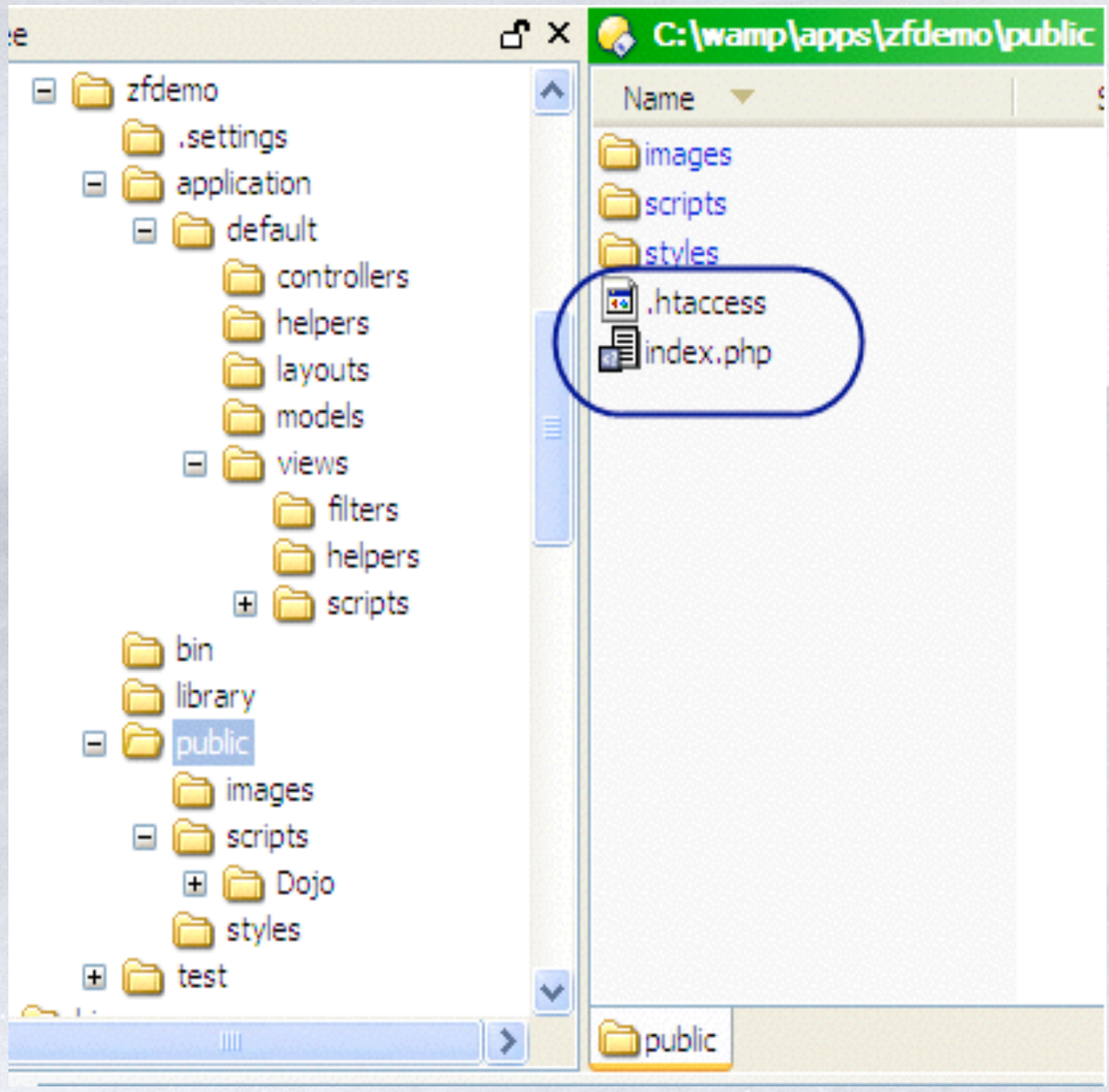
Action maps to method name

Param/value pairs are passed to action



Front controller needs two files in public folder

- In document root (public folder):
- .htaccess redirects requests to bootstrap script (index.php)
- index.php instantiates Front Controller



Front controller file #1: .htaccess

```
RewriteEngine on
# funnel all requests to index.php
# except requests for static resources
RewriteRule !\.(js|ico|gif|jpg|png|css)$ index.php
```

Front controller file #2: index.php

```
<?php
// bootstrap file

setincludepath('.' . PATHSEPARATOR . '../library' .
PATHSEPARATOR . '../application/default/models/' .
PATHSEPARATOR . getincludepath());

// Prepare the front controller
$frontController = Zend_Controller_Front::getInstance();

// Dispatch the request using the front controller
$frontController->dispatch();
```

Action Controller

- Controller classes handle groups of request URLs
  - http://example.com/controller/action
  - Default: IndexController
  - Organizes and groups functionality
  - One class (extending Zend_Controller_Action) for each controller
- Action methods in each controller class handle requests
  - http://example.com/controller/action
  - Default: indexAction()
  - Named like actionAction()
    - Example: If action is “edit” then method is editAction()

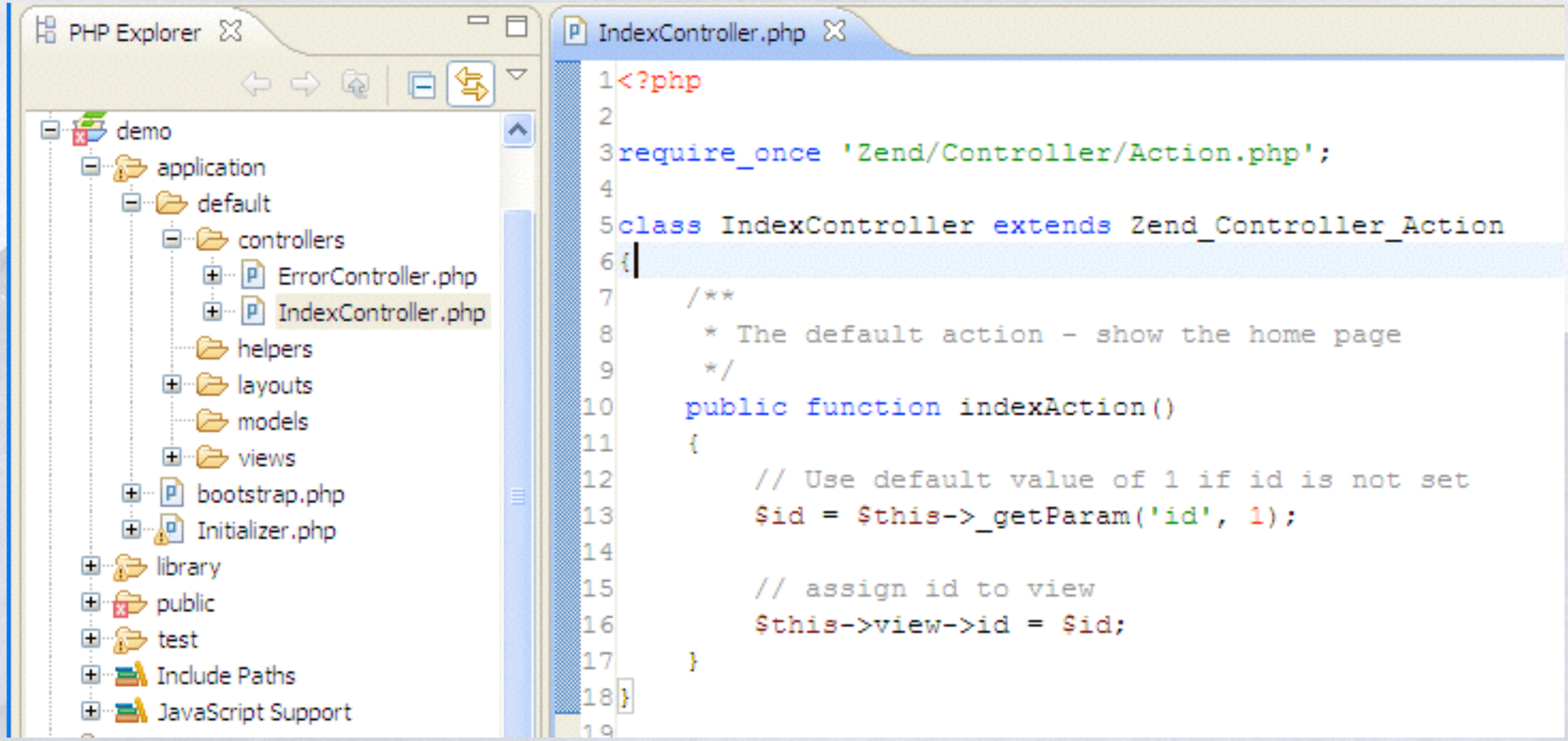
More controller functionality

- Several standard methods help organize and control the flow
  - init() – called by the constructor
  - preDispatch() – called before the action's method
  - postDispatch() – called after the action's method

- Utility methods
  - forward(), redirect(), getParam(), getRequest(), getResponse(), render()

- Action helpers add functionality
  - Built-in helpers. Example: gotoSimple()
  - Your own helpers
  - Avoids the need to build your own base controller class

Controller example



Action helpers

- They extend Zend_Controller_Action_Helper_Abstract
- Built-in action helpers
  - ActionStack
  - AjaxContext
  - ContextSwitch
  - AutoComplete: Dojo, Scriptaculous
  - FlashMessenger
  - Json
  - Redirector
  - Url
  - ViewRenderer
- Create your own
  - Place in the "My/Helper/" directory of your library (or any directory on your includepath)

Action helper example: Redirector gotoSimple()

```
class Forward_Controller extends Zend_Controller_Action
{
    protected $redirector = null;

    public function init()
    {
        $this->redirector = $this->helper->getHelper('Redirector');
    }

    public function myAction()
    {
        /* do some stuff */

        // Redirect to 'my-action' of 'my-controller' in the current
        // module, using the params param1 => test and param2 => test2
        $this->redirector->gotoSimple('my-action',
                                      'my-controller',
                                      null,
                                      array('param1' => 'test',
                                            'param2' => 'test2'
                                            )
                                      );
    }
}
```

View

- Scripts (templates)
  - PHP-based script templates to present data
  - Should contain only display logic, not business logic
  - Default naming: “myaction.phtml”
- Helpers
  - Classes and methods that provide reusable view functionality
    - Examples of built in view helpers: escape(), formText(), partial(), partialLoop(), headTitle()
    - Write your own, too
- Output filters
- Layout
- Placeholders

Zend_Layout

- Two-step view pattern
  - Uses Zend_View for rendering
- Placeholders useful for setting javascript, titles, other variable data
- Layout view helper
  - shortcut to layout placeholder
  - These are equivalent:

```
// fetch 'content' key using layout helper:
echo $this->layout()->content;

// fetch 'content' key using placeholder helper:
echo $this->placeholder('Zend_Layout')->content;
```

- Enable in bootstrap

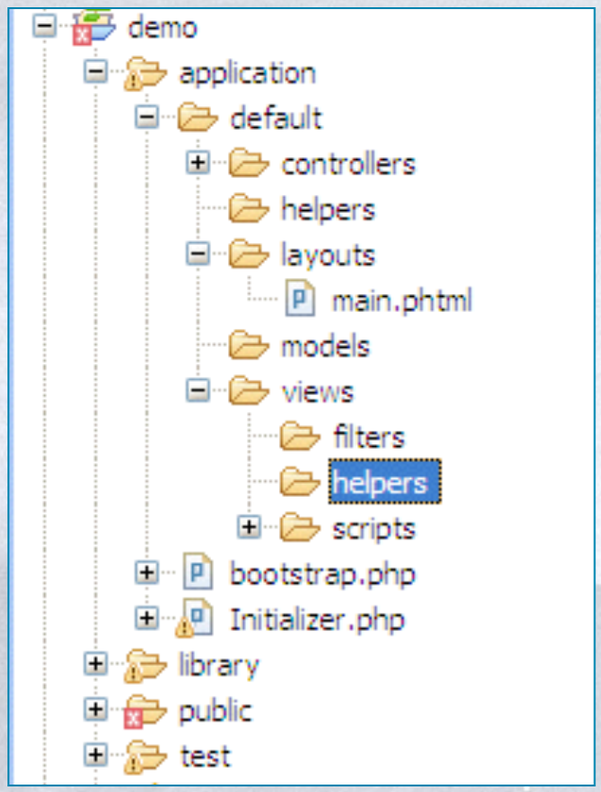
```
// accept default path
Zend_Layout::startMvc();

// or specify path
$layoutPath = realpath(dirname(__FILE__) . '/../application/layouts');
Zend_Layout::startMvc(array("layoutPath‟ => $layoutPath));
```

My own view helper: TitleCase.php

```
<?php
Require_once 'Zend/View/Interface.php';

/**
 * TitleCase helper
*/
class Zend_View_Helper_Title_Case {
    public $view;
    public function titleCase($string = '')
    {
        // convert incoming string so that
        // first letter of each word is capitalized/
        // but all other letters are lowercase.
        // Also trim the string.
        return ucwords(strtolower(trim($string)));
    } //(public function titleCase())
    public function setView(Zend_View_Interface $view) {
          $this->view = $view;
    }
}
```



Usage:

```
echo $this->titleCase('mozilla firefox');

// Mozilla Firefox
```

Model

- Models are abstract representations of data
  - Can be extended from:
    - Zend_Db_Table_Row – For database abstraction
    - Zend_Feed_Element – For RSS abstraction
    - Yahoo_Result – For Yahoo abstraction
    - Or any other class that fits your needs
    - Or build your own own abstract representations of your data

Models (more)

- Model classes contain business logic to prepare complex data for presentation
- I stuff any “weird” code in models so that controllers/views are clean

MVC your way: custom routing rules

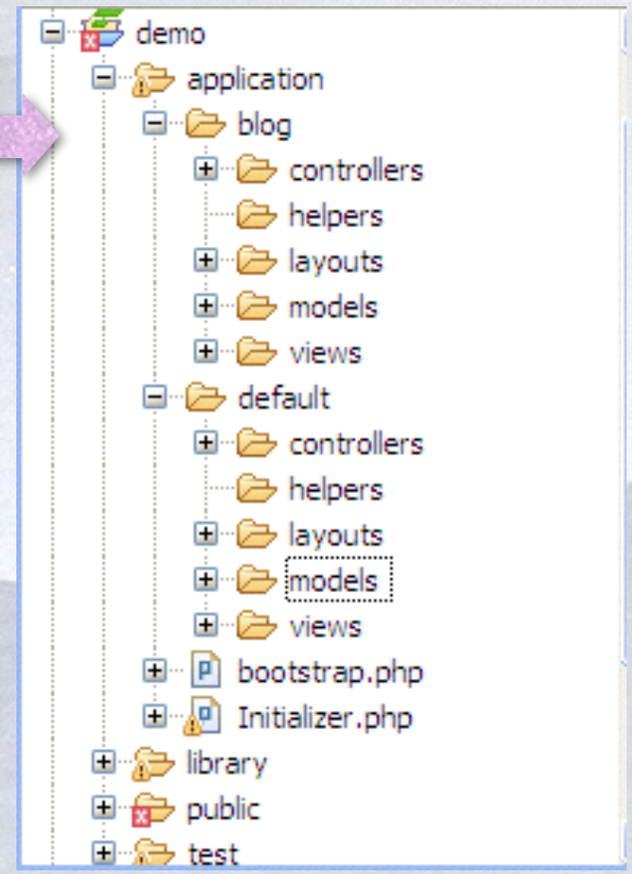
- Can declare custom routing rules with Zend_Controller_Router_Route classes
  - Not limited to “controller/action/param” format
  - Example: “year/month/day/title” as in a blog posting:
  - URL: http://myblog.com/2008/02/24/i-like-routers

```
$route = new Zend_Controller_Router_Route(
    ':year/:month/:day/:title',
    array(
        'year'       => 2009,
        'controller' => ‘articles',
        'action'     => 'show'
    ),
    array(
          'year'  => '\d+‘,
          ‘month' => '\d+‘,
          ‘day‘   => '\d+‘,
      )
);
$router->addRoute(‘posts', $route);
```

MVC your way: multi-MVC

- Can separate app sections into modules (Mitch P.'s "atomic MVC")

```
$front->setControllerDirectory(array(
'default' => '/demo/application/controllers',
'blog' => '/demo/application/blog/controllers' ));
```

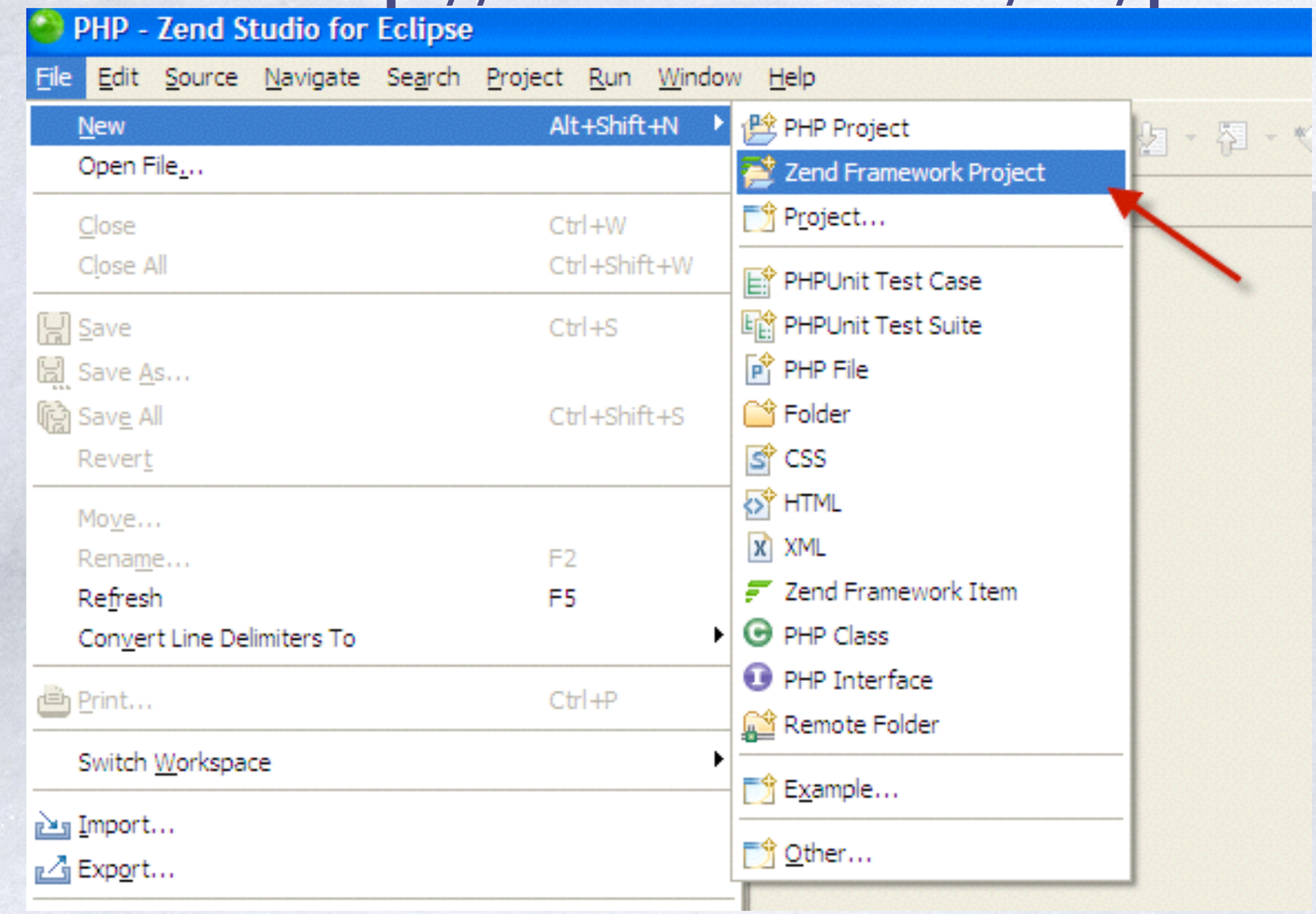


- Blog_IndexController is class name of index action controller within blog app/module
  - URL: example.com/blog or /blog/index or / blog/index/index

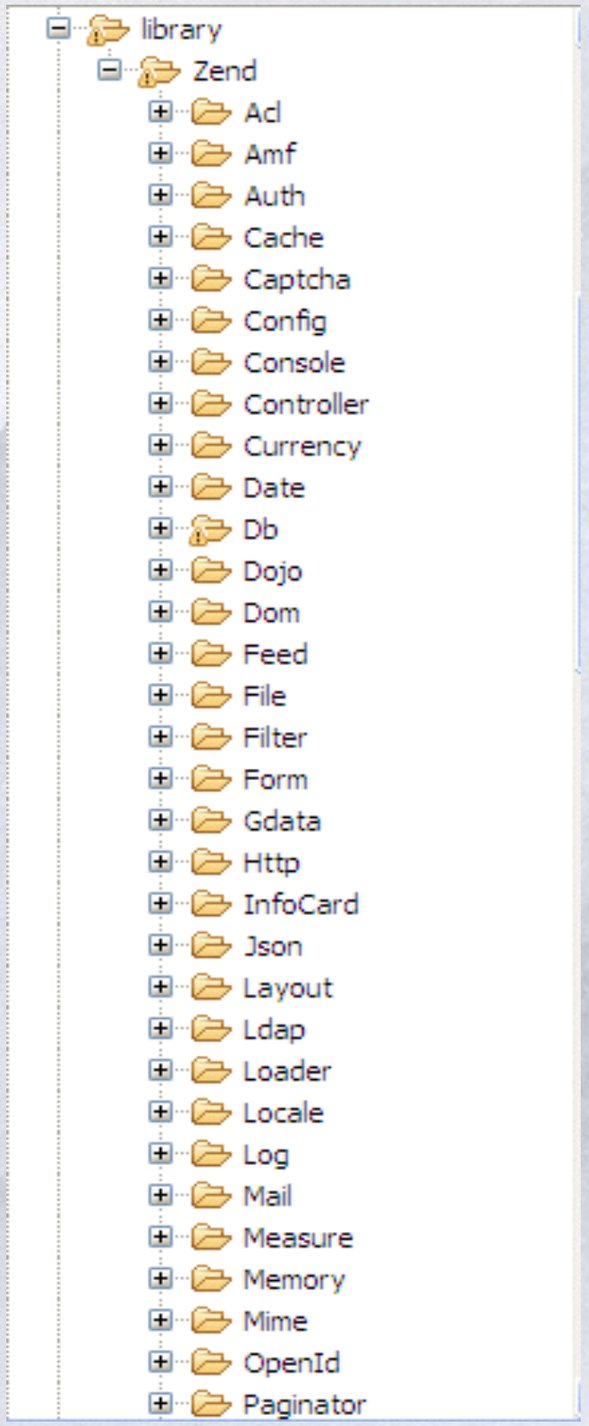
- IndexController is still class name within default app/module
  - URL: / or /index or /index/index

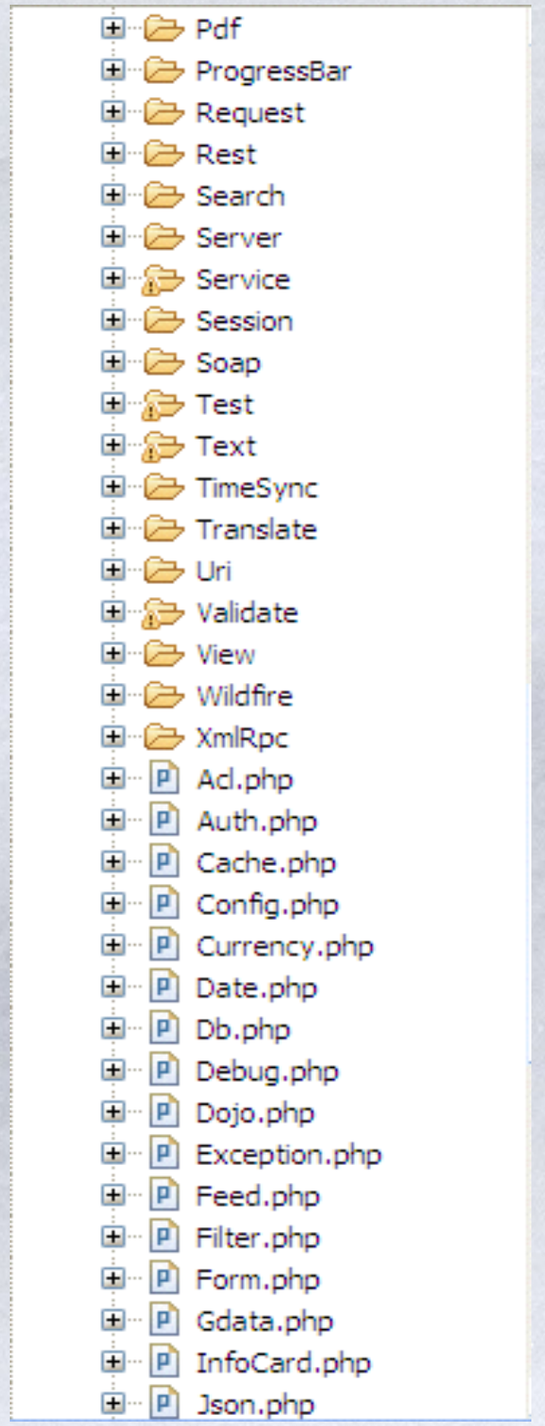
Tools can help get you started

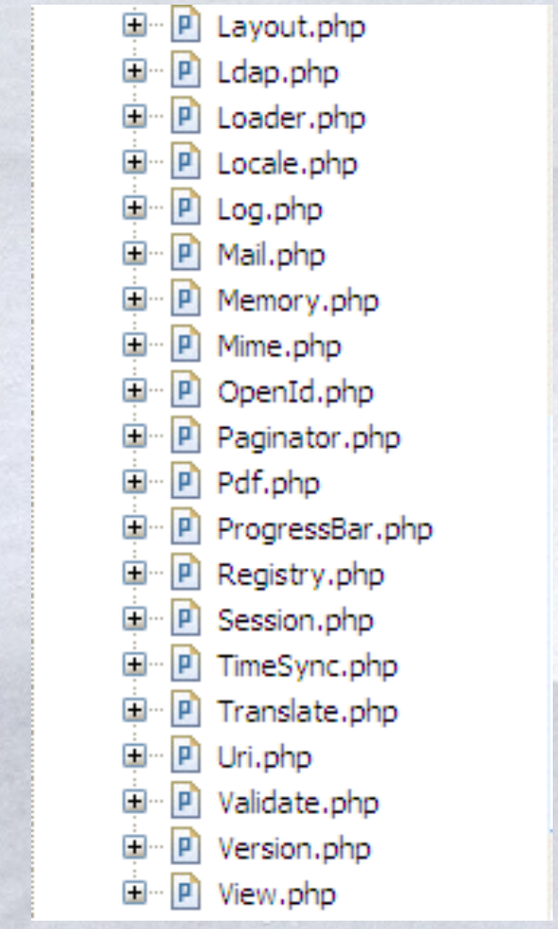
- Zend Studio for Eclipse creates default directory structures and classes for you
  - Free trial: http://www.zend.com/en/products/studio/



Library of Zend components







Reminder:
Zend/Db.php = Zend_Db
Zend/Db/Table.php = Zend_Db_Table

Components vs. straight PHP

- Additional functionality
  - Zend_Session vs. straight $_SESSION
  - Zend_Debug::dump() vs. vardump
- Thread-safety
  - Zend_Translate vs. gettext
  - Zend_Locale vs. setlocale
- OO
  - OO Syntax
  - May be extended with custom functionality
  - ZF components reduce coding when used together
- They've been tested and integrated for you

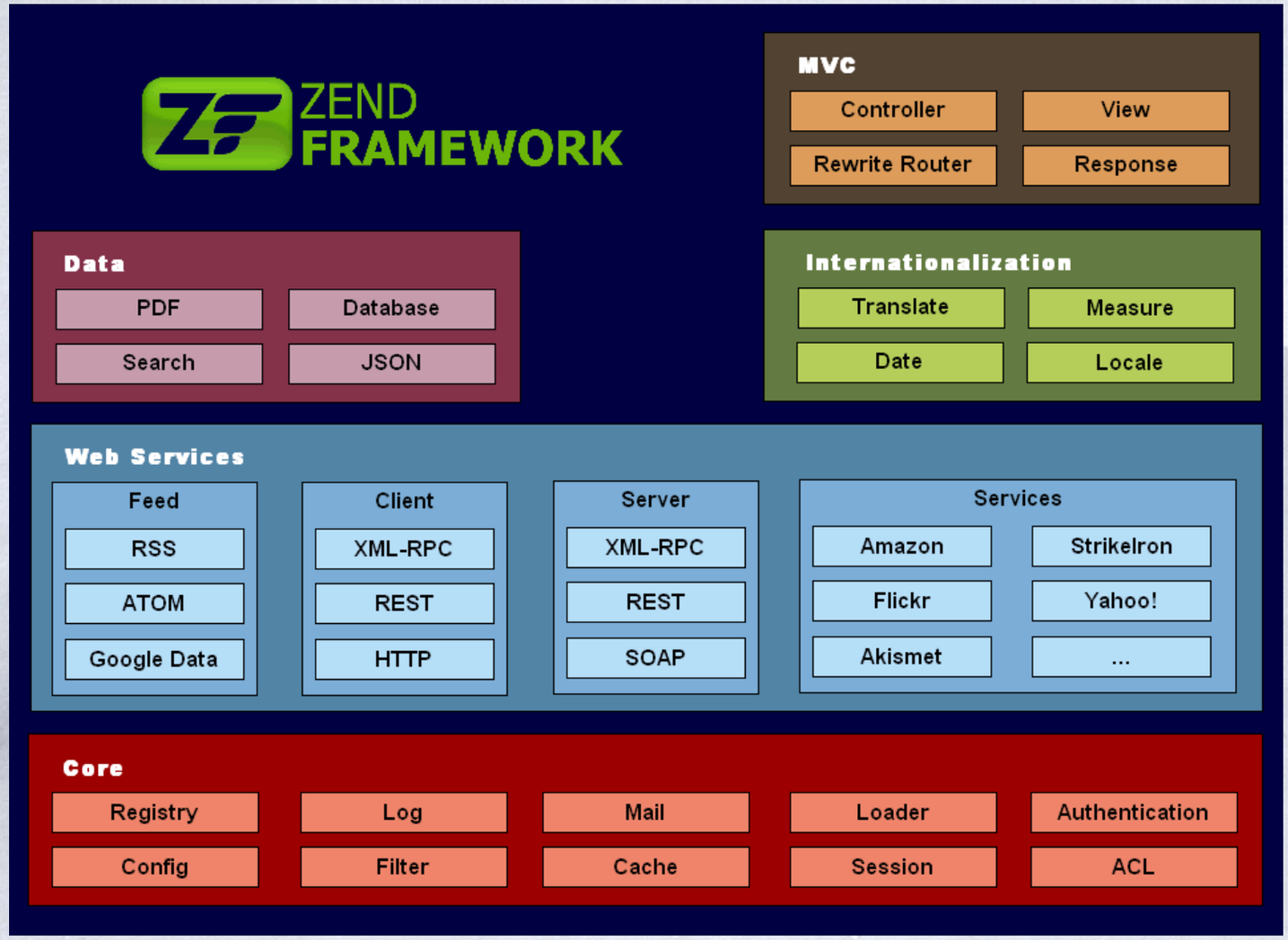
Components in 1.75

Zend_Acl
Zend_Amf
Zend_Auth
Zend_Cache
Zend_Captcha
Zend_Config
Zend_Config_Writer
Zend_Console_Getopt
Zend_Controller
Zend_Currency
Zend_Date
Zend_Db
Zend_Debug
Zend_Dojo
Zend_Dom
Zend_Exception
Zend_Feed
Zend_File
Zend_Filter
Zend_FilterInput
Zend_Form
Zend_Gdata
Zend_Http

Zend_Infocard
Zend_Json
Zend_Layout
Zend_Ldap
Zend_Loader
Zend_Locale
Zend_Log
Zend_Mail
Zend_Measure
Zend_Memory
Zend_Mime
Zend_OpenId
Zend_Paginator
Zend_Pdf
Zend_ProgressBar
Zend_Registry
Zend_Rest
Zend_Search_Lucene
Zend_Server_Reflection
Zend_Akismet
Zend_Amazon
Zend_Audioscrobbler
Zend_Delicious

Zend_Flickr
Zend_Nirvanix
Zend_ReCaptcha
Zend_Simpy
Zend_SlideShare
Zend_StrikeIron
Zend_Technorati
Zend_Twitter
Zend_Yahoo
Zend_Session
Zend_Soap
Zend_Test
Zend_Text
Zend_Timesync
Zend_Translate
Zend_Uri
Zend_Validate
Zend_Version
Zend_View
Zend_Wildfire
Zend_XmlRpc
Zend_XConsoleProcessUnix
Zend_XJQuery

Zend Framework Architecture



References

- http://anantgarg.com/2009/03/13/write-your-own-php-mvc-framework-part-1/
- PHP5应用实例详解：使用Zend Framework & Smarty构筑真正的MVC模式应用

Thanks!!!