The PHP Company

Participant Course Guide

Zend Framework 2: Fundamentals

 version 1.4

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Introduction

ZEND FRAMEWORK2: FUNDAMENTALS COURSE

The **Zend Framework 2 (ZF2) Fundamentals** course is designed for experienced PHP programmers who want to learn to combine ZF2 concepts and structural elements to utilize the full power of this software development kit for PHP applications. Zend Framework 2 is an open-source class library with a central theme of "extreme simplicity". ZF2 helps to reduce the tedious details of coding and instead allows developers to be more productive as they focus on the overall design. Utilizing a collection of customizable PHP classes, ZF2 provides robust functionality suitable for both large and small tasks. This course combines teaching ZF2 with a Test-Driven Development (TDD) approach to building applications, a best practice in PHP app creation. In the Zend Framework:2 Fundamentals course, you learn by doing. Discussions of related components are presented with examples of how best to utilize them in your apps. Hands-on exercises reinforce concepts as you build an online messaging application in the Cloud.

Audience:

This course is designed for people who have a solid foundation in the PHP language and OOP, and have successfully created complex PHP web applications.

Pre-requisite(s):

Solid understanding of PHP at an intermediate+ level and OOP experience

Objectives:

Upon completing the course, active PHP developers should be fully-equipped to apply a best practice approach to web application development, using ZF2 as the framework and TDD as the approach.

About Zend

Zend is the PHP company. Businesses utilizing PHP know Zend as the place to go for PHP expertise and sound technology solutions. Zend delivers premier web application platform products and services for PHP applications. With commercial products and services that enable developers and IT personnel to deliver business-critical PHP applications, Zend is taking the power of PHP to the enterprise.

Note:

While this is a fundamental-level course on Zend Framework 2, it requires more than a fundamental level understanding of PHP. Participants are assumed to be proficient enough in the language to understand intermediate-level code examples and to perform coding exercises.
This course assumes no previous ZF2 experience.

Zend provides a suite of products that supports the entire PHP lifecycle, from development to production, of your business-critical PHP applications. Often, PHP programmers work in demanding environments, where they are called upon to fulfill more than one role. Zend products allow those who work in web application development - as well as related fields like system administration - to seamlessly utilize all their relevant features to rapidly produce a dynamic, robust web application in a stable, reliable environment.

Zend Server

Setting the Standard in PHP Application Performance & Availability

Zend Server is the all-in-one production environment that ensures your PHP applications are available, fast, reliable and scalable. It uniquely guarantees application uptime and reliability through enhanced PHP monitoring and immediate problem resolution.

Zend Studio

The Proven PHP Development Environment

Zend Studio is the leading PHP Integrated Development Environment (IDE) designed for professional developers, which includes all the development components necessary for the full PHP application lifecycle.

Zend Guard

Protect your Code and IP

Zend Guard provides independent software vendors and IT managers with the ability to safely distribute and manage the distribution of their PHP applications while protecting their source code.

Zend Optimizer

Optimize your PHP code

Zend Optimizer is a free application that runs files encoded using Zend Guard and enhances the overall performance of your PHP applications.

Zend Framework 2

Build your apps faster and reduce maintenance costs

Zend Framework 2 embodies extreme simplicity & productivity, the latest Web 2.0 features, simple corporate-friendly licensing, and an agile well-tested code base that your enterprise can depend on.

Zend Engine

The Heart of PHP

At the center of PHP is the Zend Engine, the component that parses and executes PHP files. It is open source software and available under an Apache-style license.

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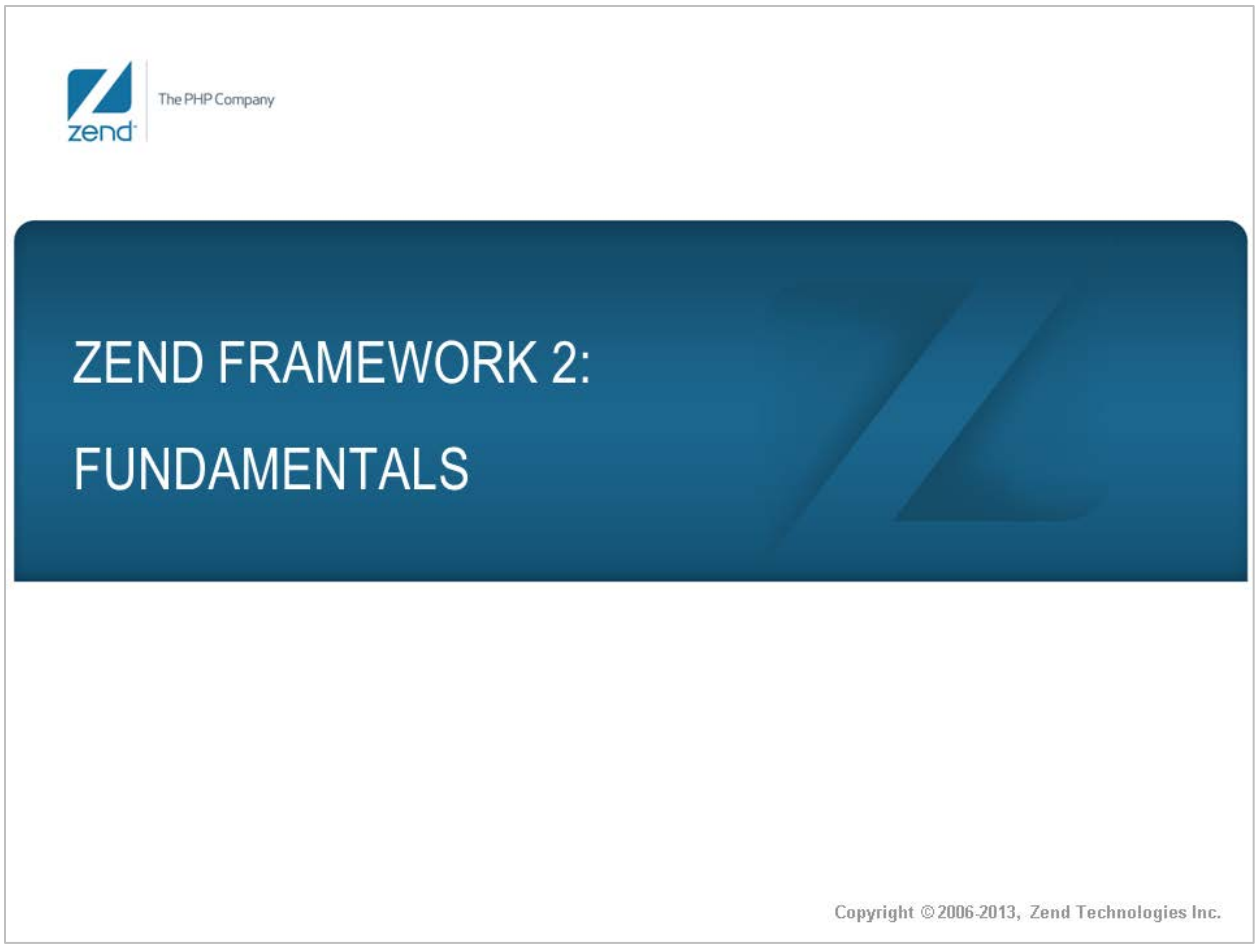

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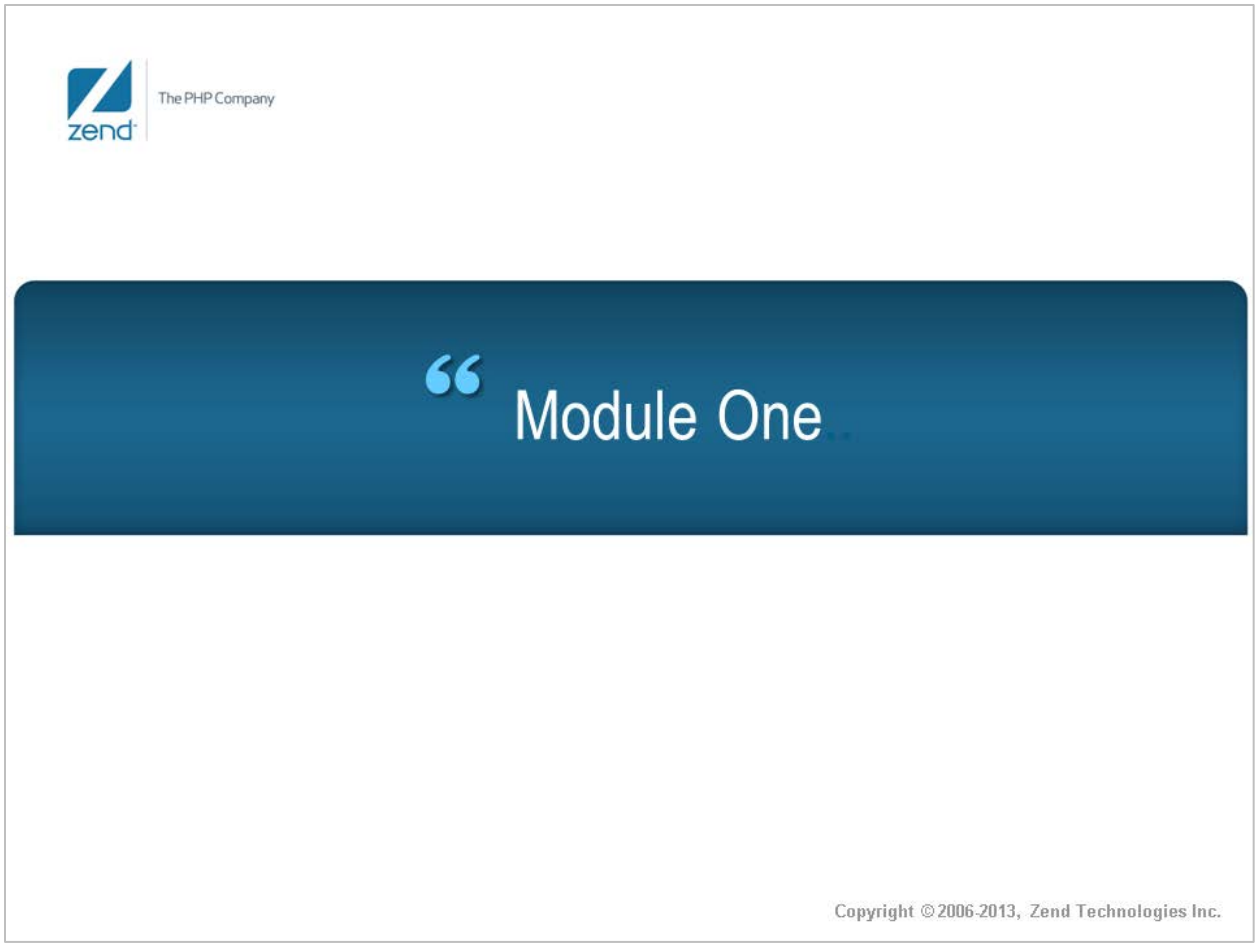
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Module One
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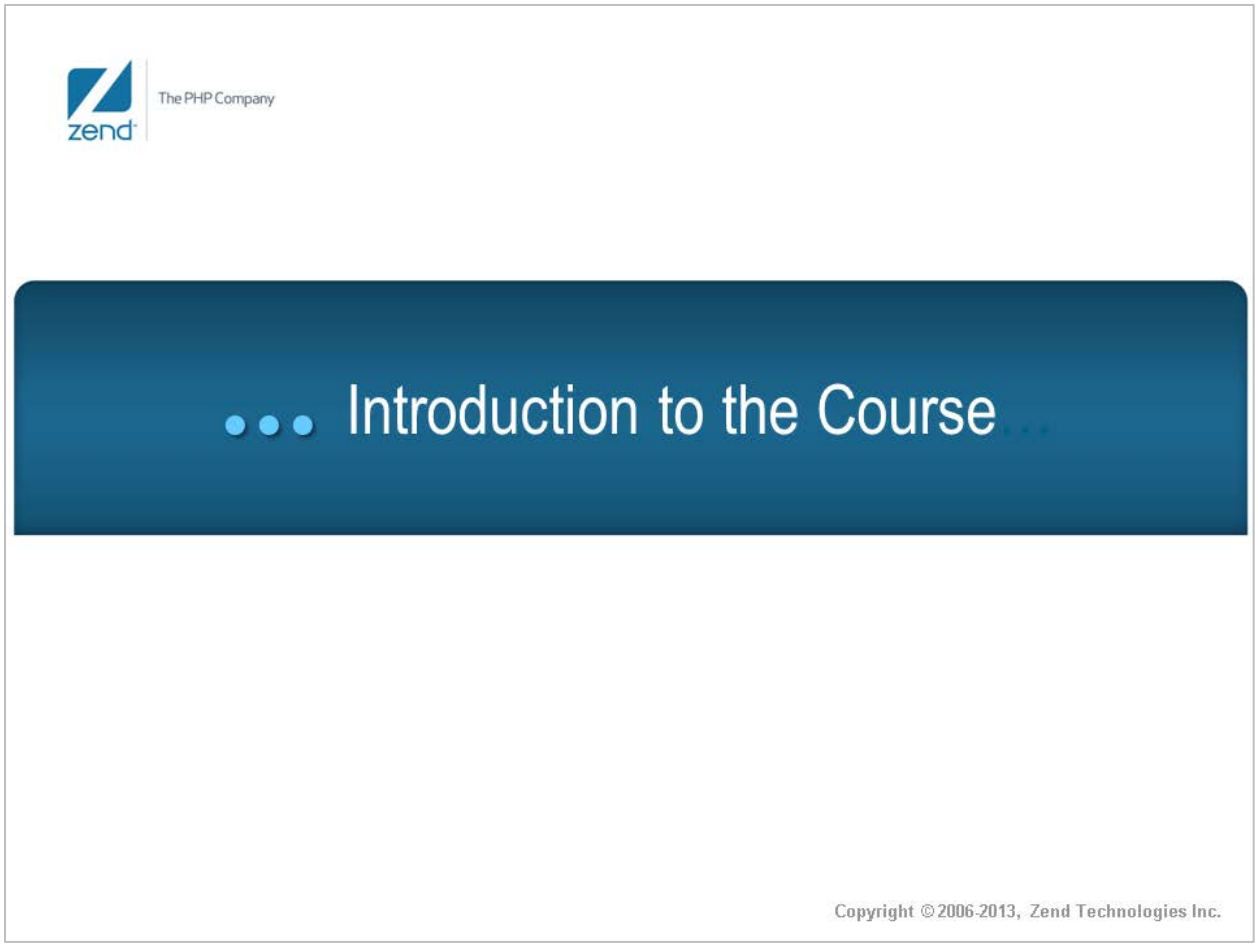

Slide 4

Course Goals

- **In this course, we will study Zend Framework 2 (ZF2) so you will understand…**
  - the concept behind the framework
  - the structural components that make up the framework
  - the power of combining these elements for a complete design solution

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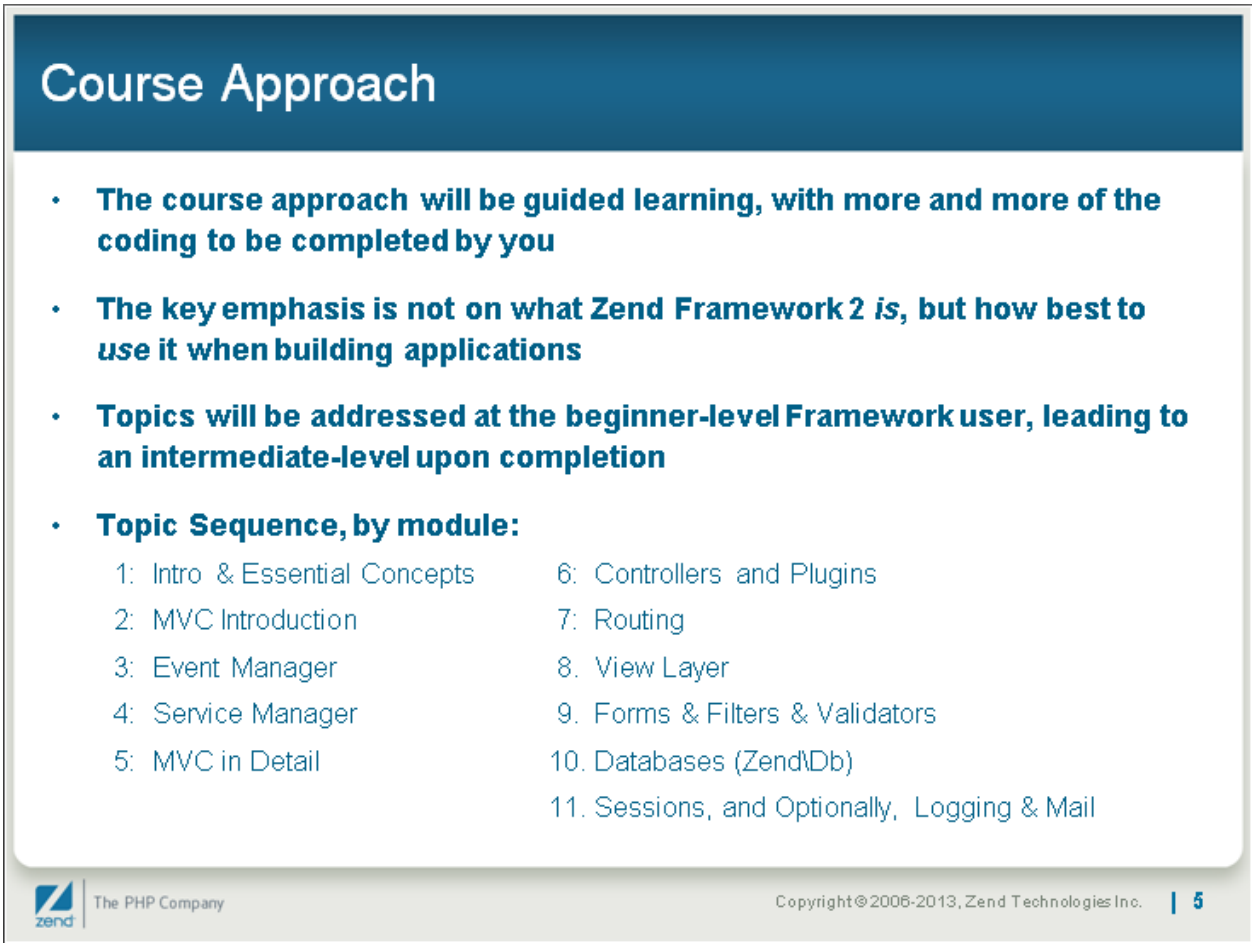

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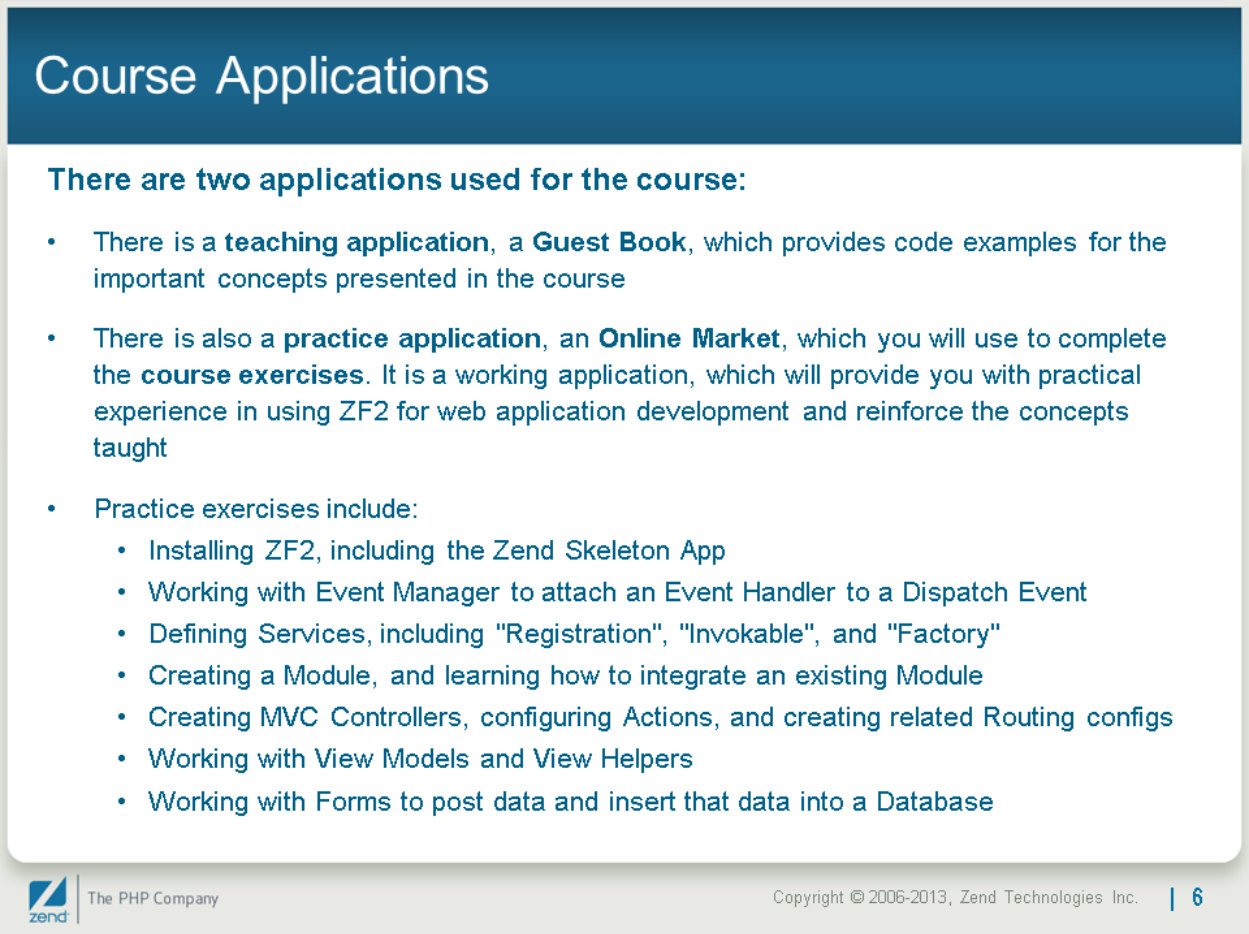
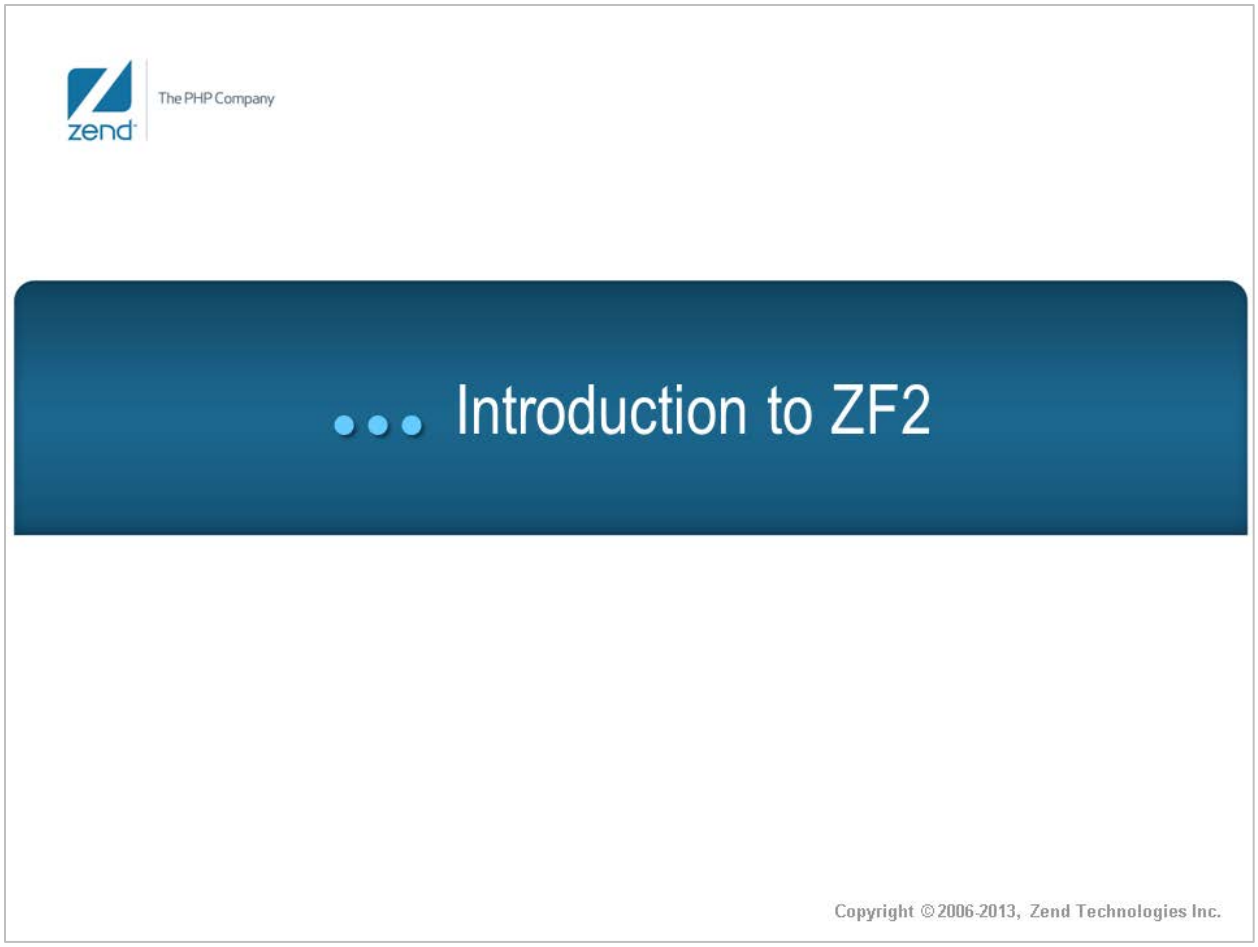


- Both of these course applications have been created specifically for this course

Slide 7



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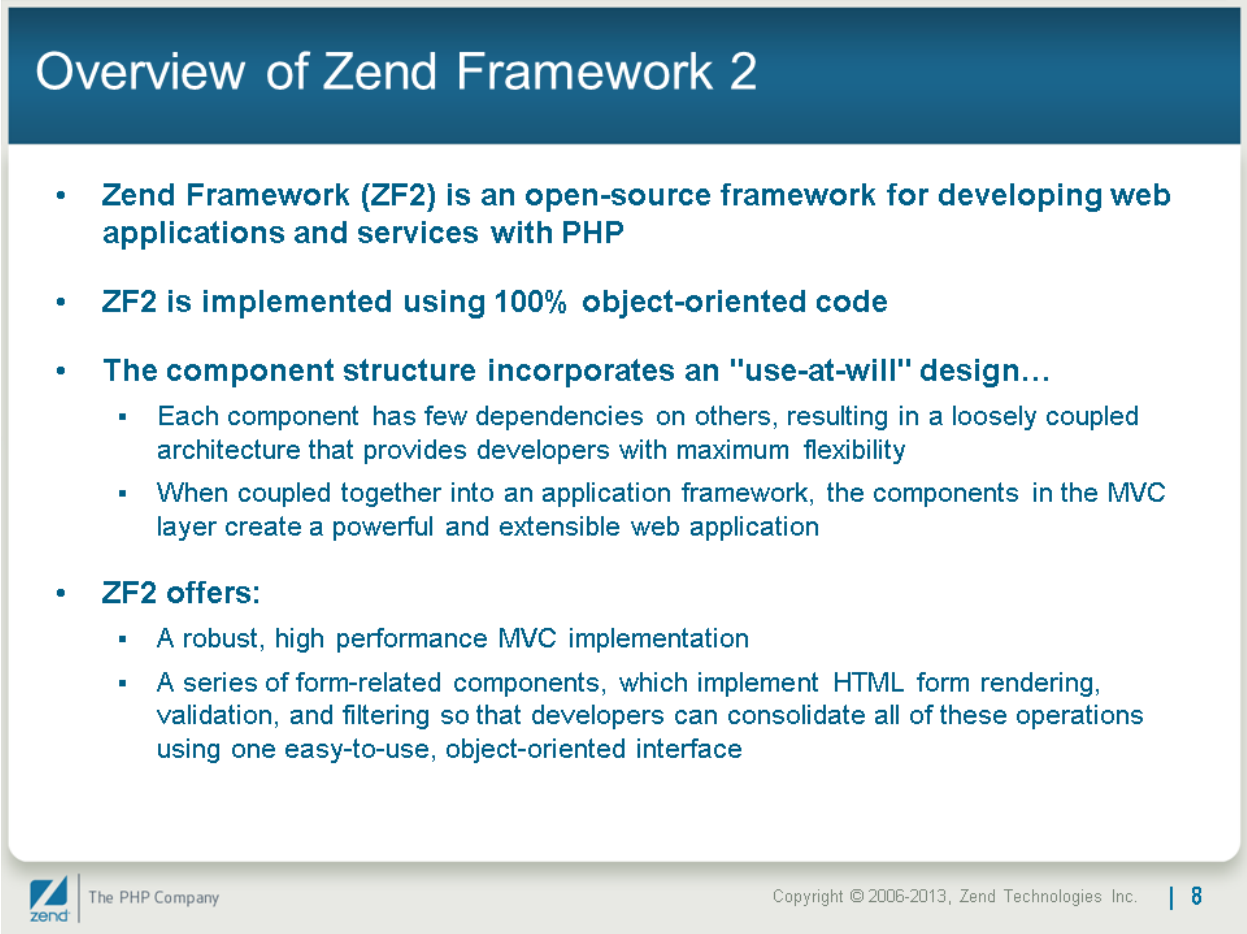

- Keep PHP competitive with other technologies like Perl, frameworks like CodeIgniter, Cake PHP, …
- Provide "clean" IP to enable commercial use - real companies can't just "borrow" code from the Internet without clear licensing
- Exploit the power of PHP 5.3 to its full advantage
- The underlying technologies may be extremely complex, but the interface - the ZF components - is designed for ease of use
- 'Use-At-Will' Architecture - utilize individual components without being forced to use everything
- Based on the Pareto Principle - 80/20 Rule
  - Works for the most common use cases out of the box
  - Built for extensibility
- ZF2 is licensed using the BSD license
  - Anyone can use it, for anything, no strings attached – period
  - Business friendly

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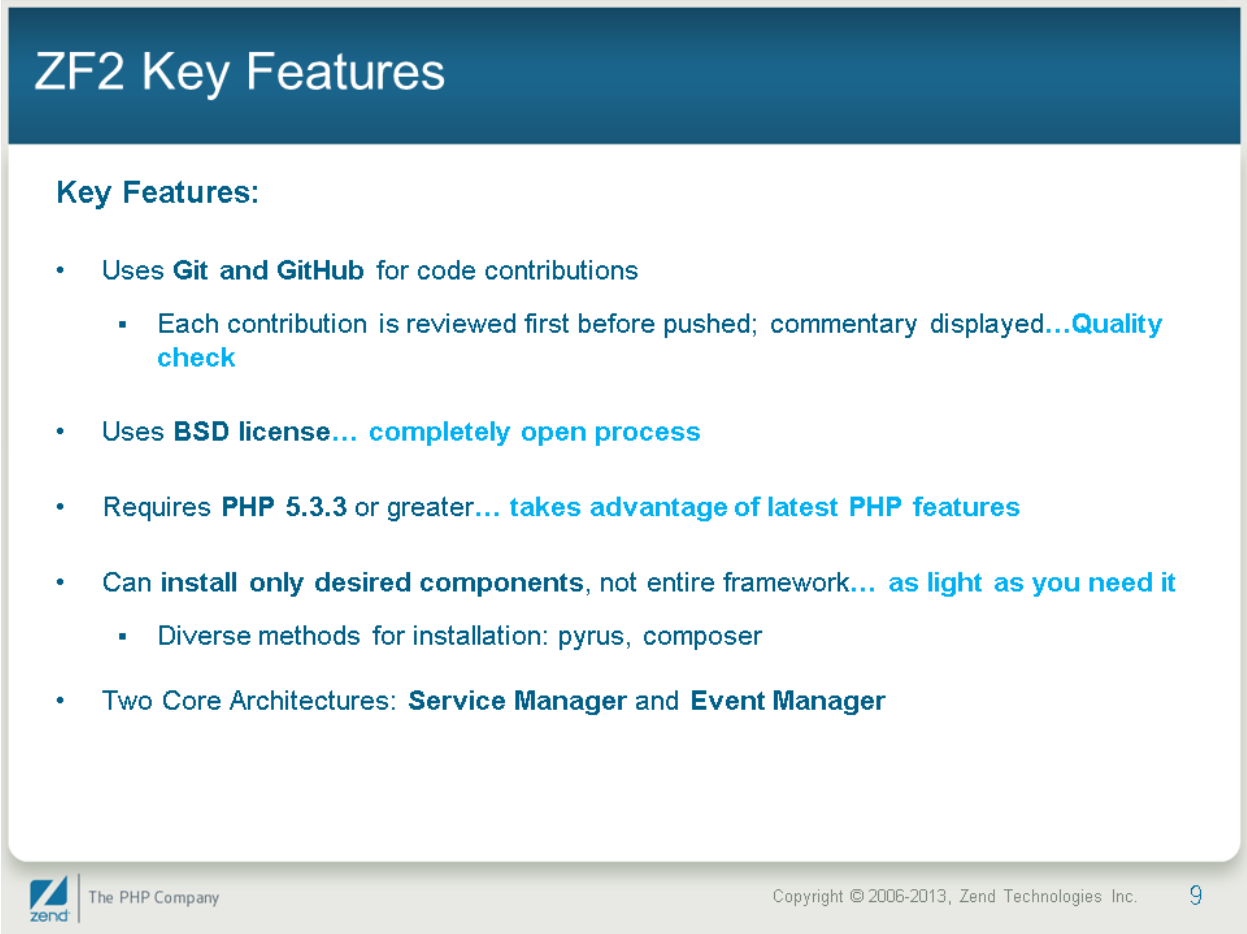

- ZF1 User Alert:
    - Now uses Git and GitHub instead of Subversion for code contributions
    - ZF2 still uses a BSD license but no longer requires a CLA for contributions

Slide 10

Any ZF1 Users?

Zf1 vs. ZF2: A new core, a new concept

ZF1		ZF2
Singletons		Event-Driven Services
Registries		
Hard- & Soft-Coded Dependencies		

- ZF2 resembles ZF1 on the surface in many parts, but structurally it works very differently – it is based on an event-driven architecture

… offers extensive flexibility and customization

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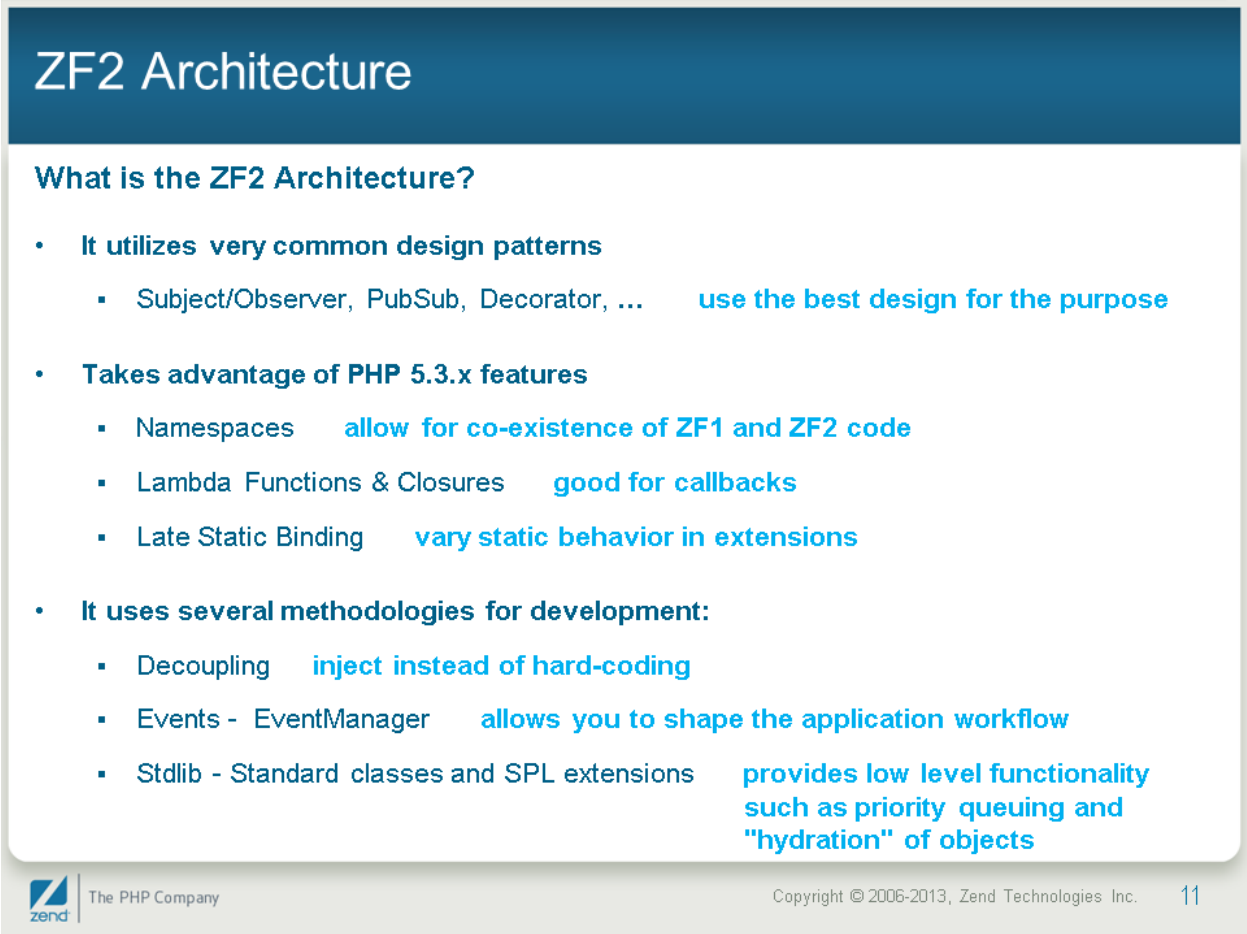
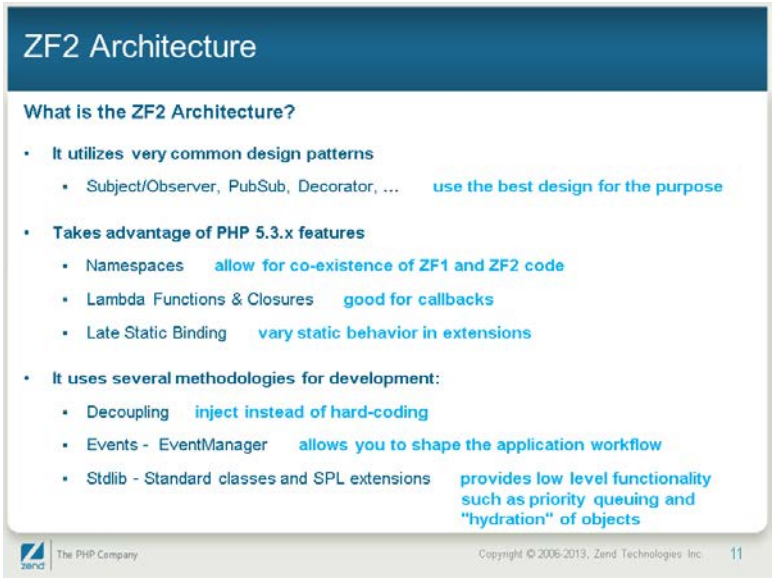


Methodologies Used in Development

- Decoupling/ Inversion of Control
  - Instead of hard-coding dependencies, inject them
  - Inversion of control containers automate this
  - ServiceManager
    - SM is explicit and easy to understand
- Event Manager:
  - Uses events for decoupling
  - Provides benefits of aspect-oriented programming
    - Concept of message bus, which allows you to shape workflow wherever needed



- SPL extensions:
  - Used whenever possible
  - Designated area is Stdlib, although it contains more than SPL extensions
  - Dispatchable interface, for example, is mainly in MVC right now, but will be used for Queuing and Servers later

- Namespaces:
  - Can use ZF1 and ZF2 code in same app because of namespaces… no conflicting names
  - Namespaces make it easier to segregate code and create hierarchies (used in file systems because it makes it easier to find code)
  - Will make migration from ZF1 to ZF2 easier

- Lambda Functions & Closures:
  - Not common in PHP, but often used in JavaScript, whenever configuring an app
  - Most often used with app code, not core; ex: when need a callback, don't want to have to define a class… just define callback in place and pass it in

- Late Static Binding:
  - Mostly used with Active Record – another way to make extension points
  - Classes differ in behavior simply by extension, with respect to their static members

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How ZF2 Works

The basic concept behind ZF2 is quite simple. It is based on two key managers - Event Manager and Service Manager - and listeners

Event Manager: Trigger events & Attaches/Detaches listeners

Listeners: Attach to specific events and listen for triggers

Service Manager: Provides the wiring that guides the app workflow

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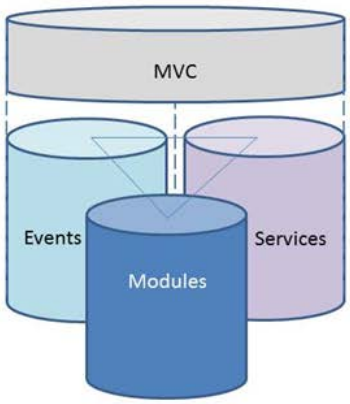
ZF2 Architecture and MVC



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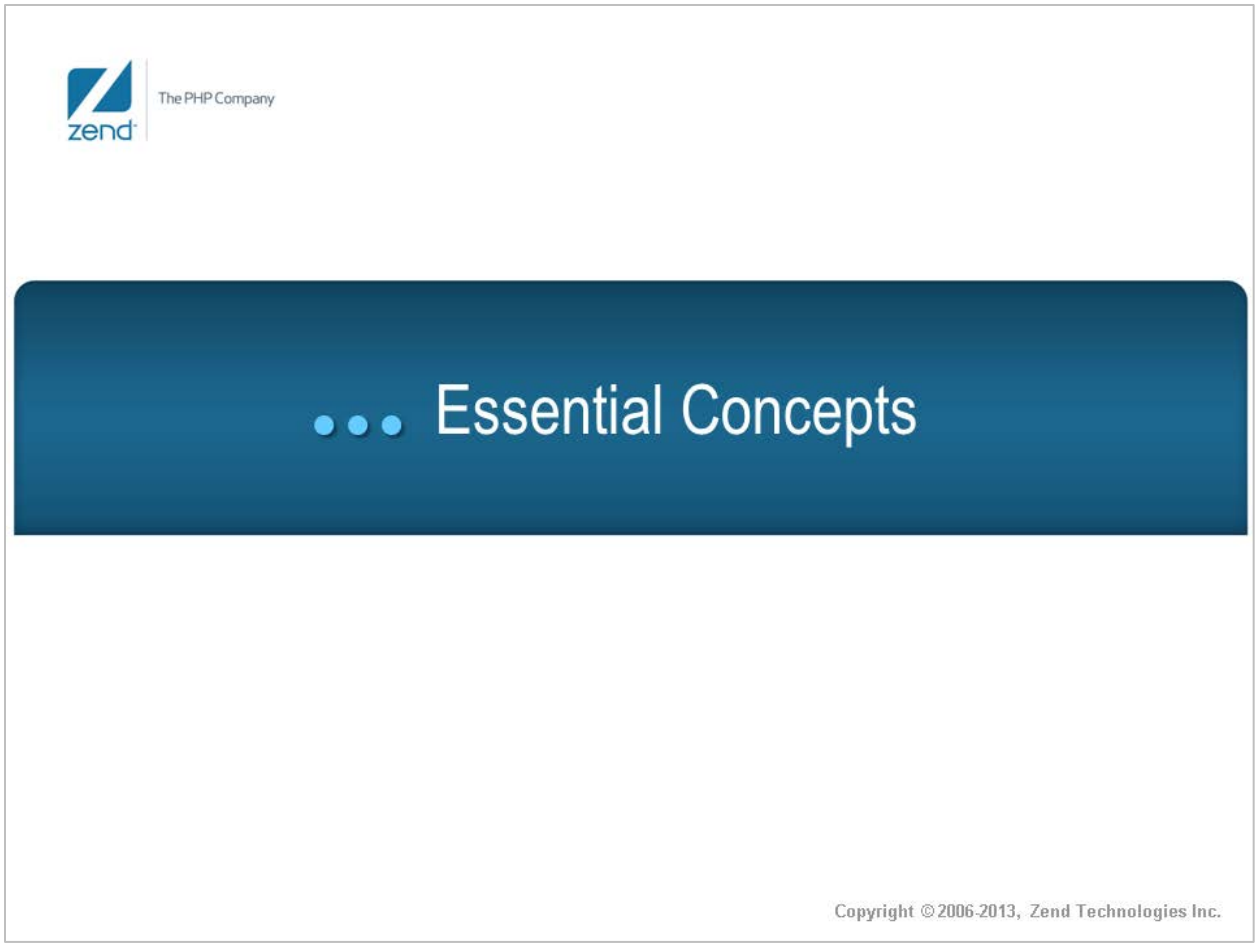
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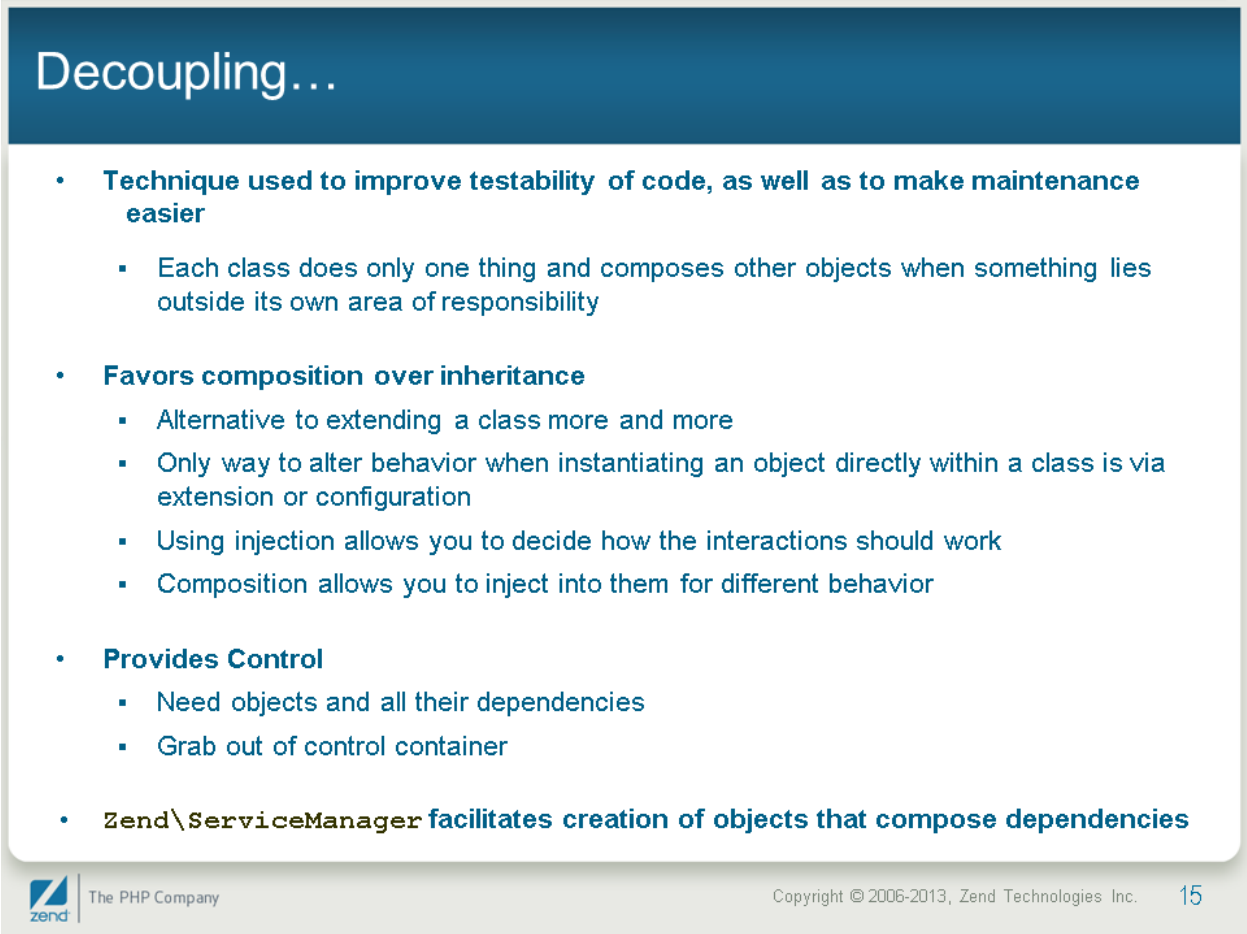

- Issue with injections and applications, in general, is that you often need more than object injections… also need configuration injections (ex: HTTP client to specify which adapter or port to use; all scalar data)
- Decoupling: removes hard-coding and uses code pieces that can be used in many places, by injection; ex: given a common plug, anything that fits that plug may be used

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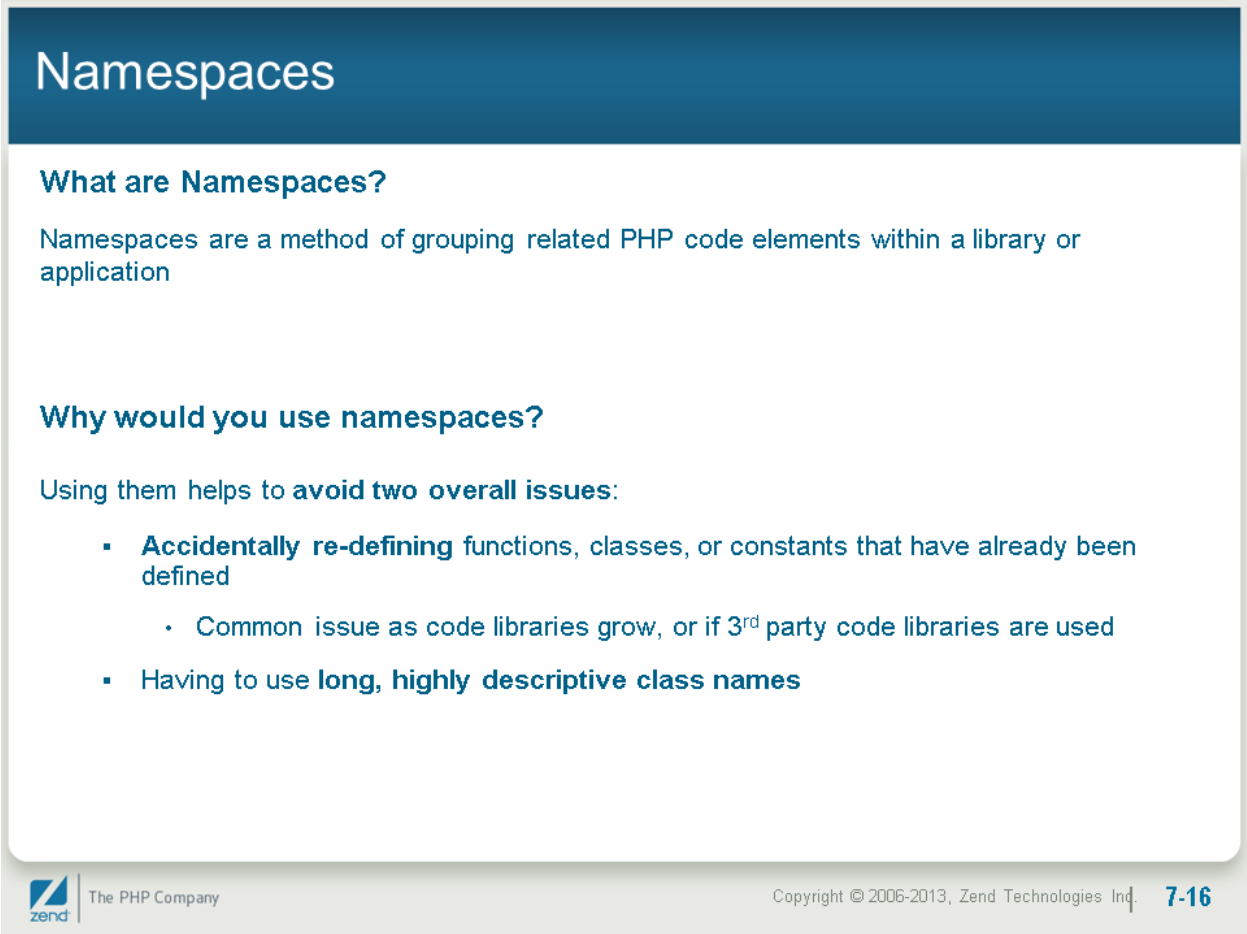

- You can have multiple namespaces per file, but it is *not recommended*
- A namespace may contain constants, functions, and classes
- Example from php.net:

```
<?php
namespace my\name; // see "Defining Namespaces" section
class MyClass {}
function myfunction() {}
const MYCONST = 1;
$a = new MyClass;
$c = new \my\name\MyClass; // see "Global Space" section
$a = strlen('hi'); // see "Using namespaces: fallback to global
                   // function/constant" section
$d = namespace\MYCONST; // see "namespace operator and __NAMESPACE__
                   // constant" section
$d = __NAMESPACE__ . '\MYCONST';
echo constant($d); // see "Namespaces and dynamic language features" section
?>
```


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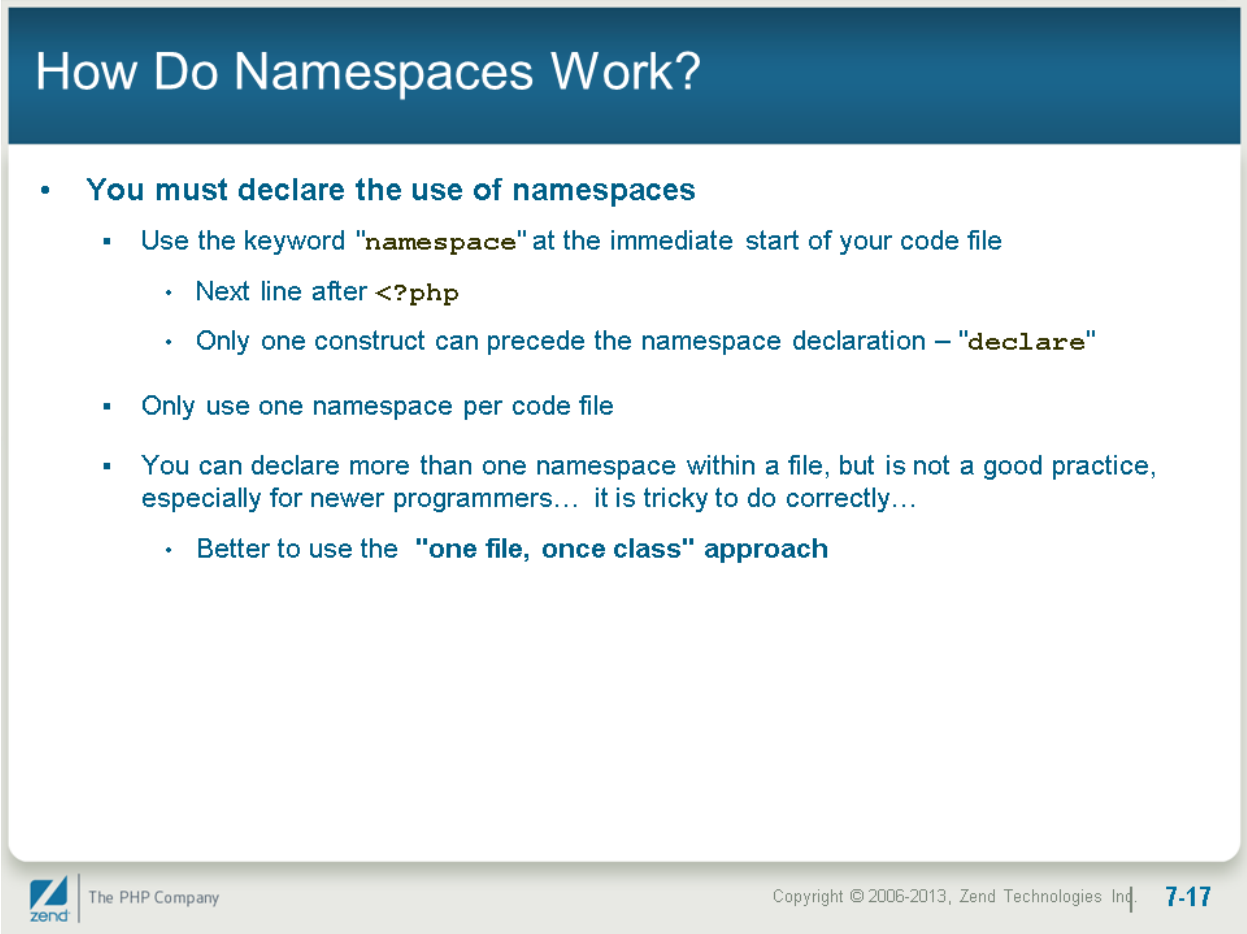

- You cannot nest or define more than one namespace within a single code BLOCK
- You can, however, define more than one within a single code FILE (but it is not a good practice, especially when starting out as a programmer – it can get tricky to use)

Slide 18

How Do Namespaces Work?

- **Three code elements are directly affected by the use of namespaces:**
  - Constants
  - Classes
  - Functions

```php
<?php
Namespace CalendarApp;
const HOURS= 24;
function day() {}
class week
{
    static function
staticmethod() {}
}
?>
```

- **Classes and functions are contained within the global space unless a namespace is defined…**
  - Prefix with " \ " to indicate a fully qualified (global) namespace

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How Do Namespaces Work?

- **Once you define code elements within a namespace they can be utilized within other php files**
  - The same namespace can be utilized in multiple files
  - Import namespaces with the "`use`" operator
- **You can sub-divide the library by creating sub-namespaces**
  - These are indicated using a "`\`"
  - Example: `use app\lib1`
- **You can create an alias for a namespace (or a class)**
  - Example for Namespace alias: `use app\lib1 as L1;`
  - Example for Class alias: `use Zend\Db\Adapter\Driver\Mysqli\Mysqli as MysqliDriver`

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Namespaces Structure Example

```php
<?php
namespace X;
class Abc
{
    public $abc = 'X';
    public function getAbc()
    {
        return $this->abc;
    }
}
```

```php
<?php
namespace Y;
class Abc
{
    public $abc = 'Y';
    public function getAbc()
    {
        return $this->abc;
    }
}
```

```php
<?php
namespace Z;

// NOTE: "use" allows
// relative reference to the namespace
use X\Abc;
$x = new Abc();

// outputs 'X'
echo $x->getAbc();

// otherwise we need an
// absolute reference to the namespace
$y = new \Y\Abc();

// outputs 'Y'
echo $y->getAbc();
```

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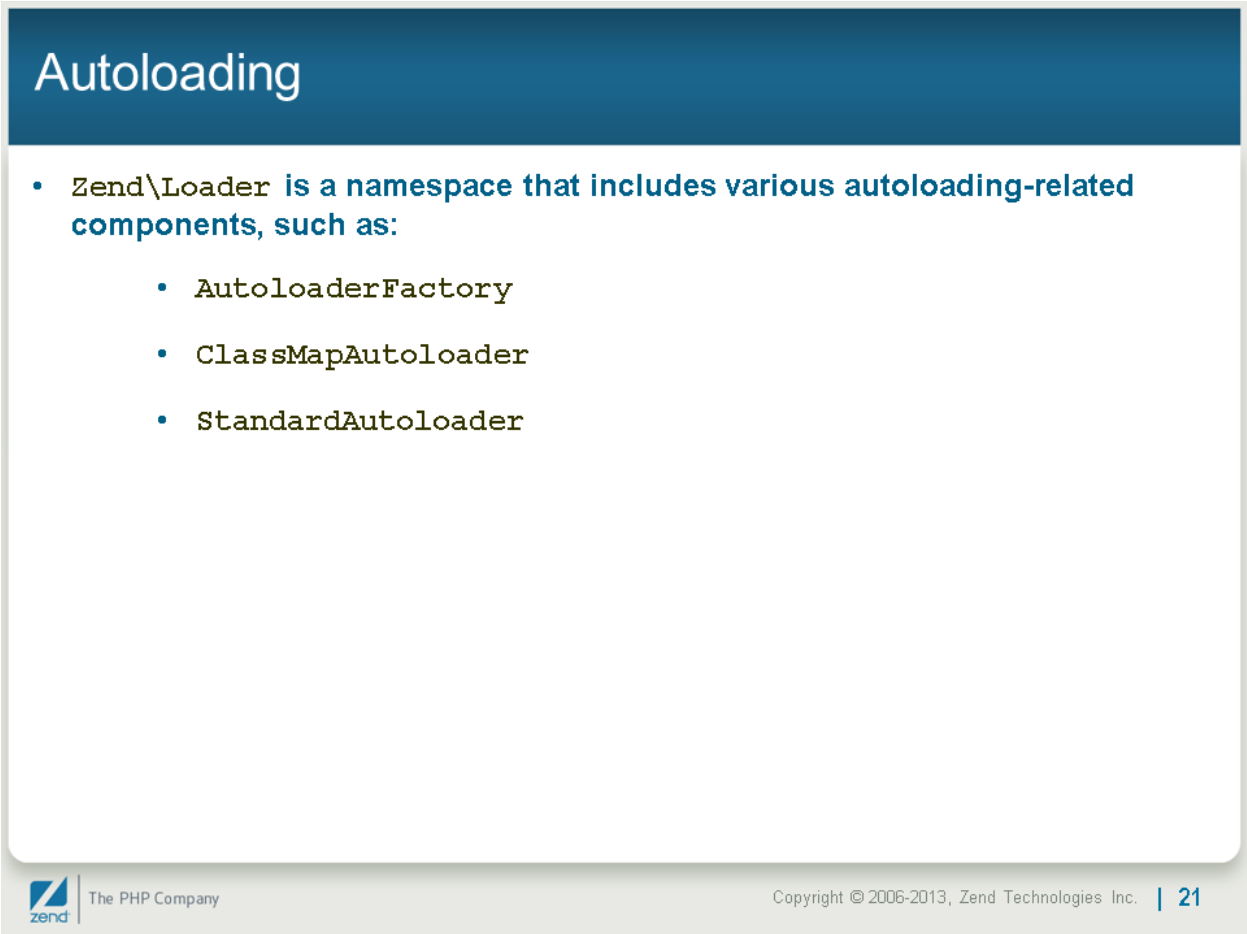

- Note: AutoloaderFactory is a factory
- There is also a ModuleAutoLoader, that is consumed by a listener on the ModuleManager (Zend\ModuleManager\ModuleManager) in order to resolve module names to their associated Module classes
  - Typically, you will never interact with this autoloader directly

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AutoloaderFactory

What is the AutoLoaderFactory?

- `Zend\Loader\AutoLoaderFactory` is a factory that instantiates, configures, and registers autoloaders that implement `SplAutoloader`
- You pass it key/value pairs of `autoloader classname => options`

Why use the AutoLoaderFactory?

If the same autoloader is provided multiple times, it simply **configures the existing instance**, which helps **minimize the number of autoloaders** you have at any given time

This is primarily **used internally in a module listener**, but it's important to know how to configure it…

- Modules should return configuration for autoloading, and that configuration will be fed to the `AutoloaderFactory`

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ClassMapAutoloader

What is the ClassMapAutoloader?

- The `ClassMapAutoloader` allows you to provide `classname => filename` pairs, where the filenames are either absolute or directly resolvable off the `include_path`
- Typically use `__DIR__ . '/path/to/ClassFile.php'` when defining them
  - Define the classmap relative to where the classes live in the filesystem; usually the classes will be at the same level or lower than the classmap itself
- This is a **high performance way** to **autoload classes**, and does not require any specific naming conventions
- Add bullet: Use `classmap_generator.php` in the `bin` folder of your ZF2 distribution to automatically generate an `autoload_classmap.php` file

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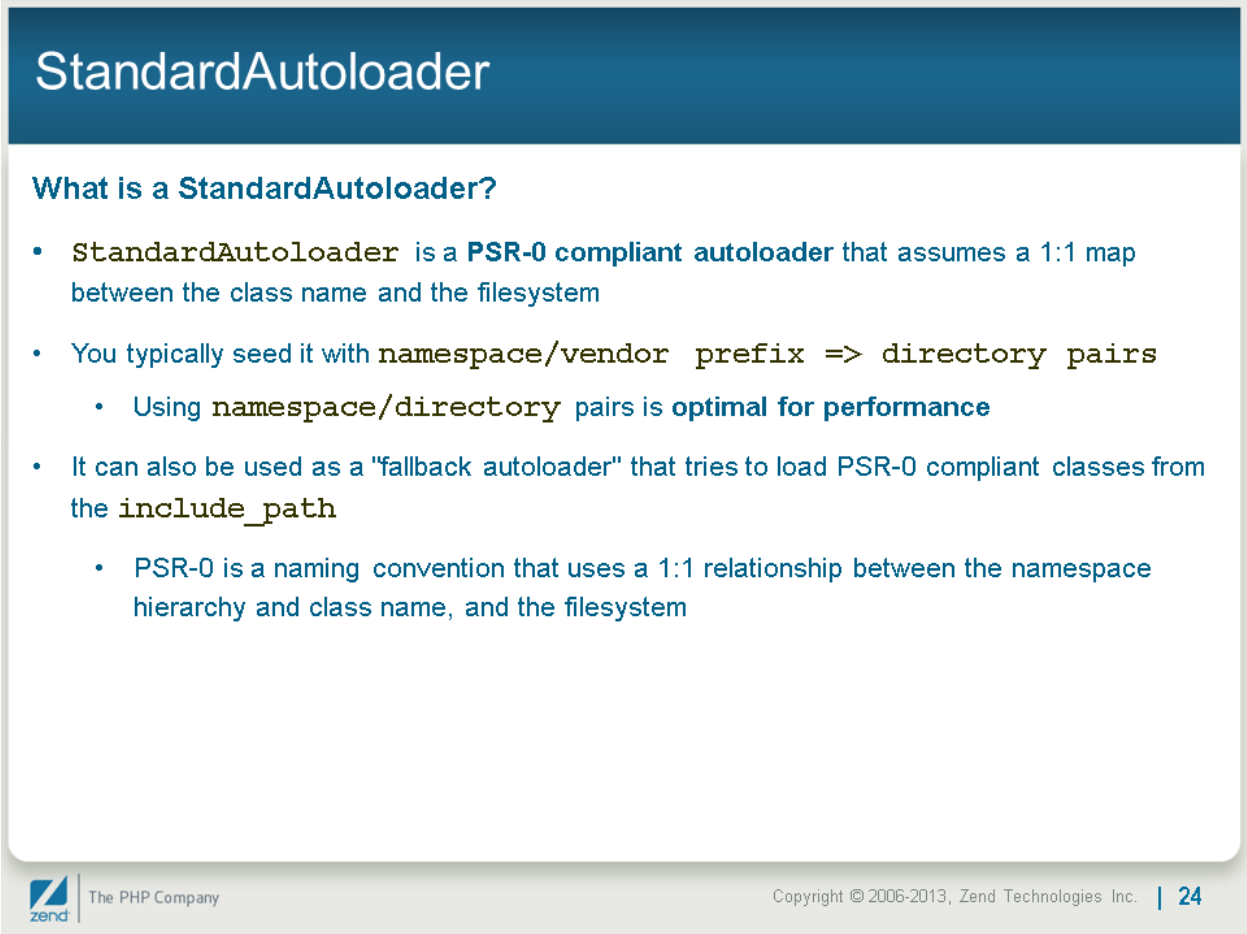
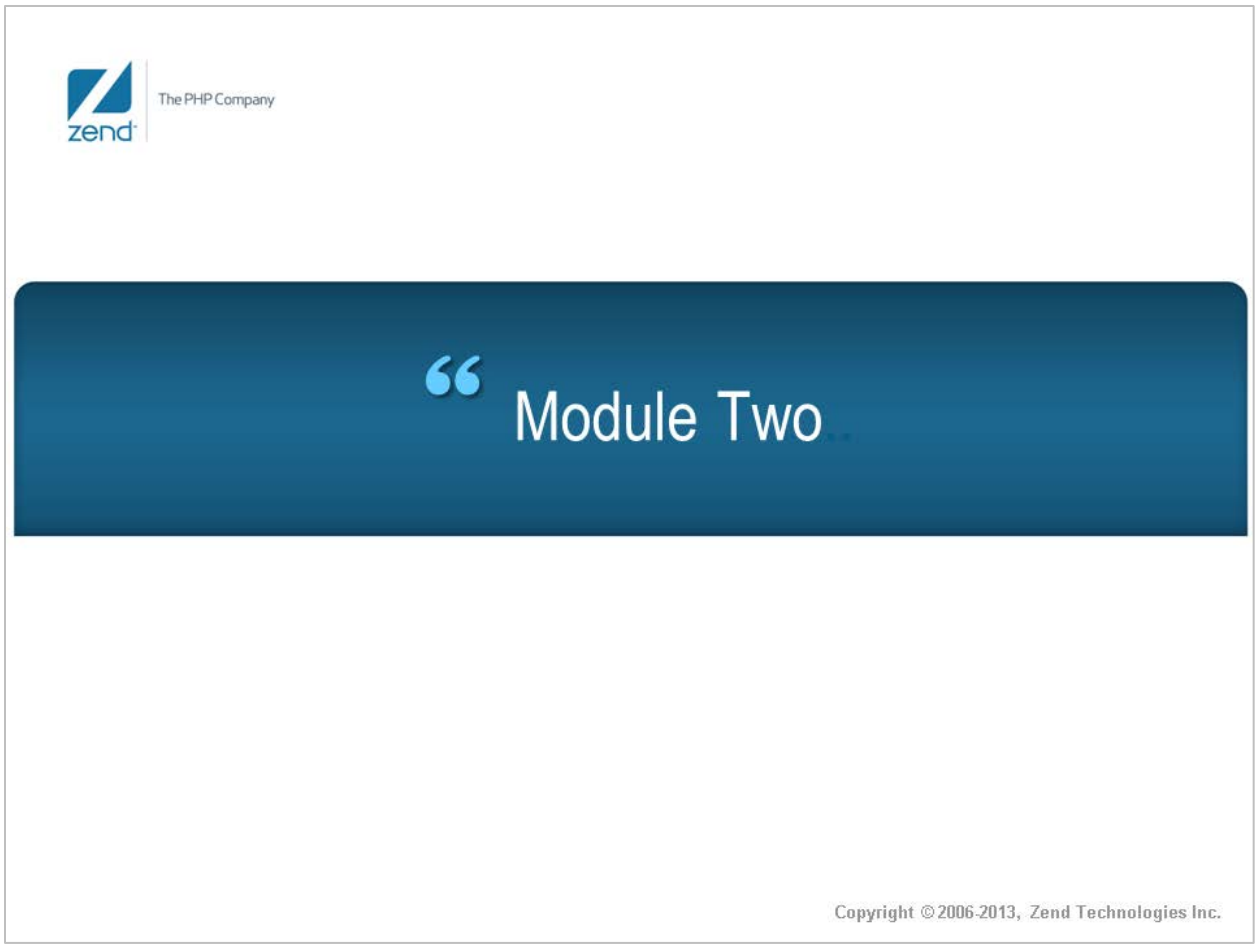


- For information on PSR-0, see https://github.com/php-fig/fig-standards/blob/master/accepted/PSR-0.md

Slide 1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Module Two
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Slide 2

Module Two Topics

- **In this module, we will cover:**
  - Design Patterns
  - Model-View-Controller (MVC) Design Pattern Introduction

Slide 3

Design Patterns

- **Some of the most commonly used PHP design patterns include:**
  - **Factory Pattern**: used for creating objects; a set of methods to make & return components of one object in various ways
  - **Singleton Pattern**: used for creating a single instance of an object; a class that distributes the only instance of itself
  - **Observer (PubSub) Pattern**: used for regulating the behavior of objects; an object notifies one or more objects if it changes
  - **Strategy Pattern**: used for regulating the behavior of objects; an object directs the set of methods called; each method, which is in its own class, extends a common base class
  - **Model-View-Controller (MVC)**: used for architecting an application; the theoretical basis is to separate the user's interactions in the view layer from the control (controller) and storage (model) of data

Slide 4

MVC Elements

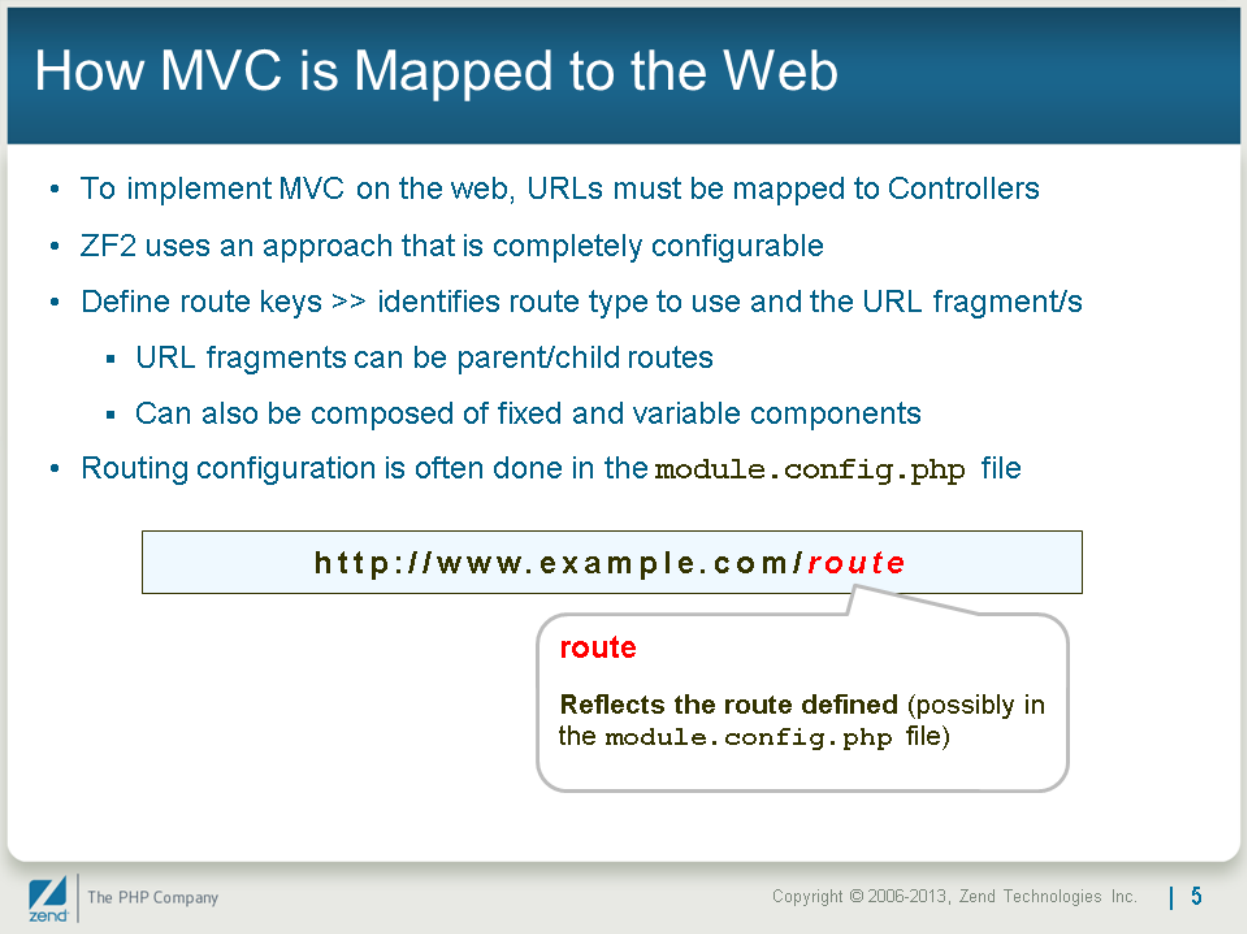
- **The MVC concept:**

Presentation  View

Flow Logic  Controller

Data Access  Model

Slide 5



- By default, the first segment of a URL path maps to a controller, and the second to an action
  - If no action is provided, the action index is assumed
  - If no controller is provided, the controller index is assumed (following the Apache convention that maps a DirectoryIndex automatically)
- Zend_Controller's dispatcher then takes the controller value and maps it to a class. By default, it Title-cases the controller name and appends the word Controller
- Similarly, the action value is mapped to a method of the controller class. By default, the value is lower-cased, and the word Action is appended
  - For example, zend.com is built using Zend Framework
  - services = controller
  - training = action
  - course-catalog = parameter
  - zend-framework = value

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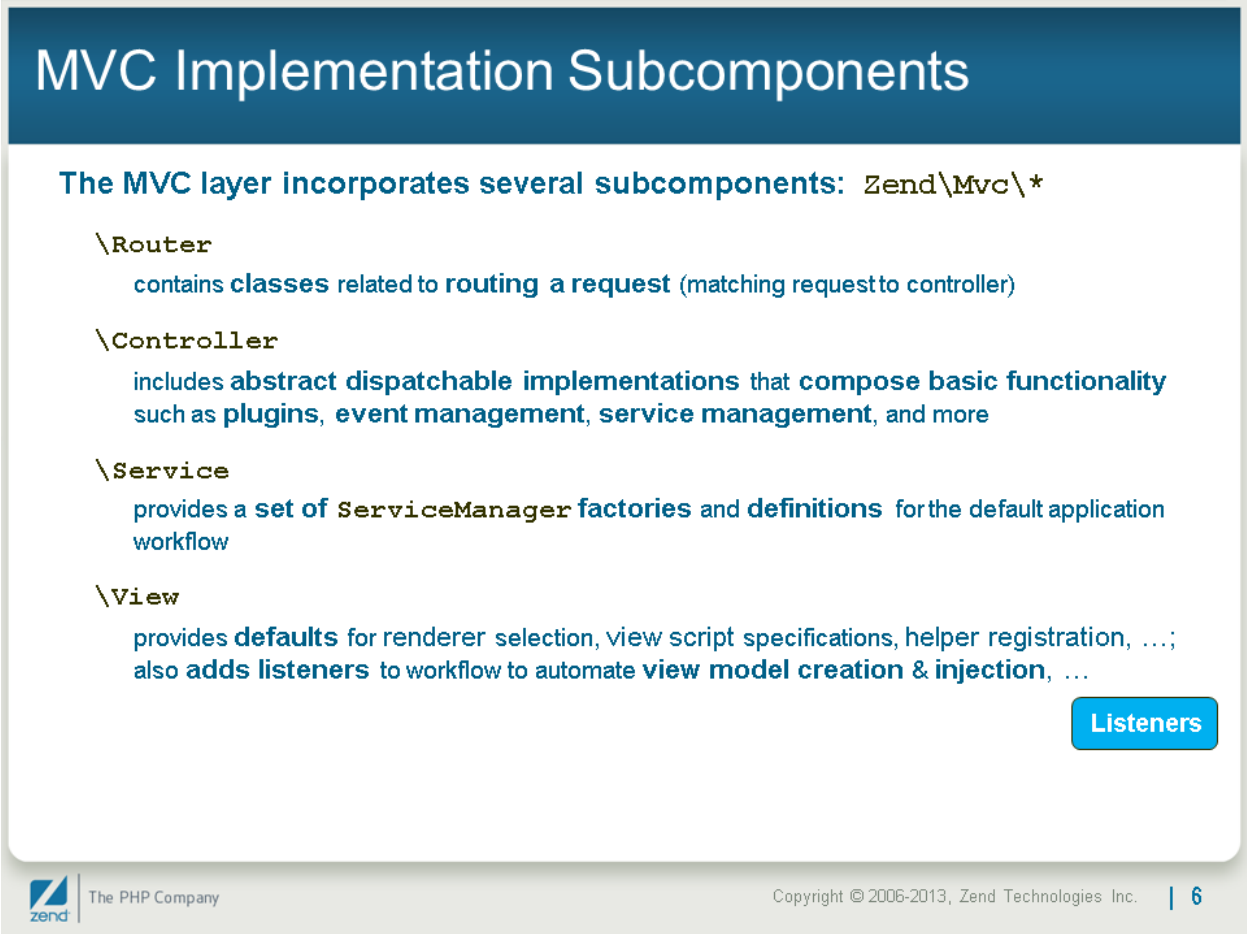

- Note that there is no base class for Model because it is too application-specific…

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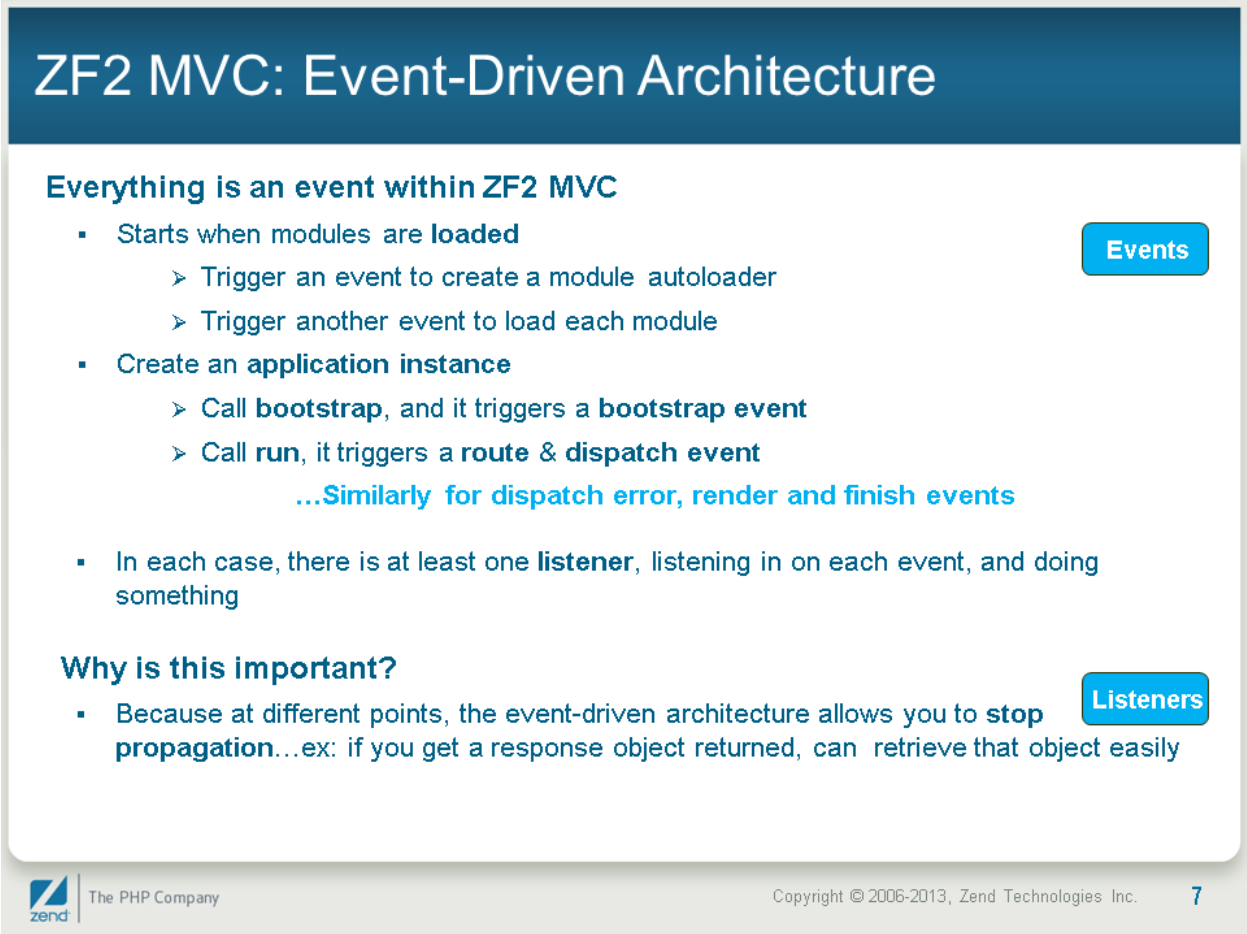
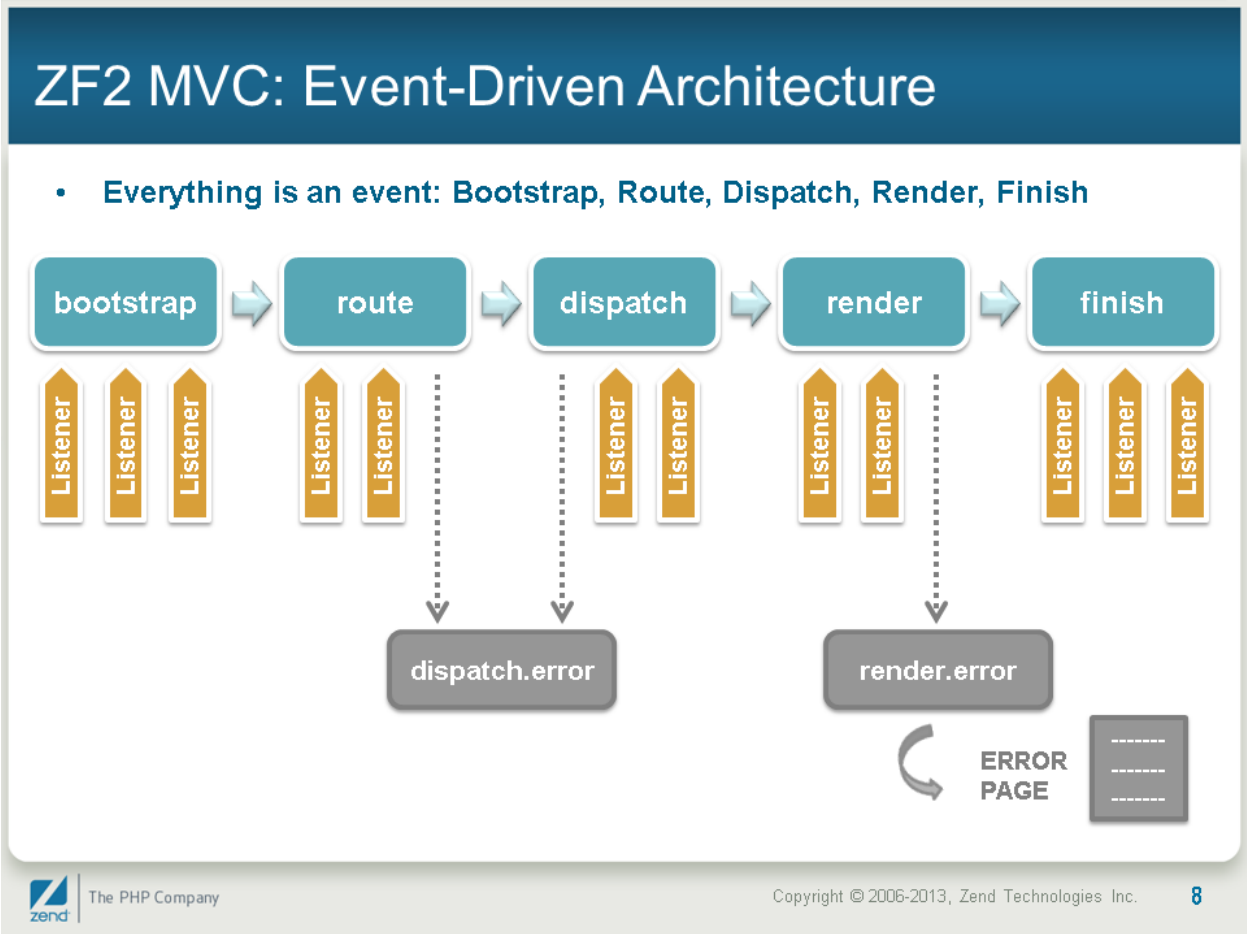


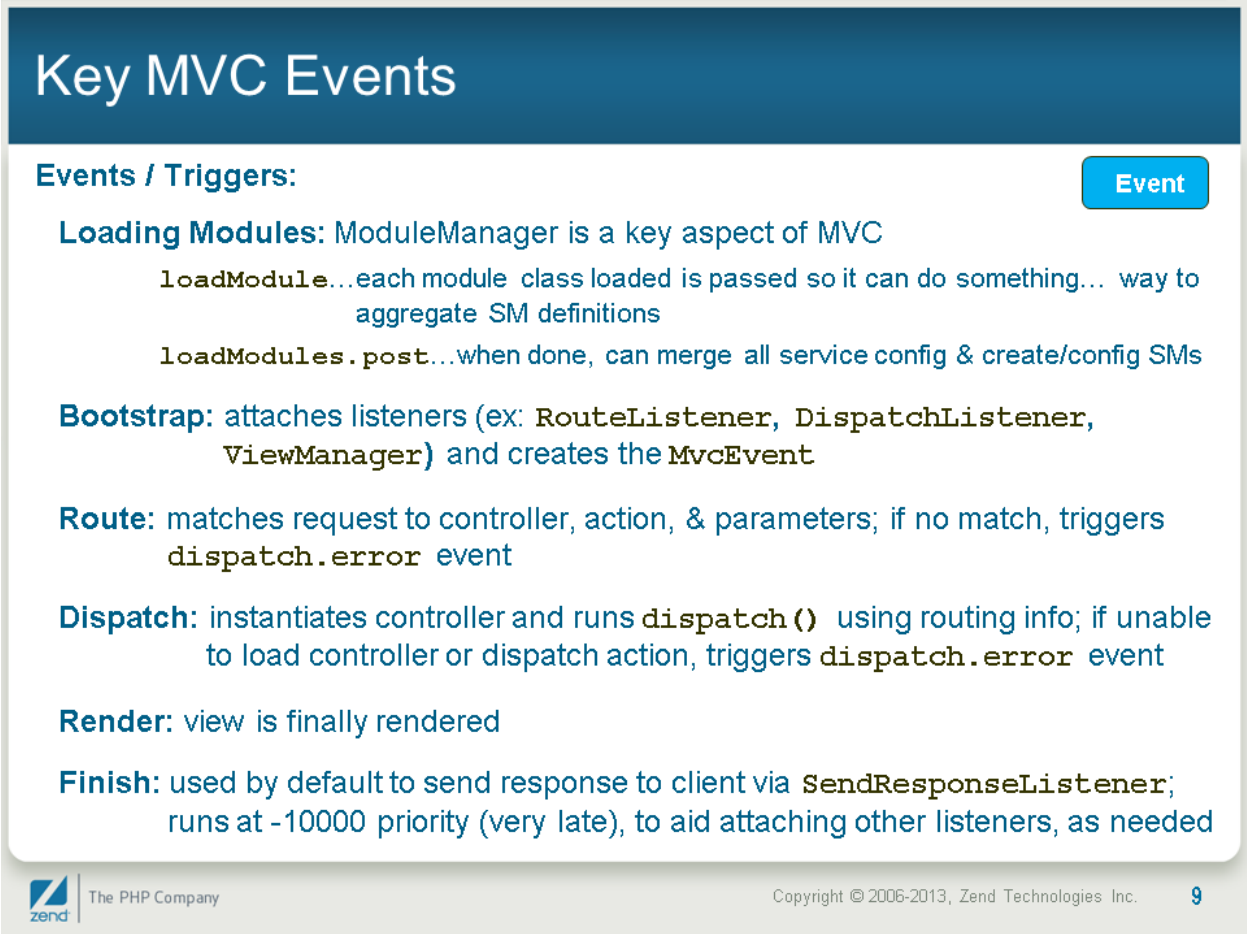
- **ZF1 Users Alert**
    - ZF2 MVC allows for easier adjustment of workflow
    - No longer need to rewrite how front controller and dispatcher work
        - Because front controller was a singleton, you could not be easily replace it without potentially breaking the whole application
- Event architecture makes the framework more robust and adaptable

Slide 8



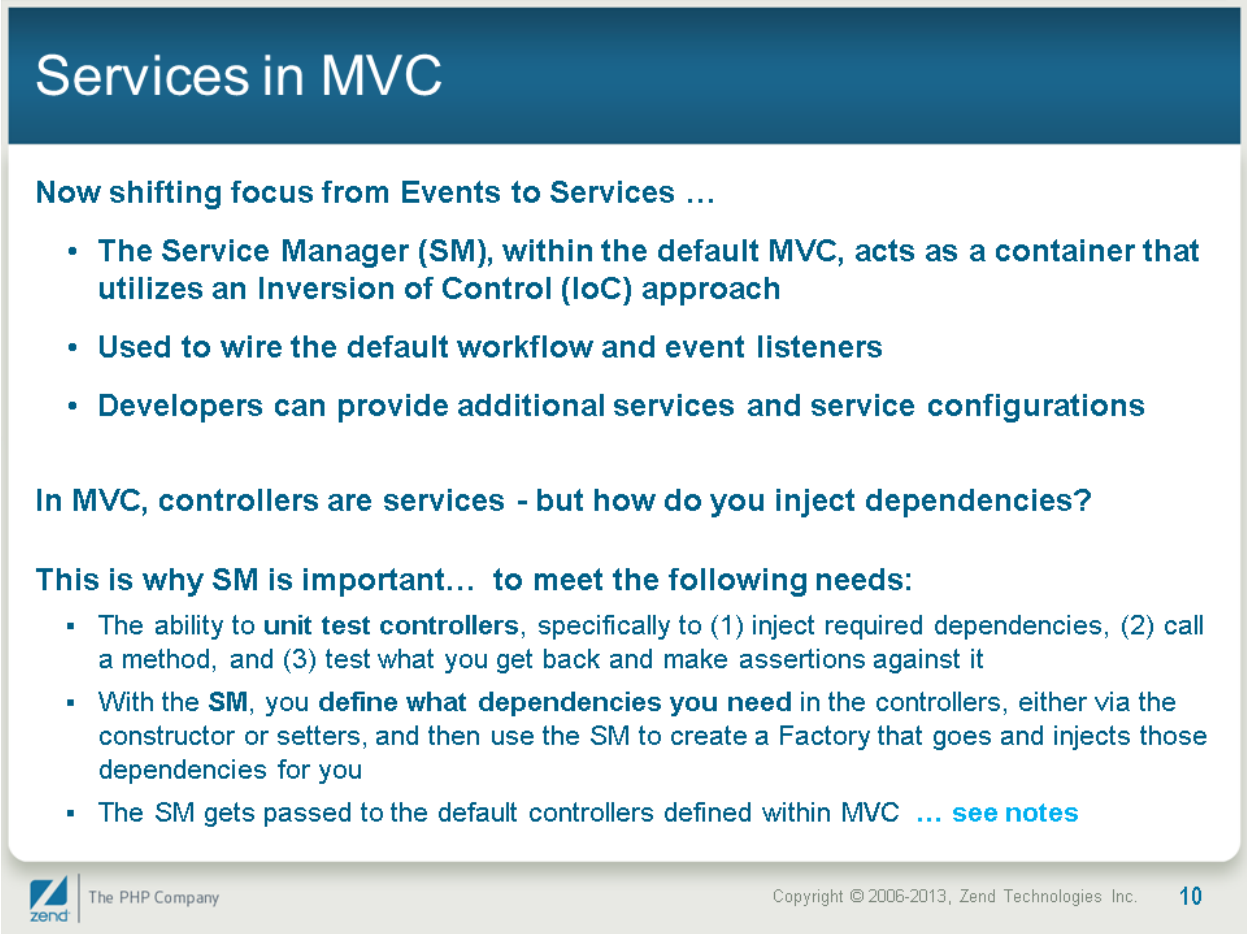
- Event architecture makes the framework more robust and adaptable
- Diagram does not show entire sequence of events, but shows general flow

Slide 9



- Example: Want to do Caching: create two listeners, one on bootstrap with high priority, and one on finish with low priority; if it finds a cache, it will return it immediately and you're done!

Slide 10



- ZF1 User Alert
    - Service Locator is analogous to the Bootstrap
- The ZF2 Best Practice is to create a Factory service to inject the dependencies you are going to use
- But… the SM is automatically passed to the default controllers defined within ZF2
- Inconsistency with best practice? Somewhat, but here's why it's done:
    - This step is needed for proper app workflow…
    - Need some knowledge of what controllers are available to be able to pull them out of the system with their dependencies

Slide 11

ZFTool

ZF2 Command Line Tool

- Provides a quick way to create essential elements or display important info
- Commands are issued from the command line, and must be preceded with "php"
  - Ex: To create a project: `php zftool.phar create project name-of-project`
- Help can be obtained via: `php zftool.phar --help`

Sample Commands By Type:

- **Basic information:**

```
zftool.phar modules [list]
```

Displays loaded modules

```
zftool.phar version | --version
```

Displays current Zend Framework version

Slide 12

ZFTool

- **Project creation:**

```
zftool.phar create project <path>
```

Creates a skeleton application, where

`<path>` = path of the project to be created

- **Module Creation:**

```
zftool.phar create module <name> [<path>]
```

Creates a module, where

`<name>` = name of the module to be created

`<path>` = root path of the ZF2 application in which module is created

Slide 13

ZFTool

- **ZF2 Installation:**

```
zftool.phar install zf <path> [<version>]
```

Installs Zend Framework 2, where

`<path>` = directory in which to install the ZF2 library

`<version>` = version to install; if not specified, uses the last available

- **Application configuration:**

```
zftool.phar config [list]
```

Lists all configuration options

```
zftool.phar config get <name>
```

Displays a single config value, ex: `config get db.host`

```
zftool.phar config set <name> <value>
```

Sets a single config value (use only to change scalar values)

Slide 14

ZFTool

- **Classmap Generator:**

```
zftool.phar classmap generate <directory> <classmap file>
[--append|-a] [--overwrite|-w]
```

Creates a classmap, where

`<directory>`	=	directory to scan for PHP classes; use "." for current directory
`<classmap file>`	=	filename for generated class map file or for standard output; if not supplied, defaults to `autoload_classmap.php` inside `<directory>`
`--append | -a`	=	append to classmap file if it exists
`--overwrite |-w`	=	whether or not to overwrite existing classmap file

Slide 15

M2Ex1: MVC-based Zend Skeleton App

- **See Participant Exercises Instruction booklet for details…**

Slide 1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Module Three
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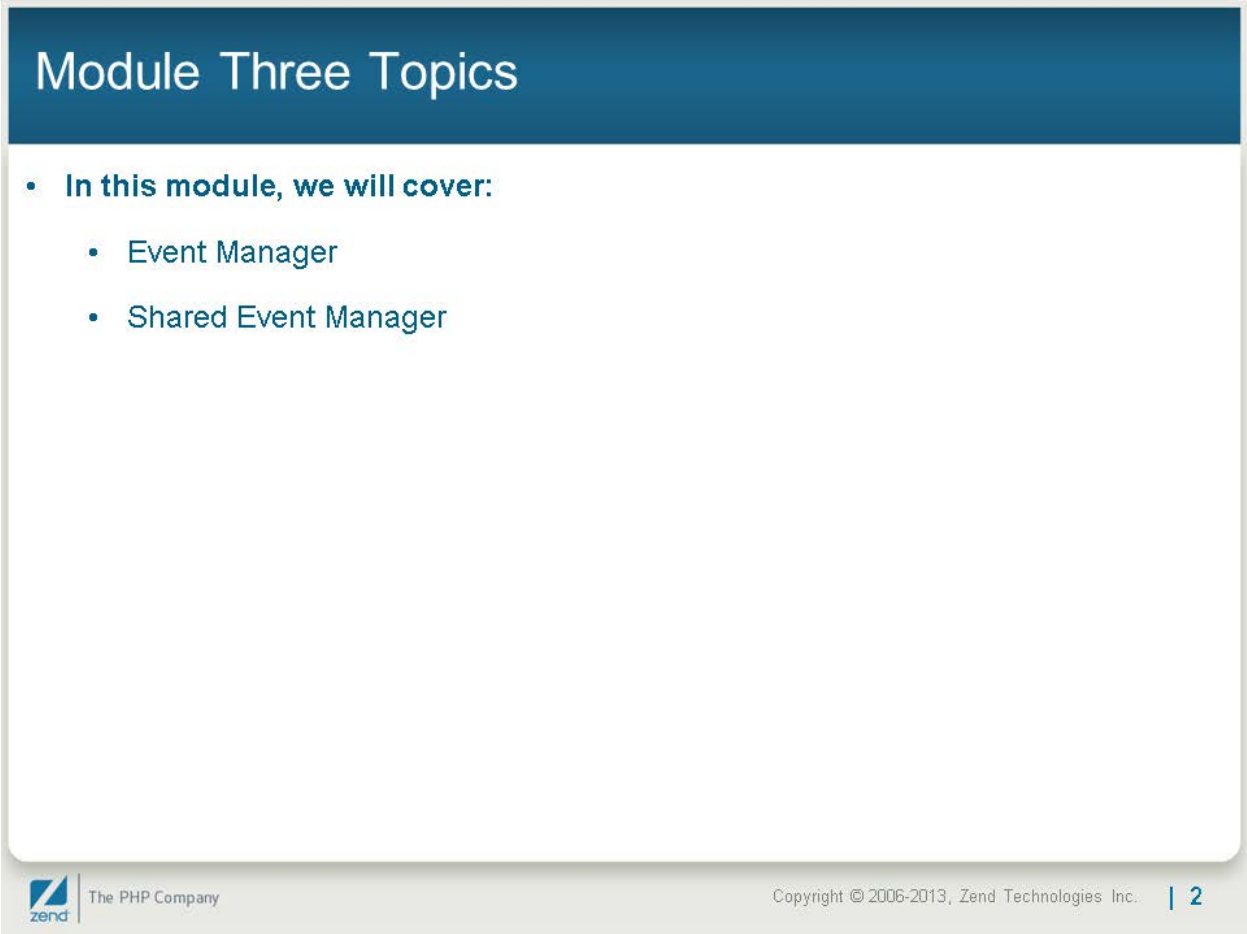
Slide 2


Module Three Topics
In this module, we will cover:
Event Manager
Shared Event Manager
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2

Slide 3

- There are two important concepts attached to the Event Manager: Events & Listeners
- If you have done some JavaScript programming, the concept of events is familiar
- The Event Manager component is designed to implement:
    - Simple Pub/Sub (also called subject/observer) patterns
    - Aspect-Oriented designs
    - Event-driven architectures
- The basic EventManager architecture allows you to:
    - Attach and detach listeners to named events on a per-instance basis, or via shared collections
    - Trigger events
    - Interrupt execution of listeners
- An event is a message in the OOP meaning of the word; in other words, an object

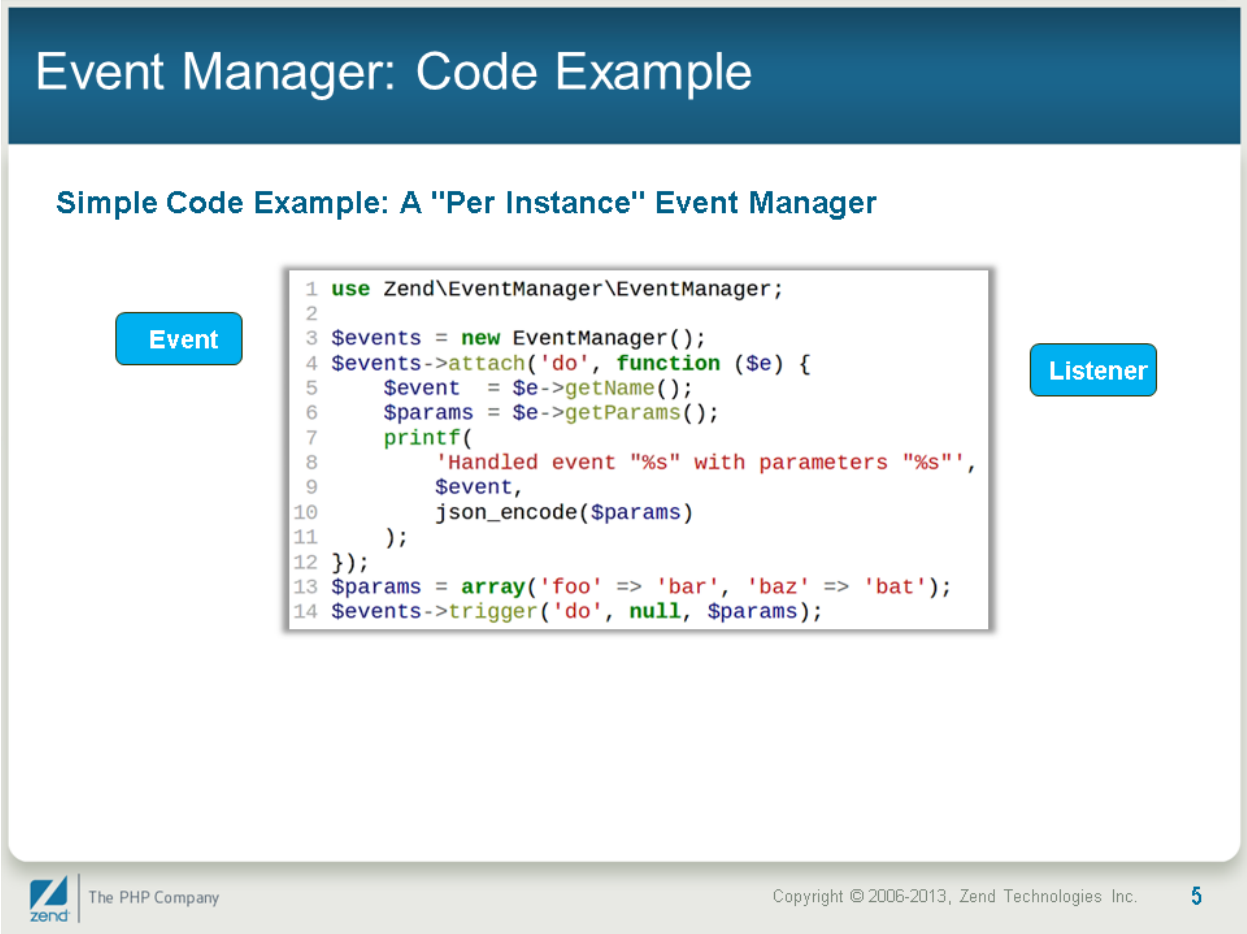
Slide 4

Event Manager: Implementation

The Implementation of EM in ZF2 is actually a combination of several common patterns:

- Publish - Subscribe **(Pub/Sub)** pattern
  - a messaging pattern that is loosely coupled
- Observer (**Subject/Observer**) pattern
  - Pattern in which an object (or subject) notifies dependencies (observer objects) of state changes by calling their methods
  - Commonly used with Event-based systems, and the MVC architectural pattern
- Elements of **aspect-oriented programming**, but not as automated (AOP is usually compiler assisted)
- Concept of **events**, which allow you to do things like to stop propagation and aggregate results

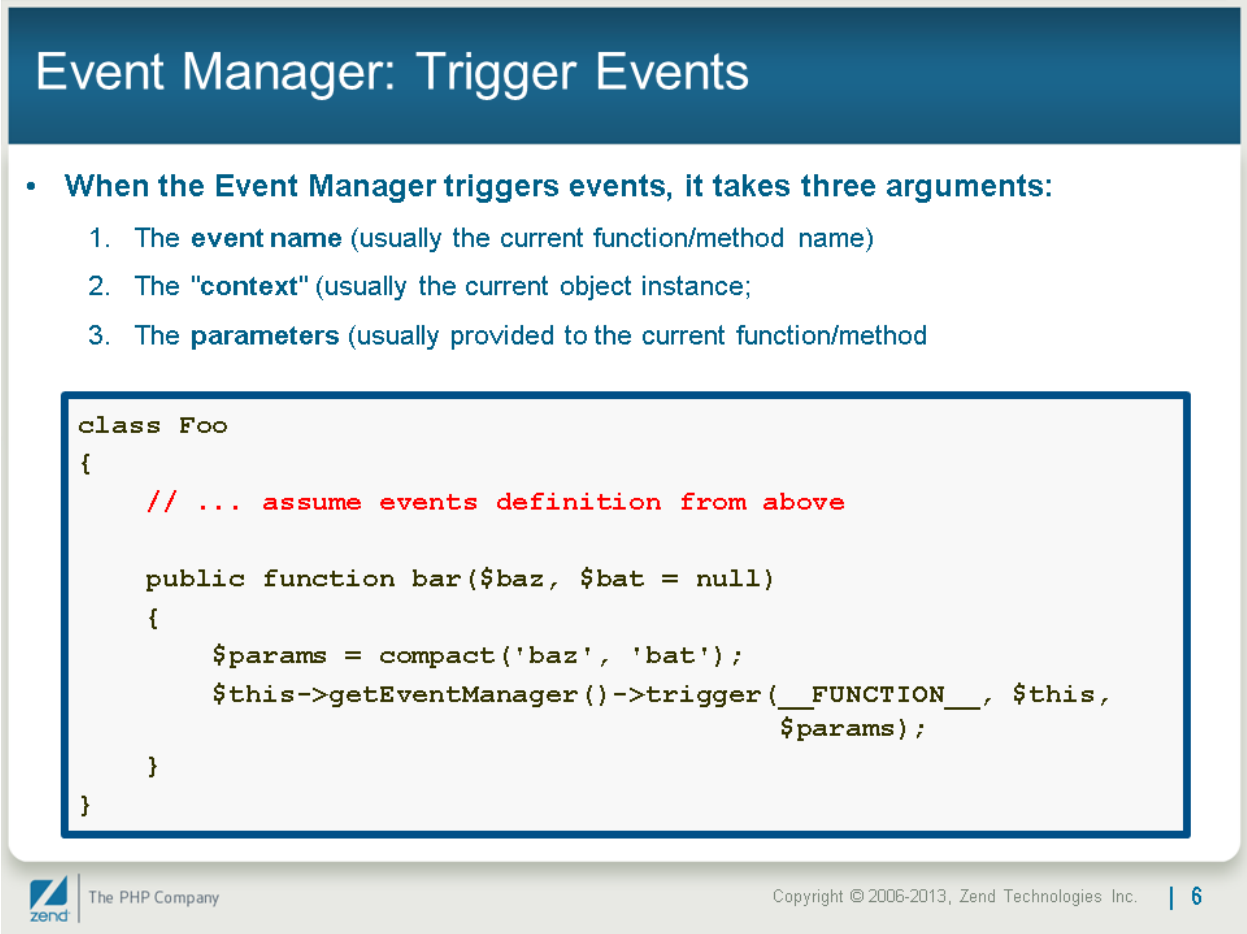
Slide 5



What's Happening in this Code Example?

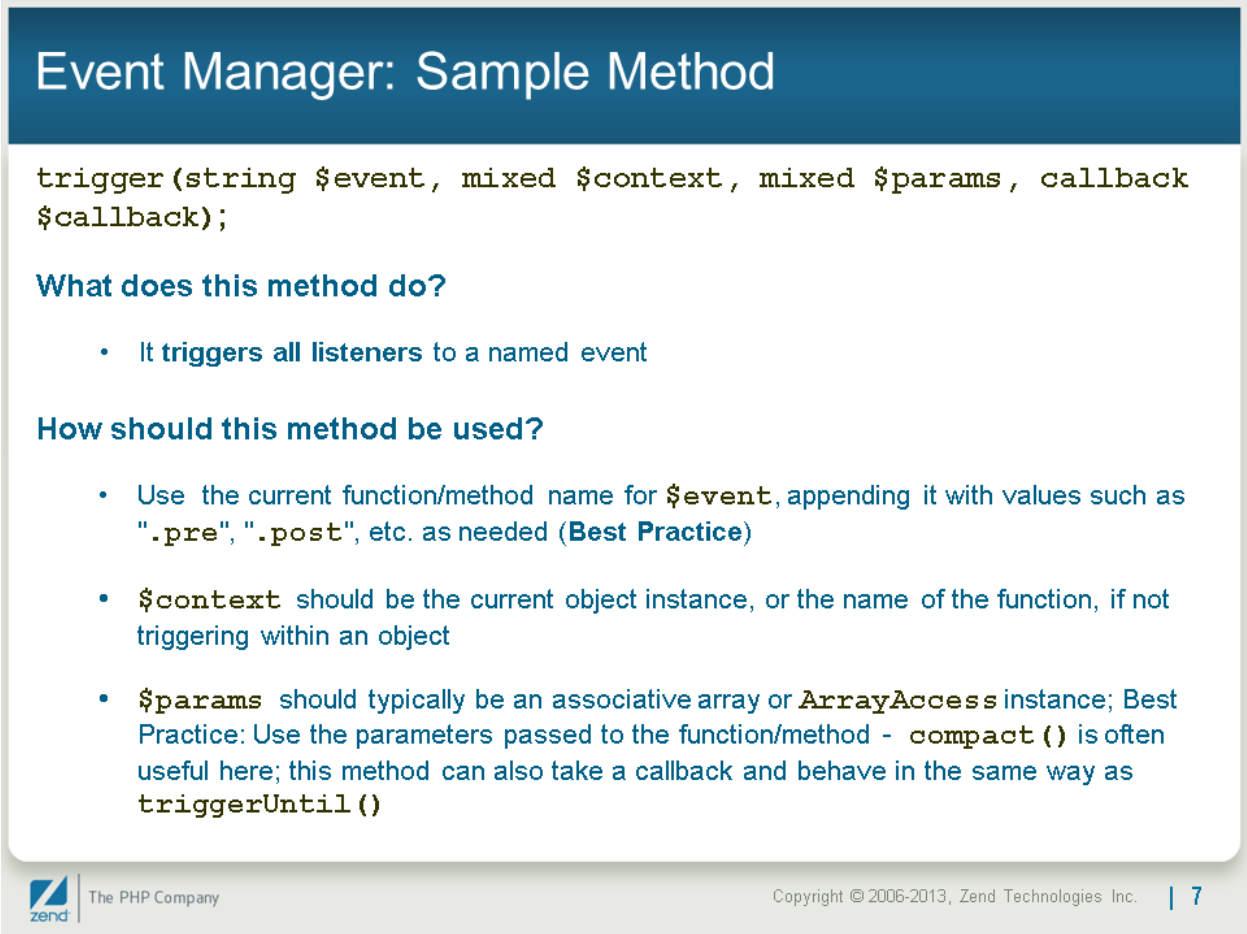
- Zend\EventManager\EventManager is the class provided by the base implementation
- $events is a new EM, attached to the 'do' event
  - Event names are typically named after the method triggered (Best Practice)
- Using a callback here (this ex: the anonymous function) for the listener, but could be any PHP callable;
  - always gets a single argument – the event $e in this case
- The anonymous function (closure) grabs the name of the event and related parameters, and executes a simple print function (printf)
- The Parameters are 'foo' and 'baz' , as defined in line 13
- Event triggered in L14
- The 2nd argument "null" is the context; usually the object calling the event, the target for the event

Slide 6



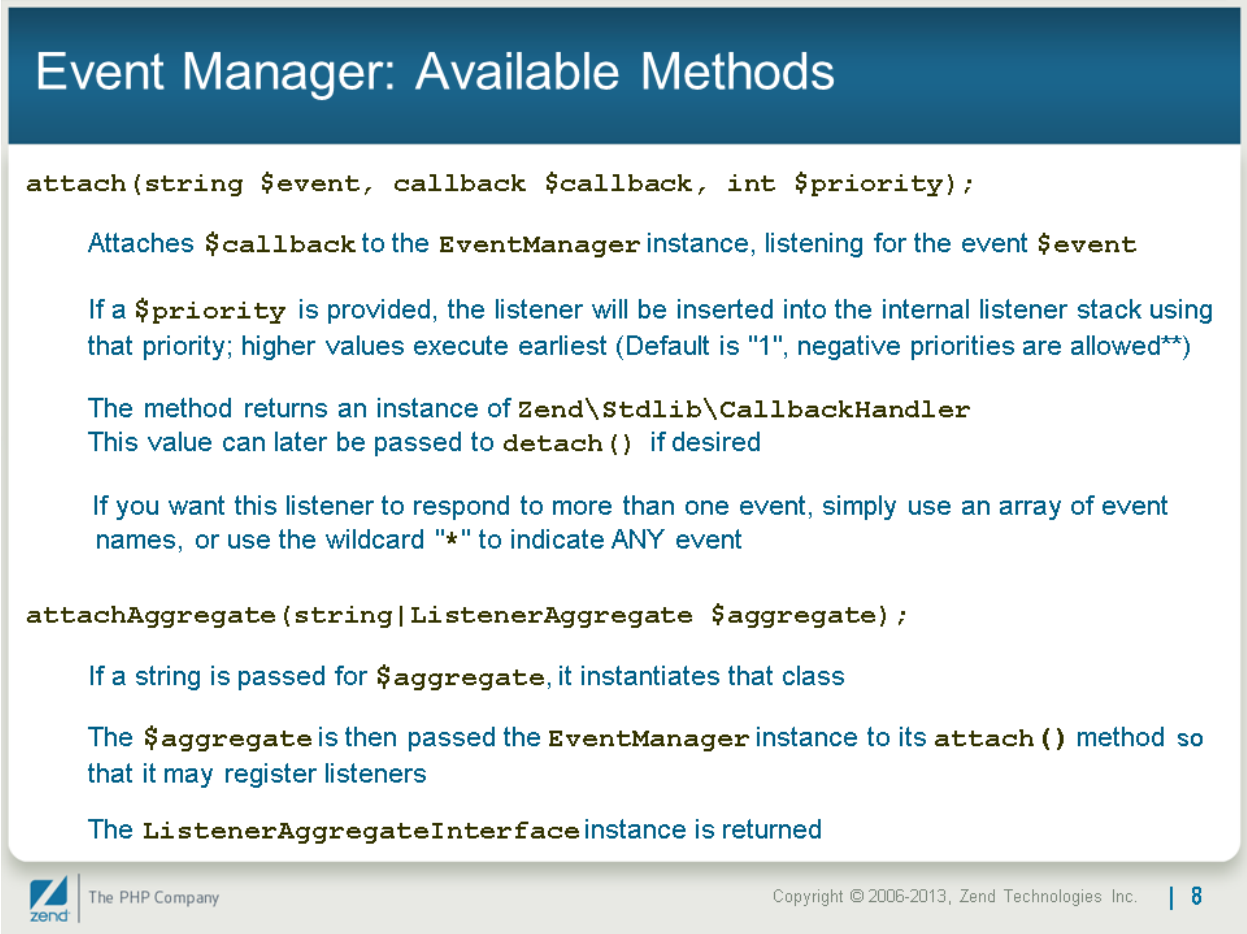
- Note that you can stop execution, either invoking the stopPropagation() method or providing a callback to the trigger() method; most commonly used for error handling

Slide 7



- This is only one of the available methods for Event Manager… the entire list can be found in the ZF2 Reference Manual, Section 8.1.4.

Slide 8



- Note that negative priorities are required to allow a listener to execute after those with default priority
- These are only some of the available methods for Event Manager… the entire list can be found in the ZF2 Reference Manual, Section 8.1.4.

Slide 9

Event Manager: Aggregates

What are Aggregates?

- Aggregates are used for **'stateful' operations**, for an object that has 'state' and needs to listen to more than one event, or is 'statefully' listening to one event
- They are also used to group related listeners that may not share 'state' but have related operations semantically
- An aggregate can **attach directly to an event manager** (EM)
  - So, events attach and pass an object that calls the aggregate and its attachments, OR calls and passes to the EM instance on the aggregate (either works)
  - Implement the `ListenerAggregateInterface`, which defines the two methods `attach()` and `detach()`
  - Pass the EM instance in the `attach()`, and do something with it
  - For `detach()`, loop through the listeners; if it finds one that is 'true', that one is pulled out of the aggregate

Why are they important?

- They allow for **stateful operations** and **group-related operations** in a **single class**

Slide 10

Zend\EventManager: Usage Examples

Example 1

```
$this->getEventManager()->trigger(__FUNCTION__ . '.pre',
                                  $this, array('entry' => $entry));
$this->getEntryMapper()->insert($entry);
$this->getEventManager()->trigger(__FUNCTION__ . '.post',
                                  $this, array('entry' => $entry));
```

- **Code Example**: demonstrates the use of triggering events for which other modules/code may have registered listeners.

  … Note that in the Teaching app, this is not the case, but it commonly occurs.

Why is this important?

- This is a pattern that is frequently employed in the various stages of the MVC execution

Slide 11

Zend\EventManager: Usage Examples

Example 2

```
public function onBootstrap(EventInterface $event)
    {
        $sm = $event->getApplication()->getServiceManager();
        $sm->get('guestbook-entry-service')->getEventManager()->attach(
            'add.post',
            array($this, 'onNewEntry')
        );
    }
```

- **Code Example**: This simple code shows how to attach a listener to a local event manager

Slide 12

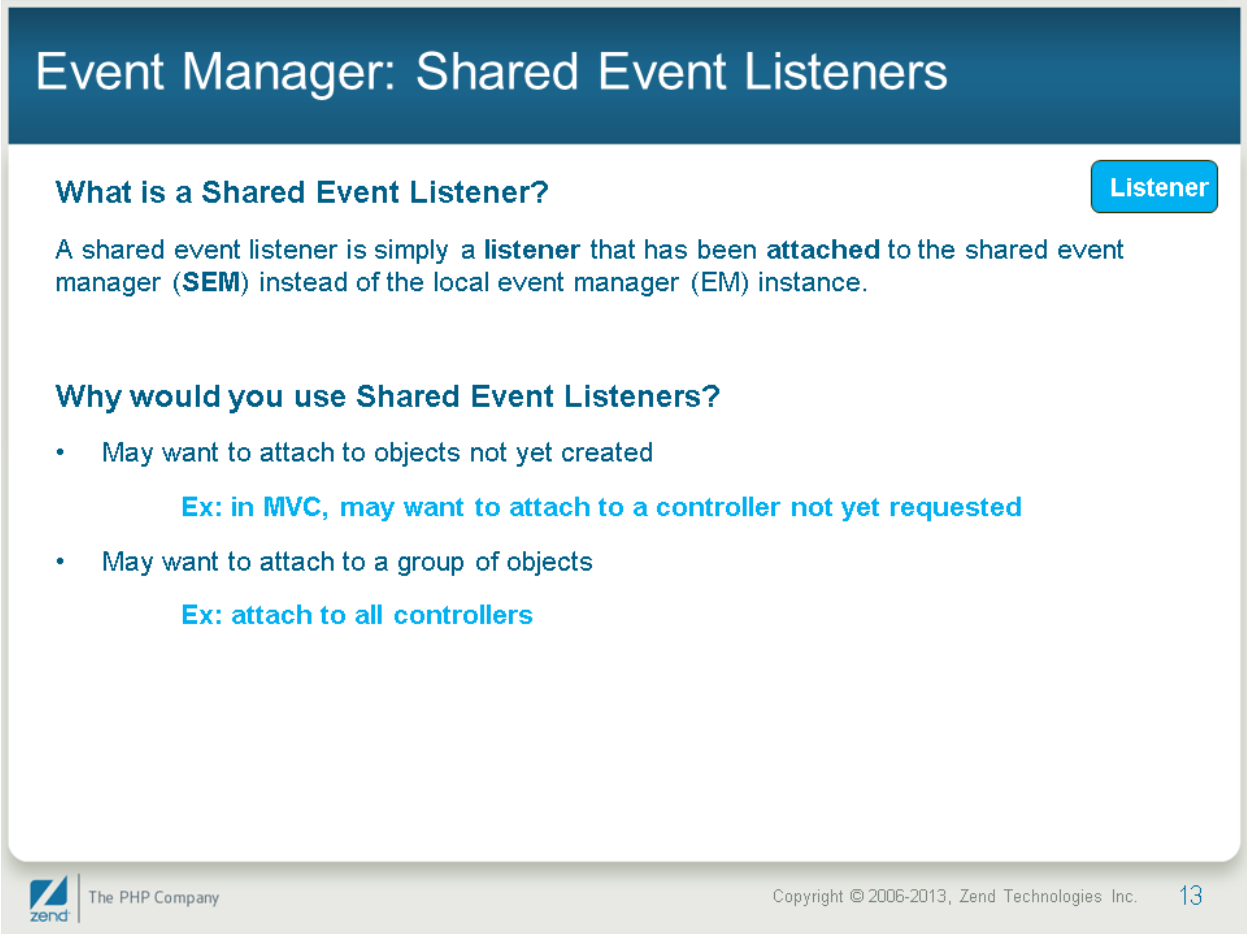
Zend\EventManager: Usage Examples

Example 3

```
{{{
    public function create(Entry $entry)
    {
        $events = $this->getEventManager();
        $events->attach(__FUNCTION__, function ($e) {
            $mapper = $e->getTarget()->getEntryMapper();
            $entry  = $e->getParam('entry');
            $mapper->insert($entry);
        });
        $events->trigger(__FUNCTION__, $this, array('entry' => $entry));
    }
}}}
```

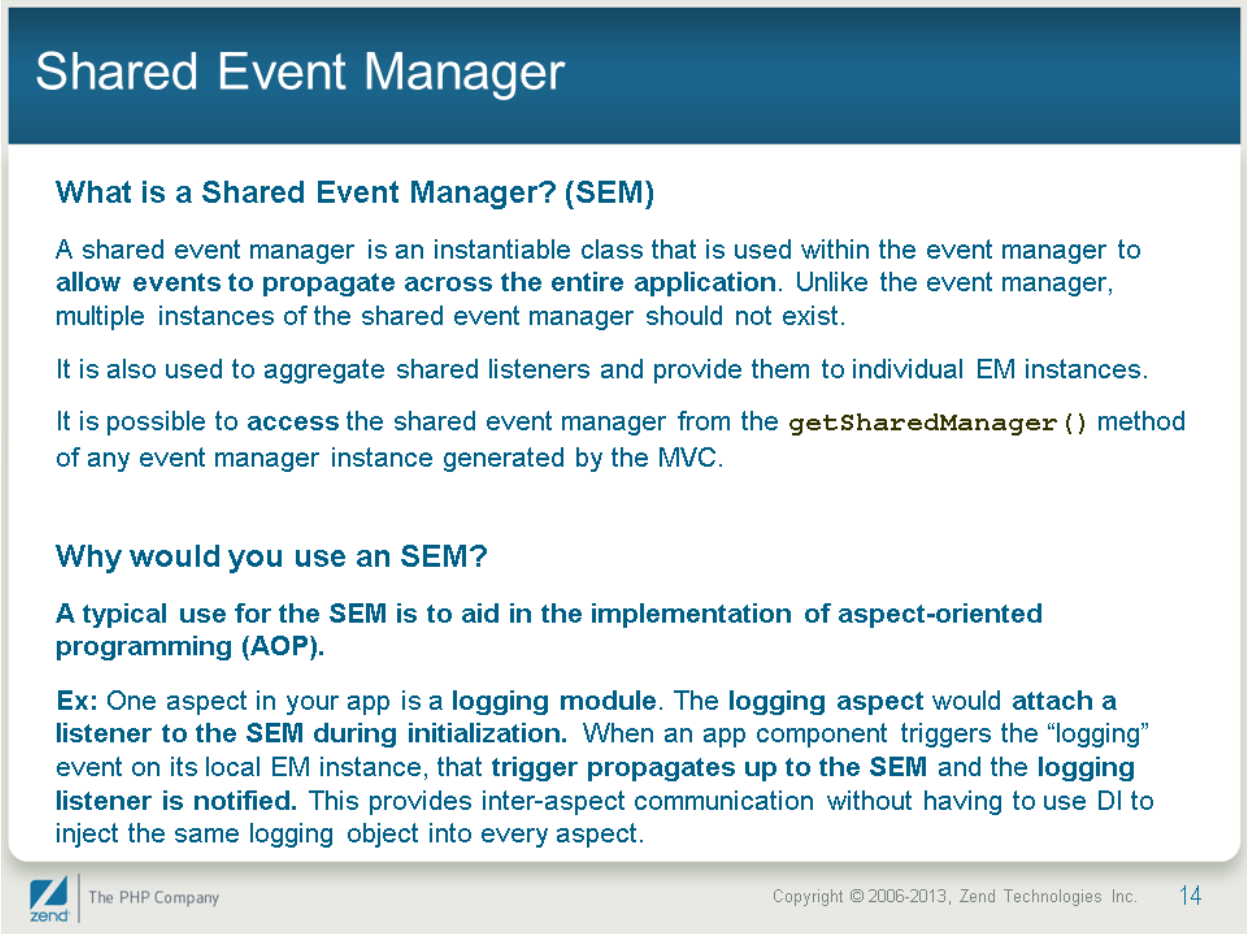
- **Code Example**: This shows attaching a default listener in the method, and simply triggering it… this allows you to alter the method completely

Slide 13



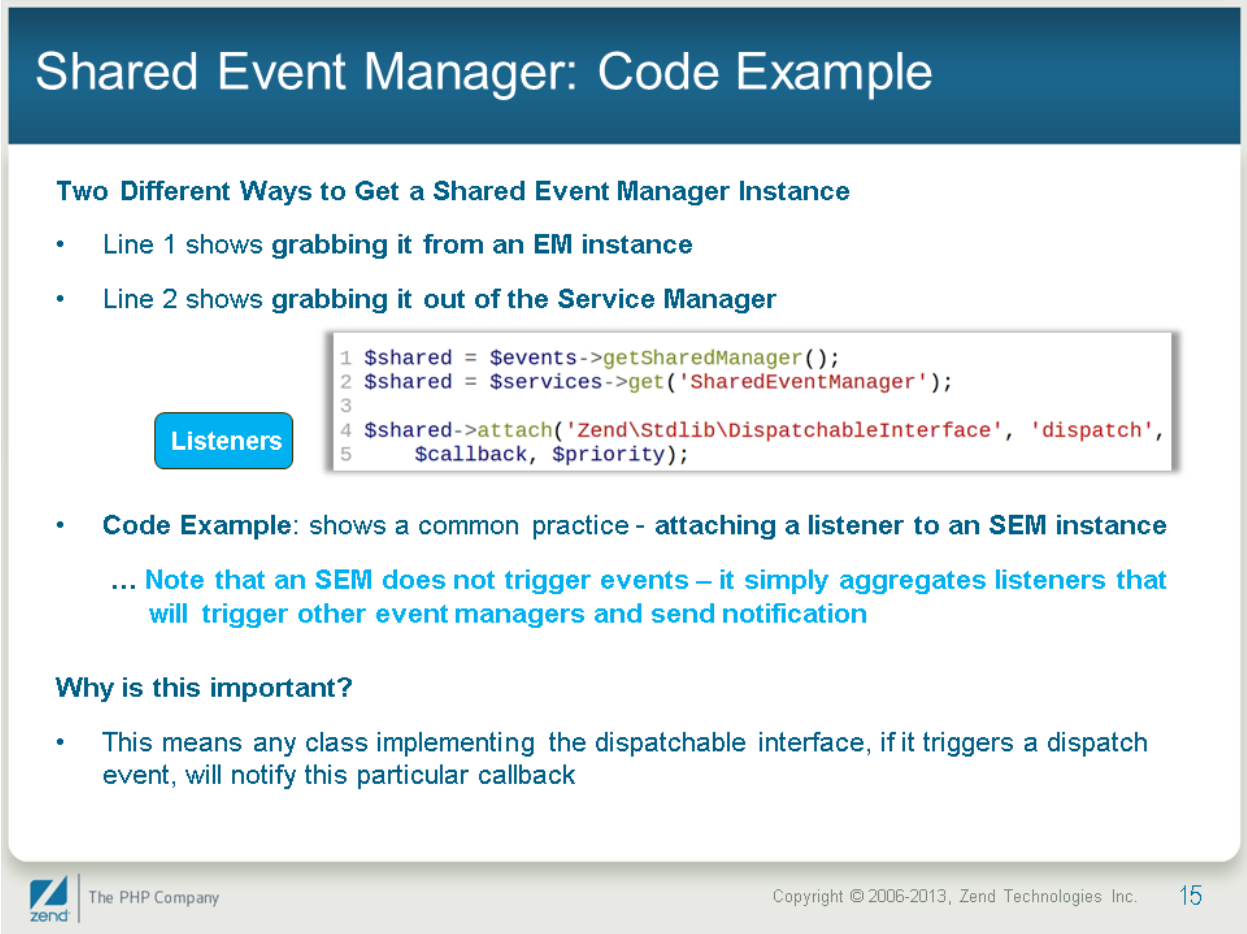
- Recall that with the SEM…
  - All EM instances pulled from SM are injected with a common SharedEventManager (SEM) instance
  - Retrieve SEM from the SM, or any EM instance
  - API is the same, except need to provide a 'context' or 'identifier' (usually a class or interface name) as a preliminary argument to attach()

Slide 14



- You will see EM and SEM often in ZF2 because *everything* in the framework is event-driven… this is how you are going to time different events
- Example: if you wanted to add authentication, typically would want to do this as an event listener that will listen in on a specific event, on dispatch, and will check whether the user is authenticated… if not, it sends back a 401 error code
- Example: in MVC, you have a route and a batch event; if you wanted to trigger some event/s before the route event, you would simply attach to the route event and give it/them a very large priority, like 100; for events you want to occur after routing, attach it/them with a negative priority
- Same process for events you want to occur pre- and post-dispatch

Slide 15

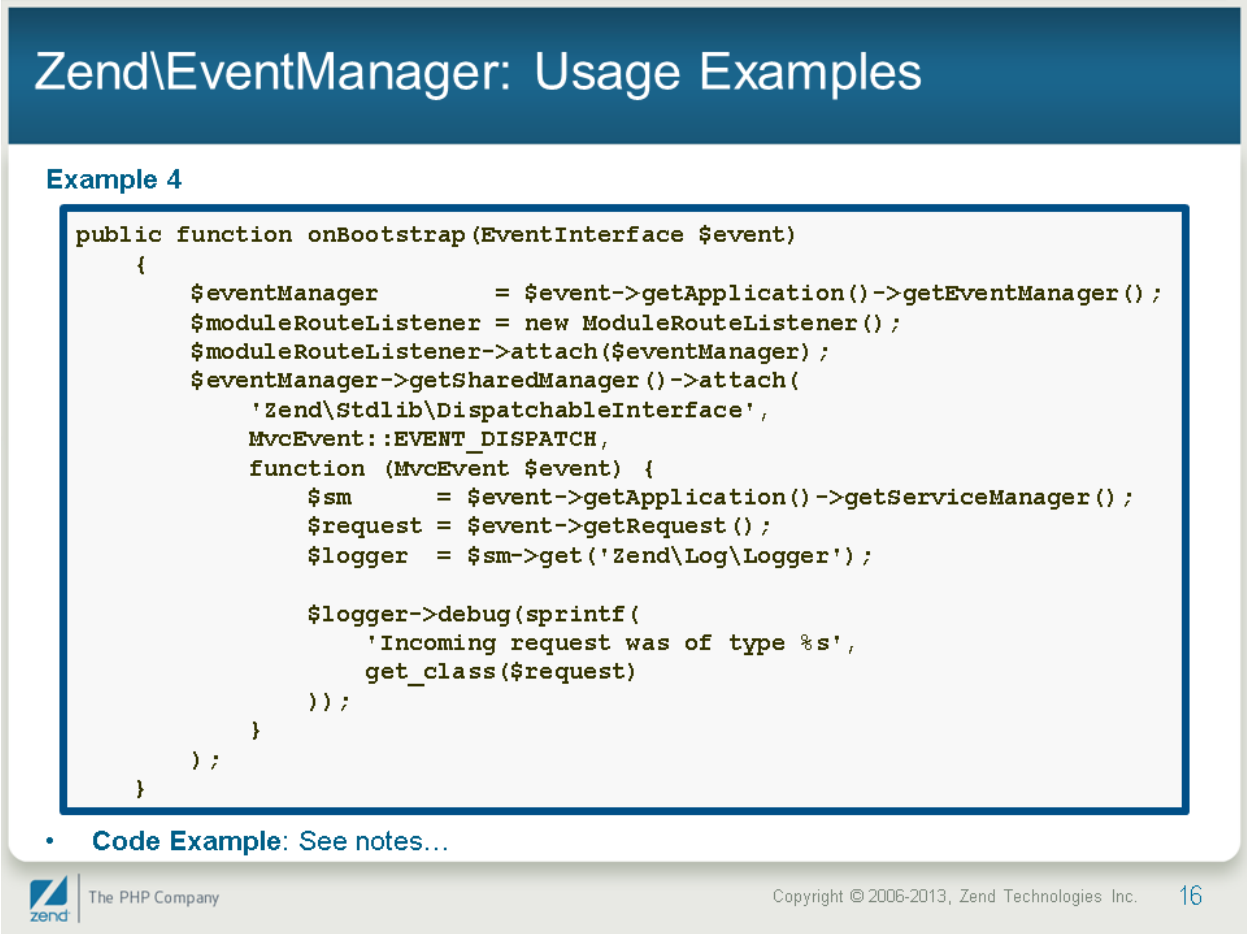


- The code example attaches the SEM to the dispatch interface from Zend Stdlib, to the 'dispatchment' for a dispatchable, and then adds a callback and priority
    - The priority is always passed as a final argument to attach(), after the callback
    - Internally, listeners are registered with an SplPriorityQueue instance

Default priority	== 1	
High priority	== positive integers >1	run FIRST
Low priority	== negative integers	run LAST

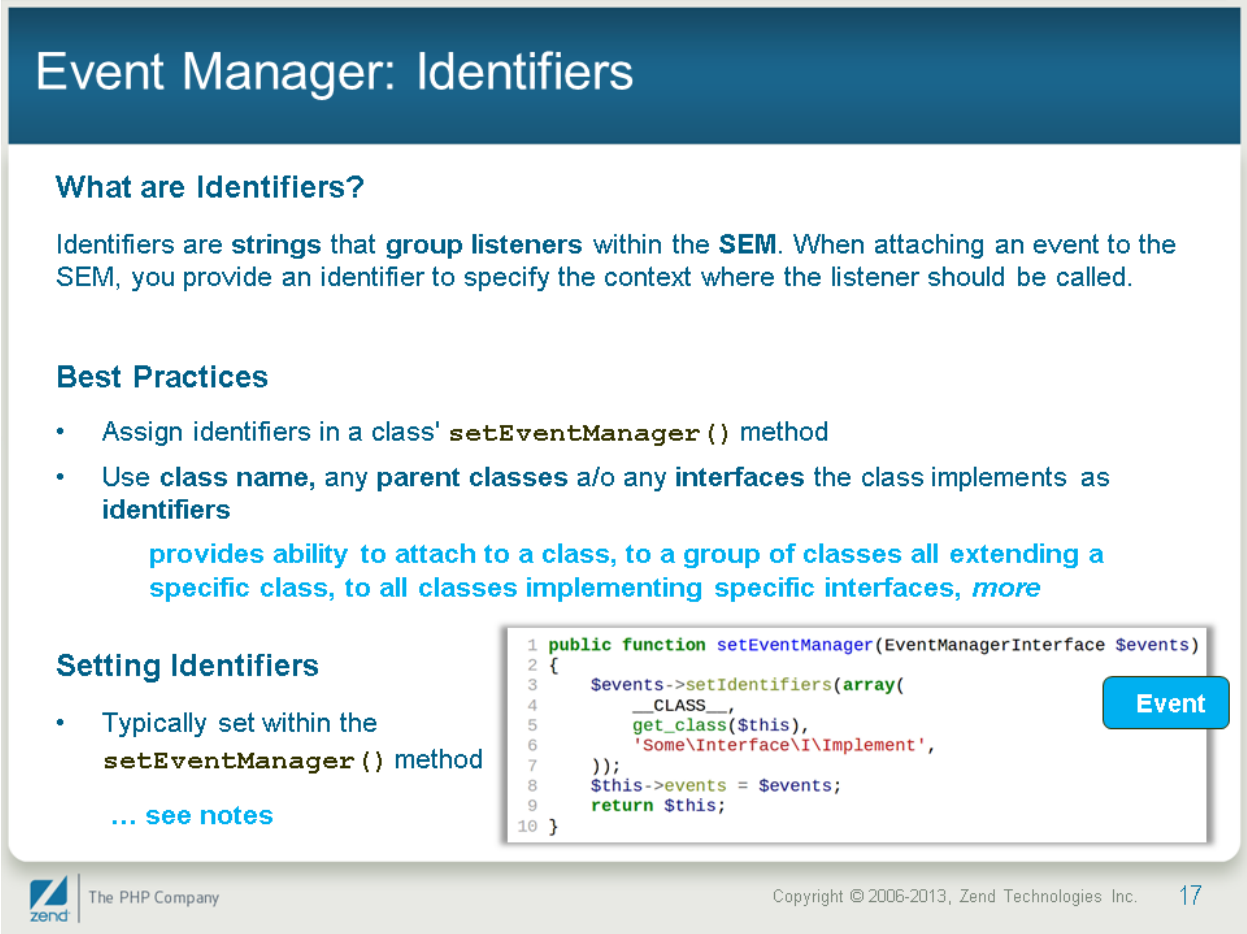
    - Way to manage the queue

Slide 16



- The first three lines of this method demonstrate a somewhat backwards form of event registration
- The ModuleRouteListener prefixes a controller service with a module name, if provided in the route configuration
  - The purpose is to disambiguate controllers
- The remainder of the example demonstrates how to attach a listener to the shared event manager

Slide 17



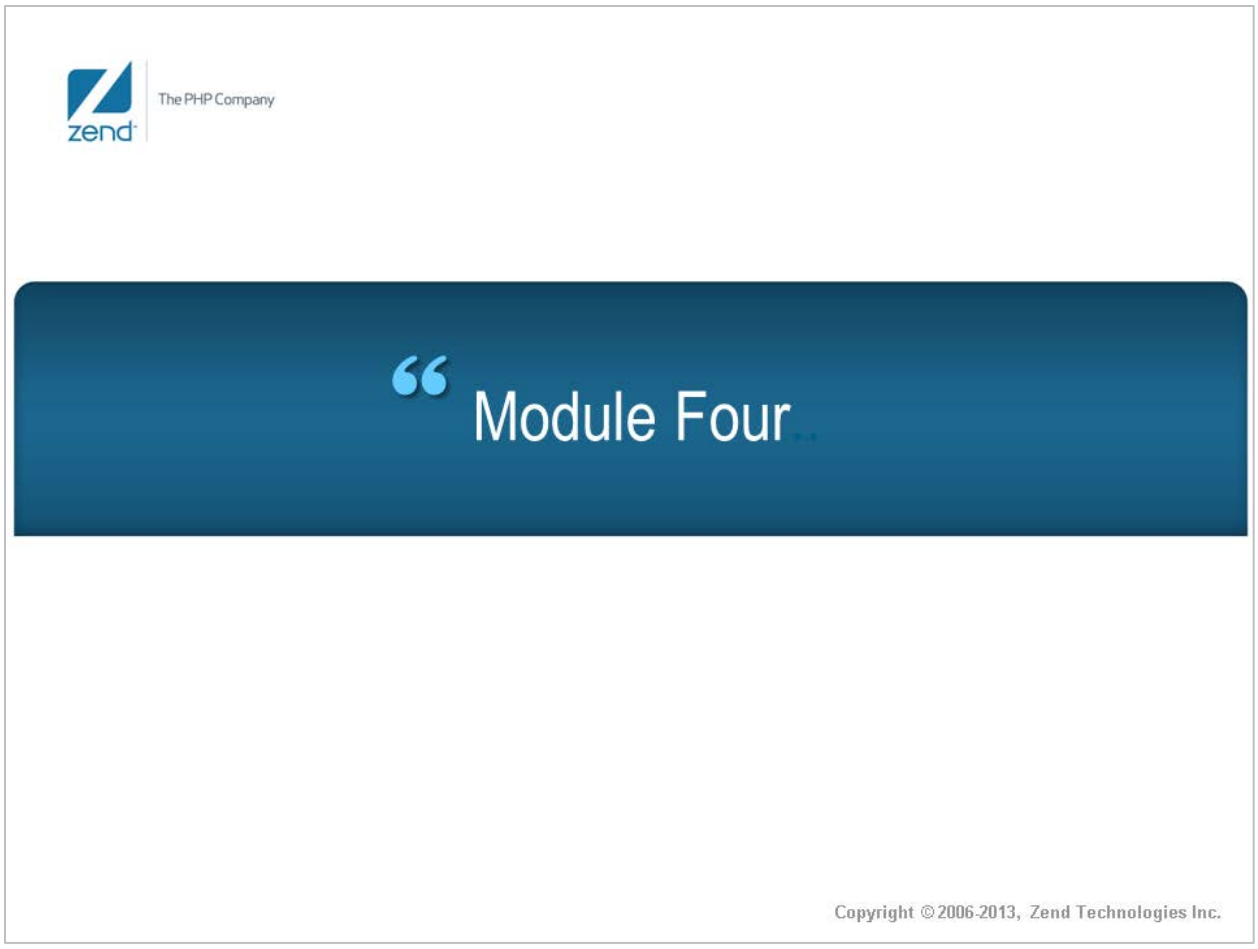
- When you inject with an EM, you want to set the Identifiers at the same time; this is why the Initializers work for setting the EM; you can have a bare instance, but then needs to be configured
  - Call setIdentifiers()
  - Pass in an array; often __CLASS__ (magic constant), which is the defining class name
  - Call get_class($this) so if extend class later, do not need to define setEventManager; will have parent class defined and whatever the current class is
  - Then implement any interfaces; allows attachment to any of the contexts when attached to an SEM
  - Set event properties and return

Slide 18

M3Ex1: Event Manager

- **See Participant Exercises Instruction booklet for details…**

Slide 1


zend
The PHP Company
Module Four
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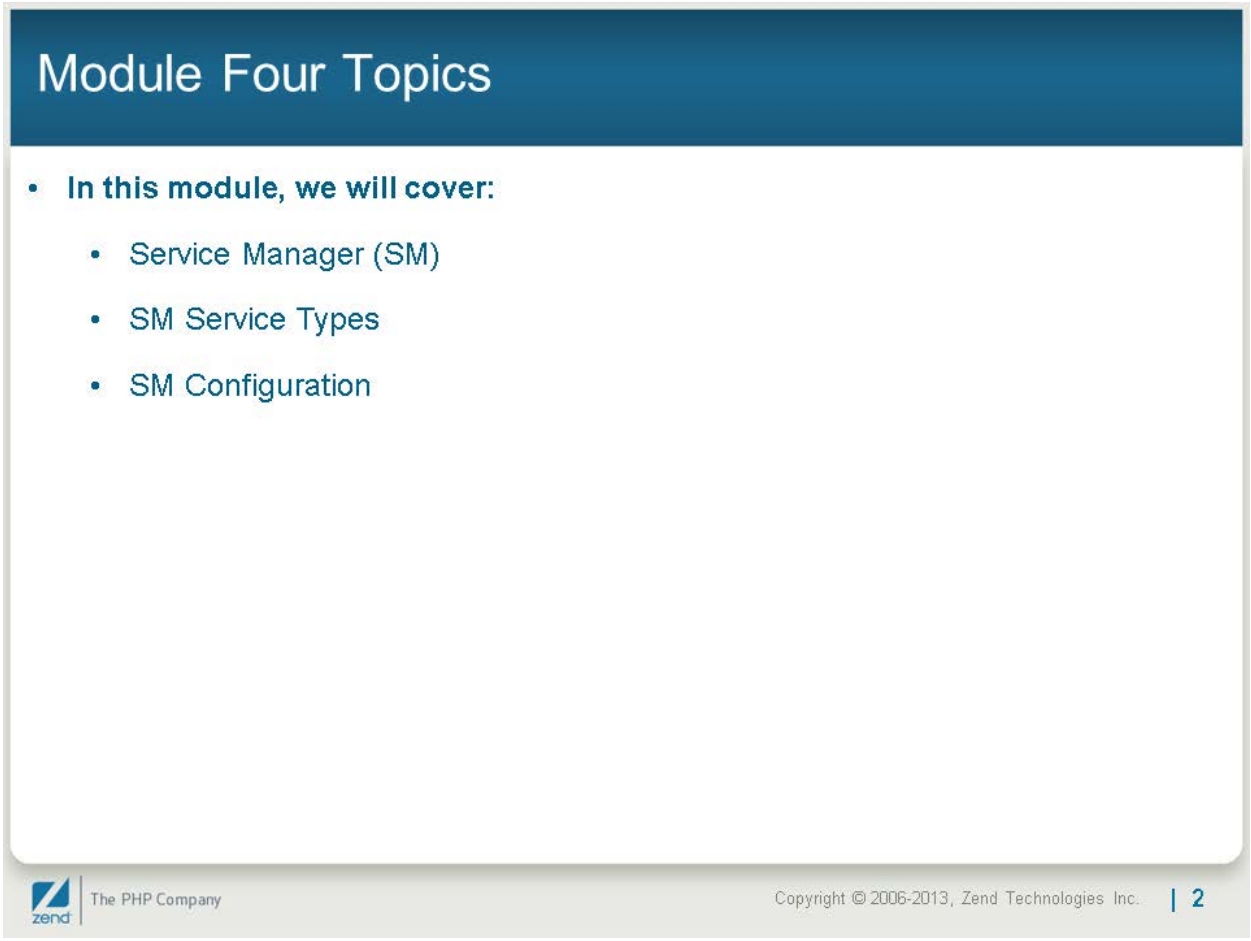
Slide 2


Module Four Topics
In this module, we will cover:
Service Manager (SM)
SM Service Types
SM Configuration
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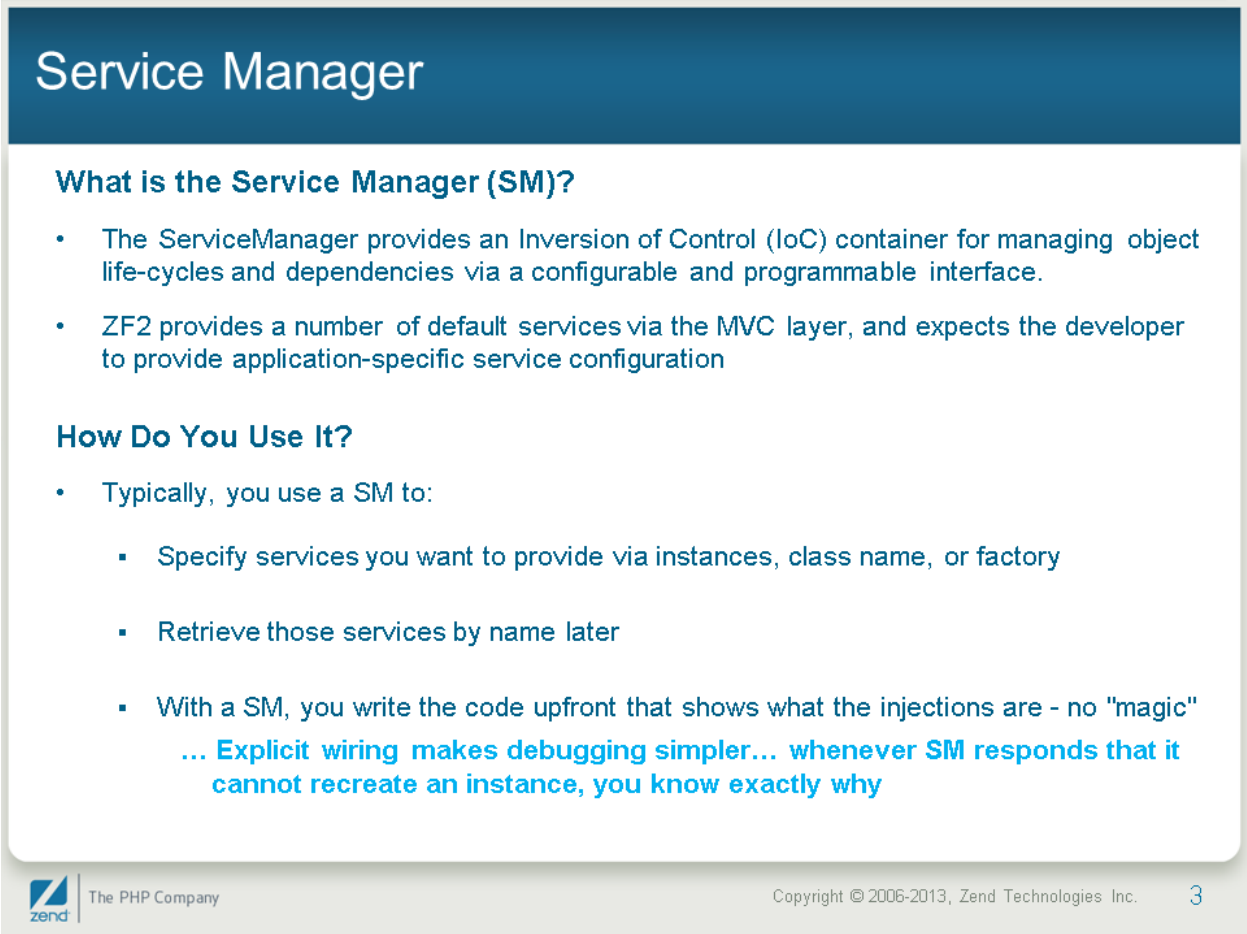
2

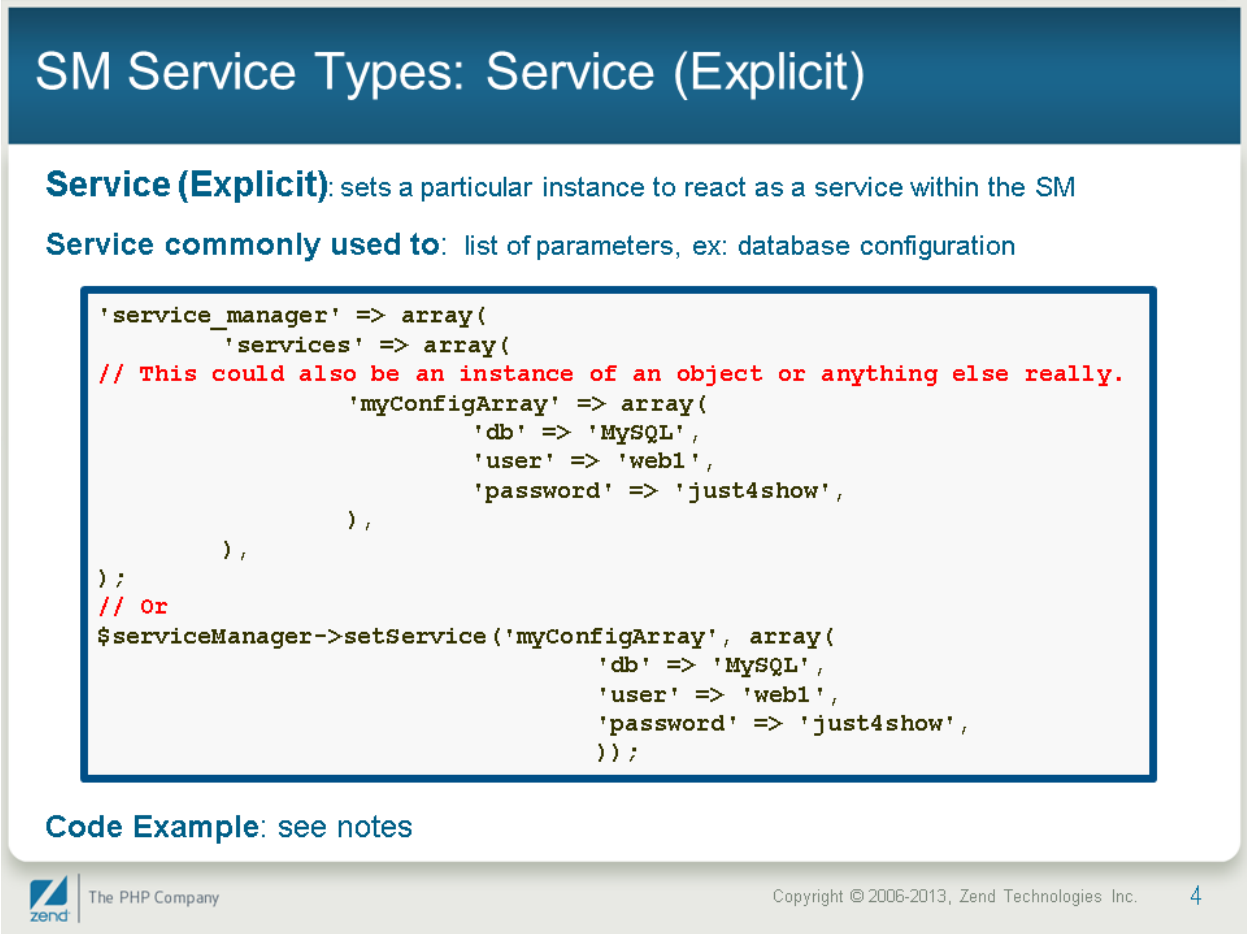
Slide 3



Dependency Injection: A solution for managing objects and their dependencies

- The concept of *how to manage object dependencies* within PHP has been evolving recently
- The solution as represented by Service Manager is generally named "dependency injection", while the abstract principle is actually called "inversion of control"

Slide 4

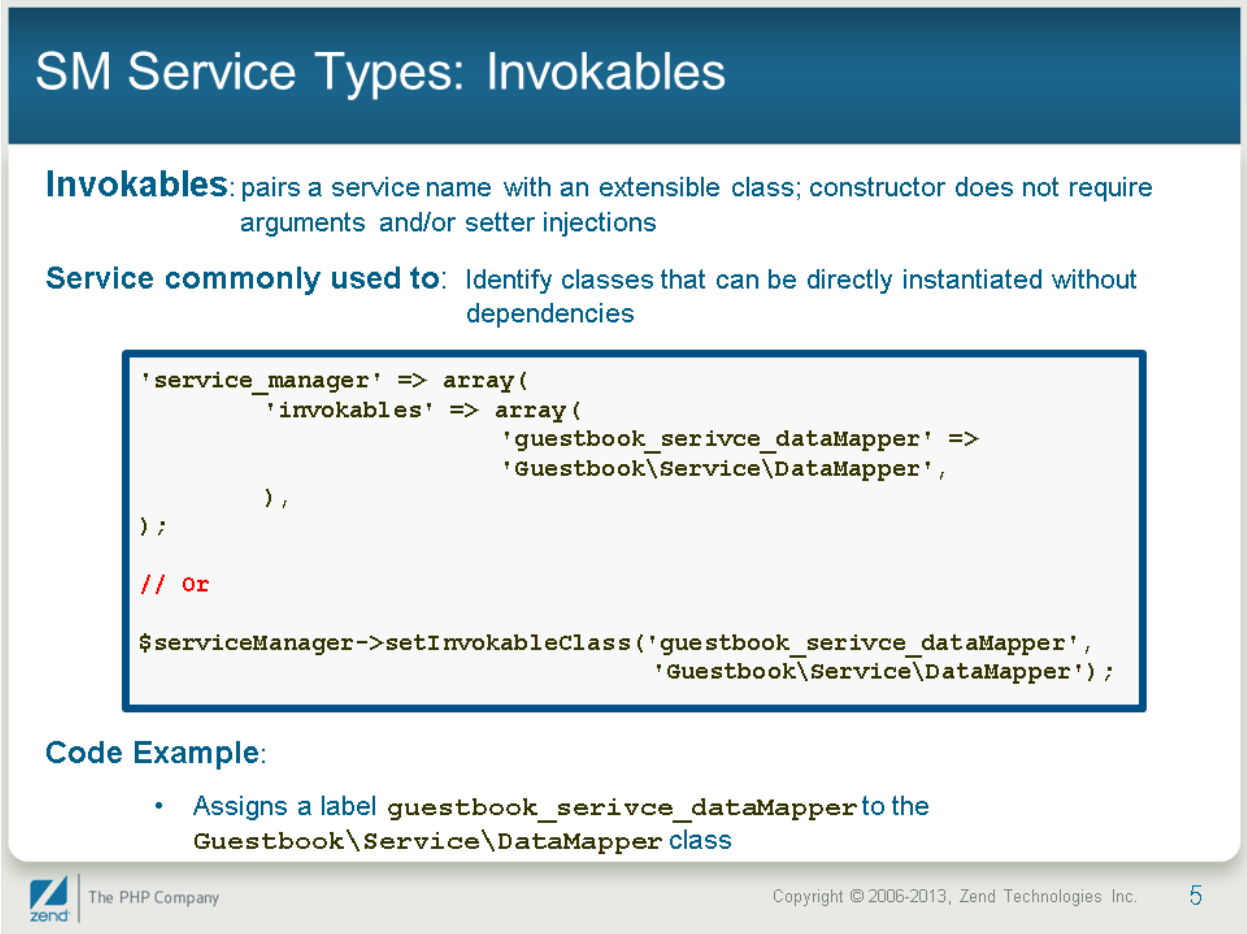


Services:

- Service/Explicit (name => object pairs)
- Invokables (name => instantiable class)
- Factories (name=> callable returning object)
- Aliases (alias => some service or alias)
- Abstract Factories (callable that handles many services)
- Shared (or not; adjustable setting)
- Initializers (perform operations on new instances)

- **Code Example**: sets an instance of a configuration array into the service manager. It is likely that this array will be consumed by one of the defined factories

Slide 5



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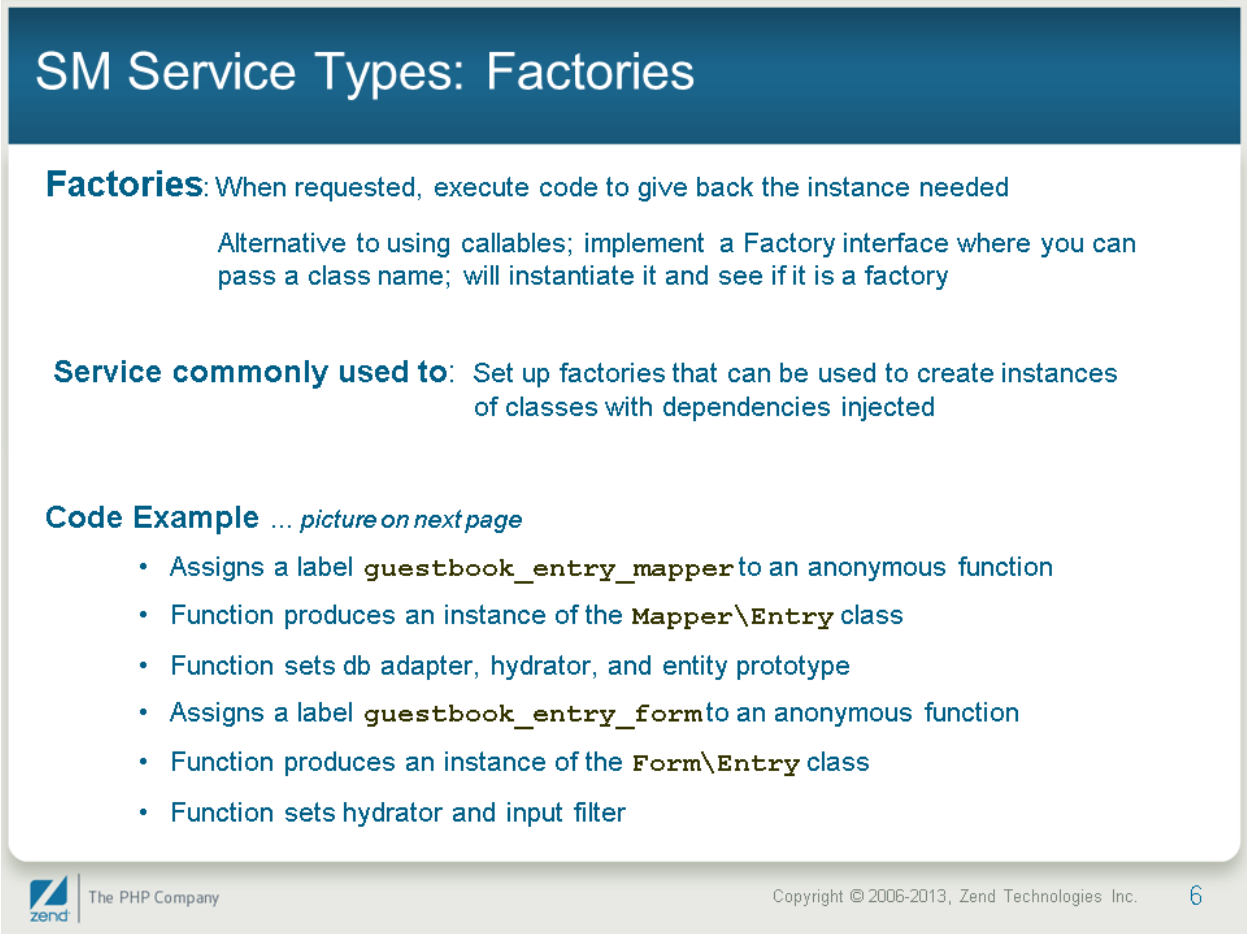
Slide 6



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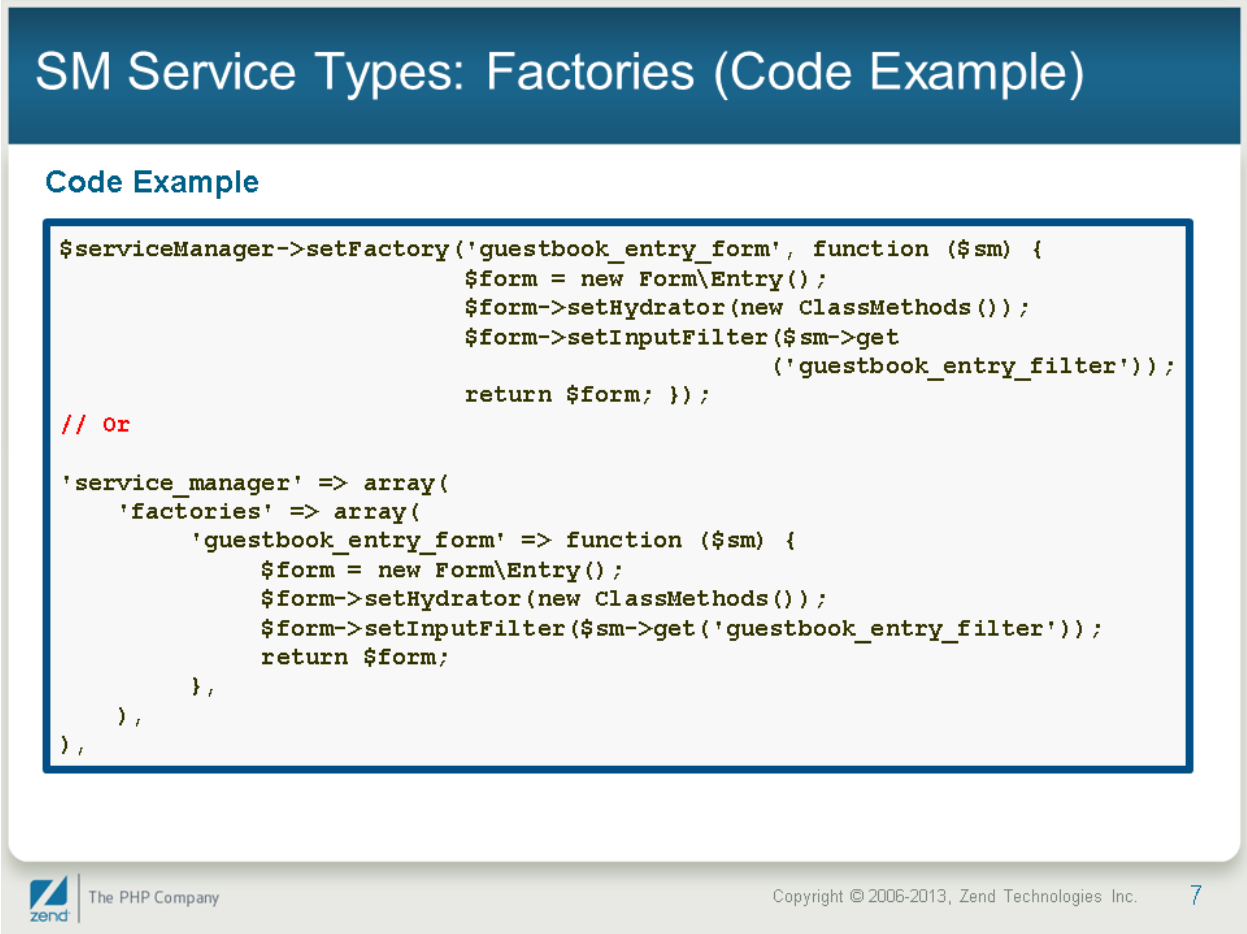
- Factories:
  - Can be any PHP callable -- static method, instance method, function, closure, even functor (class instance implementing __invoke())
  - If you specify a class name, it can implement FactoryInterface *OR* `__invoke()

Slide 7



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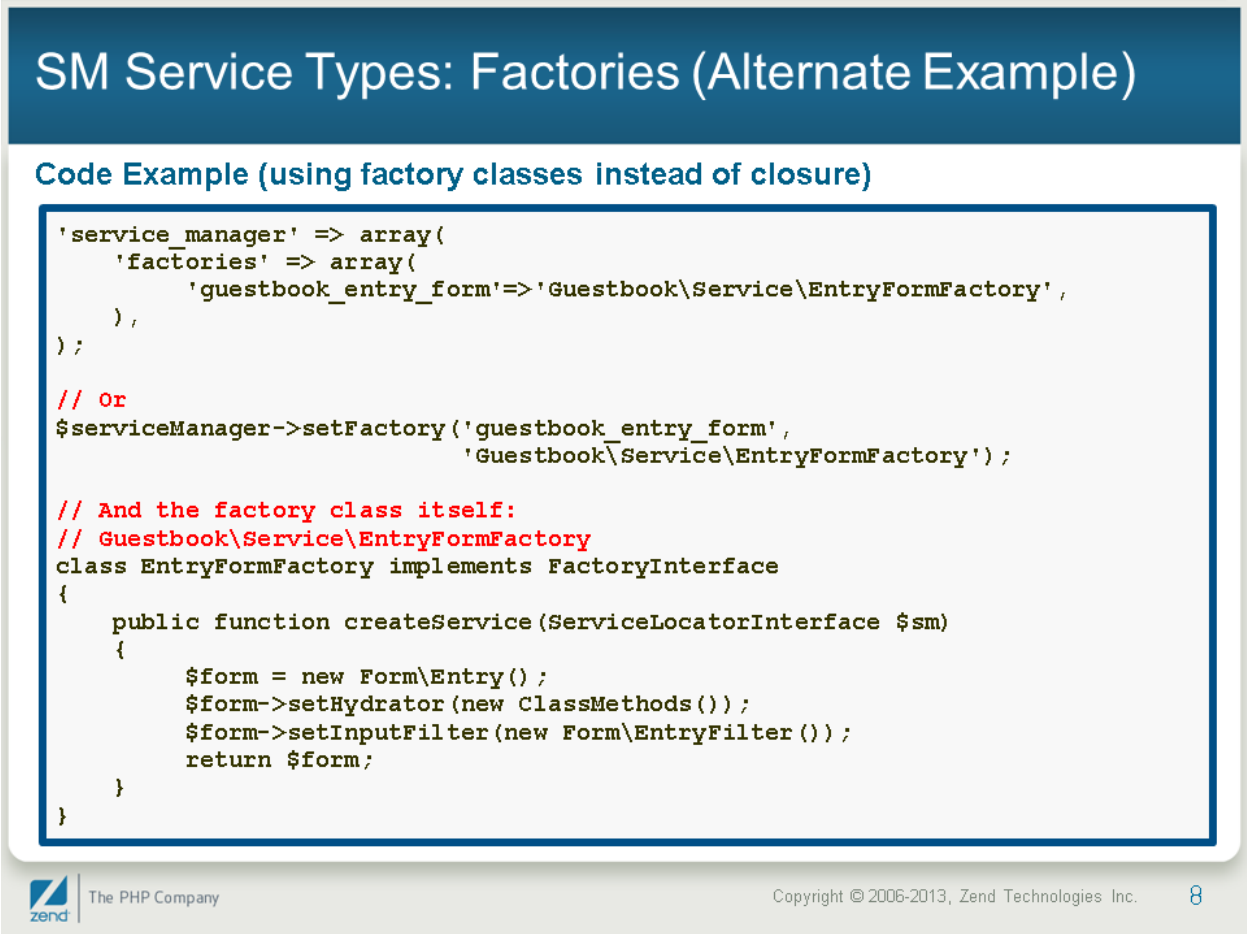

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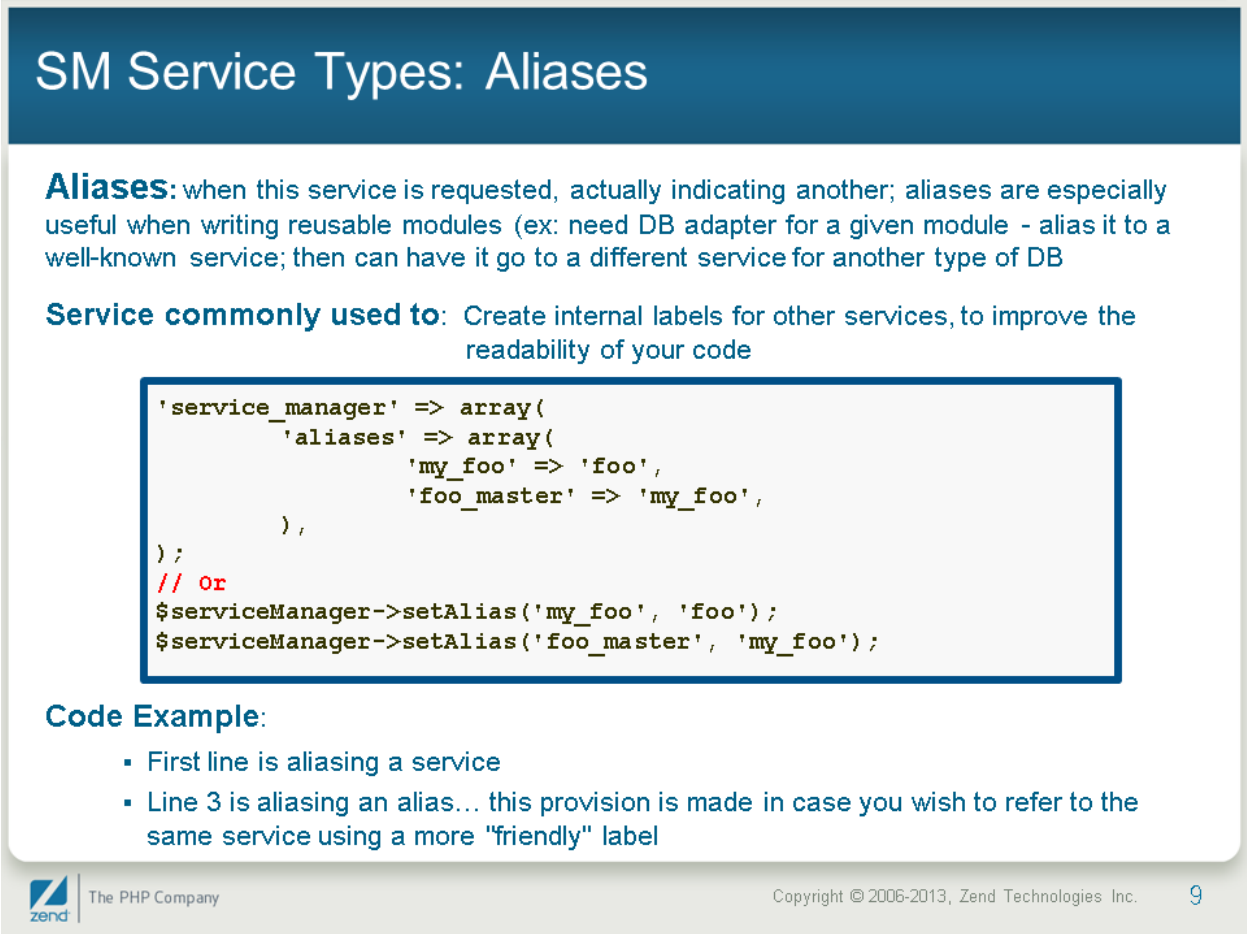
Slide 9



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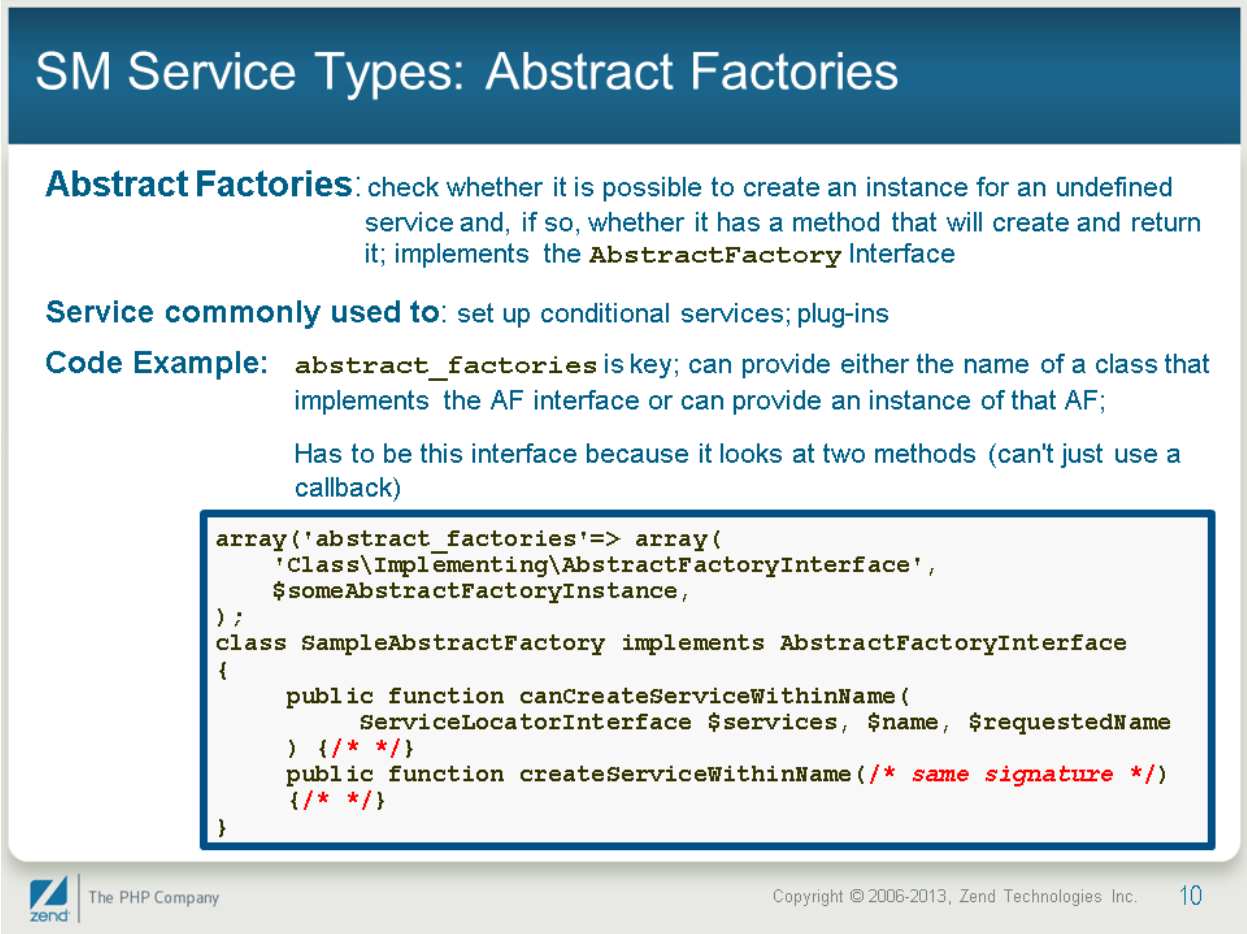
Slide 10



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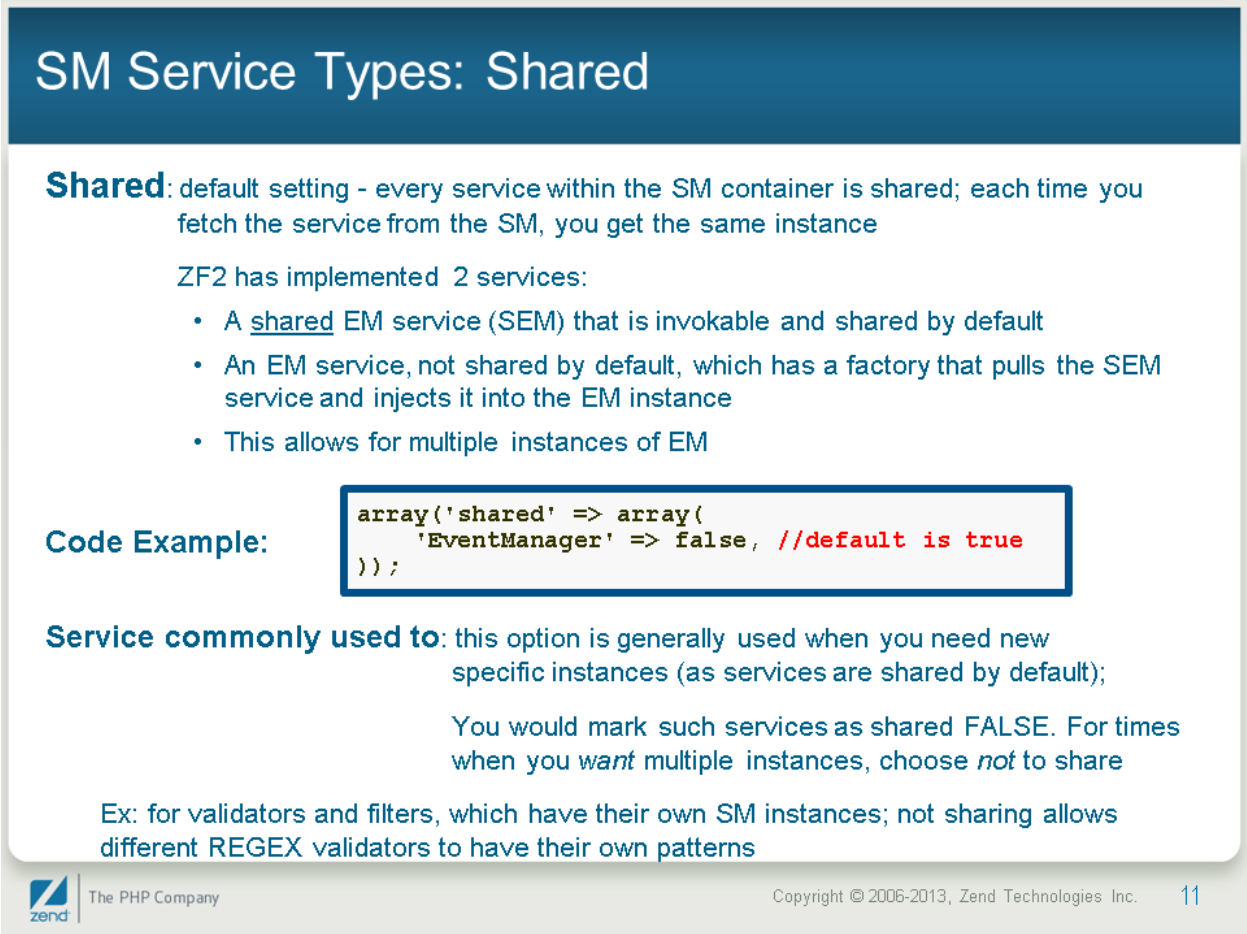
Slide 11



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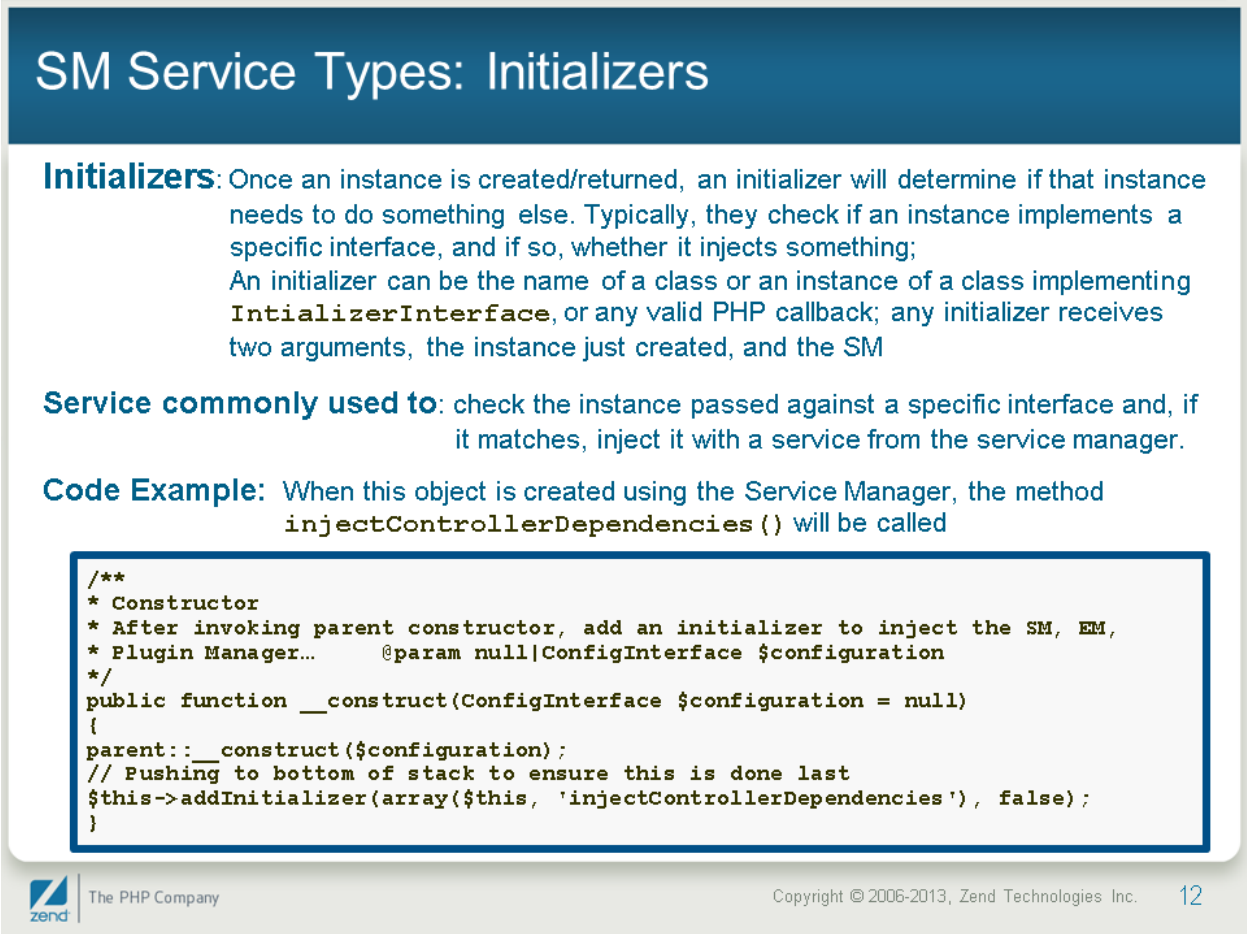
Slide 12



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Slide 13

Configuring Services

You can configure services anywhere!

- **Main Application Configuration**: Where you define what modules are available, you can also provide some initial configuration for the SM
- **Module Classes**: Can define a number of methods that are also part of implementing the interfaces; allow you to modify various SMs; main Service Factory, invokable factories, and sometimes Abstract factories
- **Module Configuration**: returns an array; aggregated; can provide a single config to the SM before you bootstrap
- **Local Override Configuration**: specify config and when to merge; alter and provide substitutions

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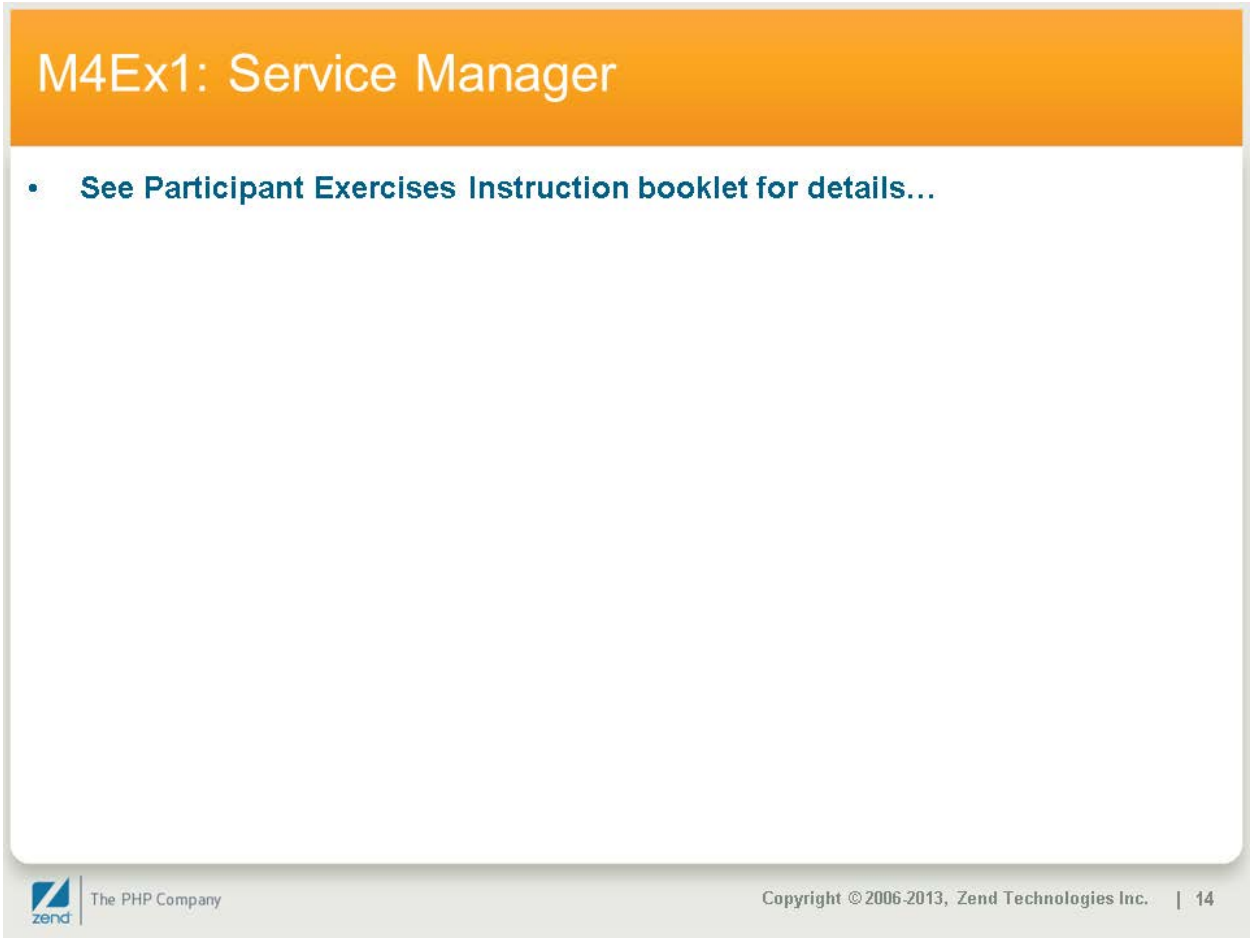
Slide 14



Slide 1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Module Five
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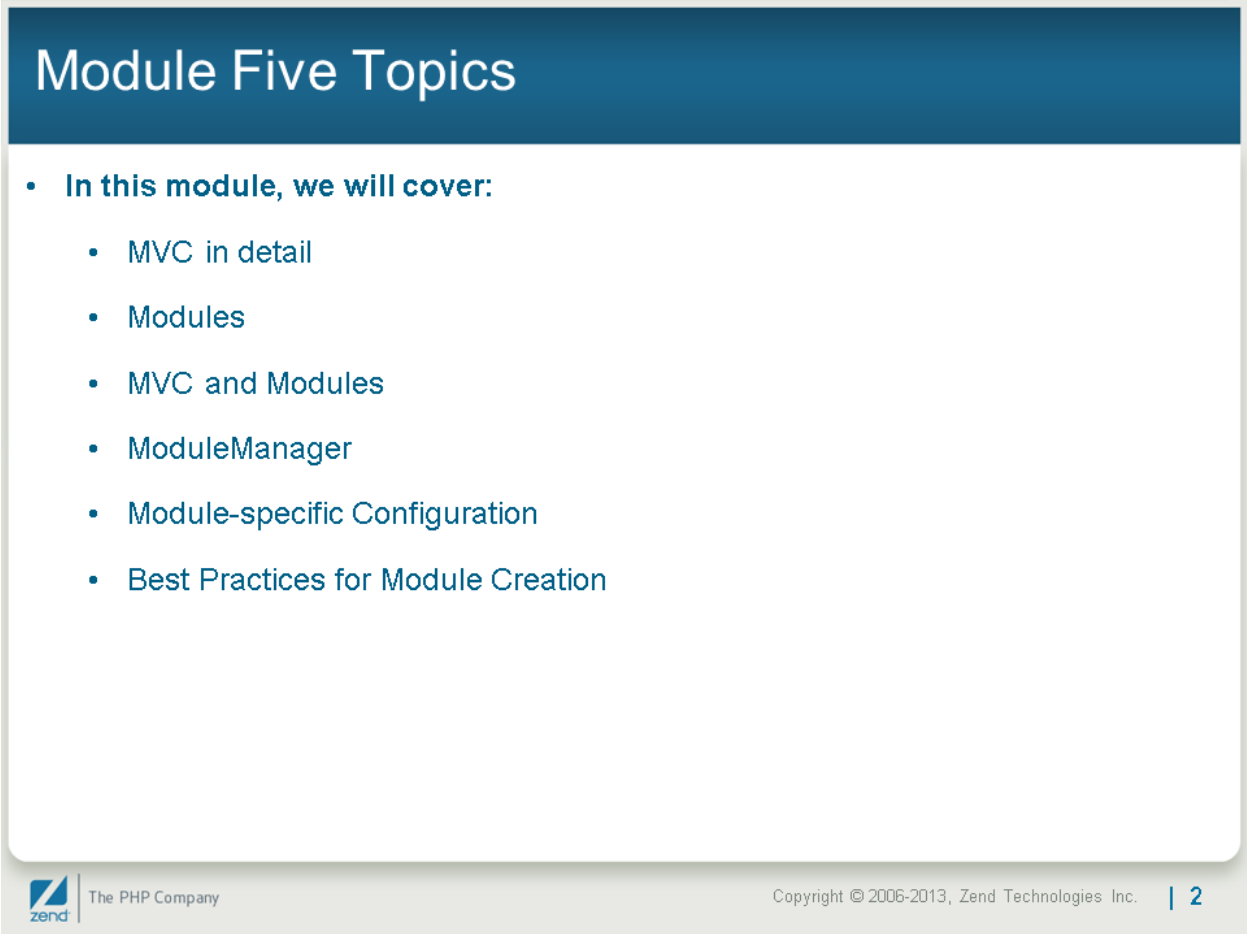
Slide 2



- The config directory has two purposes: configuring the ModuleManager, as stated above, but also configuring the ServiceManager
- config/application.config.php is used to provide default services for the SM, and to provide configuration to the module manager and its listeners
- config/autoload/* is used to provide service and application configuration
- It also has an "autoload" directory, and these are configuration files for overriding defaults provided by modules… this configuration usually seeds the ServiceManager

Slide 3

MVC: Basic Structure of an Application

`public/index.php` performs the basic work of configuring the application; it then runs the app and returns the response

- The `config` directory will typically contain configuration used by `Zend\ModuleManager` in order to load modules and merge configurations
- The `vendor` subdirectory should contain all third-party modules or libraries (ZF, custom, …); these libraries and modules should *not* be modified from their original, distributed state
- The `module` directory is where to write modules specific to the app; write modules as if they will be reused; module dir should contain few modules

```
application_root/
    init_autoloader.php
    config/
        application.config.php
        autoload/
            global.php
            local.php
            // etc.
    data/
    module/
    public/
        css
        images
        js
        .htaccess
        index.php
    vendor/
```

Slide 4

Modules in MVC

So, in ZF2 MVC:

Controllers are services... they can trigger events or be triggered by events...

Therefore, these are **event-driven services**

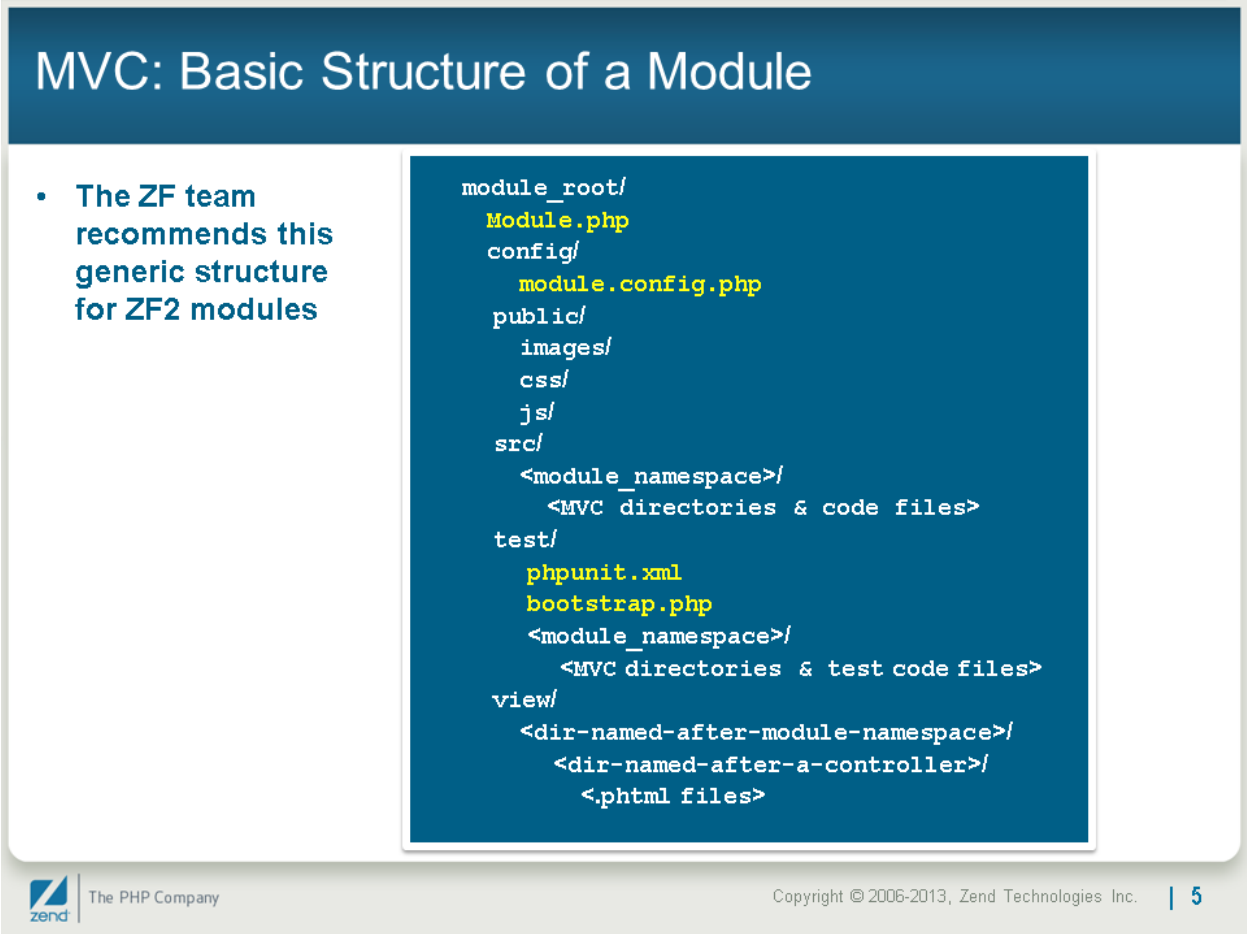
Where do we define the controllers and how do we configure them?

Answer: **Modules**

Generally, a module is a set of related code & assets that solve a specific problem

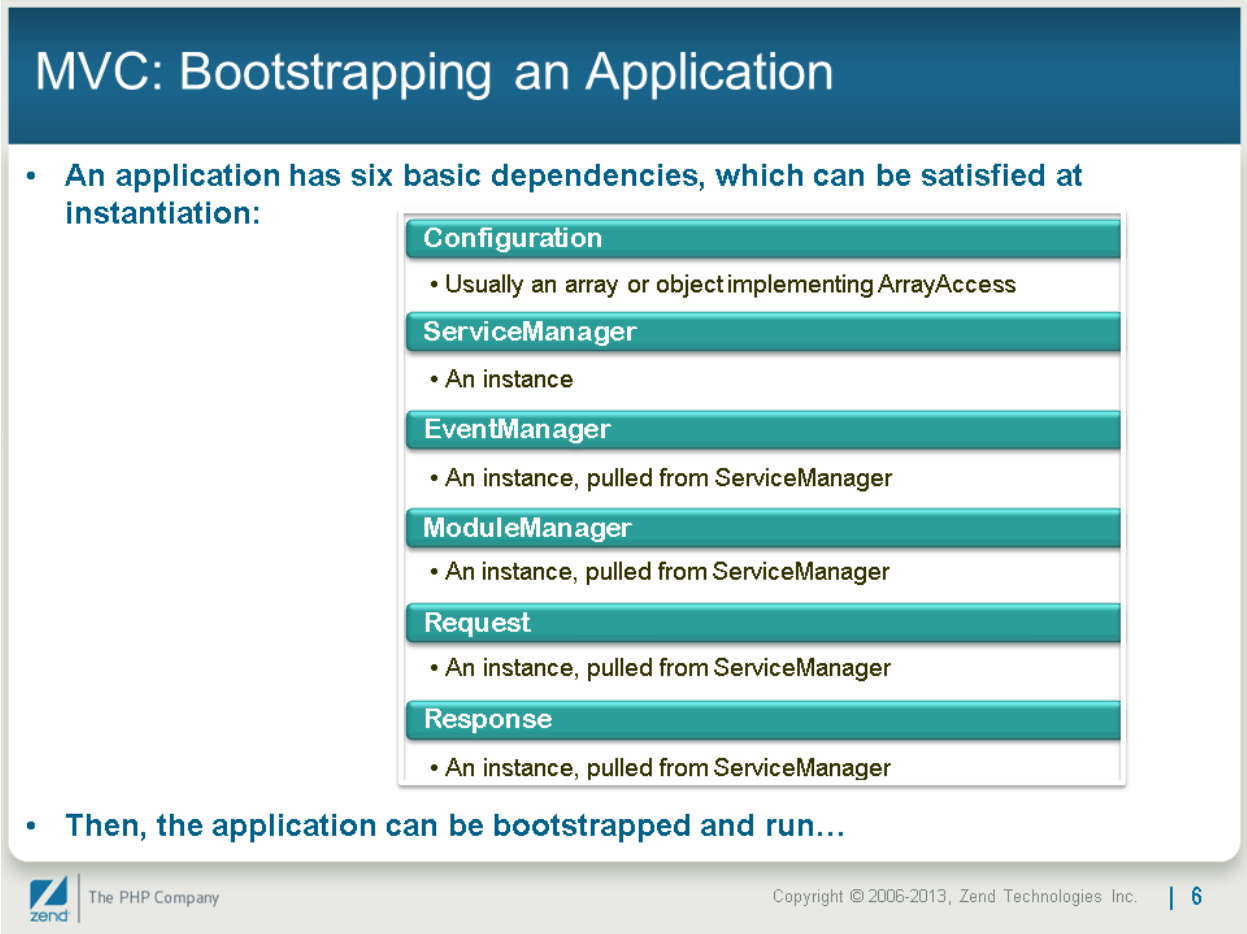
 4

Slide 5



- The config directory should contain any module-specific configuration; these files may be in any format Zend\Config supports
- We recommend naming the main configuration "module.format", and for PHP-based configuration, "module.config.php"; typically, you will create configuration for the router as well as for the dependency injector
- The src directory should be a PSR-0 compliant directory structure with your module's source code. Typically, you should at least have one subdirectory named after your module namespace; however, you can ship code from multiple namespaces if desired.
- The test directory should contain your unit tests. Typically, these will be written using PHPUnit, and contain artifacts related to its configuration (ex: phpunit.xml, bootstrap.php)
- The public directory can be used for assets that you may want to expose in your application's document root. These might include images, CSS files, JavaScript files, etc. How these are exposed is left to the developer
- The view directory contains view scripts related to your controllers

Slide 6



- Sample code for instantiation:

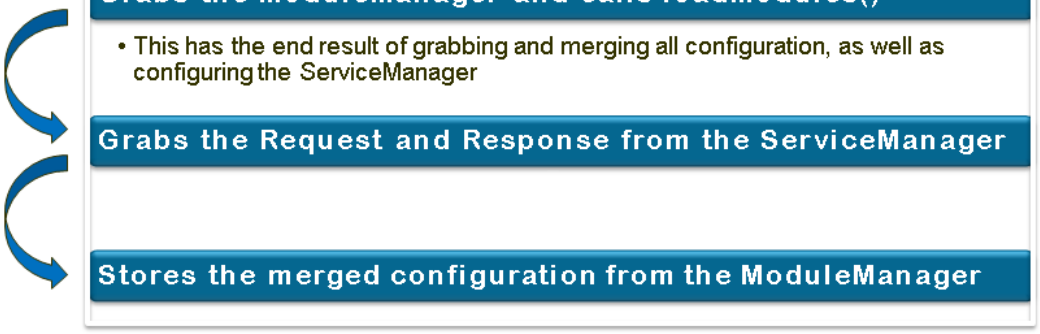
```
use Zend\EventManager\EventManager;
use Zend\Http\PhpEnvironment;
use Zend\ModuleManager\ModuleManager;
use Zend\Mvc\Application;
use Zend\ServiceManager\ServiceManager;

$config = include 'config/application.php';

$serviceManager = new ServiceManager();
$serviceManager->setService('EventManager', new EventManager());
$serviceManager->setService('ModuleManager', new ModuleManager());
$serviceManager->setService('Request', new PhpEnvironment\Request());
$serviceManager->setService('Response', new PhpEnvironment\Response());

$application = new Application($config, $serviceManager);
```


Slide 7

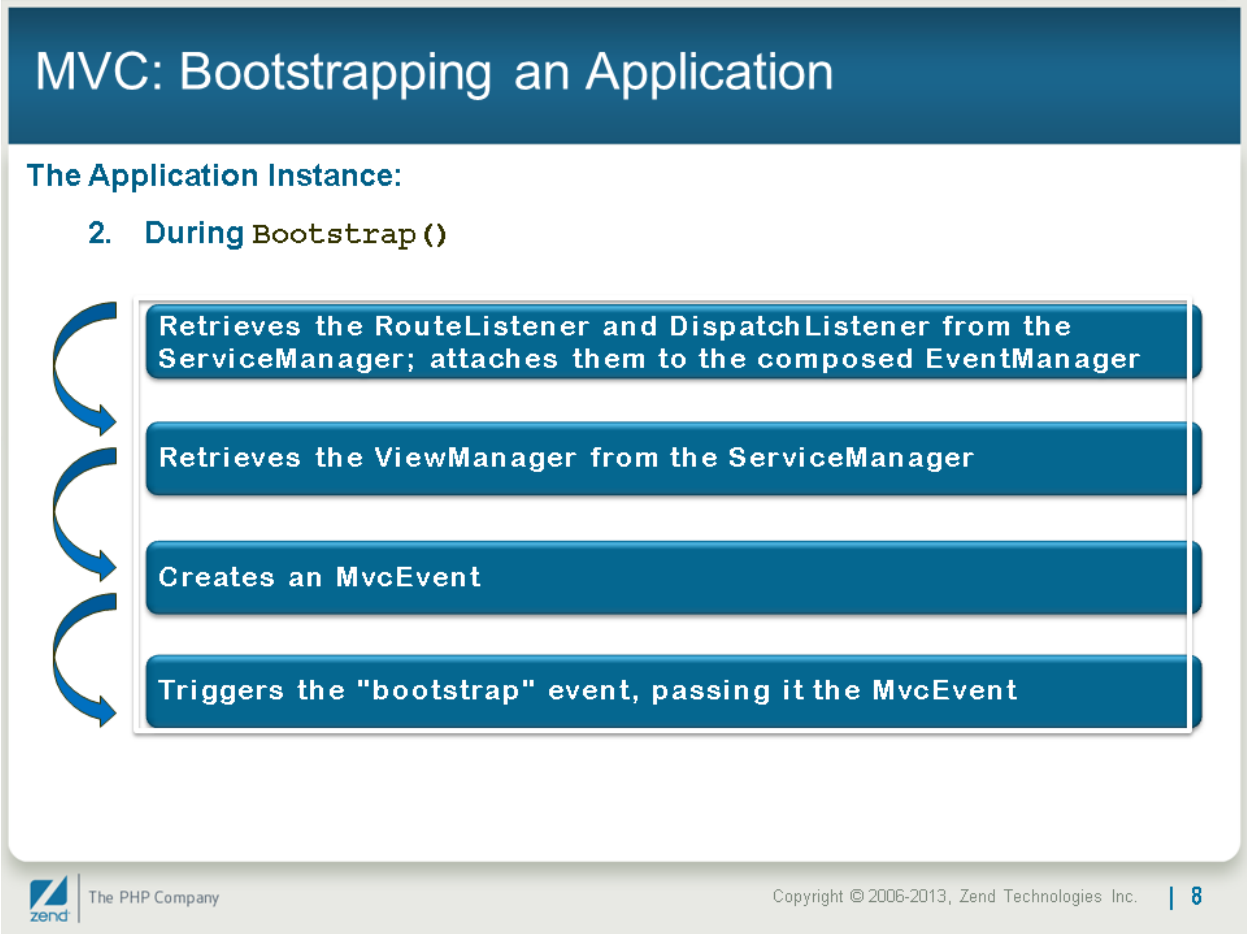
MVC: Bootstrapping an Application

The Application Instance:

1. **At instantiation**



Slide 8


MVC: Bootstrapping an Application
The Application Instance:
2. During Bootstrap()
Retrieves the RouteListener and DispatchListener from the ServiceManager; attaches them to the composed EventManager
Retrieves the ViewManager from the ServiceManager
Creates an MvcEvent
Triggers the "bootstrap" event, passing it the MvcEvent
zend The PHP Company
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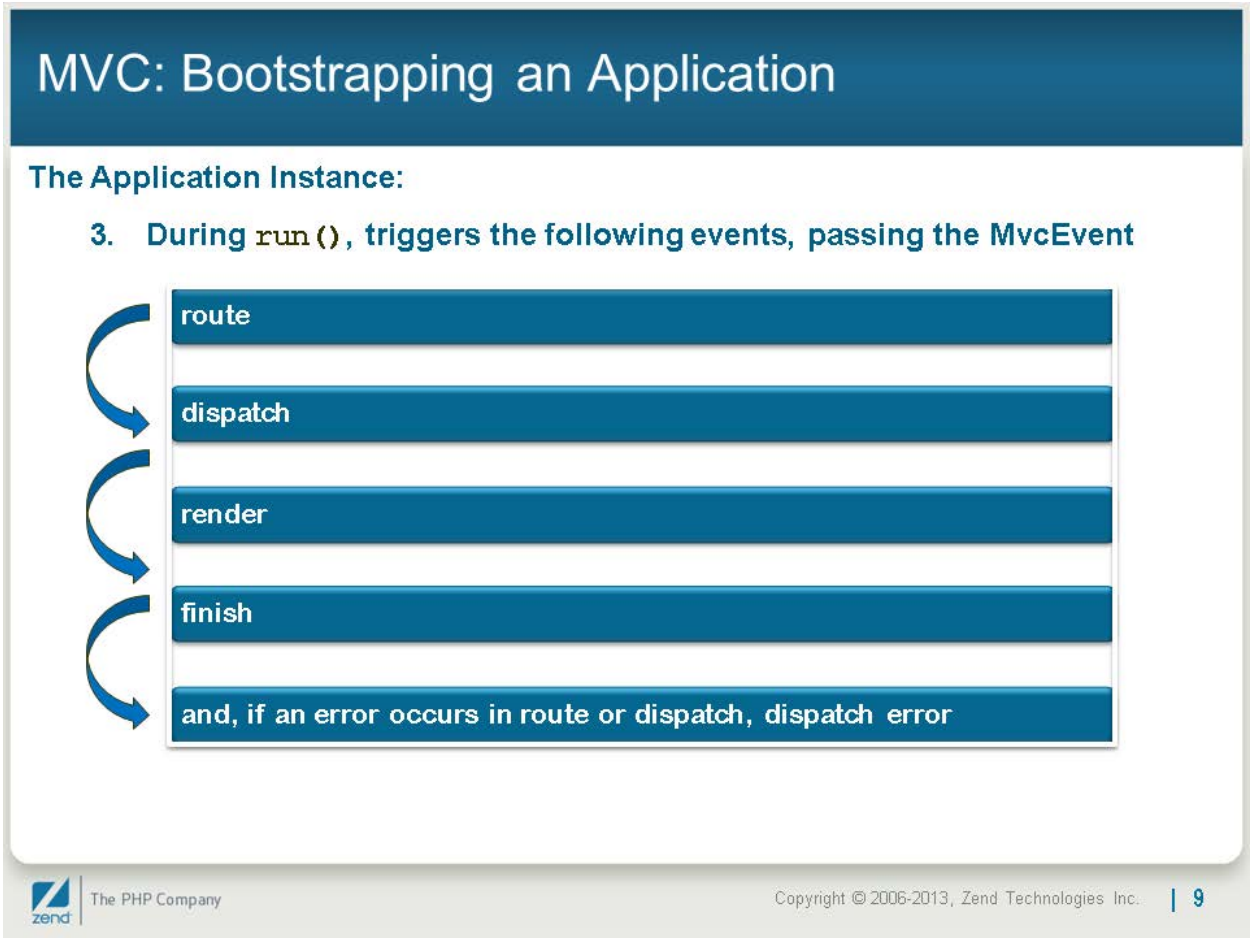
Slide 9


MVC: Bootstrapping an Application
The Application Instance:
3. During run(), triggers the following events, passing the MvcEvent
route
dispatch
render
finish
and, if an error occurs in route or dispatch, dispatch error
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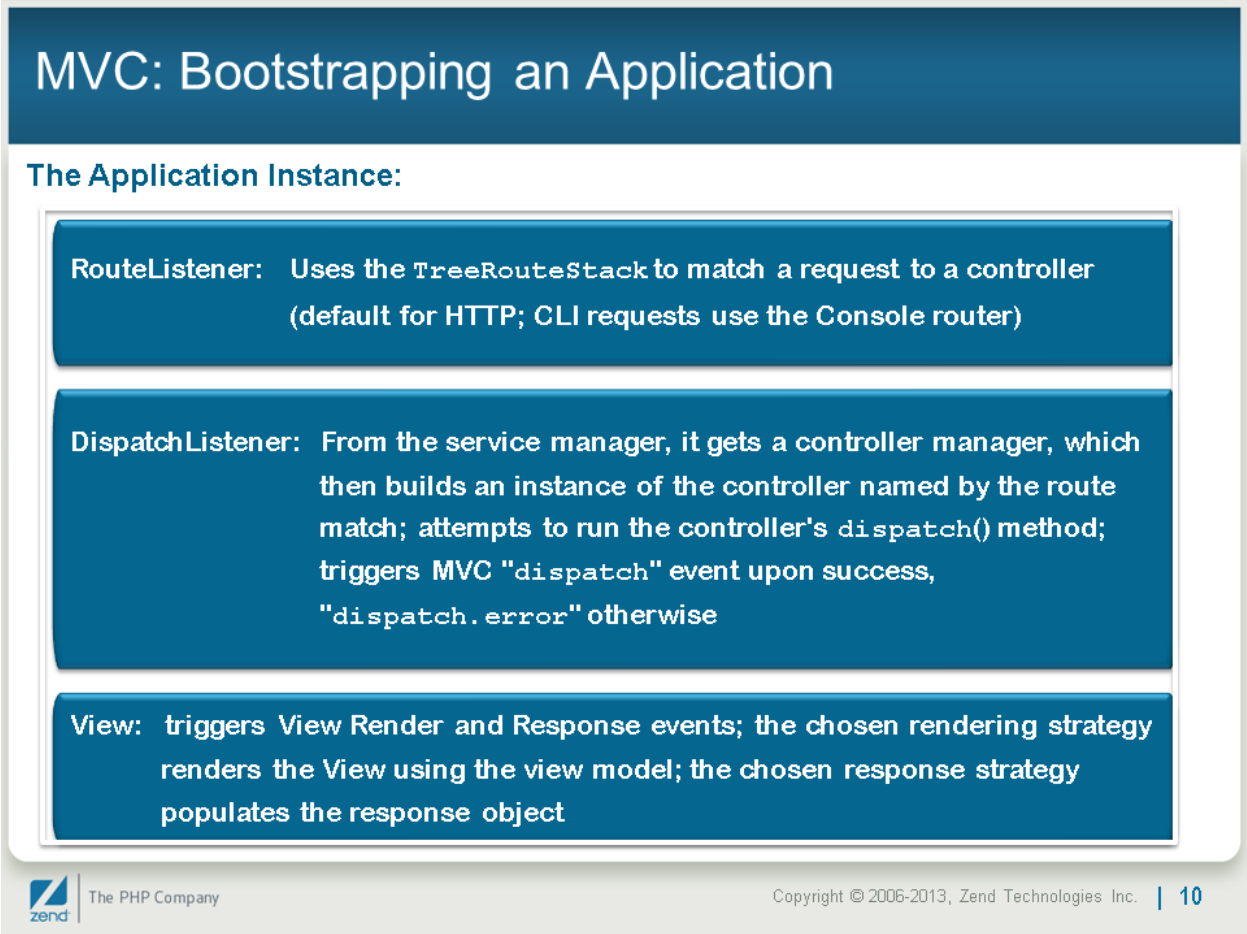
Slide 10



- DispatchListener: It does not pull the controller from the `ServiceManager`! It pulls the `Zend\Mvc\Controller\ControllerManager` from the `ServiceManager`, and then pulls the controller from that
- The "view" event is triggered, and that calls on `Zend\View\View::render()`, passing it the view model composed in the MvcEvent. That method triggers two events on its own `EventManager` instance, "render" and `response`; these are used to select a renderer, and populate the response, respectively.

Slide 11

MVC: Bootstrapping a Modular Application

Modular applications require an additional consideration…

- Each module has its own configuration, which must be aggregated
- `Zend\ModuleManager\ModuleManager` allows you to specify which modules exist and where they are located, and then initialize them
- Module classes can tie into various listeners on the `ModuleManager` to provide
  1. Configuration
  2. Services
  3. Listeners
  4. more…

Slide 12

MVC: Bootstrapping a Modular Application

1. **Configuring the Module Manager:**
   - Specify which modules to load; (optional) provide configuration for the module listeners

```
// config/application.config.php
<?php
return array(
    'modules' => array(
         'Application',
         'Guestbook',
         'GuestbookNotification',
         'ZfcBase',
         ),
    'module_listener_options' => array(
         'config_glob_paths'      => array(
              'config/autoload/{,*.}{global,local}.php',
         ),
    'module_paths' => array(
        './module',
        './vendor',
        ),
    ),
);
```

Slide 13

MVC: Bootstrapping a Modular Application

2. Add items to the `modules` array as each module is added to the app:

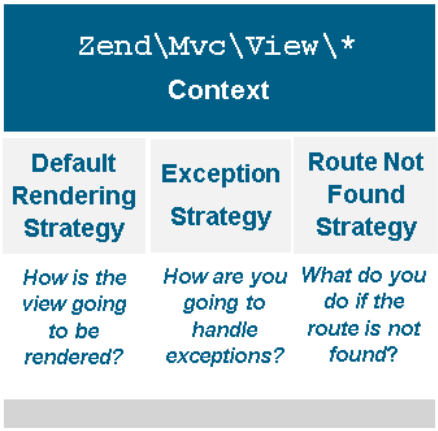
- Module classes that need to inform the application about its config should define a `getConfig()` method
- This method should return an array or traversable object, such as `Zend\Config\Config`
- Define other methods as needed - providing autoloader configuration, providing services to the `ServiceManager`, …

Slide 14

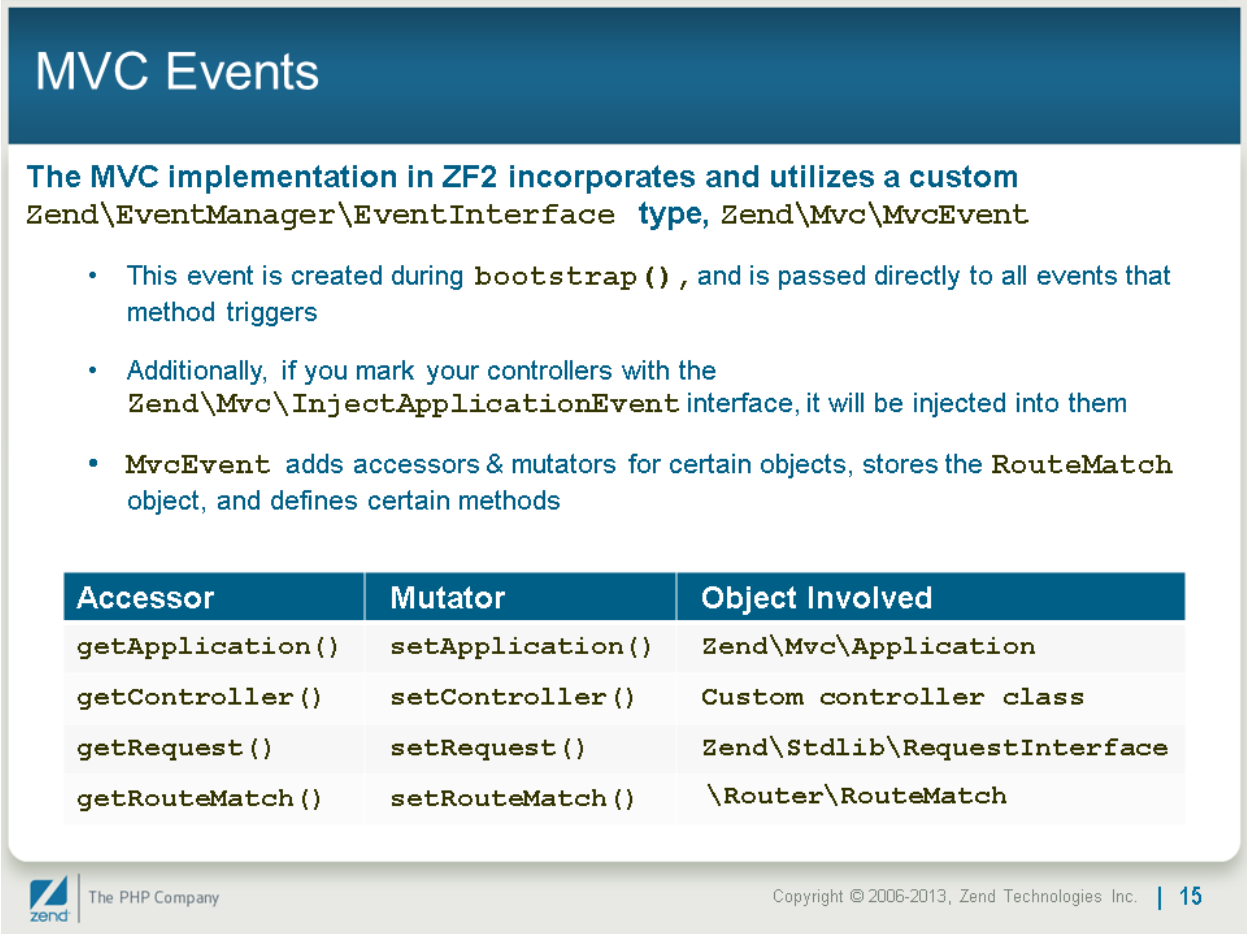
MVC: Bootstrapping a Modular Application

3. Launch the application

- Create a new vhost pointing its doc root to the `public` directory of the app
- Run it in a browser… you should see a page of view script output that corresponds to the module, controller, and action requested
- If the page is not found, then the "Route Not Found" strategy will be triggered
- If there is an exception, then the "Exception Strategy" will be triggered, and the output will vary depending upon the stage of development

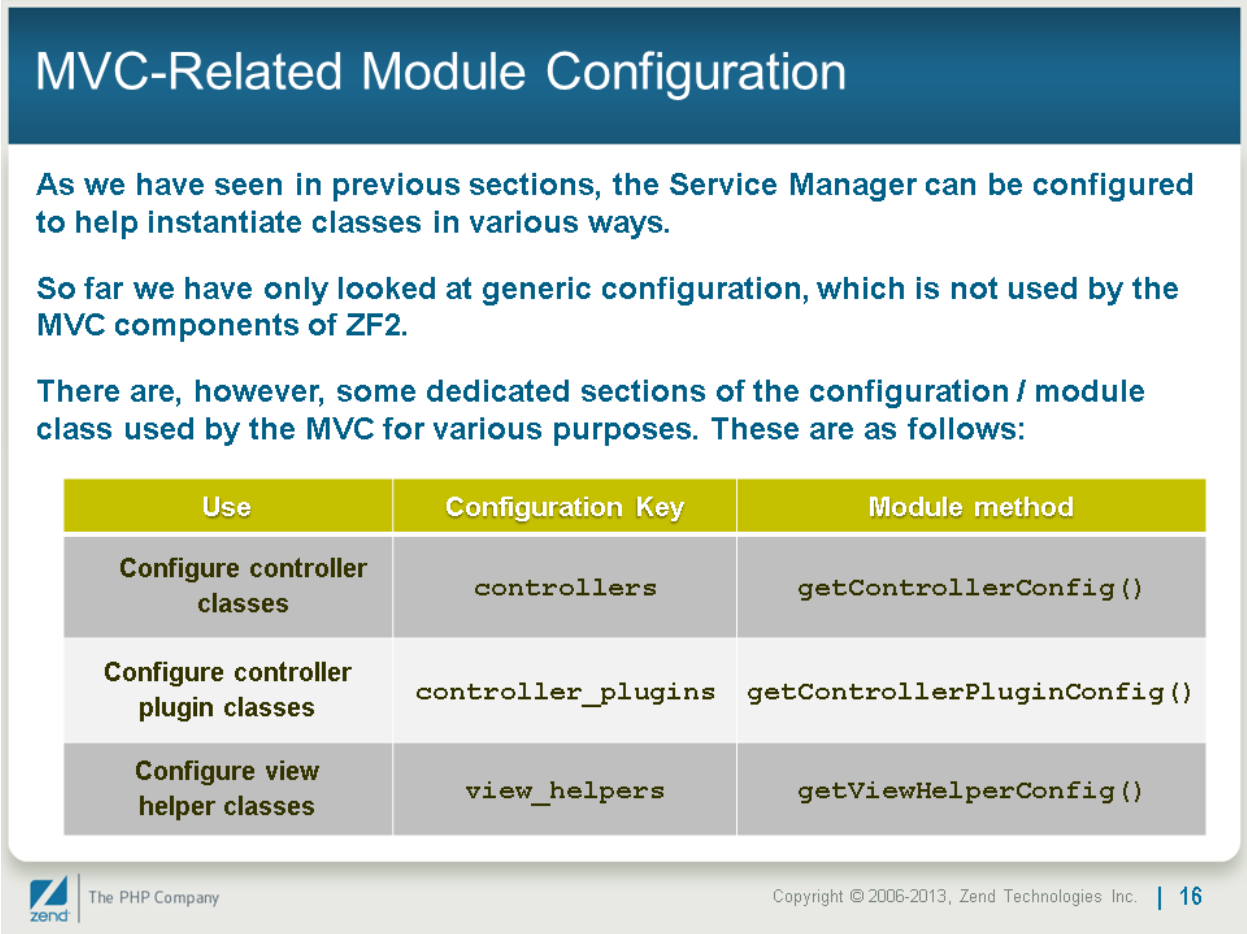


Slide 15



- The full list of accessors, mutators that MvcEvent adds and the methods it defines can be viewed at: http://packages.zendframework.com/docs/latest/manual/en/zend.mvc.mvc-event.html
- The Application, Request, Response, Router, and ViewModel are all injected during the bootstrap event
- Following the route event, it will be injected with the RouteMatch object encapsulating the results of routing
    - As this object is passed around throughout the MVC, it is a common location for retrieving the results of routing, the router, and the request and response objects
    - Setting the results of execution in the event allows event listeners to introspect them and utilize them within their execution; Ex: the results could be passed into a view renderer

Slide 16



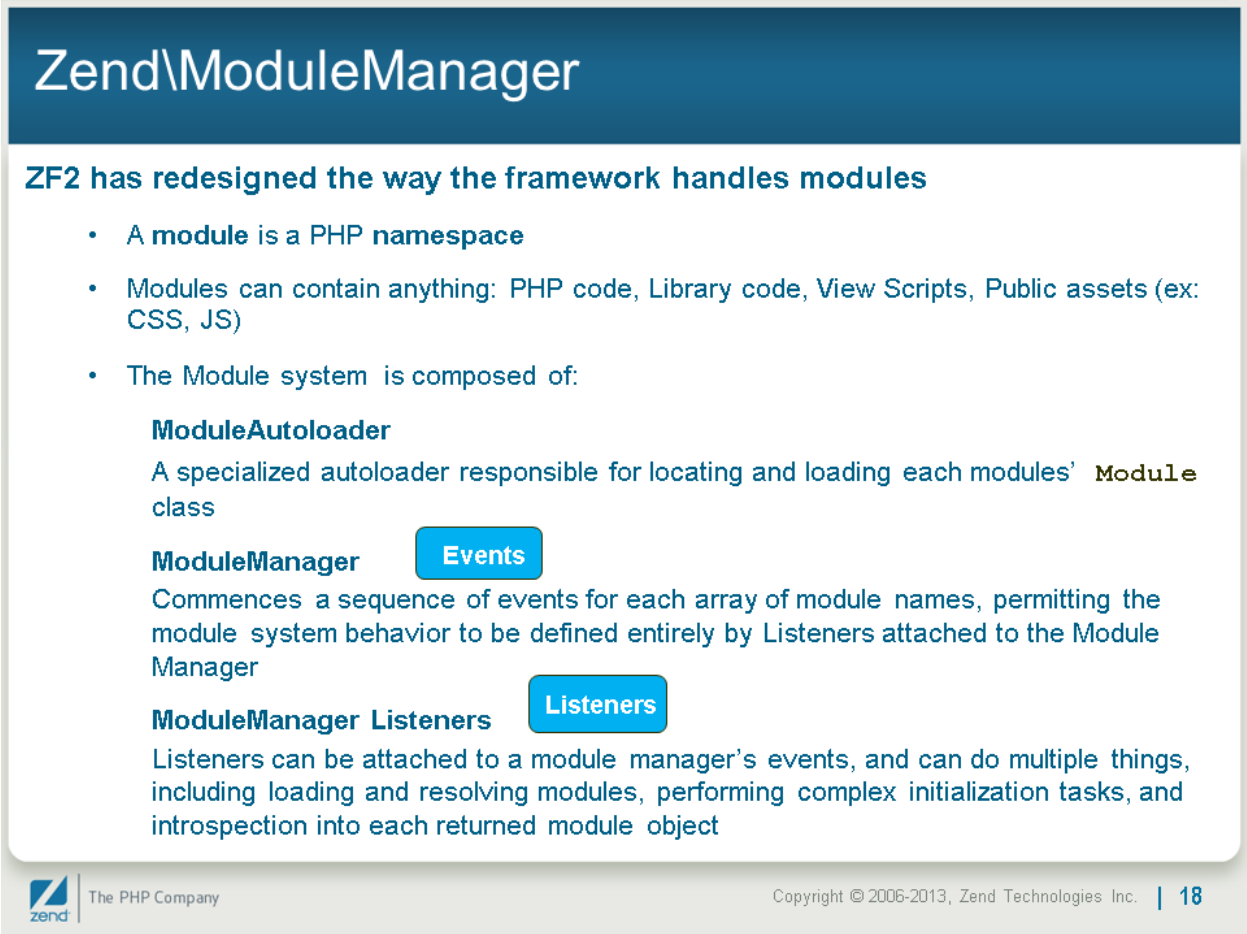
- These keys are *top-level* keys

Slide 17

SM Configuration for MVC: Code Example

```
class Module
{
    public function getControllerConfig()
    {
         return array(
              'invokables' => array(
                   'Guestbook\Controller\Index' =>
                                             'Guestbook\Controller\IndexController',
              ),
              'factories' => array(…),
              'services'  => array(…),
              'aliases'   => array(…),
         );
    }
}
// or
'controllers' => array(
    'invokables' => array(
         'Guestbook\Controller\Index' => 'Guestbook\Controller\IndexController',
    ),
    'factories' => array(…),
    'services'  => array(…),
    'aliases'   => array(…),
),
```

Slide 18



- The name of a module in a typical ZF2 application is simply a PHP namespace (which must conform with namespace naming rules)
- For a module to integrate into the MVC, it needs a Module class in its namespace

Slide 19

Module Autoloader

We discussed Autoloaders in the first module… here is one specific to modules:

Listeners

`Zend\Loader\ModuleAutoloader`

- The `ModuleAutoloader` is consumed by `Zend\ModuleManager\Listener\ModuleLoaderListener` in order to resolve module names to their associated `Module` classes

… Typically, you will never interact with this autoloader directly

Slide 20

Zend\ModuleManager

What is the ZF2 Module Manager?

`Zend\ModuleManager\ModuleManager`

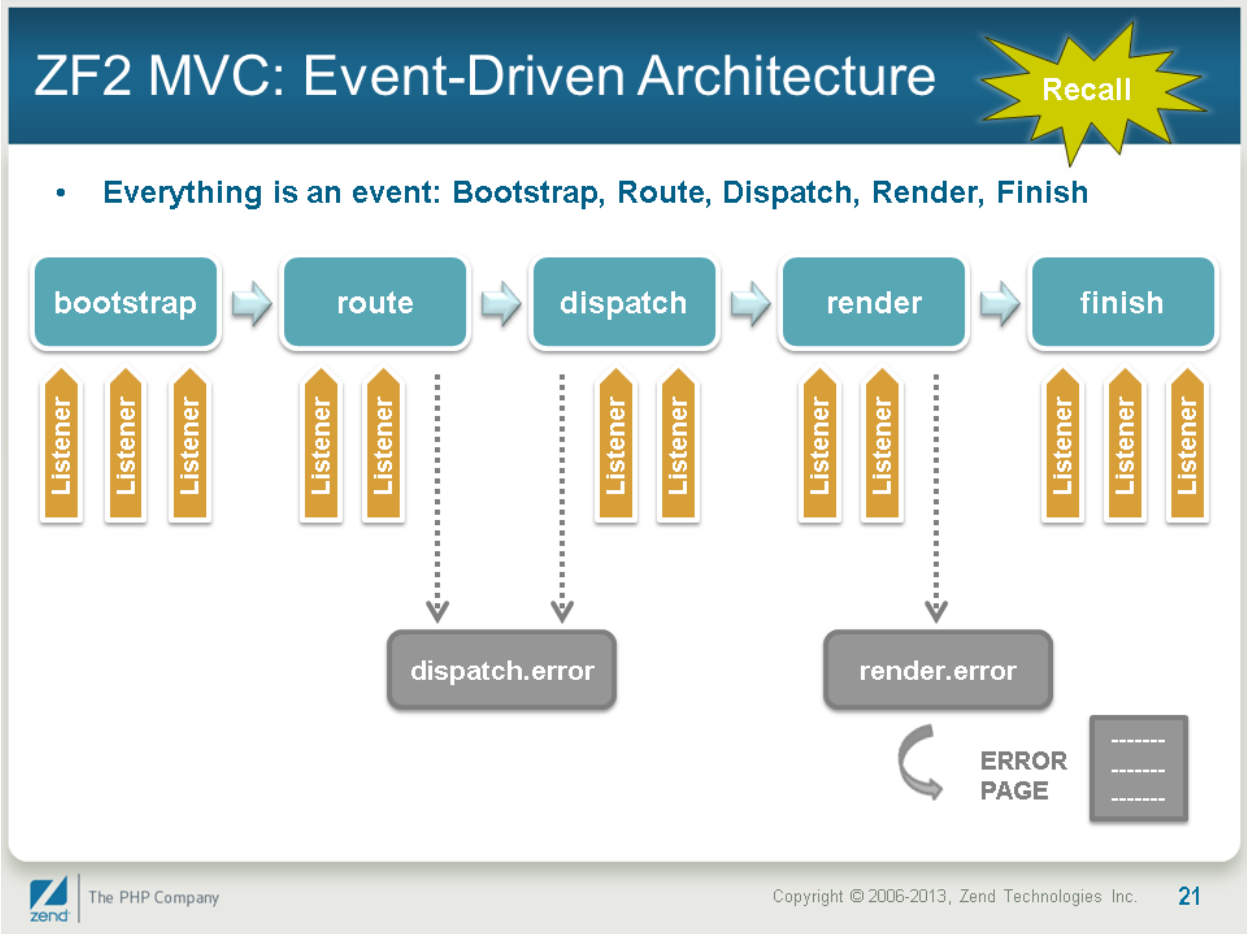
Events

- A simple **class** responsible for **iterating** over an array of **module names** and **triggering** an **event** for each

- Attached event listeners are responsible for…
  - Gathering autoloader configuration
  - Gathering application configuration
  - Triggering module-specific initialization tasks

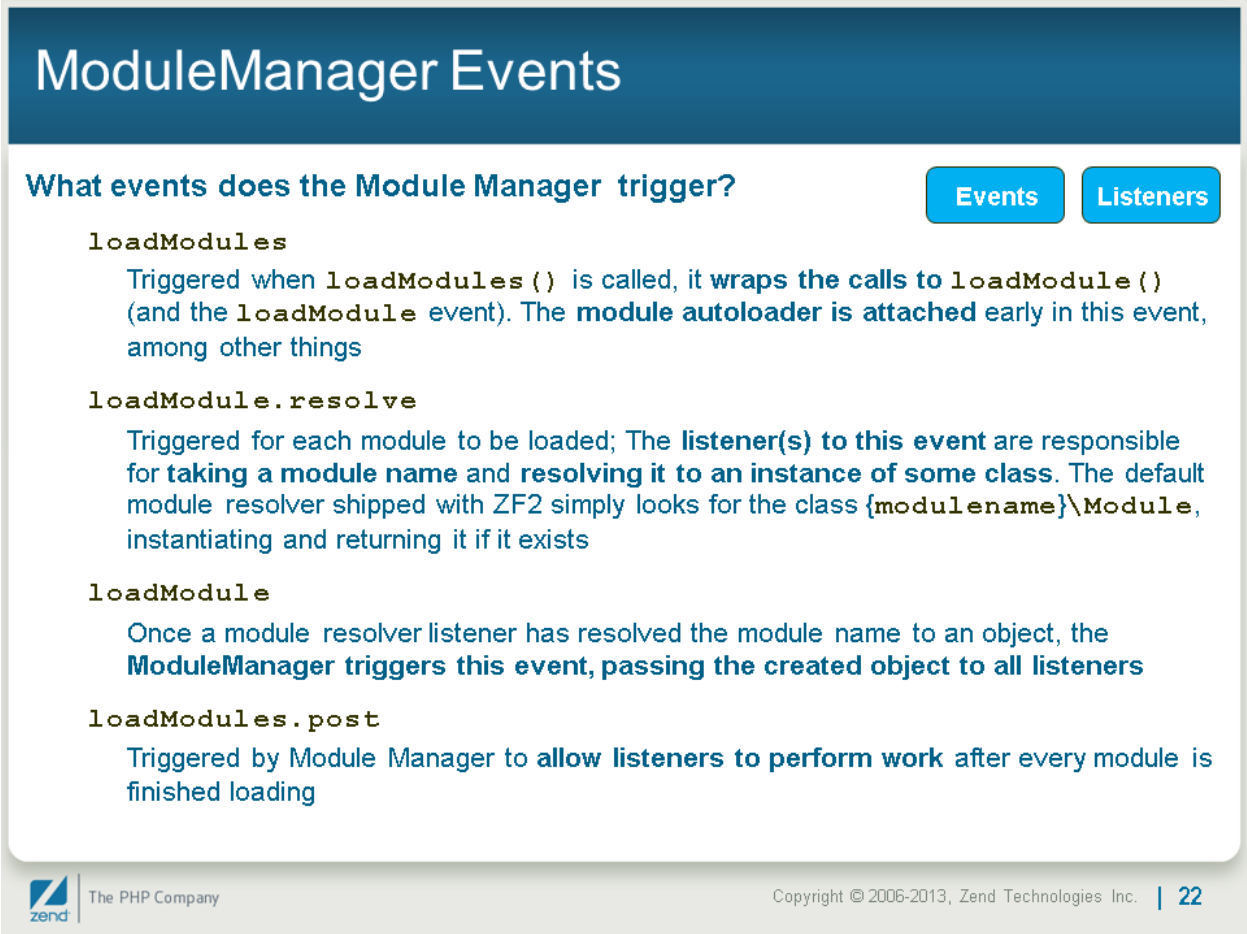
Listeners

Slide 21



- Event architecture makes the framework more robust and adaptable
- Diagram does not show entire sequence of events, but shows general flow

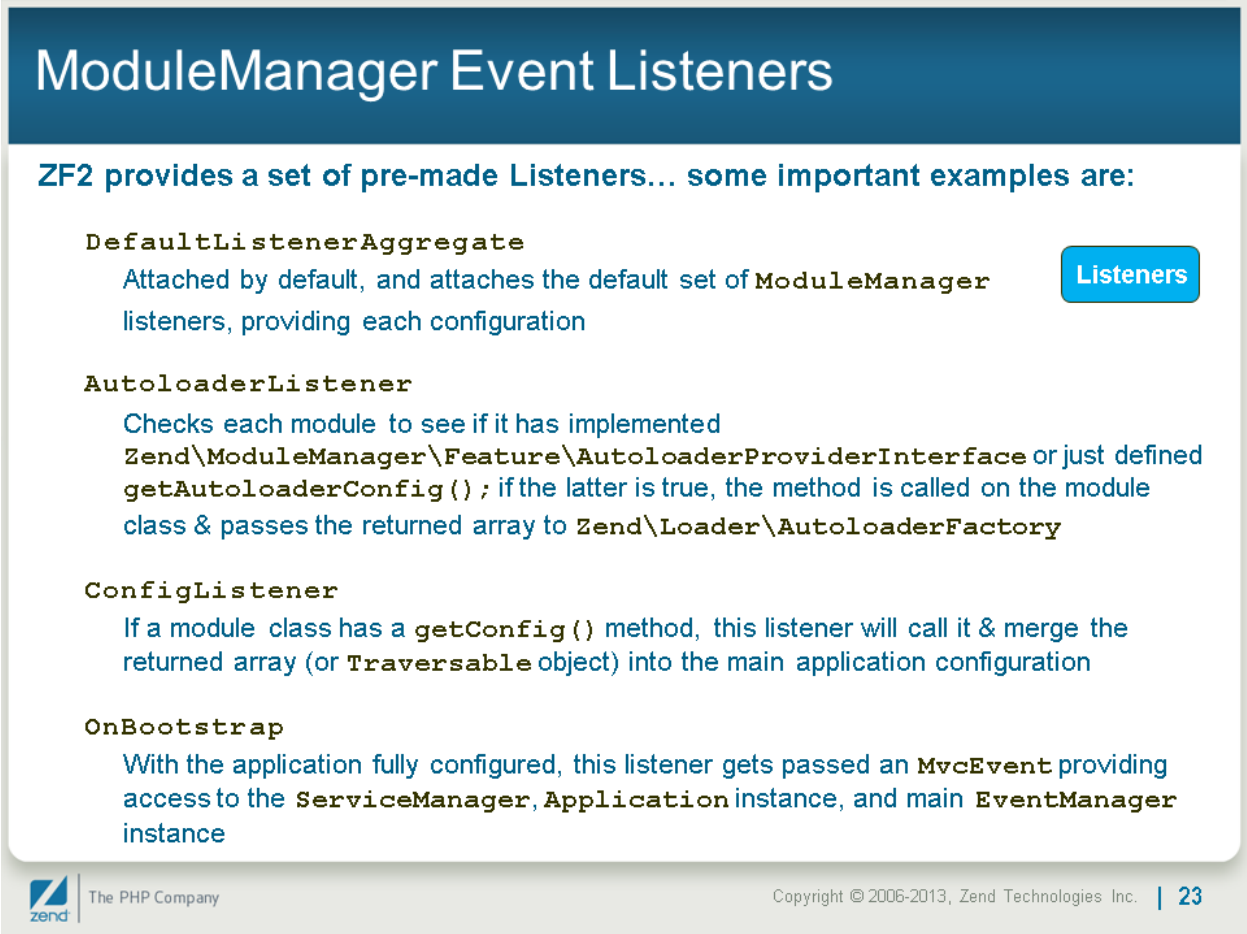
Slide 22



- An example of how loadModules.post works:

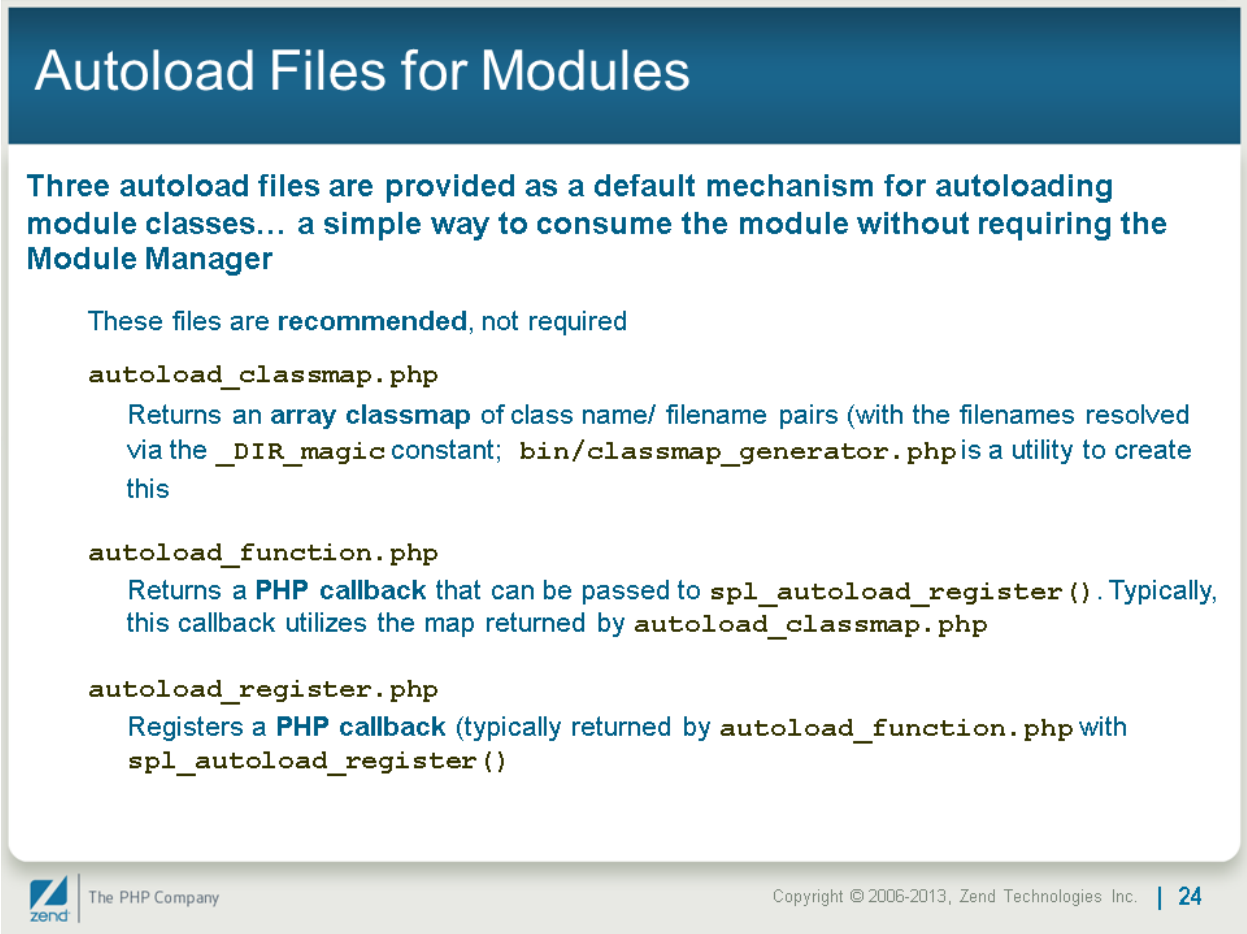
  The default configuration listener, **Zend\ModuleManager\Listener\ConfigListener,** attaches to this event to incorporate additional user-supplied configuration meant to override the default configurations of installed modules

Slide 23



- The complete list of provided listeners is:
  - Zend\ModuleManager\Listener\DefaultListenerAggregate
  - Zend\ModuleManager\Listener\AutoloaderListener
  - Zend\ModuleManager\Listener\ConfigListener
  - Zend\ModuleManager\Listener\InitTrigger
  - Zend\ModuleManager\Listener\LocatorRegistrationListener
  - Zend\ModuleManager\Listener\ModuleResolverListener
  - Zend\ModuleManager\Listener\OnBootstrapListener
  - Zend\ModuleManager\Listener\ServiceListener
- When implementing getConfig(), you can return a Zend\Config instance. This allows you to provide configuration in your module that uses one of the alternate formats Zend\Config supports
- The init() method is executed after the Module is instantiated, but other modules may not yet be instantiated - so, do not do anything in here that depends on other modules

Slide 24



- Autoload_classmap.php should return an empty array during early development; generate it once your module code is solidifying
- Will be covered in your lab…

Slide 25

Module Classes

The module class is the single entry point for `ModuleManager` listeners to interact with a module

Listeners

- ZF2 expects each module name to be resolvable to an object instance
- Default resolver `Zend\ModuleManager\Listener\ModuleResolverListener` instantiates an instance of `moduleName\Module` for each enabled module
- Ex: Minimal Module class …

Module: `MyModule` …

Expected class: `MyModule\Module`

```
// Define your MyModule\Module
// class in Module.php
namespace MyModule;
Class Module
{
}
```

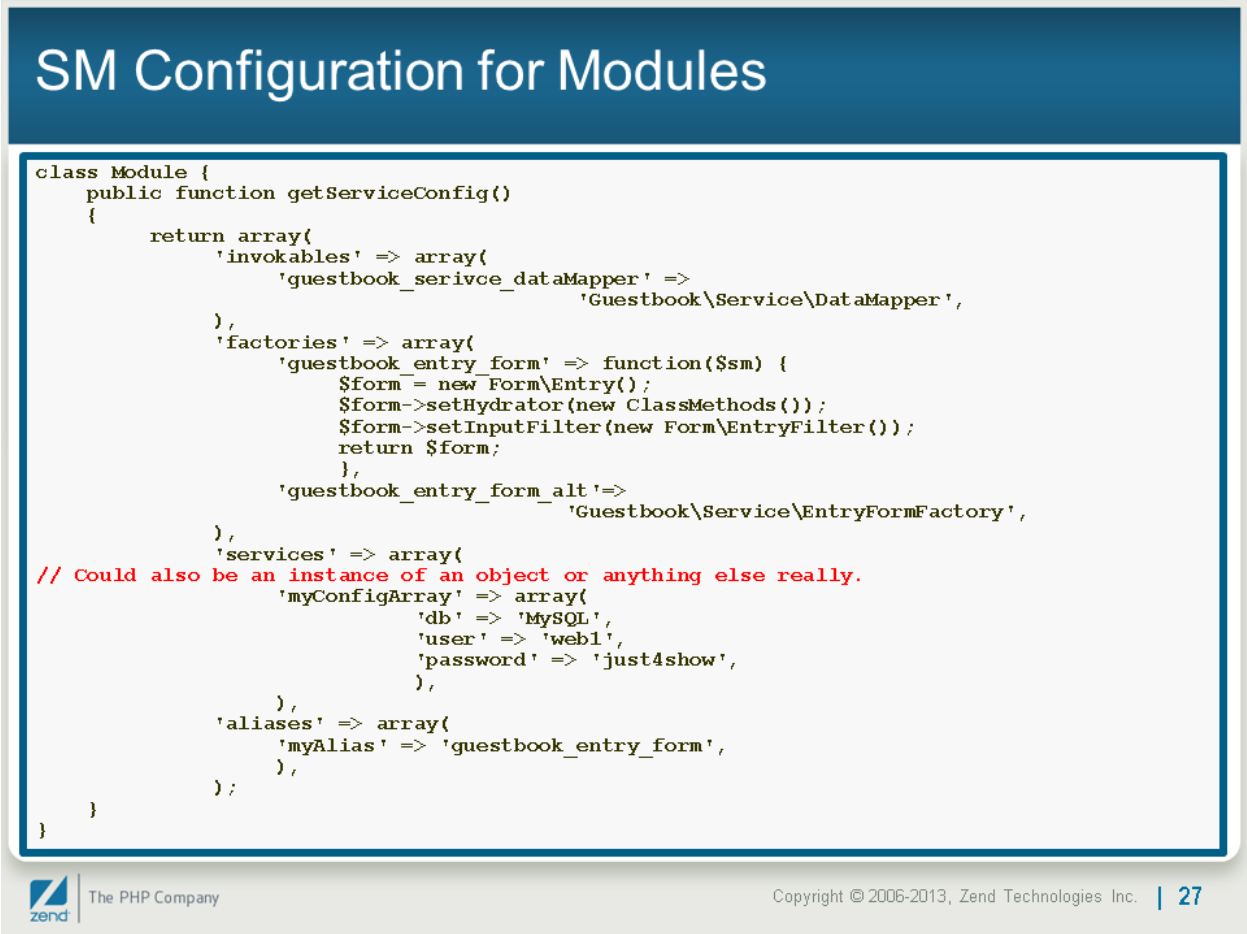
Slide 26

Typical Module Class

```
namespace MyModule;

class Module
(
    public function getAutoloaderConfig()
    {
         return array(
              'Zend\Loader\ClassMapAutoloader' => array(
                   __DIR__ . '/autoload_classmap.php',
              ),
              'Zend\Loader\StandardAutoloader' => array(
                   'namespaces' => array(
                        __NAMESPACE__ => __DIR__ . '/src/' .
                        __NAMESPACE__,
                   ),
              ),
         );
    }
    public function getConfig()
    {
        return include __DIR__ . '/config/module.config.php';
    }
}
```

Slide 27



- Note that the "getServiceConfig()" method returns an array (or Traversable) of configuration exactly like the configuration we saw in Module One.
- Also, the module configuration should typically be done in module.config.php; if you want to create closures, or will be working with object instances to configure the SM, it should ONLY be done in this method

Slide 28

MVC 'bootstrap' Event

Modules based on an MVC design pattern may need access to additional parts of the app in the Module class

Events

- Ex: An instance of `Zend\Mvc\Application` or its registered SM instance
- An MVC bootstrap event can be used to accomplish this
- Bootstrap event is triggered by `Zend\Mvc\Application::bootstrap`
  - At the time the bootstrap event is triggered …

    All modules are loaded

    The SM is fully configured

    The application instance is available (as it is the event target)

Slide 29

MVC 'bootstrap' Event: Code Example

```
// module/GuestbookNotification/Module.php
class Module implements BootstrapListenerInterface
{
    public function onBootstrap(EventInterface $event)
    {
        $sm = $event->getApplication()->getServiceManager();
        $sm->get('guestbook-entry-service')
        ->getEventManager()
        ->attach('add.post', array($this, 'onNewEntry'));
    }

    public function onNewEntry(EventInterface $event)
    {
        $message = new Message();
        $message->addFrom('noreply@localhost', 'Guestbook Notifier')
                ->addTo($event->getParam('entry')->getEmail())
                ->setSubject('Thank you!')
                ->setBody('Thank you for leaving a guestbook entry!')
                ->setEncoding('utf-8');
        $transport = new SendmailTransport();
        $transport->send($message);
    }
}
```

Slide 30

ModuleAutoloader & DefaultListenerAggregate

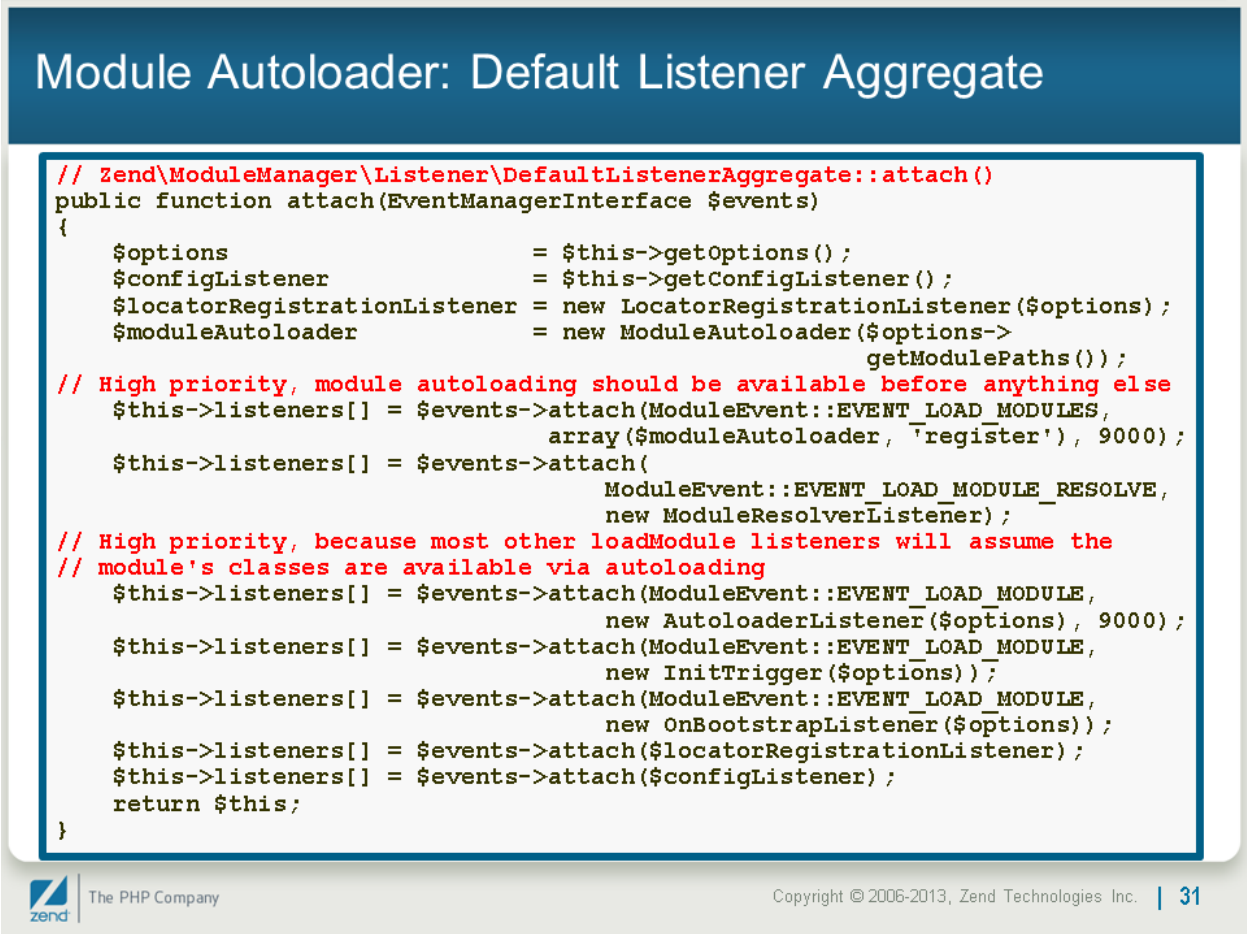
ZF2 ships with a default, specialized module autoloader that is responsible for the location and on-demand loading of Module classes

`Zend\Loader\ModuleAutoloader`

Listeners

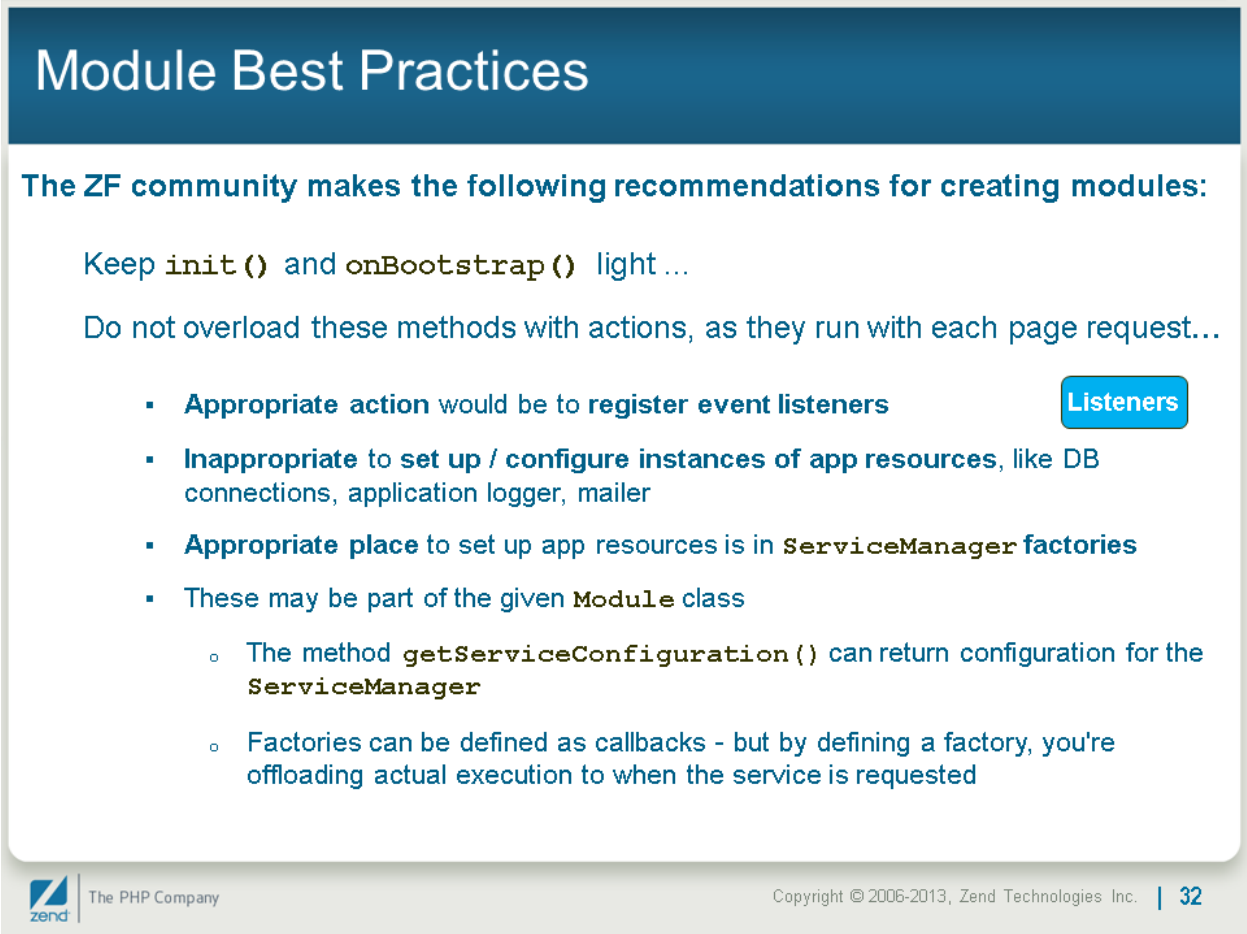
- Use the default listener and provide an array of module paths (absolute or relative) to the app root, for the module autoloader to check when loading modules
- `Zend\ModuleManager\Listener\DefaultListenerAggregate`, is an aggregate listener that registers the default module listeners; one of those is the `ModuleLoaderListener`, which consumes the `ModuleAutoloader`

Slide 31



- **Important**: In order for paths relative to the application directory to work, the directive - chdir(dirname(__DIR__)); - must be contained within public/index.php

Slide 32



- Setting up and configuring instances of application resources are better done through the Service Manager

Slide 33

Module Best Practices

The ZF community makes the following recommendations for creating modules:

Do not perform writes within a module

- **Never code a module to perform** or expect any writes **within** a module's **directory**… the files within a directory should always exactly match the distribution
- **User-provided configuration** should be performed using **overrides** in the application-level configuration files
- As `chdir()` is in the `index.php`, you can simply specify `data/` for writes, as it will resolve to the application's data directory
- Two major **advantages**:

  not allowing internal module writes retains compatibility with Phar packaging

  keeping the module in sync with the upstream distribution updates via mechanisms like GIT, Pyrus and Composer are easy

Slide 34

Module Best Practices

The ZF community makes the following recommendations for creating modules:

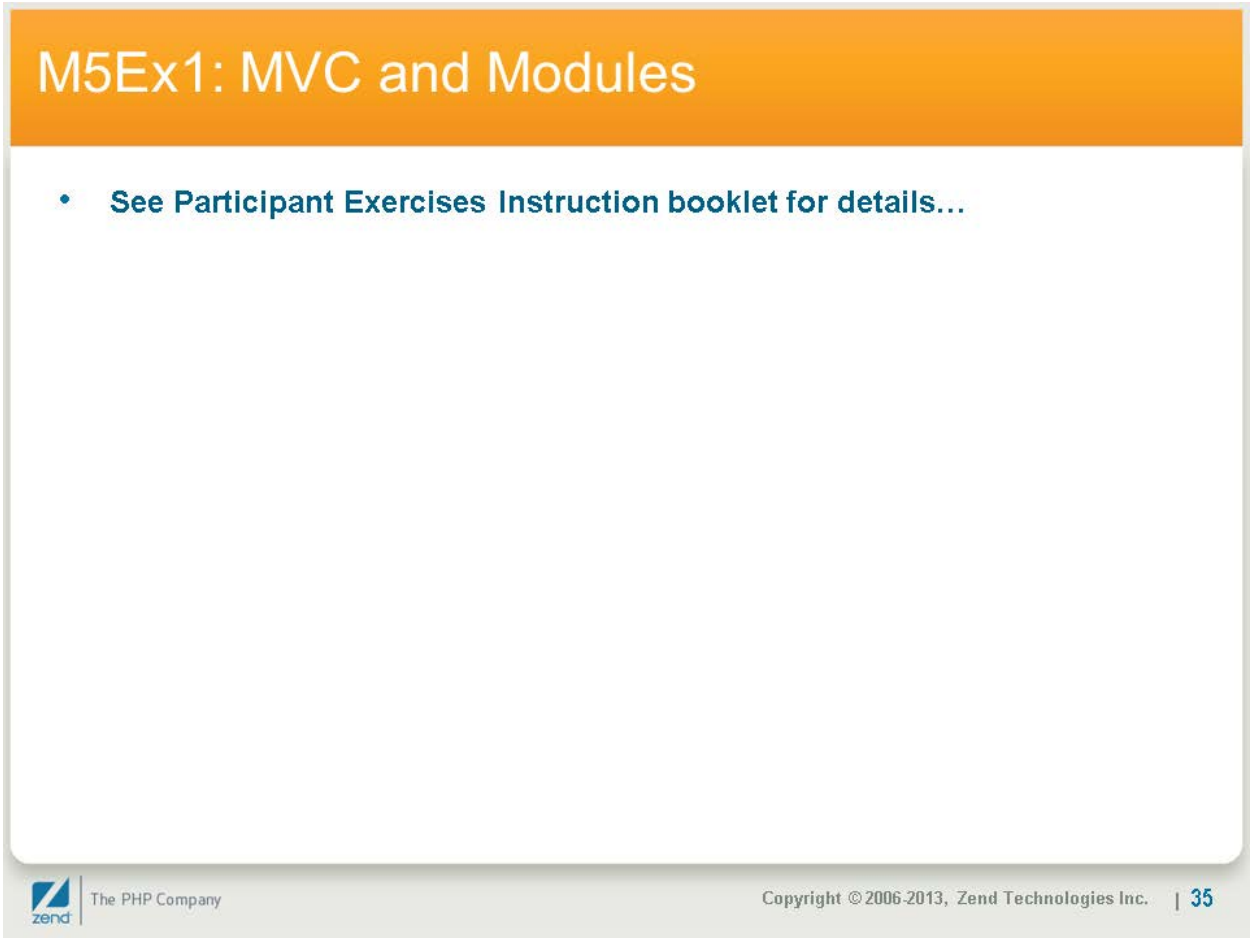
Utilize a vendor prefix for module names

Prefix your module namespace with a vendor prefix

Ex:	Module Namespace	Vendor Prefix
	`PhlyBlog`	`Phly`
	`EdpSuperLuminal`	`Edp`
	`OcraComposer`	`Ocra`
	`ZfcUser`	`Zfc`

The module name should have a good semantic meaning... For example, "Blog" is easy to understand, but "Fury" is hard to interpret-- what does this module offer the user?

Slide 35



Slide 1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Module Six
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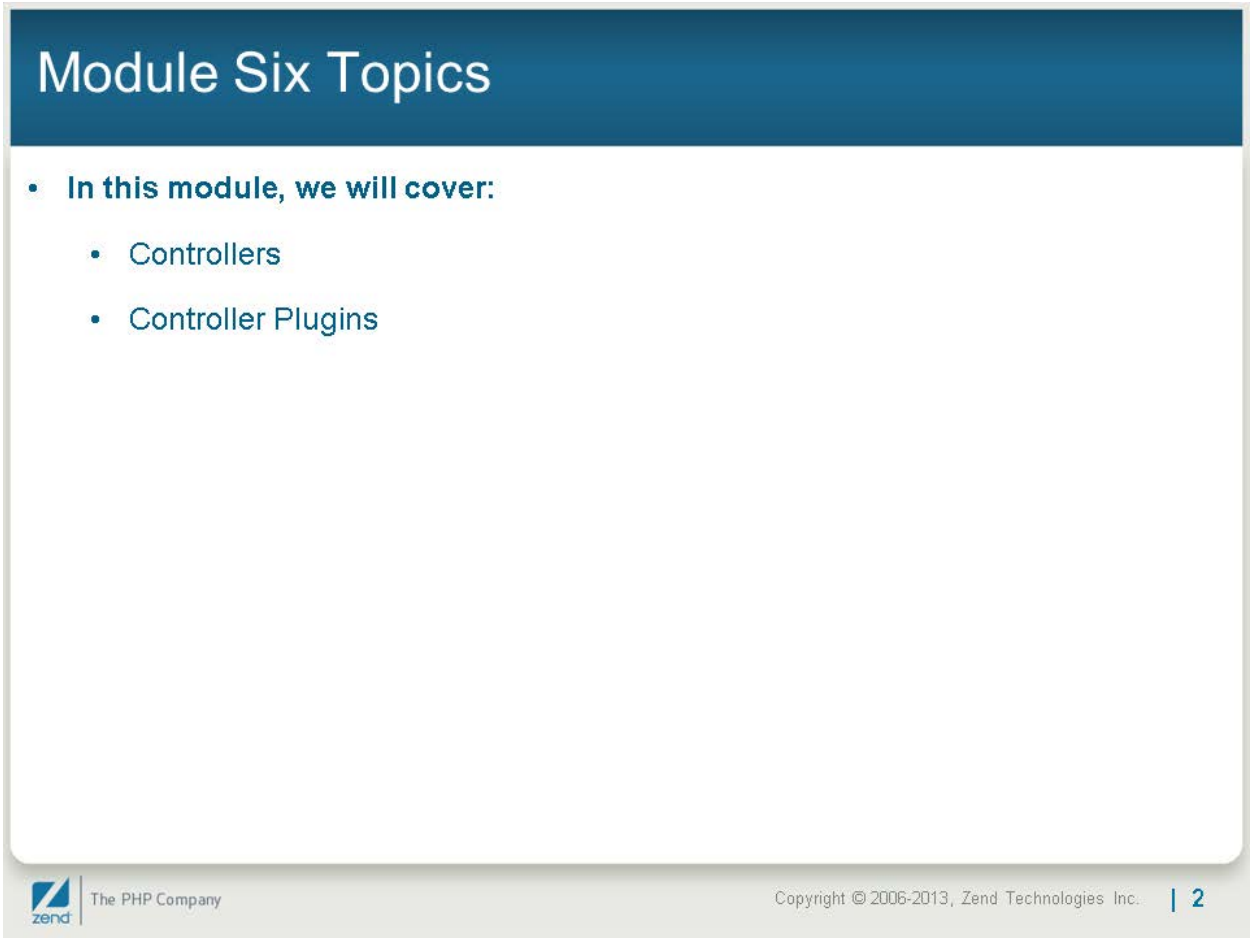
Slide 2


Module Six Topics
In this module, we will cover:
Controllers
Controller Plugins
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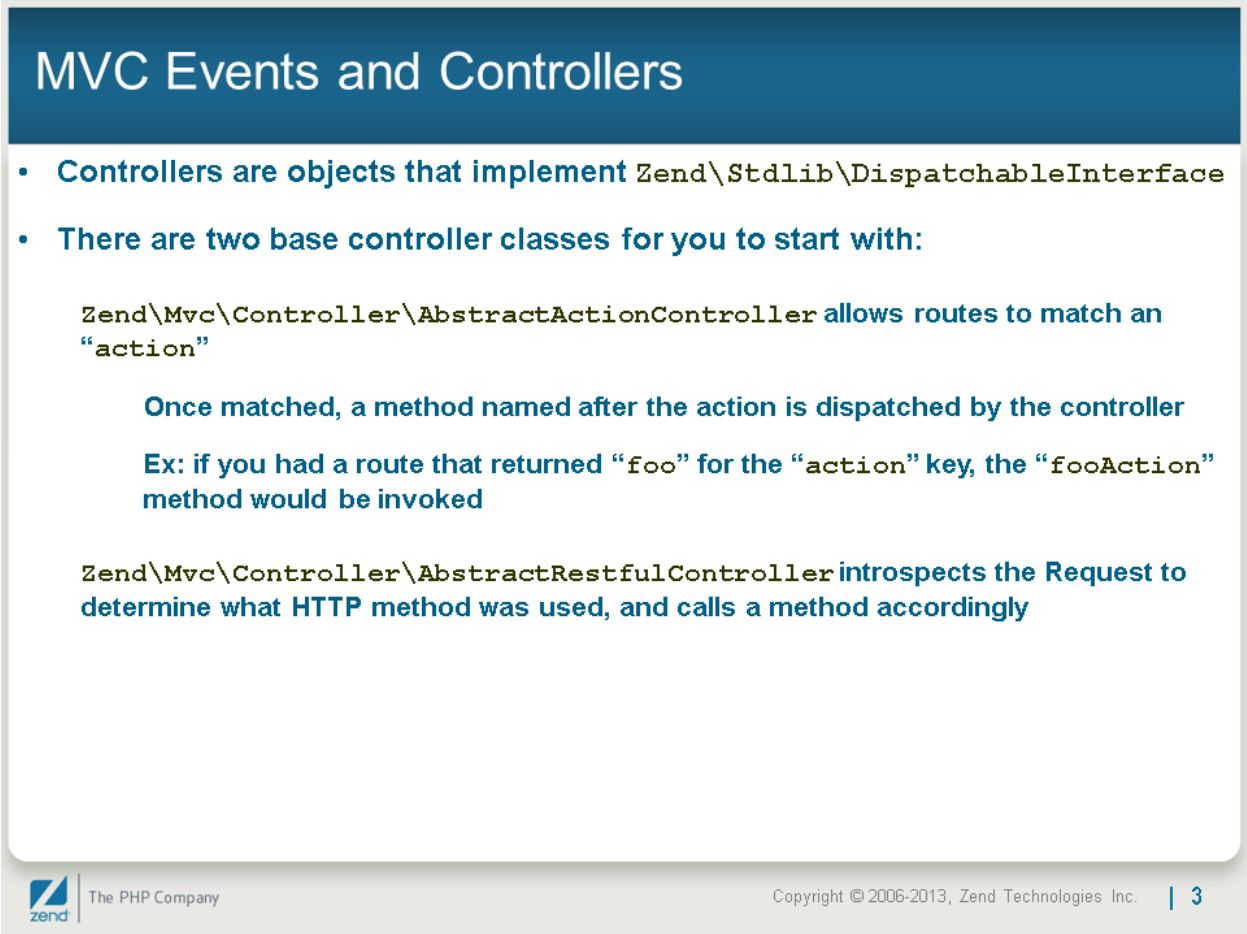
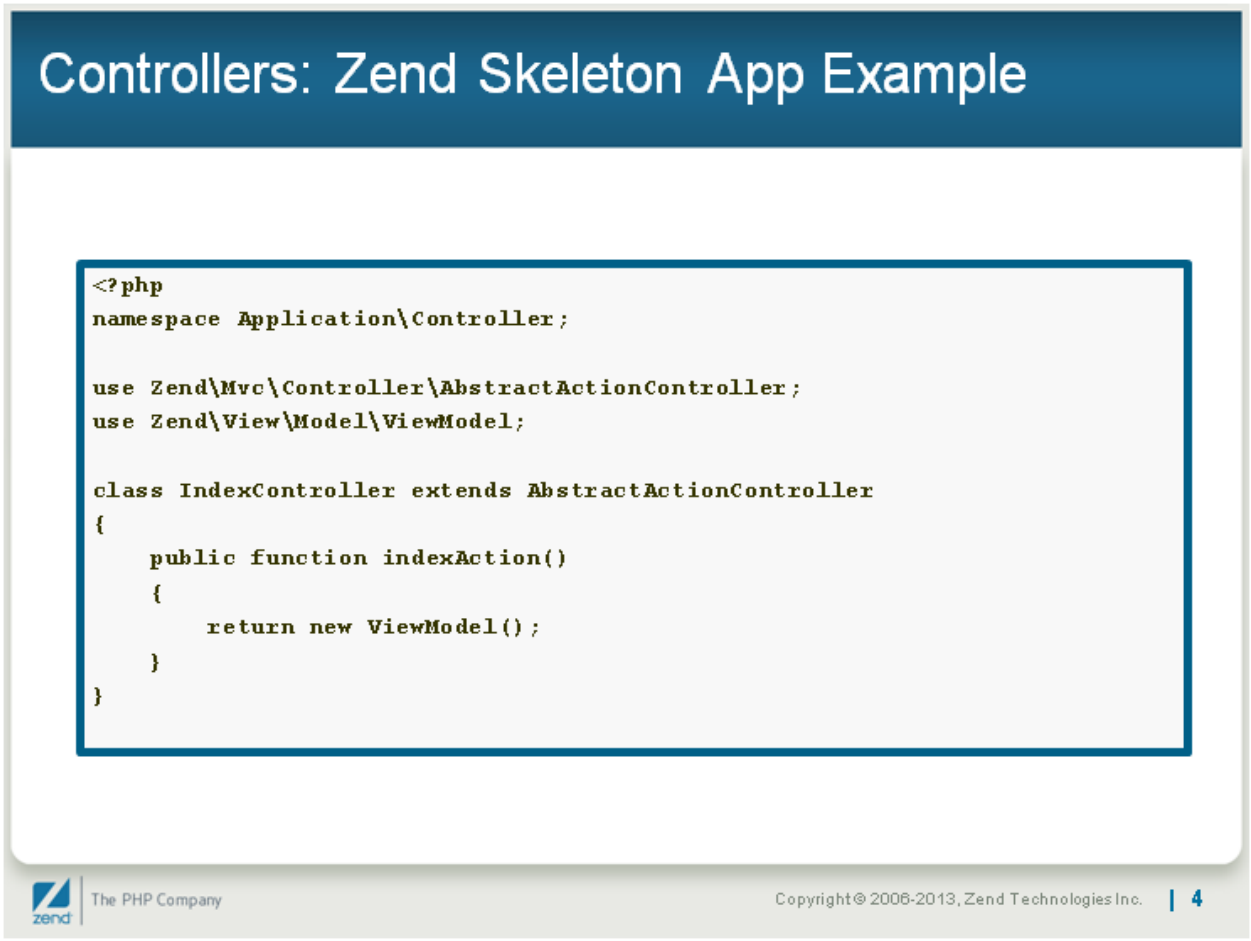
2

Slide 3



- This means they need to implement a dispatch() method that takes minimally a Request object as an argument.

Slide 4


Controllers: Zend Skeleton App Example
<?php
namespace Application\Controller;
use Zend\Mvc\Controller\AbstractActionController;
use Zend\View\Model\ViewModel;
class IndexController extends AbstractActionController
{
public function indexAction()
{
return new ViewModel();
}
}
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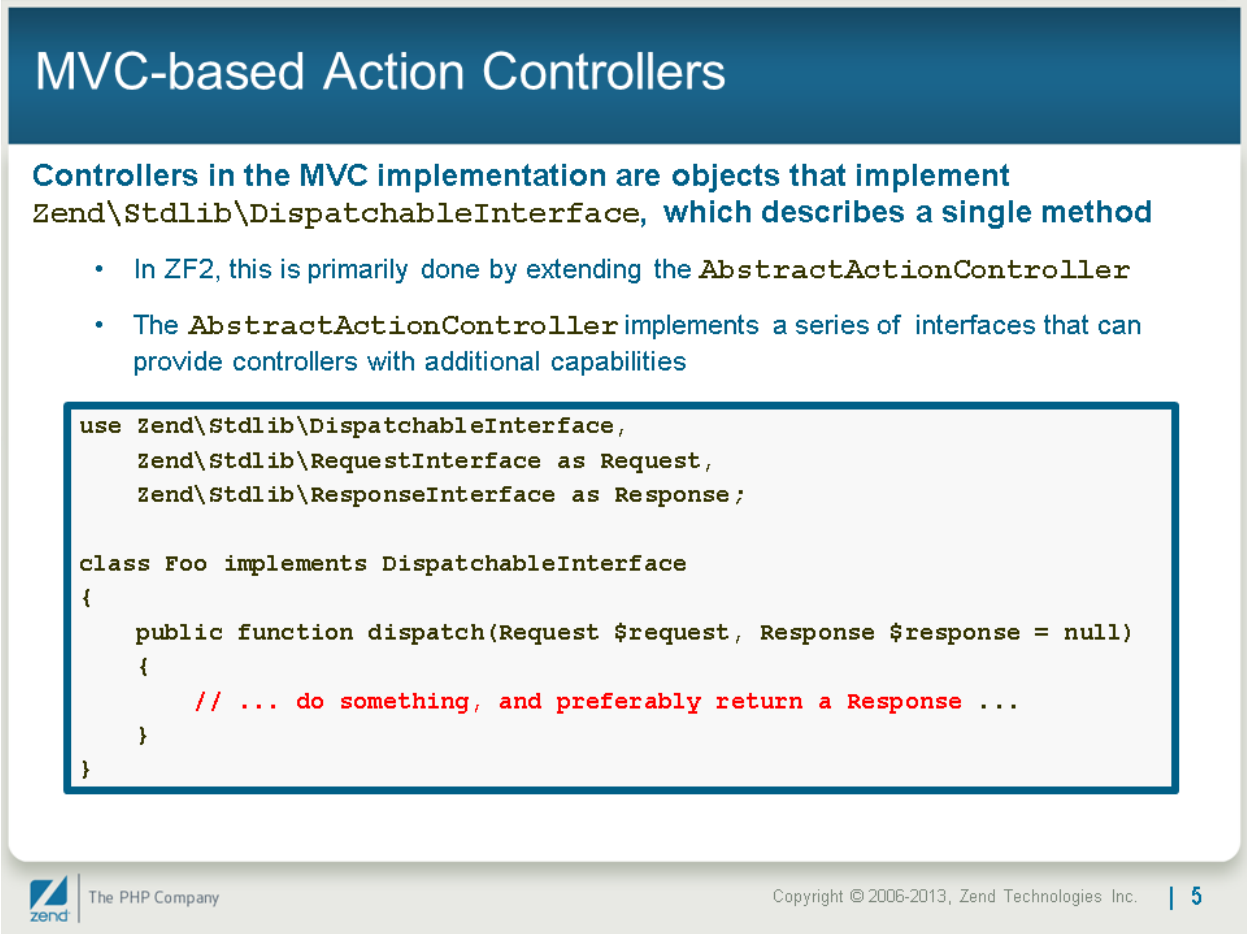
4

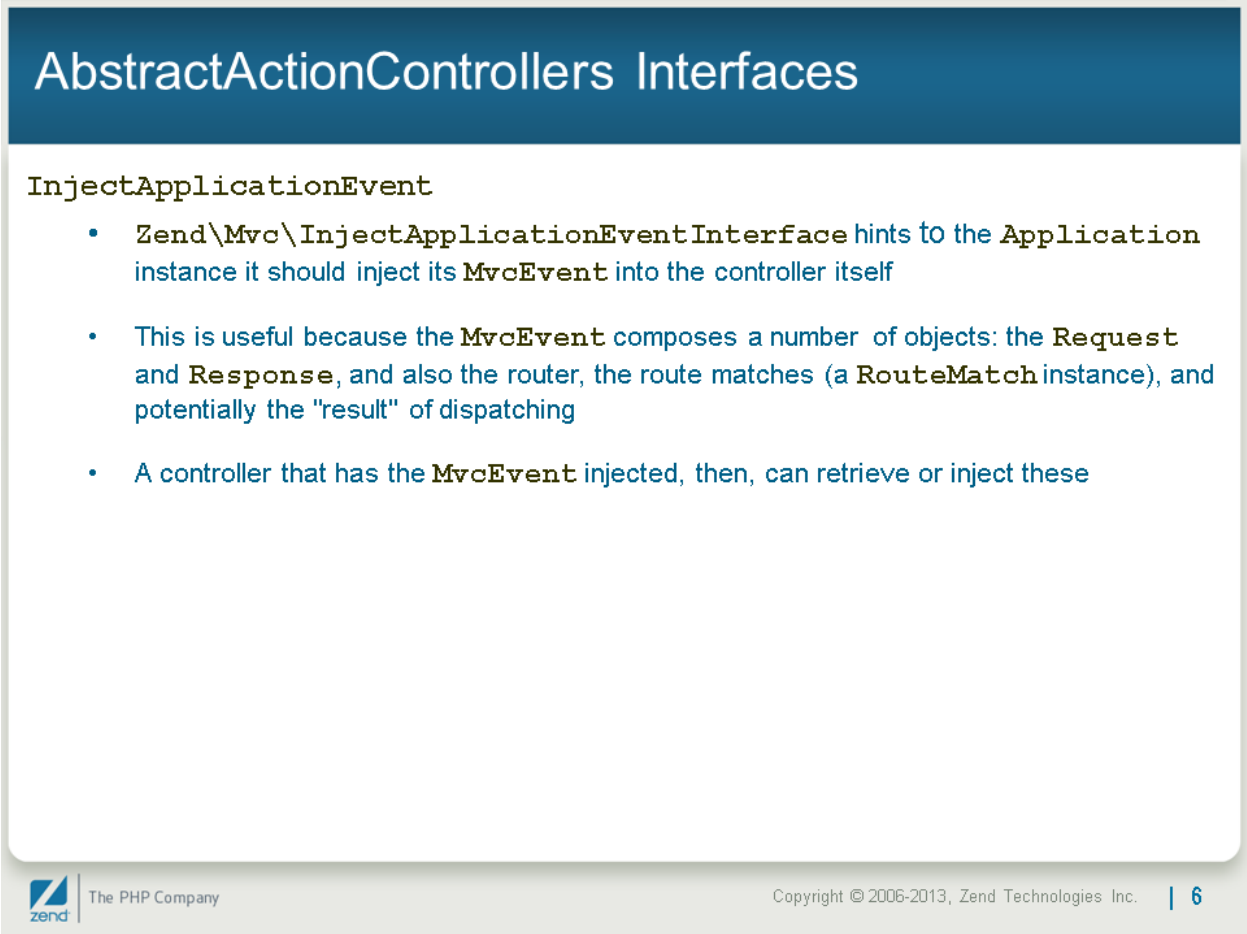
Slide 5



- NOTE: As long as you extend the AbstractActionController, you do not need to implement the following interfaces… that is done for you by the Abstract class
- Here is the list of interfaces that the ActionController within MVC implements:

  \Zend\Mvc\InjectApplicationEventInterface
  \Zend\Stdlib\DispatchableInterface
  \Zend\EventManager\EventManagerAwareInterface
  \Zend\ServiceManager\ServiceLocatorAwareInterface

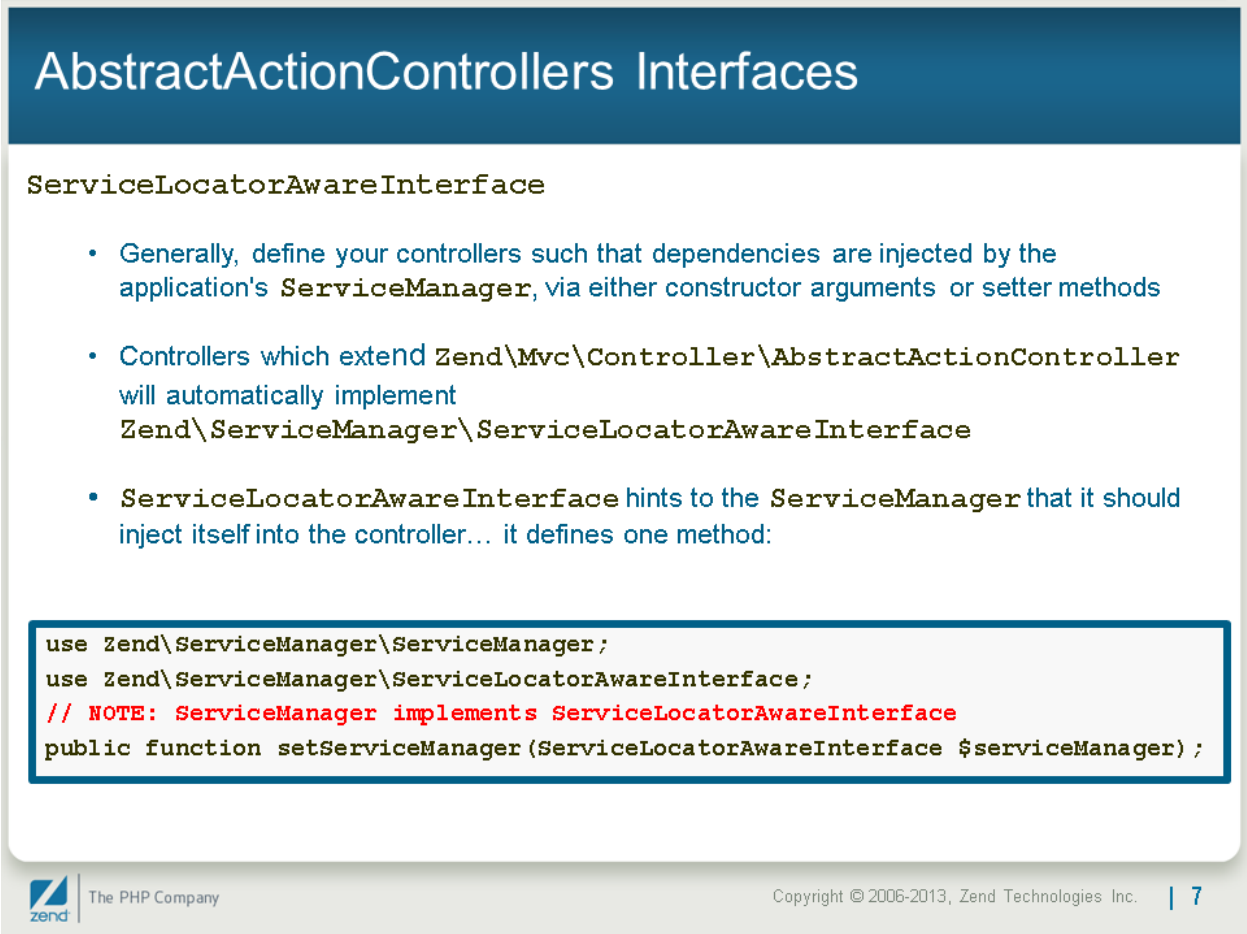
Slide 6



- The InjectApplicationEventInterface defines simply two methods:

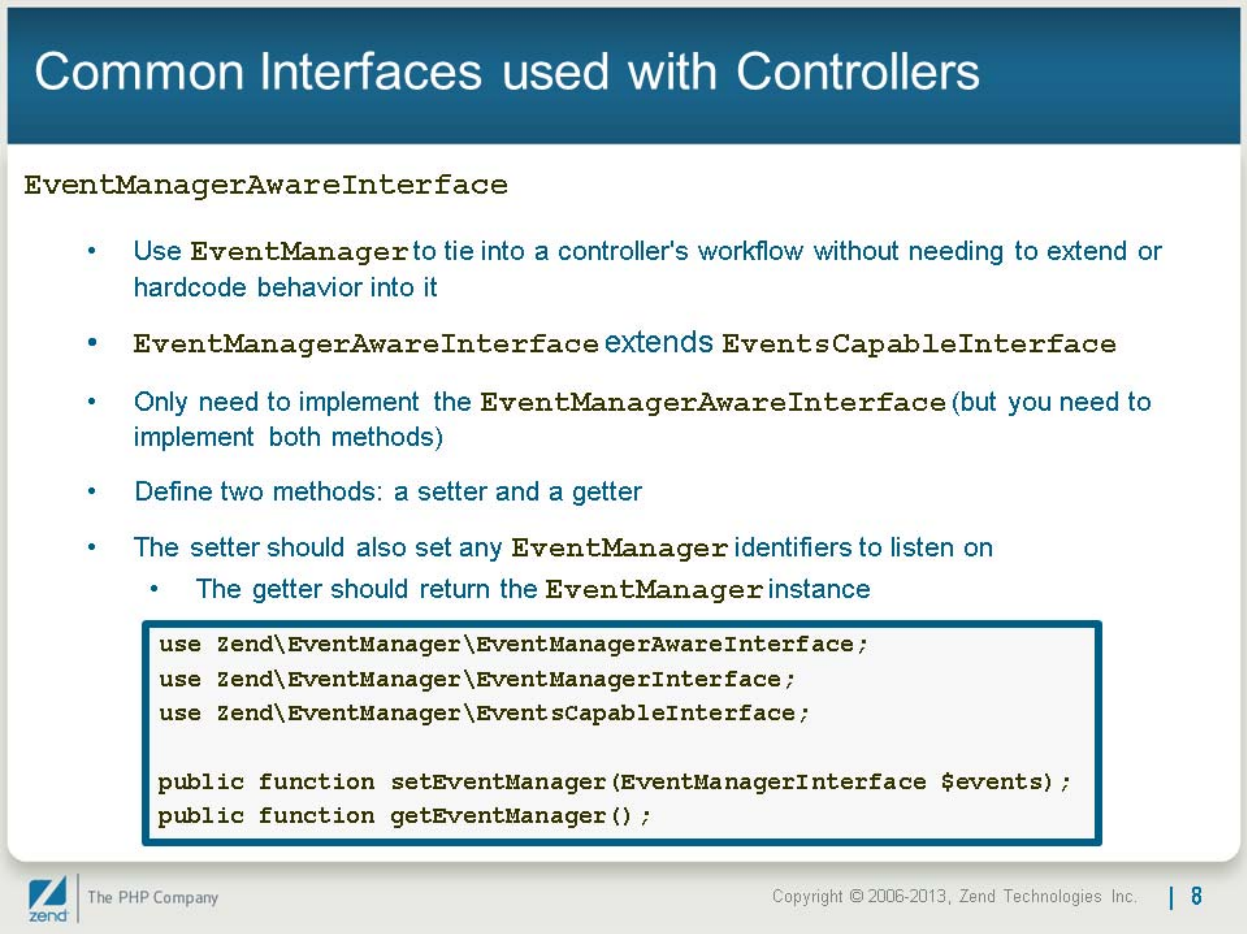
```
use Zend\EventManager\EventDescription as Event;

public function setEvent(Event $event);
public function getEvent($event);
```

Slide 7



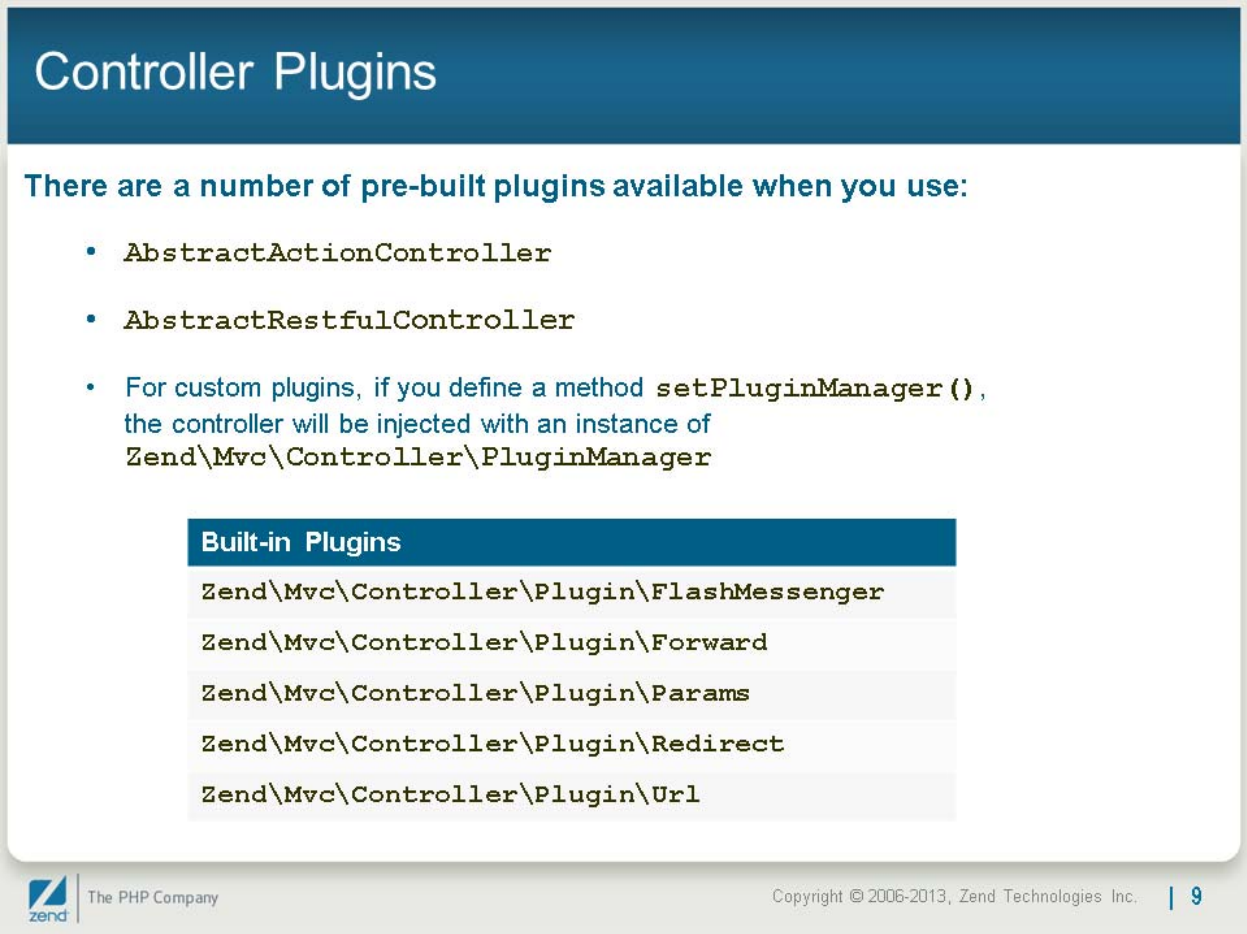
- The main purpose for composing the service locator is actually for plugins that interact with the application workflow
- For example, the forward() plugin needs to be able to fetch another controller, and so needs access to the service manager and controller manager

Slide 8



- The EventManagerAwareInterface tells the ServiceManager to inject an EventManager
- The EventsCapableInterface tells other objects that this class has an accessible EventManager instance

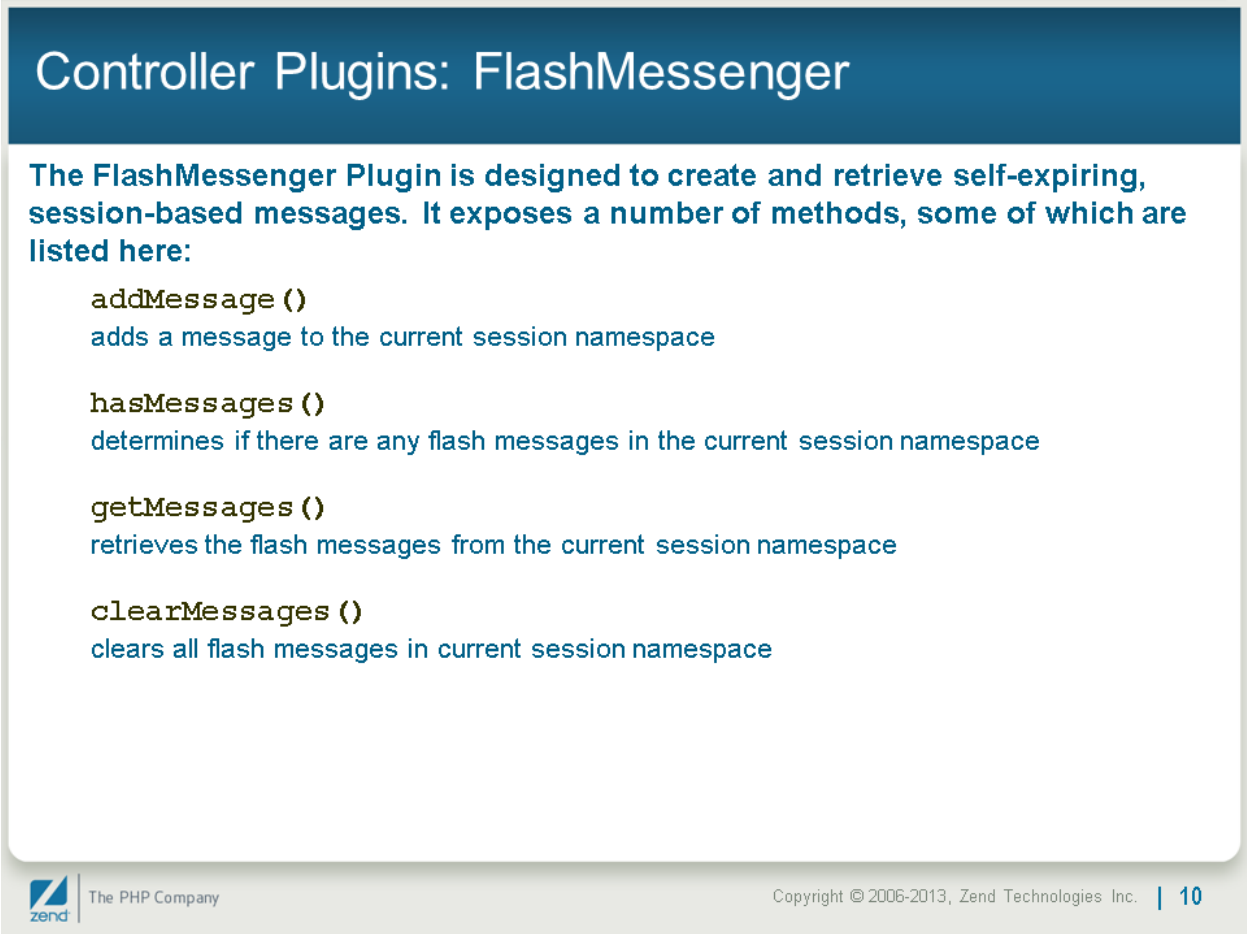
Slide 9



- The ActionController and RestfulController have __call() implementations that allow you to retrieve plugins via method calls:

```
$plugin = $this->url();
```

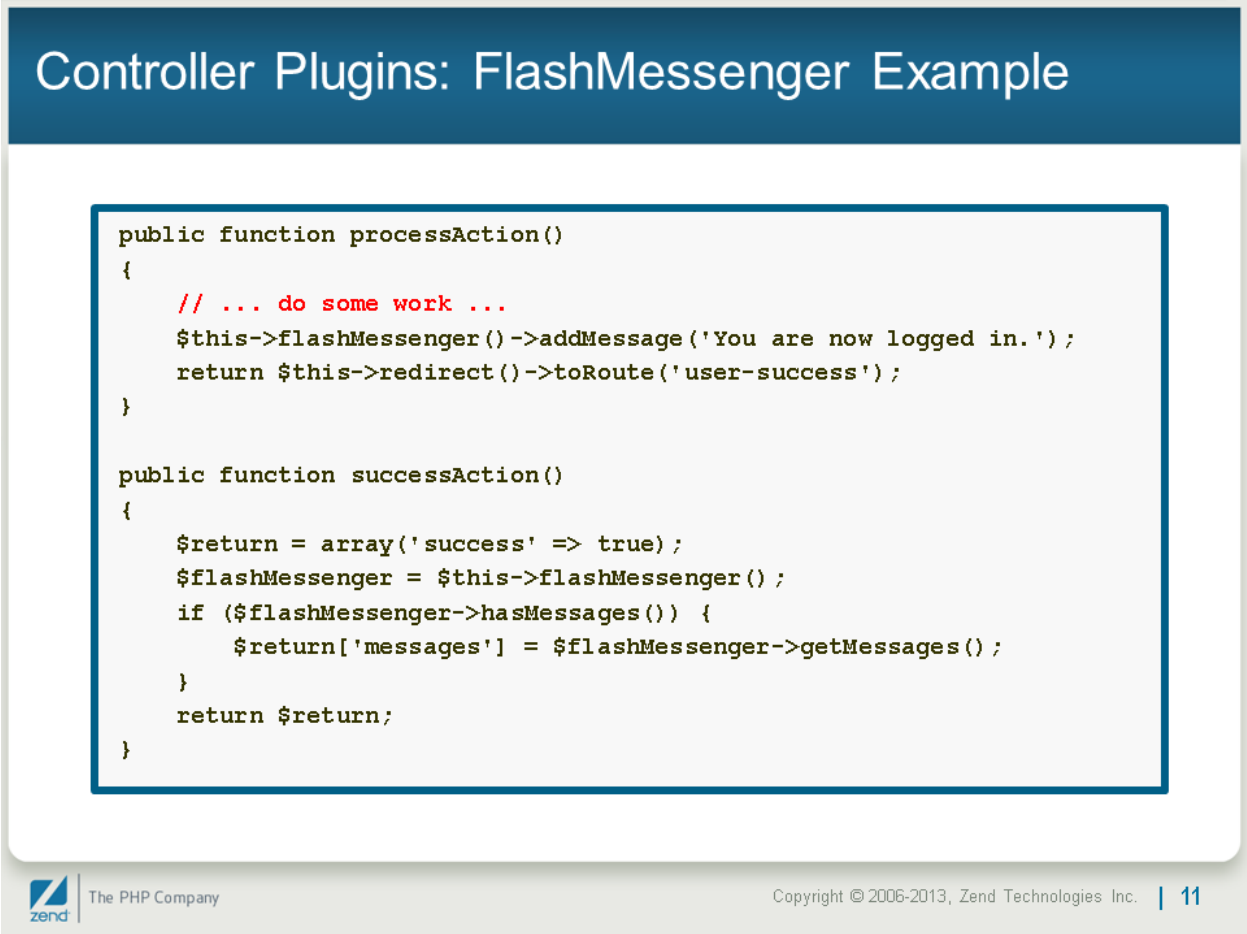
Slide 10



- The complete list of FlashMessenger Plugin methods can be found in the ZF2 Reference Manual, Section 16.7.1

  http://packages.zendframework.com/docs/latest/manual/en/zend.mvc.controller-plugins.html#zend.mvc.controller-plugins.flashmessenger

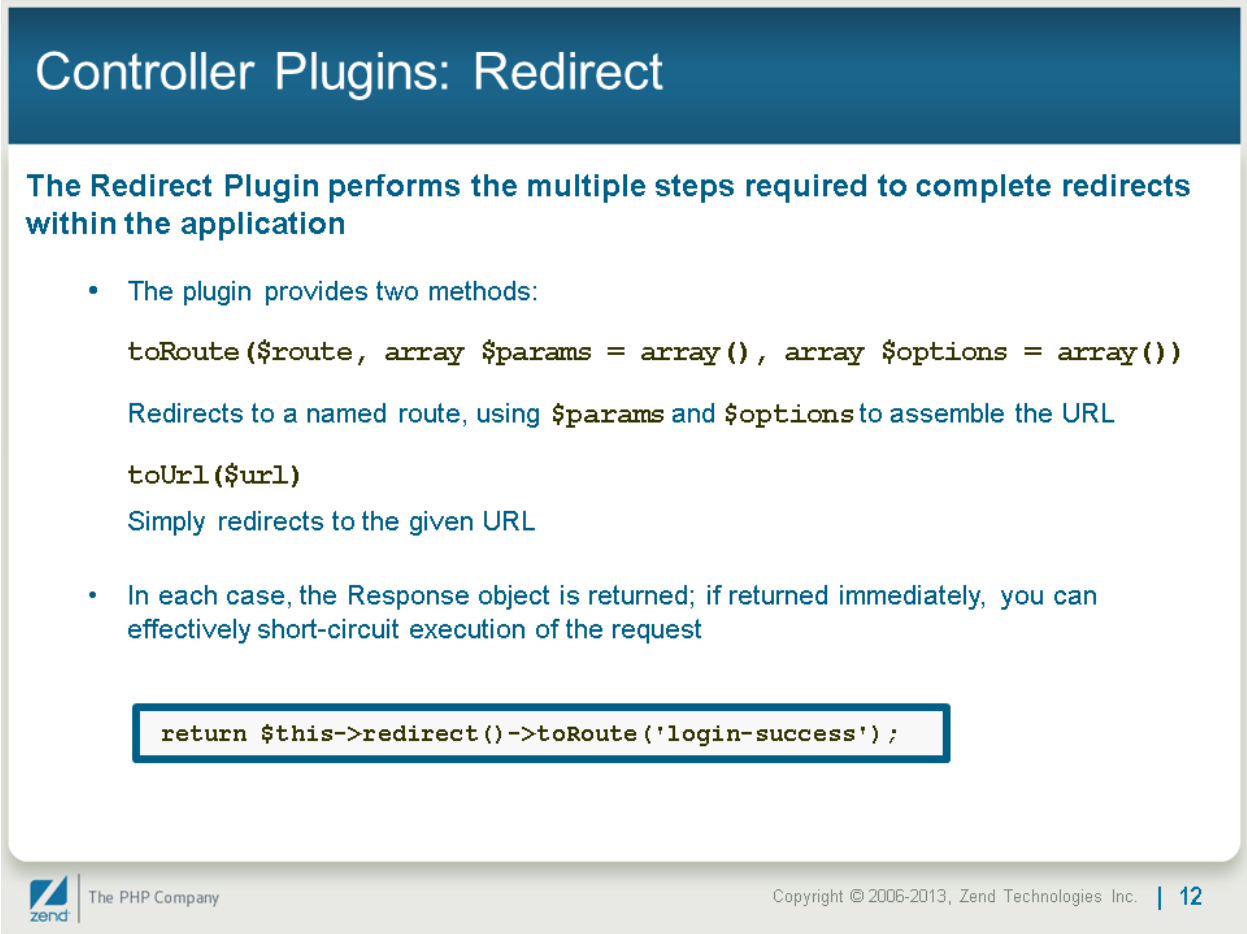
Slide 11



- The complete list of FlashMessenger Plugin methods can be found in the ZF2 Reference Manual, Section 16.7.1

  http://packages.zendframework.com/docs/latest/manual/en/zend.mvc.controller-plugins.html#zend.mvc.controller-plugins.flashmessenger

Slide 12



- To set up redirect operations manually, you would need to:
  - Assemble a URL using the router
  - Create and inject a "Location" header into the Response object, pointing to the assembled URL
  - Set the status code of the Response object to one of the 3xx HTTP statuses

  The Redirect plugin saves you all this work…
- Note: this plugin requires that the controller invoking it implements InjectApplicationEvent, and therefore has an MvcEvent composed, as it retrieves the router from the event object

Slide 13

Controller Plugins: Url

The Url Plugin provides a convenient way of generating URLs from route definitions within the controllers, to seed the view, generate headers, …

```
$url = $this->url()->fromRoute('route-name', $params);
```

- The `fromRoute()` method is the only public method defined, and has the following signature:

```
public function fromRoute($route, array $params = array(),
                          array $options = array())
```

Slide 14

Controller Plugins: Accessing Parameters

The Params Plugin can be used within a controller to access routing parameters, as well as parameters originating from GET or POST

- `fromRoute( string $param, mixed $default = null )`
  returns a parameter from a route match
- `fromQuery( string $param, mixed $default = null )`
  returns a parameter from the URL (`$_GET`)
- `fromPost( string $param, mixed $default = null )`
  returns a post parameter (`$_POST`)
- `fromFiles( $name=null, $default=null )`
  returns information from uploaded files (ex: `$_FILES`)
- `fromHeader( $header=null, $default=null )`
  returns header parameters

```
// examples using the params plugin
$match = $this->params()->fromRoute('admin');
$name = $this->params()->fromPost('name');
$page = $this->params()->fromQuery('page');
```


Slide 15

Accessing a Request & Response

When using `ActionController` or `RestfulController`, the request and response objects are composed directly into the controller, as soon as `dispatch()` is called

- You can access them in the following ways

```
// Using explicit accessor methods
$request  = $this->getRequest();
$response = $this->getResponse();
```

- If the controller implements `InjectApplicationEventInterface` (as both `ActionController` and `RestfulController` do), you can also access these objects from the attached `MvcEvent`

```
$event    = $this->getEvent();
$request  = $event->getRequest();
$response = $event->getResponse();
```

Slide 16

Accessing Routing Parameters

The parameters returned when routing completes are wrapped in a `Zend\Mvc\Router\RouteMatch` object... this object is detailed in the section on routing

- Within your controller, if you implement `InjectApplicationEventInterface` (as both `ActionController` and `RestfulController` do), you can access this object from the attached `MvcEvent`
- Once you have the `RouteMatch` object, you can pull parameters from it

```
$event   = $this->getEvent();
$match = $event->getRouteMatch();
```

- There is a `params()` plugin that can be used to access `GET` and `POST` parameters, as well as provide easy access to routing parameters

Slide 17

Returning Early

You can effectively short-circuit execution of the application at any point by returning a `Response` from your controller or any event

- When such a value is discovered, it halts further execution of the EM, bubbling up to the `Application` instance, where it is immediately returned
- As an example, the `Redirect` plugin returns a `Response`, which can be returned immediately so as to complete the request as quickly as possible
- Other use cases might be for returning JSON or XML results from web service endpoints, returning `"401 Forbidden"` results, etc.

Slide 18

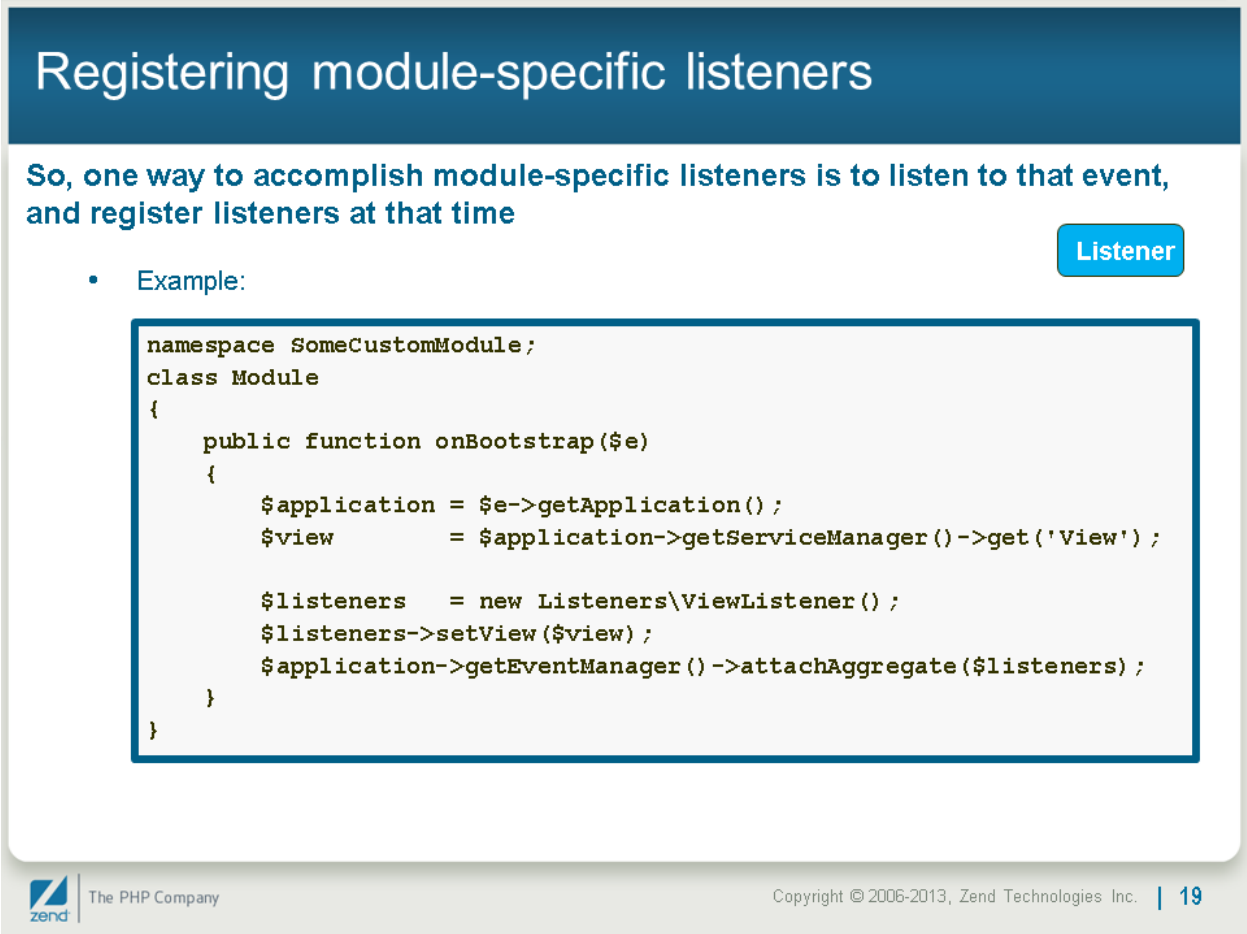
Registering module-specific listeners

You may want to use module-specific listeners as a simple and effective way to introduce authorization, logging, or caching into your application

Listeners

- Each Module class can have an optional `onBootstrap()` method
  - Typically, you'll do module-specific configuration, or setup event listeners, for your module here
  - The `onBootstrap()` method is called for every module on every page request and should only be used for performing lightweight tasks such as registering event listeners
- In ZF2, the provided base `Application` class has an `EventManager` associated with it, and once the modules are initialized, it triggers a `"bootstrap"` event, with a `getApplication()` method on the event

Slide 19



- The above demonstrates several things:

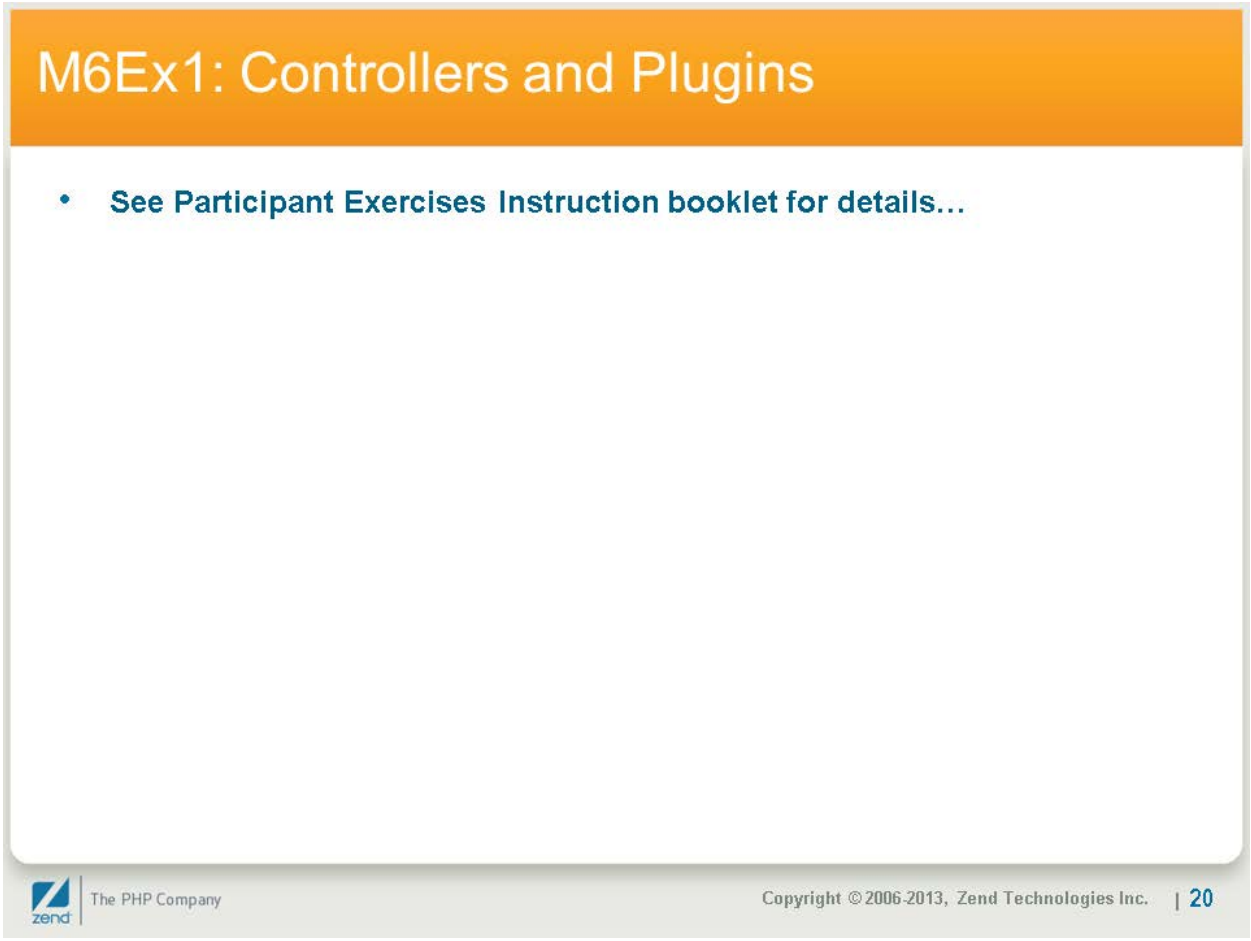
  First, it demonstrates a listener on the application's "bootstrap" event - the onBootstrap() method

  Second, it demonstrates that listener, and how it can be used to register listeners with the application

  It grabs the Application instance; from the Application, it is able to grab the attached service manager and configuration

  These are then used to retrieve the view, configure some helpers, and then register a listener aggregate with the application event manager

Slide 20



Slide 1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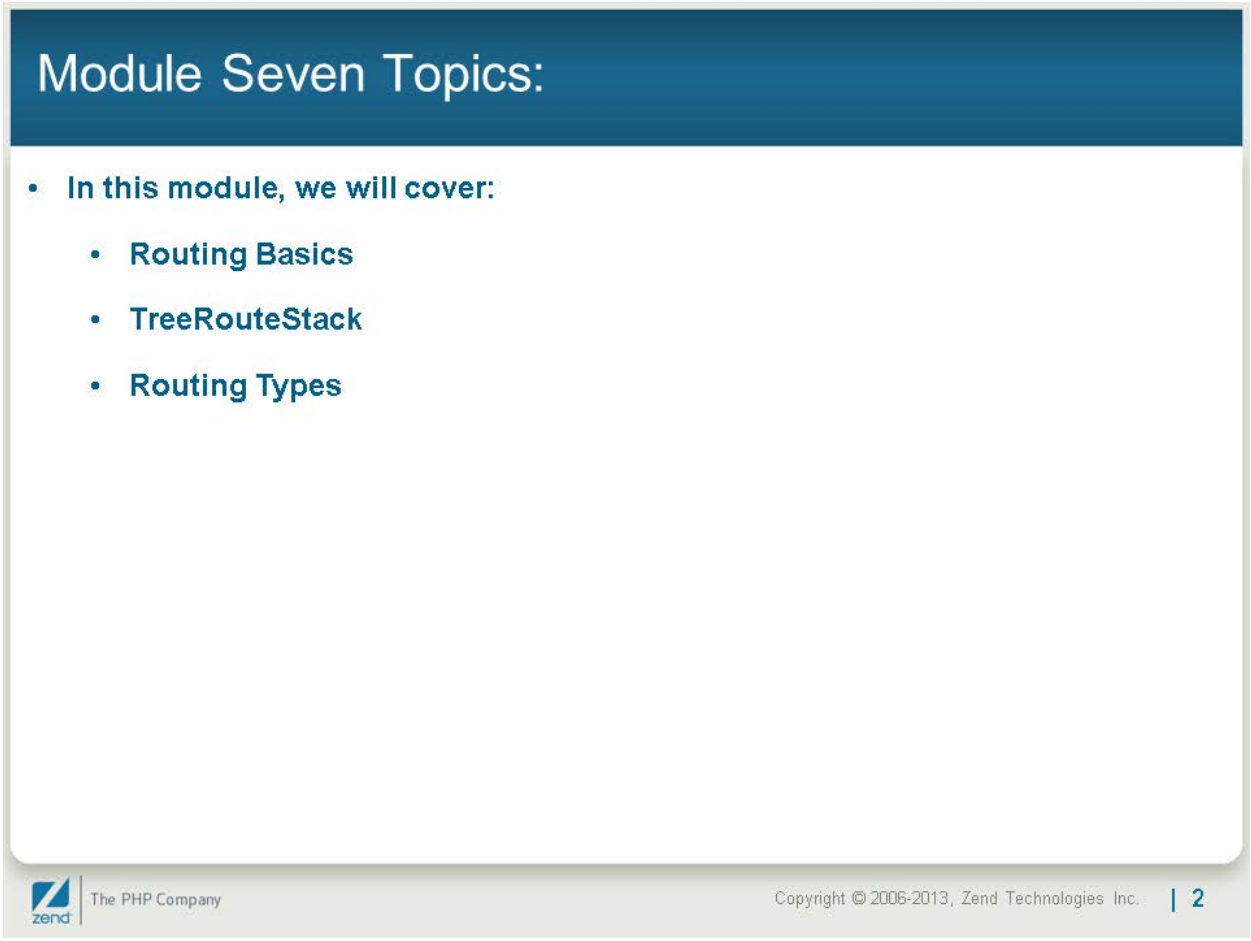
Slide 2


Module Seven Topics:
In this module, we will cover:
Routing Basics
TreeRouteStack
Routing Types
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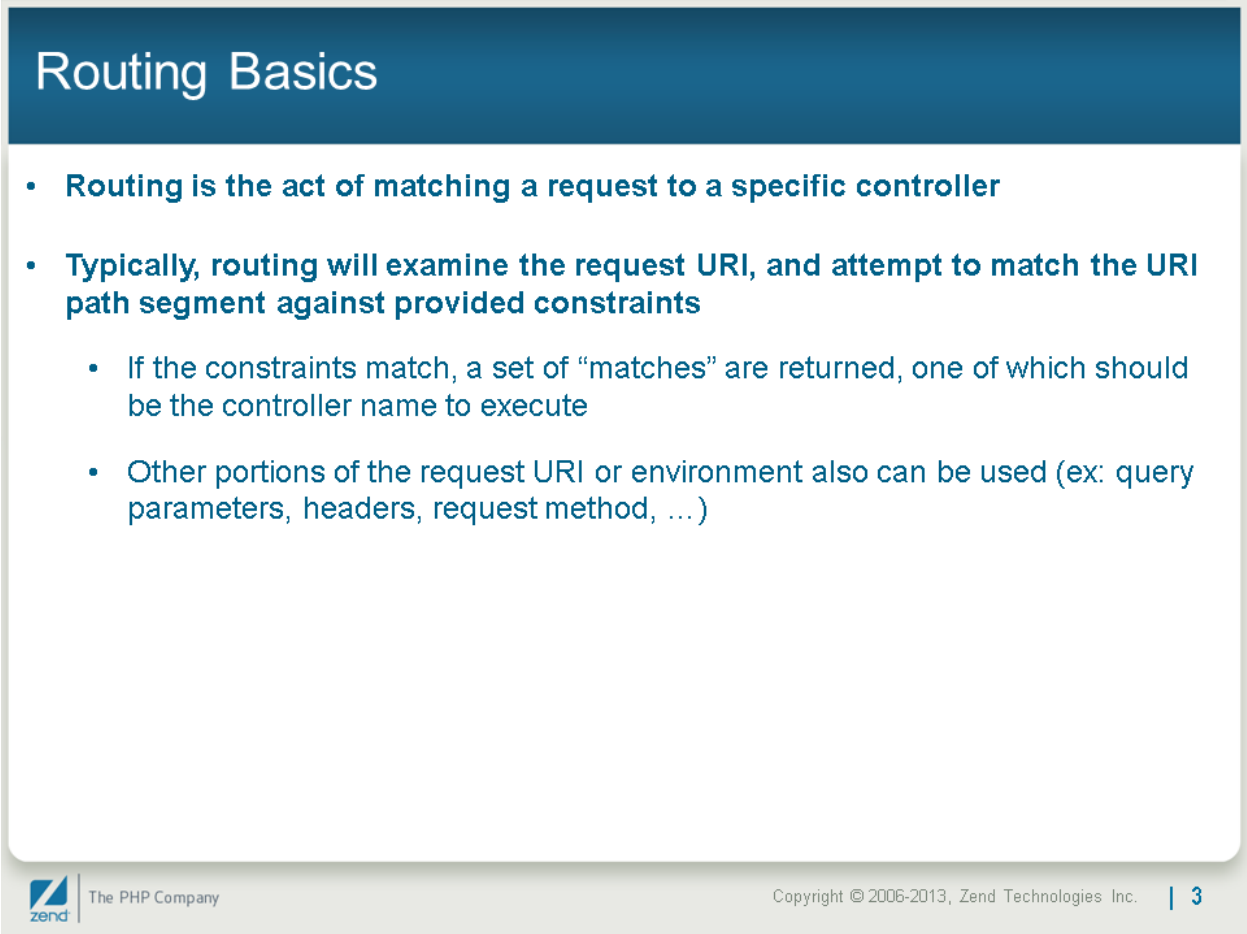
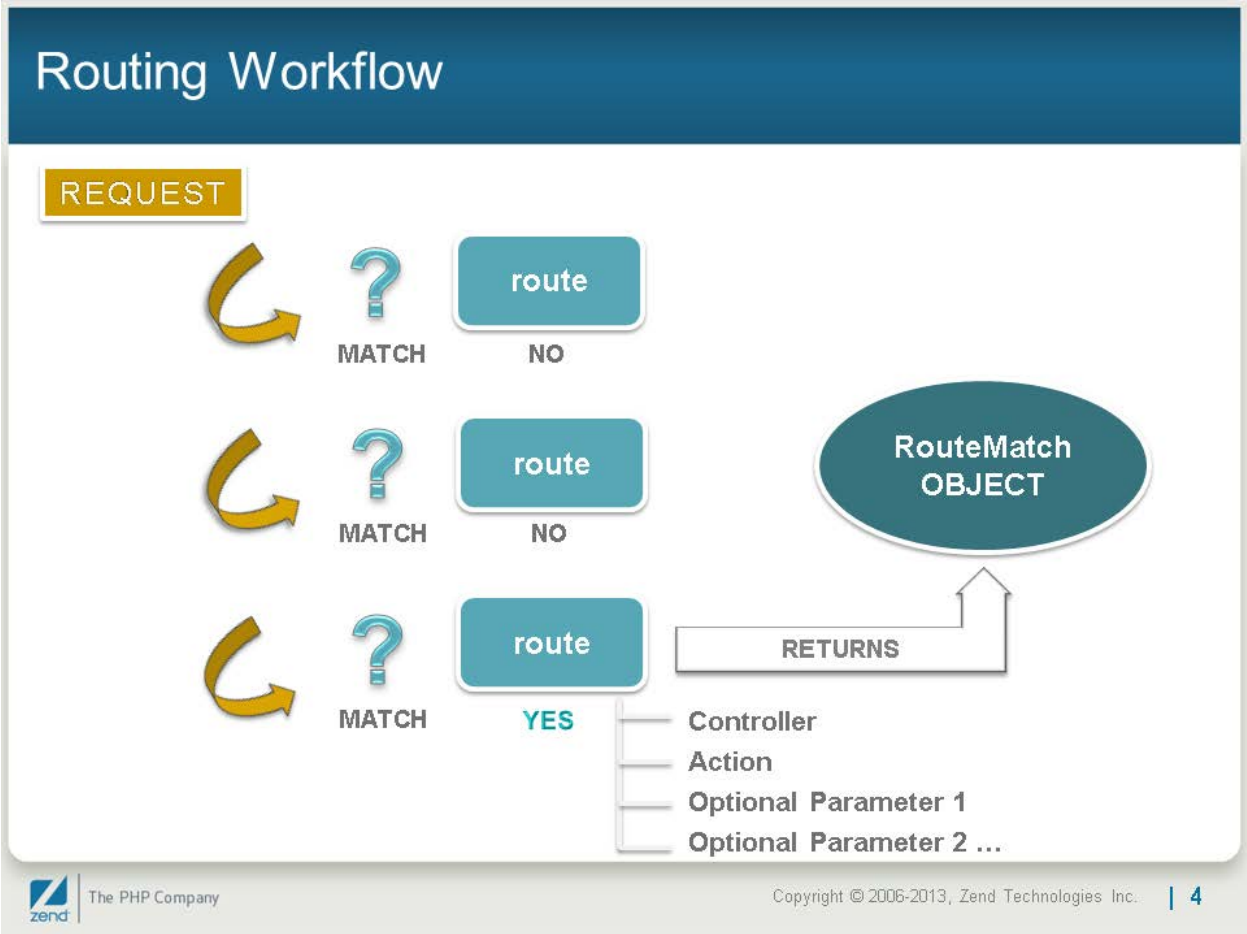
2

Slide 3



- ZF1 Alert
  - Routing has been completely rewritten for ZF2. While execution is similar, the internal workings are more consistent, perform better, and are often simpler
  - Some of the old terminology does not apply in Zend Framework 2.x. In the new routing system we don't have a router as such, as every route can match and assemble URIs by themselves, which makes them routers as well
  - In most cases, this is something the developer does not need to worry about because Zend Framework 2.x takes care of this automatically

Slide 4



- The base unit of routing is a Route
- A Route accepts a Request and determines if it matches
- If so, it returns a RouteMatch object
- The Controller Params plugin has a fromRoute() method, which allows you to retrieve the values of specific parameters from the RouteMatch object

Slide 5

ZF2 Router Types: TreeRouteStack

- **By default, `Zend\Mvc` uses the `TreeRouteStack` as the router**
  - `Zend\Mvc\Router\Http\TreeRouteStack` registers trees of routes, and uses a `B-tree` algorithm to match routes; you register a single route with many children
- **A `TreeRouteStack` consists of the following configuration:**
  - A base "`route`", describing the base match needed (root of the tree)
  - An optional "`route_plugins`", a configured `Zend\Mvc\Router\RoutePluginManager` that can lazy-load routes
  - The option "`may_terminate`" can be set to `TRUE`, which informs the router it is permissible for the route match to stop at this point
  - An optional "`child_routes`" array, containing additional routes that stem from the base "`route`" (that is, build from it)
    - **Each child route can itself be a TreeRouteStack if desired; in fact, the Part route works exactly this way**

Slide 6

ZF2 Router Types: TreeRouteStack

- When a route matches against a `TreeRouteStack`, the matched parameters from each segment of the tree will be returned
- A `TreeRouteStack` can be the sole route for the application, or can describe particular path segments of the application

Slide 7

ZF2 HTTP Route Types

ZF2 provides eight HTTP route types:

1. **Zend\Mvc\Router\Http\Hostname**
   attempts to match the hostname registered in the request against specific criteria

2. **Zend\Mvc\Router\Http\Literal**
   used for exact matching of the URI path

3. **Zend\Mvc\Router\Http\Method**
   used to match the http method or 'verb' specified in the request

4. **Zend\Mvc\Router\Http\Part**
   allows crafting a tree of possible routes based on segments of the URI path; it actually extends the `TreeRouteStack`

Slide 8

ZF2 HTTP Route Types

ZF2 provides eight HTTP route types:

5. **Zend\Mvc\Router\Http\Regex**
   utilizes a regular expression to match against the URI path… any valid regular expression is allowed

6. **Zend\Mvc\Router\Http\Scheme**
   matches the URI scheme only (must be an exact match); takes what you want to match and the "defaults", parameters to return on a match (like Literal)

7. **Zend\Mvc\Router\Http\Segment**
   allows matching any segment of a URI path; segments are denoted using a colon, followed by alphanumeric characters

8. **Zend\Mvc\Router\Http\Query**
   allows you to specify and capture query string parameters for a given route

Slide 9

Code Example: Zend\Mvc\Router\Http\Hostname

```
// from the module.config.php file under the key 'router' => 'routes'
'subdomain-post' => array(
        'type' => 'Zend\Mvc\Router\Http\Hostname',
        'options' => array(
                'route' => 'post.onlinemarket.com',
                'defaults' => array(
                        'controller' => 'market-post-controller',
                        'action'     => 'index',
                ),
        ),
),
```

Slide 10

Code Example: Zend\Mvc\Router\Http\Literal

```
// from the module.config.php file under the key 'router' => 'routes'
'market-post' => array(
        'type' => 'Zend\Mvc\Router\Http\Literal',
        'options' => array(
                'route' => '/market/post',
                'defaults' => array(
                        'controller' => 'market-post-controller',
                        'action'     => 'index',
                ),
        ),
),
```

Slide 11

Code Example: Zend\Mvc\Router\Http\Method

```
// from the module.config.php file under the key 'router' => 'routes'
'market-delete-confirm' => array(
        'type' => 'Zend\Mvc\Router\Http\Method',
        'options' => array(
                'verb' => 'post,put',
                'defaults' => array(
                        'controller' => 'market-delete-controller',
                        'action'     => 'delete-confirm',
                ),
        ),
),
```

Slide 12

Code Example: Zend\Mvc\Router\Http\Part

```
// from the module.config.php file under the key 'router' => 'routes'
'market-item' => array(
        'type'    => 'Literal',
        'options' => array(
                'route'    => '/market/item',
                'defaults' => array(
                        'controller'    => 'market-view-controller',
                        'action'        => 'item',
                ),
        ),
        'may_terminate' => true,
        'child_routes' => array(
                'default' => array(
                        'type'    => 'Segment',
                        'options' => array(
                                'route'    => '[/:id][/]',
                                'constraints' => array(
                                        'id'     => '[0-9]*',
                                ),
                        ),
                ),
        ),
),
```

Slide 13

Code Example: Zend\Mvc\Router\Http\Regex

```
// from the module.config.php file under the key 'router' => 'routes'
'market-view-item' => array(
        'type'    => 'Regex',
        'options' => array(
                'regex'    => '/view/(?<id>[0-9]+)',
                'spec'      => '/view/%id%',
                'defaults' => array(
                        'controller'    => 'market-view-controller',
                        'action'         => 'item',
                        'id'                    => 1,
                ),
        ),
),
```

Slide 14

Code Example: Zend\Mvc\Router\Http\Scheme

```
// from the module.config.php file under the key 'router' => 'routes'
'market-purchase' => array(
        'type' => 'Zend\Mvc\Router\Http\Scheme',
        'options' => array(
                'scheme' => 'https',
                'defaults' => array(
                   'https'       => true,
                        'controller' => 'market-purchase-controller',
                        'action'     => 'index',
                ),
        ),
),
```

Slide 15

Code Example: Zend\Mvc\Router\Http\Segment

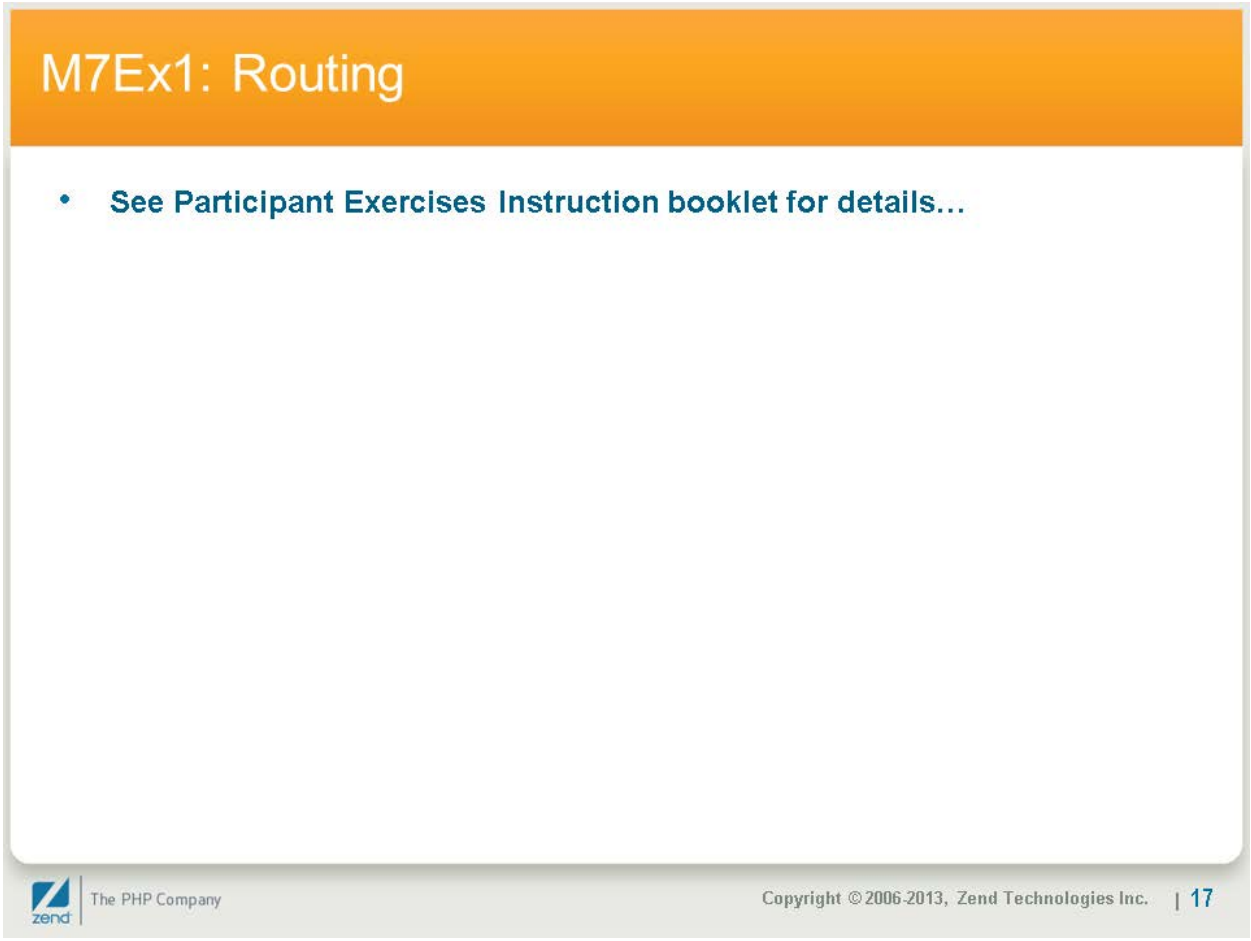
```
// from the module.config.php file under the key 'router' => 'routes'
'market-general' => array(
        'type'  => 'Zend\Mvc\Router\Http\Segment',
        'options' => array(
                'route' => '/[:controller][/][:action]',
                'constraints' => array(
                        'controller' => '[a-zA-Z][a-zA-Z0-9_-]+',
                        'action'     => '[a-zA-Z][a-zA-Z0-9_-]+',
                ),
                'defaults' => array(
                        'controller' => 'market-index-controller',
                        'action'     => 'index',
                ),
        ),
),
```

Slide 16

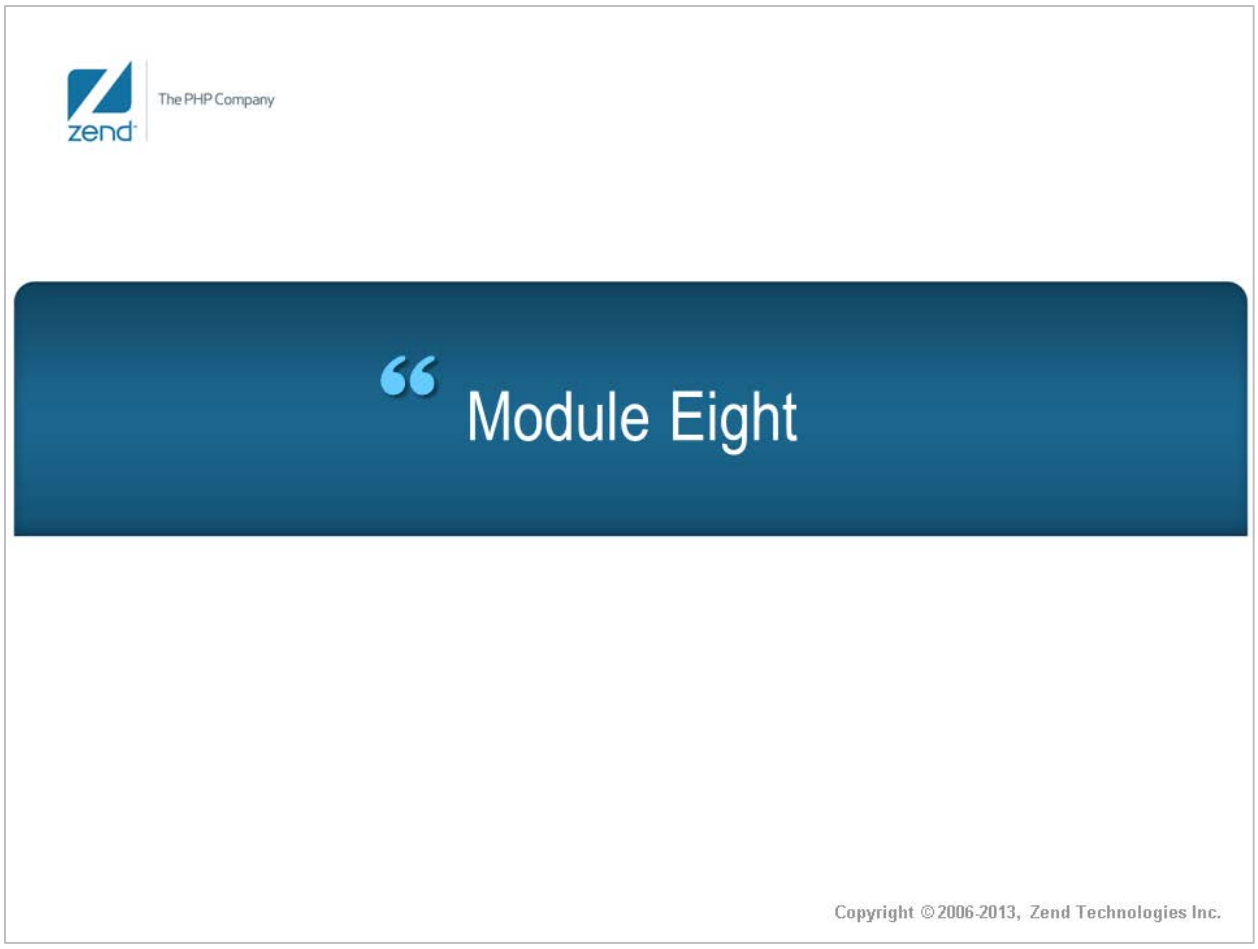
Code Example: Zend\Mvc\Router\Http\Query

```
// from the module.config.php file under the key 'router' => 'routes'
'market-item-query' => array(
        'type'    => 'Zend\Mvc\Router\Http\Segment',
        'options' => array(
                'route'    => '/market/item[/:id]',
                'defaults' => array(
                        'controller'    => 'market-view-controller',
                        'action'        => 'item',
                ),
        ),
        'may_terminate' => true,
        'child_routes' => array(
                'query' => array(
                        'type'    => 'Zend\Mvc\Router\Http\Query',
                        'options' => array(
                                'defaults' => array(),
                        ),
                ),
        ),
),
// in Market/view/market/view/item.phtml
<a href="<?php echo $this->url('market-item-query/query',
      array('id' => $random[rand(1, count($random)-1)],
              'name' => 'TEST')); ?>">View Random Item</a>
```

Slide 17



Slide 1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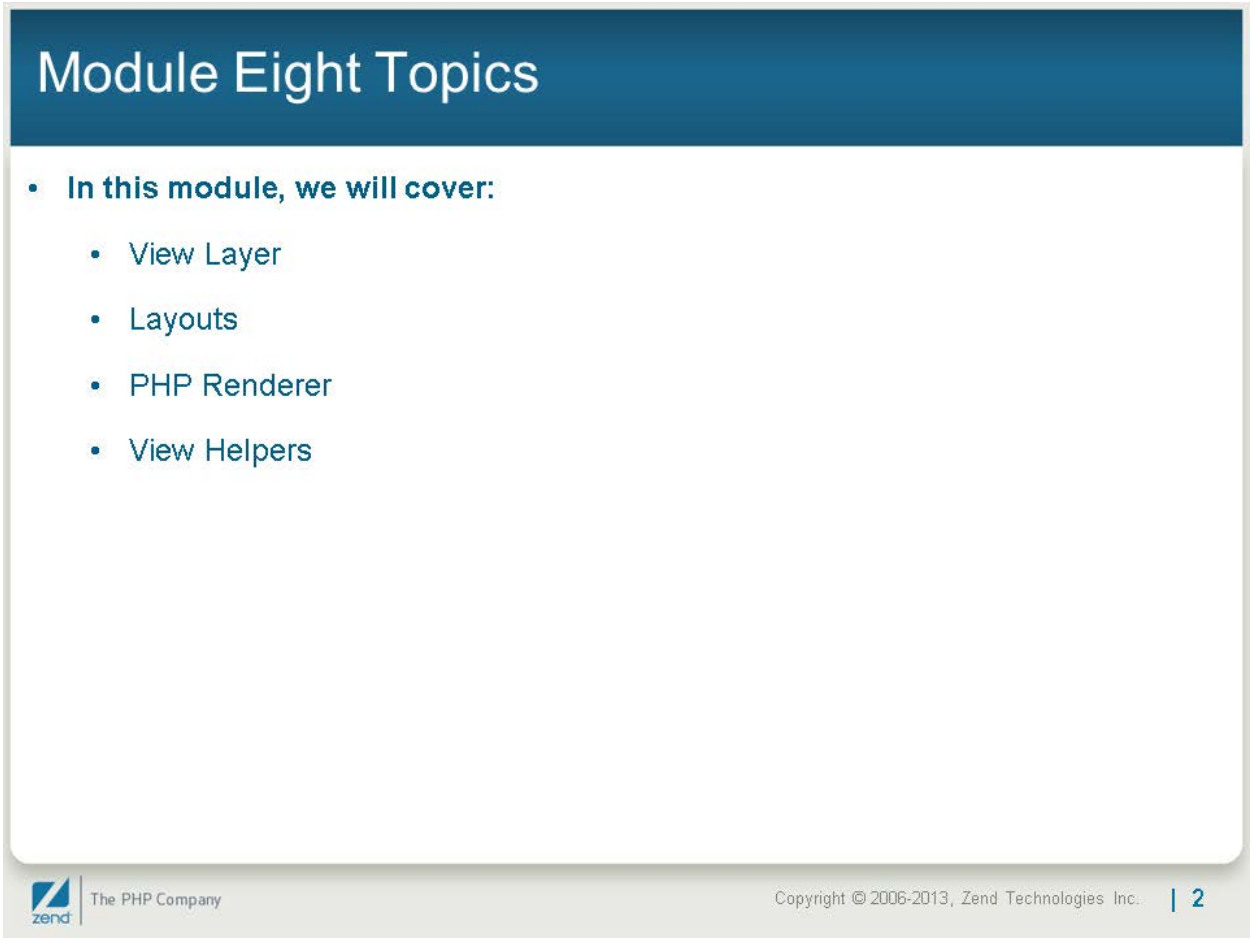
Slide 2


Module Eight Topics
In this module, we will cover:
View Layer
Layouts
PHP Renderer
View Helpers
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2

Slide 3

Zend\View

`Zend\View` provides the "View" layer of Zend Framework's MVC system

- It is a multi-tiered system allowing a variety of mechanisms for extension, substitution, …
- **View Layer** components:
  - **Variables containers…** hold *variables* and *callbacks* that you wish to represent in the view; often, a Variables container will also provide mechanisms for context-specific escaping of variables and more
  - **View Models…** hold *Variables containers*, specify the template to use, if any, and optionally provide rendering options; View Models may be nested in order to represent complex structures
  - **Renderers…** take *View Models* and provide a representation of them to return. ZF2 includes three renderers by default: (1) a "PHP" renderer, which utilizes PHP templates in order to generate markup; (2) a JSON renderer; (3) a Feed renderer, capable of generating RSS and Atom feeds

… more …

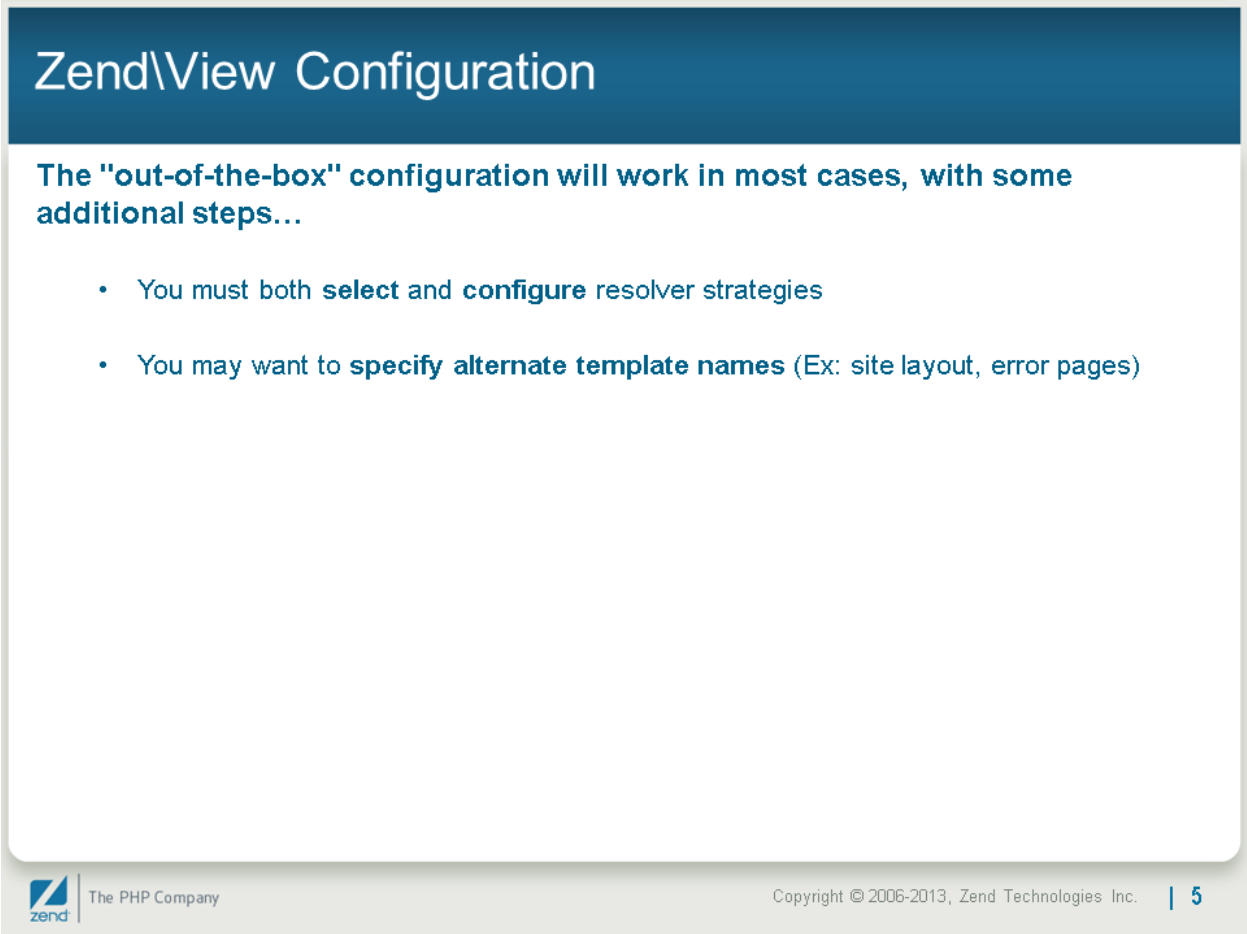
Slide 4

Zend\View

- **View Layer** components:
  - **Resolvers…** resolve a *template name* to a **resource** that a **renderer** may consume; as an example, a resolver may take the name "`blog/entry`" and resolve it to a PHP view script
  - **The View…** consists of *strategies* that map the current **request** to a **renderer**, and strategies for injecting the **response** with the result of rendering
  - **Renderer and Response Strategies…** *Renderer Strategies* listen to the "`renderer`" event of the View, and decide which **renderer** should be selected, based on the **request** or other criteria;

    Response strategies are used to inject the **response** object with the results of **rendering** – this may also include taking actions such as setting `Content-Type` headers

Slide 5



- Section 20.1.2 Usage provides a complete code example for the View configuration

Slide 6

View

View is a relatively simple component – it summons a `ViewEvent`, then triggers two subsequent events – `renderer` and `response`

- Strategies can then be added to select a renderer, as well as manipulate the response (covered shortly…)

Manual Use

Create a `ViewModel` instance in your controller,

Set any variables you want to pass to the renderer,

Specify the template name to use,

Return the instance

Slide 7

View Model

Automated Use

When the template name is based on the action and controller, and you are only passing variables, ZF2 provides an automated process for this, based on registering two listeners for controllers

Listener

Listener 1: Is an associative array returned from your controller?

- If yes, it creates a view model and injects this associative array as the view variables container; the view model replaces the MVC event's result
- If empty/null, it creates a view model without any variables attached; the view model replaces the MVC event's result

Listener 2: Is the MVC event result a view model, and if so, does it have a template associated with it?

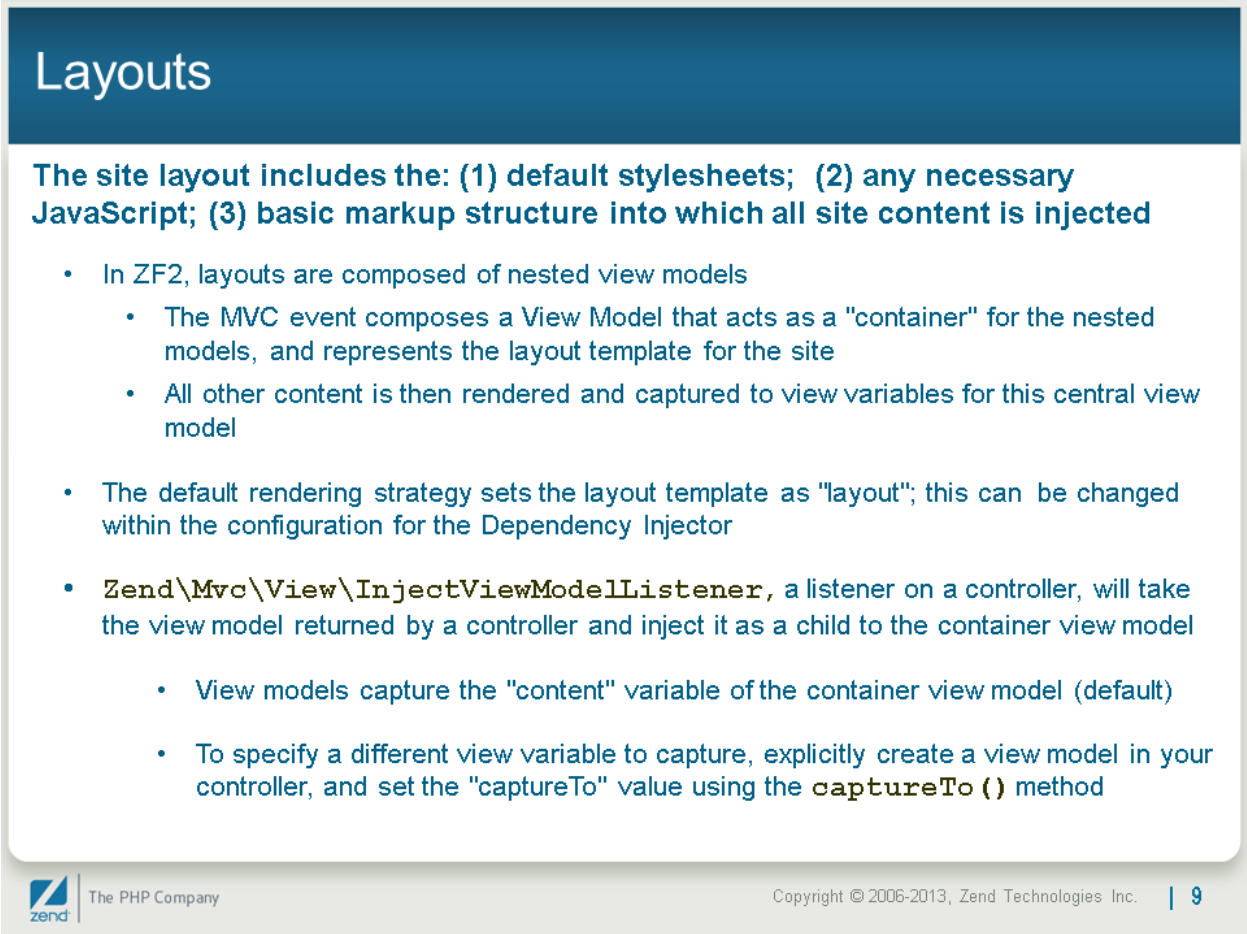
- If yes, no action needed
- If no, it uses the module namespace, controller name, and (if available), the action route parameter to create the template name

Slide 8

Controllers and View Models: Code Example

```
<?php
namespace Guestbook\Controller;
use Zend\Mvc\Controller\AbstractActionController;
use Zend\Stdlib\ResponseInterface as Response;
use Zend\View\Model\ViewModel;
class IndexController extends AbstractActionController
{
    public function indexAction()
    {
         $prg       = $this->prg();
         $entryForm = $this->getServiceLocator()->get('guestbook_entry_form');
         $entryService = $this->getServiceLocator()-
                              >get('guestbook_entry_service');
         if ($prg instanceof Response) {
              return $prg;
         } elseif ($prg !== false) {
              $entry = $entryService->add($prg);
         if ($entry) {
              return $this->redirect()->toRoute('guestbook');
              }
         }
         return new ViewModel(array(
         'entryForm' => $entryForm,
              'entries'   => $entryService->findAll()
              ));
    }
}
```

Slide 9



- The layout template is referred to as "layout" in the view manager configuration

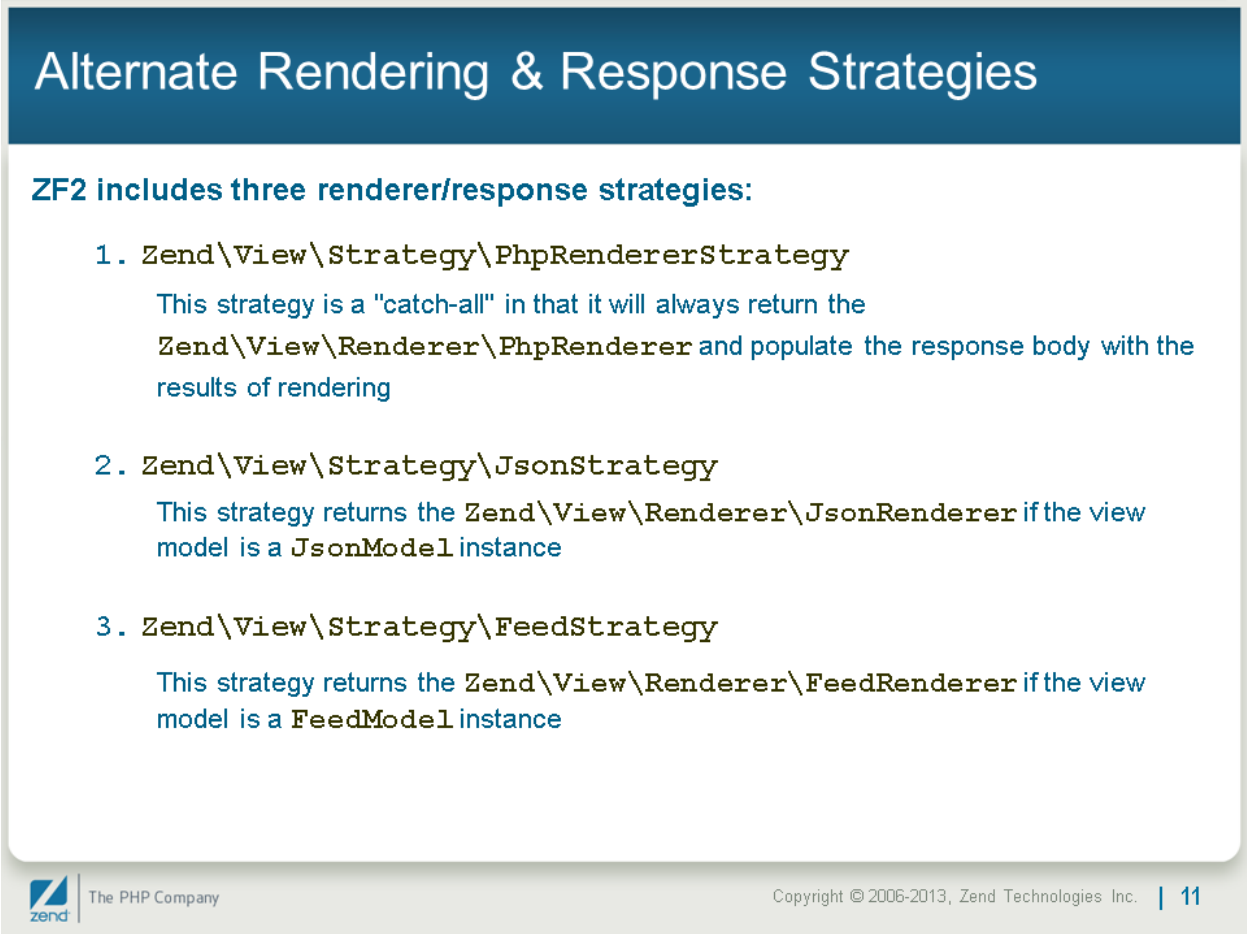
Slide 10

Alternate Rendering & Response Strategies

Rendering & Response Strategies

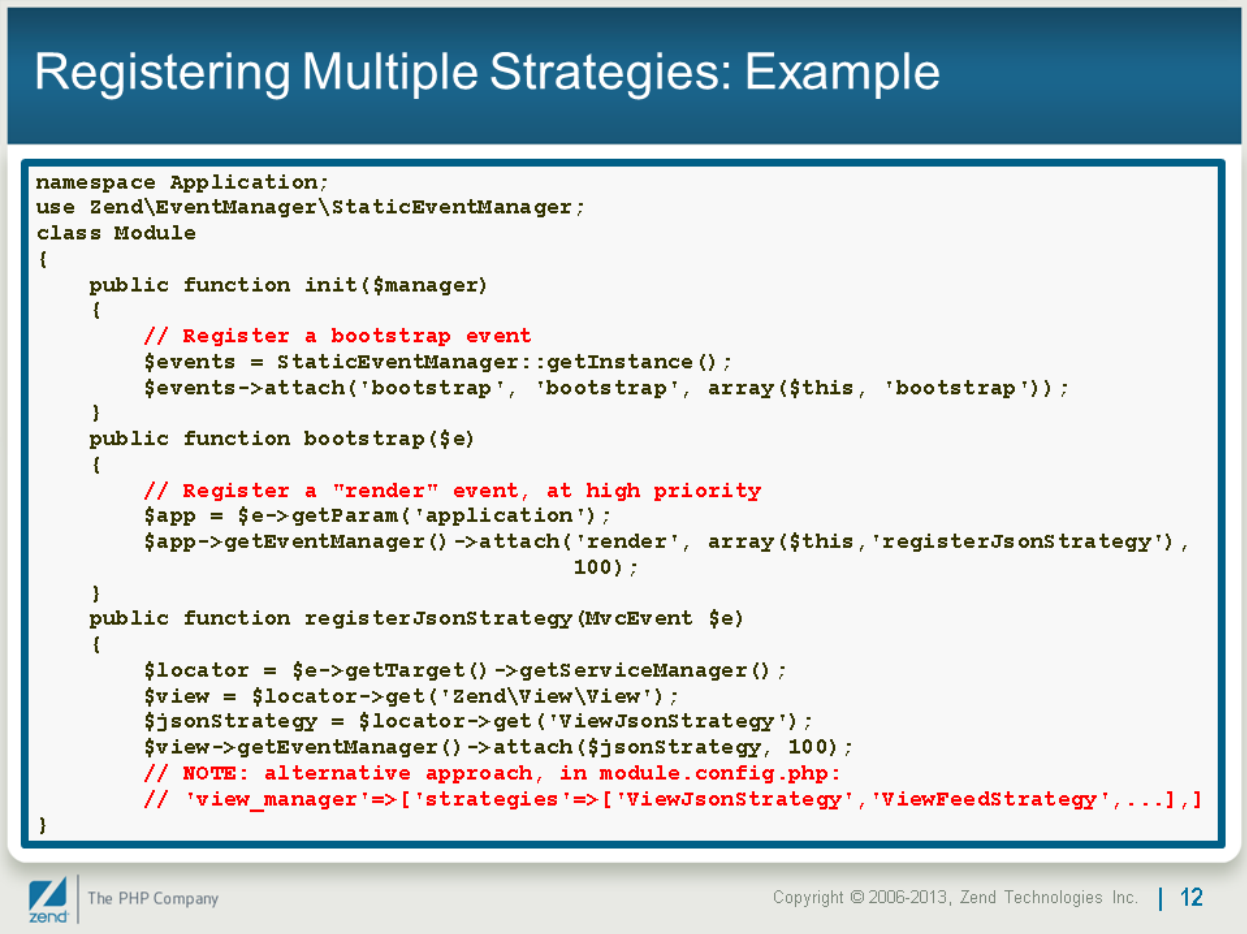
- A "**renderer strategy**" examines the Request object (or other criteria) to select an appropriate renderer (which may be none…)
- A "**response strategy**" determines how to populate the **response**, based on the rendering result
- The methods `addRendererStrategy()` and `addResponseStrategy()` are used to attach strategies to the two events, "renderer" and "response"

Slide 11



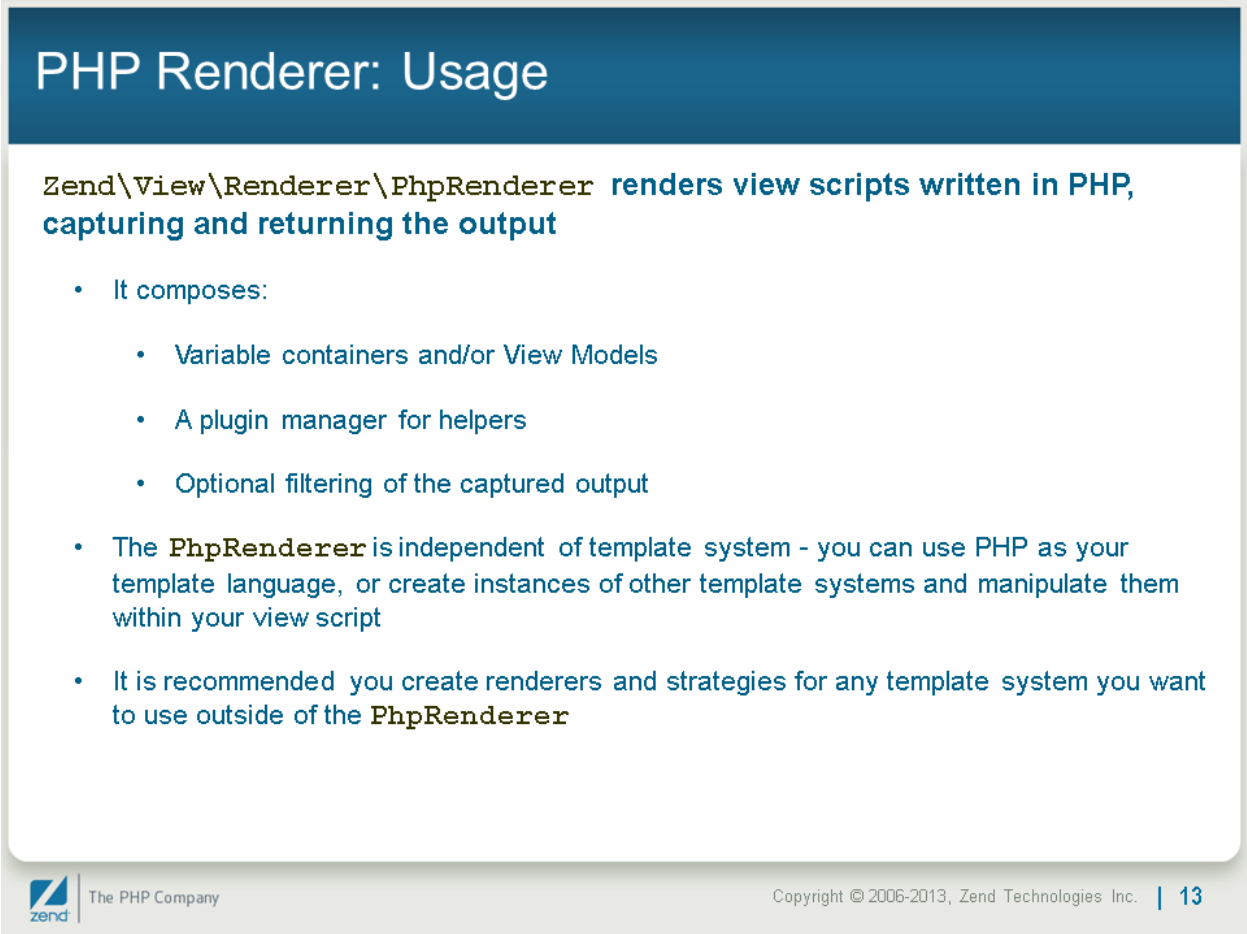
- Note: Only Zend\View\Strategy\PhpRendererStrategy is registered by default… you need to register the other strategies manually to use them

Slide 12



- Note the priority values -- these are "pre" listeners, as they are high priority, both for the application "render" event, and for the view events

Slide 13



- Example: ZfcTwig

Slide 14

PHP Renderer: Usage

- **Basic usage consists of:**
  - instantiating / obtaining an instance of the PhpRenderer
  - providing it with a resolver which will resolve templates to PHP view scripts
  - calling its `render()` method
- **Instantiating a renderer is easy:**

```
use Zend\View\Renderer\PhpRenderer;
$renderer = new PhpRenderer();
```

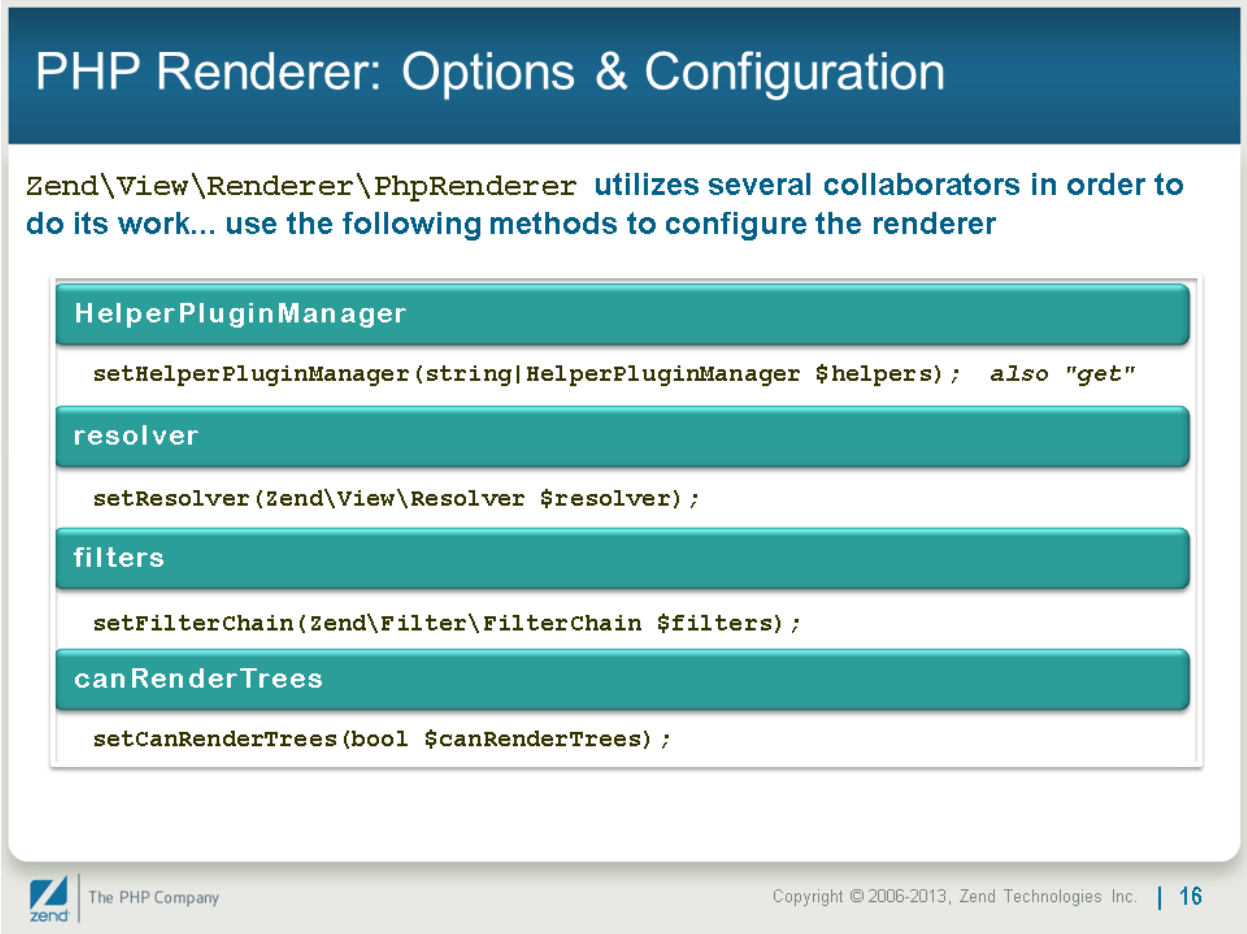
Slide 15

PHP Renderer: Usage

ZF2 includes several types of "resolvers", which are used to resolve a template name to a resource a renderer can consume

- Commonly used with the PhpRenderer are: `Zend\View\Resolver\*`
  - `\TemplateMapResolver`
    simply maps template names directly to view scripts
  - `\TemplatePathStack`
    creates a LIFO stack of script directories in which to search for a view script
    By default, it appends the suffix ".phtml" to the requested template name, and then loops through the script directories;
    If it finds a file matching the requested template, it returns the full file path
  - `\AggregateResolver`
    allows attaching a FIFO queue of resolvers to consult
- **By default, the `AggregateResolver` is used, and composes first the `TemplateMapResolver` and then the `TemplatePathStack`**
  - This provides optimal performance

Slide 16



- Methods for configuring the renderer:

  setBroker(Zend\View\HelperBroker $broker);
  Set the broker instance used to load, register, and retrieve helpers

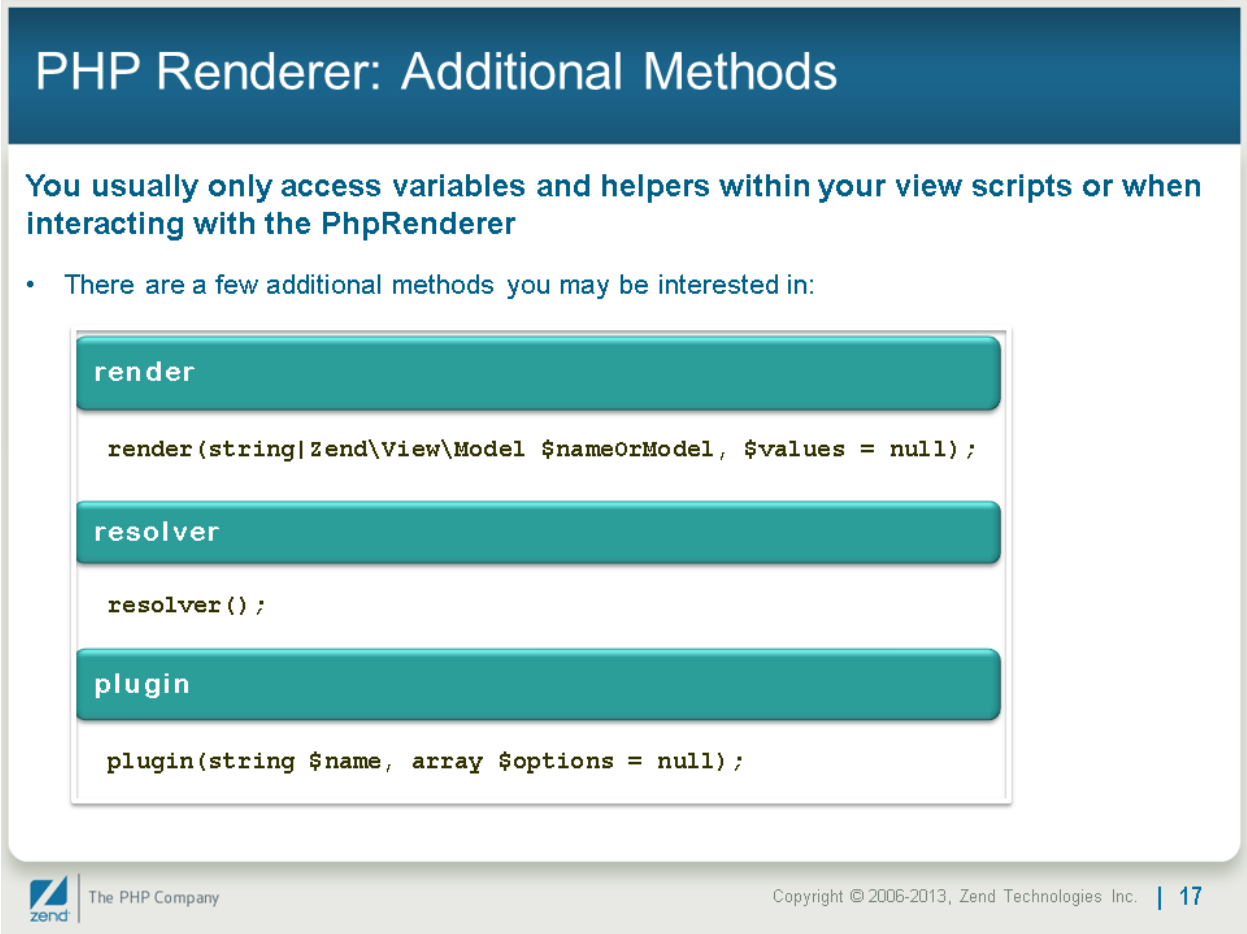
  resolver setResolver(Zend\View\Resolver $resolver);
  Set the resolver instance

  filters setFilterChain(Zend\Filter\FilterChain $filters);
  Set a filter chain to use as an output filter on rendered content

  canRenderTrees setCanRenderTrees(bool $canRenderTrees);
  Set flag indicating whether or not we should render trees of view models

  If set to true, the Zend\View\View instance will not attempt to render children separately, but instead pass the root view model directly to the PhpRenderer. It is then up to the developer to render the children from within the view script. This is typically done using the RenderChildModel helper: $this->renderChildModel('child_name')

Slide 17

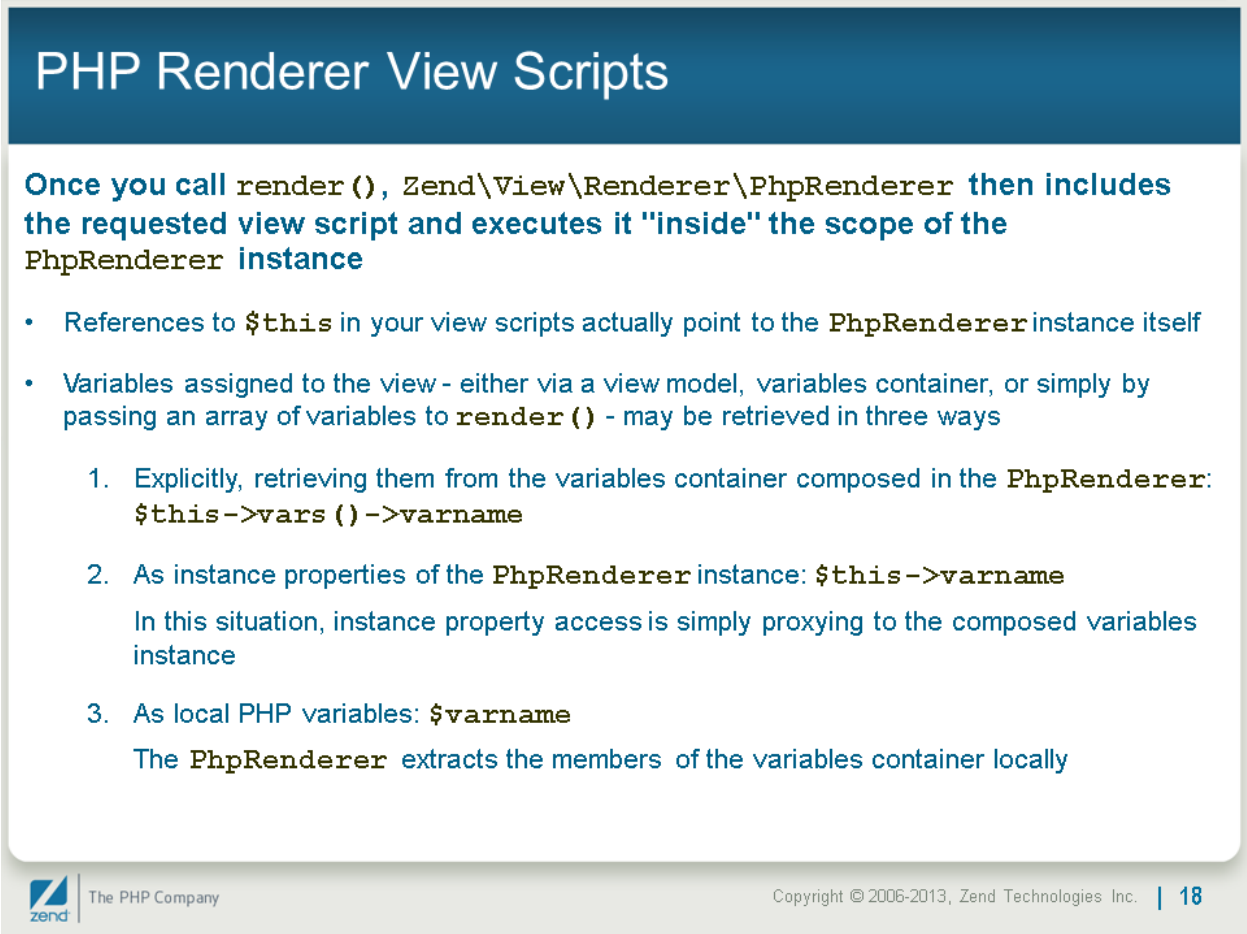


- Some PHP renderer additional methods:

  render render(string|Zend\View\Model $nameOrModel, $values = null);
  Render a template/view model;
  - If $nameOrModel is a string, it is assumed to be a template name; that template will be resolved using the current resolver, and then rendered; If $values is non-null, those values, and those values only, will be used during rendering, and will replace whatever variable container previously was in the renderer; However, the previous variable container will be reset when done;
  - If $values is empty, the current variables container (see setVars()) is injected when rendering
  - If $nameOrModel is a Model instance, the template name will be retrieved from it and used;
  - Additionally, if the model contains any variables, these will be used when rendering; otherwise, the variables container already present, if any, will be used

  addTemplate addTemplate(string $template);
  Add a template to the stack
  - When used, the next call to render() will loop through all template added using this method, rendering them one by one; the output of the last will be returned

Slide 18



- It is generally recommended that you use the second notation, as it's less verbose than the first, but differentiates between variables in the view script scope and those assigned to the renderer from elsewhere

Slide 19

View Helpers

Helper (plugin) classes can be used to perform complex, repetitive functions with a view script; ZF2 comes with a large number of helpers

- A helper is simply a class that implements the interface `Zend\View\Helper\HelperInterface`
- `Helper` defines two methods:
  - `setView()` accepts a `Zend\View\Renderer` instance/implementation
  - `getView()` is used to retrieve that instance
- `Zend\View\Renderer\PhpRenderer` creates a `HelperPluginManager` instance, from which it pulls helpers upon request
- Register new helpers by adding them to the plugin manager

Slide 20

Included View Helpers

Zend Framework comes with an initial set of helper classes, most of which relate to form element generation and perform the appropriate output escaping automatically

- There are helpers for creating route-based URLs and HTML lists, as well as declaring variables
- There is also a rich set of helpers for providing values for, and rendering, the various HTML <head> tags, such as HeadTitle, HeadLink, and HeadScript
- The following are some of the more commonly used helpers:

Action View Helper	HeadLink Helper
BasePath Helper	HeadMeta Helper
Placeholder Helper	HeadStyle Helper
Doctype Helper	HeadTitle Helper
HTML Object Helper	Inline Script Helper

- A complete list of all included helpers is available within the ZF2 Reference Manual (section 20.4.2):

  http://framework.zend.com/manual/2.0/en/modules/zend.view.helpers.html

Slide 21

Invoking View Helpers

```
// $view is a PhpRenderer instance

// Via the plugin manager:
$plugins = $view->getHelperPluginManager();
$helper  = $plugins->get('lowercase');

// Retrieve the helper instance, via the method "plugin",
// which proxies to the plugin broker:
$helper = $view->plugin('lowercase');

// If the helper does not define __invoke(), the following also retrieves it:
$helper = $view->lowercase();

// If the helper DOES define __invoke, you can call the helper as if it were
// a method:
$filtered = $view->lowercase('some value');
```

Slide 22

View Helpers: Escaping Output

Escaping output is an important task to perform in a view script for a variety of reasons, including security

- Unless you are using a function, method, or helper that does escaping on its own, you should always escape variables when you output them
- Context-specific escaping is critical for security, as HTML escaping does not work for CSS, JS, or even HTML attributes; URL escaping is also context specific
- `Zend\View` includes a class `Zend\View\Helper\Escaper\AbstractHelper`, which is extended by a series of useful escape view helpers… ultimately using `Zend\Escaper\Escaper` to do the work
- The `escapeHtml()` method uses the `htmlspecialchars()` function for escaping, using `UTF-8` as the characterset, and the `ENT_QUOTES` setting

```
// BAD view-script practice:
echo $this->variable;
```

```
// GOOD view-script practice:
echo $this->escapeHtml($this->variable);
```

- Other escape view helpers include: `escapeCss()`, `escapeHtmlAttr()`, `escapeJs()`, and `escapeUrl()`

Slide 23

View Helpers: Escaping Output Code Example

```
// escaptHtml() example
<?php echo $this->escapeHtml('<bad>tag</bad>!@#$%^&'); ?>
// produces this output:
// &lt;bad&gt;tag&lt;/bad&gt;!@#$%^&amp;

// escapeJs() example
<?php echo $this->escapeJs('<script>alert("hello");</script>'); ?>
// produces this output:
// \x3Cscript\x3Ealert\x28\x22hello\x22\x29\x3B\x3C\x2Fscript\x3E

// escapeCss() example
<?php echo $this->escapeCss('<style>b { color: red;}</style>'); ?>
// produces this output:
// \3C style\3E b\20 \7B \20 color\3A \20 red\3B \7D \3C \2F style\3E

// escapeUrl() example
<?php echo $this->escapeUrl('http://zend.com/name=Doug&id=12345'); ?>
// produces this output:
// http%3A%2F%2Fzend.com%2Fname%3DDoug%26id%3D12345
```

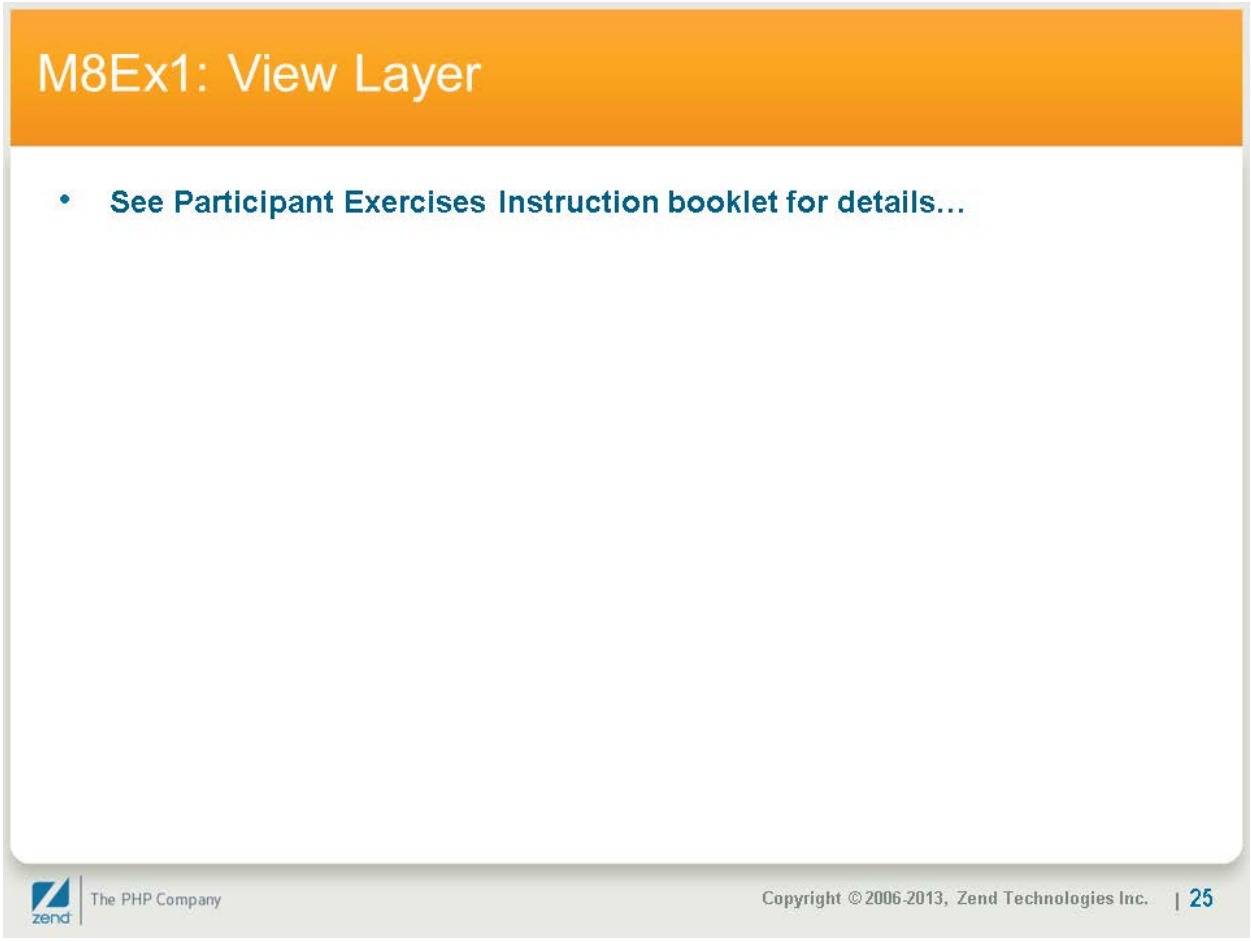
Slide 24

Registering Concrete Helpers

At times, it is convenient to instantiate a view helper, and then register it with the renderer … this can be done by injecting it into the `HelperPluginManager`

```
// Guestbook\Service\HtmlTableRowHelper
class HtmlTableRowHelper extends AbstractHtmlElement
{
    public function __invoke(array $items)
    {
         $output = '';
         foreach ($items as $value) {
              $output .= '<td>' . htmlspecialchars($value) . '</td>';
         }
         return '<tr>' . $output . '</tr>' . PHP_EOL;
    }
}
// in module.config.php
'view_helpers' => array(
    'invokables' => array(
        'htmlTableRow' => 'Guestbook\Service\HtmlTableRowHelper',
    ),
),
// in the view script
<?php echo $this->htmlTableRow(array($entry->getName(),
$entry->getEmail(), $entry->getWebsite(), $entry->getMessage()));?>
```

Slide 25



Slide 1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Module Nine
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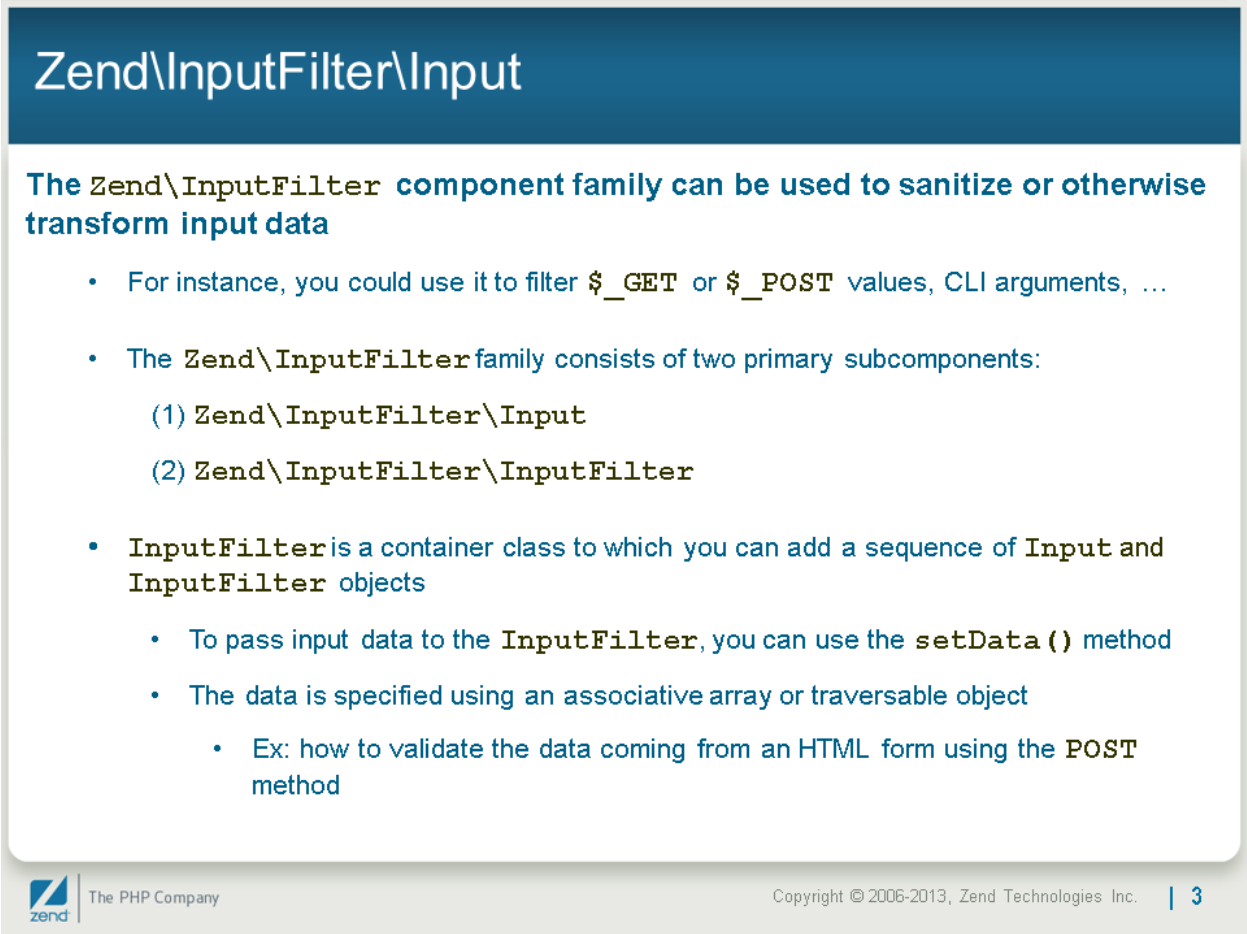
Slide 2

Module Nine Topics:

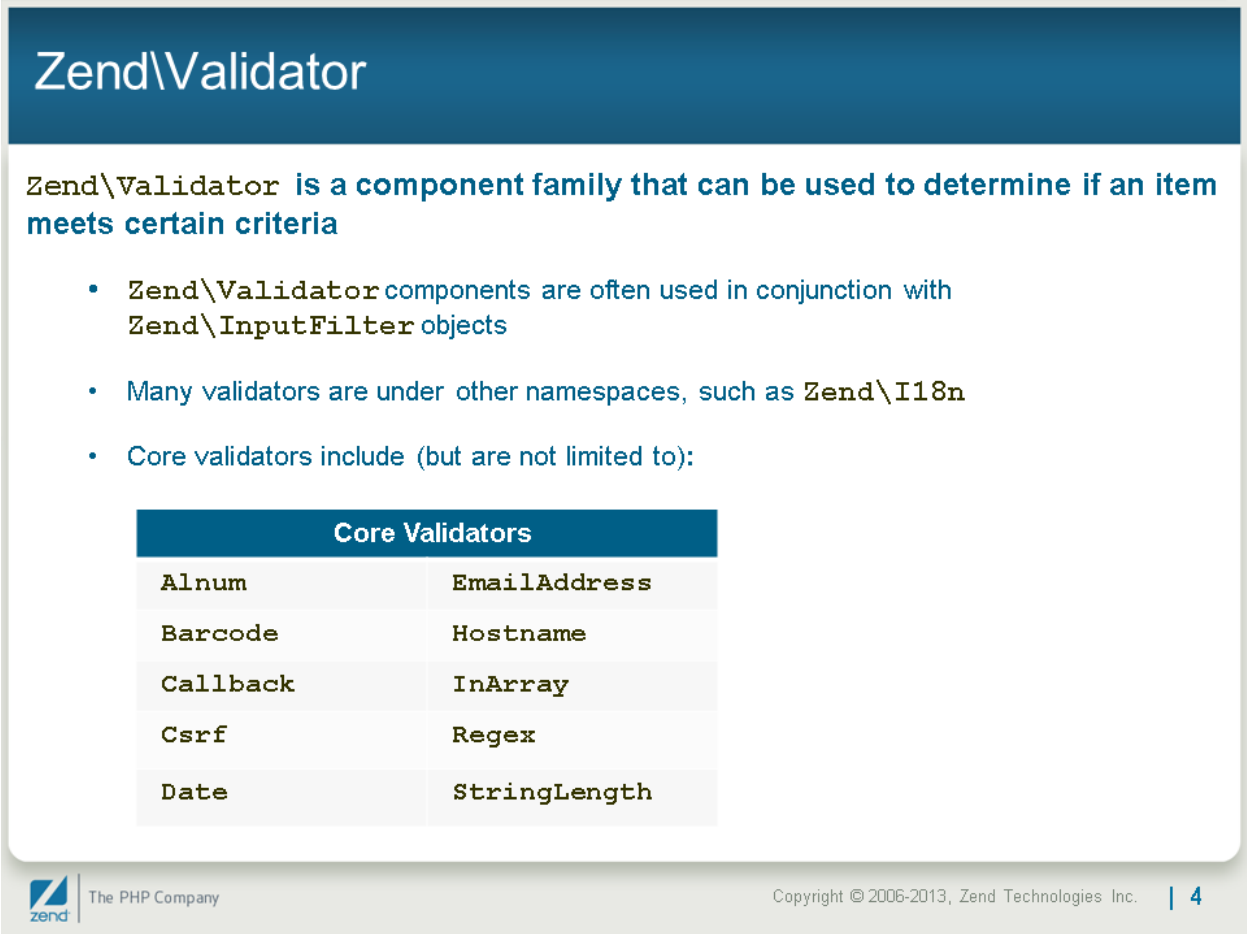
- **In this model, we will cover:**
  - `Zend\InputFilter`
  - `Zend\Validator`
  - `Zend\Filter`
  - `Zend\Form`
  - `Zend\Form\View\Helper`
  - `Zend\Stdlib\Hydrator`

Slide 3



- As with validators (covered next), filters are often used with Zend\InputFilter\input objects
- Zend\Filter includes sub-components which specialize in encryption, compression, file manipulation, and word transformation
- Core filters include: Alnum, Alpha, BaseName, Boolean, Callback, Compress, Decompress, Decrypt, Digits, Dir, Encrypt, FilterBroker, FilterChain, FilterInterface, FilterLoader, HtmlEntities, Inflector, InputFilter, Int, LocalizedToNormalized, NormalizedToLocalized, Null, PregReplace, RealPath, StaticFilter, StringToLower, StringToUpper, StringTrim, StripNewlines, and StripTags

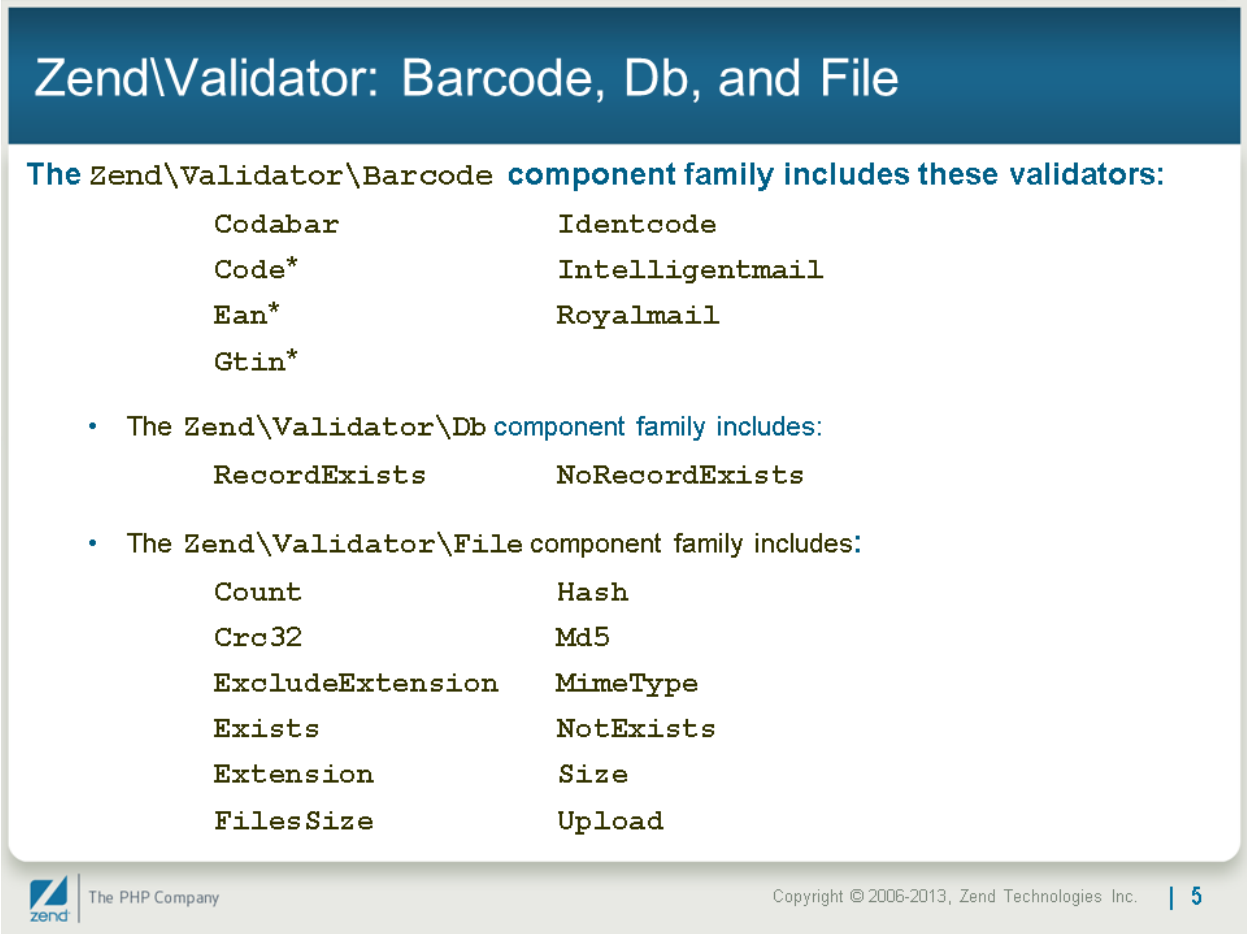
Slide 4



- These are other core validators:

  Alpha, Between, CreditCard, Digits, Float, GreaterThan, Hex, Iban, Identical, Int, Ip, Isbn, LessThan, NotEmpty, PostCode, StaticValidator,

Slide 5



- Other Zend\Validator\Barcode validators include:

  Code128, Code25, Code25interleaved, Code39, Code39ext, Code93, Code93ext

  Ean12, Ean13, Ean14, Ean18, Ean2, Ean5, Ean8

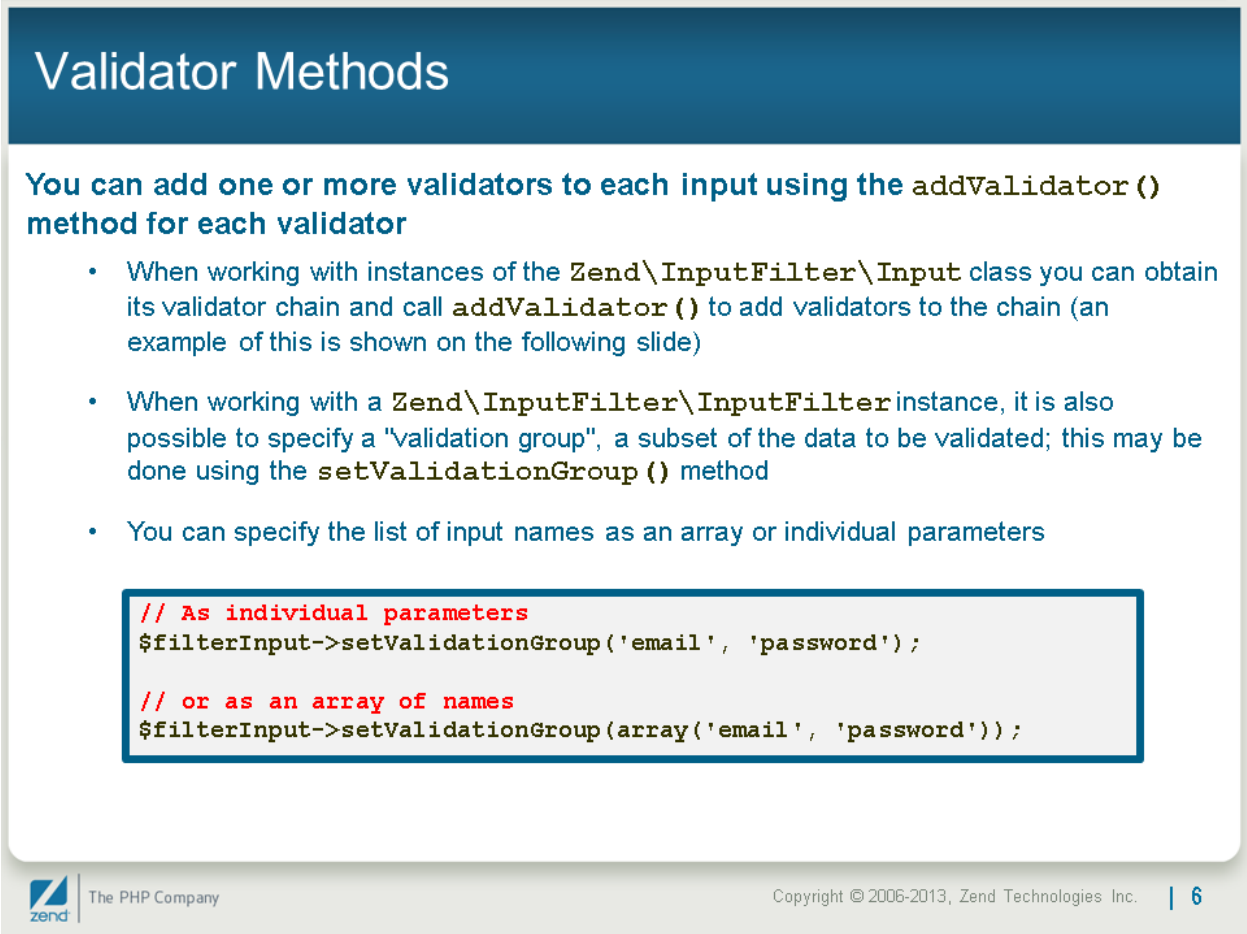
  Gtin12, Gtin13, Gtin14

  Issn, Itf14, Leitcode, Planet, Postnet, Sscc, Upca, Upce

- Other Zend\Validator\File component family includes:

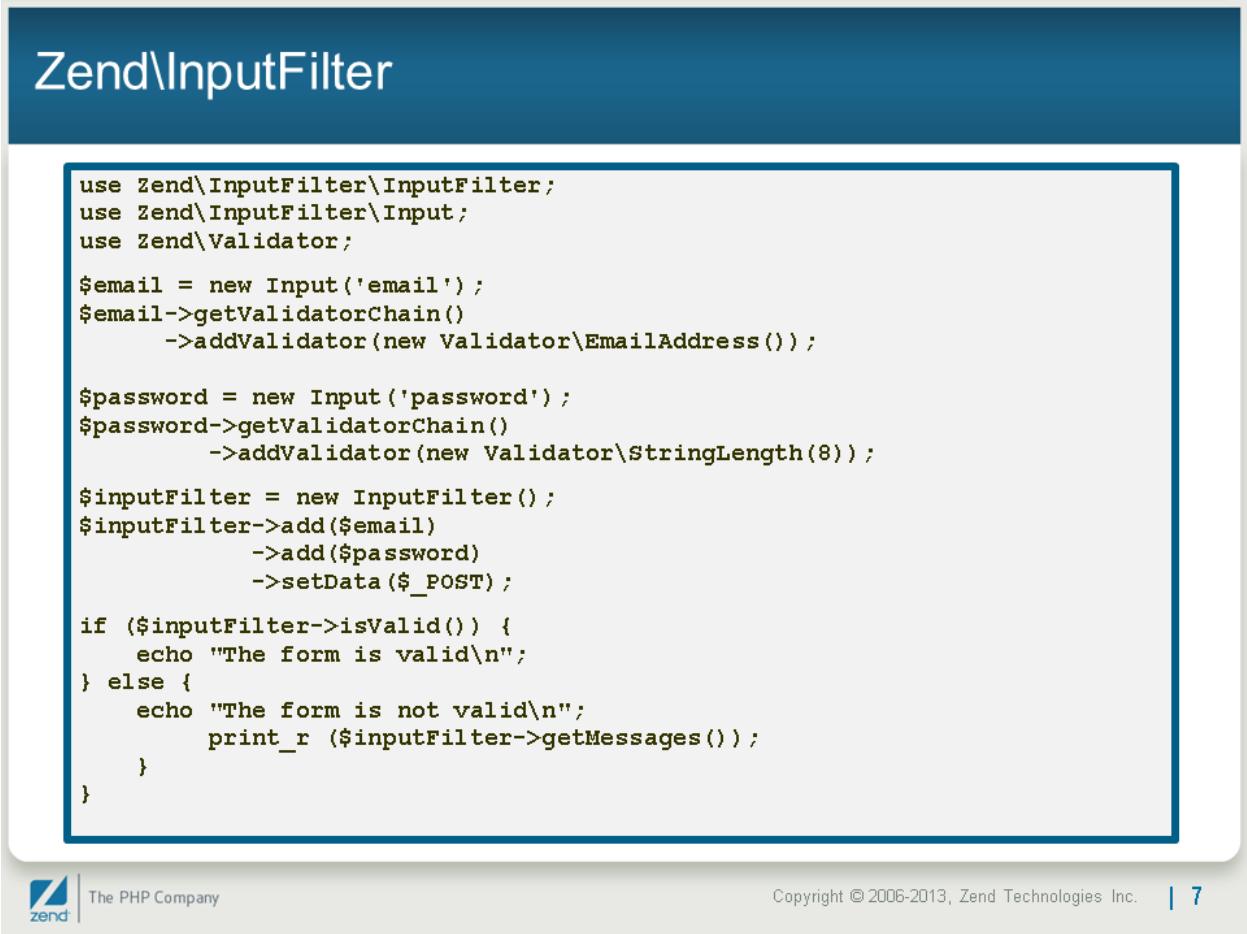
  ExcludeMimeType, ImageSize, IsCompressed, IsImage, Sha1, WordCount

Slide 6



- addValidator() belongs to Zend\Validator\ValidatorChain, which an Input composes
- setValidationGroup() belongs to Zend\InputFilter\InputFilterInterface
- In this example, the email and password values are validated
- The email must be a valid address and the password must be composed of at least 8 characters
- If the input data are not valid, ZF2 reports the list of invalid input using the getInvalidInput() method

Slide 7


Zend\InputFilter
use Zend\InputFilter\InputFilter;
use Zend\InputFilter\Input;
use Zend\Validator;
$email = new Input('email');
$email->getValidatorChain()
->addValidator(new Validator\EmailAddress());
$password = new Input('password');
$password->getValidatorChain()
->addValidator(new Validator\StringLength(8));
$inputFilter = new InputFilter();
$inputFilter->add($email)
->add($password)
->setData($_POST);
if ($inputFilter->isValid()) {
echo "The form is valid\n";
} else {
echo "The form is not valid\n";
print_r ($inputFilter->getMessages());
}
}
zend
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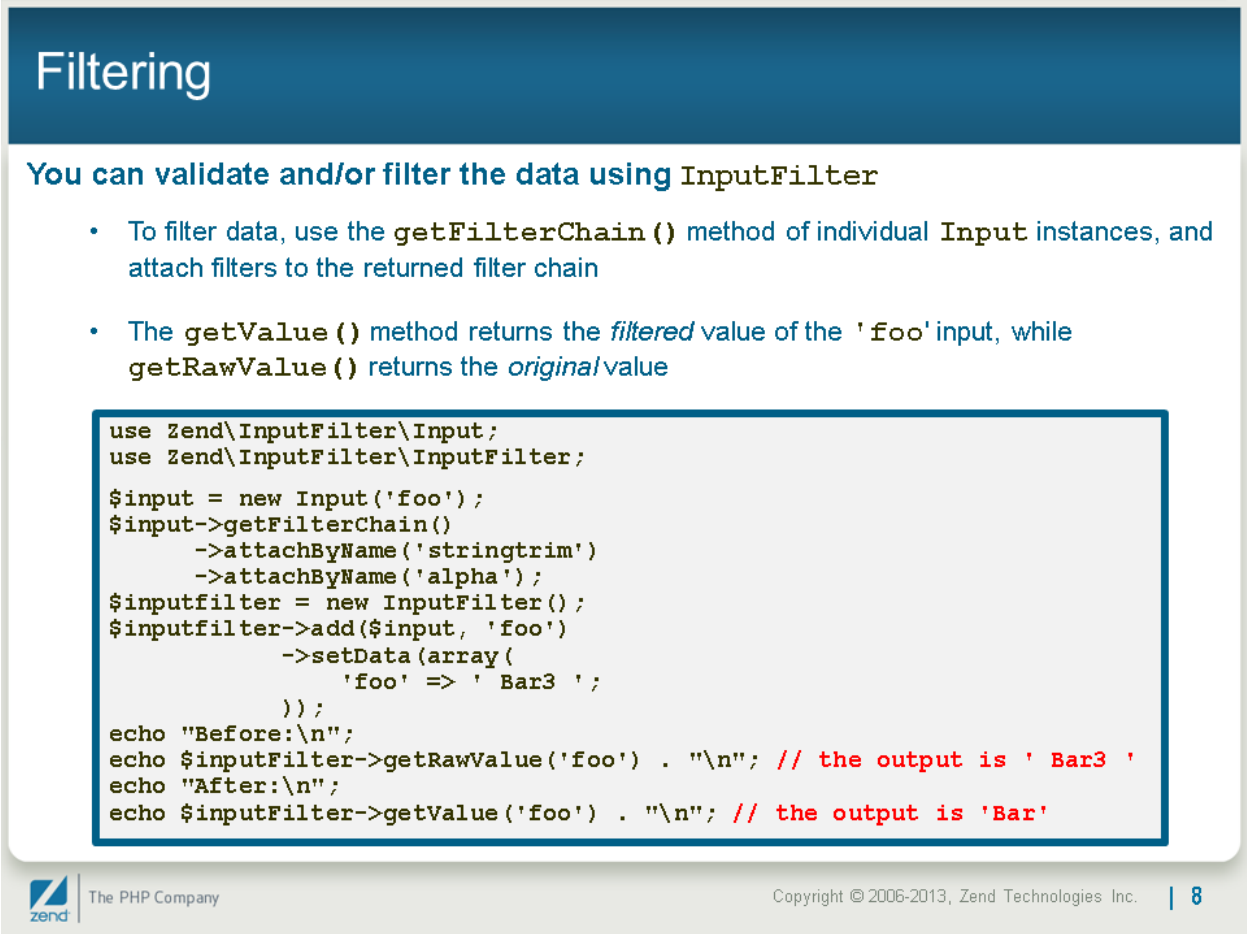
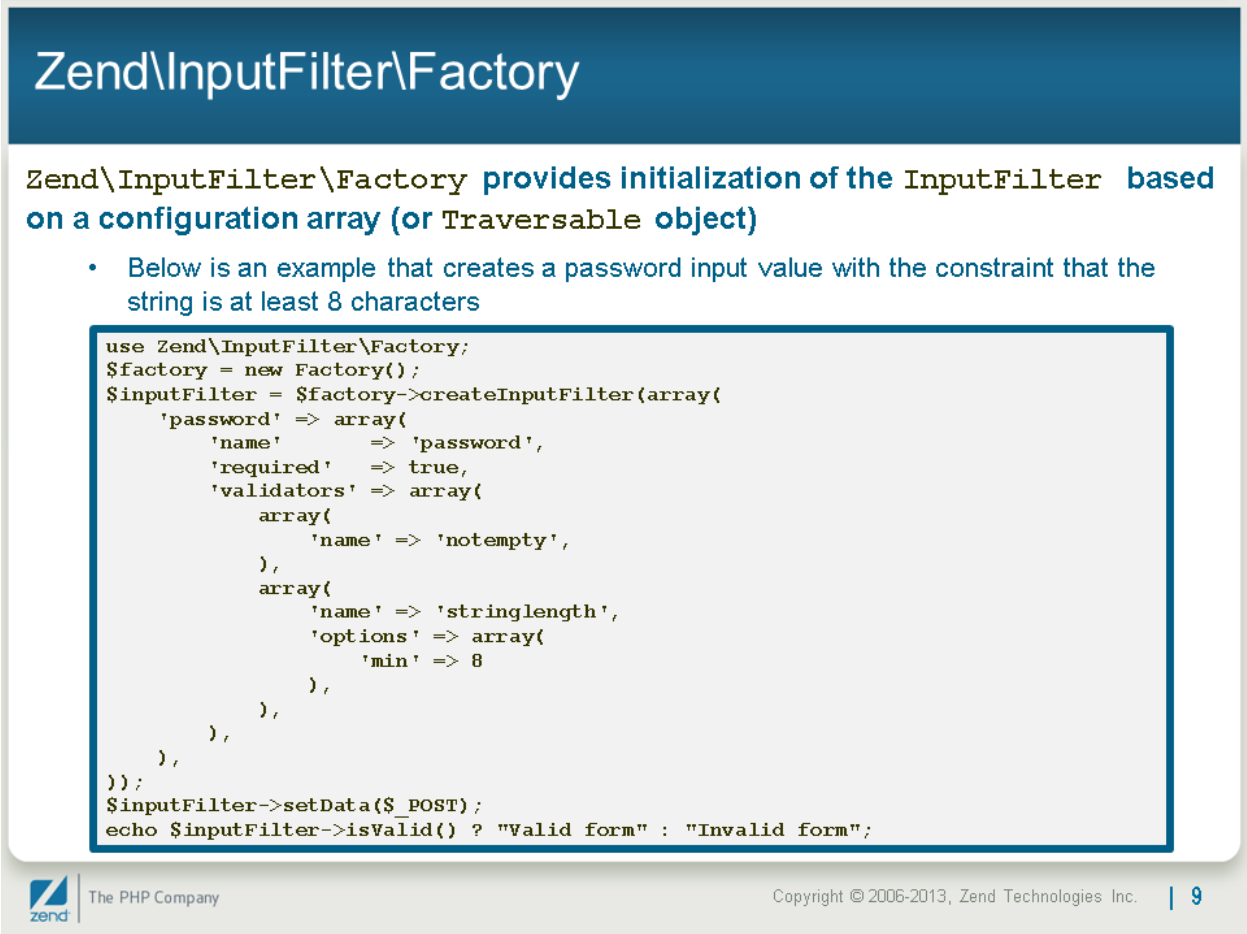
7

Slide 8



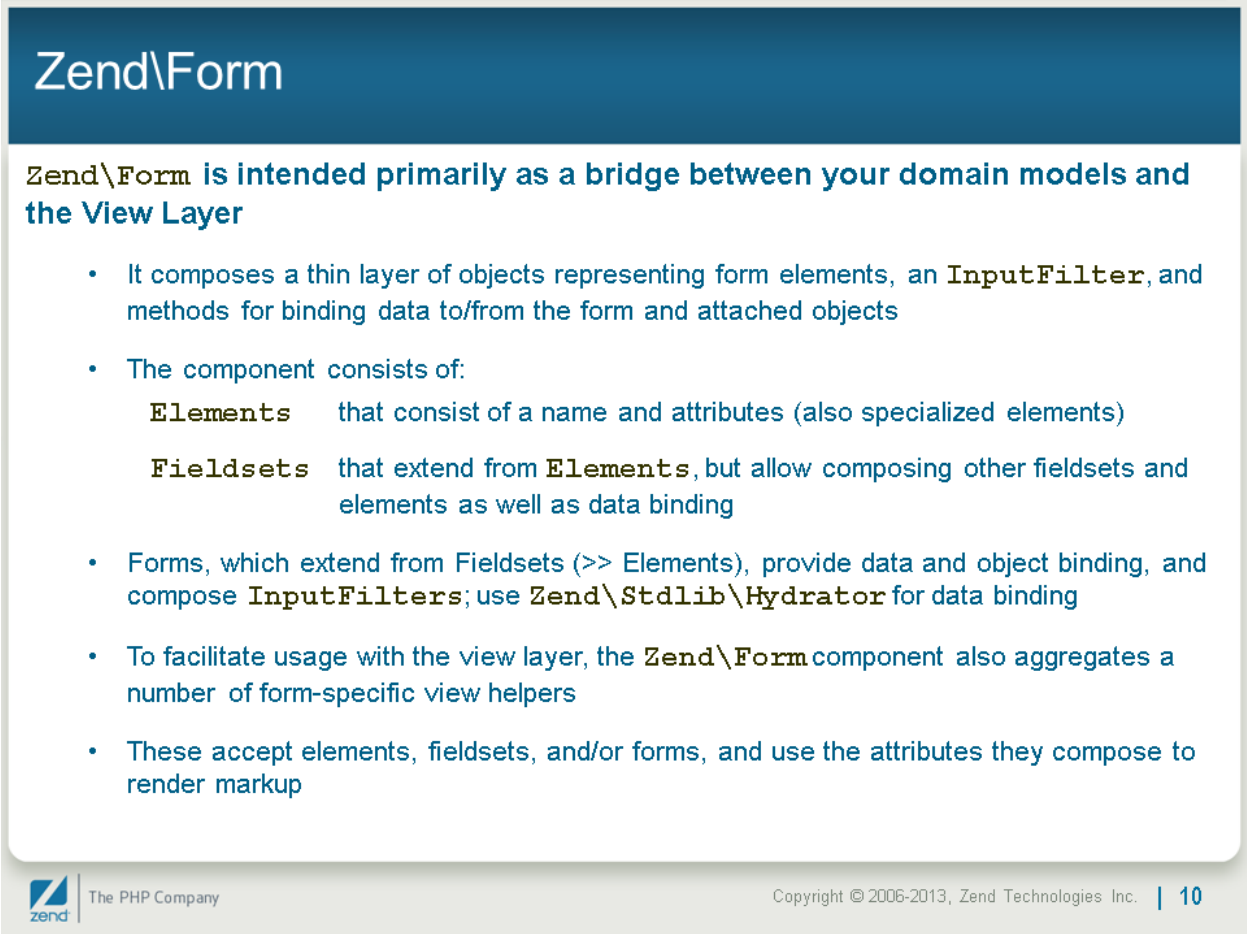
- Note that filtering in the context of the InputFilter is more accurately "data normalization"
- Example: Filtering without validation

Slide 9



- The factory may be used to create not only Input instances, but also nested InputFilters, allowing you to create validation and filtering rules for hierarchical data sets
- The standard InputFilter class is actually backed by a Factory instance
- It allows you to call add(), with a specification just like that shown on this slide, in order to create and attach an Input (or InputFilter, if you have a "type" key that specifies a class implementing the InputFilterInterface)

Slide 10



- A small number of specialized elements are provided for accomplishing application-centric tasks, such as multicheckbox or radio elements
- These include the Csrf element, used to prevent Cross Site Request Forgery attacks, and the Captcha element, used to display and validate CAPTCHAs
- Finally, a Factory is provided to facilitate creation of elements, fieldsets, forms, and the related input filter
- The default Form implementation is backed by a factory to facilitate extension and ease the process of form creation

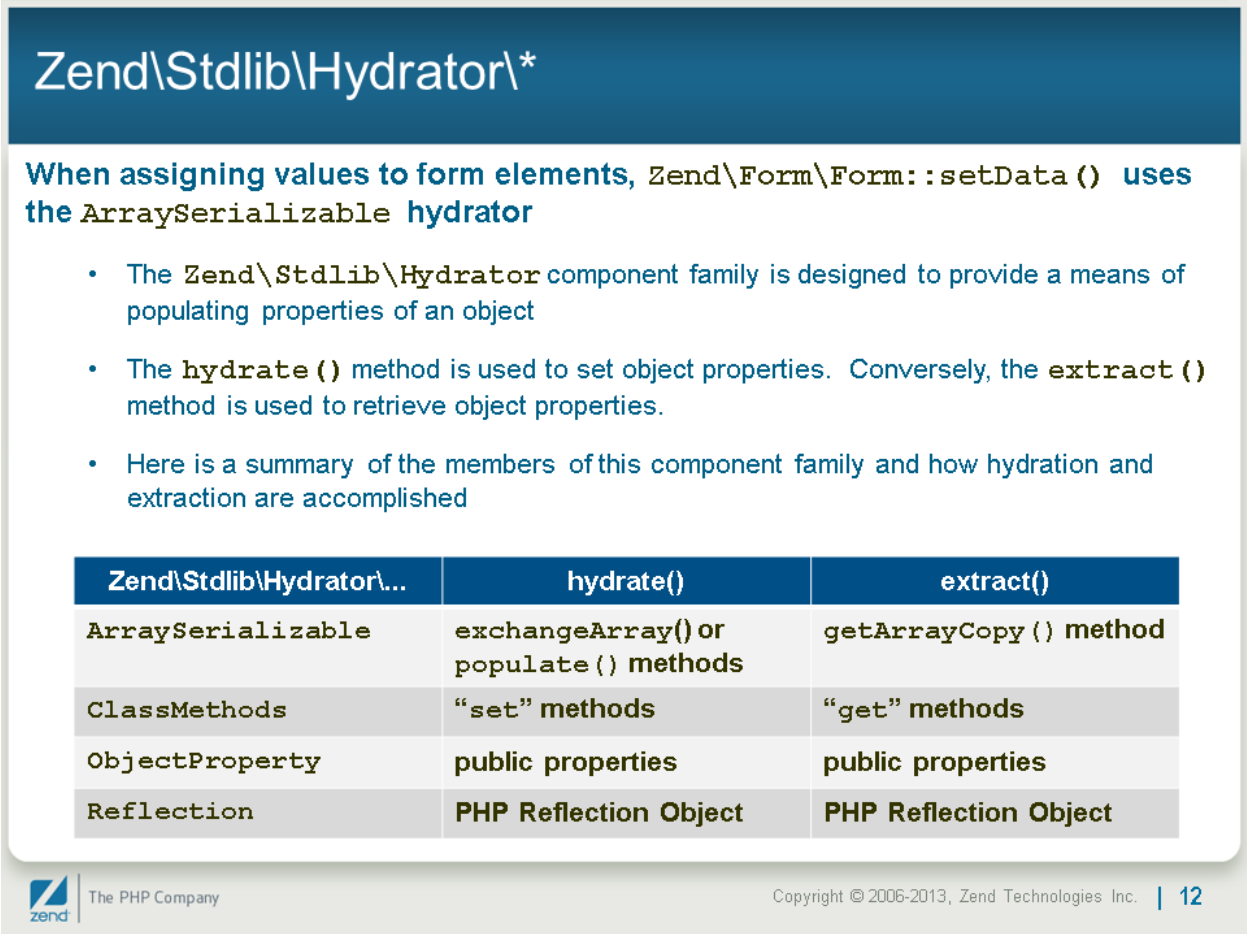
Slide 11

Zend\Form

Forms are relatively easy to create

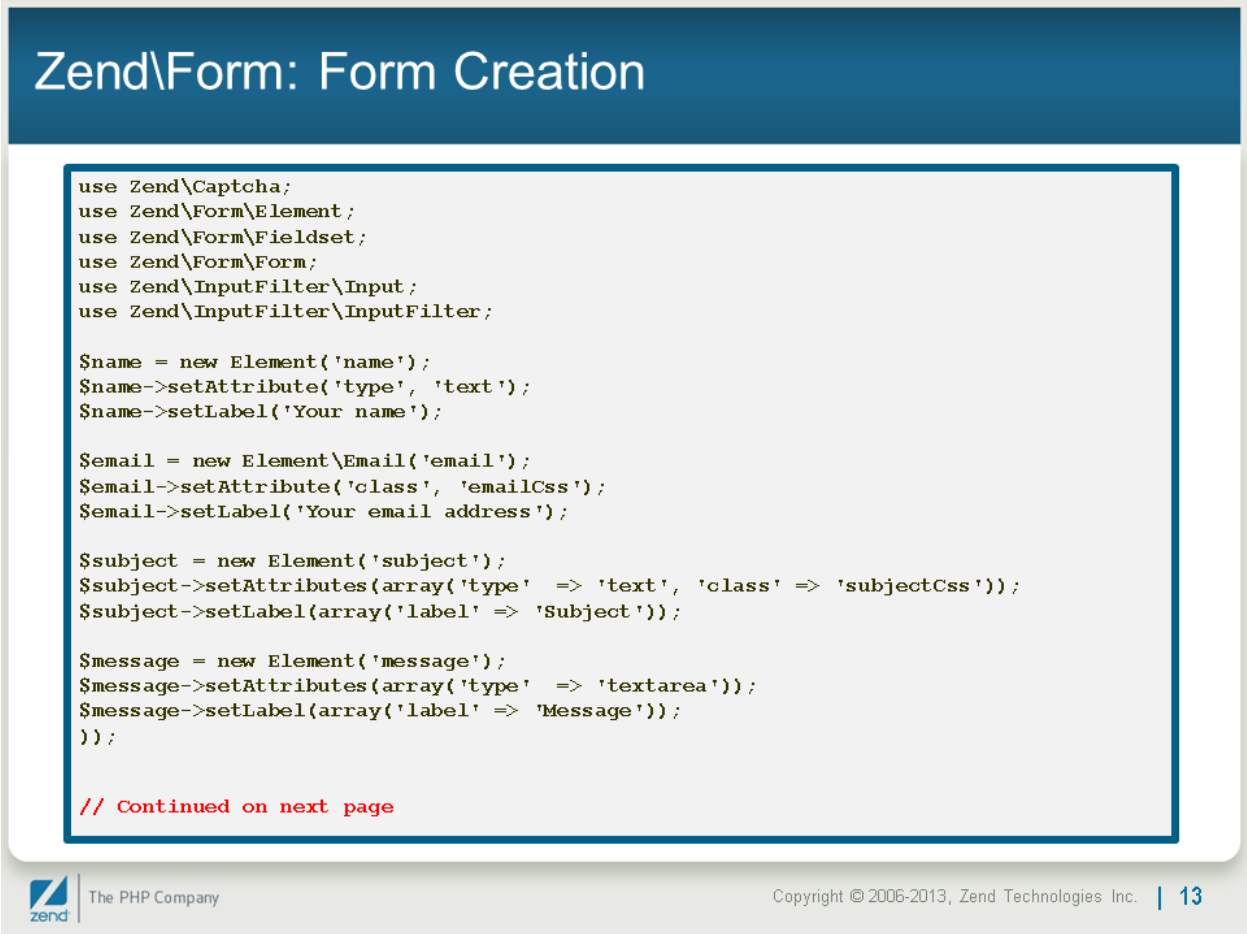
- At a bare minimum, each element or fieldset requires a name; typically, you'll also provide some attributes to inform the view layer how it might render the item
- The form itself will also include an `InputFilter`, which is required for form validation; you can conveniently create one directly in the form via a factory
- Individual elements can hint as to what defaults to use when generating a related input for the input filter
- Form validation encompasses two methods:
  - `setData()` used to provide the data to validate
  - `isValid()` used to perform validation using the provided data and `InputFilter`
- If you want to simplify your work even more, you can bind an object to the form; on successful validation, it will be populated from the validated values

Slide 12



- Zend\Db\ResultSet` also has a `HydratingResultSet` that will accept a `Hydrator` and object prototype.
- This makes it simple to wire your domain entities to forms and persistence; the `Hydrator` component then serves as a lightweight data mapper

Slide 13



- There are components for Captcha, Csrf, Date, DateTime, DateTimeLocal, Email, Month, MultiCheckbox, Number, Radio, Range, Time, Url, and Week

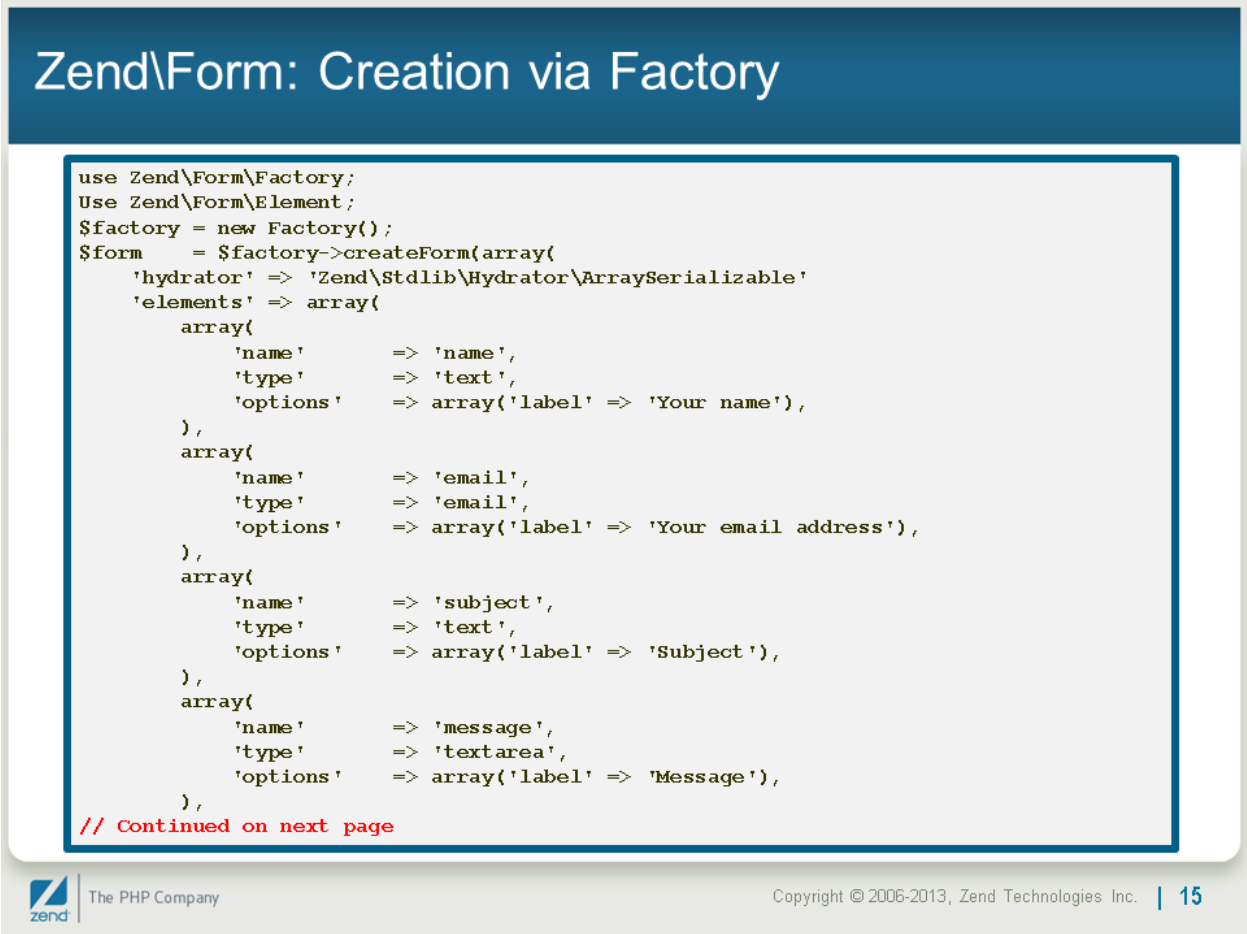
  (ex: Zend\Form\Element\Captcha, Zend\Form\Element\Email, ...)

Slide 14

Zend\Form: Form Creation

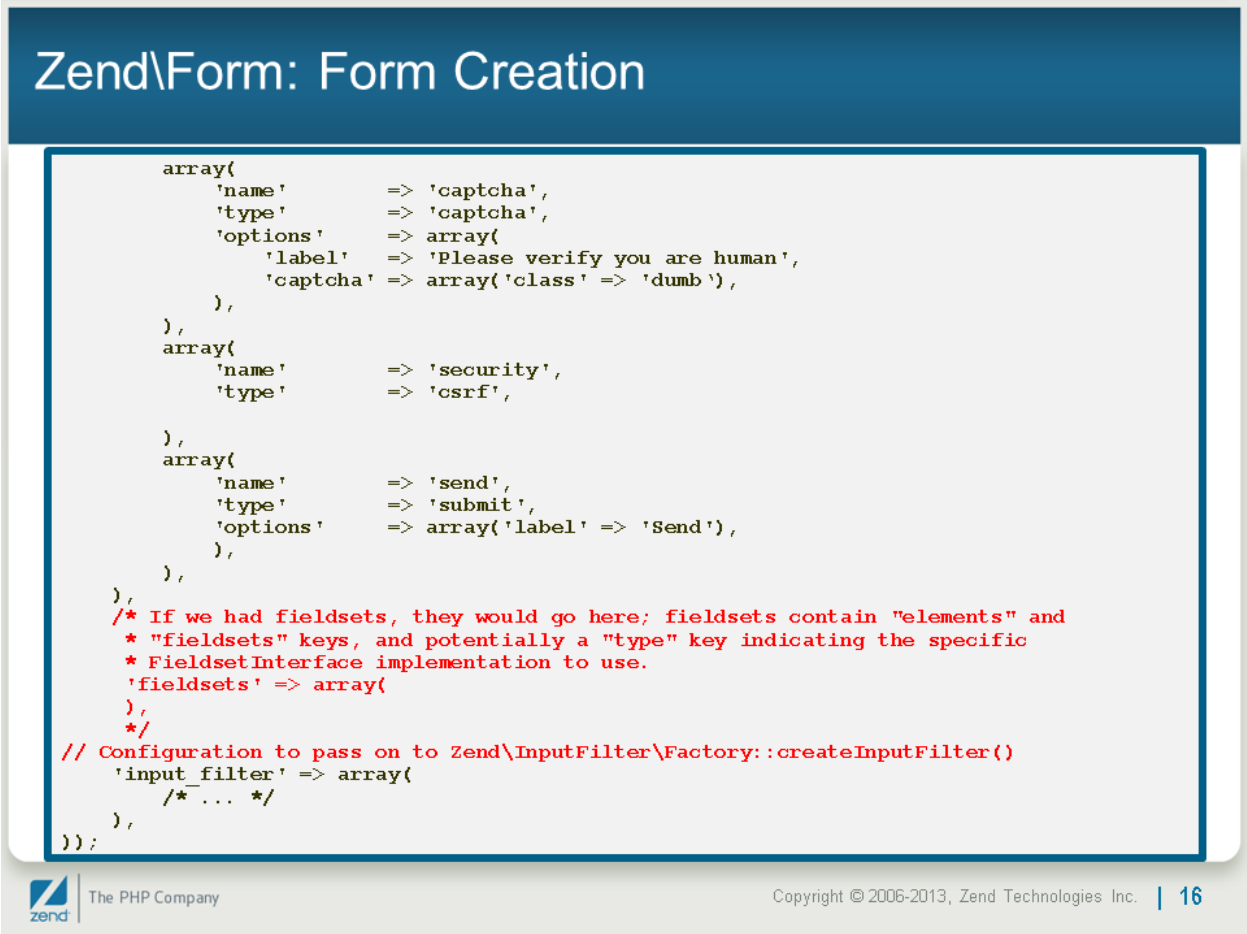
```
$captcha = new Element\Captcha('captcha');
$captcha->setCaptcha(new Captcha\Dumb());
$captcha->setOptions(array('label' => 'Please verify you are human'));

$csrf = new Element\Csrf('security');

$submit = new Element('send');
$submit->setAttributes(array(
    'type'  => 'submit',
    'label' => 'Send',
));

$form = new Form('contact');
$form->add(array($name, email, $subject, $message, $captcha, $csrf, $send));

$nameInput = new Input('name');

// configure input... and all others
$inputFilter = new InputFilter();

// attach all inputs
$form->setInputFilter($inputFilter);
```

Slide 15



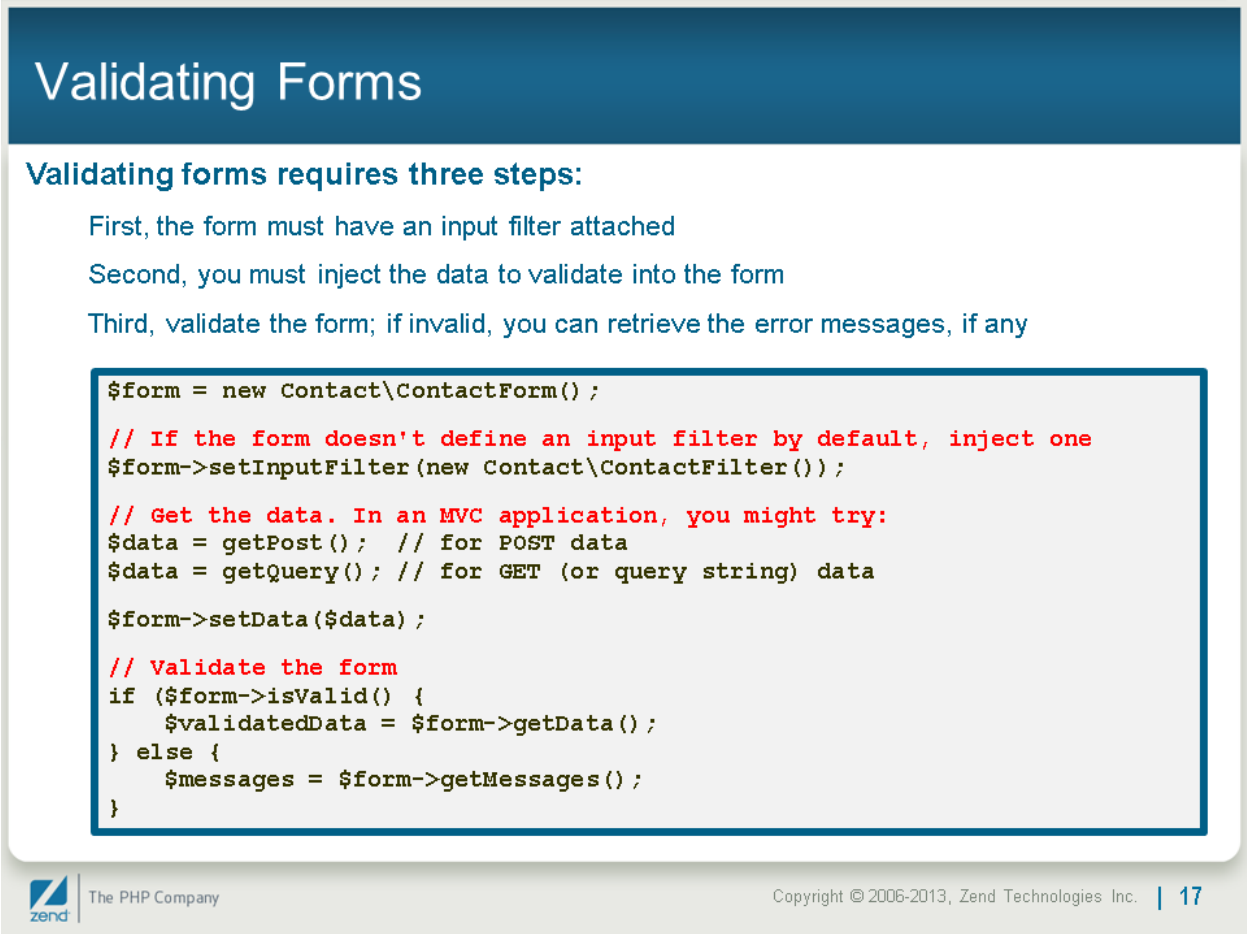
- You can create the entire form, and input filter, using the Factory
- This is particularly nice if you want to store your forms as pure configuration - you can simply pass the configuration to the factory

Slide 16



- You can create the entire form, and input filter, using the Factory
- This is particularly nice if you want to store your forms as pure configuration - you can simply pass the configuration to the factory

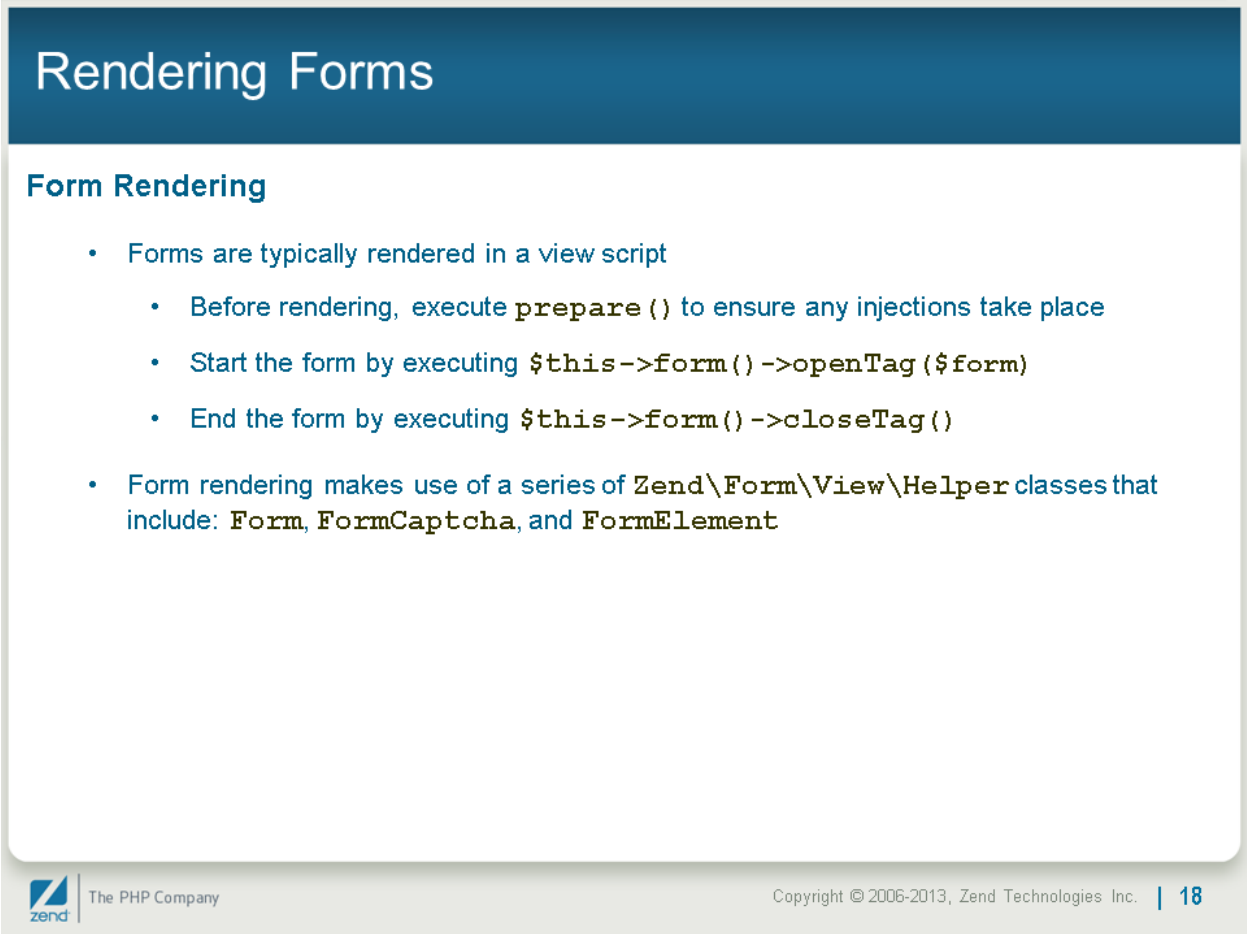
Slide 17



- You can get the raw data if you want, by accessing the composed input filter

```
$filter = $form->getInputFilter();
$rawValues = $filter->getRawValues();
$nameRawValue = $filter->getRawValue('name');
```

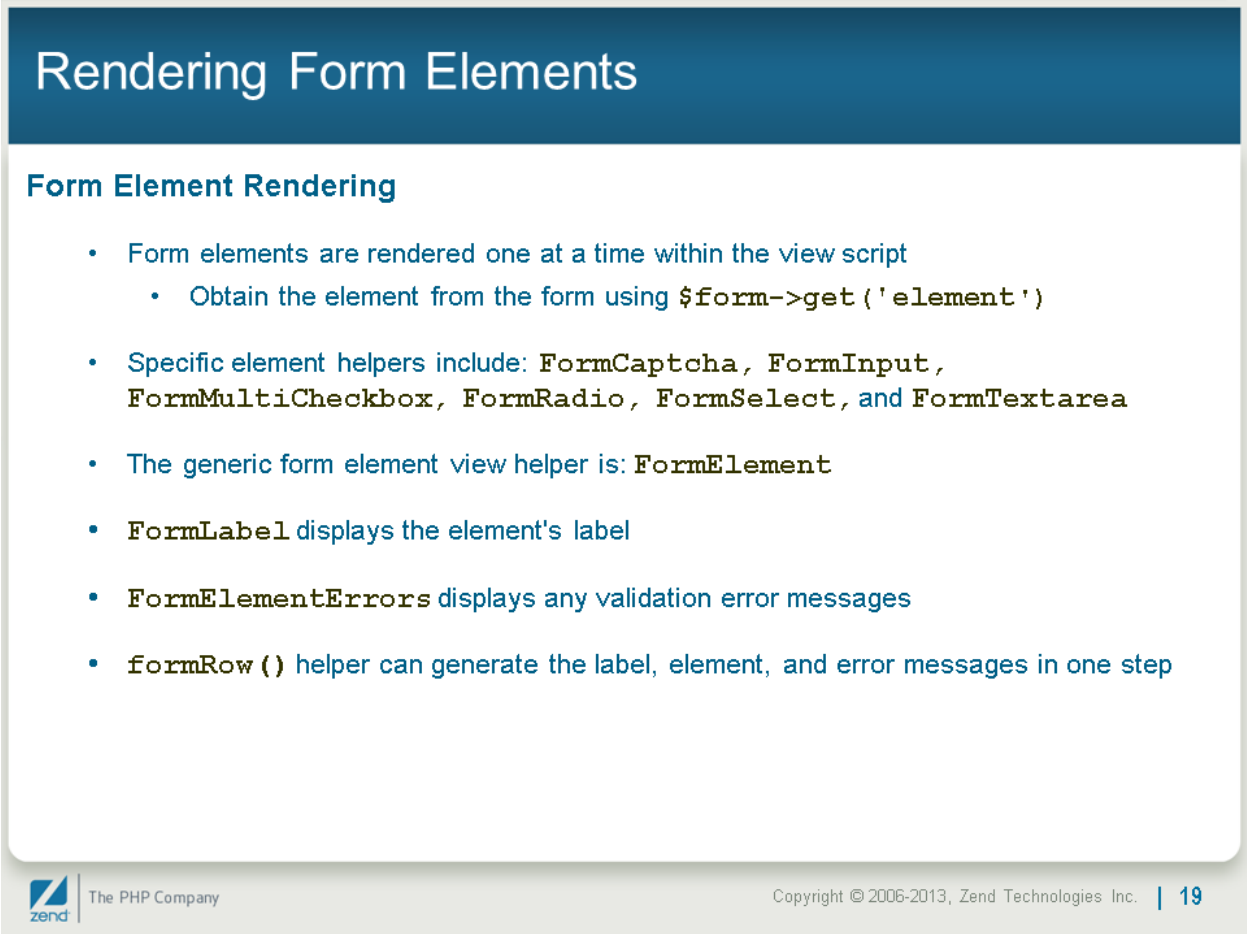
Slide 18



- The `openTag()` call will generate a `<form>` tag with attributes based on your form. However, most editors will indicate an error in your markup if you simply have "</form>" in your markup; thus the `closeTag()` method
- There are form view helpers for every single element type supported
- Other Helper classes include:

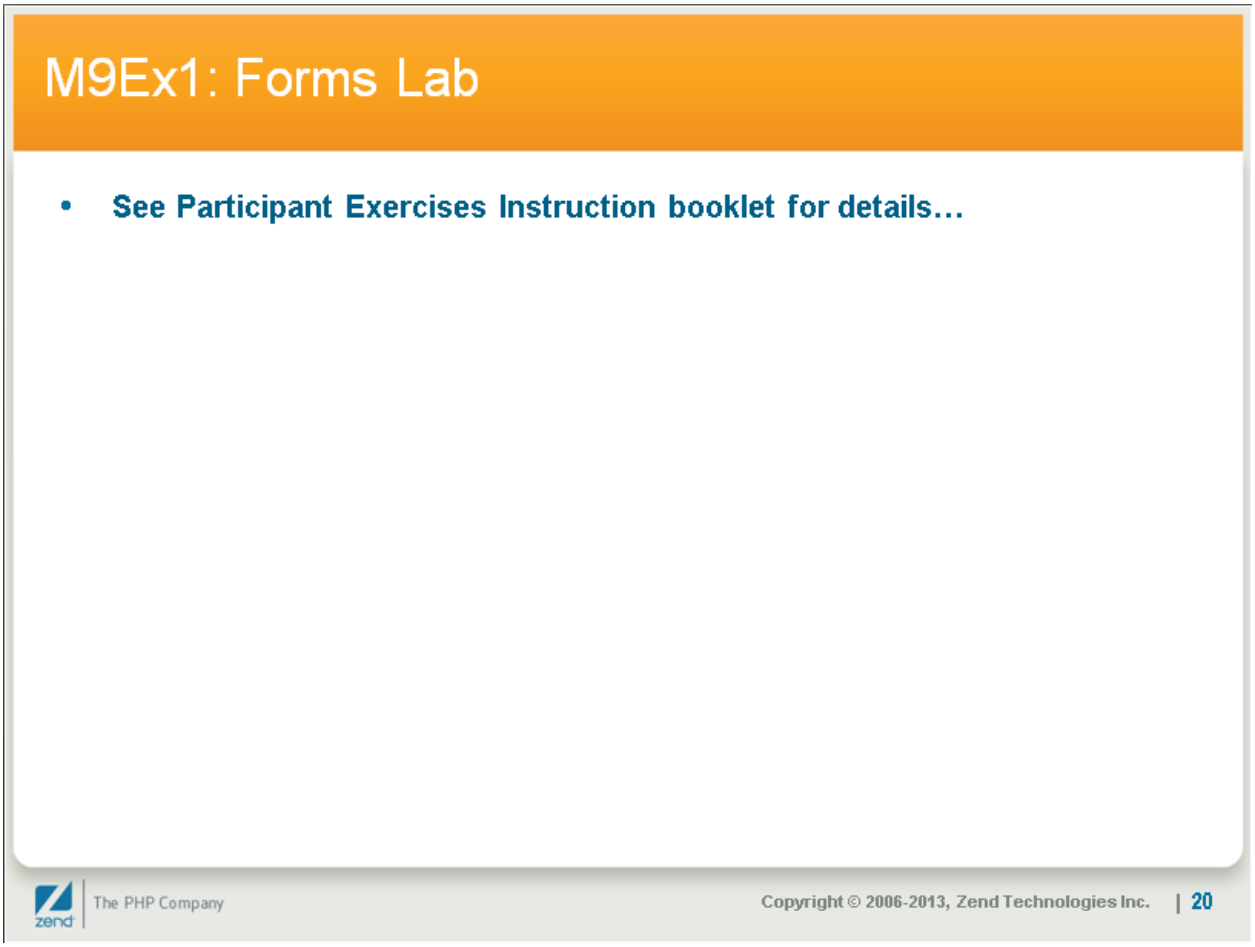
  FormElementErrors, FormInput, FormLabel, FormMultiCheckbox, FormRadio, FormSelect, and FormTextarea

Slide 19



- The Zend Framework 2 manual includes a complete list of element helpers
  http://packages.zendframework.com/docs/latest/manual/en/index.html

Slide 20


M9Ex1: Forms Lab
• See Participant Exercises Instruction booklet for details…
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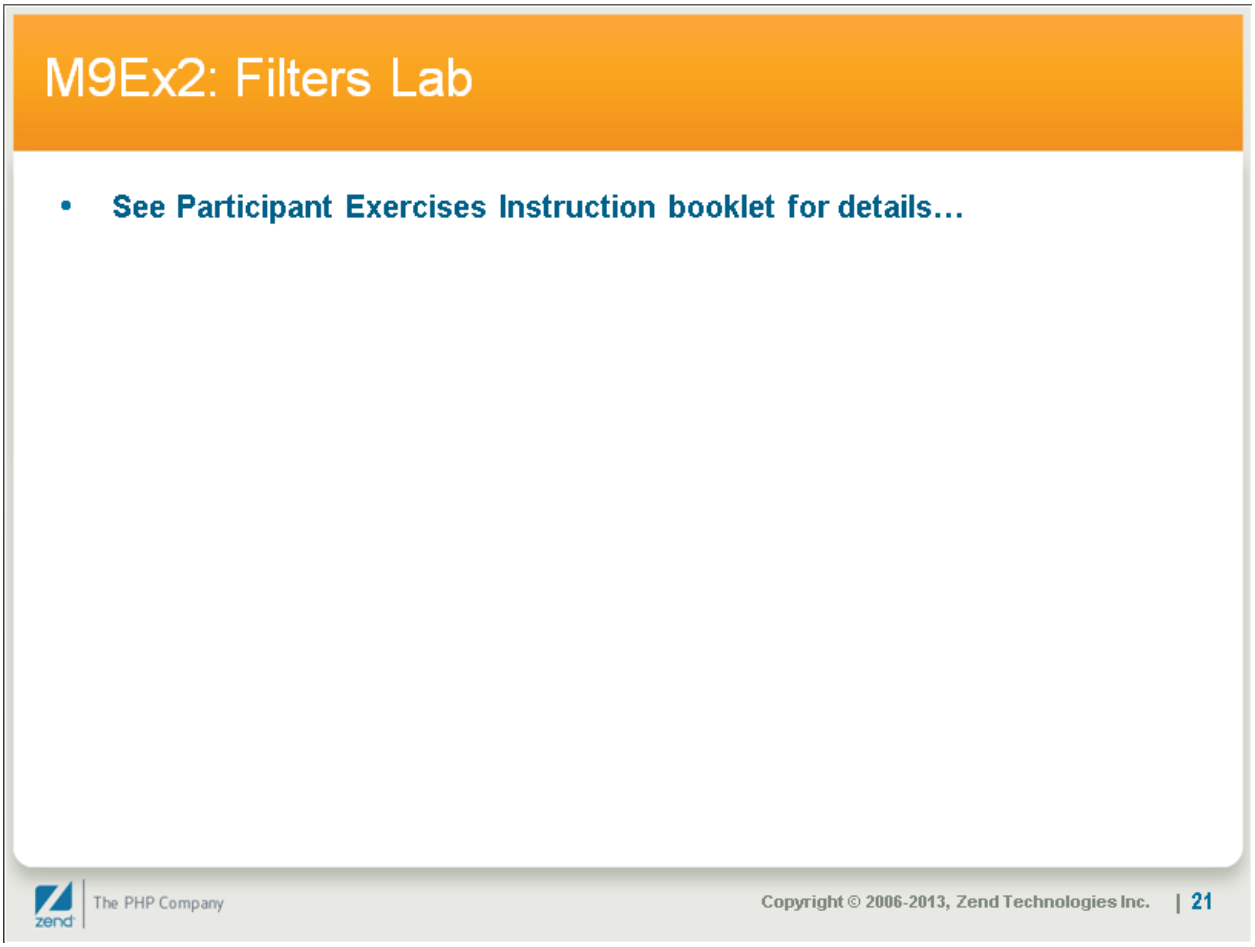
Slide 21


M9Ex2: Filters Lab
• See Participant Exercises Instruction booklet for details…
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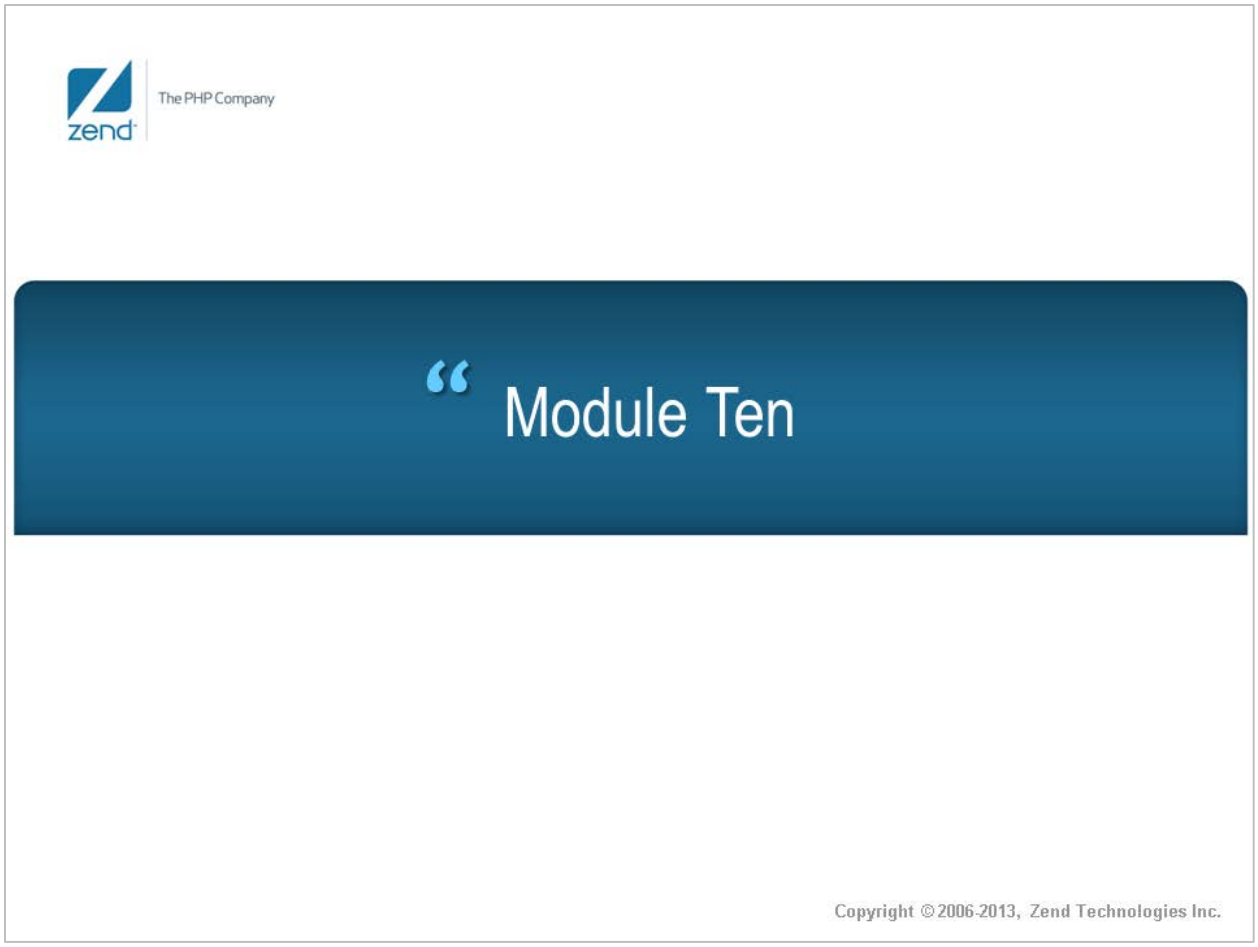
Slide 1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Module Ten
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Slide 2

Module Ten Topics

- In this module, we will cover:
  - `Zend\Db`
  - `Zend\Db\Adapter`
  - `Zend\Db\Sql`
  - `Zend\Db\TableGateway`

Slide 3

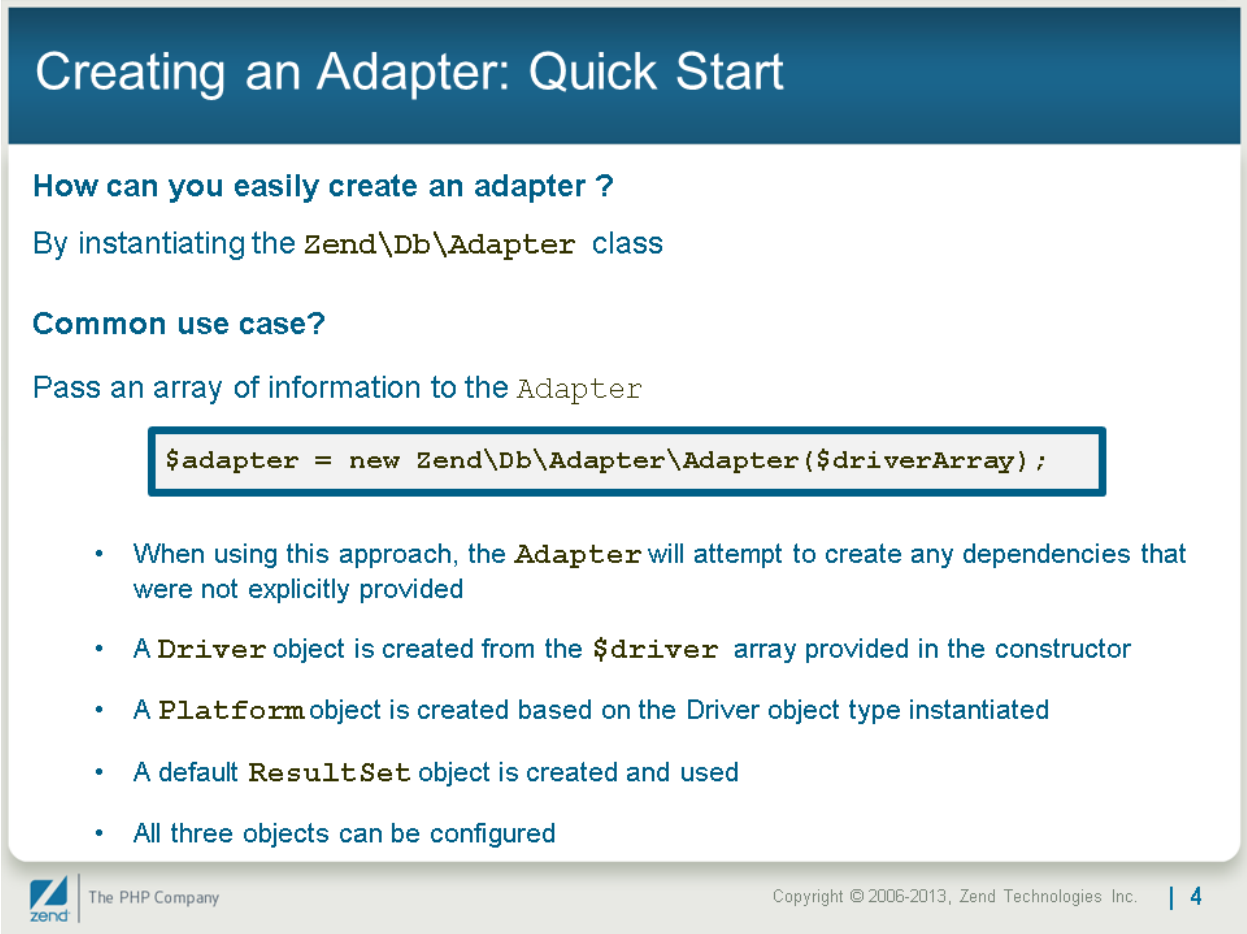
Zend\Db\Adapter

What is the `Zend\Db\Adapter`?

The `Adapter` object is the most important sub-component of `Zend\Db`; it provides a database abstraction layer for the database PHP supports.

- The "`Driver`" part of `Zend\Db\Adapter` creates an abstraction layer for PHP extensions
- The "`Platform`" part of `Zend\Db\Adapter` creates a lightweight abstraction layer for vendor-specific platform requirements in its SQL/RDBMS implementation

Slide 4



- Effectively, if the PHP manual uses a particular naming, this naming will be supported by our Driver

Slide 5

Zend\Db\Adapter: Sample Connections

```
// A MySQL connection using ext/mysqli
$adapter = new Zend\Db\Adapter\Adapter(array(
    'driver'   => 'Mysqli',
    'database' => 'zend_db_example',
    'username' => 'developer',
    'password' => 'developer-password'
));
// A Sqlite connection via PDO
$adapter = new Zend\Db\Adapter\Adapter(array(
    'driver'   => 'Pdo_Sqlite',
    'database' => 'path/to/sqlite.db'
));
// Alternative/generic Sqlite connection via PDO; assumes DB in "data" folder
$adapter = new Zend\Db\Adapter\Adapter(array(
    'driver' => 'pdo',
    'dsn'    => 'sqlite:'.__DIR__. '/data/guestbook.db'
));
```


Slide 6

Zend\Db\Adapter: Sample Connections

```
<?php
// Main application configuration array
return array(
    'service_manager' => array(
        'factories' => array(
            'Zend\Db\Adapter\Adapter' =>
                            'Zend\Db\Adapter\AdapterServiceFactory',
        ),
    ),
// The AdapterServiceFactory will search for and internally use the
// element below
    'db' => array(
        'driver'         => 'pdo',
        'dsn'            =>
                       'mysql:dbname=zend_db_example;host=localhost',
        'username'       => 'developer',
        'password'       => 'developer-password',
        'driver_options' => array(PDO::MYSQL_ATTR_INIT_COMMAND
                                => "SET NAMES 'UTF8'"),
    ),
);
```


Slide 7

Creating an Adapter: Dependency Injection

What is a more explicit way to create an adapter ?

By injecting all the dependecies up front

With `Zend\Db\Adapter\Adapter`, all required dependencies are injected through the constructor, which has the following signature in 'pseudo' code

Common use case?

```
use Zend\Db\Adapter\Platform\PlatformInterface;
use Zend\Db\ResultSet\ResultSet;

class Zend\Db\Adapter\Adapter {
    public function __construct($driver, PlatformInterface
    $platform = null, ResultSet $queryResultSetPrototype = null)
}
```

Slide 8

Creating an Adapter: By Injecting Dependencies

These are parameters you can inject:

`$driver`
an array of connection parameters (Quick start) or an instance of `Zend\Db\Adapter\Driver\DriverInterface`

`$platform` (optional)
an instance of `Zend\Db\Platform\PlatformInterface`; the default will be created based on the driver implementation

`$queryResulSetPrototype` (optional)
an instance of `Zend\Db\ResultSet\ResultSet`

Slide 9

Query Preparation

`query()` is a convenience method provided for quick "one-off" processing

- The first parameter is an SQL statement
- The second parameter can be an array of values which substitute for the parameters....
  - This generally means supplying a SQL statement with its values substituted with placeholders, and the parameters for those placeholders supplied separately
  - Example of this workflow with `Zend\Db\Adapter\Adapter`

```
$adapter->query('SELECT * FROM `artist` WHERE `id` = ?', array(5));
```

- The second parameter can also be the query "mode"
  - The default mode is `Adapter::QUERY_MODE_PREPARE`

Slide 10

Query Preparation

```
$adapter->query('SELECT * FROM `artist` WHERE `id` = ?', array(5));
```

- **The corresponding steps are:**
  - Create a new `Statement` object >>
  - Prepare an array into a `ParameterContainer`, if necessary >>
  - Inject the `ParameterContainer` into the `Statement` object >>
  - Execute the `Statement` object, producing a `Result` object >>
  - Check the `Result` object to check if the supplied sql was a "query", or a result set producing statement >>

If it is a result set producing query, clone the `ResultSet` prototype, inject `Result` as data source, return it

Else, return the `Result`

Slide 11

Query Execution

In some cases, you have to execute statements directly, rather than through preparation

- Ex: Executing a DDL statement, which cannot be prepared for most extensions and vendor platforms
- In this case, you will need to provide `Adapter::QUERY_MODE_EXECUTE` as the second parameter

```
$adapter->query('ALTER TABLE ADD INDEX(`foo_index`) ON ('foo_column'))',
Adapter::QUERY_MODE_EXECUTE);
```

Slide 12

Creating Statements

While `query()` is useful for one-off or quick querying of a database via `Adapter`, it usually is better to create a statement and interact with it directly

To accomplish this, `Adapter` provides a routine called `createStatement()`

- This component allows you to create a driver-specific statement, providing greater control over the Prepare-Then-Execute workflow

```
$statement = $adapter->createStatement($sql, $optionalParameters);

$result = $statement->execute();
```

Slide 13

Using the Platform Object

The Platform object provides an API to assist in crafting queries specific to the SQL implementation of a particular vendor

- This object can handle nuances such as how identifiers or values are quoted, or what character acts as the identifier separator
  - Ex: The interface for a platform object

```
interface Zend\Db\Adapter\Platform\PlatformInterface
{
    public function getName();
    public function getQuoteIdentifierSymbol();
    public function quoteIdentifier($identifier);
    public function quoteIdentifierChain($identifierChain);
    public function getQuoteValueSymbol();
    public function quoteValue($value);
    public function quoteValueList($valueList);
    public function getIdentifierSeparator();
    public function quoteIdentifierInFragment($identifier, array
                                              $additionalSafeWords = array());
}
```

Slide 14

Using the Platform Object

- Ex: Quoting a column name, specific to MySQL

```
$platform = new Zend\Db\Adapter\Platform\Mysql;

// returns `first_name`
$column = $platform->quoteIdentifier('first_name');
```

- Ex: Alternative approach: Rather than directly instantiating a platform object, you could obtain an instance from the adapter

```
$platform = $adapter->getPlatform();

// or

$platform = $adapter->platform;
// magic property access
```

Slide 15

Using the Parameter Container

The `ParameterContainer` object is a container for parameters that need to be passed into a `Statement` object for SQL statements

- This object implements the `ArrayAccess` interface
- `formatParameterName` selects what type of placeholder is used – "?" or ":name"

```
$adapter = new Zend\Db\Adapter\Adapter($driverConfig);

// $qi stands for "quote identifier", and $fp stands for "format parameter"
$qi = function($name) use ($adapter) { return $adapter->platform->
                                       quoteIdentifier($name); };
$fp = function($name) use ($adapter) { return $adapter->driver->
                                       formatParameterName($name); };

// Produces the string: UPDATE 'artist' SET 'name'=:name WHERE 'id'=:id
// (assuming MySQL)
$sql = 'UPDATE ' . $qi('artist')
     . ' SET ' . $qi('name') . ' = ' . $fp('name')
     . ' WHERE ' . $qi('id') . ' = ' . $fp('id');
```

- Note: the code for the parameter container is on the next slide

Slide 16

Using the Parameter Container

```
// @var $statement Zend\Db\Adapter\DriverStatementInterface
$statement = $adapter->createStatement($sql);
$parameters = array(
    'name' => 'Updated Artist',
    'id' => 1
);
$statement->execute($parameters);

// DATA INSERTED, NOW CHECK @var $statement Zend\Db\Adapter\DriverStatementInterface
$statement = $adapter->createStatement('SELECT * FROM '
    . $qi('artist')
    . ' WHERE id = ' . $fp('id'));

// @var $results Zend\Db\ResultSet\ResultSet
        $results = $statement->execute(array('id' => 1));
        $row = $results->current();
        $name = $row['name'];
```

Slide 17

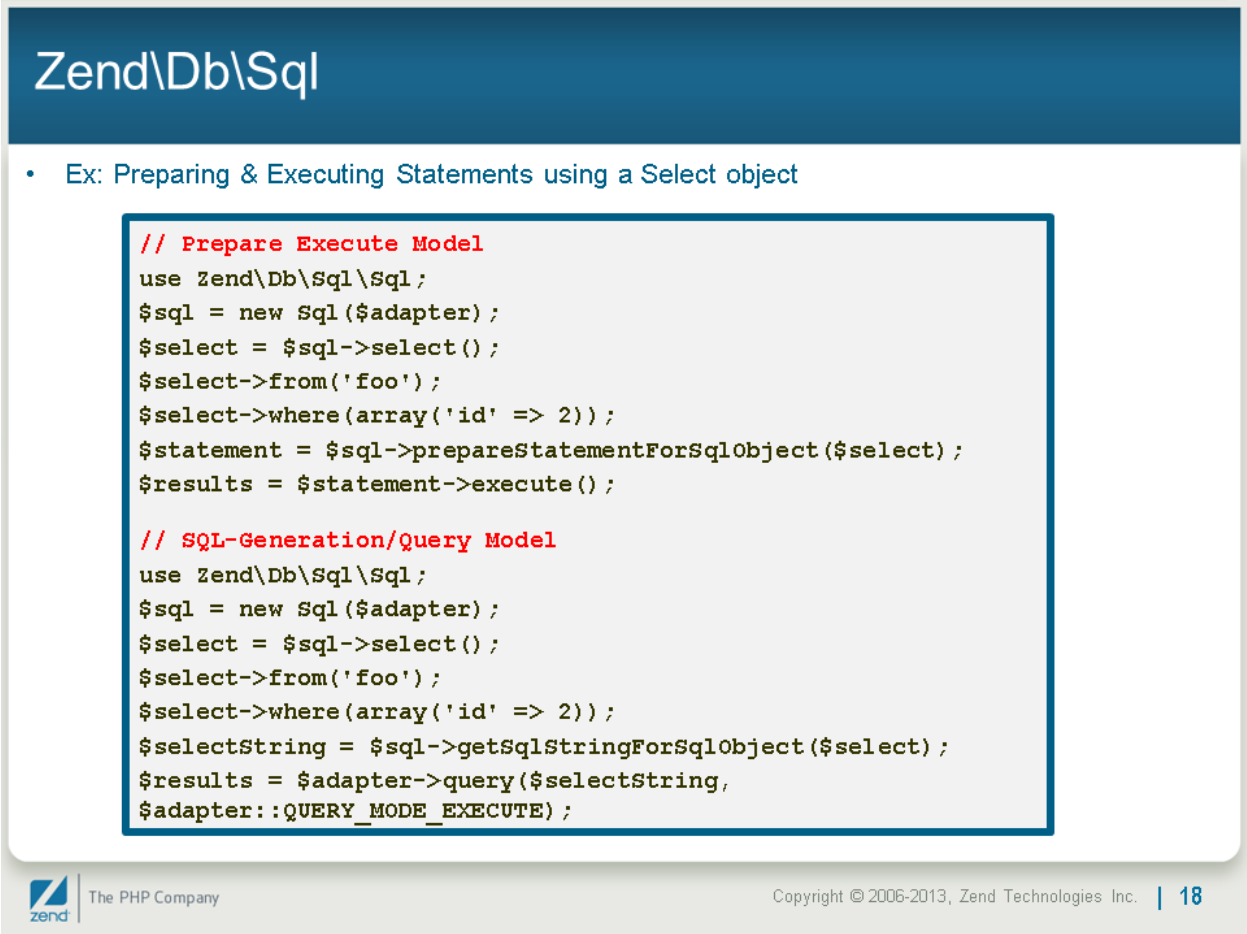
Zend\Db\Sql

`Zend\Db\Sql` is a SQL abstraction layer for building platform-specific SQL queries via an object-oriented API

- The end result of an `Zend\Db\Sql` object will be to either produce
  - (1) a `Statement` & `Parameter` container that represents the target query
  - or
  - (2) a full string that can be directly executed against the database platform
- `Zend\Db\Sql` objects require a `Zend\Db\Adapter\Adapter` object in order to produce the desired results

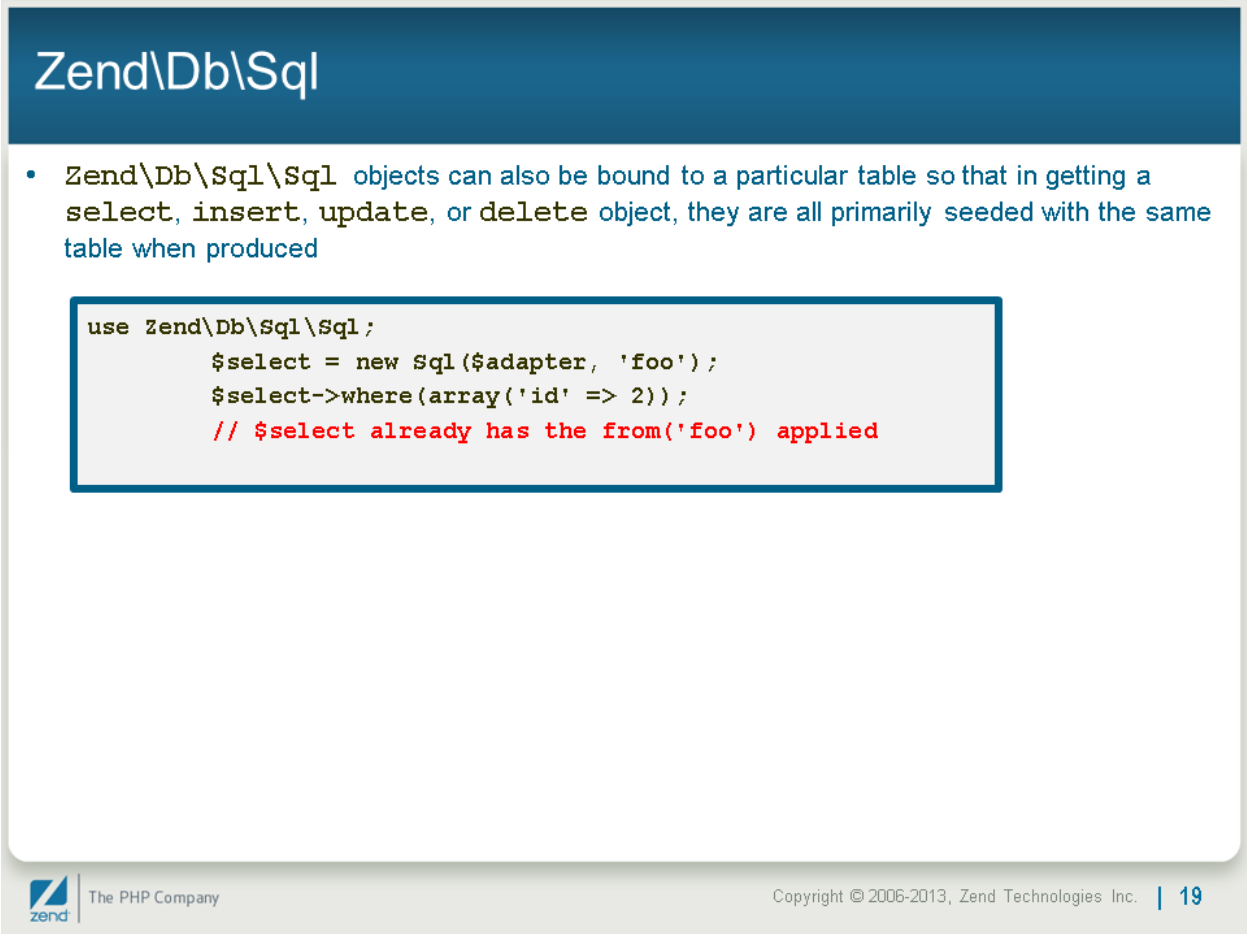
```
use Zend\Db\Sql\Sql;
$sql = new Sql($adapter);
$select = $sql->select(); // @return Zend\Db\Sql\Select
$insert = $sql->insert(); // @return Zend\Db\Sql\Insert
$update = $sql->update(); // @return Zend\Db\Sql\Update
$delete = $sql->delete(); // @return Zend\Db\Sql\Delete
```


Slide 18



- The Statement keeps track of names, even if the platform doesn't support named parameters – this means you can always use a hash map to specify parameters
- The second example is simply an additional case, showing it works in any type of SQL statement

Slide 19



- Zend\Db\Sql\Sql objects can also be bound to a particular table so that in getting a select, insert, update, or delete object, they are all primarily seeded with the same table when produced.

```
use Zend\Db\Sql\Sql;
$select = new Sql($adapter, 'foo');
$select->where(array('id' => 2));
// $select already has the from('foo') applied
```

Slide 20

Zend\Db\Sql : Select, Insert, Update, Delete

Each of the objects implement the following two interfaces:

```
public function prepareStatement(Adapter $adapter, StatementInterface
                                 $statement);
// And
public function getSqlString(PlatformInterface $adapterPlatform = null);
```

- These functions can be called to either

  (1) produce a prepared statement or

  (2) generate SQL

Slide 21

Zend\Db\Sql\Select

The primary function of the `Zend\Db\Sql\Select` object is to present a unified API for building platform specific `SQL SELECT` queries

- It can be instantiated and consumed without `Zend\Db\Sql\Sql`

```
use Zend\Db\Sql\Select;
$select = new Select();

// or, to produce a $select bound to a specific table
$select = new Select('foo');
```

- The available methods, which all correspond to SQL equivalents
- All of these methods implement a fluent interface

Methods		
`from()`	`limit()`	`having()`
`columns()`	`join()`	`order()`
`group()`	`offset()`	`where()`

- NOTE: 'Select' is a child class of \Zend\Db\Sql\AbstractSql

Slide 22

Zend\Db\Sql\Insert

The `Insert` class

```
class Insert implements SqlInterface, PreparableSqlInterface
{
    const VALUES_MERGE = 'merge';
    const VALUES_SET   = 'set';

    public function __construct($table = null);
    public function into($table);
    public function columns(array $columns);
    public function values(array $values, $flag = self::VALUES_SET);
}
```

Slide 23

Zend\Db\Sql\Update

The `Update` class

```
class Update
{
    const VALUES_MERGE = 'merge';
    const VALUES_SET   = 'set';

    public $where; // @param Where $where
    public function __construct($table = null);
    public function table($table);
    public function set(array $values, $flag = self::VALUES_SET);
    public function where($predicate, $combination =
                                    Predicate\PredicateSet::OP_AND);
}
```

Slide 24

Zend\Db\Sql\Delete

The `Delete` class

```
class Delete
{
    public $where; // @param Where $where
    public function __construct($table = null);
    public function from($table);
    public function where($predicate, $combination =
                                    Predicate\PredicateSet::OP_AND);
}
```

Slide 25

Zend\Db\Sql\Where & Predicates

`Zend\Db\Sql\Where` is used to build a SQL `Where` clause

- When building the `Where` clause, you make use of "predicates"
- Predicates include `Between`, `Equal To`, `In`, `IsNull`, `Like`, ...
- During parameterization, the parameters are replaced with their proper placeholder (a named or positional parameter), and the values are stored inside an `Adapter\ParameterContainer`
- When executed, the values will be interpolated into the fragments to which they belong and properly quoted

Slide 26

Zend\Db\Sql\Where API

It is important to realize that, in this API, a distinction is made between which elements are considered identifiers (`TYPE_IDENTIFIER`) and values (`TYPE_VALUE`)

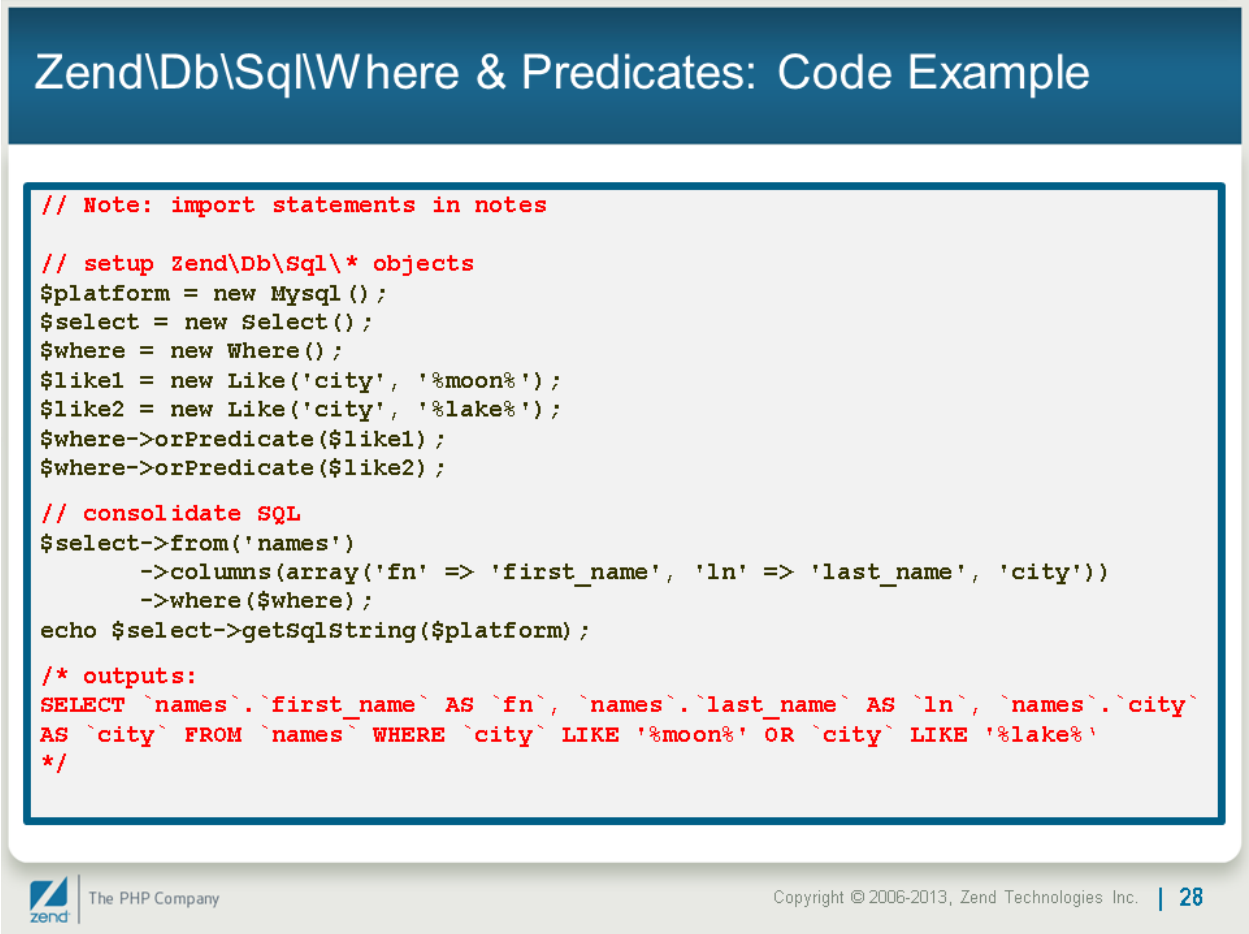
- There is also a special use case type for literal values (`TYPE_LITERAL`)
- These are all exposed via the `Zend\Db\Sql\ExpressionInterface` interface
- The API code follows …

Slide 27

Zend\Db\Sql\Where & Predicates: Code Example

```
// Example using Zend\Db\Select and Zend\Db\Where
// Note: import statements in notes

// create the objects
$platform = new Mysql();
$select = new Select();
$where = new Where();

// specify the "WHERE" conditions
$where->greaterThanOrEqualTo('qty_oh', 10);
$where->lessThan('cost', 100);
$select->from('products')
       ->where($where);

// extract the SQL
echo $select->getSqlString($platform);

// outputs:
// SELECT `products`.* FROM `products` WHERE `qty_oh` >= '10' AND `cost` < '100'
```

Slide 28

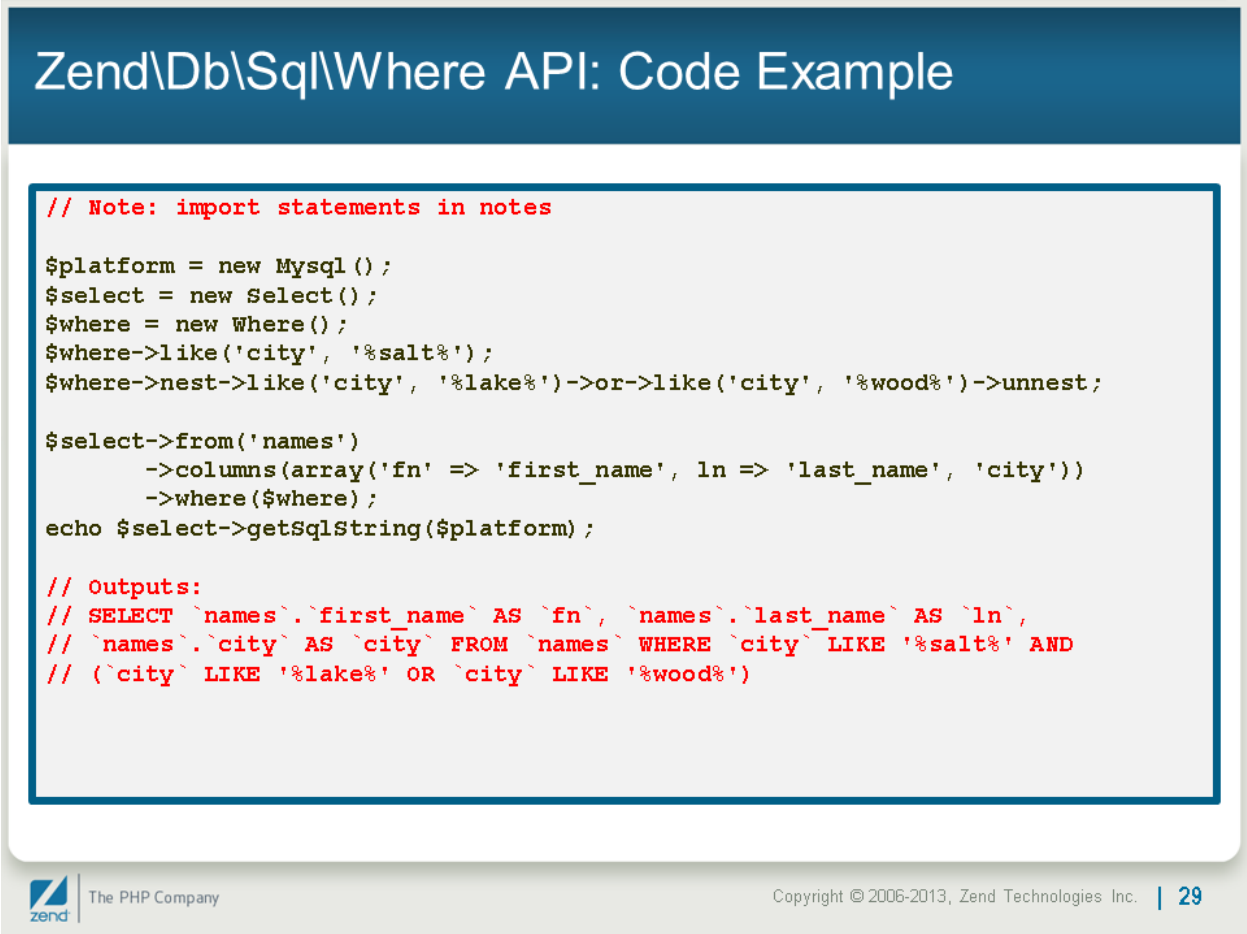


- Note the following import statements:

```
// “use” the appropriate classes
use Zend\Db\Adapter\Platform\Mysql;
use Zend\Db\Sql\Select;
use Zend\Db\Sql\Where;
```

- Code continued on next slide/page…

Slide 29



- Note the following import statements:

```
// use Zend\Db\Sql\* classes
use Zend\Db\Sql\Select;
use Zend\Db\Sql\Where;
```

Slide 30

Zend\Db\TableGateway

The Table Gateway object provides an object that represents a table in a database

- The methods of this object mirror the most common table operations
- The interface for such an object looks like:

```
interface Zend\Db\TableGateway\TableGatewayInterface
{
    public function getTable();
    public function select($where = null);
    public function insert($set);
    public function update($set, $where = null);
    public function delete($where);
}
```

Slide 31

Creating a Table: By Injecting Dependencies

- The most explicit way to create an adapter is to inject all the dependencies up front
- `Zend\Db\TableGateway\TableGateway` can use constructor injection, where all required dependencies are injected through the constructor. The example below shows a tablegateway class where the adapter is obtained via constructor injection.

```
class SomeTable extends AbstractTableGateway
{
    public function __construct(Adapter $adapter, ResultSetInterface
                                $resultPrototype=null)
    {
        /* ... */
    }
}

// Alternately, show the _actual_ `TableGateway` constructor:
class TableGateway extends TableGateway
{
    public function __construct($table, Adapter $adapter, $features = null
                    ResultSetInterface $resultSetPrototype = null, Sql $sql = null)
    {
        /* ... */
    }
}
```

Slide 32

Creating a Table: By Injecting Dependencies

These are parameters you can inject:

`$table`
a string representing the name of the table as represented in the database

`$adapter`
an instance of `Zend\Db\Adapter\Adapter` or `Zend\Db\Adapter\Driver\*`

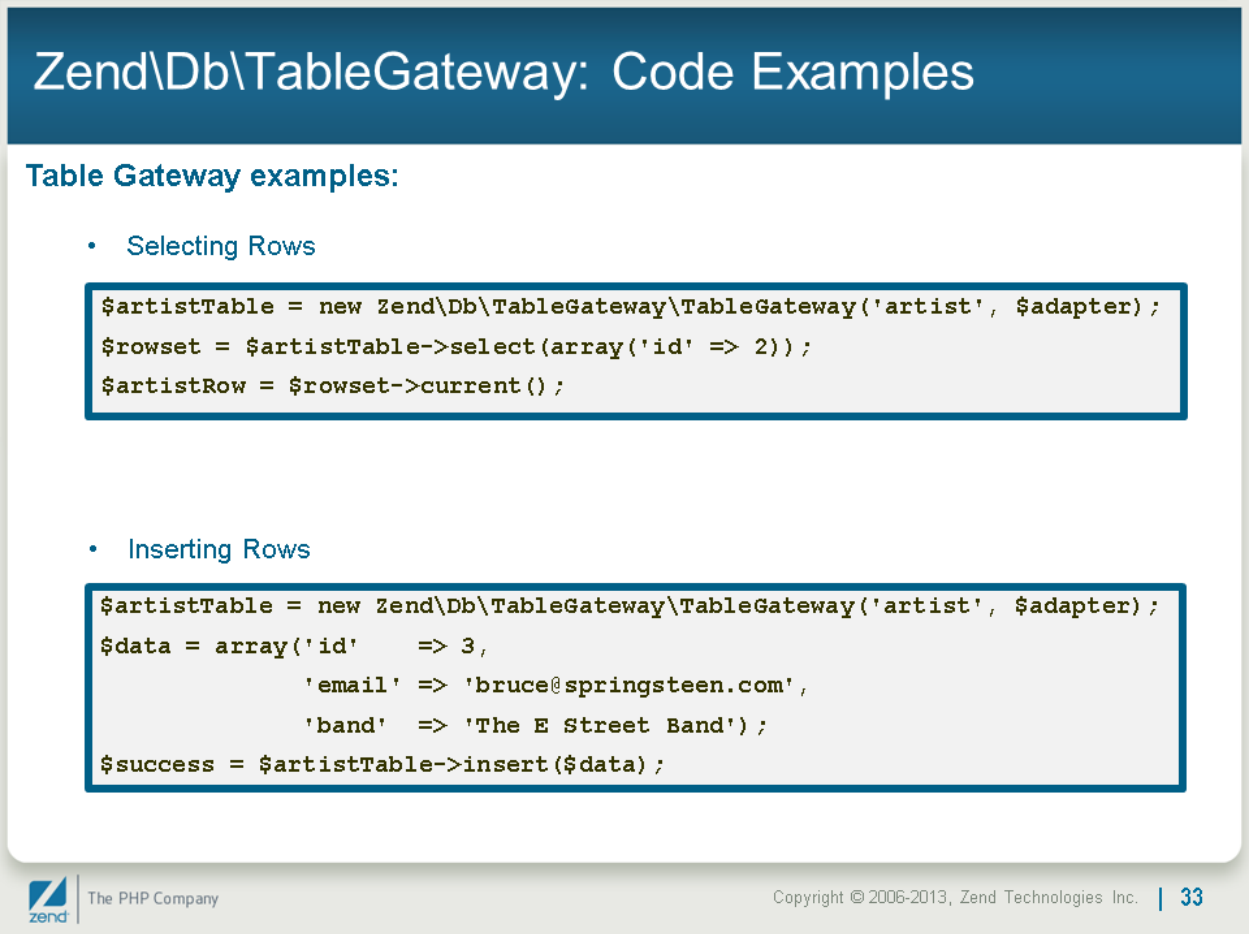
`$resultSetPrototype`
an object of a class which implements `Zend\Db\ResultSet\ResultSetInterface` (such as `Zend\Db\ResultSet\ResultSet`)

`$sql`
an instance of `Zend\Db\Sql\Sql`

`$table`
the name of the table as it appears in the database

`$features`
an implementation of a class `Zend\Db\TableGateway\Feature\*`; lets you define magic calls, `GETs` & `SETs`, as well as an `initialize()` method

Slide 33



- Note that select() always returns a ResultSet, even when a single row is returned

Slide 34

Zend\Db\TableGateway: Code Examples

Table Gateway examples:

- Updating Rows

```
$artistTable = new Zend\Db\TableGateway\TableGateway('artist', $adapter);
$result = $artistTable->update(array('name' => 'New Artist'),
                               array('id' => 2));
$name = $row['name'];
```

- Deleting Rows

```
$artistTable = new Zend\Db\TableGateway\TableGateway('artist', $adapter);
$result = $artistTable->delete(array('id' => 2));
```

Slide 35

Zend\Db\TableGateway: Code Examples

Table Gateway examples:

- Using a Where object with Select

```
$artistTable = new TableGateway('artist', $adapter);
$where = $artistTable->getSql()->select()->where();
$where->like('name', 'Bar%');
$rowset = $artistTable->select($where);
$row = $rowset->current();
```

- Using a Closure with Select

```
$artistTable = new TableGateway('artist', $adapter);
$rowset = $artistTable->select(function (Select $select) {
    $select->where()->like(/* ... */);
});
$row = $rowset->current();
```

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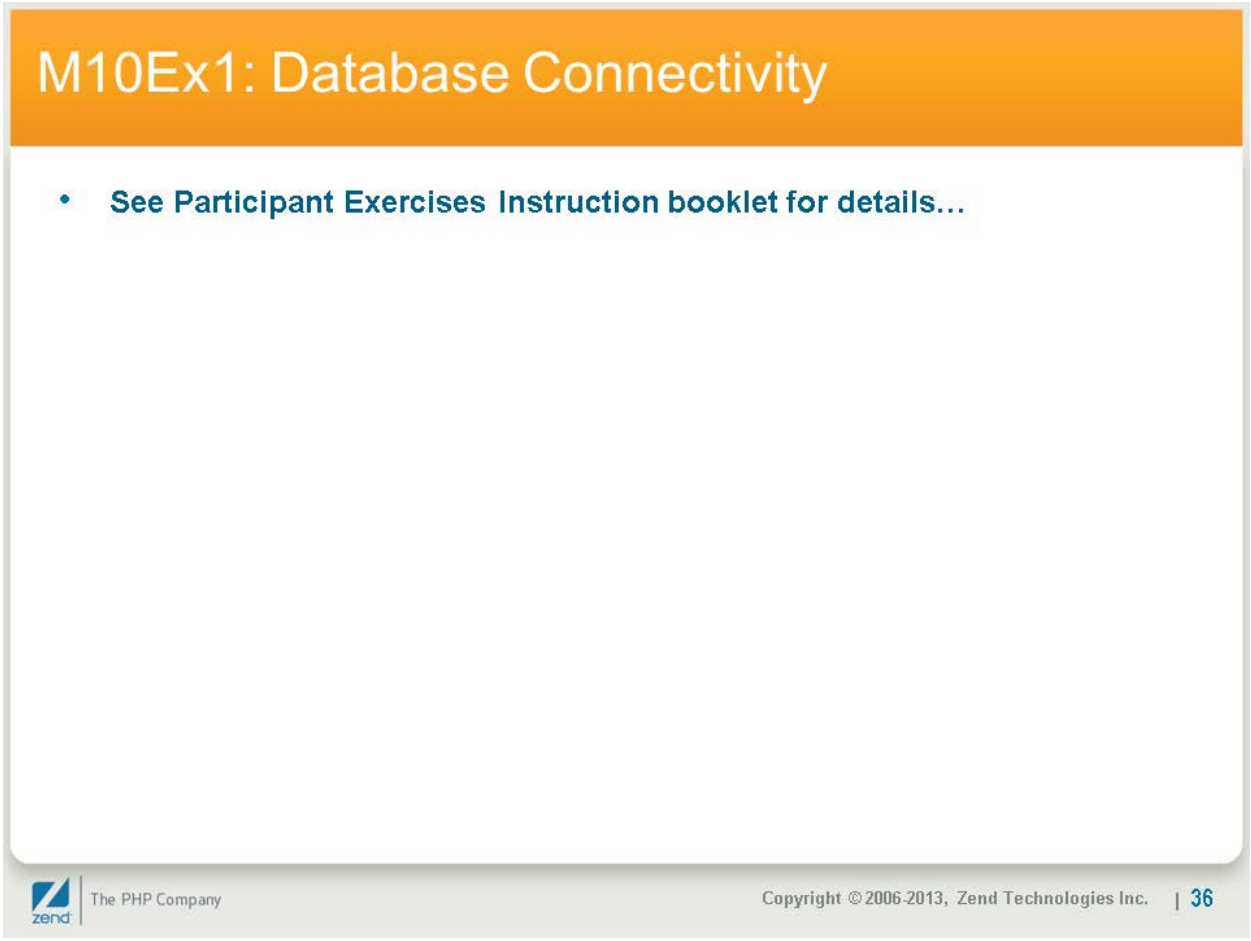
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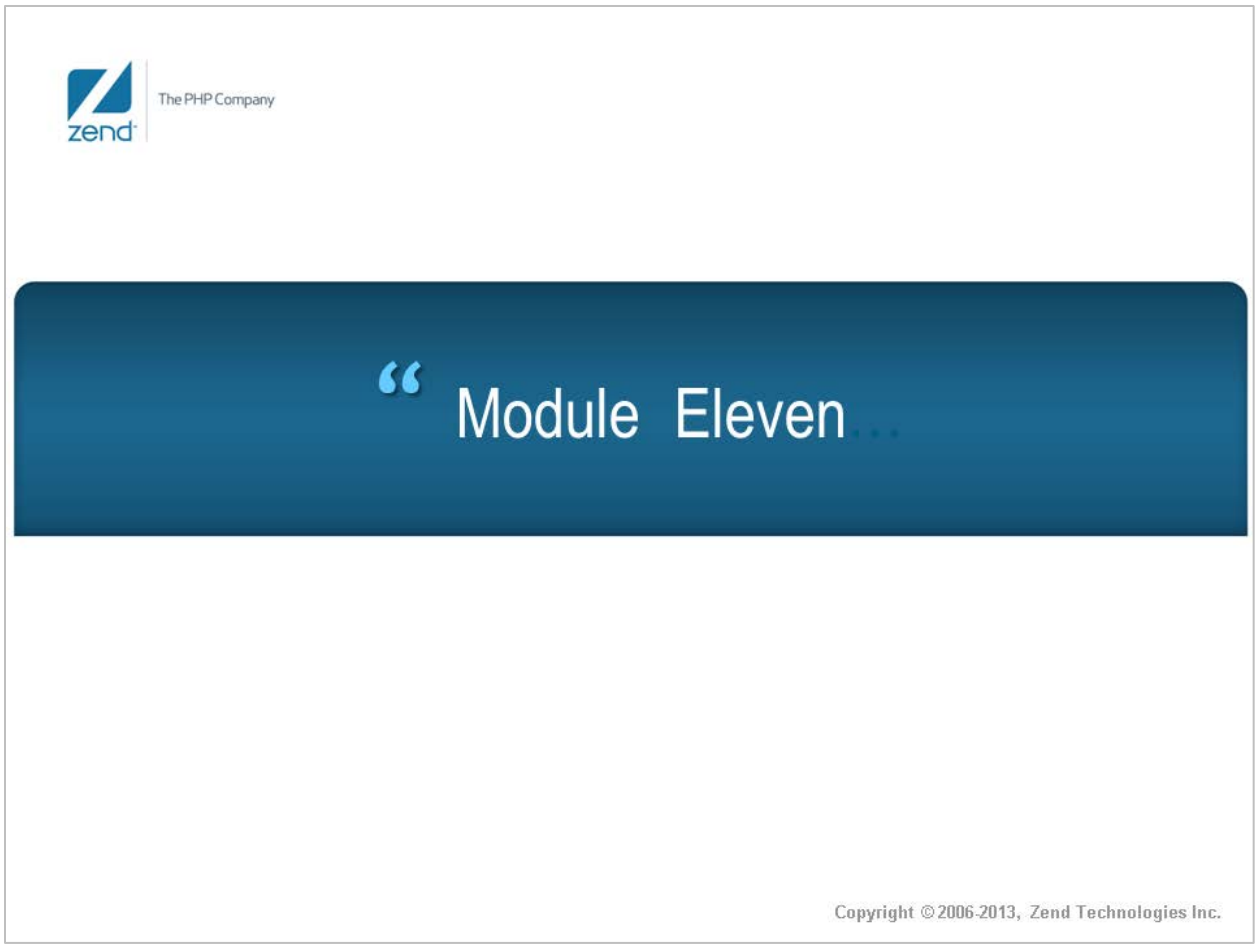
Slide 1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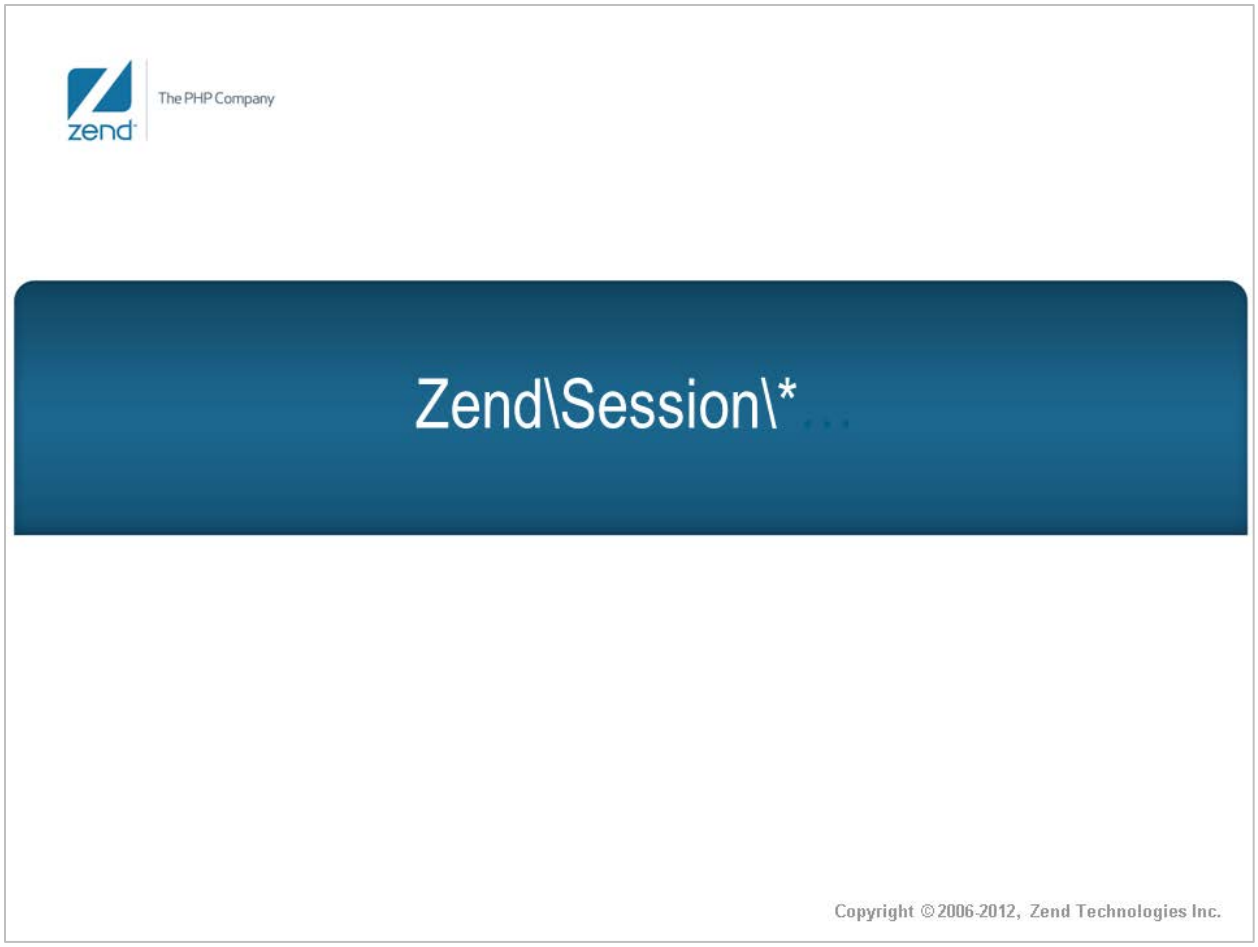
Slide 2

Module Eleven Topics

- In this model, we will cover:
  - `Zend\Session`
  - (Optional) `Zend\Log`
  - (Optional) `Zend\Mail`

Slide 3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Zend\Session*...
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Slide 4

Zend\Session\SessionManager

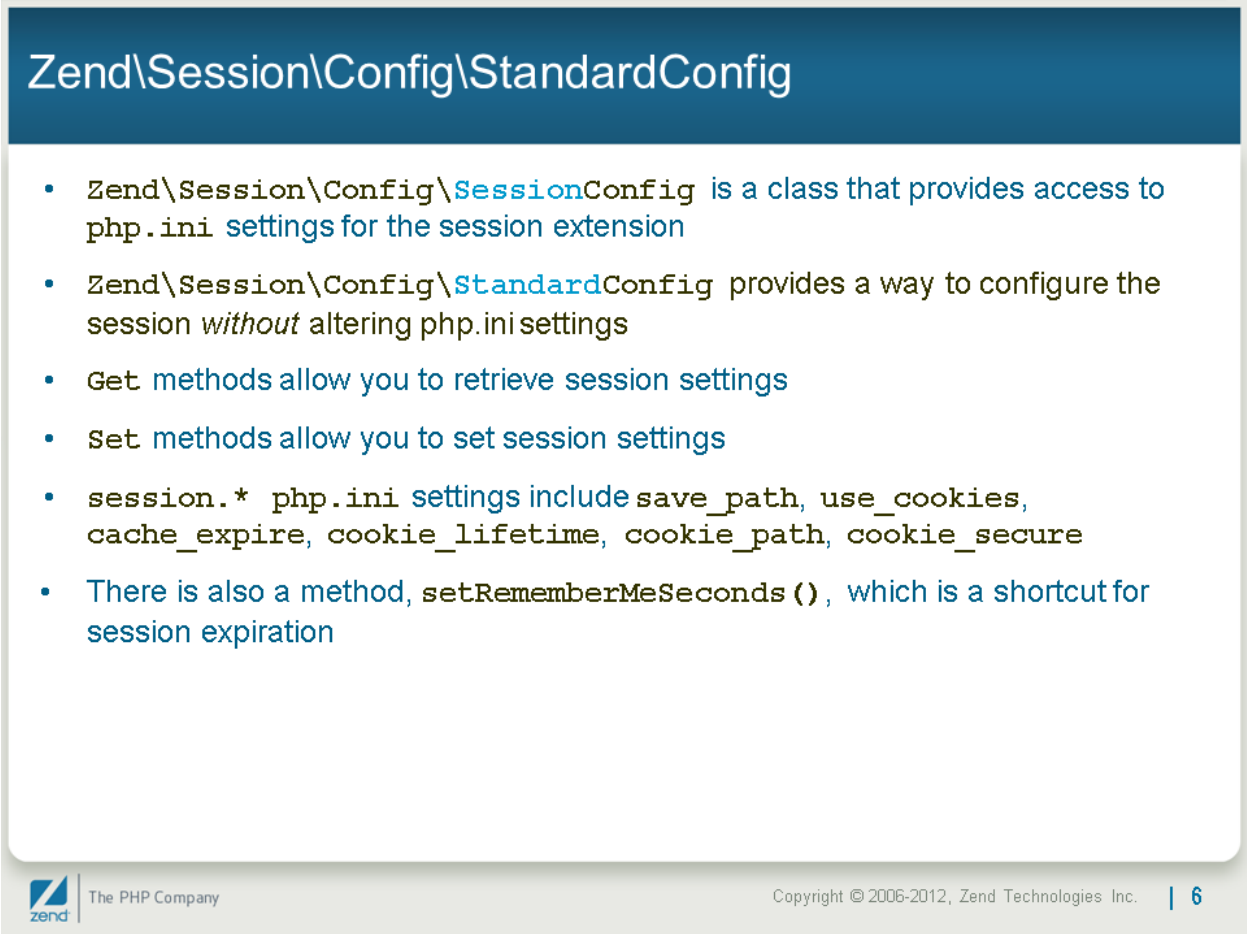
- Within PHP applications, a Session represents a logical, 1:1 connection between Server-side, persistent state data and a particular User Agent Client (Ex: a web browser)
  - Thus, a standard PHP session id, stored either in a client's cookie or embedded in URLs, maintains the association between a client and session state data
- `Zend\Session\SessionManager` helps to manage and preserve session data across multiple page requests by the same client
  - Unlike cookie data, session data is *not* stored on the client but on the server
- `Zend\Session\SessionManager` is not intended to work directly on the contents of session namespace containers - instead, we use `Zend\Session\Container`

Slide 5

Zend\Session and Zend\Session\Container

- Session data, normally accessed via `$_SESSION[]`, is managed by `Zend\Session\SessionManager` and manipulated by `Zend\Session\Container` accessor objects
- If no namespace is specified when instantiating `Zend\Session\Container`, all data will be transparently stored in a namespace called "`Default`"
- `Zend\Session\Container` is used to segregate all session data
  - Default exists to store all session data as one namespace
- `Zend\Session\SessionManager` utilizes `ext/session` and its special `$_SESSION` superglobal as the storage mechanism for session state data
  - NOTE: While `$_SESSION` is still available in PHP's global namespace, developers should refrain from directly accessing it, so that `Zend\Session\SessionManager` and `Zend\Session\Container` can operate most effectively and securely

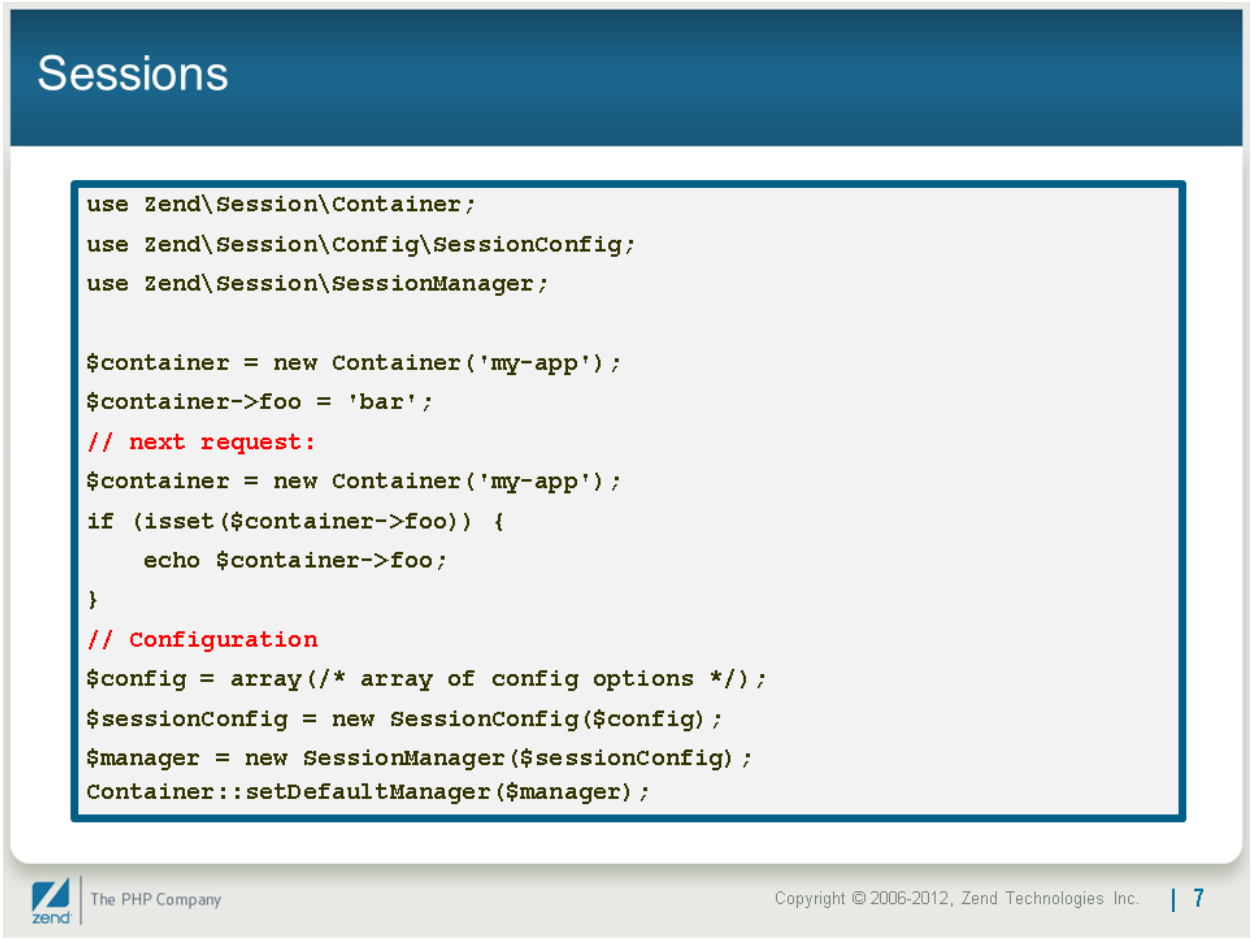
Slide 6



- Other session.* php.ini settings include:

  cookie_domain, cookie_httponly, entropy_file, name, gc_divisor, gc_maxlifetime, gc_probability, hash_bits_per_character

Slide 7


Sessions
use Zend\Session\Container;
use Zend\Session\Config\SessionConfig;
use Zend\Session\SessionManager;
$container = new Container('my-app');
$container->foo = 'bar';
// next request:
$container = new Container('my-app');
if (isset($container->foo)) {
echo $container->foo;
}
// Configuration
$config = array(/* array of config options */);
$sessionConfig = new SessionConfig($config);
$manager = new SessionManager($sessionConfig);
Container::setDefaultManager($manager);
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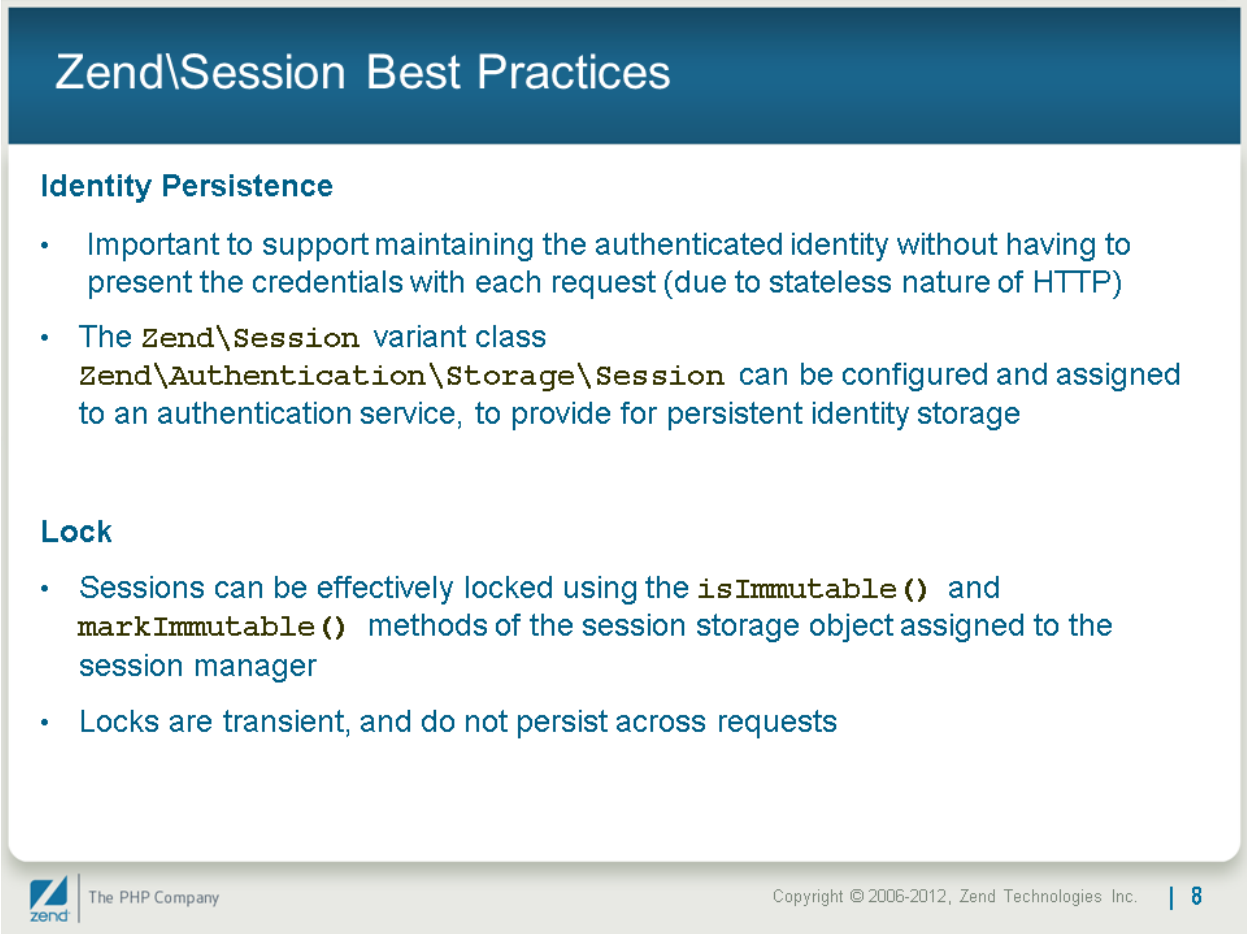
Slide 8



- HTTP is a stateless protocol, however, and techniques such as cookies and sessions have been developed in order to facilitate maintaining state across multiple requests in server-side web applications
- Zend\Session is used by default within Zend\Authentication to provide persistent storage of the identity from a successful authentication attempt using the PHP session
- By default, Zend\Authentication uses a storage class based on Zend\Session. The storage class may be changed by providing a different storage object to Zend\Authentication::setStorage()

Slide 9

Zend\Session Best Practices

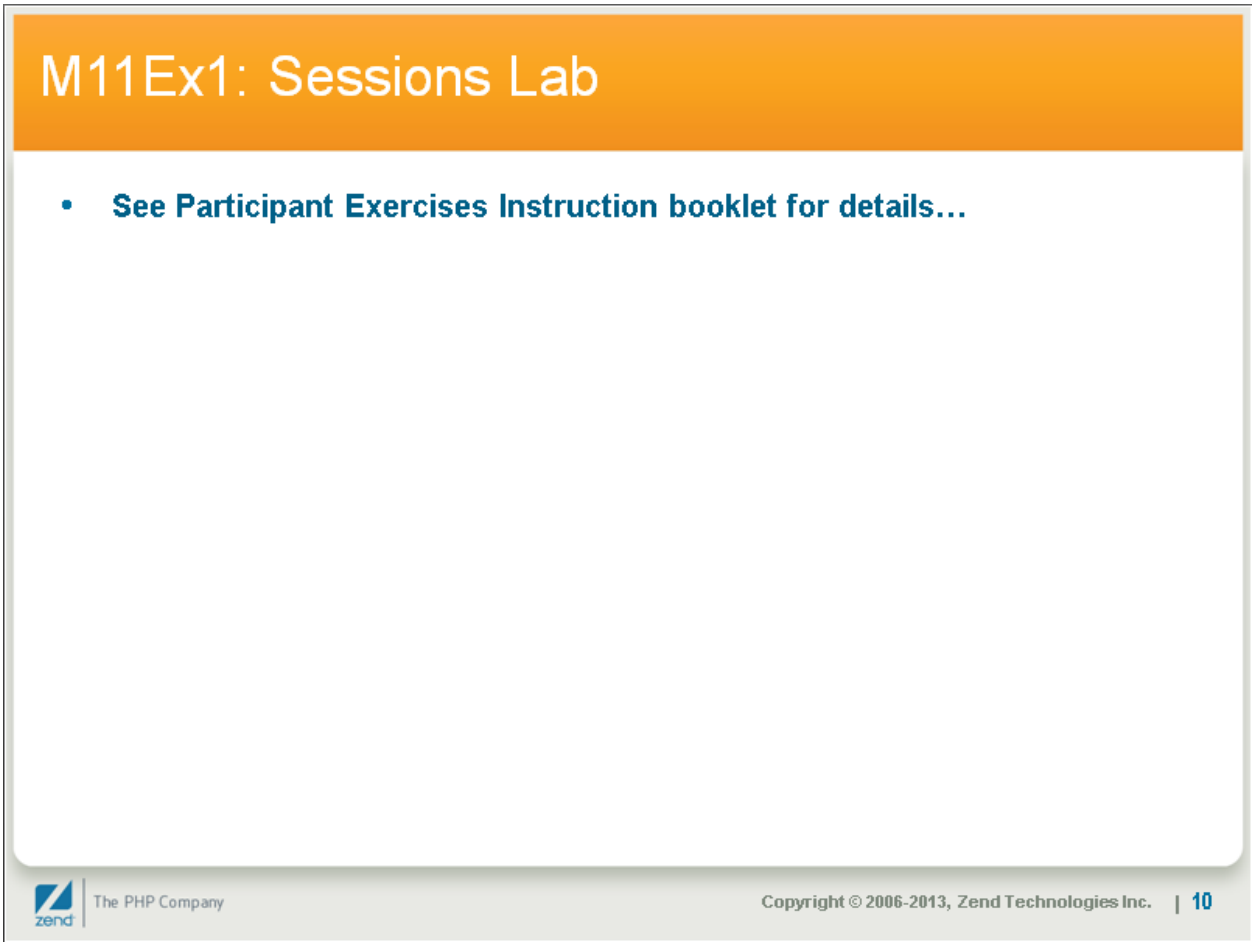
Expiration

- Limits can be placed on the longevity of both containers and individual keys in containers – example:
  - for passing temporary information between requests
  - for reducing exposure to certain security risks by removing access to potentially sensitive information 'x' times after authentication occurs
- Expiration can be based on elapsed seconds, or the concept of "hops", where a hop occurs for each successive request that activates the container, such as:

```
$space = new Zend\Session\Container('myspace');
```

- Can also use containers to separate session access by controllers, to protect variables from contamination
- Ex: An `Authentication` controller might keep its session state data separate from all other controllers

Slide 10


M11Ex1: Sessions Lab
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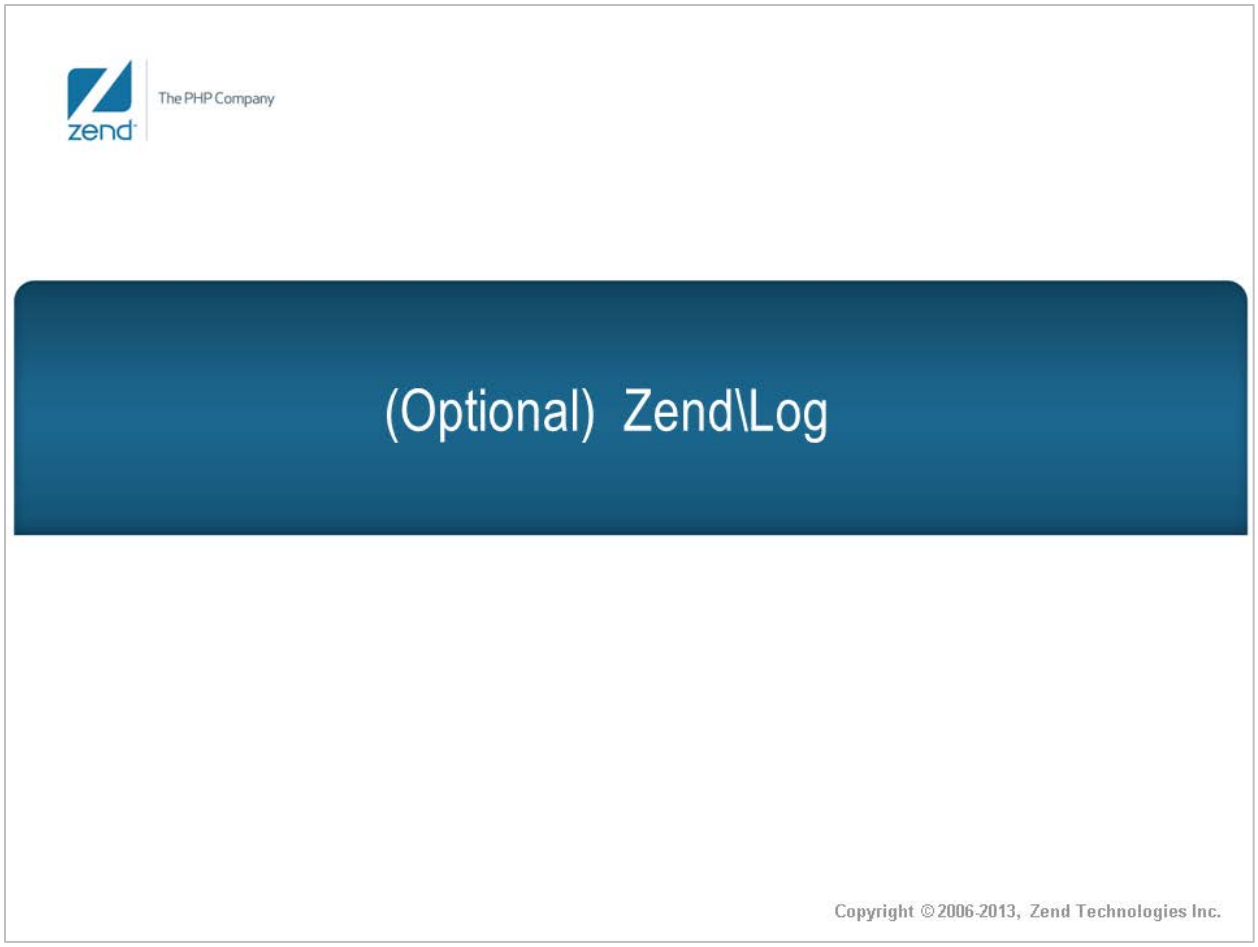
Slide 11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zend
(Optional) Zend\Log
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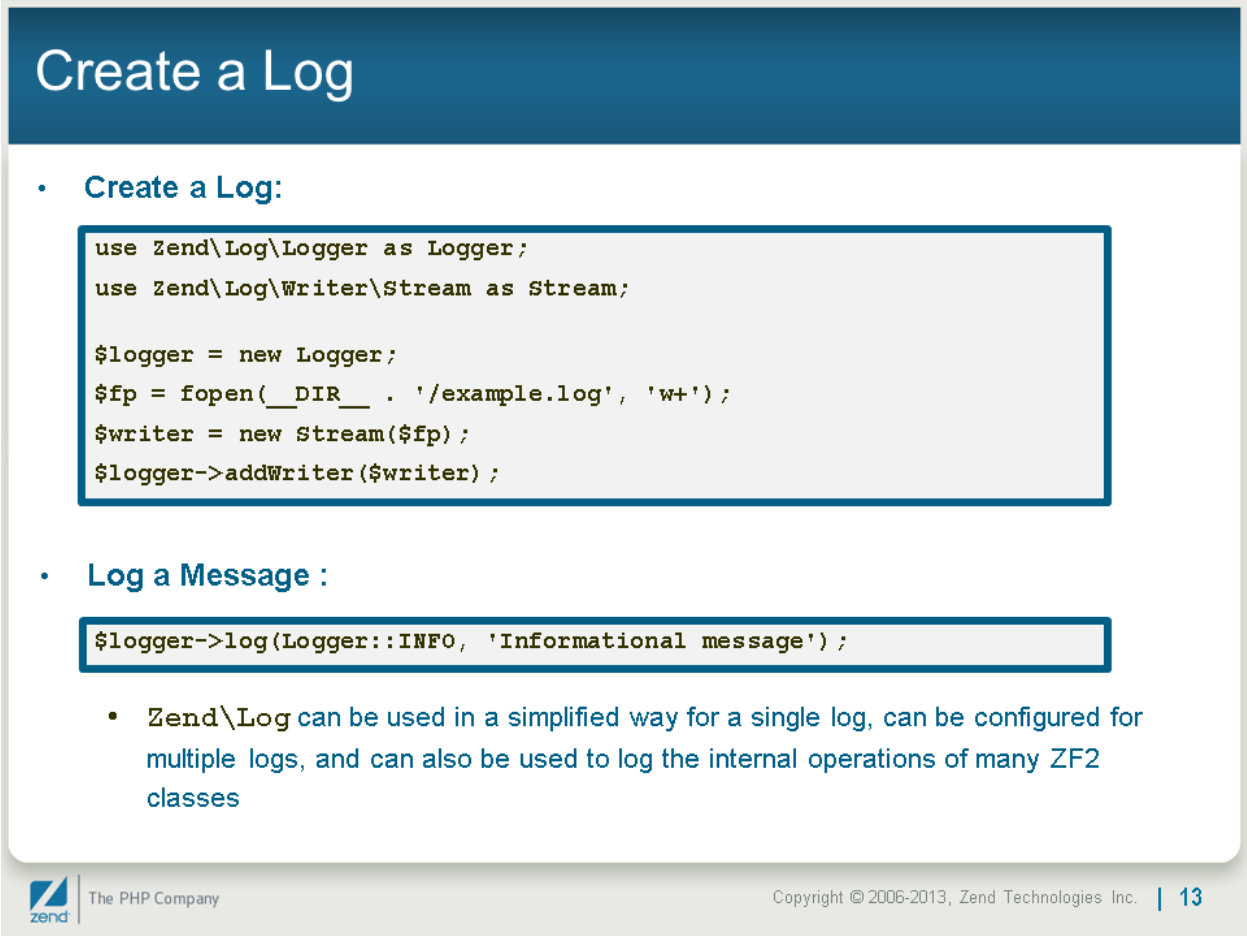
Slide 12

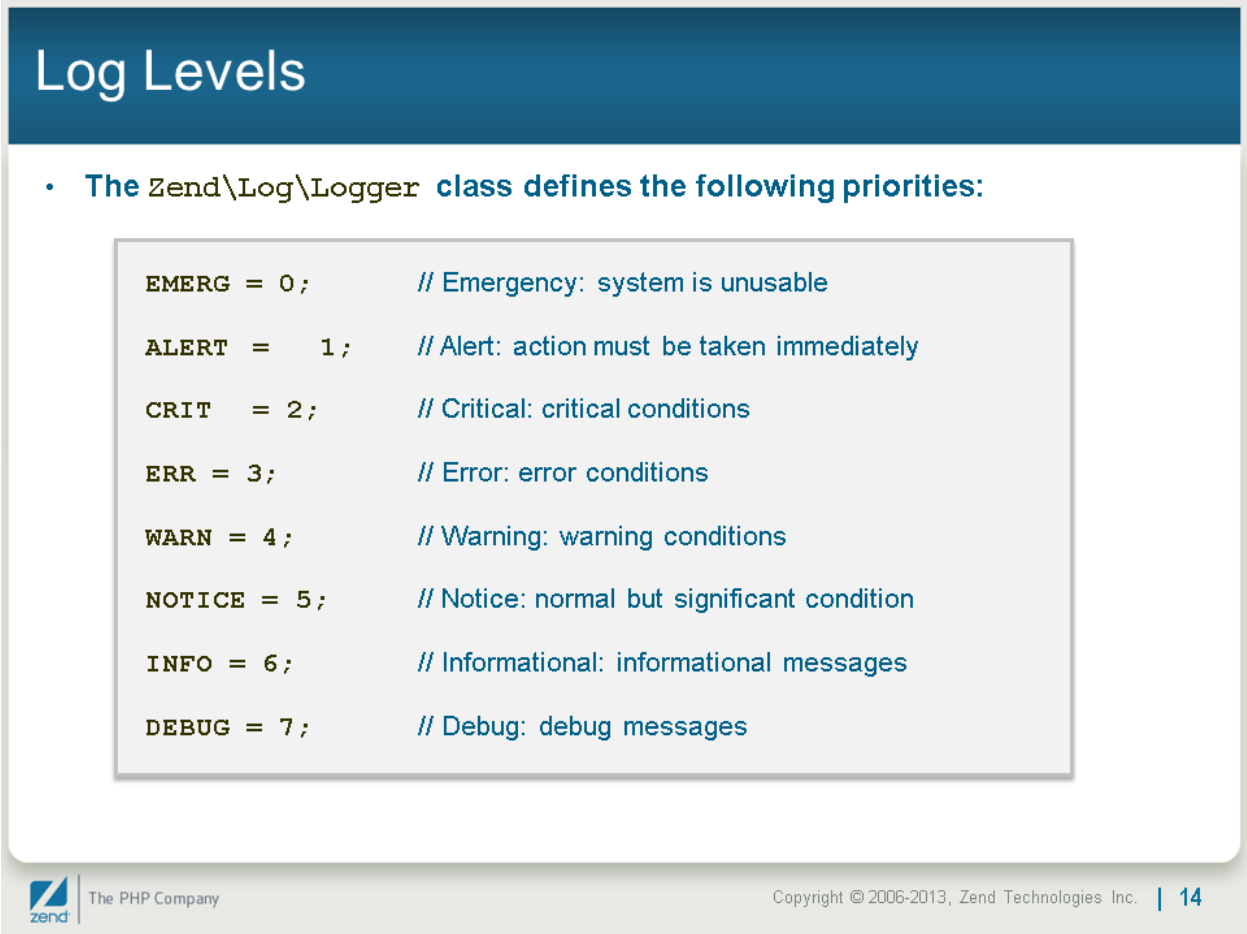
- Logs data to the console, flat files, or a database
- Its simple, procedural API reduces the hassle of logging to one line of code and is perfect for cron jobs and error logs
    - provides a simple object-oriented interface inspired by log4j
    - supports extensible output channels
    - supports extensible output formats
- All logs must have at least one Writer
    - To create a log, all you have to do is instantiate a Writer and then pass it to a Log instance

Slide 13



- Note that the use of log() requires a priority (listed on next slide)

Slide 14



- Priority numbers descend in order of importance. EMERG (0) is the most important priority; DEBUG (7) is the least important priority of the built-in priorities
- There are corresponding methods for each one:

emerg()	warn()
alert()	notice()
crit()	info()
err()	debug()

- You may define priorities of lower importance than DEBUG using $log->addPriority(). When selecting the priority for your log message, be aware of this priority hierarchy and choose appropriately
- These priorities are always available, and not arbitrary. They come from the BSD syslog protocol, which is described in RFC-3164
- The names and corresponding priority numbers are also compatible with another PHP logging system, PEAR Log, which perhaps promotes interoperability between it and Zend_Log

Slide 15

Using Zend\Log with Zend\Debug\Debug

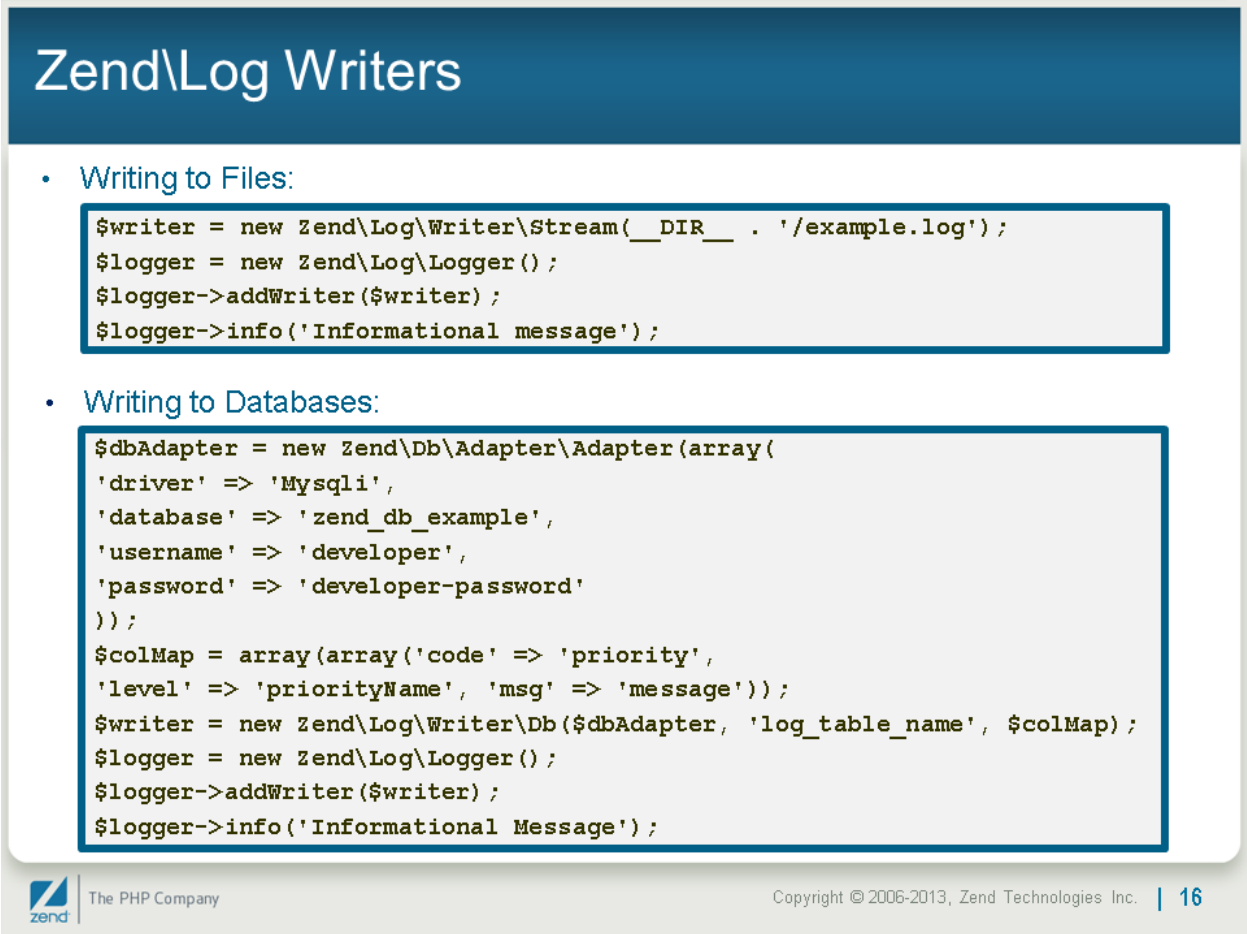
Debugging with `Zend\Log\Logger`:

- **Static method** `Zend\Debug\Debug::dump()` prints or returns information about an expression
- `Zend\Debug\Debug::dump()` is best for *ad hoc* debugging during development, requiring no initialization, special tools, or debug environment
  - Add code to dump a variable and then quickly remove the code
- Consider `Zend\Log` when writing more permanent debugging code
  - For example, use the `DEBUG` log level and the `Stream` log writer to output the string returned by `Zend\Debug\Debug::dump()`

```
// log the contents of variable $data
$logger->debug(
Zend\Debug\Debug::dump($data, 'Contents of $data', false));
```

- The method `registerExceptionHandler($logger)` intercepts uncaught exceptions, and then passes the exception information to the logger

Slide 16



- There are more writers than shown in the code example:
  - ChromePhp and FirePhp
  - FingersCrossed (only log if a certain threshold is met; if so, then log everything that has been logged to that point)
  - Mail
  - MongoDB
  - Syslog
  - ZendMonitor

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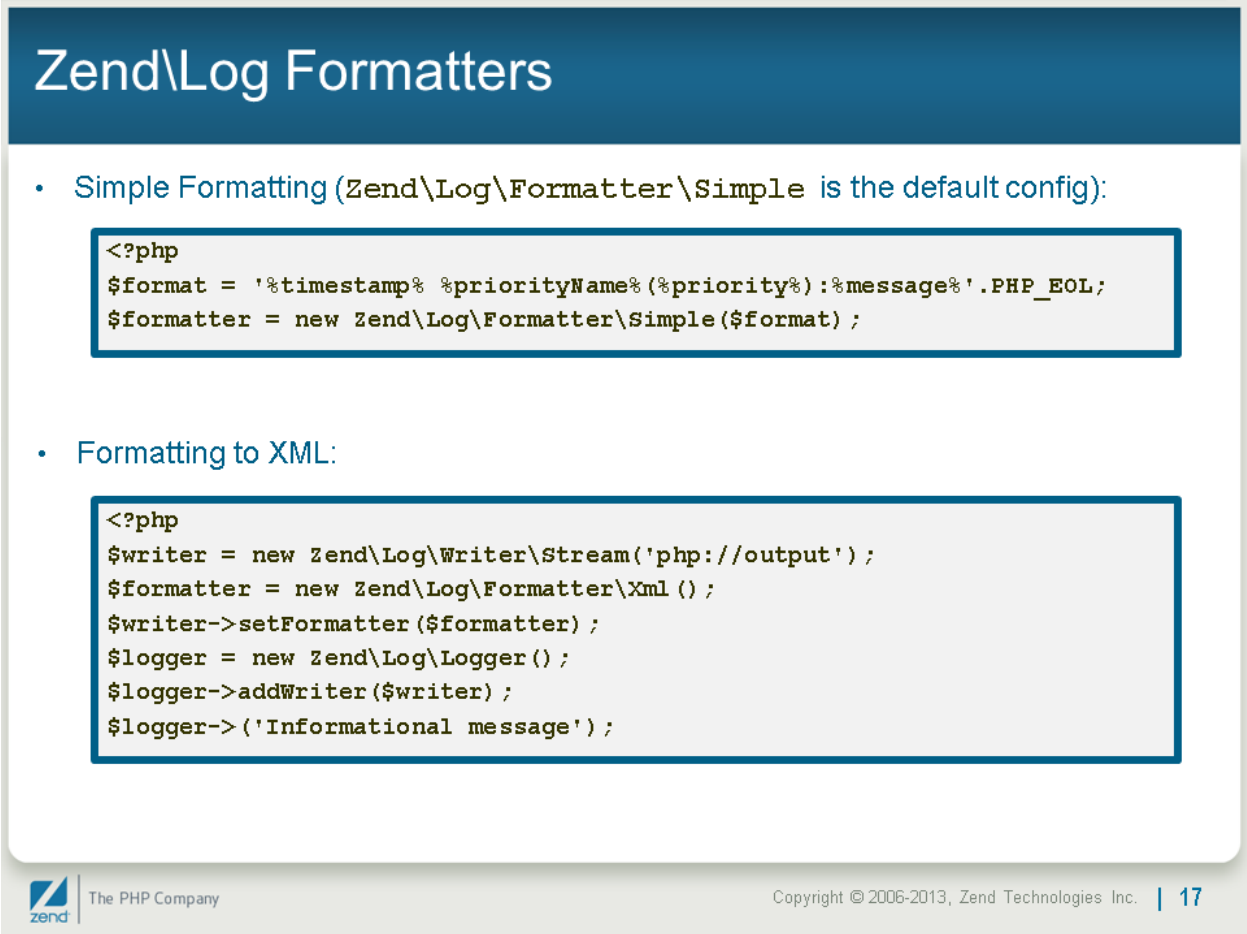

- A Formatter is an object that is responsible for taking an event array describing a log event and outputting a string with a formatted log line.
- Zend\Log\Formatter\Simple is the default formatter. It is configured automatically when you specify no formatter.
- Zend\Log\Formatter\Xml formats log data into XML strings. By default, it automatically logs all items in the event data array; The code above outputs the following XML

```
<logEntry>
<timestamp>2007-04-06T07:24:37-07:00</timestamp>
<message>informational message</message>
<priority>6</priority>
<priorityName>INFO</priorityName>
</logEntry>
```


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Zend\Log Filters

- Filtering for a Writer Instance :

```
$logger = new Zend\Log\Logger();
$writer1 = new Zend\Log\Writer\Stream($logFile);
$writer2 = new Zend\Log\Writer\Syslog();
$filter = new Zend\Log\Filter\Priority(Zend\Log\Logger::ALERT);
$writer2->addFilter($filter);
$logger->addWriter($writer1);
$logger->addWriter($writer2);

// goes into both files
$logger->emerg('Emergency Message');

// does not go into syslog
$logger->info('Informational Message');
```

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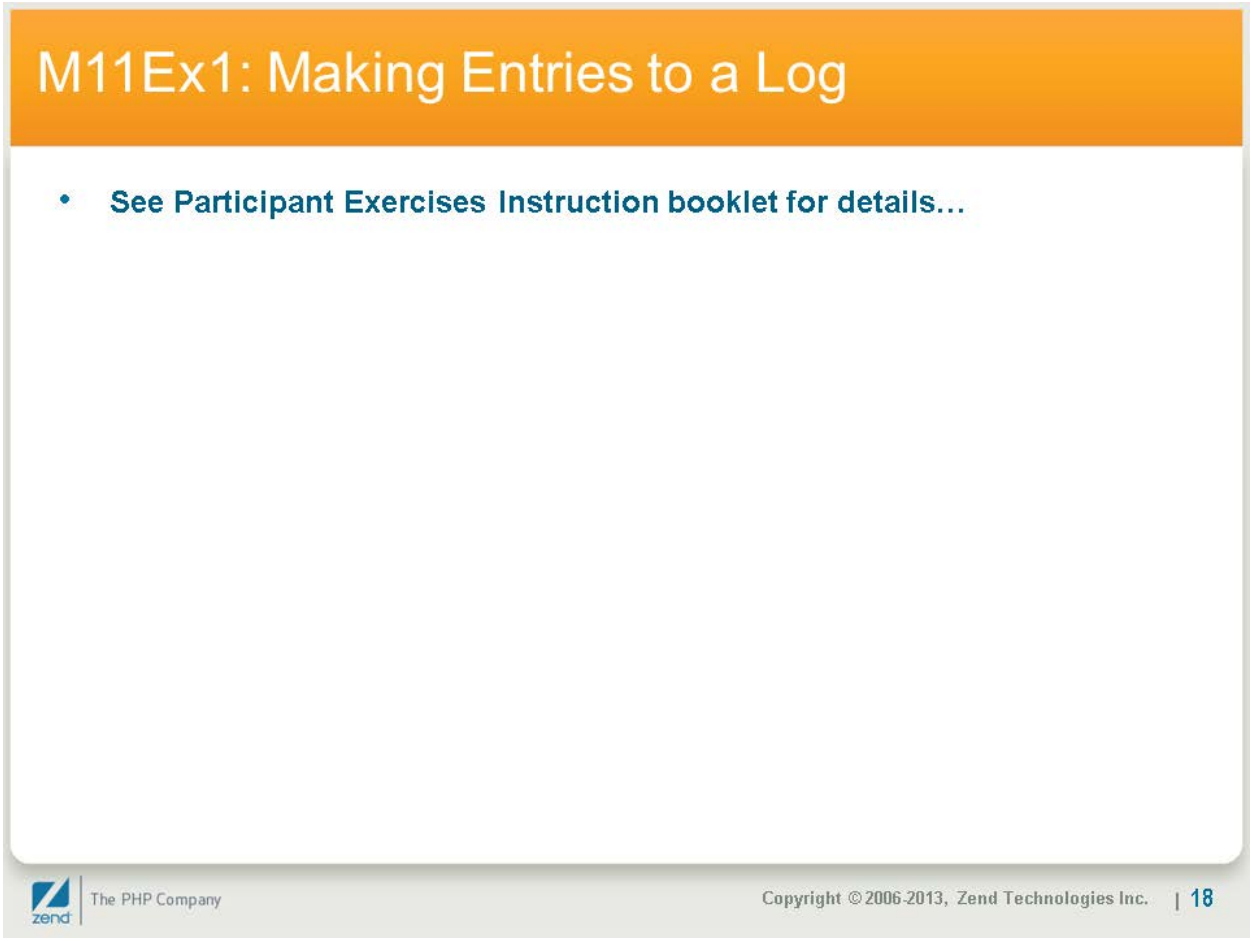
M11Ex1: Making Entries to a Log
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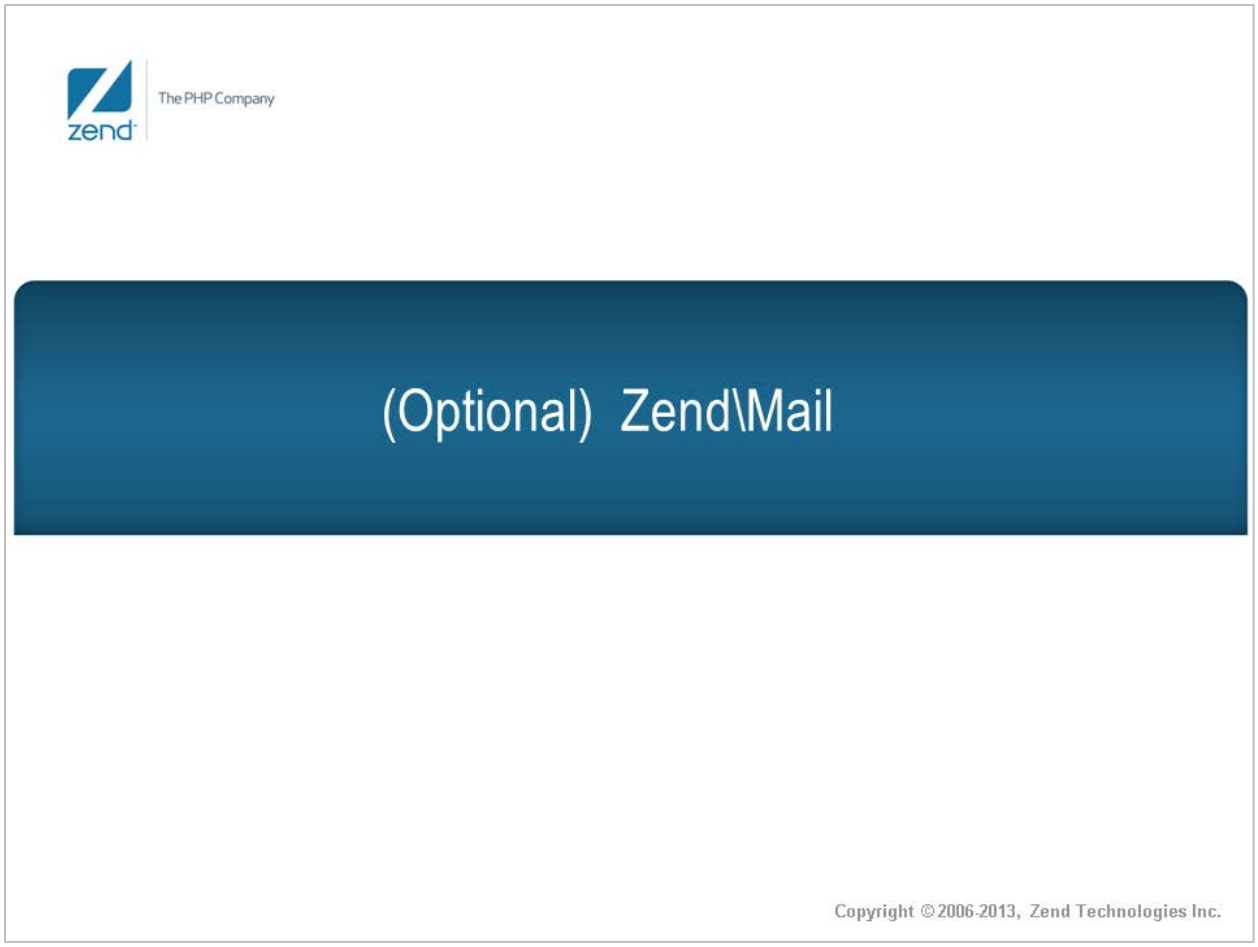
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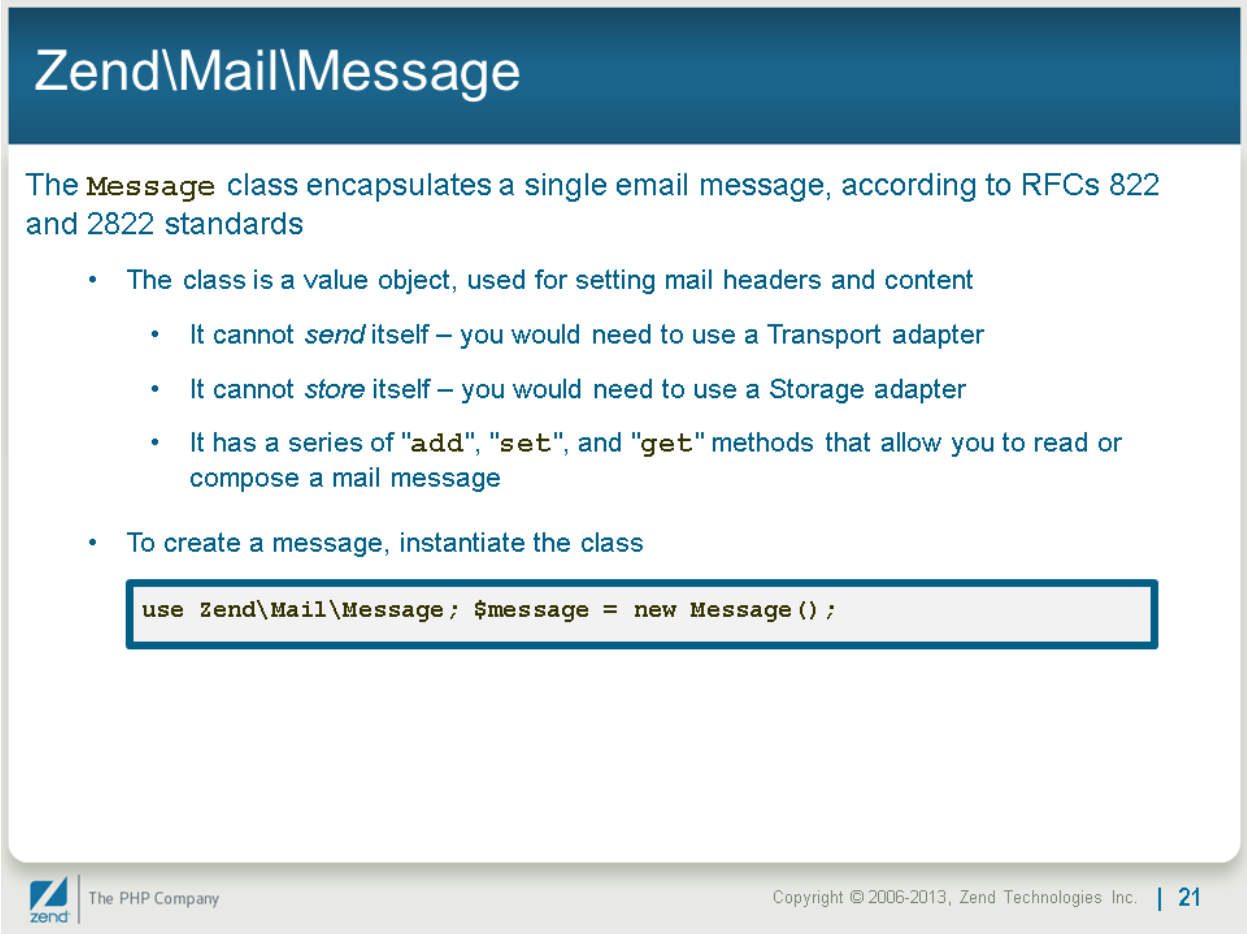
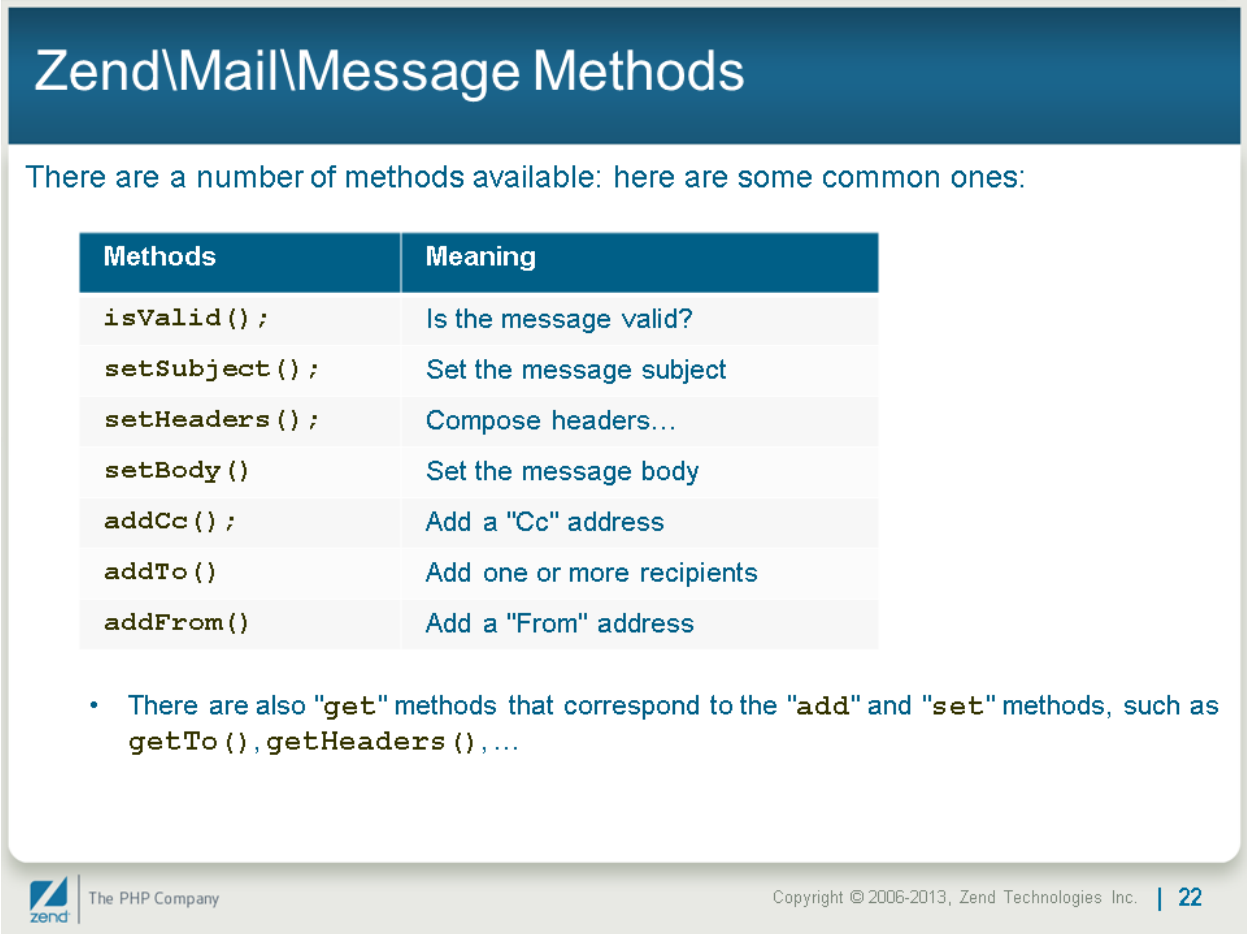
Slide 21



- Note that the Message class assumes ASCII encoding for the email
- You can choose other forms of encoding by specifying it – for example, UTF-8

```
$message->setEncoding("UTF-8");
```

Slide 22



- The full list of methods and related details can be viewed in Sections 20.1.4 in the ZF2 Reference Manual:

  http://packages.zendframework.com/docs/latest/manual/en/zend.mail.html

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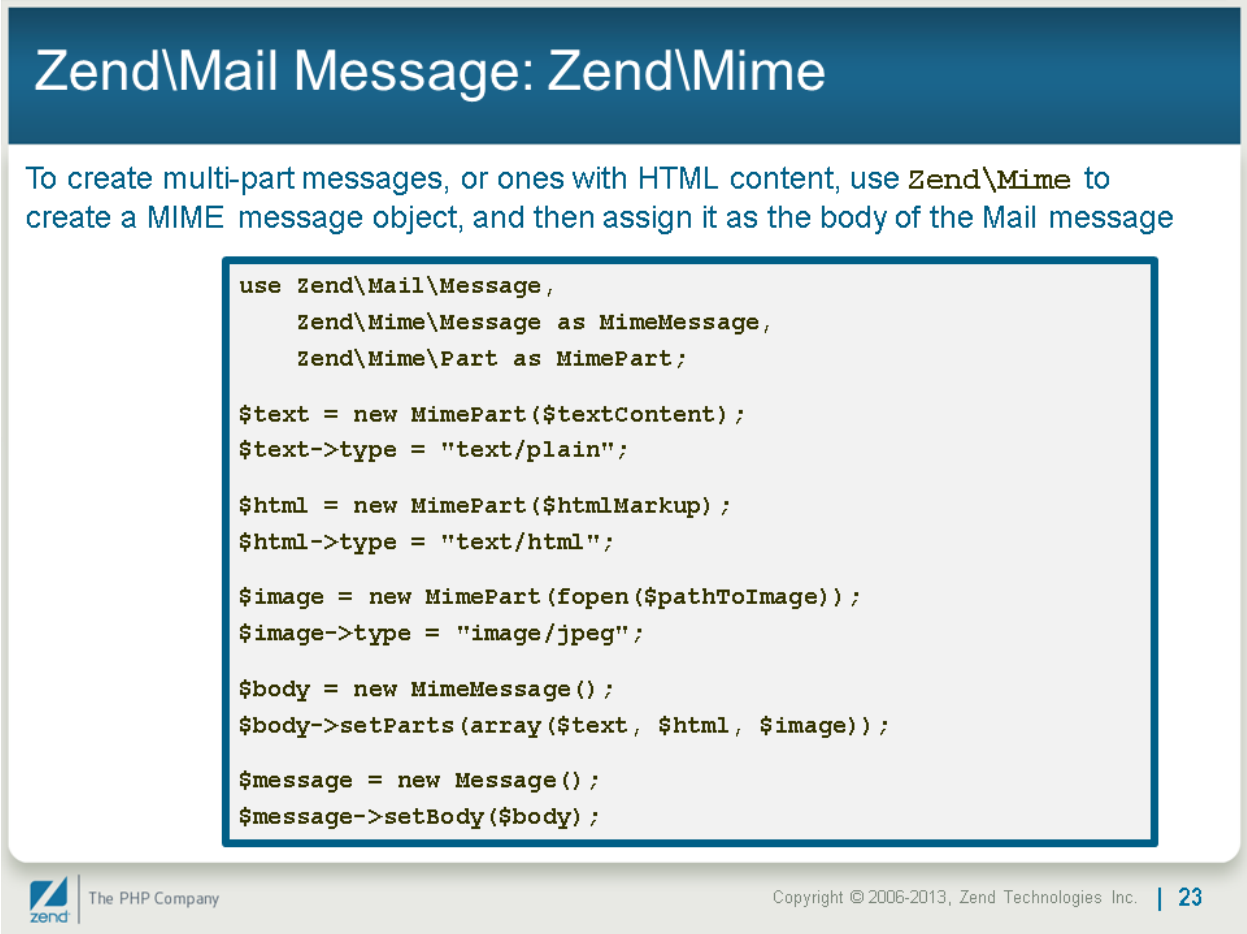

- The Message class will automatically set a "MIME-Version" header, as well as an appropriate "Content-Type" header

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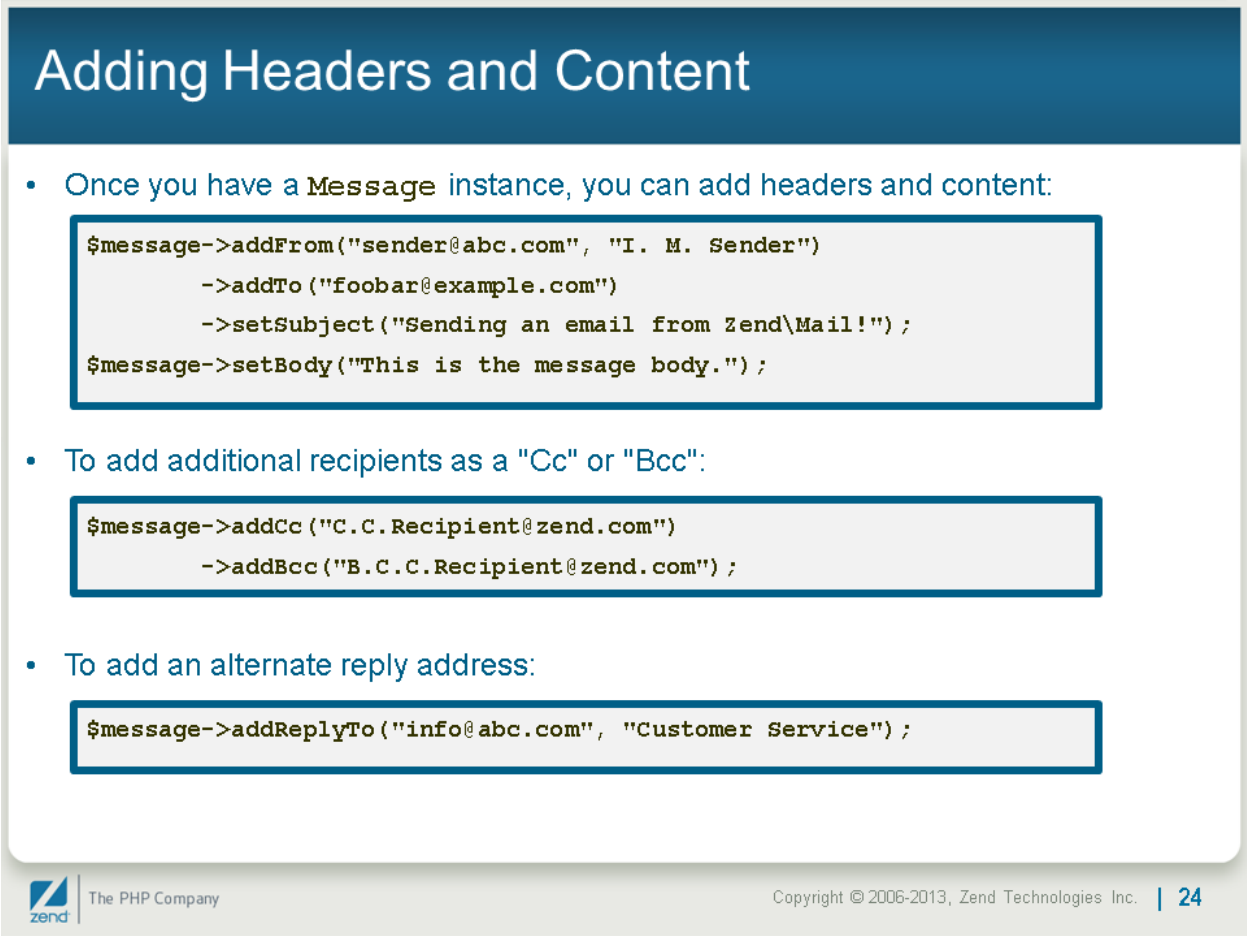
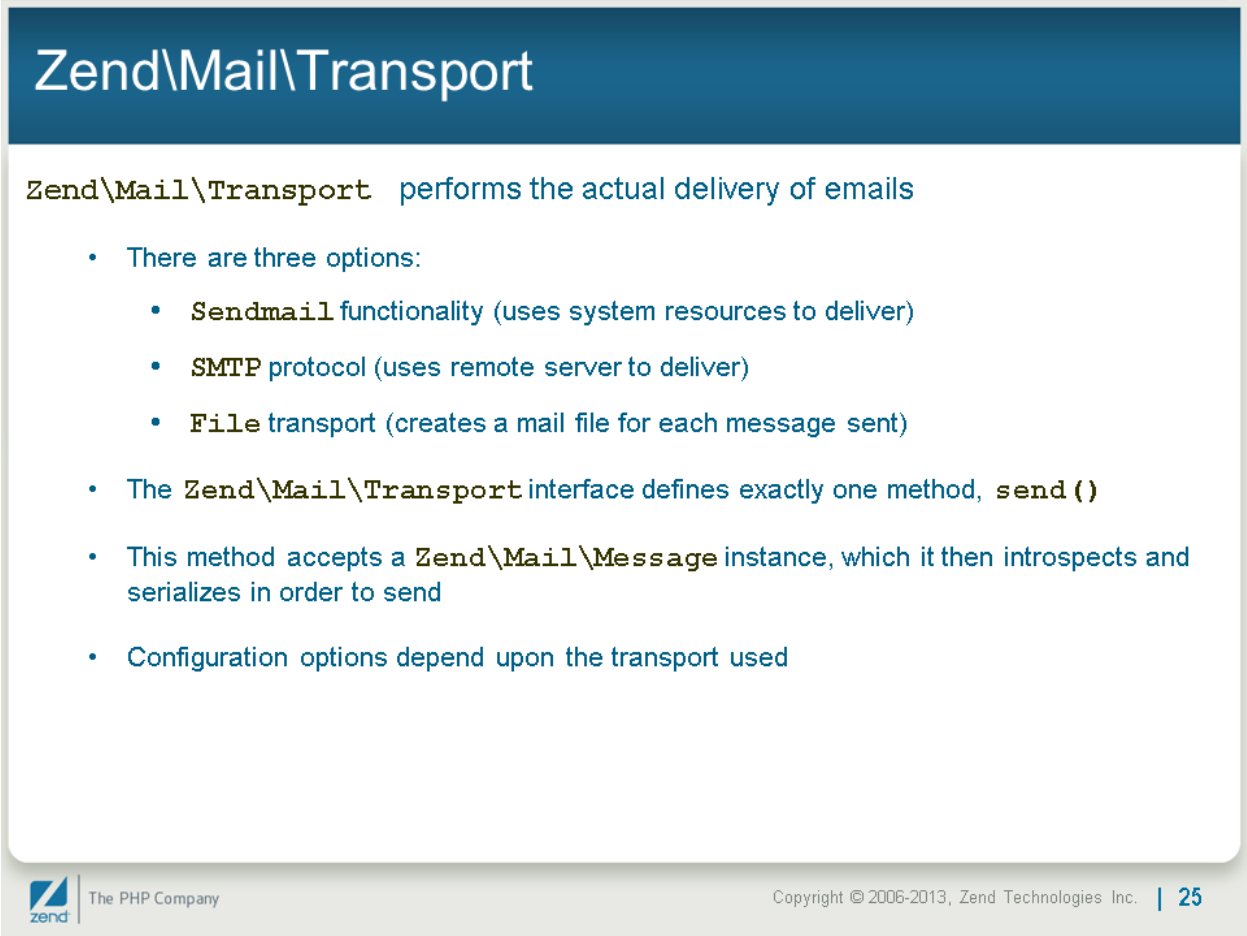


- Cc and Bcc are not Latin-based… Cc refers to "carbon copy", a throwback to when typewritten materials were copied using sheets of black "carbon" paper
- Bcc refers to "blind carbon copy", which means this recipient will receive a copy of the email, but their address will not be visible to any other recipients

Slide 25



- To learn more about the configuration options, see Sections 20.2.3 in the ZF2 Reference Manual:

  SMTP Transport:
  http://packages.zendframework.com/docs/latest/manual/en/zend.mail.smtp-options.html

  File Transport:
  http://packages.zendframework.com/docs/latest/manual/en/zend.mail.file-options.html

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Zend\Mail\Transport

```
// Using PHP's native mail() functionality
use Zend\Mail\Message,
    Zend\Mail\Transport\Sendmail as SendmailTransport;
$message = new Message();
$message->addTo('matthew@zend.com')
        ->addFrom('ralph.schindler@zend.com')
        ->setSubject('Greetings and Salutations!')
        ->setBody("Sorry, I'm going to be late today!");
$transport = new SendmailTransport();
$transport->send($message);
```

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Zend\Mail\Transport

```
// Using SMTP Protocol
use Zend\Mail\Message,
    Zend\Mail\Transport\Smtp as SmtpTransport,
    Zend\Mail\Transport\SmtpOptions;
$message = new Message();
$message->addTo('matthew@zend.com')
        ->addFrom('ralph.schindler@zend.com')
        ->setSubject('Greetings and Salutations!')
        ->setBody("Sorry, I'm going to be late today!");
// Setup SMTP transport using LOGIN authentication
$transport = new SmtpTransport();
$options   = new SmtpOptions(array(
    'name'              => 'localhost.localdomain',
    'host'              => '127.0.0.1',
    'connection_class'  => 'login',
    'connection_config' => array(
        'username' => 'user',
        'password' => 'pass',
    ),
));
$transport->setOptions($options);
$transport->send($message);
```

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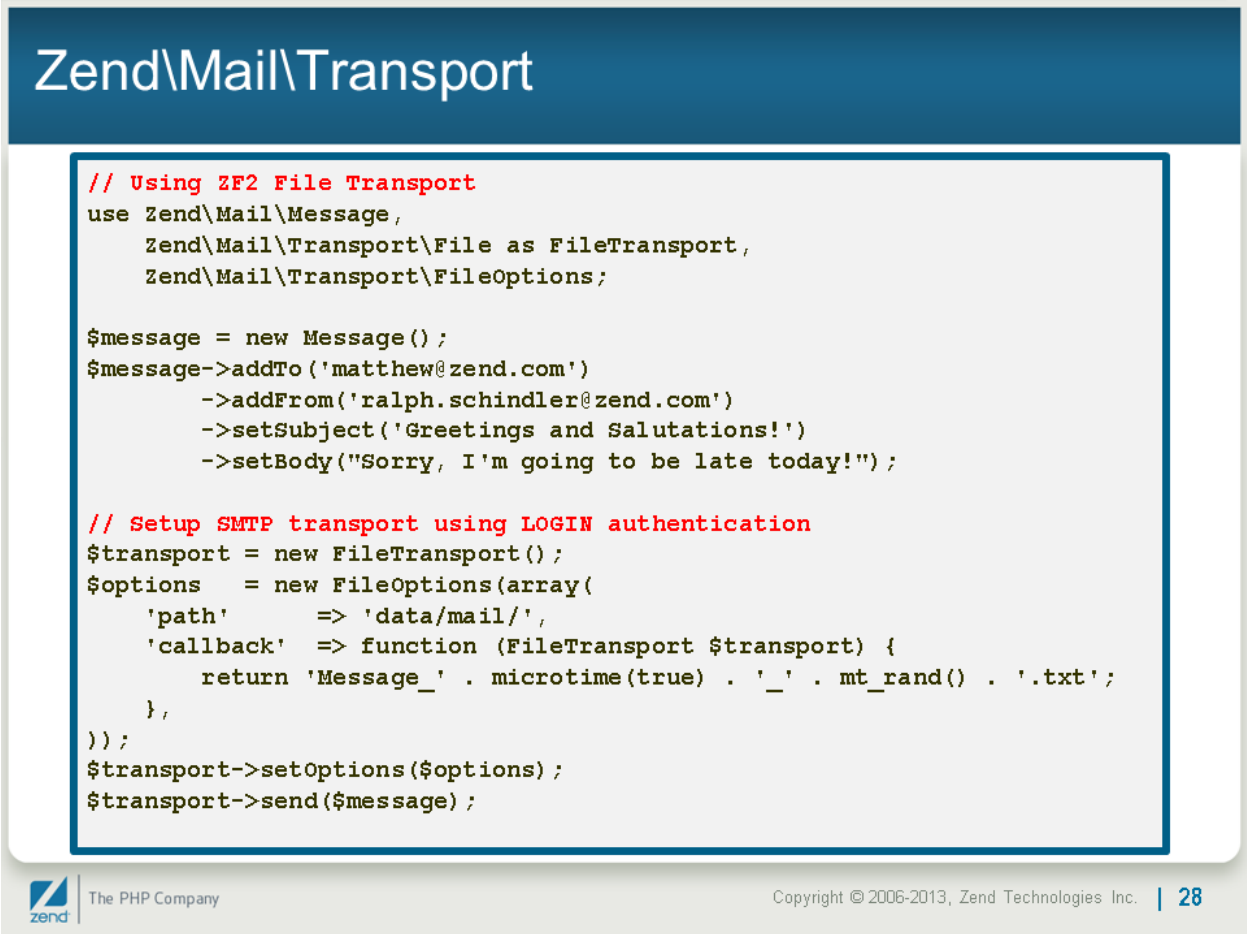
Zend\Mail\Transport
// Using ZF2 File Transport
use Zend\Mail\Message,
Zend\Mail\Transport\File as FileTransport,
Zend\Mail\Transport\FileOptions;
$message = new Message();
$message->addTo('matthew@zend.com')
->addFrom('ralph.schindler@zend.com')
->setSubject('Greetings and Salutations!')
->setBody("Sorry, I'm going to be late today!");
// Setup SMTP transport using LOGIN authentication
$transport = new FileTransport();
$options = new FileOptions(array(
'path' => 'data/mail/',
'callback' => function (FileTransport $transport) {
return 'Message_' . microtime(true) . '_' . mt_rand() . '.txt';
},
));
$transport->setOptions($options);
$transport->send($message);
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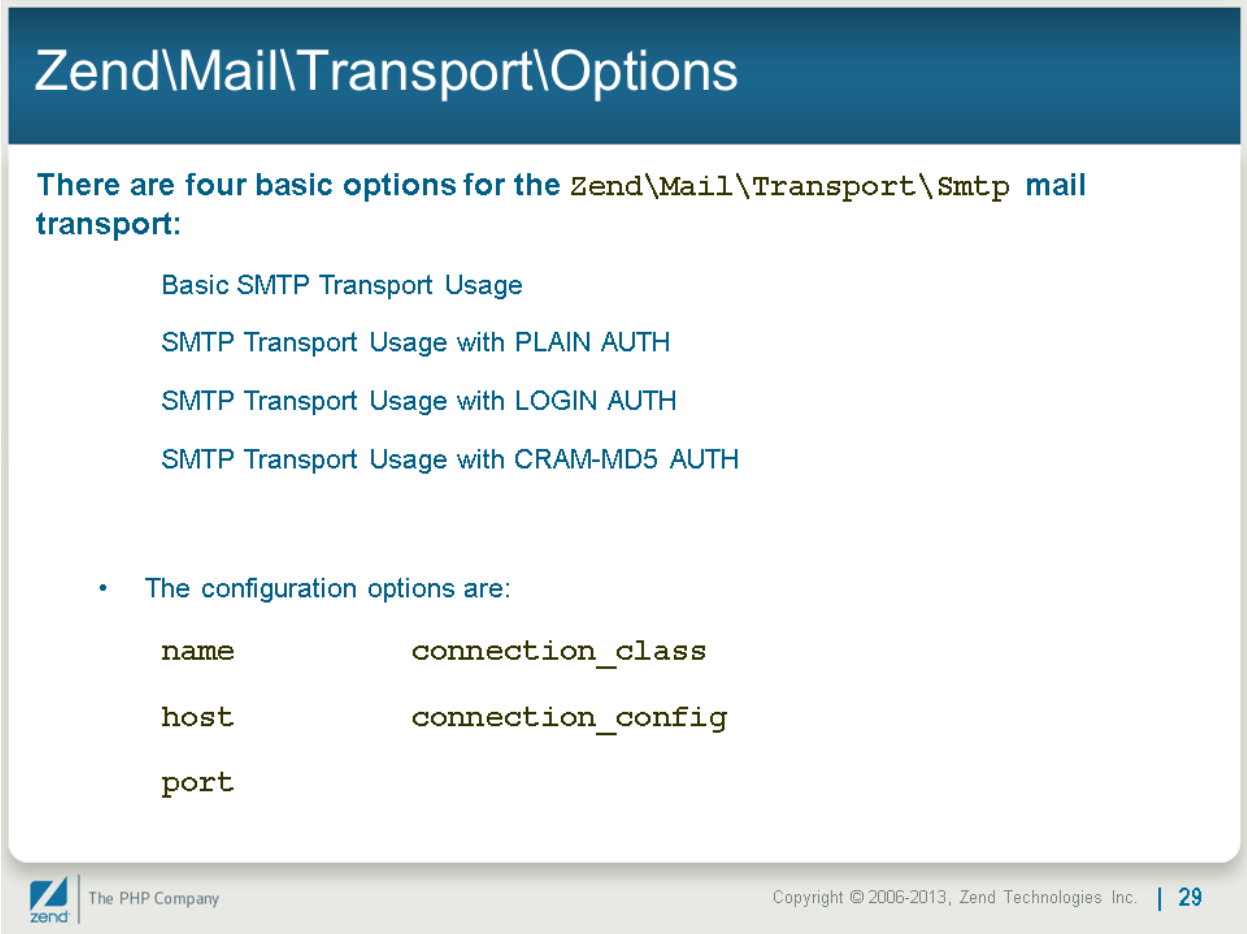

- The configuration options are:
  - name: Name of the SMTP host; defaults to "localhost".
  - host : Remote hostname or IP address; defaults to "127.0.0.1".
  - port : Port on which the remote host is listening; defaults to "25".
  - connection_class: Fully-qualified classname or short name resolvable via Zend\Mail\Protocol\SmtpLoader;
    Typically, this will be "smtp", "plain", "login", or "crammd5"; default is "smtp"
    Typically, the connection class should extend the Zend\Mail\Protocol\AbstractProtocol class, specifically the SMTP variant
  - connection_config: Optional associative array of parameters to pass to the connection_class in order to configure it; by default, this is empty; for connection classes other than the default, you will typically need to define the "username" and "password" options

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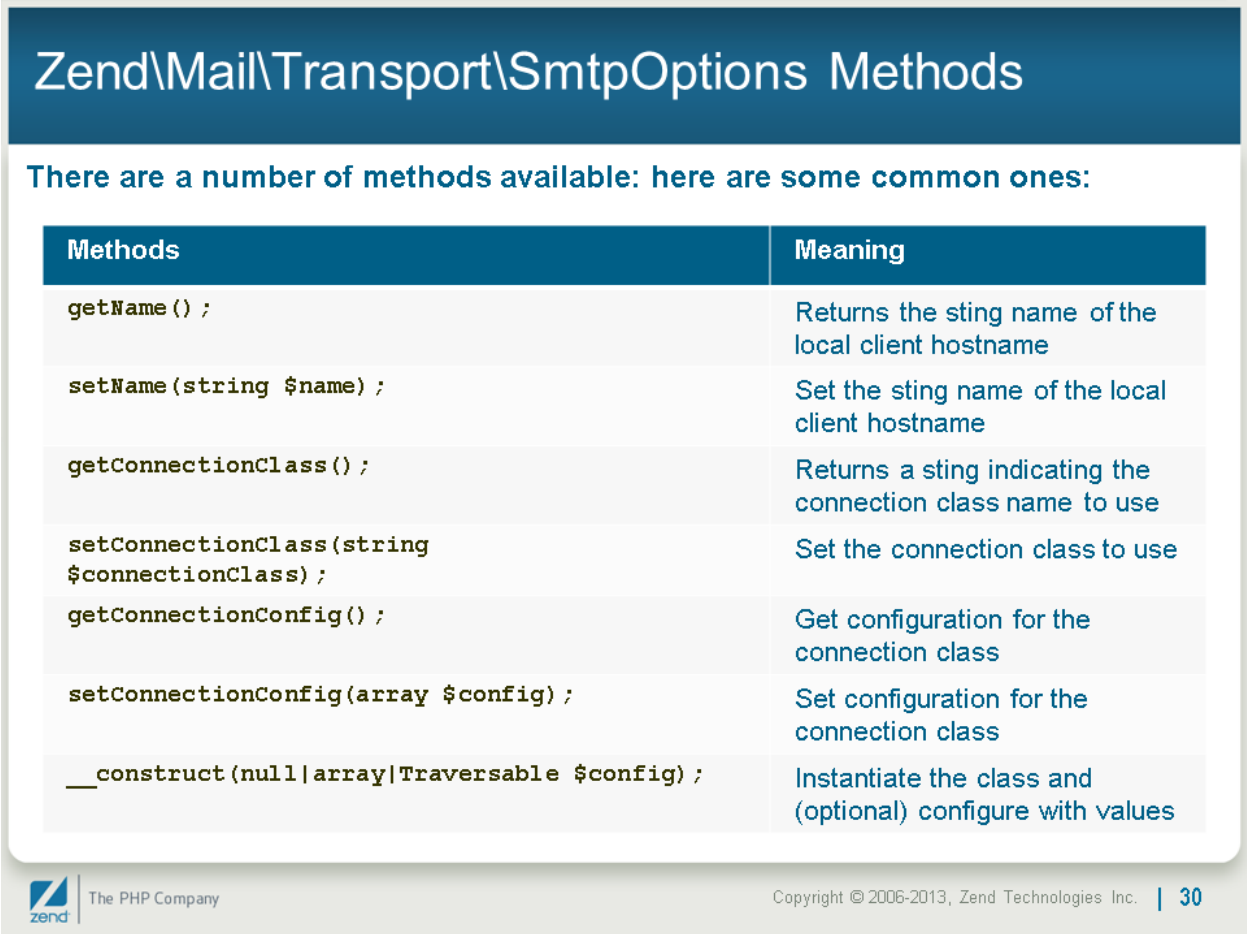

- The full list of methods and related details can be viewed in Sections 20.3.4 in the ZF2 Reference Manual:

  http://packages.zendframework.com/docs/latest/manual/en/zend.mail.smtp-options

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Zend\Mail\Transport\SmtpOptions: Code Example

```
// Basic SMTP Transport Usage
use Zend\Mail\Transport\Smtp as SmtpTransport,
    Zend\Mail\Transport\SmtpOptions;

// Setup SMTP transport
$transport = new SmtpTransport();
$options   = new SmtpOptions(array(
    'name' => 'localhost.localdomain',
    'host' => '127.0.0.1',
    'port' => 25,
));
$transport->setOptions($options);
```


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Zend\Mail\Transport\SmtpOptions: Code Example

```
// SMTP Transport Usage with PLAIN AUTH
use Zend\Mail\Transport\Smtp as SmtpTransport,
    Zend\Mail\Transport\SmtpOptions;

// Setup SMTP transport using LOGIN authentication
$transport = new SmtpTransport();
$options   = new SmtpOptions(array(
    'name'              => 'localhost.localdomain',
    'host'              => '127.0.0.1',
    'connection_class'  => 'plain',
    'connection_config' => array(
        'username' => 'user',
        'password' => 'pass',
    ),
));
$transport->setOptions($options);
```

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Zend\Mail\Transport\SmtpOptions: Code Example

```
// SMTP Transport Usage with LOGIN AUTH
use Zend\Mail\Transport\Smtp as SmtpTransport,
    Zend\Mail\Transport\SmtpOptions;

// Setup SMTP transport using LOGIN authentication
$transport = new SmtpTransport();
$options   = new SmtpOptions(array(
    'name'              => 'localhost.localdomain',
    'host'              => '127.0.0.1',
    'connection_class'  => 'login',
    'connection_config' => array(
        'username' => 'user',
        'password' => 'pass',
    ),
));
$transport->setOptions($options);
```

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Zend\Mail\Transport\SmtpOptions: Code Example

```
// SMTP Transport Usage with CRAM-MD5 AUTH
use Zend\Mail\Transport\Smtp as SmtpTransport,
    Zend\Mail\Transport\SmtpOptions;

// Setup SMTP transport using LOGIN authentication
$transport = new SmtpTransport();
$options   = new SmtpOptions(array(
    'name'              => 'localhost.localdomain',
    'host'              => '127.0.0.1',
    'connection_class'  => 'crammd5',
    'connection_config' => array(
        'username' => 'user',
        'password' => 'pass',
    ),
));
$transport->setOptions($options);
```

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M11Ex3: Mail Lab

- **See Participant Exercises Instruction booklet for details…**

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Zend Framework 2: Advanced Topics

Proposed topics to be covered in our advanced Zend Framework 2 class:

- **Advanced features: Event Manager, Dependency Injection, MVC, …**
- **Performance & Security: Caching, Encryption, Navigation, Pagination, …**
- **Web Services & External Authentication: LDAP, REST, …**
- **Code Generation & Annotations: Reflection, Scanning, Annotations, …**
- **JavaScript Integration & Form Enhancements: Captchas, Ajax, JSON, …**
- **Internationalization: Locale, Translate, …**

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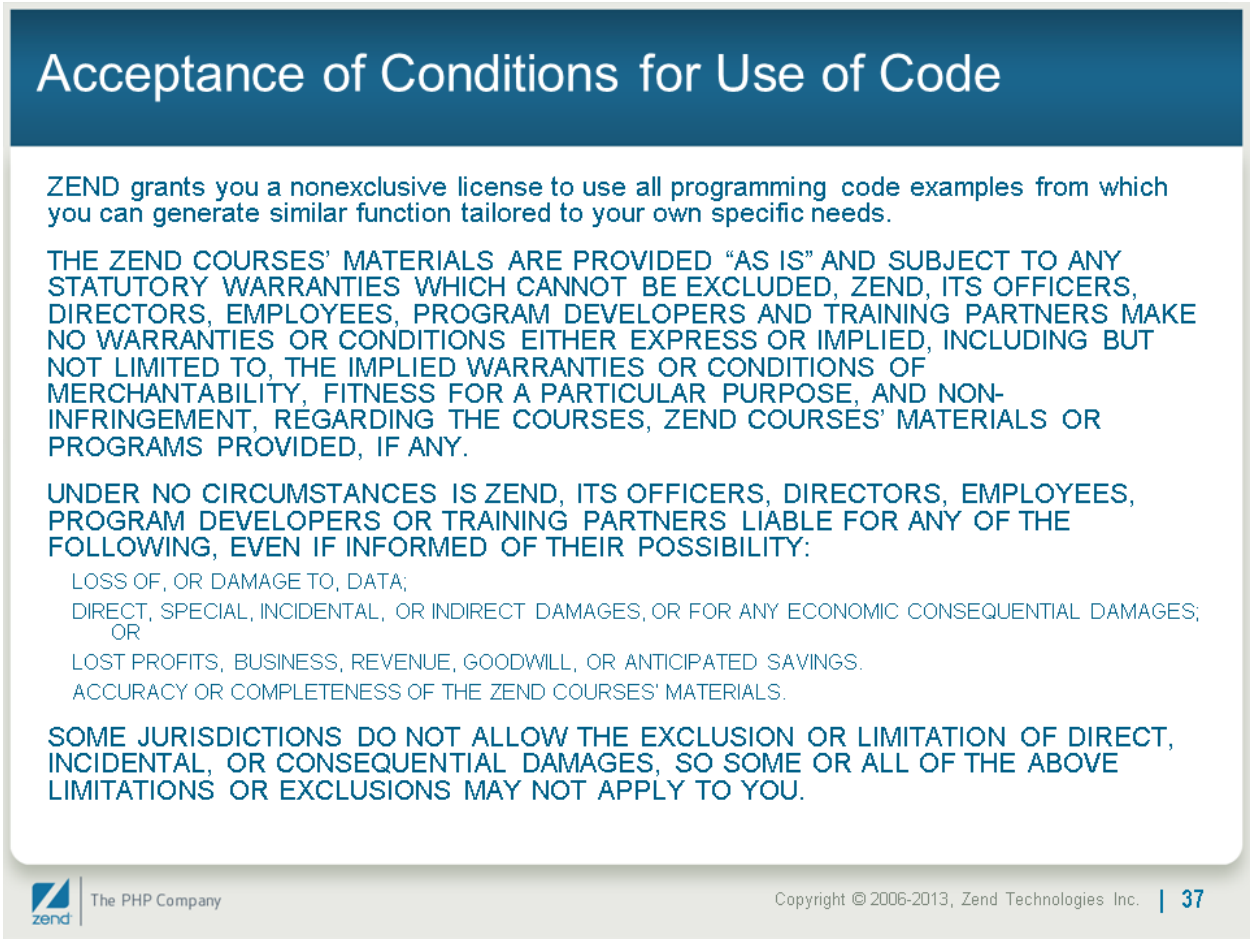
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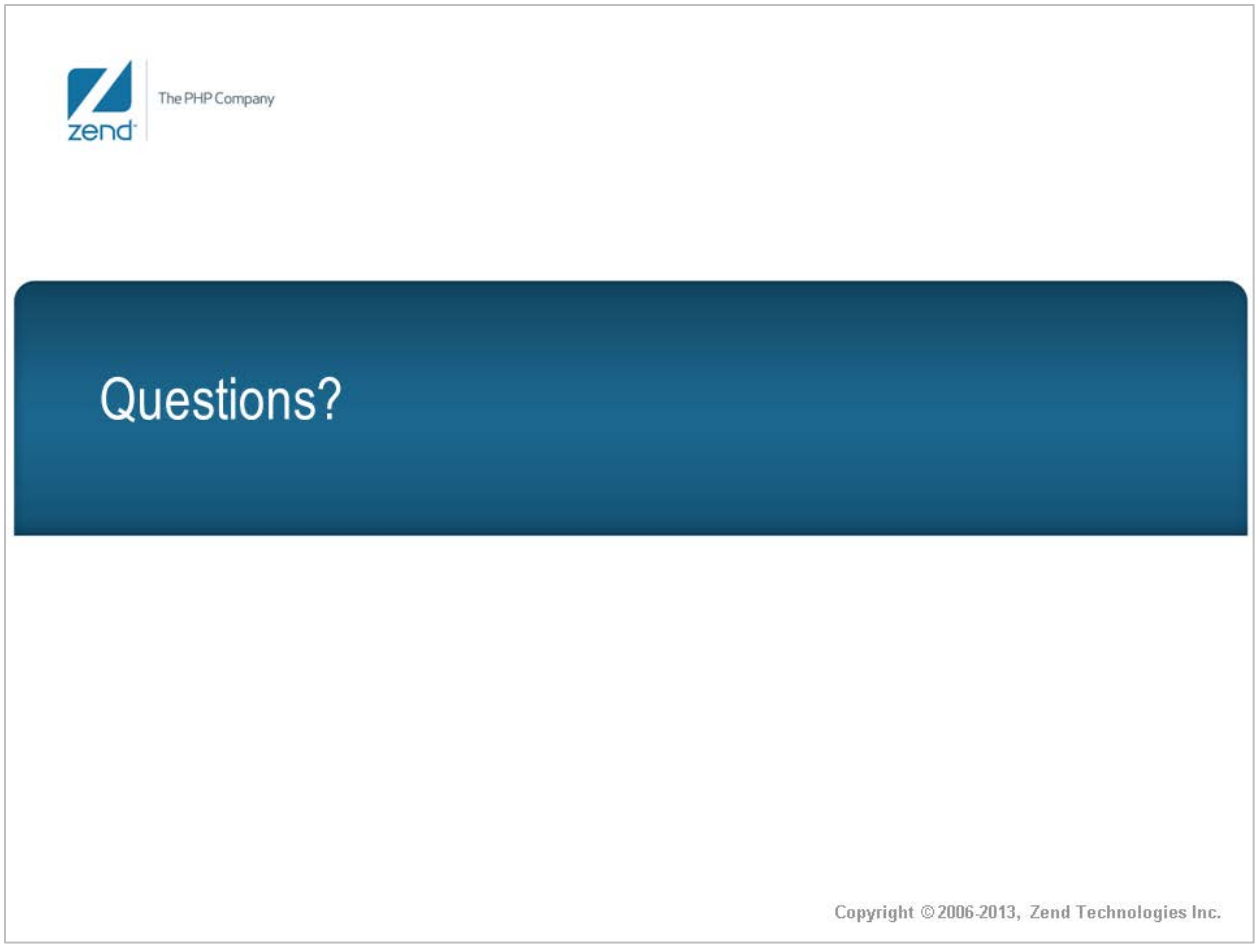
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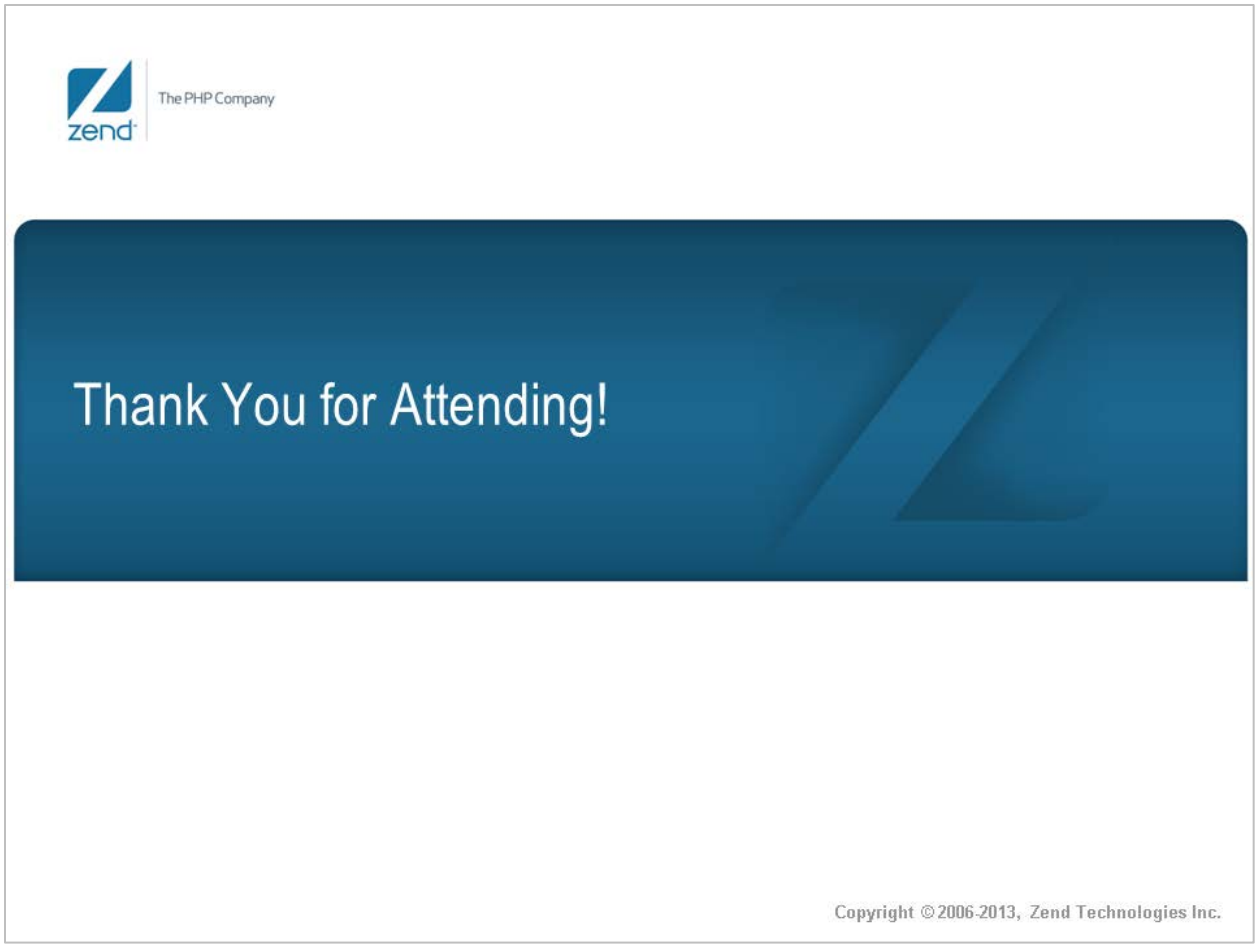
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