PHP 5
and the new OO features

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Overview

- ☑ What is OOP?
- ☑ PHP and OOP
  - ☑ PHP 5 vs. PHP 4
  - ☑ Is PHP 5 revolutionary?
- ☑ PHP 5 OOP in detail
- ☑ Using PHP 5 OOP by example

What is OOP

What does OOP aim to achieve?

☑ Allow compartmentalized refactoring of code.

☑ Promote code re-use.

☑ Promote extensibility, flexibility and adaptability.

☑ Better for team development.

☑ Some patterns lead to much more efficient code

☑ Do you need to use OOP to achieve these goals?

  ☑ Of course not.

  ☑ It’s designed to make those things easier though.

What are the features of OOP?

☑ Group data with functionality

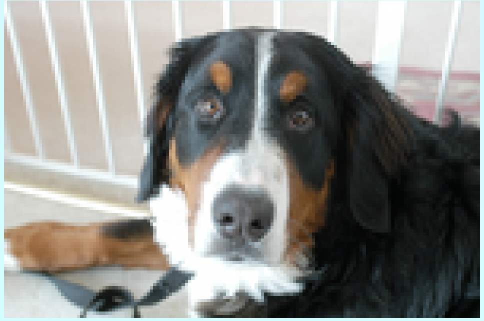
☑ Encapsulation

☑ Inheritance

☑ Polymorphism

Encapsulation

- ☑ Encapsulation is about grouping of related data (attributes) together into a coherent data structure (classes).
- ☑ Classes represent complex data types and the operations that act on them. An object is a particular instance of a class. For example 'Dog' may be a class (it's a type of thing), while Grendel (my dog) is an instance of that class.



Encapsulation: Are Objects Just Dictionaries?

☑ Classes as dictionaries are a common idiom, seen in C:

```
typedef struct _entry {
    time_t date;
    char *data;
    char *(*display)(struct _entry *e);
} entry;
entry *e = (entry*)malloc(sizeof(entry));
// initialize e
e->display(e);
```

☑ You can see this idiom in Perl and Python, both of which prototype class methods to explicitly grab $this (or their equivalent).

Encapsulation: Are Objects Just Dictionaries?

☑ PHP is somewhat different, since PHP functions aren't really first class objects. Still, PHP4 objects were little more than arrays.

☑ The difference is coherency. Classes can be told to automatically execute specific code on object creation and destruction.

```
<?php
class Simple {
	function __construct() {/*...*/}
	function __destruct() {/*...*/}
}
?>
```

Data Hiding

☑ Another difference between objects and arrays are that objects permit strict visibility semantics. Data hiding eases refactoring by controlling what other parties can access in your code.

- ☑ public anyone can access it
- ☑ protected only descendants can access it
- ☑ private only you can access it
- ☑ final no one can re-declare it
- ☑ abstract someone else will implement this

Why have these in PHP?

Because sometimes self-discipline isn’t enough.

Inheritance

☑ Inheritance allows a class to specialize (or extend) another class and inherit all its methods, properties and behaviors.

☑ This promotes
  - ☑ Extensibility
  - ☑ Reusability
  - ☑ Code Consolidation
  - ☑ Abstraction

A Simple Inheritance Example

```
class Dog {
    public function __construct($name) {
        /*...*/
    }
    public function bark() { /*...*/ }
    public function sleep() { /*...*/ }
    public function eat() { /*...*/ }
}
class Rottweiller extends Dog {
    public function guard($person) {
        /*...*/
    }
}
```

Inheritance and Code Duplication

☑ Code duplication is a major problem for maintainability. You often end up with code that looks like this:

```
function foo_to_xml($foo) {
 // generic stuff
 // foo-specific stuff
}

function bar_to_xml($bar) {
 // generic stuff
 // bar specific stuff
}
```

The Problem of Code Duplication

☑ You could clean that up as follows

```
function base_to_xml($data) { /*...*/ }
function foo_to_xml($foo) {
          base_to_xml($foo);
    // foo specific stuff
}
function bar_to_xml($bar) {
     base_to_xml($bar);
     // bar specific stuff
}
```

☑ But it’s hard to keep base_to_xml() working for the disparate foo and bar types.

The Problem of Code Duplication

☑ In an OOP style you would create classes for the Foo and Bar classes that extend from a base class that handles common functionality.

☑ Sharing a base class promotes sameness.

```
class Base {
    public function toXML() {
        /*...*/
    }
}
class Foo extends Base {
    public function toXML() {
        parent::toXML();
        // foo specific stuff
    }
}
```

```
class Foo extends Base {
    public function toXML() {
        parent::toXML();
        // foo specific stuff
    }
}
```

Polymorphism

☑ Suppose we have a calendar that is a collection of entries. Procedurally dislpaying all the entries might look like:

```
foreach($entries as $entry) {
    switch($entry['type']) {
    case 'professional':
        display_professional_entry($entry);
        break;
    case 'personal':
        display_personal_entry($entry);
        break;
    }
}
```

Simplicity Through Polymorphism

☑ In an OOP paradigm this would look like:

```
foreach($entries as $entry)  $entry->display();
```

☑ The key point is we don't have to modify this loop to add new types. When we add a new type, that type gets a display() method so it knows how to display itself, and we’re done.

☑ Also this is much faster because we do not have to check the type for every element.

Polymorphism
the other way round

☑ Unlike other languages PHP does not and will not offer polymorphism for method calling. Thus the following will never be available in PHP

```
<?php
class Test {
    function toXML(Personal $obj) //…
    function toXML(Professional $obj) //…
}
?>
```

☑ To work around this

- ☑ Use the other way round (call other methods from a single toXML() function in a polymorphic way)
- ☑ Use switch/case (though this is not the OO way)

PHP and OOP

PHP 4 and OOP ?

▣ Poor Object model

- ☑ Methods
  - ☒ No visibility
  - ☒ No abstracts, No final
  - ☒ Static without declaration
- ☑ Properties
  - ☒ No default values
  - ☒ No static properties
  - ☒ No constants
- ☑ Inheritance
  - ☒ No abstract, final inheritance, no interfaces
  - ☒ No prototype checking, no types
- ☑ Object handling
  - ☒ Copied by value
  - ☒ No destructors

ZE2's revamped object model

☑ Objects are referenced by identifiers

☑ Constructors and Destructors

☑ Static members

☑ Default property values

☑ Constants

☑ Visibility

☑ Interfaces

☑ Final and abstract members

☑ Interceptors

☑ Exceptions

☑ Reflection API

☑ Iterators

Revamped OO Model

☑ PHP 5 has really good OO

- ☑ Better code reuse
- ☑ Better for team development
- ☑ Easier to refactor
- ☑ Some patterns lead to much more efficient code
- ☑ Fits better in marketing scenarios

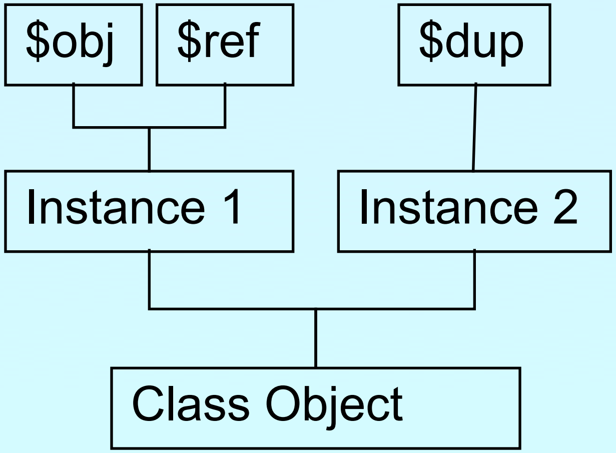
PHP 5 OOP in detail

Objects referenced by identifiers

☑ Objects are no longer copied by default

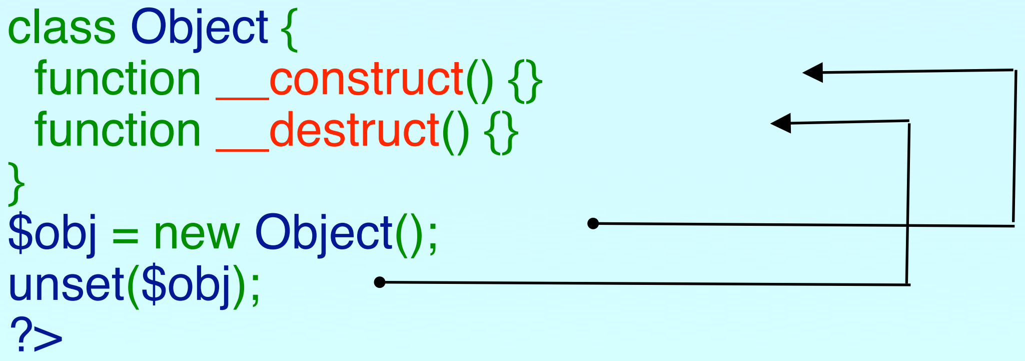
☑ Objects may be copied using clone/__clone()

```
<?php

class Object {};

$obj = new Object();

$ref = $obj;

$dup = clone $obj;

?>
```



Constructors and Destructors

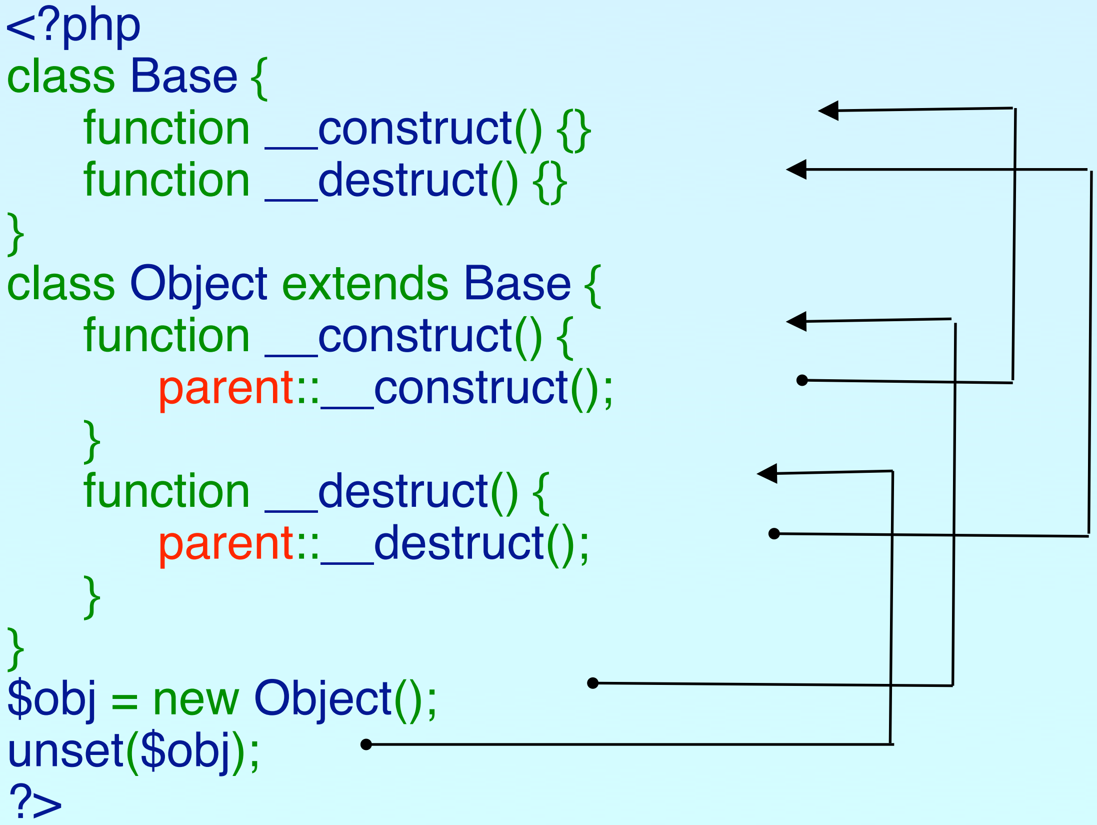
- ☑ Constructors/Destructors control object lifetime
  - ☑ Constructors may have both new OR old style name
    - ☑ New style constructors are preferred
    - ☑ Constructors must not use inherited protocol
  - ☑ Destructors are called when deleting the last reference
    - ☑ No particular or controllable order during shutdown
    - ☑ Destructors cannot have parameters
    - ☑ Since PHP 5.0.1 destructors can work with resources



```php
<?php

class Object {
  function __construct() {}
  function __destruct() {}
}
$obj = new Object();
unset($obj);
?>
```

Constructors and Destructors

☑ Parents must be called manually



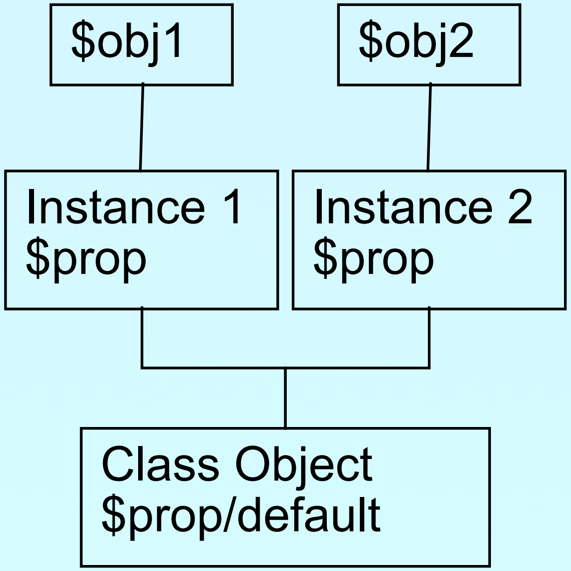
```
<?php
class Base {
    function __construct() {}
    function __destruct() {}
}
class Object extends Base {
    function __construct() {
        parent::__construct();
    }
    function __destruct() {
        parent::__destruct();
    }
}
$obj = new Object();
unset($obj);
?>
```

Default property values

☑ Properties can have default values

- ☑ Bound to the class not to the object
- ☑ Default values cannot be changed but overwritten

```php
<?php

class Object {
  var $prop = "Hello\n";
}

$obj1 = new Object;
$obj1->prop = "Hello World\n";

$obj2 = new Object;
echo $obj2->prop; // Hello

?>
```

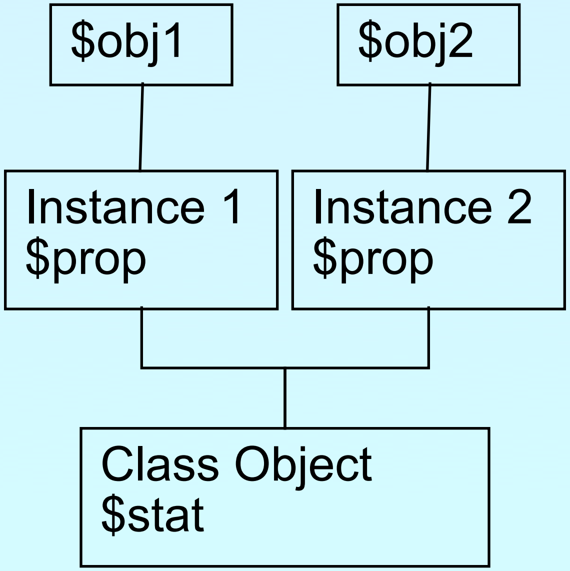


Static members

☑ Static methods and properties

- ☑ Bound to the class not to the object
- ☑ Can be initialized

```php
<?php
class Object {
  var $pop;
  static $stat = "Hello\n";
  static function test() {
    echo self::$stat;
  }
}
Object::test();
$obj1 = new Object;
$obj2 = new Object;
?>
```



Pseudo constants

☑	__CLASS__	shows the current class name
☑	__METHOD__	shows class and method or function
☑	self	references the class itself
☑	parent	references the parent class
☑	$this	references the object itself

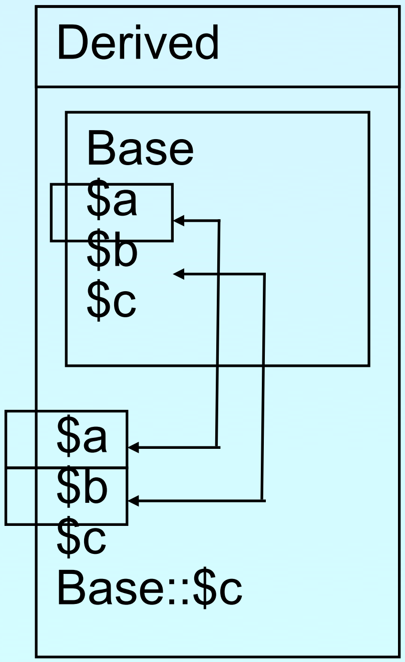
```
<?php
class Base {
        static function Show() {
                echo __FILE__.'('.__LINE__.'):'.__METHOD__."\n";
        }
}
class Object extends Base {
        static function Use() {
                Self::Show();
                Parent::Show();
        }
        static function Show() {
                echo __FILE__.'('.__LINE__.'):'.__METHOD__."\n";
        }
}
?>
```

Visibility

☑ Controlling member visibility / Information hiding

- ☑ A derived class does not know inherited privates
- ☑ An inherited protected member can be made public

```
<?php
class Base {
  public $a;
  protected $b;
  private $c;
}
class Derived extends Base {
  public $a;
  public $b;
  private $c;
}
?>
```



Constructor visibility

☑ A protected constructor prevents instantiation

```
<?php
class Base {
    protected function __construct() {
    }
}
class Derived extends Base {
    // constructor is still protected
    static function getBase() {
        return new Base; // Factory pattern
    }
}
class Three extends Derived {
    public function __construct() {
    }
}
?>
```

Clone visibility

☑ ☑ A protected __clone prevents external cloning

A protected __clone prevents external cloning

☑ A private final __clone prevents cloning

```
<?php
class Base {
private final function __clone() {
}
}
class Derived extends Base {
//  public function __clone($that) {
//      some object cloning code
//  }
//  public static function copyBase($that) {
//      return clone $that;
//  }
}
?>
```

```
<?php
class Base {
    protected function __clone() {
    }
}
class Derived extends Base {
    public function __clone($that) {
        // some object cloning code
    }
    public static function copyBase($that) {
        return clone $that;
    }
}
?>
```

The Singleton pattern

☑ Sometimes you want only a single instance of any object to ever exist.

- ☑ DB connections
- ☑ An object representing the requesting user or connection.

```
<?php
class Singleton {
        static private $instance;
        protected function __construct() {}
        final private function __clone() {}
        static function getInstance() {
            if(!self::$instance)
                self::$instance = new Singleton();
            return self::$instance;
        }
}
$a = Singleton::getInstance();
$a->id = 1;
$b = Singleton::getInstance();
print $b->id."\n";
?>
```

Constants

☑ Constants are read only static properties

☑ Constants are always public

```php
<?php
class Base {
  const greeting = "Hello\n";
}
class Dervied extends Base {
  const greeting = "Hello World\n";
  static function func() {
    echo parent::greeting;
  }
}
echo Base::greeting;
echo Derived::greeting;
Derived::func();
?>
```

Abstract members

- ☑ Properties cannot be made abstract
- ☑ Methods can be abstract
  - ☑ They don't have a body
  - ☑ A class with an abstract method must be abstract
- ☑ Classes can be made abstract
  - ☑ The class cannot be instantiated

```php
<?php
abstract class Base {
  abstract function no_body();
}
class Derived extends Base {
  function no_body() { echo "Body\n"; }
}
?>
```

Final members

- ☑ Methods can be made final
  - ☑ They cannot be overwritten
  - ☑ They are class invariants
- ☑ Classes can be made final
  - ☑ They cannot be inherited

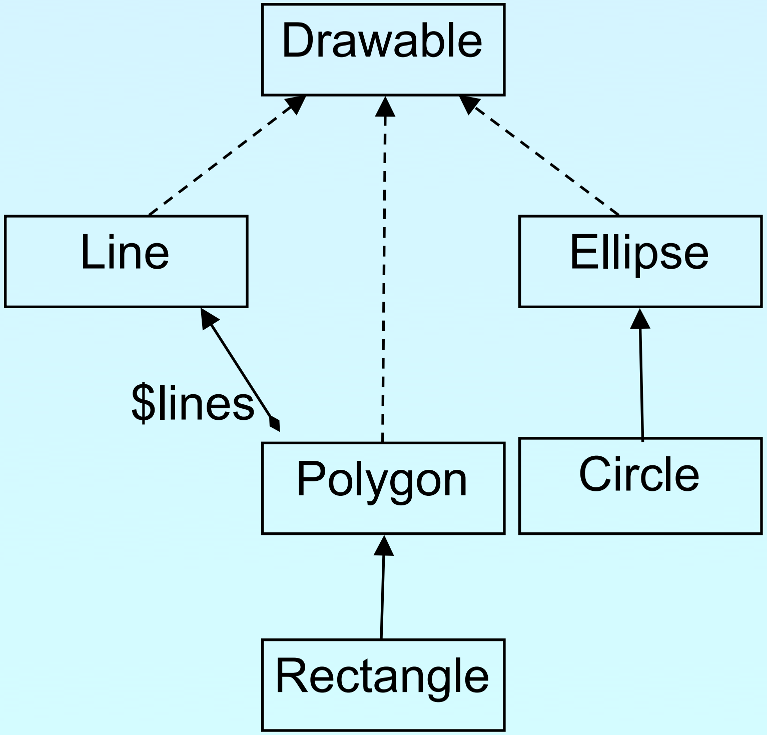
```php
<?php
class Base {
  final function invariant() { echo "Hello\n"; }
}
class Derived extends Base {
}
final class Leaf extends Derived {
}
?>
```

Interfaces

☑ Interfaces describe an abstract class protocol

☑ Classes may inherit multiple Interfaces

```
<?php
interface Drawable {
    function draw();
}
class Line implements Drawable {
    function draw() {};
}
class Polygon implements Drawable {
    protected $lines;
    function draw() {
        foreach($this->lines as $line)
            $line->draw();
    };
}
class Rectangle extends Polygon {
    function draw() {};
}
class Ellipse implements Drawable {
    function draw() {};
}
class Circle extends Ellipse {
    function draw() {
        parent::draw();
    };
}
?>
```



Property kinds

☑ Declared properties

- ☑ May have a default value
- ☑ Can have selected visibility

☑ Implicit public properties

- ☑ Declared by simply using them in ANY method

☑ Virtual properties

- ☑ Handled by interceptor methods

☑ Static properties

- ☑ Bound to the class rather then to the instance

Object to String conversion

☑ __toString(): semi-automatic object to string conversion with echo and print

```
<?php
class Object {
        function __toString() {
                return 'Object as string';
        }
}

$o = new Object;

echo $o;

$str = (string) $o; // does NOT call __toString
?>
```

Interceptors

☑ Allow to dynamically handle non class members

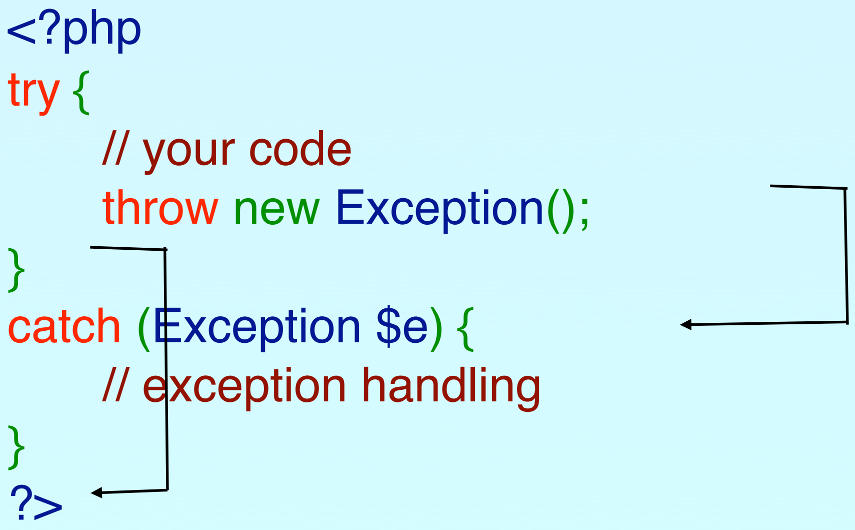
- ☑ Lazy initialization of properties
- ☑ Simulating Object aggregation and Multiple inheritance

```php
<?php
class Object {
    protected $virtual;
  function __get($name) {
        return @$this->virtual[$name];
    }
    function __set($name, $value) {
        $this->virtual[$name] = $value;
    }
    function __call($func, $params) {
        echo 'Could not call ' . __CLASS__ . '::' . $func . "\n";
    }
}
?>
```

Exceptions

☑ Respect these rules

1. Exceptions are exceptions
2. Never use exceptions for control flow
3. Never ever use exceptions for parameter passing

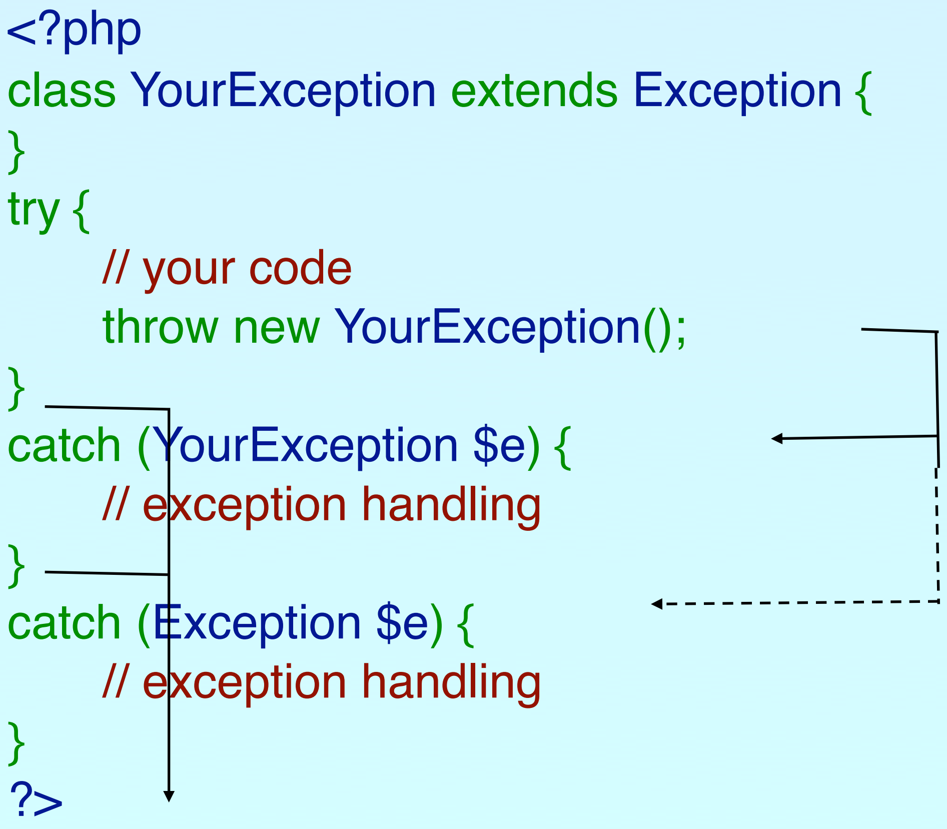


```
<?php
try {
	// your code
	throw new Exception();
}
catch (Exception $e) {
	// exception handling
}
?>
```

Exception specialization

☑ Exceptions should be specialized

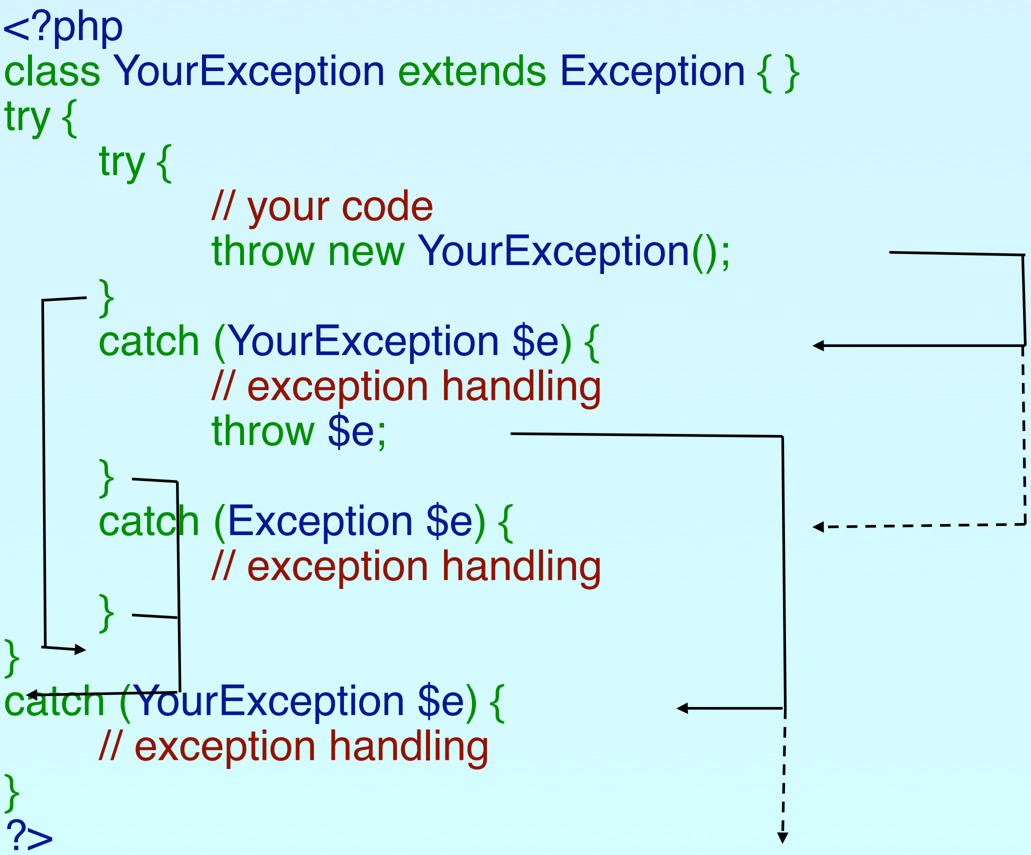
☑ Exceptions should inherit built in class exception



```
<?php
class YourException extends Exception {
}
try {
	// your code
	throw new YourException();
}
catch (YourException $e) {
	// exception handling
}
catch (Exception $e) {
	// exception handling
}
?>
```

Exception specialization

- ☑ Exception blocks can be nested
- ☑ Exceptions can be re thrown



```
<?php
class YourException extends Exception { }
try {
	try {
		// your code
		throw new YourException();
	}
	catch (YourException $e) {
		// exception handling
		throw $e;
	}
	catch (Exception $e) {
		// exception handling
	}
}
catch (YourException $e) {
	// exception handling
}
?>
```

Constructor failure

☑ Constructors do not return the created object

☑ Exceptions allow to handle failed constructors

```
<?php
class Object {
	function __construct() {
		throw new Exception;
	}
}
try {
	$o = new Object;
}
catch (Exception $e) {
	echo "Object could not be instantiated\n";
}
?>
```

Convert Errors to Exceptions

☑ Implementing PHP 5.1 class ErrorException

```
<?php
class ErrorException extends Exception {
 protected $severity, $message;
 function __construct($message, $code, $severity){
    parent::__construct($message, $code);
    $this->severity = $severity;
 }
 function getSeverity() {
    return $this->severity;
 }
}
function ErrorsToExceptions($severity, $message) {
 throw new ErrorException($message, 0, $severity);
}
set_error_handler('ErrorsToExceptions');
?>
```

Typehinting

☑ PHP 5 allows to easily force a type of a parameter

- ☑ Beta 1 and beta 2 allowed NULL with typehints
- ☑ Starting with Beta 3 NULL is disallowed for typehints
- ☑ Typehints must be inherited as given in base class
- ☑ PHP 5.1 will offer a syntax to explicitly allow NULL
- ☑ PHP 5.1 will offer typehinting with arrays

```
class Object {
    public function compare(Object $other) {
        // Some code here
    }
    public function compare2($other) {
        if (is_null($other) || $other instanceof Object) {
            // Some code here
        }
    }
}
```

Reflection API

☑ Can reflect nearly all aspects of your PHP code

- ☑ Functions
- ☑ Classes, Methods, Properties
- ☑ Extensions

```
<?php
class Foo {
    public $prop;
    function Func($name) {
        echo "Hello $name";
    }
}

ReflectionClass::export('Foo');
ReflectionObject::export(new Foo);
ReflectionMethod::export('Foo', 'func');
ReflectionProperty::export('Foo', 'prop');
ReflectionExtension::export('standard');
?>
```

Dynamic object creation

☑ Reflection API allows to dynamically create objects

```
<?php
class Test {
    function __construct($x, $y = NULL) {
        $this->x = $x;
        $this->y = $y;
    }
}
function new_object_array($class, $parameters = NULL) {          return
call_user_func_array(
        array(new ReflectionClass($class), 'newInstance'),
        $parameters);
}

new_object_array('stdClass');
new_object_array('Test', array(1));
new_object_array('Test', array(1, 2));
?>
```

__autoload

☑ __autoload supports automatic class file loading

- ☑ It's a good idea to have __autoload in an auto_prepend_file
- ☒ You can only have one __autoload function

```php
<?php
function __load_class($classname, $dir) {
    $file = $dir . '/' . $classname . '.inc';
    if (file_exists($file)) {
        require_once($file);
        return true;
    }
    return false;
}

function __autoload($classname) {
    $classname = strtolower($classname);
    $inc = split(':', ini_get('include_path'));
    $inc[] = '.';
    $inc[] = dirname($_SERVER['PATH_TRANSLATED']);
    foreach($inc as $dir) {
        if (__load_class($classname, $dir)) {
            return;
        }
    }
    error_log('Class not found (' . $classname . ')');
}
?>
```

ReflectionExtension::export('spl')

Using PHP 5 OOP by example

Built-in Interfaces

- ☑ PHP 5 contains built-in interfaces that allow you to change the way the engine treats objects.
  - ☑ ArrayAccess
  - ☑ Iterator
  - ☑ IteratorAggregate

- ☑ Built-in extension SPL provides more Interfaces and Classes
  - ☑ ArrayObject, ArrayIterator
  - ☑ FilterIterator
  - ☑ RecursiveIterator

  - ☑ Use CLI: php –r 'ReflectionExtension::export("SPL");'

Array Access Interception

☑ Allows for creating objects that can be transparently accessed as arrays.

☑ When combined with the iterator interface, it allows for creating ‘arrays with special properties’.

```php
<?php
interface ArrayAccess {
    // @return whether $offset is valid (true/false)
    function offsetExists($offset);

    // @return the value associated with $offset
    function offsetGet($offset);

    // associate $value with $offset (store the data)
    function offsetSet($offset, $value);

    // unset the data associated with $offset
    function offsetUnset($offset);
}
?>
```

ArrayAccess Example

☑ We want to create variables which can be shared between processes.

☑ We will set up interception so that access attempts on the variable are actually performed through a DBM file.

Binding Access to a DBM

```php
<?php
class TiedArray implements ArrayAccess {
  protected $db = NULL;
  function __construct($file, $handler) {
    if (!$this->db = dba_open($file, 'cd', $handler))
      throw new exception('Could not open file ' . $file);
  }
  function __destruct() { dba_close($this->db); }
  function offsetExists($offset) {
    return dba_exists($offset, $this->db);
  }
  function offsetGet($offset) {
    return dba_fetch($offset, $this->db);
  }
  function offsetSet($offset, $value) {
    return dba_replace($offset, $value, $this->db);
  }
  function offsetUnset($offset) {
    return dba_delete($offset, $this->db);
  }
}
?>
```

A Trivial Example

```
<?php
  include_once ‘TiedArray.php’;
  $_SHARED = new DbaReader("/tmp/.counter", "flatfile");
  $_SHARED['counter'] += 1;
  printf("PID: %d\nCOUNTER: %d\n", getmypid(),
  $_SHARED['counter']);
?>
```

Iterators

☑ Normal objects behave like arrays when used with the foreach construct

☑ Specialized Iterator objects can be iterated differently

```
<?php

class Object {
        public $prop1 = "Hello";
        public $prop2 = "World\n";
}

foreach(new Object as $prop) {
        echo $prop;
}

?>
```

What are Iterators

- ☑ Iterators are a concept to iterate anything that contains other things. Examples:
  - ☑ Values and Keys in an array
  - ☑ Text lines in a file
  - ☑ Database query results
  - ☑ Files in a directory
  - ☑ Elements or Attributes in XML
  - ☑ Bits in an image
  - ☑ Dates in a calendar range
- ☑ Iterators allow to encapsulate algorithms
  - ☑ Code re-use
  - ☑ Functional programming

The basic Iterator concepts

☑ Iterators can be internal or external also referred to as active or passive

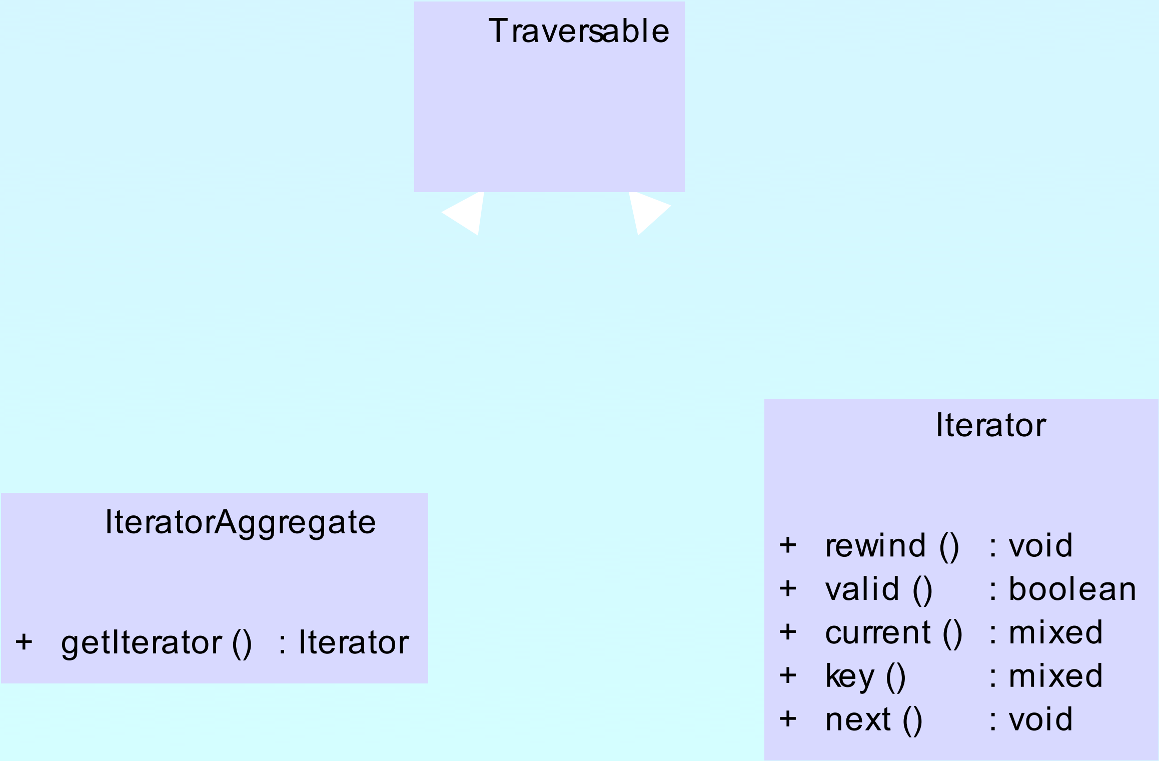
☑ An internal iterator modifies the object itself

☑ An external iterator points to another object without modifying it

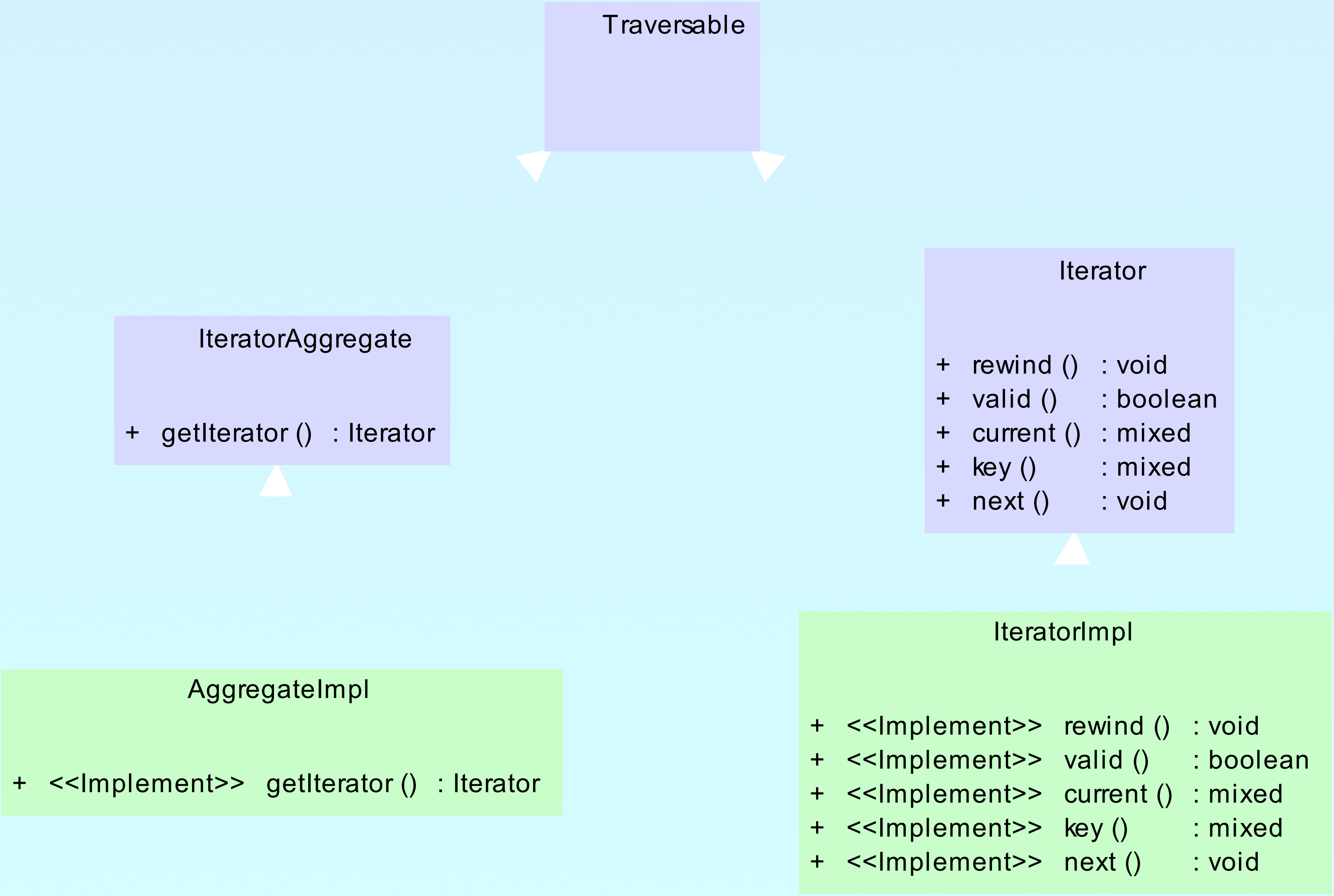
☑ PHP always uses external iterators at engine-level

PHP Iterators

- ☑ Anything that can be iterated implements **Traversable**
- ☑ User classes cannot implement **Traversable**
- ☑ **Aggregate** is used for objects that use external iterators
- ☑ **Iterator** is used for internal traversal or external iterators



Implementing Iterators



Traversable

IteratorAggregate

+ getIterator () : Iterator

Iterator

+ rewind () : void
+ valid () : boolean
+ current () : mixed
+ key () : mixed
+ next () : void

AggregateImpl

+ <<Implement>> getIterator () : Iterator

IteratorImpl

+ <<Implement>> rewind () : void
+ <<Implement>> valid () : boolean
+ <<Implement>> current () : mixed
+ <<Implement>> key () : mixed
+ <<Implement>> next () : void

How Iterators work

☑ Iterators can be used manually

☑ Iterators can be used implicitly with **foreach**

```
<?php
$o = new ArrayIterator(array(1, 2, 3));
$o->rewind();
while ($o->valid()) {
	$key = $o->key();
	$val = $o->current();
	// some code
	$o->next();
}
?>
```

```
<?php
$o = new ArrayIterator(array(1, 2, 3));
foreach($o as $key => $val) {
	// some code
}
?>
```

How Iterators work

☑ Internal Iterators

☑ User Iterators

```
<?php
interface Iterator {
  function rewind();
  function valid();
  function current();
  function key();
  function next();
}
?>
```

```
<?php
class FilterIterator implements Iterator {
  function __construct(Iterator $input)...
  function rewind()...
  function accept()...
  function valid()...
  function current()...
  function key()...
  function next()...
}
?>
```

```
<?php
$it = get_resource();
foreach($it as $key=>$val) {
  // access data
}
?>
```

```
<?php
$it = get_resource();
foreach($it as $key=>$val) {
  // access data
}
?>
```

```
<?php
$it = get_resource();
for ($it->rewind(); $it->valid(); $it->next()) {
  $value = $it->current(); $key = $it->key();
}
?>
```

```
<?php
$it = get_resource();
foreach(new Filter($it, $filter_param) as $key=>$val) {
  // access filtered data only
}
?>
```

Debug Session

PHP 5.1

```
<?php
class ArrayIterator {
        protected $ar;
        function __construct(Array $ar) {
                $this->ar = $ar;
        }
        function rewind() {
                rewind($this->ar);
        }
        fucntion valid() {
                return !is_null(key($this->ar));
        }
        function key() {
                return key($this->ar);
        }
        fucntion current() {
                return current($this->ar);
        }
        function next() {
                next($this->ar);
        }
}
?>
```

```
<?php
$a = array(1, 2, 3);
$o = new ArrayIterator($a);
foreach($o as $key => $val) {
        echo "$key => $va\n";
}
?>
```

```
0 => 1
1 => 2
2 => 3
```

Aren’t Iterators Pointless in PHP?

☑ Why not just use arrays:

```
foreach($aggregate as $item) { /*...*/ }
```

☑ Aren't we making life more difficult than need be?

☑ No! For simple aggregations the above works fine (though it’s slow), but not everything is an array. What about:

- ☑ Buffered result sets
- ☑ Lazy Initialization
- ☑ Directories
- ☑ Anything not already an array

Iterators by example

☑ Using Iterators you can efficiently grab all groups from INI files

☑ The building blocks:

- ☑ A class that handles INI files
- ☑ An abstract filter Iterator
- ☑ A filter that filters group names from the INI file input
- ☑ An Iterator to read all entries in the INI file
- ☑ Another filter that allow to search for specific groups

INI file abstraction

```php
<?php
class DbaReader implements Iterator {
    protected $db = NULL;
    private $key = false, $val = false;

    function __construct($file, $handler) {
        if (!$this->db = dba_open($file, 'r', $handler))
            throw new exception('Could not open file ' . $file);
    }
    function __destruct() {
        dba_close($this->db);
    }
    function rewind() {
        $this->key = dba_firstkey($this->db);
        fetch_data();
    }
    function next() {
        $this->key = dba_nextkey($this->db);
        fetch_data();
    }
    private function fetch_data() {
        if ($this->key!==false)
            $this->val = dba_fetch($this->key, $this->db);
    }
    function current() {  return $this->val; }
    function valid() {    return $this->key !== false; }
    function key() {      return $this->key; }
}
?>
```

Filtering Iterator keys

☑ FilterIteraor is an abstract class
  - ☑ Abstract accept() is called from rewind() and next()
  - ☑ When accept() returns false next() will be called automatically

```php
<?php
class KeyFilter extends FilterIterator
{
    private $regex;

    function __construct(Iterator $it, $regex) {
        parent::__construct($it);
        $this->regex = $regex;
    }
    function accept() {
        return ereg($this->regex, $this->getInnerIterator()->key());
    }
    function getRegex() {
        return $this->regex;
    }
    protected function __clone($that) {
        // disallow clone
    }
}
?>
```

Getting only the groups

```php
<?php
if (!class_exists('KeyFilter')) {
    require_once('keyfilter.inc');
}

class IniGroups extends KeyFilter {
    function __construct($file) {
        parent::__construct(
            new DbaReader($file, 'inifile'), '^\[.*\]$');
    }
    function current() {
        return substr(parent::key(), 1, -1);
    }
    function key() {
        return substr(parent::key(), 1, -1);
    }
}
?>
```

Putting it to work

```php
<?php

if (!class_exists('KeyFilter')) {
    require_once('keyfilter.inc');
}
if (!class_exists('IniGroups')) {
    require_once('inigroups.inc');
}

$it = new IniGroups($argv[1]);

if ($argc>2) {
    $it = new KeyFilter($it, $argv[2]);
}

foreach($it as $group) {
    echo $group . "\n";
}

?>
```

Let’s Talk About Patterns

- ☑ Patterns catalog solutions to categories of problems
- ☑ They consist of
  - ☑ A name
  - ☑ A description of their problem
  - ☑ A description of the solution
  - ☑ An assessment of the pros and cons of the pattern

What do patterns have to do with OOP?

- ☑ Not so much. Patterns sources outside OOP include:
- ☑ Architecture (the originator of the paradigm)
- ☑ User Interface Design (wizards, cookie crumbs, tabs)
- ☑ Cooking (braising, pickling)

Patterns We’ve Seen So Far

☑ Singleton Pattern

☑ Iterator Pattern

Aggregator Pattern

☑ Problem: You have collections of items that you operate on frequently with lots of repeated code.

☑ Remember our calendars:

```
     foreach($entries as $entry) {
 $entry->display();
}
```

☑ Solution: Create a container that implements the same interface, and perfoms the iteration for you.

Aggregator Pattern

☑
```
class EntryAggregate extends Entry {
  protected $entries;
  ...
  public function display() {
    foreach($this->entries as $entry) {
      $entry->display();
  }
  public function add(Entry $e) {
    array_push($this->entries, $e);
  }
}
```

☑ By extending Entry, the aggregate can actually stand in any place that entry did, and can itself contain other aggregated collections.

Proxy Pattern

☑ Problem: You need to provide access to an object, but it has an interface you don’t know at compile time.

☑ Solution: Use accessor/method overloading to dynamically dispatch methods to the object.

☑ Discussion: This is very typical of RPC-type facilities like SOAP where you can interface with the service by reading in a definitions file of some sort at runtime.

Proxy Pattern in PEAR SOAP

```php
<?php
class SOAP_Client {
    public $wsdl;
    public function __construct($endpoint) {
        $this->wsdl = WSDLManager::get($endpoint);
    }
    public function __call($method, $args) {
        $port = $this->wsdl->getPortForOperation($method);
        $this->endpoint=$this->wsdl->getPortEndpoint($port);
        $request = SOAP_Envelope::request($this->wsdl);
        $request->addMethod($method, $args);
        $data = $request->saveXML();
        return SOAP_Envelope::parse($this->endpoint,$data);
    }
}
?>
```

Observer Pattern

☑ Problem: You want an object to automatically notify dependents when it is updated.

☑ Solution: Allow 'observer' to register themselves with the observable object.

☑ Discussion: An object may not apriori know who might be interested in it. The Observer pattern allows objects to register their interest and supply a notification method.

Observer Pattern

```
<?php
class Observable {
    protected $observers;
    public function attach(Observer $o) {
        array_push($this->observers, $o);
    }
    public function notify() {
        foreach($this->observers as $o) {
            $o->update();
        }
    }
}
interface Observer {
    public function update();
}
?>
```

☑ Concrete Examples: logging facilities: email, debugging, SOAP message notifications. NOT Apache request hooks.

New extensions

☑

New extensions

☑	Date	PECL
☑	DOM	5.0
☑	FFI	PECL
☑	MySQLi	5.0
☑	PDO	PECL/5.1
☑	PIMP	?
☑	SimpleXML	5.0
☑	SPL	5.0
☑	SQLite	5.0
☑	Tidy	5.0
☑	XML + XSL	5.0

Reference

☑ Everythining about PHP
http://php.net

☑ These slides
http://somabo.de/talks

☑ SPL Documentaion & Examples
http://php.net/~helly/php/ext/spl
http://cvs.php.net/php-src/ext/spl/examples

☑ George's Book (Advanced PHP Programming)