Classes and Objects

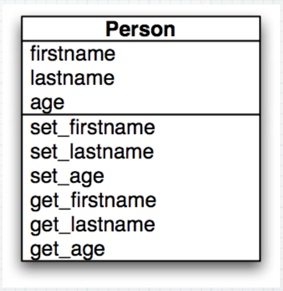
PHP

Classes / Objects

- Combine values and process in a single data structure
- Closer to real world structures
- Design in UML class diagrams

Person class

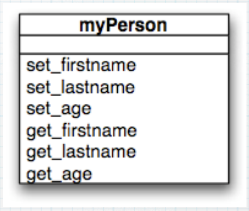
- Three properties
- Six methods



Using the Person class

To use the class, create an Object of that class using the new keyword

```
$myPerson = new Person();
```

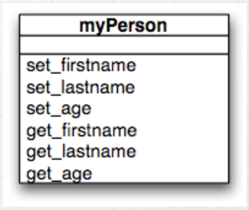


$myPerson is an Object of type Person

Using the Person class

PHP uses -> to access the properties and methods inside the object

```
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
```

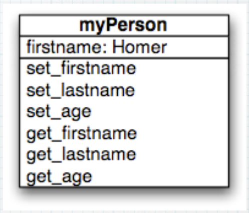


The set_ methods pass values into the object properties

Using the Person class

PHP uses -> to access the properties and methods inside the object

```
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
```

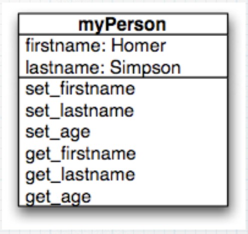


The set_ methods pass values into the object properties

Using the Person class

PHP uses -> to access the properties and methods inside the object

```
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
```

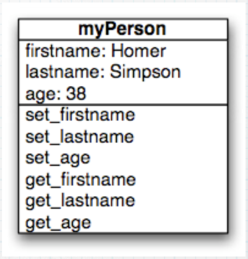


The set_ methods pass values into the object properties

Using the Person class

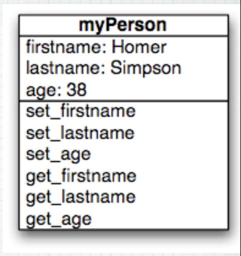
PHP uses -> to access the properties and methods inside the object

```
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
```



The set_ methods pass values into the object properties

Using the Person class



PHP uses -> to access the properties and methods inside the object

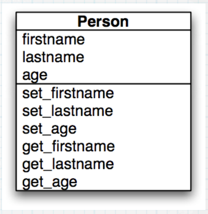
```
print $myPerson->get_firstname();     Homer
print $myPerson->get_lastname();      Simpson
print $myPerson->get_age();           38
```

The get_ methods get values out of the object properties

Class syntax

```
class classname [ extends baseclass ]
{
    [ var $property [= value ]; ... ]
    [ function functionname (args) {
          // code
      }
      ...
    ]
}
```

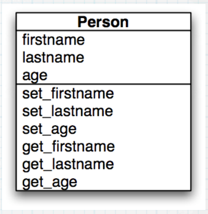
PHP implementation



```
class Person {
   var $firstname;
   var $lastname;
   var $age;


   ...




};
```

Three properties in the Person class

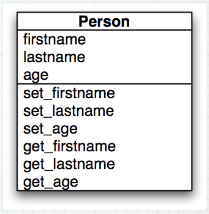
PHP implementation



```
...

  function get_firstname(){
  return $this->firstname;
  }

  function get_lastname(){
  return $this->lastname;
  }

  function get_age(){
  return $this->age;
  }
...
```

Three methods to get the values out of the object

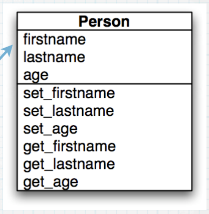
PHP implementation



```
...
  function get_firstname(){
  return $this->firstname;
  }

  function get_lastname(){
  return $this->lastname;
  }

  function get_age(){
  return $this->age;
  }
...
```

Three methods to get the values out of the object

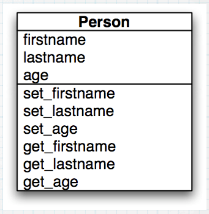
PHP implementation



```
  function get_firstname(){
  return $this->firstname;
  }
```

The $this keyword points to the containing object

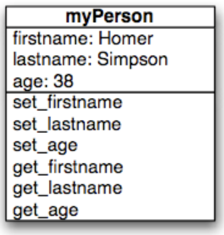
PHP implementation



```
  function get_firstname(){
  return $this->firstname;
  }
```

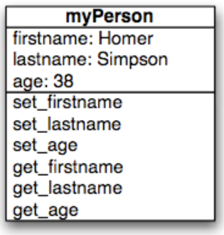
Note no $ used here

PHP implementation



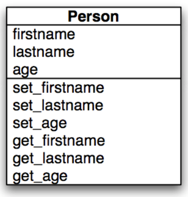
```
function get_firstname(){
return $this->firstname;
}
```

PHP implementation



```
function get_firstname(){
return 'Homer';
}
```

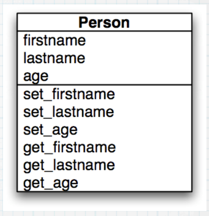
PHP implementation



```
...
   function set_firstname($new_name){
   $this->firstname=$new_name;
   }

   function set_lastname($new_name){
   $this->lastname=$new_name;
   }

   function set_age($new_age){
   $this->age=$new_age;
   }
};
```

Three methods to set the values inside the object

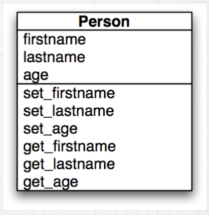
PHP implementation



```
...
  function set_firstname($new_name){
   $this->firstname=$new_name;
   }

   function set_lastname($new_name){
   $this->lastname=$new_name;
   }

   function set_age($new_age){
   $this->age=$new_age;
   }
};
```

Three methods to set the values inside the object

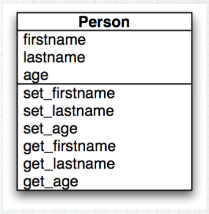
PHP implementation



```
$myPerson->set_firstname('Homer');
```

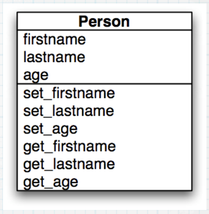
Call the set_firstname method inside myPerson

PHP implementation



```
function set_firstname($new_name){
 $this->firstname=$new_name;
 }
```

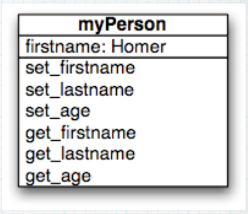
PHP implementation



```
function set_firstname('Homer'){
$this->firstname=$new_name;
}
```

Value 'Homer' is passed into the function

PHP implementation

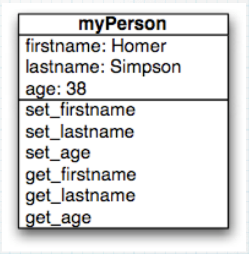


```
function set_firstname('Homer'){
$this->firstname='Homer';
}
```

Attribute firstname takes the value 'Homer'

Encapsulation

You should always access the properties through the methods of the object



```
$myPerson->age=42;
```

Don't do this

```
$myPerson->set_age(42);
```

Do this

Demo: Person example

```
<?
require('class.Person.php');
$myPerson = new Person();
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
?>

<html>
<head>
<title>Person Demo</title>
</head>
<body>
<h1>Person Demo</h1>
<p>My name is <? print $myPerson->get_firstname().' '.
    $myPerson->get_lastname(); ?></p>
<p>I am <? print $myPerson->get_age(); ?></p>


</body>
</html>
```

Using a Constructor (PHP 5)

Rather than create the object and then pass in the initial values...

```
$myPerson = new Person();
$myPerson->set_firstname('Homer');
$myPerson->set_lastname('Simpson');
$myPerson->set_age(38);
```

Use a constructor function

Using a Constructor (PHP 4)

The constructor function passes values in as we create the object:

```
$myPerson = new Person(“Homer”,”Simpson”,38);
```

Using a Constructor (PHP 5)

The constructor function is declared inside the object:

```
class Person {
   var $firstname;
   var $lastname;
   var $age;

   function __construct($newfirstname, $newlastname, $newage){
      $this->firstname=$newfirstname;
      $this->lastname=$newlastname;
      $this->age=$newage;
   }
```

Demo: Person constructor example

```
<?
require('class.Person1.php');
$myPerson = new Person('Homer','Simpson',38);
?>

<html>
<head>
<title>Person Demo</title>
</head>
<body>
<h1>Person Demo</h1>
<p>My name is <? print $myPerson->get_firstname().' '.
$myPerson->get_lastname(); ?></p>
<p>I am <? print $myPerson->get_age(); ?></p>


</body>
</html>
```

Default values

You can set default values if none are provided

```
class Person {
   var $firstname;
   var $lastname;
   var $age;

   function __construct($newfirstname, $newlastname, $newage){
      $this->firstname=$newfirstname;
      $this->lastname=$newlastname;
      $this->age=$newage;
   }
```

Default values

You can set default values if none is provided

```
class Person {
   var $firstname;
   var $lastname;
   var $age;

   function __construct($newfirstname="", $newlastname="", $newage=0){
      $this->firstname=$newfirstname;
      $this->lastname=$newlastname;
      $this->age=$newage;
   }
```

Person default values example

```
<?
require('class.Person1.php');
$myPerson = new Person('','Simpson');
?>

<html>
<head>
<title>Person Demo</title>
</head>
<body>
<h1>Person Demo</h1>
<p>My name is <? print $myPerson->get_firstname().' '.
$myPerson->get_lastname(); ?></p>
<p>I am <? print $myPerson->get_age(); ?></p>


</body>
</html>
```

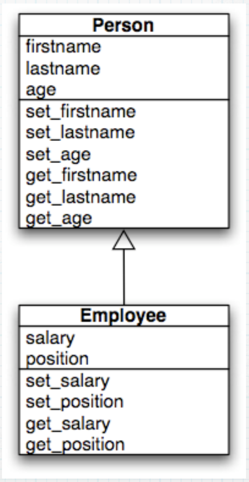
Inheritance

- PHP allows single inheritance for specialisation (or generalization)
- Properties and Methods may be added to child classes

Inheritance

Person is the parent

Employee is the descendant of Person and inherits all the properties and methods



Inheritance

Uses the extends keyword:

```
require_once("class.Person1.php");

class Employee extends Person {
   var $salary;
   var $position;
```

Inheritance

PHP doesn't offer automatic chaining of constructors like some languages - so do it by hand:

```
class Employee extends Person {
   var $salary;
   var $position;

   function __construct($newfirstname, $newlastname,
     $newage,$newsalary,$newposition ){
      parent::__construct($newfirstname, $newlastname,
   $newage);
      $this->position=$newposition;
      $this->salary=$newsalary;
   }
```

Inheritance

The rest of Employee consists of extra get / set methods

```
function get_salary(){
return $this->salary;
}

function get_position(){
return $this->position;
}

function set_salary($new_salary){
$this->salary=$new_salary;
}

function set_position($new_position){
$this->position=$new_position;
}
```

Demo: Employee example

```
<?
require_once('class.Employee.php');
$myEmployee = new Employee("Homer","Simpson",42,42000,"Safety Manager");
?>

<html>
<head>
<title>Employee Demo</title>
</head>
<body>
<h1>Employee Demo</h1>
<p>My name is
<? print $myEmployee->get_firstname().' '.$myEmployee->get_lastname(); ?>
</p>
<p>I am
<? print $myEmployee->get_age(); ?>
</p>
<p>I earn <? print $myEmployee->get_salary(); ?> in my job as
<? print $myEmployee->get_position(); ?></p>


</body>
</html>
```

Overriding a method

- If a descendant uses a method with the same name as the parent, the method overrides the parent methods

Overriding a method

happy_birthday method in Person:

```
function happy_birthday(){
   $this->age++;
   return ("Age is now: ".$this->age);
}
```

Demo: Happy Birthday example

```
<?
require('class.Person2.php');
$myPerson = new Person('Homer','Simpson',38);
?>

<html>
<head>
<title>Person Demo</title>
</head>
<body>
<h1>Person Demo</h1>
<p>My name is <? print $myPerson->get_firstname().' '.
$myPerson->get_lastname(); ?></p>
<p>I am <? print $myPerson->get_age(); ?></p>
<p>Happy birthday to me!
<? print $myPerson->happy_birthday(); ?></p>

</body>
</html>
```

Overriding a method

happy_birthday method in Employee:

```
function happy_birthday(){
return ("Employees have to buy cake: - Age is now ".
   $this->age);
   }
```

Demo: Happy Birthday example for an Employee

```
<?
require_once('class.Employee2.php');
$myEmployee = new Employee("Homer","Simpson",
    42,"42000","Safety Manager");
?>

<html>
<head>
<title>Employee Demo</title>
</head>
<body>
<h1>Employee Demo</h1>
<p>My name is <? print $myEmployee->get_firstname().' '.
    $myEmployee->get_lastname(); ?></p>
<p>I am <? print $myEmployee->get_age(); ?></p>
<p>I earn <? print $myEmployee->get_salary(); ?> in my job as
<? print $myEmployee->get_position(); ?></p>
<p>Happy birthday to me!
<? print $myEmployee->happy_birthday(); ?></p>

</body>
</html>
```

Overriding a method

We may want the employee happy_birthday method to call the parent:

```
function happy_birthday(){
   parent::happy_birthday();
   return ("Employees have to buy cake: - Age is now ".
      $this->age);
}
```

Demo: Happy Birthday example for an Employee

```
<?
require_once('class.Employee3.php');
$myEmployee = new Employee("Homer","Simpson",
    42,"42000","Safety Manager");
?>

<html>
<head>
<title>Employee Demo</title>
</head>
<body>
<h1>Employee Demo</h1>
<p>My name is <? print $myEmployee->get_firstname().' '.
    $myEmployee->get_lastname(); ?></p>
<p>I am <? print $myEmployee->get_age(); ?></p>
<p>I earn <? print $myEmployee->get_salary(); ?> in my job as
<? print $myEmployee->get_position(); ?></p>
<p>Happy birthday to me!
<? print $myEmployee->happy_birthday(); ?></p>

</body>
</html>
```