

Enterprise PHP Architecture through Design Patterns and Modularization

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Why trust this guy?



- Programming for over 2 decades
- Web Development Manager
- Author of WROX Professional PHP Design Patterns
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Why are we here?

- Focus on Enterprise Development
- Understand decoupling
- See real reasons for doing things to pattern

Why is this important?

- PHP is everywhere
- PHP runs organizations
- IT changes faster than any other area
- Long term investment
 - Do things the right way, and be valuable - longer
 - quality
 - speed
 - maintainability

Lets get into it

Disclaimer:

- There are many ways to refer to the concepts discussed next
- Don't get stuck on names
 - Get stuck on the ideas

What are the main topics?

- Data Models
- Domain Logic Models
- Mappers
- Services

Data Model

- This class represents a real entity in the organization
- Examples of entities:
 - Visitor of the website
 - Product for sale: computer
 - Mail message
 - Blog entry, Comment

Data Model (con't)

- Data models contain properties that are unique/descriptive to that entity
 - Harddrive for sale: has property of:
 - size
 - suggested sale price
 - speed
 - Does **not** have property of:
 - favorite song
- Data models contain methods that understand their properties
 - User has methods:
 - fullname() - brings together properties

Data Model (con't)

- Very dumb
- Harddrive example:
 - has a property called suggested sale price
 - has a property called sold price
 - What happens if the sold price is less than the suggested sale price?
 - This model does not care. It's a dumb data store

Sneak peek: Domain Logic Model

- Validation of the sale price would be done in the domain model
- What about string length?
 - Understand that your limits should be on your domain product
 - Is it true that your limit for a product is 255 chars - just cuz its a varchar(255) column?
 - Your data provider should handle your requirements, not the other way around

To Summarize Data Model

- Represents some sort of entity
- Has properties of that entity
- Has methods that understand its own properties only
- Dumb
- Could be really messed up if it doesn't have a relationship with a Domain Object

Domain Logic Model

- Represents the logical steps and decisions that make your app (business) unique
- Handles simple data validation
- Handles complex business rules
- The gatekeeper of the Data Model

Domain Logic Model (con't)

- Has relationships with Data Models
 - Can be 1-1, 1-N, N-1, N-N, depending on your choices and architecture. Probably is a hybrid
- Has methods that comprehend and understand Data Models
- Has properties or constants from the business configuration
 - Maximum amount of discount on sale

Domain Logic Model (con't)

- Going back to harddrive example
 - Harddrive data object has suggested price of \$40
 - Input has the sale price coming in at \$30
 - Domain Logic Model to the rescue!
- Data Logic Model validates the sale
 - Property says maximum discount is 20%
 - Input discount is 25%
 - Rejects input, does not allow Data Model to accept \$30 as the sale price
 - Perhaps maximum discount is 0% & must be exact
 - Rejects input if input is not exactly \$40

Domain Logic Model (con't)

- Another example
 - Blog Entry Model has a title
 - Business says Blog entry titles should not be longer than 100 characters
 - Domain Logic Model will validate that the input ready for this Blog Entry model is ≤ 100

Why is the separation important?

- Two reasons
 - Reuse
 - 100 different items for sale, but they don't have a common ancestor (ie, you can't extend a class. In this example, we choose not to use traits)
 - Each one must sell for the exact sale price
 - Only ONE object is required to validate that each time - instead of duplicating that code in each model
 - ** Design patterns - there are more options than just extending forever!!

Why is the separation important? (con't)

- Two reasons
 - Data models should just represent an entity, not the logic behind it
 - Your car has a maximum load. The steel doesn't know that
 - Harddrive example!
 - Harddrive is for sale at main warehouse. It is the same harddrive for 10 resellers.
 - Each reseller has different properties that determine the final sale price
 - The harddrive ITSELF never changes - so that class should be exactly the same for all retailers

Summarize Domain Logic Models

- Understands the business logic
- Comprehends data models
- The Gatekeeper of valid data

Data Mapper Object

- Data mappers map data from a Data Access Object to Data Models
- Data Access Object
 - not covered too much in this talk
 - provides access to a data source like a database, salesforce, as400, REST, via a predictable interface
- Concerned with retrieving or persisting a single Data Model (or collection)

Data Mapper Object (con't)

- Not particularly smart
 - will work to retrieve data based on parameters
 - will populate a Data Model generally without validation
 - ** caveat: sometimes a hybrid is created when working with remote sources to introduce Domain Logic Models here... but that's another talk
- Works directly with the Data Model
 - Creates new instances
 - Understands properties
 - Determines what to persist

Data Mapper Object (con't)

- Harddrive example
 - Can take a Harddrive Data Model and save it in the proper format to MySQL
 - Remember, the object has the data, but perhaps the database is normalized
 - Has a method to find a harddrive by serial number
 - Internally, determines what db field is the serial number, runs the query, and then populates the model with the full properties
 - Build collection
 - findAll() - parameter where size is > 250gb

Why is Data Mapper Important?

- Data Models are dumb
 - Don't care what their data is or where it came from
- Domain Logic Models only care about decisions
 - They don't care about the source
- Something needs to retrieve and persist
- Data Mapper is still not your "public" interface
 - (that's a service) - can swap out Data Mappers

Summarize Data Mapper Model

- Works directly with Data Model and Data Access Objects
- Retrieves and Persists Data Models
- Understands properties of Data Models
 - Can map data source to properties
 - Can determine retrieval method based on properties

Services

- A lot of confusion with this term
 - Sometimes they're the public interface of your app
 - Other times they reflect connections to third parties, like Amazon or Salesforce
 - Doesn't matter - let's just move to the concept
- Services are the public face to your controllers
 - These classes allow for calling methods that create, persist, modify, and retrieve data
 - Used to translate and process information from user input or other helper classes

Services (con't)

- Services are responsible for providing the Data Model or collection to the consumer
- Services act as the layer to work with your external consumer or framework
- Services do processing that is the same no matter what Data Model, Data Mapper, or other Service is involved
 - retrieving data from a helper model, filtering search term and city/state, etc.

Services (con't)

- **Harddrive example!**
 - `Service::save()` would accept a harddrive model, grab the proper mapper (perhaps the harddrive mapper associated with mysql), and introduce those two. It would then reintroduce the saved model
 - `Service::findBySerialNumber()` would accept a serial number parameter, translate that into a parameter for the mapper, get the mapper, retrieve the collection, and pass that back to the consumer

Services (con't)

- **Harddrive example (con't)**
 - `Service::validateUpdate()` - would take user input in, validate that it is valid and could match up with the Data Model, and return whether the input was acceptable or not
 - `Service::populateModel()` - takes that validated user input and the model, calls the mapper with this information to populate it (mapper knows fields, not services), and returns it

Why are Services Important?

- Services are the public interfaces to the rest of the classes in your app
- Things that you allow 'the consumer' to do are only defined in the service layer
- If data sources, mappers, models change, your service stays the same, and so does the consumer side of your app

Summarize Services

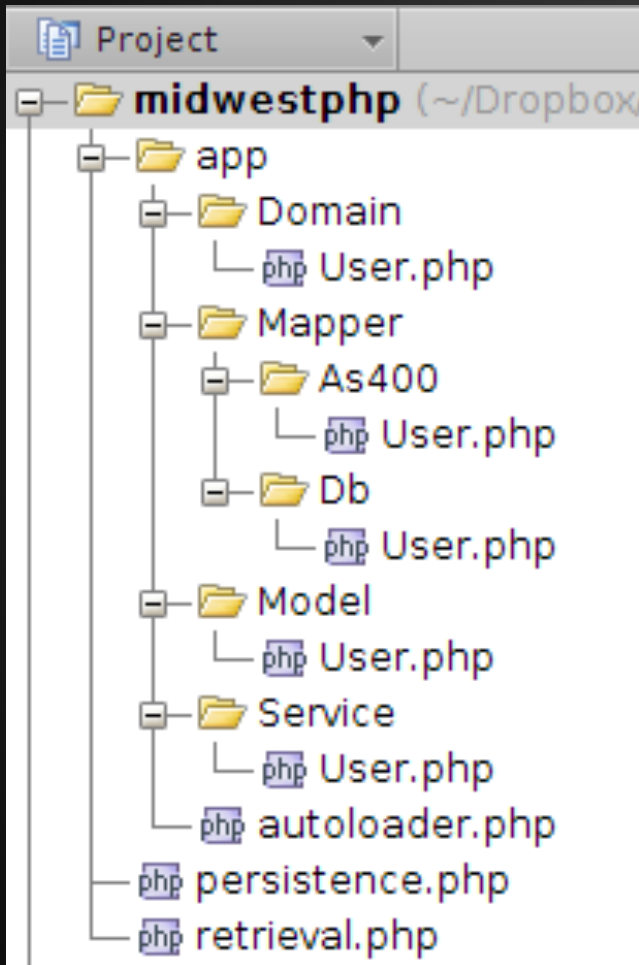
- Public interface to the rest of your code
- Understand Data Models, Domain Models, Mappers
- Execute processing that is always the same, never differs no matter what objects are in use

Example Code

- Let's see this in action. Things to remember:
- This is not a whole app - don't treat it as one
- It is example code
- This is not a whole app
- Don't forget, this is not a completed app

**Just trying to demonstrate the concepts
with the least amount of distraction!**

Layout - Overview



Main layout of files

We will cover each code section

Retrieval Options (A Controller)

```
php retrieval.php x
1  <?php
2  require 'app/autoloader.php';
3
4  $service = new Service_User();
5
6  //one id 3
7  $user = $service->findOneById(3);
8
9  // find only 5 first users
10 $users = $service->findAll(array('limit'=>5));
11
12 //users created before today's date
13 $legacyUsers = $service->findAllCreatedBeforeToday();
```

Retrieve one by ID

```
php User.php x
\Service User
1 <?php
2 class Service_User
3 {
4     public function findOneById($id)
5     {
6         $mapper = $this->_getMapper();
7         $params = array('id'=>$id);
8         return $mapper->findOne($params);
9     }
10
11     protected function _getMapper()
12     {
13         return new Mapper_Db_User();
14     }
15
16     //snippy
```

Other retrieval code

```
php User.php x
\Service User
1  <?php
2  class Service_User
3  {
4      public function findAll($params = array())
5      {
6          $mapper = $this->_getMapper();
7          return $mapper->findAll($params);
8      }
9
10     public function findAllCreatedBeforeToday()
11     {
12         $mapper = $this->_getMapper();
13         $params = array('createdBefore'=>date('Y-m-d'));
14         return $mapper->findAll($params);
15     }
```

The Mapper

```
php User.php x
\Mapper Db User
1  <?php
2  class Mapper_Db_User
3  {
4      protected static $pdo = null;
5
6      protected function _getDao()
7      {
8          if (self::$pdo == null) {
9              // obviously remove credentials and don't use root
10             self::$pdo = new PDO('mysql:host=localhost;dbname=test', 'root', 'password');
11         }
12         return self::$pdo;
13     }
14
15     // and then more code ...
16
```

The Mapper (con't)

```
6 public function findAll($params = array())
7 {
8     $whereStrings = $whereParams = array();
9
10    if (isset($params['id'])) {
11        $whereStrings[] = 'id = ?';
12        $whereParams[] = $params['id'];
13    }
14    if (isset($params['firstname'])) {
15        $whereStrings[] = 'firstname = ?';
16        $whereParams[] = $params['firstname'];
17    }
18    if (isset($params['createdBefore'])) {
19        $whereStrings[] = 'datecreated < ?';
20        $whereParams[] = $params['createdBefore'];
21    }
22
23    $sql = "select * from user";
24    if (!empty($whereStrings)) {
25        $sql .= " where " . implode(' AND ', $whereStrings);
26    }
27    if (isset($params['limit'])) {
28        $sql .= " limit " . intval($params['limit']);
29    }
30
31    $statement = $this->_getDao()->prepare($sql);
32    $statement->execute($whereParams);
33
34    $results = $statement->fetchAll();
35
36    return $this->_populateCollection($results);
37 }
```

More Mapper

```
39 public function findOne($params = array())
40 {
41     $collection = $this->findAll($params);
42
43     if (count($collection) > 1) {
44         throw new Exception("More than one result found");
45     }
46
47     $returnOne = null;
48     if (!empty($collection)) {
49         $returnOne = array_shift($collection);
50     }
51
52     return $returnOne;
53 }
```

Mapper (populating / mapping)

```
70 protected function _populateCollection($results)
71 {
72     $return = array();
73
74     foreach ($results as $result) {
75         $return[] = $this->mapFromArray($result);
76     }
77
78     return $return;
79 }
80
81 public function mapFromArray($array, Model_User $user = null)
82 {
83     if (is_null($user)) $user = new Model_User();
84     if (isset($array['firstname'])) $user->firstname = $array['firstname'];
85     if (isset($array['lastname'])) $user->lastname = $array['lastname'];
86     if (isset($array['email'])) $user->email = $array['email'];
87     if (isset($array['id'])) $user->id = $array['id'];
88     if (isset($array['datecreated'])) $user->datecreated = $array['datecreated'];
89     return $user;
90 }
```

Data Model

```
php User.php x
1  <?php
2  Class Model_User
3  {
4      public $firstname;
5      public $lastname;
6      public $email;
7      public $id;
8      public $datecreated;
9
10     public function getFullName()
11     {
12         return trim($this->firstname . ' ' . $this->lastname);
13     }
14 }
```


Next Up...

Retrieval is done...

Let's look at persistence

Persistence Controller (1 of 2)

```
php persistence.php x
1  <?php
2  require 'app/autoloader.php';
3
4  $service = new Service_User();
5
6  // save new user
7  $inputFromUser = array('firstname'=>'aaron', 'lastname'=>'saray', 'email'=>'me@me.com');
8  try {
9      $user = $service->createFromUserInput($inputFromUser);
10     $service->save($user);
11 }
12 catch (Exception $e) {
13     print $e->getMessage();
14 }
```

Persistence Controller (2 of 2)

```
16 // save new user, invalid data
17 $inputFromUser = array('firstname'=>'aaron', 'lastname'=>'', 'email'=>'me@me.com');
18 try {
19     $user = $service->createFromUserInput($inputFromUser);
20     $service->save($user);
21 }
22 catch (Exception $e) {
23     // would go to exception, deal with it how you'd like
24     print $e->getMessage();
25 }
26
27 //update existing user with data
28 $user = $service->findOneById(1);
29 $inputFromUser = array('firstname'=>'Joe');
30 try {
31     $service->applyUpdateFromUserInput($user, $inputFromUser);
32     $service->save($user);
33 }
34 catch (Exception $e) {
35     print $e->getMessage();
36 }
```

Creating a User

```
php User.php x
\Service User
1  <?php
2  class Service_User
3  {
4      public function createFromUserInput($params = array())
5      {
6          $domainValidation = $this->_getDomainValidation();
7
8          if (!$domainValidation->validateFirstname($params)) {
9              throw new Exception("First name did not validate");
10         }
11         if (!$domainValidation->validateLastname($params)) {
12             throw new Exception("Last name did not validate");
13         }
14
15         $mapper = $this->_getMapper();
16         $user = $mapper->mapFromArray($params);
17
18         return $user;
19     }
20
21     // more code below
22
```

Creating User (con't)

```
58     protected function _getDomainValidation()
59     {
60         return new Domain_User();
61     }
62
63     public function save(Model_User $user)
64     {
65         $this->_getMapper()->save($user);
66         $this->_audit("User has been saved");
67     }
68
69     protected function _audit($text)
70     {
71         // can log text here
72     }
73
74     protected function _getMapper()
75     {
76         return new Mapper_Db_User();
77     }
```

Domain User Model

```
php User.php x
1  <?php
2  class Domain_User
3  {
4      public function validateFirstname($values)
5      {
6          return !empty($values['firstname']) && strlen($values['firstname']) < 25;
7      }
8
9      public function validateLastname($values)
10     {
11         return !empty($values['lastname']) && strlen($values['lastname']) < 45;
12     }
13 }
```

Mapper DB - Save

```
php User.php x
\Mapper Db User
1  <?php
2  class Mapper_Db_User
3  {
4      public function save(Model_User $user)
5      {
6          if ($user->id) {
7              $sql = "update user set firstname = ?, lastname = ?, email = ? where id = ?";
8              $params = array($user->firstname, $user->lastname, $user->email, $user->id);
9          }
10         else {
11             $sql = "insert into user (firstname, lastname, email) values (?, ?, ?)";
12             $params = array($user->firstname, $user->lastname, $user->email);
13         }
14
15         $statement = $this->_getDao()->prepare($sql);
16         $statement->execute($params);
17     }

```

Apply Update From User

```
41 public function applyUpdateFromUserInput(Model_User $user, $params = array())
42 {
43     $domainValidation = $this->_getDomainValidation();
44
45     if (isset($params['firstname']) && !$domainValidation->validateFirstname($params)) {
46         throw new Exception("First name did not validate");
47     }
48     if (isset($params['lastname']) && !$domainValidation->validateLastname($params)) {
49         throw new Exception("Last name did not validate");
50     }
51
52     $mapper = $this->_getMapper();
53     $user = $mapper->mapFromArray($params, $user);
54
55     return $user;
56 }
```


Persistence Done

Yay

Now - let's introduce the value!

Users must be sync'd to AS400

- Previously was from mysql db
- Need to change as little code as possible
- The only thing changing is how we map data
 - to / from the data source
 - "map"... mapper
- Lets substitute in a different mapper

Modify User Service

```
64     protected function _getMapper()  
65     {  
66         //return new Mapper_Db_User();  
67         return new Mapper_As400_User();  
68     }
```

This is the **ONLY** change to your code.

All else is **NEW** code.

What does this mapper look like?

```
php User.php x
\Mapper As400 User
1 <?php
2 class Mapper_As400_User
3 {
4     protected static $pdo = null;
5
6     public function findAll($params = array())
7     {
8         $in = array();
9
10        $id = isset($params['id']) ? $params['id'] : 0;
11        $in['id'] = str_pad($id, 10, '0', STR_PAD_LEFT);
12
13        $firstname = isset($params['firstname']) ? $params['firstname'] : '';
14        $in['firstname'] = $firstname;
15
16        if (isset($params['createdBefore'])) {
17            $createdBefore = date('Ymd', strtotime($params['createdBefore']));
18        }
19        else {
20            $createdBefore = '00000000';
21        }
22        $in['createdBefore'] = $createdBefore;
23
24        $out = array(
25            'id'=>'',
26            'firstname'=>'',
27            'lastname'=>'',
28            'email'=>'',
29            'id'=>'',
30            'datecreated'=>''
31        );

```

AS400 Mapper Continued

```
33     $query = "CALL MYLIB.GETUSER(?, ?, ?, ?, ?, ?, ?, ?, ?)";
34     $stmt = $this->_getDao()->prepare($query);
35     $stmt->bindParam(1, $in['id']);
36     $stmt->bindParam(2, $in['firstname']);
37     $stmt->bindParam(3, $in['createdBefore']);
38     $stmt->bindParam(4, $out['id'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
39     $stmt->bindParam(5, $out['firstname'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
40     $stmt->bindParam(6, $out['lastname'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
41     $stmt->bindParam(7, $out['email'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
42     $stmt->bindParam(8, $out['id'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
43     $stmt->bindParam(9, $out['datecreated'], PDO::PARAM_STR|PDO::PARAM_INPUT_OUTPUT);
44
45     $results = array();
46
47     do {
48         $stmt->execute();
49         $results[] = $out;
50     } while ($stmt->nextRowset());
51
52     return $this->_populateCollection($results);
53 }
54
55 public function findOne($params = array())
56 {
57     $collection = $this->findAll($params);
58
59     if (count($collection) > 1) {
60         throw new Exception("More than one result found");
61     }
62
63     $returnOne = null;
64     if (!empty($collection)) {
65         $returnOne = array_shift($collection);
66     }
67
68     return $returnOne;
69 }
```

AS400 Mapper Continued

```
71 public function mapFromArray($array, Model_User $user = null)
72 {
73     if (is_null($user)) $user = new Model_User();
74     $user->firstname = trim($array['firstname']);
75     $user->lastname = trim($array['lastname']);
76     $user->email = trim($array['email']);
77     $user->id = intval($array['id']);
78     $user->datecreated = date('Y-m-d', strtotime($array['datecreated']));
79     $return[] = $user;
80
81     return $user;
82 }
```

AS400 Mapper Continued

```
84     protected function _populateCollection($results)
85     {
86         $return = array();
87
88         foreach ($results as $result) {
89             $return[] = $this->mapFromArray($result);
90         }
91
92         return $return;
93     }
94
95     protected function _getDao()
96     {
97         if (self::$pdo == null) {
98             self::$pdo = new PDO('odbc:iSeriesDSN', 'MYUSER', 'MYPASS');
99         }
100        return self::$pdo;
101    }
102 }
```

Whew! Done!

Check it out at

<http://aaronsaray.com/midwestphp>

Tweet at @aaronsaray