Community Experience Distilled

# Magento PHP Developer's Guide

## *Second Edition*

Get up and running with the highly customizable and powerful e-commerce solution, Magento

**Allan MacGregor**

[PACKT] PUBLISHING open source* community experience distilled

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BIRMINGHAM - MUMBAI

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**Allan MacGregor** is a Magento Certified Developer Plus with 4 years of Magento experience. He also has a certification in Linux System Administration from IBM. He started working with Magento as a freelancer, looking for a better framework to build e-commerce solutions with, and he is now the Magento lead developer at Demac Media (`http://www.demacmedia.com`). At Demac Media, he has participated in building core solutions for a wide range of clients; this has given him the experience and knowledge to solve many Magento challenges. As part of an internal project at Demac Media, he worked on Triplecheck.io (`http://triplecheck.io/`), a unique service to monitor and audit the code health of a Magento store. He's very passionate about software development in general. He is constantly working with new technologies and frameworks. You can also follow him on Twitter at `http://www.twitter.com/allanmacgregor`.

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**Bartosz Górski** is a Magento developer with four Magento certifications (Developer, Developer Plus, Front End Developer, and Solution Specialist). He's been working in the web development/programming field for over 7 years and has over 3 years of experience in developing solely on the Magento eCommerce platform.

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When he's not at work, he's probably playing pool somewhere or sitting in his office, browsing camera lenses on eBay and complaining how little time he actually has to take some photos himself.

---

I'd like to thank my wife for her love and support.

---

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---

I would like to dedicate this to my amazing girlfriend for her continuous support.

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# Preface

This book will help new and not-so-new developers understand and work with the Magento fundamental concepts and standard practices in order to develop and test Magento code.

This book is my attempt at writing a book that answers questions that many developers, including myself, had when we started to develop for Magento, for example, what is EAV? How does the ORM in Magento work? What are observers and events? What were the design patterns used to create Magento?

More importantly, it will also answer questions that many developers still have, for example, what is the standard to develop modules and extend the frontend and backend? How can I properly test my code? What is the best method to deploy and distribute custom modules?

## What this book covers

*Chapter 1*, *Magento Fundamentals for Developers*, discusses Magento's fundamental concepts, such as the system architecture and the MVC implementation and its relation with the Zend Framework. All the concepts in this chapter will set the foundation for developers starting with Magento.

*Chapter 2*, *ORM and Data Collections*, introduces you to the Magento ORM system. It explains how collections and models are the bread and butter of everyday Magento development. We will learn how to properly work with data collections and the EAV system.

*Chapter 3*, *Frontend Development*, discusses the practical use of the skills and knowledge we have acquired so far, and we'll build a fully functional Magento module step by step. The custom module will allow readers to apply a variety of important concepts, such as working with collections, routing, sessions, and caching.

*Chapter 4*, *Backend Development*, extends on what we built in the previous chapter—that is, the frontend part of our module—and create an interface in the Magento backend for interaction with our application data. We will learn about extending the backend and the adminhtml theme, setting data sources, and controlling our extension behavior through configuration.

*Chapter 5*, *The Magento API*, discusses the Magento API and how we can extend it to provide access to the custom data that we captured using our extension.

*Chapter 6*, *Testing and Quality Assurance*, teaches us the critical skills required to test our custom Magento modules; this is an integral part of development. We will learn about the different types of tests and the tools available for each particular type of test.

*Chapter 7*, *Deployment and Distribution*, discusses the multiple tools available in order to deploy our code to a production environment, and we will also learn how to properly pack our extensions for distribution through channels such as Magento Connect.

*Appendix A*, *Hello Magento!*, gives new developers a quick and easy-to-follow introduction to create our first Magento extension.

*Appendix B*, *Understanding and Setting Up Our Development Environment*, discusses steps to set up a complete environment for Magento development with MySQL and Apache. Additionally, we will go over the tools available to facilitate the development, several IDEs, and version control systems.

# What you need for this book

You will need an installation of Magento 1.7, either on a local machine or on a remote server, your favorite code editor, and permissions to install and modify files.

# Who this book is for

If you are a PHP developer getting started with Magento or if you already have some experience with Magento and want to understand the Magento architecture and how to extend the frontend and backend of Magento, then this is the book for you.

You are expected to be confident with PHP5. No experience with Magento development is expected, although you should be familiar with basic Magento operations and concepts.

# Conventions

In this book, you will find a number of styles of text that distinguish between different kinds of information. Here are some examples of these styles, and an explanation of their meaning.

Code words in text, database table names, folder names, filenames, file extensions, pathnames, dummy URLs, user input, and Twitter handles are shown as follows: "The `autoload` class takes a single parameter called `$class`, which is an alias provided by the factory method."

A block of code is set as follows:

```
Mage::register('original_include_path', get_include_path());
if (defined('COMPILER_INCLUDE_PATH')) {
    $appPath = COMPILER_INCLUDE_PATH;
    set_include_path($appPath . PS .
    Mage::registry('original_include_path'));
    include_once "Mage_Core_functions.php";
    include_once "Varien_Autoload.php";
```

Any command-line input or output is written as follows:

```
$ n98-magerun.php dev:console
```

**New terms** and **important words** are shown in bold. Words that you see on the screen, in menus or dialog boxes for example, appear in the text like this: "Click on the **Submit** button."

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# 1
# Magento Fundamentals for Developers

In this chapter, we will cover the fundamental concepts of working with Magento. We will learn how Magento is structured, and go over the source of Magento's flexibility, that is, its modular architecture.

Magento is a flexible and powerful system. Unfortunately, this adds some level of complexity as well. Currently, a clean installation of Magento has around 20,000 files and over 1.2 million lines of code.

With all that power and complexity, Magento can be daunting for new developers; but don't worry. This chapter is designed to give new developers all the fundamental concepts and tools they need to use and extend Magento, and in the next chapter, we will dive deep into Magento models and data collection.

## Zend Framework – the base of Magento

As you probably know, Magento is the most powerful e-commerce platform in the market. What you might not know about Magento is that it is also an object-oriented (OO) PHP framework developed on top of **Zend Framework**.

Zend Framework 2 has been available since 2013, but Magento still relies on Zend Framework 1.11.

Here's how Zend's official site describes the framework:

> *"We designed Zend Framework with simplicity in mind. To provide a lightweight, loosely-coupled component library simplified to provide 4/5s of the functionality everyone needs and that lets you customize the other 20% to meet your specific business needs. By focusing on the most commonly needed functionality, we retain the simplified spirit of PHP programming, while dramatically lower the learning curve – and your training costs – so developers get up-to-speed quickly."*
>
> - `http://files.zend.com/help/Zend-Server-5/zend_framework.htm`

What exactly is Zend Framework? Zend Framework is an OO framework developed on PHP that implements the **Model-View-Controller** (MVC) paradigm. When **Varien** (now Magento Inc.) started developing Magento, they decided to do it on top of Zend because of some components, some of which are as follows:

- `Zend_Cache`
- `Zend_Acl`
- `Zend_Locale`
- `Zend_DB`
- `Zend_Pdf`
- `Zend_Currency`
- `Zend_Date`
- `Zend_Soap`
- `Zend_Http`

In total, Magento uses around 15 different Zend components. The Varien library extends several of the Zend components mentioned before directly. For example, `Varien_Cache_Core` extends from `Zend_Cache_Core`.

Using Zend Framework, Magento was built with the following principles in mind:

- **Maintainable**: By using code pools to keep the core code separate from local customizations and third-party modules
- **Upgradable**: Magento modularity allows extensions and third-party modules to be updated independently from the rest of the system
- **Flexible**: Allows seamless customization and simplifies the development of new features

Although experience of using Zend Framework or even understanding it are not requirements to develop Magento, having at least some basic understanding of the Zend components, usage, and interaction can be invaluable information as we start digging deeper into the core of Magento.

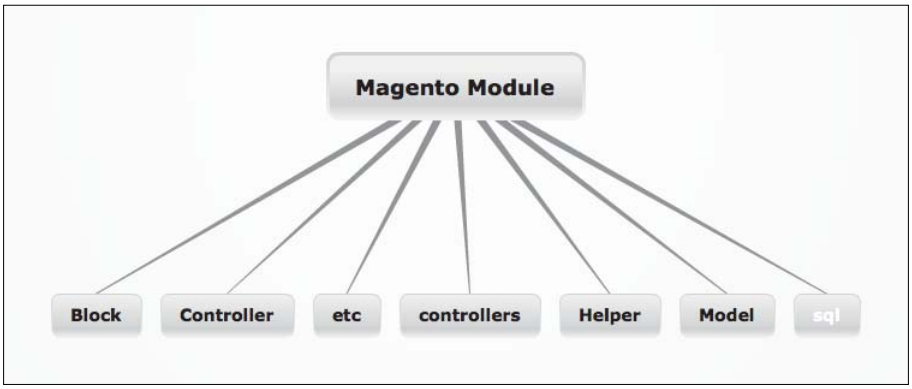
You can learn more about Zend Framework at `http://framework.zend.com/`.

# The Magento folder structure

The Magento folder structure is slightly different from other MVC applications. Let's take a look at the directory tree, and each directory and its functions:

- `app`: This folder is the core of Magento and is subdivided into three important directories:
    - `code`: This contains all our application code divided into three code pools, namely core, community, and local
    - `design`: This contains all the templates and layouts for our application
    - `locale`: This contains all the translation and e-mail template files used for the store
- `js`: This contains all the JavaScript libraries that are used in Magento
- `media`: This contains all the images and media files for our products and CMS pages, as well the product image cache
- `lib`: This contains all the third-party libraries used in Magento (such as Zend and PEAR) as well as the custom libraries developed by Magento, which reside under the `Varien` and `Mage` directories
- `skin`: This contains all CSS, images and JavaScript used by the corresponding theme
- `var`: This contains our temporary data, such as the cache file, index lock files, sessions, import/export files, and in the case of the Enterprise edition, the full page cache folders

Magento is a modular system. This means the application, including the core, is divided into smaller modules. For this reason, the folder structure plays a key role in the organization of each module. A typical Magento module folder structure would look something like this:




Let's review each folder further:

- `Block`: In Magento, blocks form an additional layer of logic between the controllers and views
- `controllers`: These are formed by actions that process webserver requests
- `Controller`: Classes in this folder can be abstract classes and they can be extended by the `controller` class under the `controllers` folder
- `etc`: In this we can find the module-specific configuration in the form of XML files such as `config.xml` and `system.xml`
- `Helper`: This contains auxiliary classes that encapsulate a common module functionality and make them available to a class of the same module and to other modules classes as well
- `Model`: This contains models that support the controllers in the module to interact with data
- `sql`: These contain the installation and upgrade files for each specific module
- `data`: This folder was introduced in Magento 1.6 CE and it is used in a manner similar to SQL scripts, but data scripts are only concerned about inserting data

As we will see later in this chapter, Magento makes heavy use of factory names and factory methods. This is why the folder structure is so important.

# Modular architecture

Rather than being a large application, Magento is built by smaller modules, each adding specific functionality to Magento.

One of the advantages of this approach is the ability to enable and disable specific module functionality with ease as well as adding new functionality by adding new modules.

# Autoloader

Magento is a huge framework composed by close to 20,000 files. Requiring every single file when the application starts would make it incredibly slow and resource intensive. Hence, Magento makes use of an autoloader class to require the files each time a factory method is called.

So what exactly is an autoloader? PHP5 includes a function called `__autoload()`. When instantiating a class, the `__autoload()` function is automatically called. Inside this function, the custom logic is defined to parse the class name and require the file.

Let's take a closer look at the Magento Bootstrap code located in `app/Mage.php`:

```
…
Mage::register('original_include_path', get_include_path());
if (defined('COMPILER_INCLUDE_PATH')) {
    $appPath = COMPILER_INCLUDE_PATH;
    set_include_path($appPath . PS .
    Mage::registry('original_include_path'));
    include_once "Mage_Core_functions.php";
    include_once "Varien_Autoload.php";
} else {
    /**
     * Set include path
     */
    $paths[] = BP . DS . 'app' . DS . 'code' . DS . 'local';
    $paths[] = BP . DS . 'app' . DS . 'code' . DS . 'community';
    $paths[] = BP . DS . 'app' . DS . 'code' . DS . 'core';
    $paths[] = BP . DS . 'lib';

    $appPath = implode(PS, $paths);
    set_include_path($appPath . PS .
    Mage::registry('original_include_path'));
    include_once "Mage/Core/functions.php";
    include_once "Varien/Autoload.php";
}

Varien_Autoload::register();
```

The Bootstrap file takes care of defining the include paths and initializing the Varien autoloader, which will in turn define its own autoload function as the default function to call. Let's take a look under the hood and see what the Varien's autoload function is doing:

```
/**
 * Load class source code
 *
 * @param string $class
 */
public function autoload($class)
{
    if ($this->_collectClasses) {
        $this->_arrLoadedClasses[self::$_scope][] = $class;
    }
    if ($this->_isIncludePathDefined) {
        $classFile =  COMPILER_INCLUDE_PATH .
        DIRECTORY_SEPARATOR . $class;
    } else {
        $classFile = str_replace(' ', DIRECTORY_SEPARATOR,
        ucwords(str_replace('_', ' ', $class)));
    }
    $classFile.= '.php';
    //echo $classFile;die();
    return include $classFile;
}
```

The `autoload` class takes a single parameter called `$class`, which is an alias provided by the factory method. This alias is processed to generate a matching class name that is then included.

As we mentioned before, Magento's directory structure is important due to the fact that Magento derives its class names from the directory structure. This convention is the core principle behind factory methods, which we will be reviewing later in this chapter.

# Code pools

As mentioned before, inside our `app/code` folder, we have our application code divided into the following three different directories known as code pools:

- `core`: This is where the Magento Core modules that provide the base functionality reside. The golden rule among Magento developers is that you should never, under any circumstance, modify any files under the core code pool.

- `community`: This is the location where third-party modules are placed. They are either provided by third parties or installed through Magento Connect.
- `local`: This is where all the modules and code developed specifically for this instance of Magento reside.

The code pools identify where the module came from and in which order they should be loaded. If we take another look at the `Mage.php` Bootstrap file, we can see the order in which code pools are loaded:

```
$paths[] = BP . DS . 'app' . DS . 'code' . DS . 'local';
$paths[] = BP . DS . 'app' . DS . 'code' . DS . 'community';
$paths[] = BP . DS . 'app' . DS . 'code' . DS . 'core';
$paths[] = BP . DS . 'lib';
```

This means, for each class request, Magento will look in the `local` folder, then in the community and `core` folders, and finally inside the `lib` folder.

This also produces an interesting behavior that can easily be used to override core and community classes by just copying the directory structure and matching the class name.

Needless to say, this is a terrible practice, but it is still useful to know about, just in case someday you have to take care of a project that exploits this behavior.

# Routing and request flow

Before going into more detail about the different components that form a part of Magento, it is important that we understand how these components interact together and how Magento processes requests coming from the web server.

As with any other PHP application, we have a single file as an entry point for every request. In the case of Magento, this file is `index.php`, which is in charge of loading the `Mage.php` Bootstrap class and starting the request cycle.

1. The web server receives the request and Magento is instantiated by calling the Bootstrap file `Mage.php`.
2. The frontend controller is instantiated and initialized. During this controller initialization, Magento searches for the web routes and instantiates them.
3. Magento then iterates through each of the routers and calls the match. The match method is responsible for processing the URL and generating the corresponding controller and action.
4. Instantiates the matching controller and corresponding action.

Routers are especially important in this process. Router objects are used by the frontend controller to match a requested URL (route) to a module controller and action. By default, Magento comes with the following routers:

- `Mage_Core_Controller_Varien_Router_Admin`
- `Mage_Core_Controller_Varien_Router_Standard`
- `Mage_Core_Controller_Varien_Router_Cms`
- `Mage_Core_Controller_Varien_Router_Default`

The action controller will then load and render the layout, which in turn will load the corresponding blocks, models, and templates.

Let's analyze how Magento will handle a request to a category page. We will use `http://localhost/catalog/category/view/id/10` as an example. The Magento URI comprises three parts, namely `FrontName/ControllerName/ActionName`.

Hence, for our example URL, the breakdown is as follows:

- `FrontName`: This is a catalog
- `ControllerName`: This is a category
- `ActionName`: This is a view

Let's take a look at the Magento router class `Mage_Core_Controller_Varien_Router_Standard` match function:

```
public function match(Zend_Controller_Request_Http $request)
{
  …
   $path = trim($request->getPathInfo(), '/');
            if ($path) {
                $p = explode('/', $path);
            } else {
                $p = explode('/', $this->_getDefaultPath());
            }
  …
}
```

From the previous code, we can see that the first thing the router tries to do is parse the URI into an array. Based on our example URL, the corresponding array will be similar to the following code:

```
$p = Array
(
    [0] => catalog
    [1] => category
    [2] => view
)
```

The next part of the function will first try to check if the request has the module name specified. If not, then it tries to determine the module name, based on the first element of our array. If a module name can't be provided, then the function will return false. Let's take a look at this part of the code:

```
// get module name
  if ($request->getModuleName()) {
      $module = $request->getModuleName();
  } else {
      if (!empty($p[0])) {
          $module = $p[0];
      } else {
          $module = $this->getFront()->getDefault('module');
          $request->setAlias(Mage_Core_Model_Url_Rewrite
          ::REWRITE_REQUEST_PATH_ALIAS, '');
      }
  }
  if (!$module) {
      if (Mage::app()->getStore()->isAdmin()) {
          $module = 'admin';
      } else {
          return false;
      }
  }
```

Next, the `match` function will iterate through each of the available modules and try to match the controller and action using the following code:

```
…
        foreach ($modules as $realModule) {
            $request->setRouteName(
            $this->getRouteByFrontName($module));
```

```
// get controller name
if ($request->getControllerName()) {
    $controller = $request->getControllerName();
} else {
    if (!empty($p[1])) {
        $controller = $p[1];
    } else {
        $controller =
        $front->getDefault('controller');
        $request->setAlias(
            Mage_Core_Model_Url_Rewrite
            ::REWRITE_REQUEST_PATH_ALIAS,
            ltrim($request->getOriginalPathInfo(),
            '/')
        );
    }
}

// get action name
if (empty($action)) {
    if ($request->getActionName()) {
        $action = $request->getActionName();
    } else {
        $action = !empty($p[2]) ? $p[2]
        : $front->getDefault('action');
    }
}

//checking if this place should be secure
$this->_checkShouldBeSecure($request,
'/'.$module.'/'.$controller.'/'.$action);

$controllerClassName =
$this->_validateControllerClassName($realModule,
$controller);
if (!$controllerClassName) {
    continue;
}
```

```
                // instantiate controller class
                $controllerInstance = Mage
                ::getControllerInstance($controllerClassName,
                $request, $front->getResponse());

                if (!$controllerInstance->hasAction($action)) {
                    continue;
                }

                $found = true;
                break;
            }
    ...
```

Now that looks like an awful lot of code! Let's break it down further. The first part of the loop will check if the request has a controller name. If it is not set, it will check our parameter array's (`$p`) second value and try to determine the controller name. Then, it will try to do the same for the action name.

If we get this far in the loop, we should have a module name, a controller name, and an action name. Magento will now use these to try and get matched with the Controller class name by calling the following code:

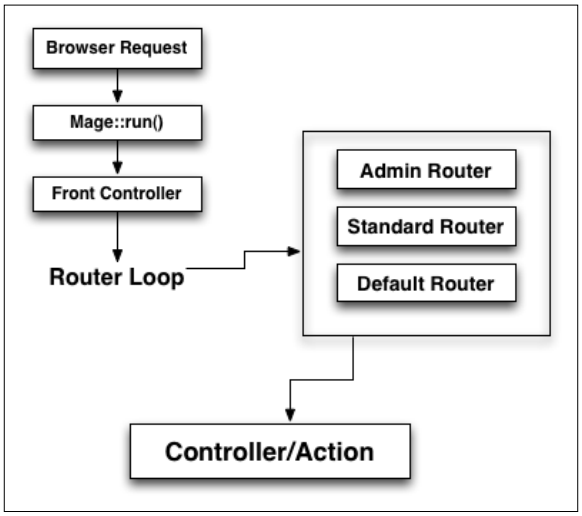
```
$controllerClassName =
$this->_validateControllerClassName($realModule, $controller);
```

This function will not only generate a matching class name, but it will also validate its existence. In our example case, this function should return `Mage_Catalog_CategoryController`.

As we now have a valid class name, we can proceed to instantiate our controller object. You may probably notice that so far we haven't done anything with our action yet, and that's precisely the next step on our loop.

Now, our instantiated controller comes with a very handy function called `hasAction()`. In essence, all this function does is call a PHP function called `is_callable()`, which will check if our current controller has a public function matching the action name. In our case this will be `viewAction()`.

The reason behind this elaborate matching process and the use of a `foreach` loop is that it is possible for several modules to use the same `frontName`:




Now, `http://localhost/catalog/category/view/id/10` is not a very user-friendly URL. Fortunately, Magento has its own URL rewrite system that allows us to use `http://localhost/books.html`.

Let's dig a little deeper into the URL rewrite system and see how Magento gets the controller and action names from our URL alias. Inside our `Varien/Front.php` controller dispatch function, Magento will call the following action:

```
Mage::getModel('core/url_rewrite')->rewrite();
```

Before actually looking into the inner working of the rewrite function, let's take a look at the structure of the `core/url_rewrite` model:

```
Array (
  ["url_rewrite_id"] => "10"
  ["store_id"]       => "1"
  ["category_id"]    => "10"
  ["product_id"]     => NULL
  ["id_path"]        => "category/10"
  ["request_path"]   => "books.html"
  ["target_path"]    => "catalog/category/view/id/10"
  ["is_system"]      => "1"
  ["options"]        => NULL
  ["description"]    => NULL
)
```

As we can see, the rewrite module comprises several properties, but only two of them are of particular interest to us, namely `request_path` and `target_path`. Simply put, the job of the rewrite module is to modify the request object path information with the matching values of `target_path`.

# The Magento version of MVC

If you are familiar with traditional MVC implementations such as CakePHP or Symfony, you may know that the most common implementation is called a convention-based MVC. With a convention-based MVC to add a new Model, or let's say a Controller, you only need to create the file/class (following the framework conventions); the system will pick it up automatically.

Magento on the other hand uses a configuration-based MVC pattern, which means creating our file/class is not enough; we have to tell Magento explicitly that we have added a new class using configuration files written in XML.

Each Magento module has a `config.xml` file that is located under the module's `etc/` directory and contains all the relevant module configurations. For example, if we want to add a new module that includes a new model, we need to define a node in the configuration file that tells Magento where to find our model. Here's an example:

```
<global>
…
<models>
     <group_classname>
          <class>Namespace_Modulename_Model</class>
     <group_classname>
</models>
...
</global>
```

Although this might look like additional work, it also gives us a huge amount of flexibility and power. For example, we can rewrite another class by using the rewrite node:

```
<global>
…
<models>
     <modulenamemodulename>
      <rewrite>
             <groupgroup_classname>Namespace_Modulename_Model
             </groupgroup_classname>
```

```
        </rewrite>
       <//modulename>
</models>
...
</global>
```

Magento will then load all the `config.xml` files and merge them at runtime, creating a single configuration tree.

Additionally, modules can also have a `system.xml` file that is used to specify configuration options in the Magento backend, which end users can in turn use to configure the module functionality. A snippet of a `system.xml` file will look like this:

```
<config>
  <sections>
    <section_name translate="label">
      <label>Section Description</label>
      <tab>general</tab>
      <frontend_type>text</frontend_type>
      <sort_order>1000</sort_order>
      <show_in_default>1</show_in_default>
      <show_in_website>1</show_in_website>
      <show_in_store>1</show_in_store>
      <groups>
       <group_name translate="label">
         <label>Demo Of Config Fields</label>
         <frontend_type>text</frontend_type>
         <sort_order>1</sort_order>
         <show_in_default>1</show_in_default>
         <show_in_website>1</show_in_website>
         <show_in_store>1</show_in_store>
   <fields>
          <field_name translate="label comment">
             <label>Enabled</label>
             <comment>
               <![CDATA[Comments can contain
               <strong>HTML</strong>]]>
             </comment>
             <frontend_type>select</frontend_type>
             <source_model>adminhtml/
             system_config_source_yesno</source_model>
             <sort_order>10</sort_order>
             <show_in_default>1</show_in_default>
             <show_in_website>1</show_in_website>
             <show_in_store>1</show_in_store>
```

```
            </field_name>
          </fields>
        </group_name>
      </groups>
    </section_name>
  </sections>
</config>
```

Let's break down each node function:

- `section_name`: This is just an arbitrary name that we use to identify our configuration section. Inside this node, we will specify all the fields and groups for the configuration section.
- `group`: Groups, as the name implies, are used to group configuration options and display them inside an accordion section.
- `label`: This defines the title or label to be used on the field/section/group.
- `tab`: This defines the tab on which the section should be displayed.
- `frontend_type`: This node allows us to specify which renderer to use for our custom option field. Some of the available options are as follows:
    - Button
    - Checkboxes
    - Checkbox
    - Date
    - File
    - Hidden
    - Image
    - Label
    - Link
    - Multiline
    - Multiselect
    - Password
    - Radio
    - Radios
    - Select
    - Submit
    - Textarea
    - Text
    - Time

- `sort_order`: This specifies the position of the field, group, or section.
- `source_model`: Certain type of fields, such as a select field, can take options from a source model. Magento already provides several useful classes under `Mage/Adminhtml/Model/System/Config/Source`. Some of the classes we can find are as follows:
    - `YesNo`
    - `Country`
    - `Currency`
    - `AllRegions`
    - `Category`
    - `Language`

Just by using XML, we can build complex configuration options for our modules right on the Magento backend without having to worry about setting up templates, populating fields, or validating data.

Magento is also kind enough to provide a comprehensive amount of form field validation models that we can use with the `<validate>` tag. Among the field validators we have the following options:

- `validate-email`
- `validate-length`
- `validate-url`
- `validate-select`
- `validate-password`

As with any other part of Magento, we can extend `source_models`, `frontend_types`, and validators, and even create new ones. We will be tackling this task in a later chapter, where we will create a new type of each. For now, we will explore the concepts of models, views, file layouts, and controllers.

# Models

Magento makes use of the ORM approach, although we can still use `Zend_Db` to access the database directly. We will be using models to access our data most of the time. For this type of task, Magento provides the following two types of models:

- **Simple models**: These model implementations are a simple mapping of one object to one table, meaning our object attributes match each field and our table structure

- **Entity Attribute Value (EAV) models**: These type of models are used to describe entities with a dynamic number of attributes

Magento splits the model layer in two parts: a model handling the business logic and a resource handling the database interaction. This design decision allows Magento to support multiple database platforms without having to change any of the logic inside the models.

Magento ORM uses one of PHP's magic class methods to provide dynamic access to object properties. In the next chapter, we will look into models, the Magento ORM, and the data collections in more detail.

Magento models don't necessarily have to be related to any type table in the database or an EAV entity. Observers, which we will be reviewing later, are perfect examples of these type of Magento models.

# Views

The view layer is one of the areas where Magento truly sets itself apart from other MVC applications. Unlike traditional MVC systems, Magento's view layer is divided into three different components:

- **Layouts**: These are XML files that define block structures and properties, such as name and which template file to use. Each Magento module has its own set of layout files.
- **Blocks**: These are used in Magento to reduce the burden on the controller by moving most of the logic into blocks.
- **Templates**: These are PHTML files that contain the HTML code and PHP tags required.

Layouts give the Magento frontend an amazing amount of flexibility. Each module has its own layout XML files that tell Magento what to include and render on each page request. By using the layouts, we can move, add, or remove blocks from our store, without worrying about changing anything else other than our XML files.

# Dissecting a layout file

Let's examine one of the Magento core layout files, in this case, the `catalog.xml` file:

```
<layout version="0.1.0">
<default>
    <reference name="left">
```

```
            <block type="core/template" name="left.
            permanent.callout" template="callouts/left_col.phtml">
                <action method="setImgSrc"><src>images/media/
                col_left_callout.jpg</src></action>
                <action method="setImgAlt" translate="alt" module=
                "catalog"><alt>Our customer service is available 24/7.
                Call us at (555) 555-0123.</alt></action>
                <action method="setLinkUrl"><url>checkout/cart
                </url></action>
            </block>
        </reference>
        <reference name="right">
            <block type="catalog/product_compare_sidebar"
            before="cart_sidebar" name="catalog.compare.sidebar"
            template="catalog/product/compare/sidebar.phtml"/>
            <block type="core/template" name="
            right.permanent.callout" template=
            "callouts/right_col.phtml">
                <action method="setImgSrc"><src>images/media/
                col_right_callout.jpg</src></action>
                <action method="setImgAlt" translate="alt"
                module="catalog"><alt>Visit our site and save A
                LOT!</alt></action>
            </block>
        </reference>
        <reference name="footer_links">
            <action method="addLink" translate="label title"
            module="catalog" ifconfig="catalog/seo/site_map">
            <label>Site Map</label><url
            helper="catalog/map/getCategoryUrl"
            /><title>Site Map</title></action>
        </reference>
        <block type="catalog/product_price_template"
        name="catalog_product_price_template" />
    </default>
```

Layout blocks comprise three main XML nodes:

- **Handle**: Each page request will have several unique handles. The layout uses these handles to tell Magento which blocks to load and render on a per page basis. The most commonly used handles are the default handle and the `[frontname]_[controller]_[action]` handle.
- The default handle is especially useful to set global blocks, for example, adding CSS or JavaScript to all pages on the header block.

- **Reference**: A `<reference>` node is use to make references to a block. It is useful for the specification of nested blocks or modifying an already existing block. In our example, we can see how a new child blocks being specified inside `<reference name="left">`.
- **Block**: The `<block>` node is used to load our actual blocks. Each block node can have the following properties:
    - `type`: This is the identifier for the actual block class. For example, `catalog/product_list` makes reference to the `Mage_Catalog_Block_Product_List`.
    - `name`: This is the name used by other blocks to make a reference to this block.
    - `before/after`: These properties can be used to position the blocks relative to other block position. Both properties can use a hyphen as value to specify if the module should appear at the very top or the very bottom.
    - `template`: This property determines the `.phtml` template file that will be used to render the block.
    - `action`: Each block type has specific actions that affect the frontend functionality. For instance, the `page/html_head` block has actions to add CSS and `js` (`addJs` and `addCss`).
    - `as`: This used to specify the unique identifier that we will be using to call the block from the template. For example, calling a child block by using `getChildHtml('block_name')`.

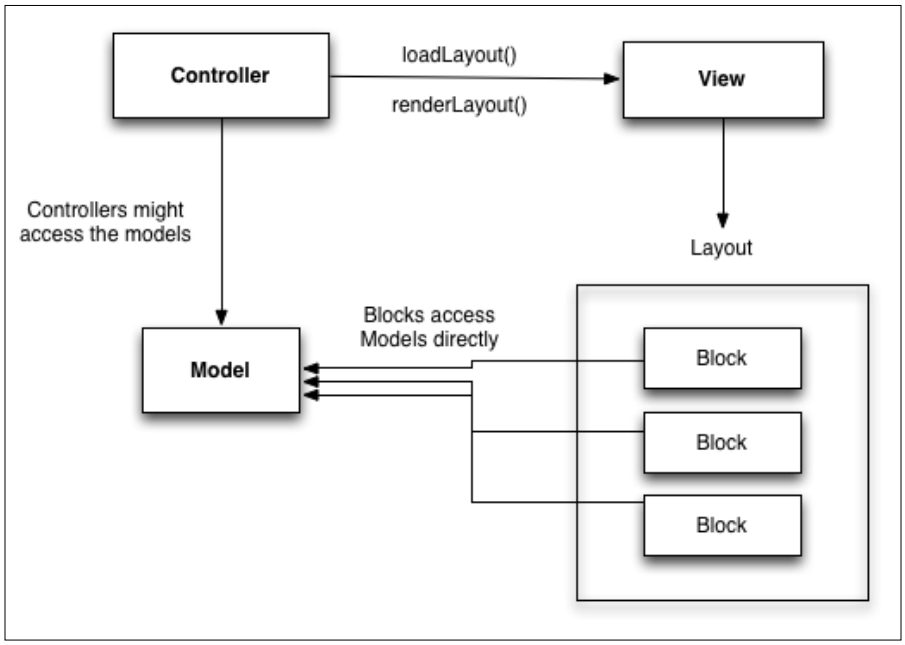
Blocks are a new concept that Magento implements in order to reduce the controller load. They are basically data resources that communicate directly with the models that manipulate the data if needed and then pass it to the views.

Finally, we have our `.phtml` files. Templates contain HTML and PHP tags and are in charge of formatting and displaying the data from our models. Let's take a look at a snippet from the product view template:

```
<div class="product-view">
...
    <div class="product-name">
        <h1><?php echo $_helper->productAttribute($_product, $_
product->getName(), 'name') ?></h1>
    </div>
...
```

```
    <?php echo $this->getReviewsSummaryHtml($_product, false, true)?>
    <?php echo $this->getChildHtml('alert_urls') ?>
    <?php echo $this->getChildHtml('product_type_data') ?>
    <?php echo $this->getTierPriceHtml() ?>
    <?php echo $this->getChildHtml('extrahint') ?>
...

    <?php if ($_product->getShortDescription()):?>
        <div class="short-description">
            <h2><?php echo $this->__('Quick Overview') ?></h2>
            <div class="std"><?php echo $_helper->productAttribute($_
product, nl2br($_product->getShortDescription()), 'short_description')
?></div>
        </div>
    <?php endif;?>
...
</div>
```

The following is a diagram displaying the MVC model:



# Controllers

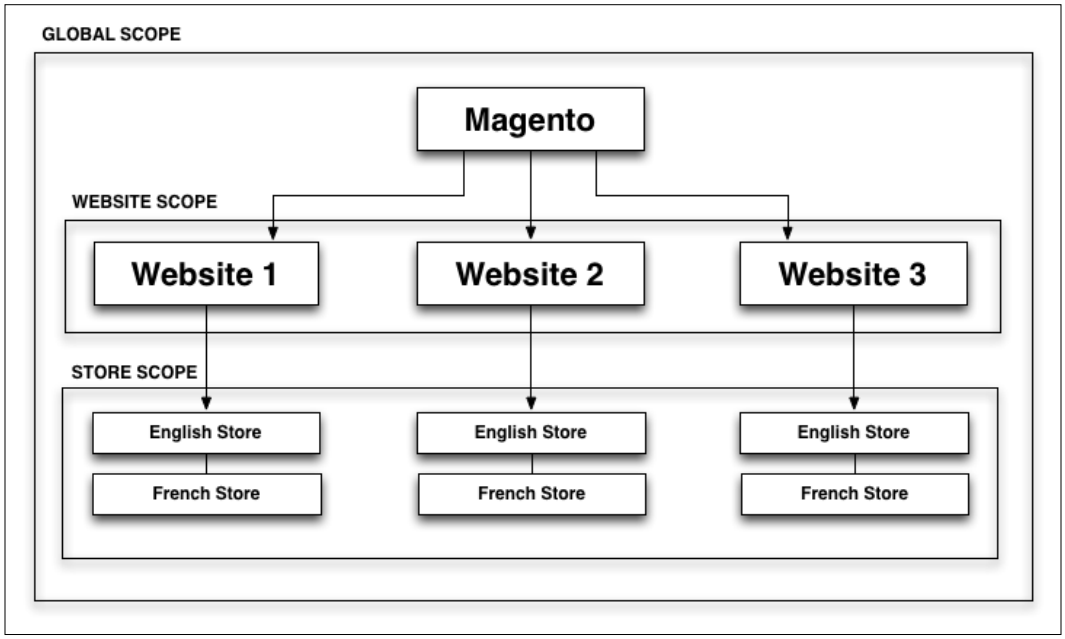
The Magento MVC controllers are designed to be thin controllers. Thin controllers have little business logic and are mostly used to drive the application requests. A basic Magento controller action will just load and render the layout:

```
public function viewAction()
{
    $this->loadLayout();
    $this->renderLayout();
}
```

From here, it is the job of the blocks to handle the *display logic* to get the data from our models, prepare the data, and send it to the views.

# Websites and store scopes

One of Magento's core features is the ability to handle multiple websites and stores with a single Magento installation. Internally, Magento refers to each of these instances as scopes.



Values for certain elements such as products, categories, attributes, and configuration are scope-specific and can differ on different scopes. This gives Magento tremendous flexibility. For example, a product can be set up on two different websites with different prices but still share the rest of the attribute configuration.

As developers, one of the areas where we will be using scopes the most is when working with configuration. The different configuration scopes available in Magento are as follows:

- **Global**: As the name implies, this applies across all scopes.
- **Website**: These are defined by a domain name and are composed by one or more stores. Websites can be set up to share customer data or be completely isolated.
- **Store**: These are used to manage products and categories and to group store views. Stores also have a root category that allows us to have separated catalogs per store.
- **Store view**: By using store views, we can set up multiple languages on our store frontend.

Configuration options in Magento can store values on three scopes (global, website, and store views). By default, all the values are set on the global scope. Using `system.xml` on our modules, we can specify the scopes on which the configuration options can be set. Let's revisit our previous `system.xml` file:

```
…
<field_name translate="label comment">
    <label>Enabled</label>
    <comment>
         <![CDATA[Comments can contain <strong>HTML</strong>]]>
     </comment>
     <frontend_type>select</frontend_type>
     <source_model>adminhtml/
     system_config_source_yesno</source_model>
     <sort_order>10</sort_order>
     <show_in_default>1</show_in_default>
     <show_in_website>1</show_in_website>
     <show_in_store>1</show_in_store>
</field_name>
…
```

# Factory names and functions

Magento makes use of factory methods to instantiate models, helpers, and block classes. A factory method is a design pattern that allows us to instantiate an object without using the exact class name and using a class alias instead.

Magento implements the following factory methods:

- `Mage::getModel()`
- `Mage::getResourceModel()`
- `Mage::helper()`
- `Mage::getSingleton()`
- `Mage::getResourceSingleton()`
- `Mage::getResourceHelper()`

Each of these methods takes a class alias that is used to determine the real class name of the object that we are trying to instantiate. For example, if we want to instantiate a product object, we can do so by calling the `getModel()` method:

```
$product = Mage::getModel('catalog/product');
```

Notice that we are passing a factory name composed of `group_classname/model_name`. Magento will resolve this to the actual class name of `Mage_Catalog_Model_Product`. Let's take a closer look at the inner workings of `getModel()`:

```
public static function getModel($modelClass = '', $arguments
= array())
    {
        return self::getConfig()->getModelInstance($modelClass,
        $arguments);
    }

getModel calls the getModelInstance from the
Mage_Core_Model_Config class.

public function getModelInstance($modelClass='',
$constructArguments=array())
{
    $className = $this->getModelClassName($modelClass);
    if (class_exists($className)) {
        Varien_Profiler::start('CORE
        ::create_object_of::'.$className);
        $obj = new $className($constructArguments);
```

```
            Varien_Profiler::stop(
            'CORE::create_object_of::'.$className);
            return $obj;
        } else {
            return false;
        }
    }
```

In return, `getModelInstance()` calls the `getModelClassName()` method that takes a class alias as a parameter. Then, it tries to validate the existence of the returned class, and if the class exists, it creates a new instance of that class and returns it to our `getModel()` method:

```
public function getModelClassName($modelClass)
{
    $modelClass = trim($modelClass);
    if (strpos($modelClass, '/')===false) {
        return $modelClass;
    }
    return $this->getGroupedClassName('model', $modelClass);
}
```

The `getModelClassName()` method calls the `getGroupedClassName()` method, which is actually in charge of returning the real class name of our model.

The `getGroupedClassName()` method takes two parameters, namely `$groupType` and `$classId`. The `$groupType` parameter refers to the type of object that we are trying to instantiate. Currently, only models, blocks, and helpers are supported. The `$classId` that we are trying to instantiate is as follows:

```
public function getGroupedClassName($groupType, $classId,
$groupRootNode=null)
{
    if (empty($groupRootNode)) {
        $groupRootNode = 'global/'.$groupType.'s';
    }
    $classArr = explode('/', trim($classId));
    $group = $classArr[0];
    $class = !empty($classArr[1]) ? $classArr[1] : null;

    if (isset($this->_classNameCache[
    $groupRootNode][$group][$class])) {
        return $this->_classNameCache[
        $groupRootNode][$group][$class];
    }
```

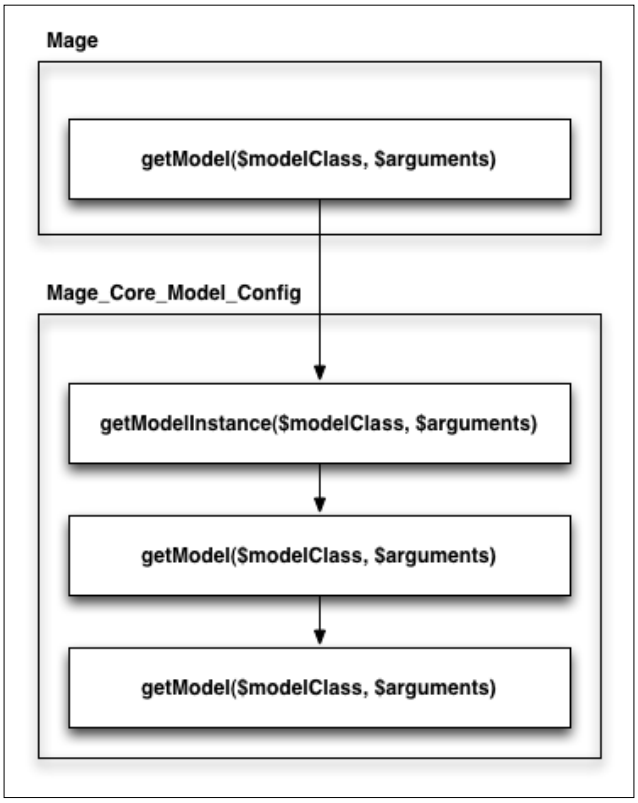
```
        $config = $this->_xml->global->{$groupType.'s'}->{$group};
        $className = null;
        if (isset($config->rewrite->$class)) {
            $className = (string)$config->rewrite->$class;
        } else {
            if ($config->deprecatedNode) {
                $deprecatedNode = $config->deprecatedNode;
                $configOld = $this->_xml->global->{
                $groupType.'s'}->$deprecatedNode;
                if (isset($configOld->rewrite->$class)) {
                    $className = (string) $configOld->rewrite->$class;
                }
            }
        }
        if (empty($className)) {
            if (!empty($config)) {
                $className = $config->getClassName();
            }
            if (empty($className)) {
                $className = 'mage_'.$group.'_'.$groupType;
            }
            if (!empty($class)) {
                $className .= '_'.$class;
            }
            $className = uc_words($className);
        }
        $this->_classNameCache[$groupRootNode][$group][$class] =
    $className;
        return $className;
    }
```

As we can see, `getGroupedClassName()` is actually doing all the work. It grabs our class alias catalog/product and creates an array by exploding the string on the slash character.

Then, it loads an instance of `Varien_Simplexml_Element` and passes the first value in our array (`group_classname`). It also checks if the class has been rewritten, and if it has, we will use the corresponding group name.

Magento also uses a custom version of the `uc_words()` function that will capitalize the first letters and convert separators of the class alias if needed.

Finally, the function will return the real class name to the `getModelInstance()` function. In our example case, this will return `Mage_Catalog_Model_Product`:

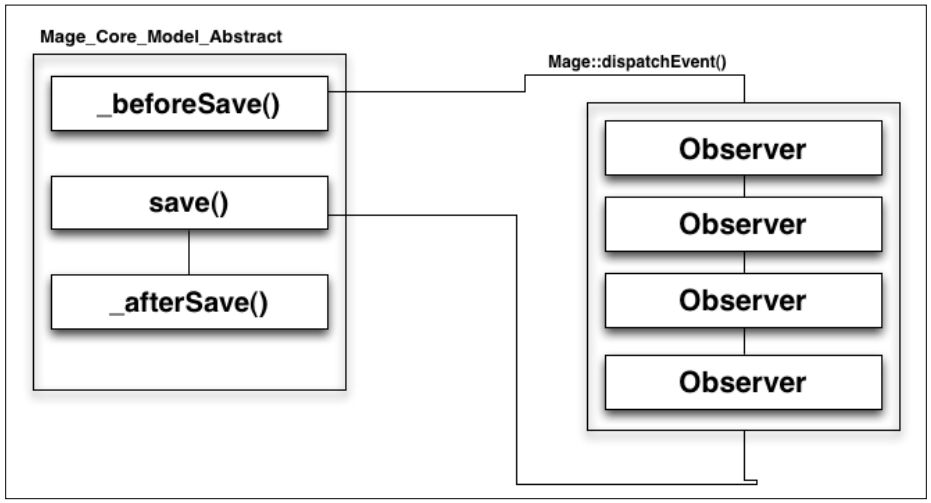



# Events and observers

The event and observer pattern is probably one of Magento's more interesting features, as it allows developers to extend Magento in critical parts of the application flow.

In order to provide more flexibility and facilitate interaction between the different modules, Magento implements an **Event/Observer** pattern. This pattern allows modules to be loosely coupled.

There are two parts to this system, an **Event** dispatch with the object and event information and an **Observer** listening to a particular event:




# Event dispatch

Events are created or dispatched using the `Mage::dispatchEvent()` function. The core team has already created several events on critical parts of the core. For example, the Model abstract class `Mage_Core_Model_Abstract` calls two protected functions every time a model is saved: `_beforeSave()` and `_afterSave()` on each of these methods two event are fired.

```
protected function _beforeSave()
{
    if (!$this->getId()) {
        $this->isObjectNew(true);
    }
    Mage::dispatchEvent('model_save_before',
    array('object'=>$this));
    Mage::dispatchEvent($this->_eventPrefix.'_save_before',
    $this->_getEventData());
    return $this;
}
```

```
protected function _afterSave()
{
    $this->cleanModelCache();
    Mage::dispatchEvent('model_save_after',
    array('object'=>$this));
    Mage::dispatchEvent($this->_eventPrefix.'_save_after',
    $this->_getEventData());
    return $this;
}
```

Each function fires a generic `model_save_after` event, and then a dynamic version based on the type of object being saved. This gives us a wide range of possibilities to manipulate objects through observers.

The `Mage::dispatchEvent()` method takes two parameters, the first is the event name and the second is an array of data that is received by the observer. We can pass values or objects in this array. This comes in handy if we want to manipulate the objects.

In order to understand the details of the event system, let's take a look at the `dispatchEvent()` method:

```
public static function dispatchEvent($name, array $data = array())
{
    $result = self::app()->dispatchEvent($name, $data);
    return $result;
}
```

This function is actually an alias to the `dispatchEvent()` function inside the App core class, located in `Mage_Core_Model_App`:

```
public function dispatchEvent($eventName, $args)
{
    foreach ($this->_events as $area=>$events) {
        if (!isset($events[$eventName])) {
            $eventConfig = $this->getConfig()->getEventConfig(
            $area, $eventName);
            if (!$eventConfig) {
                $this->_events[$area][$eventName] = false;
                continue;
            }
            $observers = array();
            foreach ($eventConfig->observers->children() as
            $obsName=>$obsConfig) {
                $observers[$obsName] = array(
                    'type'  => (string)$obsConfig->type,
```

```
                    'model' => $obsConfig->class ? (string)
                    $obsConfig->class :
                    $obsConfig->getClassName(),
                    'method'=> (string)$obsConfig->method,
                    'args'  => (array)$obsConfig->args,
                );
            }
            $events[$eventName]['observers'] = $observers;
            $this->_events[$area][$eventName]['observers'] =
            $observers;
        }
        if (false===$events[$eventName]) {
            continue;
        } else {
            $event = new Varien_Event($args);
            $event->setName($eventName);
            $observer = new Varien_Event_Observer();
        }

        foreach ($events[$eventName]['observers'] as
        $obsName=>$obs) {
            $observer->setData(array('event'=>$event));
            Varien_Profiler::start('OBSERVER: '.$obsName);
            switch ($obs['type']) {
                case 'disabled':
                    break;
                case 'object':
                case 'model':
                    $method = $obs['method'];
                    $observer->addData($args);
                    $object = Mage::getModel($obs['model']);
                    $this->_callObserverMethod($object,
                    $method, $observer);
                    break;
                default:
                    $method = $obs['method'];
                    $observer->addData($args);
                    $object = Mage::getSingleton($obs['model']);
                    $this->_callObserverMethod($object,
                    $method, $observer);
                    break;
            }
            Varien_Profiler::stop('OBSERVER: '.$obsName);
        }
    }
    return $this;
}
```

The `dispatchEvent()` method actually does all the work on the **Event/Observer** model:

1. It gets the Magento configuration object.
2. Then, it walks through the observer's node children, checking if the defined observer is listening to the current event.
3. For each of the available observers, the dispatch event tries to instantiate the observer object.
4. Lastly, Magento tries to call the corresponding observer function mapped to this particular event.

# Observer bindings

Now, dispatching an event is only part of the equation. We also need to tell Magento which observer is listening to each event. Not to our surprise, observers are specified through the `config.xml` file. As we saw before, the `dispatchEvent()` function queries the configuration object for available observers. Let's take a look at an example `config.xml` file:

```
<events>
    <event_name>
        <observers>
            <observer_identifier>
                <class>module_name/observer</class>
                <method>function_name</method>
            </observer_identifier>
        </observers>
    </event_name>
</events>
```

The event node can be specified in each of the configuration sections (admin, global, frontend, and so on) and we can specify multiple `event_name` children nodes. The `event_name` node has to match the event name used in the `dispatchEvent()` function.

Inside each `event_name` node, we have a single observer node that can contain multiple observers, each with a unique identifier.

Observer nodes have two properties, `<class>`, which points to our observer model class, and `<method>`, which points to the actual method inside the observer class. Let's analyze an example observer class definition:

```
class Namespace_Modulename_Model_Observer
{
```

```
    public function methodName(Varien_Event_Observer $observer)
    {
        //some code
    }
}
```

One interesting thing about observer models is that they don't extend to any other Magento class.

# Summary

In this chapter, we covered many important and fundamental topics about Magento:

- Architecture
- Folder structure
- Routing system
- MVC patterns
- Events and observers
- Configuration scope

While this may seem overwhelming at first sight, it is just the tip of the iceberg. There is a lot more to learn about each of these topics and Magento. The purpose of this chapter is to make developers aware of all the important components of the platform, from the configuration object to the way the event/object pattern is implemented.

Magento is a powerful and flexible system and much more than an e-commerce platform. The core team has put a lot of effort in making Magento a powerful framework.

In later chapters, we will not only review all these concepts in more detail, but we will also apply them in a practical manner by building our own extensions.

# 2
# ORM and Data Collections

Collections and models are the bread and butter of everyday Magento development. In this chapter, we will introduce the reader to the Magento ORM system, and we will learn how to work with data collections and the EAV system properly. As most modern systems, Magento implements an **object-relational mapping** (**ORM**) system.

> *Object-relational mapping (ORM, O/RM, and O/R mapping) in computer software is a programming technique for converting data between incompatible type systems in object-oriented programming languages. This creates, in effect, a "virtual object database" that can be used from within the programming language.*

In this chapter, we will cover the following topics:

- Magento Models
- Anatomy of a Magento Data Model
- EAV and EAV models
- Working with Direct SQL queries

We will also be working with several snippets of code to provide an easy framework to experiment and play around with Magento.

The interactive examples in this chapter assume you are working either with the default Magento installation inside the VagrantBox or a Magento installation with sample data.

For this purpose, I have created the Magento IMC (Interactive Magento Console), which is a shell script specially created for this book and inspired by Ruby's IRB (Interactive Ruby Console). To get started, follow these steps:

1. The first thing we will need to do is install the IMC to download the source files from `https://github.com/amacgregor/mdg_imc` and extract them under your Magento test installation. The IMC is a simple Magento shell script that will allow to test our code in real time.
2. Once you extract the script, log into the shell of your VirtualBox.
3. Next, we will need to navigate to our Magento root folder. If you are using the default vagrant box and installation provided, the root folder is located under `/srv/www/ce1720/public_html`. We navigate to it by running this command:

   ```
   $ cd /srv/www/ce1720/public_html
   ```

4. Finally, we can start the IMC by running the following command:

   ```
   $ php shell/imc.php
   ```

5. If everything is installed successfully, we will see a new line starting with `magento >`.

# Magento Model anatomy

As we learned in the previous chapter, Magento data models are used to manipulate and access the data. The model layer is divided into two fundamental types, simple models and EAV:

- **Simple models**: These model implementations are a simple mapping of one object to one table, meaning our object attributes match each field and our table structure.
- **Entity Attribute Value models**: This type of models, known as EAV models, are used to describe entities with a dynamic number of attributes.

It is important to clarify that not all Magento models extend or make use of the ORM. Observers are a clear example of simpler model classes that are not mapped to a specific database table or entity.

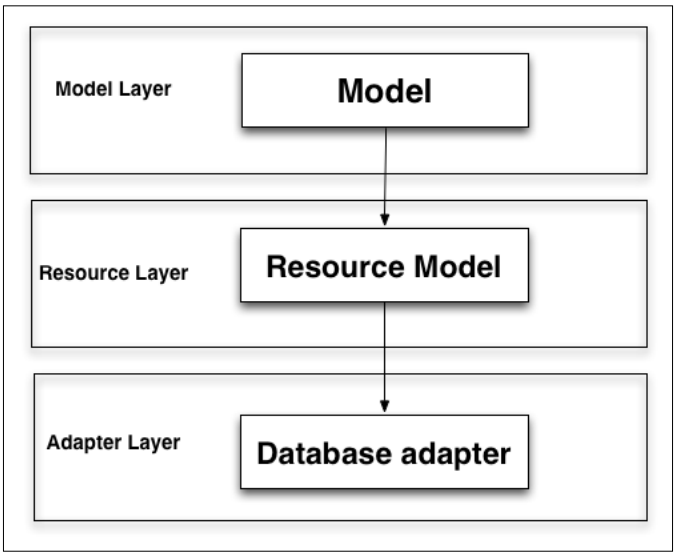
In addition to that, each Model type is formed by the following layers:

- **Model class**: This is where most of our business logic resides. Models are used to manipulate the data, but they don't access it directly.
- **Resource Model class**: Resource Models are used to interact with the database on behalf of our models. They are in charge of the actual CRUD operations.
- **Model Collection class**: Each Data Model has a collection class. Collections are objects that hold a number of individual Magento Model instances.

CRUD stands for the four basic types of database operations, namely create, read, update, and delete.

Magento Models don't contain any logic to communicate with the database; they are database agnostic. Instead, this code resides in the Resource Model layer.

This gives Magento the capacity to support different types of databases and platforms. Although currently, only MySQL is officially supported, it is entirely possible to write a new resource class for a new database without touching any of the Model logic:



Let's experiment now by instantiating a product object and setting some of its properties:

1. Start the Magento interactive console running under your Magento staging installation root:

   ```
   php shell/imc.php
   ```

2. Our first step is to create a new product object instance by typing the following code:

   ```
   magento> $product = Mage::getModel('catalog/product');
   ```

3. We can confirm this is a blank instance of the product class by running the following code:

   ```
   magento> echo get_class($product);
   ```

4. We should see the following as a successful output:

   ```
   magento> Magento_Catalog_Model_Product
   ```

5. If we want to know more about the class methods, we can run the following code:

   ```
   magento> print_r(get_class_methods($product));
   ```

This will return an array with all the available methods inside the class. Let's try to run the following code snippet and modify a product's price and name:

```
$product = Mage::getModel('catalog/product')->load(2);
$name   = $product->getName() . '-TEST';
$price   = $product->getPrice();
$product->setPrice($price + 15);
$product->setName($name);
$product->save();
```

On the first line of code, we instantiate a specific object and then proceed to retrieve the name attribute from the object. Next, we set the price and name, and finally, we save the object.

If we open our Magento product class `Mage_Catalog_Model_Product`, the first thing we will notice is that while both `getName()` and `getPrice()` are defined inside our class, the `setPrice()` and `setName()` functions are not defined anywhere.

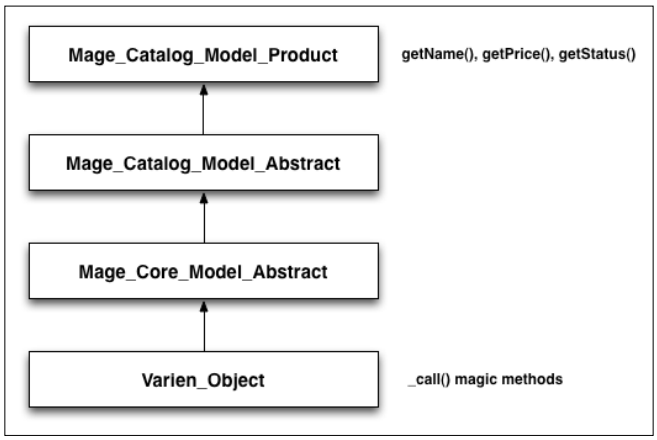
However, why, and more importantly how, is Magento *magically* defining each of the product object setter and getter methods? While `getPrice()` and `getName()` are indeed defined, there is no definition for any of the getter and setter methods for product attributes such as color or manufacturer.

# It's magic – methods

Well it so happens that the Magento ORM system is indeed magic. To be precise, one of PHP's more powerful features is to implement its getters and setters, the magic `__call()` method. Magic methods are used inside Magento to set, unset, check, or retrieve data.

When we try to call a method that does not actually exist in our corresponding class, PHP will look into each of the parent classes for a declaration of that method. If it can't find the function on any of the parent classes, it will use its last resort and try to use a `__call()` method. If found, Magento (or PHP for that matter) will call the magic method, passing the requested method name and its arguments.

Now, the Product model doesn't have a `__call()` method defined, but it gets one from the `Varien_Object` that most Magento models inherit from. The inheritance tree for the `Mage_Catalog_Model_Product` class is as follows:




Most Magento Models inherit from the `Varien_Object` class.

Let's take a closer look at the `Varien_Object` class:

1. Open the file located in `magento_root/lib/Varien/Object.php`.
2. The `Varien_Object` class not only has a **`__call()`** method but also has two deprecated methods, **`__set()`** and **`__get()`**. Both of these are replaced by the **`__call()`** method and are no longer used.

```
public function __call($method, $args)
{   switch (substr($method, 0, 3)) {
```

```
            case 'get' :
              //Varien_Profiler::start('GETTER:
              '.get_class($this).'::'.$method);
                $key = $this->_underscore(substr($method,3));
                $data = $this->getData($key, isset($args[0]) ?
                $args[0] : null);

        //Varien_Profiler::stop('GETTER:
          '.get_class($this).'::'.$method);
                return $data;

                case 'set' :
                //Varien_Profiler::start('SETTER:
               '.get_class($this).'::'.$method);
                $key = $this->_underscore(substr($method,3));
                $result = $this->setData($key, isset($args[0]) ?
                $args[0] : null);
                //Varien_Profiler::stop('SETTER:
               '.get_class($this).'::'.$method);
                  return $result;
                case 'uns' :
                //Varien_Profiler::start('UNS:
               '.get_class($this).'::'.$method);
               $key = $this->_underscore(substr($method,3));
               $result = $this->unsetData($key);
               //Varien_Profiler::stop('UNS:
               '.get_class($this).'::'.$method);
               return $result;

               case 'has' :
               //Varien_Profiler::start('HAS:
              '.get_class($this).'::'.$method);
               $key = $this->_underscore(substr($method,3));
               //Varien_Profiler::stop('HAS:
               '.get_class($this).'::'.$method);
               return isset($this->_data[$key]);
        }
        throw new Varien_Exception("Invalid method" .
        get_class($this)."::".$method."(".print_r($args,1).")");
    }
```

Inside the `__call()` method, we have a switch that will handle not only getters and setters but also the `unset` and `has` functions.

If we start a debugger and follow the calls of our snippet code to the `__call()` method, we will see that it receives two arguments, the method name (for example `setName()`) and the arguments from the original call.

Interestingly, Magento tries to match the corresponding method type based on the first three letters of the method being called. This is done with the switch case argument by calling the substring function:

```
substr($method, 0, 3)
```

The first thing that is called inside each case is the `_underscore()` function, which takes as parameter anything after the first three characters in the method name. Following our example, the argument passed will be `Name`.

The `__underscore()` function returns a data key. This key is then used by each of the cases to manipulate the data. There are four basic data operations, each is used on the corresponding switch case:

- `setData` (`$parameters`)
- `getData` (`$parameters`)
- `unsetData` (`$parameters`)
- `isset` (`$parameters`)

Each of these functions will interact with the `Varien_Object` data array and manipulate it accordingly. In most cases, a magic set/get method will be used to interact with our object attributes. Only in a few exceptions, where additional business logic is required, getters and setters will be defined. In our example, this would be `getName()` and `getPrice()`:

```
public function getPrice()
{
    if ($this->_calculatePrice || !$this->getData('price')) {
      return $this->getPriceModel()->getPrice($this);
    } else {
      return $this->getData('price');
    }
}
```

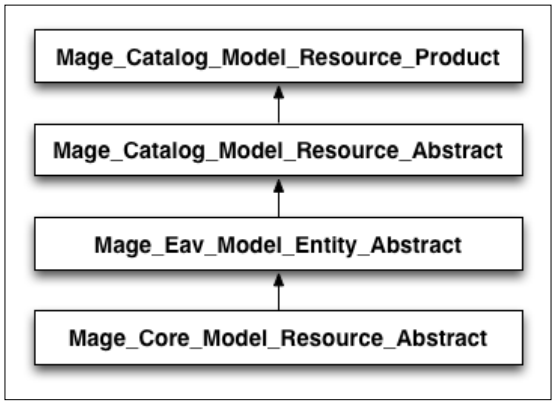
We will not get into details of what the price function is actually doing, but it clearly illustrates that additional logic may be required for certain parts of the models:

```
public function getName()
{
    return $this->_getData('name');
}
```

On the other hand, the `getName()` getter wasn't declared because of the need to implement special logic but by the need to optimize a crucial part of Magento. The `Mage_Catalog_Model_Product` `getName()` function, which can potentially be called hundreds of times per page load, is one of the most commonly used functions across all Magento. After all, what kind of e-commerce platform would it be if it was not centered around products?

Frontend and backend will both call the `getName()` function at one point or another. For example, loading a category page with 24 products. That's 24 separate calls to the `getName()` function. Having each of these calls look for a `getName()` method on each of the parent classes and then trying to use the magic `__call()` method will result in losing precious milliseconds.

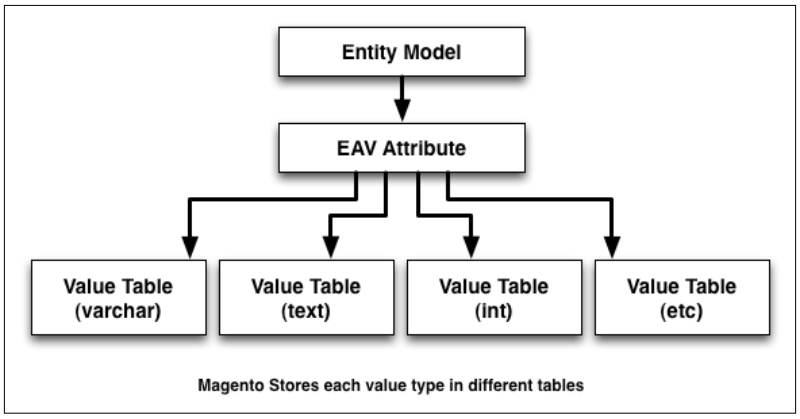
**Resource Models** contain all the database-specific logic and they instantiate specific read-and-write adapters for their corresponding data source. Let's go back to our example of working with products and take a look the product Resource Model located in `Mage_Catalog_Model_Resource_Product`:




Resource Models come in two different types, Entity and Resource. The latter is a pretty standard one-table/one-model association, while the former is far more complicated.

# The EAV model

EAV stands for entity, attribute, and value and is probably the most difficult concept for new Magento developers to grasp. While the EAV concept is not unique to Magento, it is rarely implemented on modern systems. Additionally, a Magento implementation is not a simple one.




# What is EAV?

In order to understand what EAV is and what its role within Magento is, we need to break down parts of the EAV model:

- **Entity**: This represents the data items (objects) inside Magento products, customers, categories, and orders. Each entity is stored in the database with a unique ID.
- **Attribute**: These are our object properties. Instead of having one column per attribute on the product table, attributes are stored on separate sets of tables.
- **Value**: As the name implies, it is simply the value link to a particular attribute.

This data model is the secret behind Magento's flexibility and power, allowing entities to add and remove new properties without having to make any changes to the code, templates, or the database schema.

This model can be seen as a vertical way of growing our database (new attributes and more rows), while the traditional model involves a horizontal growth pattern (new attributes and more columns), which would result in a schema redesign every time new attributes are added.

The **EAV** model not only allows for the fast evolution of our database, but is also more effective because it only works with non-empty attributes, avoiding the need to reserve additional space in the database for null values.

If you are interested in exploring and learning more about the Magento database structure, I highly recommend visiting `www.magereverse.com`.

Adding a new product attribute is as simple going to the Magento backend and specifying the new attribute type, be it color, size, brand, or anything else. The opposite is true as well and we can get rid of unused attributes on our products or customer models.

For more information on managing attributes, visit `http://www.magentocommerce.com/knowledge-base/entry/how-do-attributes-work-in-magento`.

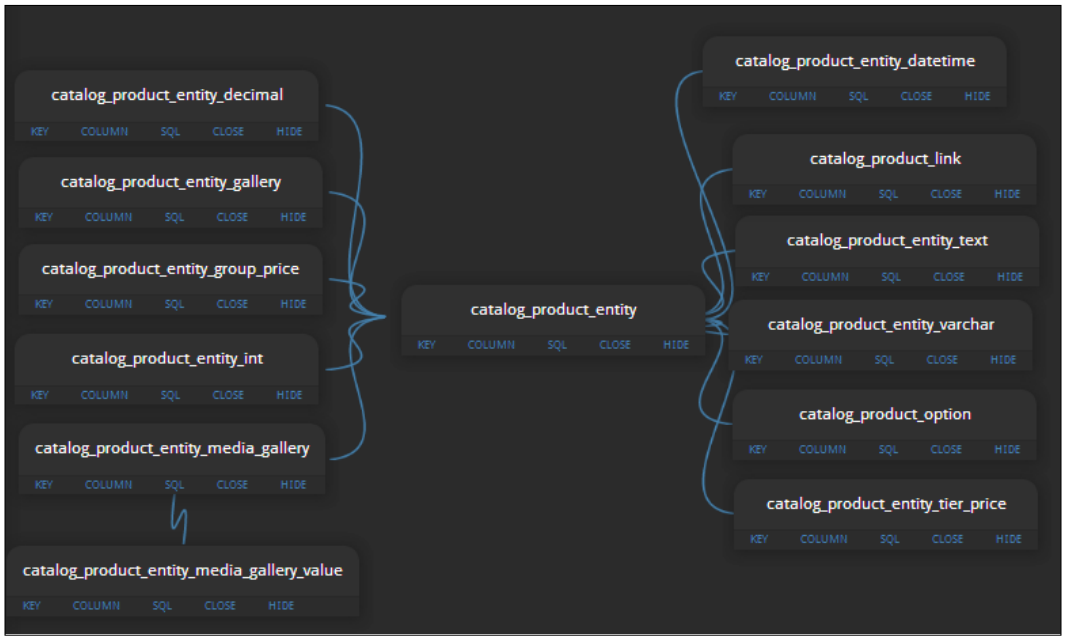
The Magento community edition currently has eight different types of EAV objects:

- Customer
- Customer Address
- Products
- Product Categories
- Orders
- Invoices
- Credit Memos
- Shipments

The Magento Enterprise Edition has one additional type called **RMA** item, which is part of the **Return Merchandise Authorization** (**RMA**) system.

All this flexibility and power is not free; there is a price to pay. Implementing the EAV model results in having our entity data distributed on a large number of tables. For example, just the Product Model is distributed to around 40 different tables.

The following diagram only shows a few of the tables involved in saving the information of Magento products:



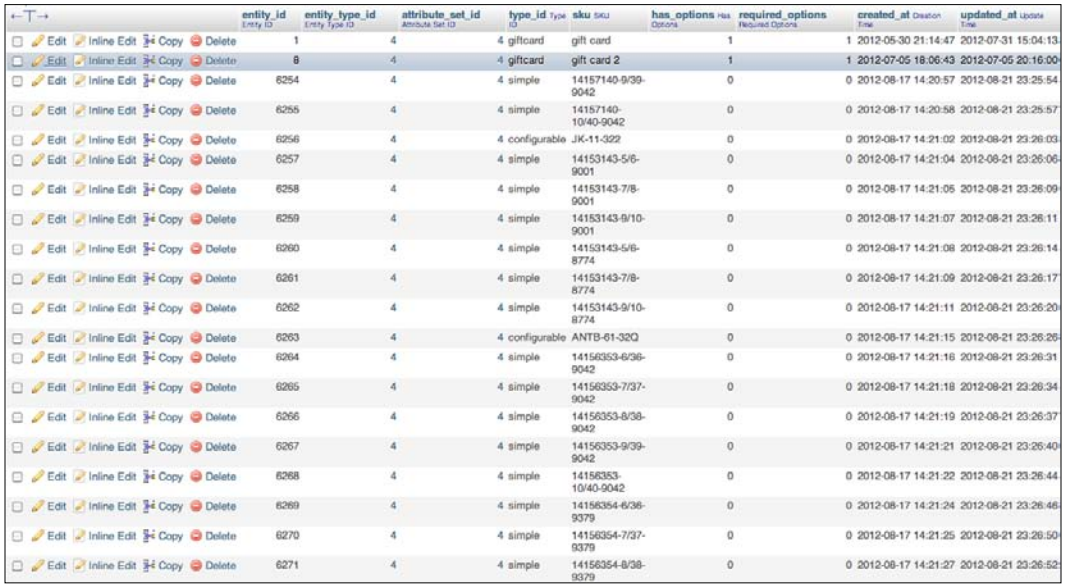

Other major downsides of **EAV** are the loss of performance while retrieving large collections of **EAV** objects and an increase in the database query complexity. As the data is more fragmented (stored in more tables), selecting a single record involves several joins.

One way Magento works around this downside of EAV is by making use of indexes and flat tables. For example, Magento can save all the product information into the `flat_catalog` table for easier and faster access.

Let's continue using Magento products as our example and manually build the query to retrieve a single product.

If you have **phpmyadmin** or **MySQL Workbench** installed on your development environment, you can experiment with the following queries. Each can be downloaded on the **PHPMyAdmin** website at `http://www.phpmyadmin.net/` and the **MySQL Workbench** website at `http://www.mysql.com/products/workbench/`.

The first table that we need to use is the `catalog_product_entity` table. We can consider this our main product **EAV** table *since it contains the main entity records for our products*:



| | entity_id | entity_type_id | attribute_set_id | type_id | sku | has_options | required_options | created_at | updated_at |
|---|---|---|---|---|---|---|---|---|---|
| Edit Inline Edit Copy Delete | 1 | 4 | 4 | giftcard | gift card | 1 | 1 | 2012-05-30 21:14:47 | 2012-07-31 15:04:13 |
| Edit Inline Edit Copy Delete | 8 | 4 | 4 | giftcard | gift card 2 | 1 | 1 | 2012-07-05 18:06:43 | 2012-07-05 20:16:00 |
| Edit Inline Edit Copy Delete | 6254 | 4 | 4 | simple | 14157140-9/39-9042 | 0 | 0 | 2012-08-17 14:20:57 | 2012-08-21 23:25:54 |
| Edit Inline Edit Copy Delete | 6255 | 4 | 4 | simple | 14157140-10/40-9042 | 0 | 0 | 2012-08-17 14:20:58 | 2012-08-21 23:25:57 |
| Edit Inline Edit Copy Delete | 6256 | 4 | 4 | configurable | JK-11-322 | 0 | 0 | 2012-08-17 14:21:02 | 2012-08-21 23:26:03 |
| Edit Inline Edit Copy Delete | 6257 | 4 | 4 | simple | 14153143-5/6-9001 | 0 | 0 | 2012-08-17 14:21:04 | 2012-08-21 23:26:06 |
| Edit Inline Edit Copy Delete | 6258 | 4 | 4 | simple | 14153143-7/8-9001 | 0 | 0 | 2012-08-17 14:21:05 | 2012-08-21 23:26:09 |
| Edit Inline Edit Copy Delete | 6259 | 4 | 4 | simple | 14153143-9/10-9001 | 0 | 0 | 2012-08-17 14:21:07 | 2012-08-21 23:26:11 |
| Edit Inline Edit Copy Delete | 6260 | 4 | 4 | simple | 14153143-5/6-8774 | 0 | 0 | 2012-08-17 14:21:08 | 2012-08-21 23:26:14 |
| Edit Inline Edit Copy Delete | 6261 | 4 | 4 | simple | 14153143-7/8-8774 | 0 | 0 | 2012-08-17 14:21:09 | 2012-08-21 23:26:17 |
| Edit Inline Edit Copy Delete | 6262 | 4 | 4 | simple | 14153143-9/10-8774 | 0 | 0 | 2012-08-17 14:21:11 | 2012-08-21 23:26:20 |
| Edit Inline Edit Copy Delete | 6263 | 4 | 4 | configurable | ANTB-61-32Q | 0 | 0 | 2012-08-17 14:21:15 | 2012-08-21 23:26:26 |
| Edit Inline Edit Copy Delete | 6264 | 4 | 4 | simple | 14156353-6/36-9042 | 0 | 0 | 2012-08-17 14:21:16 | 2012-08-21 23:26:31 |
| Edit Inline Edit Copy Delete | 6265 | 4 | 4 | simple | 14156353-7/37-9042 | 0 | 0 | 2012-08-17 14:21:18 | 2012-08-21 23:26:34 |
| Edit Inline Edit Copy Delete | 6266 | 4 | 4 | simple | 14156353-8/38-9042 | 0 | 0 | 2012-08-17 14:21:19 | 2012-08-21 23:26:37 |
| Edit Inline Edit Copy Delete | 6267 | 4 | 4 | simple | 14156353-9/39-9042 | 0 | 0 | 2012-08-17 14:21:21 | 2012-08-21 23:26:40 |
| Edit Inline Edit Copy Delete | 6268 | 4 | 4 | simple | 14156353-10/40-9042 | 0 | 0 | 2012-08-17 14:21:22 | 2012-08-21 23:26:44 |
| Edit Inline Edit Copy Delete | 6269 | 4 | 4 | simple | 14156354-6/36-9379 | 0 | 0 | 2012-08-17 14:21:24 | 2012-08-21 23:26:46 |
| Edit Inline Edit Copy Delete | 6270 | 4 | 4 | simple | 14156354-7/37-9379 | 0 | 0 | 2012-08-17 14:21:25 | 2012-08-21 23:26:50 |
| Edit Inline Edit Copy Delete | 6271 | 4 | 4 | simple | 14156354-8/38-9379 | 0 | 0 | 2012-08-17 14:21:27 | 2012-08-21 23:26:52 |

Let's query the table by running the following SQL query:

```
SELECT * FROM `catalog_product_entity`;
```

The table contains the following fields:

- `entity_id`: This is our product unique identifier that is used internally by Magento.
- `entity_type_id`: Magento has several different types of EAV models. Products, customers, and orders are just some of them. Identifying each of these by type allows Magento to retrieve the attributes and values from the appropriate tables.
- `attribute_set_id`: Product attributes can be grouped locally into attribute sets. Attribute sets allow even further flexibility on the product structure as products are not forced to use all available attributes.
- `type_id`: There are several different types of products in Magento: simple, configurable, bundled, downloadable, and grouped products; each with unique settings and functionality.

- `sku`: This stands for Stock Keeping Unit and is a number or code used to identify each unique product or item for sale in a store. This is a user-defined value.
- `has_options`: This is used to identify if a product has custom options.
- `required_options`: This is used to identify if any of the custom options that are required.
- `created_at`: This is the row creation date.
- `updated_at`: This is the last time the row was modified.

Now we have a basic understanding of the product entity table. Each record represents a single product in our Magento store, but we don't have much information about that product beyond the SKU and the product type.

So, where are the attributes stored? And how does Magento know the difference between a product attribute and a customer attribute?

For this, we need to take a look into the `eav_attribute` table by running the following SQL query:

```
SELECT * FROM `eav_attribute`;
```

As a result, we will not only see the product attributes, but also the attributes corresponding to the customer model, order model, and so on. Fortunately, we already have a key to filter the attributes from this table. Let's run the following query:

```
SELECT * FROM `eav_attribute`
WHERE entity_type_id = 4;
```

This query tells the database to only retrieve the attributes where the `entity_type_id` column is equal to the product `entity_type_id(4)`. Before moving, let's analyze the most important fields inside the `eav_attribute` table:

- `attribute_id`: This is the unique identifier for each attribute and primary key of the table.
- `entity_type_id`: This relates each attribute to a specific eav model type.
- `attribute_code`: This is the name or key of our attribute and is used to generate the getters and setters for our magic methods.
- `backend_model`: These manage loading and storing data into the database.
- `backend_type`: This specifies the type of value stored in the backend (database).

- `backend_table`: This is used to specify if the attribute should be stored on a special table instead of the default EAV table.
- `frontend_model`: These handle the rendering of the attribute element into a web browser.
- `frontend_input`: Similar to the frontend model, the frontend input specifies the type of input field the web browser should render.
- `frontend_label`: This is the label/name of the attribute as it should be rendered by the browser.
- `source_model`: These are used to populate an attribute with possible values. Magento comes with several predefined source models for countries, yes or no values, regions, and so on.

# Retrieving the data

At this point, we have successfully retrieved a product entity and the specific attributes that apply to that entity. Now it's time to start retrieving the actual values. In order to simplify the example (and the query) a little, we will only try to retrieve the name attribute of our products.

How do we know which table our attribute values are stored on? Well, thankfully, Magento follows a naming convention to name the tables. If we inspect our database structure, we will notice that there are several tables using the `catalog_product_entity` prefix:

- `catalog_product_entity`
- `catalog_product_entity_datetime`
- `catalog_product_entity_decimal`
- `catalog_product_entity_int`
- `catalog_product_entity_text`
- `catalog_product_entity_varchar`
- `catalog_product_entity_gallery`
- `catalog_product_entity_media_gallery`
- `catalog_product_entity_tier_price`

Wait! How do we know which is the right table to query for our name attribute values? If you were paying attention, I already gave you the answer. Remember that the `eav_attribute` table had a column called `backend_type`?

Magento EAV stores each attribute on a different table based on the backend type of that attribute. If we want to confirm the backend type of our name attribute, we can do so by running the following code:

```
SELECT * FROM `eav_attribute`
WHERE `entity_type_id` =4 AND `attribute_code` = 'name';
```

As a result, we should see that the backend type is varchar and that the values for this attribute are stored in the `catalog_product_entity_varchar` table. Let's inspect this table:

| | value_id Value ID | entity_type_id Entity Type ID | attribute_id Attribute ID | store_id Store ID | entity_id Entity ID | value Value |
|---|---|---|---|---|---|---|
| Edit Inline Edit Copy Delete | 1 | 3 | 35 | 0 | 1 | Root Catalog |
| Edit Inline Edit Copy Delete | 2 | 3 | 35 | 1 | 1 | Root Catalog |
| Edit Inline Edit Copy Delete | 3 | 3 | 37 | 1 | 1 | root-catalog |
| Edit Inline Edit Copy Delete | 4 | 3 | 35 | 0 | 2 | Default Category |
| Edit Inline Edit Copy Delete | 5 | 3 | 35 | 1 | 2 | Default Category |
| Edit Inline Edit Copy Delete | 6 | 3 | 43 | 1 | 2 | PRODUCTS |
| Edit Inline Edit Copy Delete | 7 | 3 | 37 | 1 | 2 | default-category |
| Edit Inline Edit Copy Delete | 8 | 3 | 35 | 0 | 3 | Clothing |
| Edit Inline Edit Copy Delete | 9 | 3 | 37 | 0 | 3 | clothing |
| Edit Inline Edit Copy Delete | 10 | 3 | 40 | 0 | 3 | *NULL* |
| Edit Inline Edit Copy Delete | 11 | 3 | 43 | 0 | 3 | PRODUCTS |
| Edit Inline Edit Copy Delete | 12 | 3 | 60 | 0 | 3 | position |
| Edit Inline Edit Copy Delete | 13 | 3 | 52 | 0 | 3 | *NULL* |
| Edit Inline Edit Copy Delete | 14 | 3 | 55 | 0 | 3 | two_columns_left |
| Edit Inline Edit Copy Delete | 15 | 3 | 35 | 0 | 4 | Tops |
| Edit Inline Edit Copy Delete | 16 | 3 | 37 | 0 | 4 | tops |
| Edit Inline Edit Copy Delete | 17 | 3 | 40 | 0 | 4 | *NULL* |
| Edit Inline Edit Copy Delete | 18 | 3 | 43 | 0 | 4 | PRODUCTS |
| Edit Inline Edit Copy Delete | 19 | 3 | 52 | 0 | 4 | *NULL* |
| Edit Inline Edit Copy Delete | 20 | 3 | 55 | 0 | 4 | *NULL* |
| Edit Inline Edit Copy Delete | 21 | 3 | 35 | 0 | 5 | Bottoms |
| Edit Inline Edit Copy Delete | 22 | 3 | 37 | 0 | 5 | bottoms |
| Edit Inline Edit Copy Delete | 23 | 3 | 40 | 0 | 5 | *NULL* |
| Edit Inline Edit Copy Delete | 24 | 3 | 43 | 0 | 5 | PRODUCTS |
| Edit Inline Edit Copy Delete | 25 | 3 | 52 | 0 | 5 | *NULL* |
| Edit Inline Edit Copy Delete | 26 | 3 | 55 | 0 | 5 | *NULL* |
| Edit Inline Edit Copy Delete | 27 | 3 | 35 | 0 | 6 | Intimates |
| Edit Inline Edit Copy Delete | 28 | 3 | 37 | 0 | 6 | intimates |
| Edit Inline Edit Copy Delete | 29 | 3 | 40 | 0 | 6 | *NULL* |
| Edit Inline Edit Copy Delete | 30 | 3 | 43 | 0 | 6 | PRODUCTS |

The `catalog_product_entity_varchar` table is formed by only 6 columns:

- `value_id`: This is the attribute value unique identifier and primary key
- `entity_type_id`: This is the entity type ID to which this value belongs
- `attribute_id`: This is the foreign key that relates the value to our `eav_entity` table

- `store_id`: This is the foreign key matching an attribute value with a storeview
- `entity_id`: This is the foreign key relating to the corresponding entity table, in this case, `catalog_product_entity`
- `value`: This is the actual value that we want to retrieve

Depending on the attribute configuration, we can have it as a global value, meaning, it applies across all store views or a value per storeview.

Now that we finally have all the tables that we need to retrieve the product information, we can build our query:

```
SELECT p.entity_id AS product_id, var.value AS product_name, p.sku
AS product_sku
FROM catalog_product_entity p, eav_attribute eav,
catalog_product_entity_varchar var
WHERE p.entity_type_id = eav.entity_type_id
   AND var.entity_id = p.entity_id
   AND eav.attribute_code = 'name'
   AND eav.attribute_id = var.attribute_id
```

| product_id | product_name | product_sku |
|---|---|---|
| 16 | Nokia 2610 Phone | n2610 |
| 17 | BlackBerry 8100 Pearl | bb8100 |
| 18 | Sony Ericsson W810i | sw810i |
| 19 | AT&T 8525 PDA | 8525PDA |
| 20 | Samsung MM-A900M Ace | MM-A900M |
| 25 | Apple MacBook Pro MA464LL/A 15.4" Notebook PC | MA464LL/A |
| 26 | Acer Ferrari 3200 Notebook Computer PC | LX.FR206.001 |
| 27 | Sony VAIO VGN-TXN27N/B 11.1" Notebook PC | VGN-TXN27N/B |
| 28 | Toshiba M285-E 14" | M285-E |
| 29 | CN Clogs Beach/Garden Clog | cn_3 |
| 30 | ASICS® Men's GEL-Kayano® XII | asc_8 |
| 31 | Steven by Steve Madden Pryme Pump | steve_4 |
| 32 | Nine West Women's Lucero Pump | nine_3 |
| 33 | ECCO Womens Golf Flexor Golf Shoe | ecco_3 |
| 34 | Kenneth Cole New York Men's Con-verge Slip-on | ken_8 |
| 35 | Coalesce: Functioning On Impatience T-Shirt | coal_sm |
| 36 | Ink Eater: Krylon Bombear Destroyed Tee | ink_sm |
| 37 | The Only Children: Paisley T-Shirt | oc_sm |
| 38 | Zolof The Rock And Roll Destroyer: LOL Cat T-shirt | zol_r_sm |
| 39 | The Get Up Kids: Band Camp Pullover Hoodie | 4fasd5f5 |
| 41 | Akio Dresser | 384822 |
| 42 | Barcelona Bamboo Platform Bed | bar1234 |

From our query, we should see a result set with three columns, `product_id`, `product_name`, and `product_sku`. So let's step back for a second in order to get product names with SKUs with raw SQL. We had to write a five-line SQL query, and we only retrieved two values from our products, from one single EAV value table if we want to retrieve a numeric field such as price or a text-value-like product.

If we didn't have an **ORM** in place, maintaining Magento would be almost impossible. Fortunately, we do have an ORM in place, and most likely, you will never need to deal with raw SQL to work with Magento.

That said, let's see how we can retrieve the same product information by using the Magento ORM:

1. Our first step is going to be to instantiate a product collection:

```
$collection = Mage::getModel('catalog/product'
)->getCollection();
```

2. Then we will specifically tell Magento to select the name attribute:

```
$collection->addAttributeToSelect('name');
```

3. Then, we will ask it to sort the collection by name:

```
$collection->setOrder('name', 'asc');
```

4. Finally, we will tell Magento to load the collection:

```
$collection->load();
```

5. The end result is a collection of all products in the store sorted by name. We can inspect the actual SQL query by running the following code:

```
echo $collection->getSelect()->__toString();
```

In just three lines of code, we are telling Magento to grab all the products in the store, to specifically select the name, and finally order the products by name.

The last line `$collection->getSelect()->__toString();` allows to see the actual query that Magento is executing in our behalf.

The actual query being generated by Magento is as follows:

```
SELECT `e`.*. IF( at_name.value_id >0, at_name.value,
at_name_default.value ) AS `name`
FROM `catalog_product_entity` AS `e`
LEFT JOIN `catalog_product_entity_varchar` AS `at_name_default` ON
(`at_name_default`.`entity_id` = `e`.`entity_id`)
AND (`at_name_default`.`attribute_id` = '65')
```

```
AND `at_name_default`.`store_id` =0
LEFT JOIN `catalog_product_entity_varchar` AS `at_name` ON (
`at_name`.`entity_id` = `e`.`entity_id` )
AND (`at_name`.`attribute_id` = '65')
AND (`at_name`.`store_id` =1)
ORDER BY `name` ASC
```

As we can see, the ORM and the EAV models are wonderful tools that not only put a lot of power and flexibility in the hands of the developers, but they also do it in a way that is comprehensive and easy to use.

# Working with Magento collections

If you look back at the previous code example, you will notice that I'm not only instantiating a product model, but I'm also calling the `getCollection()` method. The `getCollection()` method is part of the `Mage_Core_Model_Abstract` class, meaning, every single model inside Magento can call this method.

All collections inherit from `Varien_Data_Collection`.

A Magento collection is basically a model that contains other models. So instead of using an array to hold a collection of products, we will use a product collection. Collections not only provide a convenient data structure to group models, they also provide special methods that we can use to manipulate and work with a collection of entities.

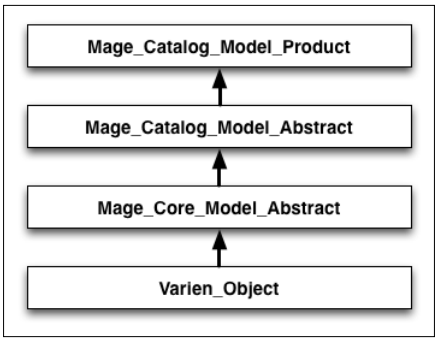
Some of the most useful collection methods are:

- `addAttributeToSelect`: To add an attribute to the entities in a collection; `*` can be used as a wildcard to add all the available attributes
- `addFieldToFilter`: To add an attribute filter to a collection; this function is used on regular non-EAV models or to filter attributes that are part of the master product table like SKU
- `addAttributeToFilter`: This method is used to filter a collection of EAV entities
- `addAttributeToSort`: This method is used to add an attribute to the sort order
- `addStoreFilter`: This method is used to add a store filter to the current collection. It might not be available on all object types

- `addWebsiteFilter`: This method is used to add a website filter to a collection
- `addCategoryFilter`: This method is used to specify a category filter for a product collection
- `addUrlRewrite`: This method is used to add URL rewrite data to the product collection
- `setOrder`: This method is used to set the sorting order of a collection

These are just a few of the collection methods available. Each collection implements different unique methods depending on the entity type they correspond to. For example, the customer collection `Mage_Customer_Model_Resource_Customer_Collection` has a unique method called `groupByEmail()`, which, as the name correctly implies, groups the entities inside a collection by e-mail.

As with previous examples, we will continue working with the product models, and in this case, the product collection.




In order to better illustrate how we can use the collection, will be working on the following common product scenarios:

1. Get a product collection only from a specific category
2. Get new products since date *X*
3. Get bestseller products
4. Filter product collections by visibility
5. Filter products without image
6. Add multiple sort orders

# Get product collections only from a specific category

The first thing most developers try to do when starting with Magento is load a product collection with products only from a specific category. While I have seen many approaches by using `addCategoryFilter()` or `addAttributeToFilter()`, the reality is that for most cases, the approach is much simpler and a bit contra-intuitive to what we have learned so far.

The easiest way of doing this is not getting a product collection first and then filtering by a category, but actually instantiating our target category and getting the product collection from there, let's run the following code snippet on IMC:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
```

We can find the `getProductCollection()` method declaration inside the `Mage_Catalog_Model_Category` class. Let's take a closer look at this method:

```
public function getProductCollection()
{
    $collection =
    Mage::getResourceModel('catalog/product_collection')
        ->setStoreId($this->getStoreId())
        ->addCategoryFilter($this);
    return $collection;
}
```

As we can see, the function does nothing more than instantiate Resource Model for the product collection, set the store to the current store ID, and pass the current category to the `addCategoryFilter()`.

This is one of those decisions that was taken to optimize Magento's performance and frankly, to simplify the life of the developers working with it, as in most cases, a category is going to be available one way or the other.

# Get new products added since X date

So now that we know how to get a product collection from a specific category, let's say we are able to apply filters to the resulting products and we only the retrieve the ones matching our conditions. In this particular case, we will request all products added after December 2012. Following our previous example code, we can filter our collection by product creation date by running the following code on IMC:

```
// Product collection from our previous example
$productCollection->addFieldToFilter('created_at', array('from'
=> '2012-12-01));
```

It's that simple! We could even add any additional conditions and get the products added between two dates. Let's say we only want to retrieve the products that were created in the month of December:

```
$productCollection->addFieldToFilter('created_at', array('from'
  => '2012-12-01));
$productCollection->addFieldToFilter('created_at', array('to'
  => '2012-12-30));
```

Magento `addFieldToFilter` supports the following conditions:

| Attribute code | SQL condition |
|---|---|
| eq | = |
| neq | != |
| like | LIKE |
| nlike | NOT LIKE |
| in | IN () |
| nin | NOT IN () |
| is | IS |
| notnull | NOT NULL |
| null | NULL |
| moreq | >= |
| gt | > |
| lt | < |
| gteq | >= |
| lteq | <= |

We can try other types of filters. For example, let's use the following code on IMC after adding our creation date filter. So we can retrieve only visible products.

```
$productCollection->addAttributeToFilter('visibility', 4);
```

The visibility attribute is a special attribute used by products to control where products are shown. It has the following values:

- **Not visible individually**: This has a value of 1
- **Catalog**: This has a value of 2
- **Search**: This has a value of 3
- **Catalog and Search**: This has a value of 4

# Get bestseller products

To try and get the bestseller products for a specific category, we will need to step up our game and join with the `sales_order` table. Retrieving bestseller products will come in handy later to create a special category or custom reporting. We can run the following code on IMC:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
$productCollection->getSelect()
            ->join(array('o'=> 'sales_flat_order_item'),
            'main_table.entity_id = o.product_id', array(
            'o.row_total','o.product_id'))->group(array('sku'));
```

Let's analyze what's happening on the third line of our snippet. `getSelect()` is a method inherited directly from `Varien_Data_Collection_Db`, which returns the variable where the select statement is stored. Additionally, collections provide methods to specify a join and a group without actually having to write any SQL.

This is not the only way of adding a join to a collection. There is, in fact, another way of doing this by using the `joinField()` function which will result in a simpler query. Let's rewrite our previous code to make use of this function:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
$productCollection->joinField('o', 'sales_flat_order_item',
array('o.row_total','o.product_id'), 'main_table.entity_id =
o.product_id')
->group(array('sku'));
```

# Filter the product collection by visibility

This is extremely easy to do with the help of `addAttributeToFilter`. Magento products have a system attribute called visibility, which has four possible number values ranging from one to four. We are only interested in showing products that have a visibility of four, meaning they can be seen both in the search results and the catalog. Let's run the following code in IMC:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
$productCollection->addAttributeToFilter('visibility', 4);
```

If we change the visibility code, we can compare the different collection results.

# Filter products without images

Filtering products without images comes in handy when you are dealing with any third-party import system, which can at times be unreliable. As with everything we have done so far, product images are attributes of our product:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
$productCollectio->addAttributeToFilter(
'small_image',array('notnull'=>'','neq'=>'no_selection'));
```

By adding that extra filter, we are requiring products to have a small image specified. By default, Magento has three product image types, thumbnail, `small_image`, and image. These three types are used on different parts of the application. We could even set up a stricter rule for products if we wanted to:

```
$productCollection->addAttributeToFilter('small_image',
array('notnull'=>'','neq'=>'no_selection'));
->addAttributeToFilter('thumbnail,
array('notnull'=>'','neq'=>'no_selection'))
->addAttributeToFilter('image',
array('notnull'=>'','neq'=>'no_selection'));
```

Only products that have all of three types of images will be included in our collection. Try experimenting by filter with the different image types.

# Add multiple sort orders

Finally, let's take our collection and sort it first by stock status and then by price from highest to lowest. In order to retrieve the stock status information, we will use a method unique to the stock status Resource Model called `addStockStatusToSelect()`, which will take care of generating the corresponding SQL for our collection query:

```
$category = Mage::getModel('catalog/category')->load(5);
$productCollection = $category->getProductCollection();
$select = $productCollection->getSelect();
Mage::getResourceModel('cataloginventory/stock_status'
)->addStockStatusToSelect($select, Mage::app()->getWebsite());
$select->order('salable desc');
$select->order('price asc');
```

Inside this query, Magento will sort products by the salable status, which is either true or false, and by price. The end result is where all the available products show in the order of first ordered, from most expensive to cheapest, and then the out-of-stock products will show from most expensive to cheapest.

Experiment with different sort order combinations to see how Magento organizes and orders the product collections.

# Using Direct SQL

So far we have learned how Magento data models and ORM systems provide a clean and simple way to access, store, and manipulate our data. Before we jump right into this section and learn about the Magento database adapters and how to run raw SQL queries, I feel it is important that we understand why you should avoid using what you are about to learn in this section as much as possible.

Magento is an extremely **complex system**, and as we've also learned in the previous chapter, a framework driven in part by events. Just saving a product will trigger half a dozen different events, each doing a different task. This will not happen if you decide to just create a query and update a product directly. So, as developers, we must be extremely careful and be sure there is a justifiable reason to go outside the ORM.

That said, there are of course scenarios when being able to work with the database directly comes in extremely handy and is actually simpler than working with the Magento models. For example, when updating the product attribute globally or changing a product collection status, we could load a product collection and loop through each of the individual products, updating and saving them. While this will work fine on smaller collections, as soon we start growing and working with a larger dataset, our performance starts dropping and the script takes several seconds to execute.

On the other hand, a Direct SQL query will execute much faster (usually under one second) depending on the size of the dataset and the query being executed.

Out-of-the-box Magento will take care of all the heavy lifting of having to establish a connection to the database by using the `Mage_Core_Model_Resource` model. Magento makes three types of connections available to us, `core_read`, `core_setup` and `core_write`. For now, we will only focus on `core_read` and `core_write`.

Let's start by instantiating a Resource Model and two connections, one to read and the other to write:

```
$resource = Mage::getModel('core/resource');
$read = $resource->getConnection('core_read');
$write = $resource->getConnection('core_write');
```

Even if we are working with Direct SQL queries, thanks to Magento, we don't have to worry about setting up the connection to the DB beyond instantiating a Resource Model and the proper type of connection.

# Reading

Let's test our read connection by executing the following code:

```
$resource = Mage::getModel('core/resource');
$read = $resource->getConnection('core_read');
$query = 'SELECT * FROM catalog_product_entity';
$results = $read->fetchAll($query);
```

Although this query works and it will return all the products in the `catalog_product_entity` table, what will happen if we try to run this same code on a Magento installation that uses table prefixes? Or what if Magento suddenly changes the table name in the next upgrade? This code is not portable or easily maintainable. Fortunately, the Resource Model provides another handy method called `getTableName()`.

The `getTableName()` method will take a factory name as a parameter, and based on the configuration established by the config.xml, it will not only find the right table, but will also verify if the table exists in the DB. Let's update our code to use `getTableName()`:

```
$resource = Mage::getModel('core/resource');
$read = $resource->getConnection('core_read');
$query = 'SELECT * FROM ' .
$resource->getTableName('catalog/product');
$results = $read->fetchAll($query);
```

We are also using the `fetchAll()` method that will return all the rows returned by our query as an array, but this is not the only available method. We also have `fetchCol()` and `fetchOne()` at our disposition:

- `fetchAll`: This retrieves all the rows returned by the original query.
- `fetchOne`: This returns only the values from the first database row returned by the query.
- `fetchCol`: This returns all the columns returned by the query but only the first row. This is useful if you only want to retrieve a single column with unique identifiers such products IDs or SKUs.

# Writing

As we mentioned before, saving a model in Magento, be it a product, category, customer, or anything else, can be relatively slow due to the amount of observers and events triggered in the backend.

However, if we are only looking to update simple static values, updating large collections can be a painfully slow process if done through the Magento ORM. Let's say that, for example, we want to make all the products on the site out of stock. Instead of doing this through the Magento backend or creating a custom script that iterates through a collection of all the products, we can simply do as follows:

```
$resource = Mage::getModel('core/resource');
$read = $resource->getConnection('core_write);
$tablename = $resource->getTableName(
'cataloginventory/stock_status');
$query = 'UPDATE {$tablename} SET `is_in_stock` = 0';
$write->query($query);
```

# Summary

In this chapter, we have learned about Magento models, their inheritance and purpose, and how Magento uses resources and collections to implement its own ORM.

We also learned about EAV models and how they are structured to provide Magento with data flexibility and extensibility that both merchants and developers can take advantage of.

Finally, we saw how developers can access the database directly by writing DirectSQL and using the Magento resource adapters.

The chapters so far have been more theory than practice. This has been done with the intention of guiding you through the complexity of Magento and providing you with the tools and knowledge that you require for the rest of the book. For the remaining chapters of the book, we will take a more hands-on approach and start building extensions, incrementally applying all the concepts we have learned so far.

Our next chapter is called *Frontend Development* where we will start getting our feet wet and develop our first Magento extension.

# 3
# Frontend Development

So far, we have focused on the theory behind Magento, its architecture, and getting familiar with the common and important concepts of everyday Magento development.

In this chapter, we will give practical use to the skills and knowledge we have acquired so far by incrementally building a Magento extension for our frontend. We will build a fully functional gift registry extension.

## Extending Magento

Before jumping ahead and building our extension, let's define an example scenario and a scope for our extension. This way, we will have a clear idea of what we are building, and more importantly, what we are not building.

## Scenario

Our scenario is simple. We want to extend Magento to allow customers to create gift registry lists and share them with their friends and families. Customers should be able to create multiple gift registries and specify the recipients of those gift registries.

A gift registry will hold the following information:

- Event type
- Event name
- Event date
- Event location
- List of products

# Features

Have a look at the following features:

- A store administrator can define multiple event types (birthdays, weddings, and gift registries)
- Create events and assign multiple gift registry lists to each event
- Customers can add products to their registries from the cart, wish list, or directly from the product pages
- Customers can have multiple gift registries
- People can share their registries with friends and family through e-mail and/or a direct link
- Friends and family can buy the items from the gift registry

# Further improvements

The following is a list of possible features that have been left out of this example extension due to their complexity, or in the case of social media, due to the fact that their APIs and the amount of social media platforms is ever changing. However, they are still a good challenge for readers who want to extend this module event further. These features are as follows:

- Social media integration
- Keep track of the request and fulfilled quantities for each registry item
- Specify multiple and different registry owners
- Delivery to the registry owner's address

# Hello Magento!

In previous chapters, we learned about the Magento code pools (core, community, and local). As we don't intend to distribute our module on Magento Connect, we will create it under the local directory.

All Magento modules are kept inside packages or namespaces. For example, all the core Magento modules are kept under the `Mage` namespace. For the purpose of this book, we will use **Magento Developer's Guide** (**Mdg**).

The Magento naming convention for modules is `Namespace_Modulename`

Our next step is to create the module structure and configuration files. We need to create a "namespace" directory under `app/code/local/`.

The namespace can be anything you like. The accepted convention is to use the company name or the author name as the namespace. So, our first step will be to create the directory `app/code/local/Mdg/`. This directory will hold not only our gift registry module, but any future modules we develop.

Under our namespace directory, we will also need to create a new directory with the name of our module which will hold all the code of a custom extension.

So let's go ahead and create a `Giftregistry` directory. Once that is done, let's create the rest of our directory structure located at `/app/code/local/Mdg/Giftregistry/`:

```
Block/
Controller/
controllers/
Helper/
etc/
Model/
sql/
```

Magento is a bit sensitive to the use of camel casing due to its use of factory methods. In general, it's a good idea to avoid using camel casing in our module/controller/action names. For more information on Magento naming conventions, please see the Appendices of this book.

As we have learned so far, Magento uses XML files as a central part of its configuration. In order for a module to be recognized and activated by Magento, we need to create a single file under `app/etc/modules/` following the `Namespace_Modulename.xml` convention. Let's create our file located at `app/etc/modules/Mdg_Giftregistry.xml`:

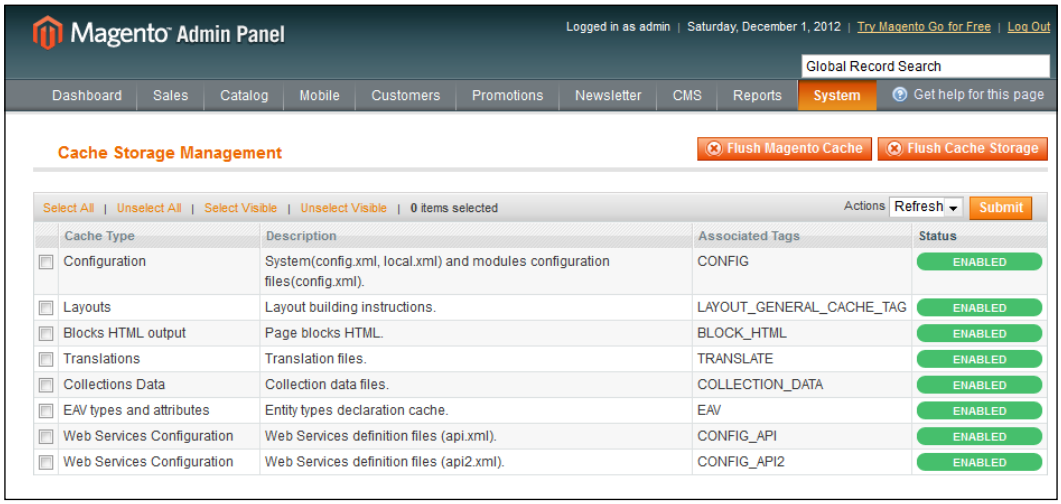
```
<?xml version="1.0"?>
<config>
  <modules>
    <Mdg_Giftregistry>
      <active>true</active>
      <codePool>local</codePool>
    </Mdg_Giftregistry>
  </modules>
</config>
```

After creating this file or making any changes to our module configuration files, we will need to refresh the Magento configuration cache:

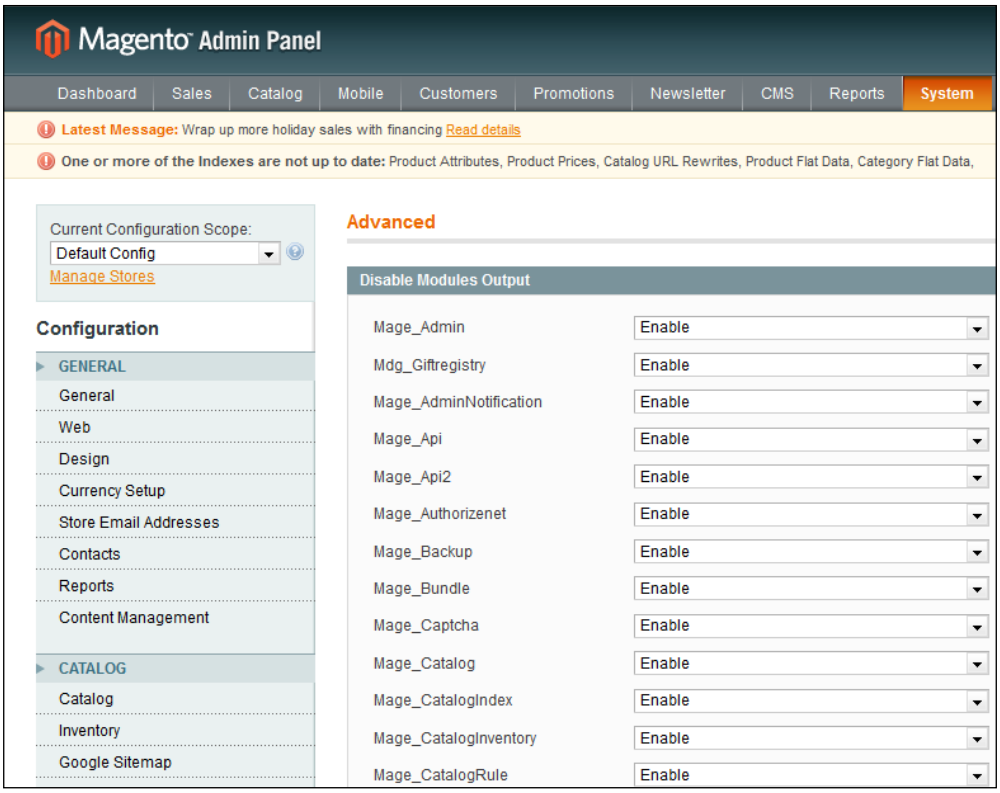
1. Navigate to the Magento backend.
2. Go to the **System | Cache Management** menu.
3. Click on **Flush Magento Cache**.

As we are working on a development extension and are going to make frequent changes to the configuration and extension code, it is a good idea to disable the cache as follows:

1. Navigate to the Magento backend.
2. Go to the **System | Cache Management** menu.
3. Select all the checkboxes under **Cache Type**.
4. Select **Disable** from the **Actions** drop-down menu.
5. Click on the **Submit** button.




Once we have cleared the cache, we can confirm that our extension is active by going into the Magento backend's **System | Advanced** section and confirming our new module is shown on the list.




Magento now knows about our module, but we haven't told Magento what our module is supposed to do. For that, we will need to set up the module configuration.

# The XML module configuration

There are two main files involved in a module configuration, `config.xml` and `system.xml`. In addition to these, module configuration is also stored in the following files:

- `api.xml`
- `adminhtml.xml`
- `cache.xml`
- `widget.xml`
- `wsdl.xml`
- `wsi.xml`
- `convert.xml`

In this chapter, we will only focus on `config.xml`. Let's create our base file and break down each of the nodes:

1. Start by creating the `config.xml` file under our module `etc/` directory.
2. Copy the given code to `config.xml`, located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
<?xml version="1.0">
<config>
  <modules>
    <Mdg_Giftregistry>
      <version>0.2.0</version>
    </Mdg_Giftregistry>
  </modules>
  <global>
    <models>
      <mdg_giftregistry>
        <class>Mdg_Giftregistry_Model</class>
      </mdg_giftregistry>
    </models>
    <blocks>
      <mdg_giftregistry>
        <class>Mdg_Giftregistry_Block</class>
      </mdg_giftregistry>
    </blocks>
    <helpers>
      <mdg_giftregistry>
        <class>Mdg_Giftregistry_Helper</class>
      </mdg_giftregistry>
    </helpers>
    <resources>
      <mdg_giftregistry_setup>
        <setup>
          <module>Mdg_Giftregistry</module>
        </setup>
      </mdg_giftregistry_setup>
    </resources>
  </global>
</config>
```

All module configurations are contained inside the `<config>` node. Inside this node, we have the `<global>` and `<modules>` nodes.

The `<modules>` node is just used to specify the current module version, which is later used to decide which installation and upgrade scripts to run.

There are three main configuration nodes that are most commonly used to specify the configuration scope:

- `<global>`
- `<adminhtml>`
- `<frontend>`

For now, we will be working on the `<global>` scope. This will make any configuration available to both the Magento frontend and backend. Under the `<global>` node, we have the following nodes:

- `<models>`
- `<blocks>`
- `<helpers>`
- `<resources>`

As we can see, each node follows the same configuration pattern:

```
<context>
  <factory_alias>
    <class>NameSpace_ModuleName_ClassType</class>
  </factory_alias>
</context>
```

Each of the nodes is used by the Magento class **factories** to instantiate our custom objects. The `<factory_alias>` node is a critical part of our extension configuration; it is used by factory methods such as `Mage::getModel()` or `Mage::helper()`.

Notice that we are not defining each specific **Model**, **Block**, or **Helper**, just the path where Magento factories can find them. The Magento naming convention allows us to have any folder structure under each of these folders and Magento will be smart enough to load the appropriated class.

In Magento, class names and directory structures are one and the same.

For example, we could have created a new model class under `app/code/local/Mdg/Giftregistry/Models/Folder1/Folder2/Folder3` and the factory name to instantiate an object from this class would be as follows:

```
Mage::getModel('mdg_giftregistry/folder1_folder2_folder3_classname');
```

Let's create our first model, or to be more specific, our helper class. Helpers are used to contain utility methods used to perform common tasks and can be shared among different classes.

Let's go ahead and create an empty helper class at `app/code/loca/Mdg/Giftregistry/Helper/Data.php` (we will add the helper logic later in this chapter):

```
<?php
  class Mdg_Giftregistry_Helper_Data extends
  Mage_Core_Helper_Abstract {

}
```

It may seem odd that we are naming our helper `Data`, but this is actually part of Magento standards. Each module has a default helper class named `Data`. Another interesting thing with helpers is that they can just pass `<factory_alias>` without a class-specific class name to the `helper` factory method and this will default to the `Data` helper class.

So, if we wanted to instantiate our default helper class, we only need to do the following:

```
Mage::helper('mdg_registry');
```

# Models and saving data

Before jumping straight to creating our models, we need to define clearly what type of models we are going to build and how many. So let's review our example scenario. For our gift registry, it appears that we will need two different models, which are as follows:

- **Registry model**: This is used to store the gift registry information such as gift registry type, address, and recipient information
- **Registry item**: This is used to store the information of each of the gift registry items (for example, quantity requested, quantity bought, and product_id)

Although this approach is correct, it does not meet all the requirements of our example scenario. By having all the registry information stored in a single table, we cannot add more registry types without modifying the code.

So, in this case, we need to break down our data into multiple tables:

- **Registry entity**: This is used to store the gift registry and event information
- **Registry type**: By storing the gift registry type into a separate table, we can add or remove event types
- **Registry item**: This is used to store the information of each of the gift registry items (for example, quantity requested, quantity bought, and product_id)

Now that we have defined our data structure, we can start building the corresponding models that will allow us to access and manipulate our data.

# Creating the models

Let's start by creating the `Giftregistry` type model, which is used to manage the registry types (wedding, birthday, baby shower, and so on):

1. Navigate to the `Model` folder in our module directory.
2. Create a new file named `Type.php` and copy the following contents into the file located at `app/code/local/Mdg/Giftregistry/Model/Type.php`:

```
<?php
class Mdg_Giftregistry_Model_Type extends
  Mage_Core_Model_Abstract
{
  public function _construct()
  {
    $this->_init('mdg_giftregistry/type');
    parent::_construct();
  }
}
```

We also need to create a resource class. Every Magento data model has its own resource class. It is also important to clarify that only models that handle the data directly, be it a simple data model or an EAV model, need to have a resource class.

1. Navigate to the `Model` folder in our module directory.
2. Create a new folder under `Model`, named `Resource`.
3. Create a new file named `Type.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Type.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Type extends
  Mage_Core_Model_Resource_Db_Abstract
```

```
{
  public function _construct()
  {
    $this->_init('mdg_giftregistry/type', 'type_id');
  }
}
```

Finally, we will also need a `collection` class to retrieve all the available event types. Perform the following steps:

1. Navigate to the `Model/Resource` folder in our module directory.
2. Create a new folder named `Type`.
3. Create a new file named `Collection.php` in the `Type` folder and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Type/Collection.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Type_Collection
  extends Mage_Core_Model_Resource_Db_Collection_Abstract{
    public function _construct()
    {
      $this->_init('mdg_giftregistry/type');
      parent::_construct();
    }
}
```

Let's do the same and create another model to handle the gift registry items. This model will hold all the relevant product information for the registry items.

1. Navigate to the `Model` folder in our module directory.
2. Create a new file named `Item.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Item.php`:

```
<?php
class Mdg_Giftregistry_Model_Item extends
  Mage_Core_Model_Abstract
{
  public function __construct()
  {
    $this->_init('mdg_giftregistry/item');
    parent::_construct();
  }
}
```

Let's go ahead and create the resource class:

1. Navigate to the `Model` folder in our module directory.
2. Open the `Resource` folder.
3. Create a new file named `Item.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Item.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Item extends
  Mage_Core_Model_Resource_Db_Abstract
{
  public function _construct()
  {
    $this->_init('mdg_giftregistry/item', 'item_id');
  }
}
```

Finally, let's create the corresponding collection class:

1. Navigate to the `Model/Resource` folder in our module directory.
2. Create an `Item` folder.
3. Create a new file named `Item/Collection.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Item/Collection.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Item_Collection
  extends Mage_Core_Model_Resource_Db_Collection_Abstract
{
  public function _construct()
  {
    $this->_init('mdg_giftregistry/item');
    parent::_construct();
  }
}
```

Our next step will be to create our `registry` entity. This is the core of our registry and is the model that ties everything together. Perform the following steps:

1. Navigate to the `Model` folder in our module directory.

2. Create a new file named `Entity.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Entity.php`:

```
<?php
class Mdg_Giftregistry_Model_Entity extends
  Mage_Core_Model_Abstract
{
  public function __construct()
  {
    $this->_init('mdg_giftregistry/entity');
    parent::_construct();
  }
}
```

Let's go ahead and create the resource class:

1. Navigate to the `Model` folder in our module directory.
2. Open the `Resource` folder.
3. Create a new file named `Entity.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Entity.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Entity extends
  Mage_Core_Model_Resource_Db_Abstract{
  public function _construct()
  {
    $this->_init('mdg_giftregistry/entity',
      'entity_id');
  }
}
```

Finally, let's create the corresponding collection class:

1. Navigate to the `Model/Resource` folder in our module directory.
2. Create a new folder named `Entity`.
3. Create a new file named `Entity/Collection.php` and copy the following content into the file located at `app/code/local/Mdg/Giftregistry/Model/Resource/Entity/Collection.php`:

```
<?php
class Mdg_Giftregistry_Model_Resource_Entity_Collection
  extends Mage_Core_Model_Resource_Db_Collection_Abstract
{
  public function _construct()
  {
```

```
        $this->_init('mdg_giftregistry/entity');
        parent::_construct();
    }
}
```

So far, we haven't done more than blindly create new models by copying code and adding classes to our module. Now, let's test our newly created models.

In the previous version of this book, we were using **Interactive Magento Console** (**IMC**) to test code on the fly. Nowadays, the community has built a much more powerful tool that not only allows us to test code interactively, but also to run common and useful commands right from the shell. This tool is called **Netz98/n98-magerun**.

This Netz98/n98-magerun tool can be downloaded at `https://github.com/netz98/n98-magerun`.

Let's fire up the `dev` console and try out the new models by running the following command in the root of our Magento installation:

```
$ n98-magerun.php dev:console
```

The following code assumes you are running a Magento test installation with sample data:

1. We will start by loading the `customer` model:

   ```
   php > $customer = Mage::getModel('customer/customer')->load(1);
   ```

2. Next, we need to instantiate a new registry object:

   ```
   php > $registry = Mage::getModel('mdg_giftregistry/entity');
   ```

3. One handy function that is part of all Magento models is the `getData()` function, which returns an array of all the object attributes. Let's run this function on both the `registry` and `customer` objects, and compare the output:

   ```
   php > print_r($customer->getData());
   php > print_r($registry->getData());
   ```

4. You may notice that the customer has all the datasets for our John Doe example record, while the `registry` object returns a completely empty array. Let's change this by running the following code:

   ```
   php > $registry->setCustomerId($customer->getId());
   php > $registry->setTypeId(1);
   php > $registry->setWebsiteId(1);
   php > $registry->setEventDate('2012-12-12');
   php > $registry->setEventCountry('CA');
   php > $registry->setEventLocation('Toronto');
   ```

5. Now, let's try to print the `registry` data one more time by running the following:

   ```
   php > print_r($registry->getData());
   ```

6. Finally, to make our changes permanent, we need to call the model's `save()` function:

   ```
   php > $registry->save();
   ```

And oops! Something went wrong when saving the product. We got the following error in the console:

```
Fatal error: Call to a member function beginTransaction() on a non-object
in …/app/code/core/Mage/Core/Model/Abstract.php on line 313
```

What happened? The `save()` function that is being called is part of the parent class `Mage_Core_Model_Resource_Abstract`, which in turn calls the abstract class' `save()` function, but we are missing a critical part of our `config.xml` file.

In order for Magento to properly identify which resource class to use, we need to specify the resource model class and the matching table for each entity. Let's go ahead and update our configuration file:

1. Navigate to the extension `etc/` folder.
2. Open `config.xml`.
3. Update the `<models>` node located at `app/code/local/Mdg/Giftregistry/etc/config.xml` with the following code:

```
…
<models>
  <mdg_giftregistry>
    <class>Mdg_Giftregistry_Model</class>
    <resourceModel>mdg_giftregistry_mysql4</resourceModel>
  </mdg_giftregistry>
  <mdg_giftregistry_mysql4>
    <class>Mdg_Giftregistry_Model_Mysql4</class>
    <entities>
      <entity>
        <table>mdg_giftregistry_entity</table>
      </entity>
      <item>
        <table>mdg_giftregistry_item</table>
      </item>
      <type>
        <table>mdg_giftregistry_type</table>
```

```
            </type>
          </entities>
        </mdg_giftregistry_mysql4>
      </models>
      …
```

Now, before we can actually save a product to the database, we have to create our database tables first. Next, we will learn how to use setup resources to create our table structure and set our default data.

# Setup resources

Now that we have created our model code, we need to create setup resources in order to be able to save them. The setup resources will take care of creating the corresponding database tables. Now, we could just use straight **SQL** or a tool such as **phpmyadmin** to create all the tables. However, this is not the standard practice and by general rule, we should never modify the Magento database directly.

To achieve this, we will do the following:

- Define a setup resource on our configuration file
- Create a resource class
- Create an installer script
- Create a data script
- Create an upgrade script

## Defining a setup resource

When we first defined our configuration file, we defined a `<resources>` node, which is located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
<resources>
  <mdg_giftregistry_setup>
    <setup>
      <module>Mdg_Giftregistry</module>
    </setup>
  </mdg_giftregistry_setup>
</resources>
```

The first thing to notice is that `<mdg_giftregistry_setup>` is used as a unique identifier for our setup resource. The standard naming convention is `<modulename_setup>` and while it is not required, it is highly recommend to follow this naming convention. Creating this setup resource is not required for basic setup scripts and `Mage_Core_Model_Resource_Setup` can be used instead, but by creating our own setup class, we are planning ahead and giving ourselves more flexibility for future improvements.

Adding this resource node allows Magento to keep track of the versions and data of each of the extensions installed. We are going to use that functionality to our advantage and make an upgrade script to create the tables we need.

## Creating the upgrade script

Our next step is to create an upgrade script. This script contains all the SQL code to create our tables. First, let's take another quick look at our `config.xml` file. If we remember, the first node defined before our `<global>` node was the `<modules>` node, which is located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
<modules>
  <Mdg_Giftregistry>
    <version>0.2.0</version>
  </Mdg_Giftregistry>
</modules>
```

As we mentioned before, this node is required on all Magneto modules and is used to identify the current installed version of our module. This version number is used by Magento to identify which installation and upgrade scripts to run.

**A word on naming conventions**: Since Magento 1.6, the setup script naming conventions have changed. Originally, the `mysql4-install-x.x.x.php` naming convention was used. It is currently deprecated but still supported.

Since Magento 1.6, the naming convention for the setup script has changed and now, developers can make use of three different script types:

- **Install**: This is used when the module is first installed and no record of it exists on the `core_resource` table
- **Upgrade**: This is used if the version in the `core_resource` table is lower than the one in the `config.xml` file
- **Data**: This will run after the matching version install/upgrade script and is used to populate the tables with required data

Data scripts were introduced in Magento 1.6 and are stored under the data/ directory directly under our module's root. They follow a slightly different convention to the install and upgrade scripts, by adding the prefix.

Let's continue creating our registry entity table in our installation script, which is located at `app/code/local/Mdg/Giftregistry/sql/mdg_giftregistry_setup/upgrade-0.2.0-0.2.1.php`:

```
<?php

$installer = $this;
$installer->startSetup();
// Create the mdg_giftregistry/registry table
$tableName = $installer->getTable('mdg_giftregistry/entity');
// Check if the table already exists
if ($installer->getConnection()->isTableExists($tableName) !=
    true) {
    $table = $installer->getConnection()
        ->newTable($tableName)
        ->addColumn('entity_id',
        Varien_Db_Ddl_Table::TYPE_INTEGER, null,
            array(
                'identity' => true,
                'unsigned' => true,
                'nullable' => false,
                'primary' => true,
            ),
            'Entity Id'
        )
        ->addColumn('customer_id',
        Varien_Db_Ddl_Table::TYPE_INTEGER, null,
            array(
                'unsigned' => true,
                'nullable' => false,
                'default' => '0',
            ),
            'Customer Id'
        )
        ->addColumn('type_id', Varien_Db_Ddl_Table::TYPE_SMALLINT,
        null,
            array(
                'unsigned' => true,
                'nullable' => false,
```

```
            'default' => '0',
        ),
        'Type Id'
)
->addColumn('website_id',
Varien_Db_Ddl_Table::TYPE_SMALLINT, null,
        array(
            'unsigned' => true,
            'nullable' => false,
            'default' => '0',
        ),
        'Website Id'
)
->addColumn('event_name', Varien_Db_Ddl_Table::TYPE_TEXT,
255,
        array(),
        'Event Name'
)
->addColumn('event_date', Varien_Db_Ddl_Table::TYPE_DATE,
null,
        array(),
        'Event Date'
)
->addColumn('event_country',
Varien_Db_Ddl_Table::TYPE_TEXT, 3,
        array(),
        'Event Country'
)
->addColumn('event_location',
Varien_Db_Ddl_Table::TYPE_TEXT, 255,
        array(),
        'Event Location'
)
->addColumn('created_at',
Varien_Db_Ddl_Table::TYPE_TIMESTAMP, null,
        array(
            'nullable' => false,
        ),
        'Created At')
->addIndex($installer-
>getIdxName('mdg_giftregistry/entity',
array('customer_id')),
        array('customer_id'))
->addIndex($installer-
>getIdxName('mdg_giftregistry/entity',
```

```
        array('website_id')),
            array('website_id'))         ->addIndex($installer-
        >getIdxName('mdg_giftregistry/entity', array('type_id')),
            array('type_id'))
        ->addForeignKey(
            $installer->getFkName(
                'mdg_giftregistry/entity',
                'customer_id',
                'customer/entity',
                'entity_id'
            ),
            'customer_id', $installer-
            >getTable('customer/entity'), 'entity_id',
            Varien_Db_Ddl_Table::ACTION_CASCADE,
            Varien_Db_Ddl_Table::ACTION_CASCADE)
        ->addForeignKey(
            $installer->getFkName(
                'mdg_giftregistry/entity',
                'website_id',
                'core/website',
                'website_id'
            ),
            'website_id', $installer->getTable('core/website'),
            'website_id',
            Varien_Db_Ddl_Table::ACTION_CASCADE,
            Varien_Db_Ddl_Table::ACTION_CASCADE)
        ->addForeignKey(
            $installer->getFkName(
                'mdg_giftregistry/entity',
                'type_id',
                'mdg_giftregistry/type',
                'type_id'
            ),
            'type_id', $installer-
            >getTable('mdg_giftregistry/type'), 'type_id',
            Varien_Db_Ddl_Table::ACTION_CASCADE,
            Varien_Db_Ddl_Table::ACTION_CASCADE);

    $installer->getConnection()->createTable($table);
}
$installer->endSetup();
```

Please note that due to space constraints, we have not added the full installation script. You still need to add the installer code for the item and type tables. The full installation file and the code files can be downloaded directly at `https://github.com/amacgregor/mdg_giftreg`.

Now that might look like a lot of code, but it is only creating one of the tables. In order to make sense of it, let's break it down and see exactly what the code does.

The first thing to notice is that even if we are creating and setting database tables, we are not writing any SQL. The Magento ORM provides an adapter with the database. All the installation, upgrade, and data scripts inherit from `Mage_Core_Model_Resource_Setup`. Let's break down each of the functions being used in our installation script.

The first three lines of the script take off by instantiating both the `resource_setup` model and the connection. The rest of the script deals with setting up a new table instance and calls the following functions on it:

- `addColumn`: This function is used to define each of the table columns and takes the following five parameters:
    - `name`: This is the name of the column
    - `type`: This is the data storage type (`int`, `varchar`, `text`, and so on)
    - `size`: This is the column's length
    - `options`: This is an array of additional options for data storage
    - `comment`: This is the column's description
- `addIndex`: This function is used to define the indexes of a particular table and takes the following three parameters:
    - `index`: This is the index's name
    - `columns`: This can be a string with a single column name or an array with multiple ones
    - `options`: This is an array of additional options for data storage
- `addForeginKey`: This function is used to define foreign key relationships and it takes the following six parameters:
    - `fkName`: This is the foreign key's name
    - `column`: This is the foreign key column's name
    - `refTable`: This is the reference table's name.
    - `refColumn`: This is the reference table column's name.

- `onDelete`: This is the action to delete a row
- `onUpdate`: This is the action to update a row

The code creating each of our tables is basically composed of these three functions. After each table definition, the following code is executed:

```
$installer->getConnection()->createTable($table);
```

This code is telling our database adapter to convert our code into SQL and run it against the database. There is one important thing to notice. Instead of providing or hardcoding the database names, the following code is called:

```
$installer->getTable('mdg_giftregistry/entity')
```

This is the table alias that we defined earlier inside our `config.xml` files. To finish our installer, we need to create a `newTable` instance for each of our entities. The data scripts can be used to populate our tables. In our case, this will come in handy to set up some base event types.

We will first need to create a data installation script under the data folder. As we mentioned before, the structure is very similar to the SQL folder, and the only difference is that we append the data prefix to the matching installation/upgrade script. Perform the following steps:

1. Go to the module data folder by navigating to `app/code/local/Mdg/Giftregistry/data/`.
2. Create a new directory based on the resource. In this case, it would be `mdg_giftregistry_setup`.
3. Under `mdg_giftregistry_setup`, create a file named `data-upgrade-0.2.0-0.2.1.php`.
4. Copy the following code into the `data-upgrade-0.2.0-0.2.1.php` located at `app/code/local/Mdg/Giftregistry/data/mdg_giftregistry_setup/data-upgrade-0.2.0-0.2.1.php <?php`:

```
$registryTypes = array(
    array(
        'code' => 'baby_shower',
        'name' => 'Baby Shower',
        'description' => 'Baby Shower',
        'store_id' => Mage_Core_Model_App::ADMIN_STORE_ID,
        'is_active' => 1,
    ),
    array(
        'code' => 'wedding',
        'name' => 'Wedding',
```

```
            'description' => 'Wedding',
            'store_id' => Mage_Core_Model_App::ADMIN_STORE_ID,
            'is_active' => 1,
        ),
        array(
            'code' => 'birthday',
            'name' => 'Birthday',
            'description' => 'Birthday',
            'store_id' => Mage_Core_Model_App::ADMIN_STORE_ID,
            'is_active' => 1,
        ),
    );

    foreach ($registryTypes as $data) {
        Mage::getModel('mdg_giftregistry/type')
            ->addData($data)
            ->setStoreId($data['store_id'])
            ->save();
    }
```

Let's take a closer look at the last conditional block in the `data-install-0.1.0.php` script:

```
foreach ($registryTypes as $data) {
    Mage::getModel('mdg_giftregistry/type')
        ->addData($data)
        ->setStoreId($data['store_id'])
        ->save();
}
```

Now, if we refresh our Magento installation, the error should be gone. If we take a closer look at the `mdg_giftregistry_type` table, we should see the following records:

+ Options

| | type_id<br>Registry Type Id | code<br>Code | name<br>Name | description<br>Description | store_id<br>Store Id | is_active<br>Is Active |
|---|---|---|---|---|---|---|
| Edit Copy Delete | 2 | baby_shower | Baby Shower | Baby Shower | 0 | 1 |
| Edit Copy Delete | 3 | wedding | Wedding | Wedding | 0 | 1 |
| Edit Copy Delete | 4 | birthday | Birthday | Birthday | 0 | 1 |

As we learned before, the installation and data scripts will run the first time our module is installed. However, what happens in our case when Magento already thinks our module is installed?

As the module is already registered in the `core_resource` table, the installation scripts will not be run again unless Magento detects a version change in the extension. This is great to handle multiple releases of an extension but not very practical for development purposes.

Fortunately, it is easy to trick Magento into running our extension installation scripts again. We only have to delete the corresponding entry in the `core_resource` table:

1. Open your MySQL console. If you are using our Vagrant box, you can just open it by typing `mysql`.
2. Once we are in the MySQL shell, we need to select our working database.
3. Finally, we need to add the entry the `core_resource` table using the following query:

```
mysql> DELETE FROM core_resource WHERE code =
  'mdg_giftregistry_setup'
```

# What we have learned

So far, we have learned the following:

- To create the base directory structure for our Magento module
- The role and importance of the configuration files
- Creating models and setup resources
- The role and order of installation, upgrade, and data scripts

# Setting up our routes

Now that we are capable of saving and manipulating the data by using our models, we need to provide a way for customers to interact with the actual gift registries. Our first step is to need to create valid routes or URLs for the frontend.

As are many things in Magento, this is controlled by the configuration file. A route will convert a URL into a valid controller, action, and method.

Open our `config.xml` file and insert the following code, located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
<config>

  <frontend>
    <routers>
      <mdg_giftregistry>
```

```
            <use>standard</use>
            <args>
              <module>Mdg_Giftregistry</module>
              <frontName>giftregistry</frontName>
            </args>
          </mdg_giftregistry>
        </routers>
      </frontend>

    </config>
```

Let's break down the configuration code we just added:

- `<frontend>`: Previously, we added all the configurations inside the global scope. As we want our routes to only be available in the frontend, we need to declare our custom routes under the frontend scope.
- `<routers>`: This is the container tag that holds the configuration for our custom routes.
- `<mdg_giftregistry>`: The naming convention for this tag is to match the module name and is the unique identifier for our route.
- `<frontName>`: As we learned in *Chapter 2, ORM and Data Collections*, break down the URLs into the following sections: `http://localhost.com/frontName/actionControllerName/actionMethod/`.

Once we have defined our route configuration, we need to create an actual controller to handle all the incoming requests.

# IndexController

Our first step is to create an `IndexController` under our module controllers directory. Magento will always try to load the `IndexController` if no controller name is specified, this is located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
<?php
class Mdg_Giftregistry_IndexController extends
  Mage_Core_Controller_Front_Action
{
     public function indexAction()
  {
    echo 'This is our test controller';
     }
}
```

After creating our file, if we go to `http://localhost.com/giftregistry/index/index`, we should see a blank page with only the message `This is our test controller`. This is because we are not loading the layout. To properly load the layout of our customer controller, we need to change our action code to the following, which is located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
<?php
class Mdg_Giftregistry_IndexController extends
  Mage_Core_Controller_Front_Action
{
  public function indexAction()
  {
    $this->loadLayout();
    $this->renderLayout();
  }
}
```

Before going into the details of what is happening in the controller action, let's create the rest of the controllers and corresponding actions.

We need a controller that takes care of the basic operations for customers so that they are able to create, manage, and delete their registries. Also, we require a `SearchController` so that family and friends can locate the matching gift registries. Finally, we require a `ViewController` to show the registry's details.

Our first step is to add the remaining actions to the `IndexController` located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
<?php
class Mdg_Giftregistry_IndexController extends
  Mage_Core_Controller_Front_Action
{
    public function indexAction()
    {
        $this->loadLayout();
        $this->renderLayout();
        return $this;
    }

    public function deleteAction()
    {
        $this->loadLayout();
        $this->renderLayout();
        return $this;
```

```
        }

        public function newAction()
        {
            $this->loadLayout();
            $this->renderLayout();
            return $this;
        }

        public function editAction()
        {
            $this->loadLayout();
            $this->renderLayout();
            return $this;
        }

        public function newPostAction()
        {
            $this->loadLayout();
            $this->renderLayout();
            return $this;
        }

        public function editPostAction()
        {
            $this->loadLayout();
            $this->renderLayout();
            return $this;
        }
    }
```

Before we start adding all the logic to the `IndexController`, we need to take an extra step to prevent customers who are not logged in from accessing the `giftregistry` functionality. The Magento Front Controller already has a very useful method for handling this; it's called the `preDispatch()` method that is executed before any other action in the controller.

Open your `IndexController.php` and add the following code to the beginning of the class located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
<?php
class Mdg_Giftregistry_IndexController extends
  Mage_Core_Controller_Front_Action
{
```

```
public function preDispatch()
{
    parent::preDispatch();
    if (!Mage::getSingleton('customer/session')-
    >authenticate($this)) {
        $this->getResponse()-
        >setRedirect(Mage::helper('customer')->getLoginUrl());
        $this->setFlag('', self::FLAG_NO_DISPATCH, true);
    }
}
```

Now, if we try to load `http://localhost.com/giftregistry/index/index`, we will be redirected to the login page, unless we are logged into the frontend.

Our next step is to add all the logic to each of the controller actions so that the controller can properly handle creation, update, and deletion.

The index, new, and edit actions are mostly used to load and render the layout so there is not much logic involved in the controller. The `newPostAction()`, `editPostAction()`, and the `deleteAction()` controllers, on the other hand, handle heavier and more complicated logic.

Let's get started with the `newPostAction()` controller. This action is used to handle the data received from the `newAction()` form:

1. Open the `IndexController.php` file.
2. The first thing we will add to the action is an `if` statement to check if the request is a `Post` request that we can retrieve by using the following code:

   ```
   $this->getRequest()->isPost()
   ```

3. In addition to this, we also want to check if the request has actual data. To do this, we can use the following code:

   ```
   $this->getRequest()->getParams()
   ```

Once we have validated that the request is a proper request, and while we are receiving data, we need to actually create a gift registry. To do this, we must add a new function inside our registry model:

1. Open the registry `Entity` model.
2. Create a new function named `updateRegistryData()` and make sure the function takes two parameters, `$customer` and `$data`.

3. Add the following code inside this function located at `app/code/local/Mdg/Giftregistry/Model/Entity.php`:

```
public function updateRegistryData(Mage_Customer_Model_Customer
$customer,
  $data)
{
    try{
        if(!empty($data))
        {
            $this->setCustomerId($customer->getId());
            $this->setWebsiteId($customer->getWebsiteId());
            $this->setTypeId($data['type_id']);
            $this->setEventName($data['event_name']);
            $this->setEventDate($data['event_date']);
            $this->setEventCountry($data['event_country']);
            $this-
            >setEventLocation($data['event_location']);
        }else{
            throw new Exception("Error Processing Request:
            Insufficient Data Provided");
        }
    } catch (Exception $e){
        Mage::logException($e);
    }
    return $this;
}
```

This function will help us out by adding the form data into the current instance of the registry object, which means we need to create one inside our controller. Let's put the code for our controller together, which is located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
public function newPostAction()
{
    try {
        $data = $this->getRequest()->getParams();
        $registry = Mage::getModel('mdg_giftregistry/entity');
        $customer = Mage::getSingleton('customer/session')-
        >getCustomer();

        if($this->getRequest()->getPost() && !empty($data)) {
            $registry->updateRegistryData($customer, $data);
            $registry->save();
            $successMessage = Mage::helper('mdg_giftregistry')-
            >__('Registry Successfully Created');
            Mage::getSingleton('core/session')-
            >addSuccess($successMessage);
        }else{
```

```
            throw new Exception("Insufficient Data provided");
        }
    } catch (Mage_Core_Exception $e) {
        Mage::getSingleton('core/session')->addError($e-
        >getMessage());
        $this->_redirect('*/*/');
    }
    $this->_redirect('*/*/');
}
```

We have created a very basic controller action that will handle the registry creation and most of the possible exceptions.

Let's continue by creating the `editPostAction()` controller. This action is very similar to the `newPostAction()` controller. The main difference is that, in the case of the `editPostAction()` controller, we are working with an already existing registry record so we will need to add some validation before setting the data.

Let's take a closer look at the action code which is located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
public function editPostAction()
{
    try {
        $data = $this->getRequest()->getParams();
        $registry = Mage::getModel('mdg_giftregistry/entity');
        $customer = Mage::getSingleton('customer/session')-
        >getCustomer();

        if($this->getRequest()->getPosts() && !empty($data)) {
            $registry->load($data['registry_id']);
            if($registry) {
                $registry->updateRegistryData($customer, $data);
                $registry->save();
                $successMessage =
                Mage::helper('mdg_giftregistry')->__('Registry
                Successfully Saved');
                Mage::getSingleton('core/session')-
                >addSuccess($successMessage);
            }else {
                throw new Exception("Invalid Registry Specified");
            }
        }else {
            throw new Exception("Insufficient Data provided");
        }
    } catch (Mage_Core_Exception $e) {
```

```
            Mage::getSingleton('core/session')->addError($e-
            >getMessage());
            $this->_redirect('*/*/');
        }
        $this->_redirect('*/*/');
    }
```

As we can see, this code is pretty much the same as our `newPostAction()` controller, with the critical distinction that it tries to load an existing registry before updating the data.

**Challenge**: As the code between `editPostAction()` and `newPostAction()` are very similar, try combining both into a single post action that can be reused. To see the answer with the complete code and full breakdown, visit `http://www.magedevguide.com/challenge/chapter3/3`.

To finalize the `IndexController`, we need to add an action that allows us to delete a specific registry record. For this, we will use the `deleteAction()` controller.

Thanks to the Magento **Object Relation Mapping** (**ORM**) system, this process is really simple. Magento models inherit the `delete` function, which, as the name implies, will simply delete that specific model instance.

Inside your `IndexController`, add the following code, which is located at `app/code/local/Mdg/Giftregistry/controllers/IndexController.php`:

```
    public function deleteAction()
    {
        try {
            $registryId = $this->getRequest()-
            >getParam('registry_id');
            if($registryId && $this->getRequest()->getPost()){
                if($registry =
                Mage::getModel('mdg_giftregistry/entity')-
                >load($registryId))
                {
                    $registry->delete();
                    $successMessage =
                    Mage::helper('mdg_giftregistry')->__('Gift
                    registry has been succesfully deleted.');
                    Mage::getSingleton('core/session')-
                    >addSuccess($successMessage);
                }else{
                    throw new Exception("There was a problem deleting
                    the registry");
```

```
            }
        }
    } catch (Exception $e) {
        Mage::getSingleton('core/session')->addError($e-
        >getMessage());
        $this->_redirect('*/*/');
    }
}
```

The important actions to notice in our delete controller are as follows:

1. We check for the right type of request in our action.
2. We instantiate the registry object and verify if it is a valid one.
3. Finally, we call the `delete()` function on the registry instance.

You may notice by now that as we have made a critical omission, there is no way for us to add an actual product to our cart.

We will skip that particular action for now and create it after we have a better understanding of the blocks and layouts involved and how to interact with our custom controllers.

# SearchController

Now that we have a working `IndexController` that will handle most of the logic to modify actual registries, using the following steps, we will create the next controller, `SearchController`:

1. Create a new controller under the `controllers` directory with the name `SearchController`.
2. Copy the following code into the `SearchController.php` file located at `app/code/local/Mdg/Giftregistry/controllers/SearchController.php`:

```
<?php
class Mdg_Giftregistry_SearchController extends
  Mage_Core_Controller_Front_Action
{
    public function indexAction()
    {
        $this->loadLayout();
        $this->renderLayout();
        return $this;
    }
    public function resultsAction()
    {
```

```
            $this->loadLayout();
            $this->renderLayout();
            return $this;
        }
    }
```

We will leave our `indexAction()` as is for now and focus on the logic involved in `resultsAction()`, which will be taking the search parameters and loading a registry collection.

Let's take a look at the complete action code and break it down, this is located at `app/code/local/Mdg/Giftregistry/controllers/SearchController.php`:

```
public function resultsAction()
{
    $this->loadLayout();
    if ($searchParams = $this->getRequest()-
    >getParam('search_params')) {
        $results = Mage::getModel('mdg_giftregistry/entity')-
        >getCollection();
        if($searchParams['type']){
            $results->addFieldToFilter('type_id',
            $searchParams['type']);
        }
        if($searchParams['date']){
            $results->addFieldToFilter('event_date',
            $searchParams['date']);
        }
        if($searchParams['location']){
            $results->addFieldToFilter('event_location',
            $searchParams['location']);
        }
        $this->getLayout()-
        >getBlock('mdg_giftregistry.search.results')
            ->setResults($results);
    }
    $this->renderLayout();
    return $this;
}
```

As with the previous actions, we are taking the request parameters, but in this particular case, we load a gift registry collection and apply a field filter for each of the available fields. One thing that stands out is that this is the first time we are interacting with the layout directly from a Magento controller:

```
$this->getLayout()->getBlock('mdg_giftregistry.search.results')
        ->setResults($results);
```

What we are doing here is making the loaded registry collection available to that particular block instance.

# ViewController

Finally, we need a controller that allows the display of registry details regardless of whether a customer is logged in or not:

1. Create a new controller under the controllers directory with the name `ViewController`.
2. Open the controller that we just created and use the following placeholder code which is located at `app/code/local/Mdg/Giftregistry/controllers/ViewController.php`:

```
<?php
class Mdg_Giftregistry_ViewController extends
  Mage_Core_Controller_Front_Action
{
    public function viewAction()
    {
        $registryId = $this->getRequest()-
        >getParam('registry_id');
        if($registryId){
            $entity =
            Mage::getModel('mdg_giftregistry/entity');
            if($entity->load($registryId))
            {
                Mage::register('loaded_registry', $entity);
                $this->loadLayout();
                $this-
                >_initLayoutMessages('customer/session');
                $this->renderLayout();
                return $this;
            } else {
                $this->_forward('noroute');
                return $this;
            }
        }
    }
}
```

So here, we are using a new function named `Mage::register()`, which sets a global variable that we can retrieve later into the application flow by any method. This function is part of the Magento registry pattern, which comprises the following three functions:

- `Mage::register()`: This is used to set global variables
- `Mage::unregister()`: This is used to unset global variables
- `Mage::registry()`: This is used to retrieve global variables

We are using the registry function to provide access to the registry entity later down the application flow, and doing so in this particular case, to the view block that we will be creating next.

# Blocks and layouts

As we learned in *Chapter 2*, *ORM and Data Collections*, Magento separates its view layer into blocks, templates, and layout files. Blocks are objects that handle part of the logic. Templates are `.phtml` files that are a mix of HTML and PHP code. Layout files are XML files that control the position of the blocks.

Each module has its own layout file that is in charge of updating that specific module layout. We need to start by creating a layout file for our module:

1. Navigate to `app/design/frontend/base/default/layout/`.
2. Create a file named `mdg_giftregistry.xml`.
3. Add the following code located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<layout version="0.1.0">
  <mdg_giftregistry_index_index>
  </mdg_giftregistry_index_index>

  <mdg_giftregistry_index_new>
  </mdg_giftregistry_index_new>

  <mdg_giftregistry_index_edit>
  </mdg_giftregistry_index_edit>

  <mdg_giftregistry_view_view>
  </mdg_giftregistry_view_view>
```

```
    <mdg_giftregistry_search_index>
    </mdg_giftregistry_search_index>

    <mdg_giftregistry_search_results>
    </mdg_giftregistry_search_results>
</layout>
```

By adding our templates and layouts to the base/default theme, we'll make our templates and layouts available to all stores and themes.

If we take a closer look at the XML we just pasted, we can see that we have a default XML tag and several sets of tags. As we mentioned before, Magento routes are formed by a frontend name, a controller, and an action.

Each of the XML tags in the layout file represents one of our controllers and actions. For example, `<giftregistry_index_index>` will control the layout of our `IndexController` index action. Magento assigns each page a unique handle.

In order for Magento to recognize our layout file, we need to declare the layout file inside the `config.xml` file:

1. Navigate to the extension `etc/` folder.
2. Open `config.xml`.
3. Add the following code inside the `<frontend>` node, which is located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<frontend>
   <layout>
       <updates>
           <mdg_giftregistry module="mdg_giftregistry">
               <file>mdg_giftregistry.xml</file>
           </mdg_giftregistry>
       </updates>
   </layout>

</frontend>
```

# IndexController blocks and views

As we did before, we will start by building the `IndexController`. Let's define which templates and blocks we need to define for each of the actions:

- `Index`: This is a list of the current customer available registries
- `New`: This is used if we need a new form to capture the registry information
- `Edit`: This loads a specific registry data and loads them in the a form

For the index action, we need to create a new block named listed while the **New** and **Edit** actions can share their template form:

1. Let's start by creating the registry's `List` block.
2. Navigate to `app/code/local/Mdg/Giftregistry/Block/`.
3. Create a file named `List.php`.
4. Copy the following code which is located at `app/code/local/Mdg/Giftregistry/Block/List.php`:

```
<?php
class Mdg_Giftregistry_Block_List extends
  Mage_Core_Block_Template
{
    public function getCustomerRegistries()
    {
        $collection = null;
        $currentCustomer =
        Mage::getSingleton('customer/session')-
        >getCustomer();
        if($currentCustomer)
        {
            $collection =
            Mage::getModel('mdg_giftregistry/entity')-
            >getCollection()
                ->addFieldToFilter('customer_id',
                $currentCustomer->getId());
        }
        return $collection;
    }
}
```

The previous code declares the `list` block that will be used in the `IndexController`. The blocks declares `getCustomerRegistries()`, which will check for the current customer and try to retrieve a collection of registries based on that customer.

Now that we have created a new block, we need to add it to our layout XML file:

1. Open the `mdg_giftregistry.xml` file.
2. Add the following code inside the `<mdg_gifregistry_index_index>` file located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<reference name="content">
    <block name="giftregistry.list"
    type="mdg_giftregistry/list" template="mdg/list.phtml"
    as="giftregistry_list"/>
</reference>
```

In the layout, we declare our block. Inside that declaration, we set the block name's template and type. If we try loading the `IndexController` page right now, because we have not created our template file, we should see an error about the missing template.

Let's create the template file:

1. Navigate to `design/frontend/base/default/template/`.
2. Create the `mdg/` folder.
3. Inside that folder, create a file named `list.phtml`, located at `app/design/frontend/base/default/template/mdg/list.phtml`:

```
<?php
$_collection = $this->getCustomerRegistries();
?>
<div class="customer-list">
    <ul>
        <?php foreach($_collection as $registry): ?>
            <li>
                <h3><?php echo $registry->getEventName();
                ?></h3>
                <p><strong><?php echo $this->__('Event
                Date:') ?> <?php echo $registry-
                >getEventDate(); ?></strong></p>
                <p><strong><?php echo $this->__('Event
                Location:') ?> <?php echo $registry-
                >getEventLocation(); ?></strong></p>
                <a href="<?php echo $this-
                >getUrl('giftregistry/view/view',
                array('_query' => array('registry_id' =>
                $registry->getEntityId()))) ?>">
                    <?php echo $this->__('View Registry')
                    ?>
                </a>
```

```
                </li>
            <?php endforeach; ?>
        </ul>
    </div>
```

This is the first time we generate a `.phtml` file. As we mentioned before, `.phtml` files are just a combination of PHP and HTML code.

In the case of `list.phtml`, the first thing we are doing is loading a collection by calling the `getCustomerRegistries()` method. One thing to notice is that we are actually calling `$this->getCustomerRegistries()`. Each template is assigned to a specific block.

We are missing a few important things:

- If there are no registries for the current customer, we would only display an empty unordered list
- There is no link to delete or edit a specific registry

One quick way to check if the collection has registries is to call the `count` function and display an error message if the collection is actually empty which is located at `app/design/frontend/base/default/template/mdg/list.phtml`:

```
<?php
    $_collection = $this->getCustomerRegistries();
?>
<div class="customer-list">
    <?php if(!$_collection->count()): ?>
        <h2><?php echo $this->__('You have no registries.')
        ?></h2>
        <a href="<?php echo $this-
        >getUrl('giftregistry/index/new') ?>">
            <?php echo $this->__('Click Here to create a new Gift
            Registry') ?>
        </a>
    <?php else: ?>
        <ul>
            <?php foreach($_collection as $registry): ?>
                <li>
                    <h3><?php echo $registry->getEventName();
                    ?></h3>
                    <p><strong><?php echo $this->__('Event Date:')
                    ?> <?php echo $registry->getEventDate();
                    ?></strong></p>
                    <p><strong><?php echo $this->__('Event
                    Location:') ?> <?php echo $registry-
```

```
                    >getEventLocation(); ?></strong></p>
                    <a href="<?php echo $this-
                    >getUrl('giftregistry/view/view',
                    array('_query' => array('registry_id' =>
                    $registry->getEntityId()))) ?>">
                        <?php echo $this->__('View Registry') ?>
                    </a>
                    <a href="<?php echo $this-
                    >getUrl('giftregistry/index/edit',
                    array('_query' => array('registry_id' =>
                    $registry->getEntityId()))) ?>">
                        <?php echo $this->__('Edit Registry') ?>
                    </a>
                    <a href="<?php echo $this-
                    >getUrl('giftregistry/index/delete',
                    array('_query' => array('registry_id' =>
                    $registry->getEntityId()))) ?>">
                        <?php echo $this->__('Delete Registry') ?>
                    </a>
                </li>
            <?php endforeach; ?>
        </ul>
    <?php endif; ?>
</div>
```

We have added a new `if` statement to check that the collection count is not empty and link it to the `IndexController` edit action. Finally, if there are no registries to show, we are displaying an error message linking to `newAction`.

Let's continue by adding the block and templates for the new action:

1. Open the `mdg_giftregistry.xml` layout file.
2. Add the following code inside the `<mdg_gifregistry_index_new>` node located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<reference name="content">
    <block name="giftregistry.new" type="core/template"
    template="mdg/new.phtml" as="giftregistry_new"/>
</reference>
```

As we are just displaying a form to post the registry information to `newPostAction()`, we are just creating a core/template block with the custom template file that will contain the form code. Our template file is located at `app/design/frontend/base/default/template/mdg/new.phtml` and will look like this:

```
<?php $helper = Mage::helper('mdg_giftregistry'); ?>
<form action="<?php echo $this-
  >getUrl('giftregistry/index/newPost/') ?>" method="post"
  id="form-validate">
    <fieldset>
        <?php echo $this->getBlockHtml('formkey')?>
        <ul class="form-list">
            <li>
                <label for="type_id"><?php echo $this->__('Event
                type') ?></label>
                <select name="type_id" id="type_id">
                    <?php foreach($helper->getEventTypes() as
                    $type): ?>
                        <option id="<?php echo $type->getTypeId();
                        ?>" value="<?php echo $type->getCode();
                        ?>">
                            <?php echo $type->getName(); ?>
                        </option>
                    <?php endforeach; ?>
                </select>
            </li>
            <li class="field">
                <input type="text" name="event_name"
                id="event_name" value="" title="Event Name"/>
                <label class="giftreg" for="event_name"><?php echo
                $this->__('Event Name') ?></label>
            </li>
            <li class="field">
                <input type="text" name="event_location"
                id="event_location" value="" title="Event
                Location"/>
                <label class="giftreg" for="event_location"><?php
                echo $this->__('Event Location') ?></label>
            </li>
            <li class="field">
                <input type="text" name="event_country"
                id="event_country" value="" title="Event
                Country"/>
                <label class="giftreg" for="event_country"><?php
                echo $this->__('Event Country') ?></label>
            </li>
        </ul>
        <div class="buttons-set">
            <button type="submit" title="Save" class="button">
```

```
                <span>
                    <span><?php echo $this->__('Save') ?></span>
                </span>
            </button>
        </div>
    </fieldset>
</form>
<script type="text/javascript">
    //<![CDATA[
    var dataForm = new VarienForm('form-validate', true);
    //]]>
</script>
```

So we are doing something new here, we are calling a helper. A helper is a class that contains methods that can be reused from blocks, templates, controllers, and so on. In our case, we are creating a helper that will retrieve all the available registry types:

1. Navigate to `app/code/local/Mdg/Giftregistry/Helper`.
2. Open the `Data.php` class.
3. Add the following code to it, which is located at `app/code/local/Mdg/Giftregistry/Helper/Data.php`:

```
<?php
class Mdg_Giftregistry_Helper_Data extends
  Mage_Core_Helper_Abstract {

public function getEventTypes()
    {
        $collection =
        Mage::getModel('mdg_giftregistry/type')-
        >getCollection();
        return $collection;
    }
}
```

Finally, we need to set up the `edit` template. The edit template will be exactly the same as the `new` template but with one major difference. We will check for the existence of a loaded registry and pre-populate the values of our fields in the `edit` template which is located at `app/design/frontend/base/default/template/mdg/edit.phtml`:

```
<?php
    $helper = Mage::helper('mdg_giftregistry');
    $loadedRegistry = Mage::getSingleton('customer/session')-
    >getLoadedRegistry();
?>
<?php if($loadedRegistry): ?>
```

```
<form action="<?php echo $this-
>getUrl('giftregistry/index/editPost/') ?>" method="post"
id="form-validate">
    <fieldset>
        <?php echo $this->getBlockHtml('formkey')?>
        <input type="hidden" id="type_id" value="<?php echo
        $loadedRegistry->getTypeId(); ?>" />
        <ul class="form-list">
            <li class="field">
                <label class="giftreg" for="event_name"><?php
                echo $this->__('Event Name') ?></label>
                <input type="text" name="event_name"
                id="event_name" value="<?php echo
                $loadedRegistry->getEventName(); ?>"
                title="Event Name"/>
            </li>
            <li class="field">
                <label class="giftreg"
                for="event_location"><?php echo $this-
                >__('Event Location') ?></label>
                <input type="text" name="event_location"
                id="event_location" value="<?php echo
                $loadedRegistry->getEventLocation(); ?>"
                title="Event Location"/>
            </li>
            <li class="field">
                <label class="giftreg"
                for="event_country"><?php echo $this-
                >__('Event Country') ?></label>
                <input type="text" name="event_country"
                id="event_country" value="<?php echo
                $loadedRegistry->getEventCountry(); ?>"
                title="Event Country"/>
            </li>
        </ul>
        <div class="buttons-set">
            <button type="submit" title="Save" class="button">
                <span>
                    <span><?php echo $this->__('Save')
                    ?></span>
                </span>
            </button>
        </div>
    </fieldset>
</form>
<script type="text/javascript">
    //<![CDATA[
```

```
        var dataForm = new VarienForm('form-validate', true);
        //]]>
    </script>
<?php else: ?>
    <h2><?php echo $this->__('There was a problem loading the
    registry') ?></h2>
<?php endif; ?>
```

Let's continue by adding the blocks and templates for the edit action.

1. Open the `mdg_giftregistry.xml` layout file.
2. Add the following code inside the `<mdg_gifregistry_index_edit>` node located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<reference name="content">
    <block name="giftregistry.edit" type="core/template"
    template="mdg/edit.phtml" as="giftregistry_edit"/>
</reference>
```

Once this is set, we can try creating a couple of test registries and modifying their properties.

**Challenge**: As with the controller, the edit and new form can be combined into a single reusable form. To see the answer with the complete code and full breakdown, visit `http://www.magedevguide.com/challenge/chapter3/4`.

# SearchController blocks and views

For our `SearchController`, we need a search template for our index, and for the results, we can actually reuse the registry list template simply by making a change to our controller:

1. Navigate to the `template` folder.
2. Create a file named `search.phtml`.
3. Add the following code located at `app/design/frontend/base/default/template/mdg/search.phtml`:

```
<?php $helper = Mage::helper('mdg_giftregistry'); ?>
<form action="<?php echo $this-
  >getUrl('giftregistry/search/results/') ?>" method="post"
  id="form-validate">
    <fieldset>
```

```
        <?php echo $this->getBlockHtml('formkey')?>
        <ul class="form-list">
            <li>
                <label for="type">Event type</label>
                <select name="type" id="type">
                    <?php foreach($helper->getEventTypes()
                    as $type): ?>
                        <option id="<?php echo $type-
                        >getTypeId(); ?>" value="<?php echo
                        $type->getCode(); ?>">
                            <?php echo $type->getName(); ?>
                        </option>
                    <?php endforeach; ?>
                </select>
            </li>
            <li class="field">
                <label class="giftreg" for="name"><?php
                echo $this->__('Event Name') ?></label>
                <input type="text" name="name" id="name"
                value="" title="Event Name"/>
            </li>
            <li class="field">
                <label class="giftreg" for="location"><?php
                echo $this->__('Event Location') ?></label>
                <input type="text" name="location"
                id="location" value="" title="Event
                Location"/>
            </li>
            <li class="field">
                <label class="giftreg" for="country"><?php
                echo $this->__('Event Country') ?></label>
                <input type="text" name="country"
                id="country" value="" title="Event
                Country"/>
            </li>
        </ul>
        <div class="buttons-set">
            <button type="submit" title="Save"
            class="button">
                    <span>
                        <span><?php echo $this->__('Save')
                        ?></span>
                    </span>
            </button>
        </div>
    </fieldset>
```

```
</form>
<script type="text/javascript">
    //<![CDATA[
    var dataForm = new VarienForm('form-validate', true);
    //]]>
</script>
```

You will notice a few things:

- We are using the helper model to populate the `Event` type IDs
- We are posting directly to the search/results

Now, let's make the appropriate change to our layout file.

1. Open the `mdg_giftregistry.xml`.
2. Add the following code inside `<mdg_gifregistry_search_index>` located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<reference name="content">
    <block name="giftregistry.search" type="core/template"
    template="mdg/search.phtml" as="giftregistry_search"/>
</reference>
```

For the search results, we don't need to create a new block type as we are passing the results collection directly to the block. In the layout, our changes will be minimal and we can reuse the list block to display the search registry results.

However, we do need to make a change in the controller. We need to change the function from `setResults()` to `setCustomerRegistries()` in the `SearchController` located at `app/code/local/Mdg/Giftregistry/controllers/SearchController.php`:

```
public function resultsAction()
{
    $this->loadLayout();
    if ($searchParams = $this->getRequest()-
    >getParam('search_params')) {
        $results = Mage::getModel('mdg_giftregistry/entity')-
        >getCollection();
        if($searchParams['type']){
            $results->addFieldToFilter('type_id',
            $searchParams['type']);
        }
        if($searchParams['date']){
            $results->addFieldToFilter('event_date',
            $searchParams['date']);
        }
```

```
            if($searchParams['location']){
                $results->addFieldToFilter('event_location',
                $searchParams['location']);
            }
            $this->getLayout()-
            >getBlock('mdg_giftregistry.search.results')
                ->setCustomerRegistries($results);
        }
        $this->renderLayout();
        return $this;
    }
```

Finally, let's update the layout files:

1. Open the `mdg_giftregistry.xml` file.
2. Add the following code inside `<mdg_gifregistry_search_results>`, located at `app/design/frontend/base/default/layout/mdg_giftregistry.xml`:

```
<reference name="content">
    <block name="giftregistry.results"
    type="mdg_giftregistry/list"
    template="mdg/list.phtml"/>
</reference>
```

This will be the end of our `SearchController` templates. However, there is a problem; our search results are displaying the delete and edit links for a registry. We need a way to restrict these links only to the owner.

We can do this with the following helper function, located at `app/code/local/Mdg/Giftregistry/Helper/Data.php`:

```
public function isRegistryOwner($registryCustomerId)
{
    $currentCustomer = Mage::getSingleton('customer/session')-
    >getCustomer();
    if($currentCustomer && $currentCustomer->getId() ==
    $registryCustomerId)
    {
        return true;
    }
    return false;
}
```

Let's update our template to use the new `helper` method located at `app/design/frontend/base/default/template/mdg/list.phtml`:

```
<?php
    $_collection = $this->getCustomerRegistries();
    $helper = Mage::helper('mdg_giftregistry')
?>
<div class="customer-list">
    <?php if(!$_collection->count()): ?>
        <h2><?php echo $this->__('You have no registries.')
        ?></h2>
        <a href="<?php echo $this-
        >getUrl('giftregistry/index/new') ?>">
            <?php echo $this->__('Click Here to create a new Gift
            Registry') ?>
        </a>
    <?php else: ?>
        <ul>
            <?php foreach($_collection as $registry): ?>
                <li>
                    <h3><?php echo $registry->getEventName();
                    ?></h3>
                    <p><strong><?php echo $this->__('Event Date:')
                    ?> <?php echo $registry->getEventDate();
                    ?></strong></p>
                    <p><strong><?php echo $this->__('Event
                    Location:') ?> <?php echo $registry-
                    >getEventLocation(); ?></strong></p>
                    <a href="<?php echo $this-
                    >getUrl('giftregistry/view/view',
                    array('_query' => array('registry_id' =>
                    $registry->getEntityId()))) ?>">
                        <?php echo $this->__('View Registry') ?>
                    </a>
                    <?php if($helper->isRegistryOwner($registry-
                    >getCustomerId())): ?>
                        <a href="<?php echo $this-
                        >getUrl('giftregistry/index/edit',
                        array('_query' => array('registry_id' =>
                        $registry->getEntityId()))) ?>">
                            <?php echo $this->__('Edit Registry')
                            ?>
                        </a>
                        <a href="<?php echo $this-
                        >getUrl('giftregistry/index/delete',
                        array('_query' => array('registry_id' =>
                        $registry->getEntityId()))) ?>">
```

```
                            <?php echo $this->__('Delete
                            Registry') ?>
                        </a>
                    <?php endif; ?>
                </li>
            <?php endforeach; ?>
        </ul>
    <?php endif; ?>
</div>
```

# ViewController blocks and views

For our `ViewController`, we just need to create a new template file and a new entry in the `layout.xml` file:

1. Navigate to the template directory.
2. Create a template named `view.phtml`.
3. Add the following code located at `app/design/frontend/base/default/template/mdg/view.phtml`:

```
<?php $registry = Mage::registry('loaded_registry'); ?>
<h3><?php echo $registry->getEventName(); ?></h3>
<p><strong><?php $this->__('Event Date:') ?> <?php echo
  $registry->getEventDate(); ?></strong></p>
<p><strong><?php $this->__('Event Location:') ?> <?php echo
  $registry->getEventLocation(); ?></strong></p>
```

Update the layout XML file `<mdg_gifregistry_view_view>`:

```
<reference name="content">
    <block name="giftregistry.view" type="core/template"
    template="mdg/view.phtml" as="giftregistry_view"/>
</reference>
```

**Challenge**: Improve the view form to return an error if there is not an actual loaded registry. To see the answer with the complete code and full breakdown, visit `http://www.magedevguide.com/challenge/chapter3/5`.

# Adding products to the registry

We are almost at the end of the chapter and we are yet to cover how to add products to our registries. Due to space concerns in this book, I have decided to move this section to the website at `http://www.magedevguide.com/chapter3/adding-products-registry`.

# Summary

In this chapter, we have covered a lot of ground. We have learned how to extend the frontend of Magento, and how to work with routes and controllers.

The Magento layout system allows us to modify and control blocks and the display on our store. We also started working with Magento data models and learned how to use them to handle and manipulate our data.

We have only touched the surface of frontend development and the data models. In the next chapter, we will expand a little more on configuration, models, and data, and we will explore and create an admin section on the Magento backend.

# 4
# Backend Development

In the previous chapter, we added all the frontend functionality for the gift registry. Now, customers are able to create registries and add products to the customer registries, and in general, have full control over their own registries.

In this chapter, we are going build all the functionality that store owners need to manage and control the registries through the Magento backend.

The Magento backend can be considered, in many senses, as a separate application from the Magento frontend. It uses a completely separate theme, style, and a different base controller.

For our gift registry, we want to allow store owners to see all customer registries, modify the information, and add/remove items. In this chapter, we will cover the following points:

- Extending Adminhtml with configuration
- Using the grid widget
- Using the form widget
- Restricting access and permissions with **Access Control Lists** (**ACLs**)

## Extending Adminhtml

`Mage_Adminhtml` is a single module that provides all the backend functionality for Magento through the usage of configuration. As we learned before, Magento uses scopes to define the configuration. In the previous chapter, we used the frontend scope to set up the configuration for our custom module.

To modify the backend, we need to create a new scope in our configuration file called `admin`. Perform the following steps to do so:

1. Open the `config.xml` file.
2. Add the following code to the file located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
<admin>
  <routers>
    <mdg_giftregistry>
      <use>admin</use>
        <args>
          <module>Mdg_Giftregistry_Adminhmtl</module>
          <frontName>giftregistry</frontName>
        </args>
    </mdg_giftregistry>
  </routers>
</admin>
```

This code is very similar to the one we used before to specify our frontend route. However, by declaring the route this way, we are breaking an unwritten Magento design pattern.

In order to keep things consistent on the backend, all new modules should extend the main admin route.

Instead of defining the route with the previous code, we are creating a completely new admin route.

Normally, you don't want to do this for the Magento backend unless you are creating a new route that requires admin access but not the rest of the Magento backend. A callback URL for an admin action would be a good example of something like this.

Fortunately, there is a very easy way to share route names among Magento modules.

Sharing route names was introduced in Magento 1.3, but to this day, we still see extensions that don't use this pattern properly.

Let's update our code:

1. Open the `config.xml` file.

2. Update the route's configuration file located at `app/code/local/Mdg/Giftregistry/etc/config.xml` with the following code:

```
<admin>
  <routers>
    <adminhtml>
      <args>
        <modules>
          <mdg_giftregistry
            before="Mage_Adminhtml">
            Mdg_Giftregistry_Adminhtml</mdg_giftregistry>
        </modules>
      </args>
    </adminhtml>
  </routers>
</admin>
```

After making this change, we can properly access our `admin` controllers through the `admin` namespace, for example, `http://magento.localhost.com/giftregistry/index` will now be `http://magento.localhost.com/admin/giftregistry/index`.

Our next step is to create a new controller that we can use to manage the customer registries. Let's call this controller `GiftregistryController.php`.

1. Navigate to your module's `controllers` folder.
2. Create a new folder named `Adminhtml`.
3. Create a file named `GiftregistryController.php`.
4. Insert the following code into this file located at `app/code/local/Mdg/Giftregistry/controllers/Adminhtml/GiftregistryController.php`:

```
<?php
class Mdg_Giftregistry_Adminhtml_GiftregistryController
  extends Mage_Adminhtml_Controller_Action
{
  public function indexAction()
  {
    $this->loadLayout();
    $this->renderLayout();
    return $this;
  }

  public function editAction()
  {
    $this->loadLayout();
    $this->renderLayout();
    return $this;
  }
```

```
    public function saveAction()
    {
      $this->loadLayout();
      $this->renderLayout();
      return $this;
    }

    public function newAction()
    {
      $this->loadLayout();
      $this->renderLayout();
      return $this;
    }

    public function massDeleteAction()
    {
      $this->loadLayout();
      $this->renderLayout();
      return $this;
    }
  }
```

Notice something important; this new controller extends `Mage_Adminhtml_Controller_Action` instead of `Mage_Core_Controller_Front_Action`, which we have been using so far. This is because the `Adminhtml` controller has additional validation to prevent non-admin users from accessing their actions.

Notice that we are placing our controller inside a new subfolder inside the `controllers/` directory. By using this subdirectory, we are keeping the frontend and backend controllers organized. This is a widely accepted Magento standard practice.

For now, let's leave this blank controller alone, extend the Magento backend navigation, and add some extra tabs to the customer edit page.

# Back to the configuration

As we have seen so far, much of Magento is controlled by XML configuration files and the backend layout is no different. We need a new `adminhtml` layout file. We create it as follows:

1. Navigate to the `design` folder.
2. Create a new folder named `adminhtml`, and inside it, create the following folder structure:
    - `adminhtml/`
    - `--default/`

- ----default/
- ------template/
- ------layout/

3. Inside the `layout` folder, let's create a new layout file called `giftregistry.xml`.
4. Copy the following code to the `layout` file located at `app/design/adminhtml/default/default/layout/giftregistry.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<layout version="0.1.0">
  <adminhtml_customer_edit>
    <reference name="left">
      <reference name="customer_edit_tabs">
        <block type="mdg_giftregistry/
          adminhtml_customer_edit_tab_giftregistry"
          name="tab_giftregistry_main" template=
          "mdg_giftregistry/giftregistry/
          customer/main.phtml" />
        <action method="addTab">
          <name>mdg_giftregistry</name>
          <block>tab_giftregistry_main</block>
        </action>
      </reference>
    </reference>
  </adminhtml_customer_edit>
</layout>
```

We also need to add the new layout file to the `config.xml` module:

1. Navigate to the `etc/` folder.
2. Open the `config.xml` file.
3. Copy the following code to the `config.xml` file located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

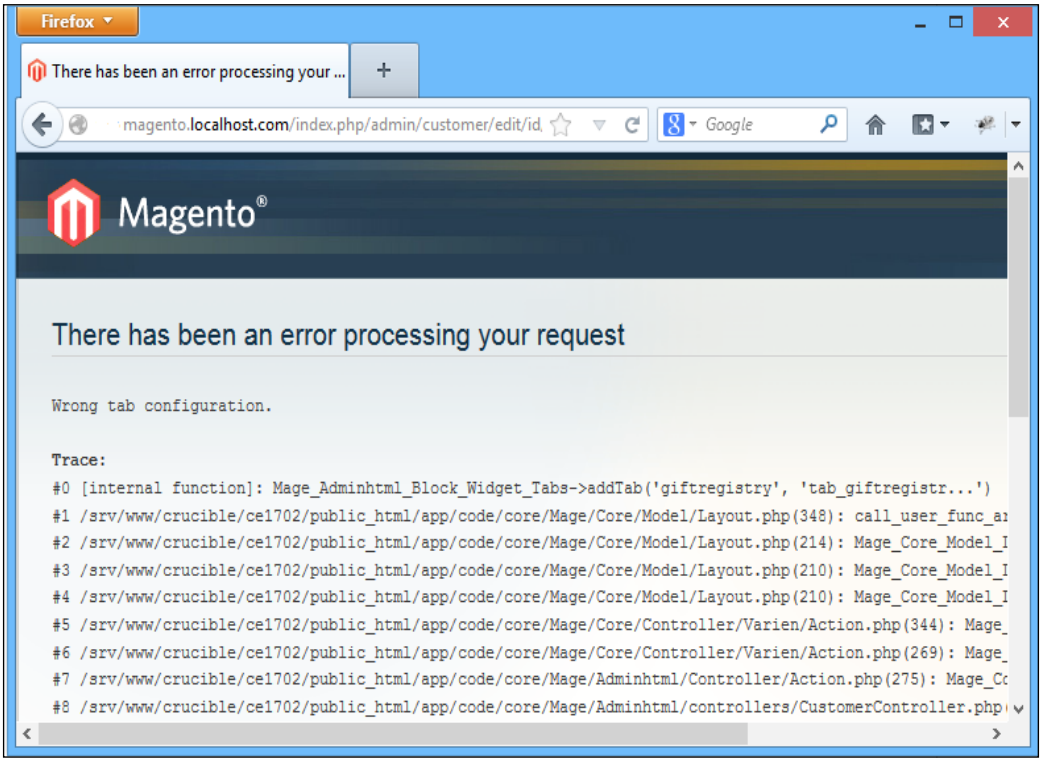
```
…
  <adminhtml>
    <layout>
      <updates>
        <mdg_giftregistry module="mdg_giftregistry">
          <file>giftregistry.xml</file>
```

```
            </mdg_giftregistry>
          </updates>
        </layout>
      </adminhtml>
...
```

What we are doing inside the layout is creating a new container block and declaring a new tab that contains this block.

Let's quickly test our changes so far by logging in to the Magento backend and opening the customer information by going into **Customer Manager** by navigating to **Customers** | **Manage Customers**.

We should get the following error at the backend:




This is because we are trying to add a block that has not been declared yet.

To fix this, we need to create a new block class:

1. Navigate to the `Block` folder and create a new block class following the directory structure named `Giftregistry.php`.
2. Add the following code to the `Giftregistry.php` file located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Customer/Edit/Tab/Giftregistry.php`:

```
<?php
class
Mdg_Giftregistry_Block_Adminhtml_Customer_Edit_Tab_Giftregistry
  extends Mage_Adminhtml_Block_Template
  implements Mage_Adminhtml_Block_Widget_Tab_Interface {

  public function __construct()
  {
    $this- >setTemplate
      ('mdg/giftregistry/customer/main.phtml');
    parent::__construct();
  }

  public function getCustomerId()
  {
    return Mage::registry('current_customer')->getId();
  }

  public function getTabLabel()
  {
    return $this->__('GiftRegistry List');
  }

  public function getTabTitle()
  {
    return $this->__('Click to view the customer Gift
      Registries');
  }

  public function canShowTab()
  {
    return true;
  }

  public function isHidden()
  {
```

```
        return false;
      }
    }
```

There are a couple of interesting things happening with this block class. For starters, we are extending a different block class, `Mage_Adminhtml_Block_Template`, and implementing a new interface, `Mage_Adminhtml_Block_Widget_Tab_Interface`. This is done in order to access all the features and functionality of the Magento backend.

We are also setting the block template inside the `construct` function of our class. Additionally, under `getCustomerId`, we are making use of the Magento global variables to get the current customer.

Our next step is to create the corresponding template file for this block, otherwise, we will get an error on the block initialization.

1. Create a template file named `main.phtml` under the `adminhtml` template folder.
2. Copy the following code into `main.phtml`, located at `app/design/adminhtml/default/default/template/mdg/giftregistry/customer/main.phtml`:

```
<div class="entry-edit">
  <div class="entry-edit-head">
    <h4 class="icon-head head-customer-view"><?php echo
      $this->__('Customer Gift Registry List') ?></h4>
  </div>
  <table cellspacing="2" class="box-left">
    <tr>
      <td>
        Nothing here
      </td>
    </tr>
  </table>
</div>
```

For now, we are just adding the placeholder content to the template, so we can actually see our tabs in action. Now, if we go to the customer section in the backend, we should see that a new tab is available. Clicking on that tab will display our placeholder content.

By now, we have modified the backend and added a **Customers** tab to the customer section just by changing a configuration and adding some simple blocks and template files. However, so far, this hasn't been particularly useful, so we need a way of displaying all the customer gift registries under the **Gift registry** tab.

# The grid widget

Instead of having to write our own grid blocks from scratch, we can reuse the ones that are already provided by the Magento `Adminhtml` module.

The block that we will be extending is called the grid widget. The grid widget is a special type of block designed to render a collection of Magento objects in a particular table grid.

A grid widget is normally rendered inside a grid container. The combination of both elements not only allows us to display our data in grid form, but also adds search, filtering, sorting, and mass action capabilities. Perform the following steps:

1. Navigate to the block's `Adminhtml/` folder and create a folder named `Giftregistry/`.
2. Create a class called `List.php` inside that folder.
3. Copy the following code inside `List.php`, located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Customer/Edit/Tab/Giftregistry/List.php`:

```
<?php
class
Mdg_Giftregistry_Block_Adminhtml_Customer_Edit_Tab_Giftregistry_
List extends Mage_Adminhtml_Block_Widget_Grid
{
  public function __construct()
  {
    parent::__construct();
    $this->setId('registryList');
    $this->setUseAjax(true);
    $this->setDefaultSort('event_date');
    $this->setFilterVisibility(false);
    $this->setPagerVisibility(false);
  }

  protected function _prepareCollection()
  {
    $collection = Mage::getModel('mdg_giftregistry/entity')
      ->getCollection()
      ->addFieldToFilter('main_table.customer_id', $this
        ->getRequest()->getParam('id'));
    $this->setCollection($collection);
    return parent::_prepareCollection();
  }
```

```
    protected function __prepareColumns()
    {
      $this->addColumn('entity_id', array(
        'header'   => Mage::helper('mdg_giftregistry')
          ->__('Id'),
        'width'    => 50,
        'index'    => 'entity_id',
        'sortable' => false,
      ));

      $this->addColumn('event_location', array(
        'header'   => Mage::helper('mdg_giftregistry')
          ->__('Location'),
        'index'    => 'event_location',
        'sortable' => false,
      ));

      $this->addColumn('event_date', array(
        'header'   => Mage::helper('mdg_giftregistry')
          ->__('Event Date'),
        'index'    => 'event_date',
        'sortable' => false,
      ));

      $this->addColumn('type_id', array(
        'header'   => Mage::helper('mdg_giftregistry')
          ->__('Event Type'),
        'index'    => 'type_id',
        'sortable' => false,
      ));
      return parent::_prepareColumns();
    }
}
```

Looking at the class we just created, there are only three functions involved:

- `__construct()`
- `_prepareCollection()`
- `_prepareColumns()`

In the `__construct` function, we are specifying a few important options about our grid class, we are setting the grid ID, and the default sort to by `event_date`, and we are enabling pagination and filtering.

The `_prepareCollection()` function loads a collection of registries filtered by the current customer ID. This function can be used for more complex operations in our collection as well. For example, joining a secondary table to get more information about the customer or another related record.

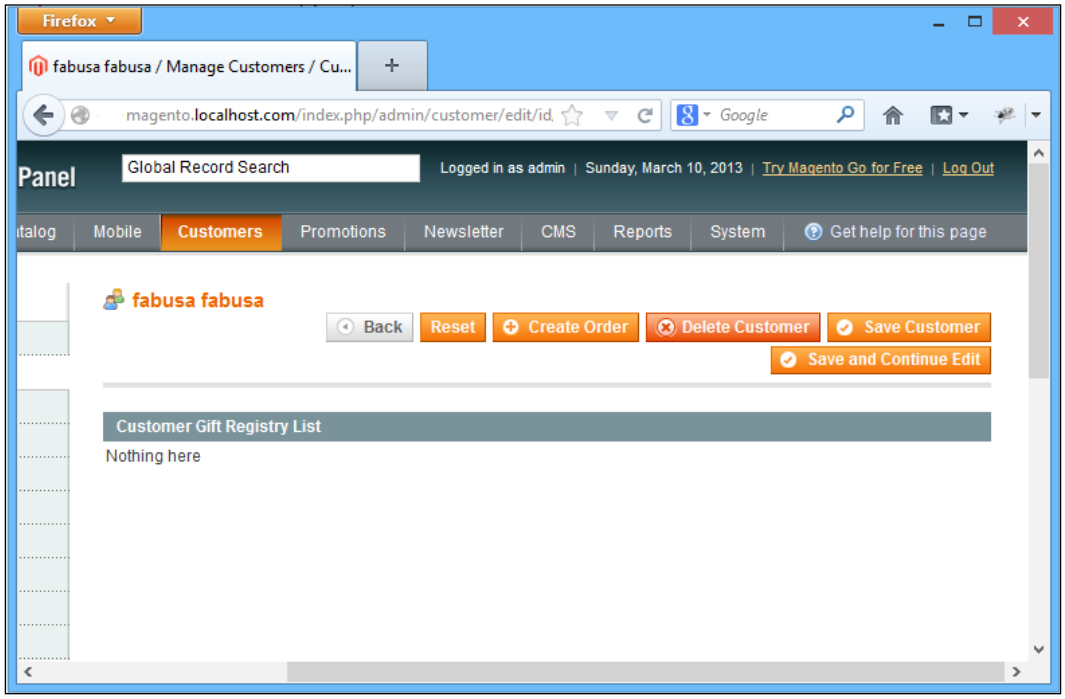
Finally, by using the `_prepareColumns()` function, we are telling Magento which attributes and columns of our data collection should be shown and how to render them.

Now that we have created a functional grid block, let's make some changes to our layout XML file in order to display it:

1. Open the `giftregistry.xml` folder under the `adminhtml` layout folder.
2. Make the following changes in this folder, which is located at `app/design/adminhtml/default/default/layout/giftregistry.xml`:

```
<?xml version="1.0"?>
<layout>
  <adminhtml_customer_edit>
    <reference name="left">
      <reference name="customer_edit_tabs">
        <block type="mdg_giftregistry/
          adminhtml_customer_edit_tab_giftregistry"
          name="tab_giftregistry_main"
          template="mdg/giftregistry/customer/main.phtml">
          <block type="mdg_giftregistry/
            adminhtml_customer_edit_tab_giftregistry_list"
            name="tab_giftregistry_list"
            as="giftregistry_list" />
        </block>
        <action method="addTab">
          <name>mdg_giftregistry</name>
          <block>mdg_giftregistry/
            adminhtml_customer_edit_tab_giftregistry
            </block>
        </action>
      </reference>
    </reference>
  </adminhtml_customer_edit>
</layout>
```

What we did was add the grid block as part of our main block, but if we go to the customer edit page and click on the **Gift Registry** tab, we still see the old placeholder text where the grid is not displayed:




This is because we haven't made the necessary changes to our `main.phtml` template file. In order to display children blocks, we specifically need to tell the templating system to load any or a specific child. For now, let's just load our specific grid block:

1. Open the `main.phtml` template file.
2. Replace the template code located at `app/design/adminhtml/default/default/template/mdg/giftregistry/customer/main.phtml` with the following code:

```
<div class="entry-edit">
  <div class="entry-edit-head">
    <h4 class="icon-head head-customer-view"><?php echo
      $this->__('Customer Gift Registry List') ?></h4>
  </div>
  <?php echo $this->getChildHtml('giftregistry_list'); ?>
</div>
```

The `getChildHtml()` function is responsible for rendering all the child blocks.

The `getChildHtml()` function can be called with a specific child block name or without parameters. When called without parameters, it will load all the available children blocks.

In our extension, we are only interested in instantiating a particular child block. So, we will be passing the block name as the function parameter. Now, if we refresh the page, we should see our grid block loaded with all the gift registries available for that particular customer.

# Managing the registries

Now, this comes in handy if we want to manage the registries for a specific customer, but it does not really help us if we want to manage all the registries available in a store. For the latter, we need to create a grid that loads all the available gift registries.

As we have already created a `giftregistry` controller for the backend, we can use the index action to display all the available registries.

The first thing we need to do is modify the Magento backend navigation to show a link to our new controller index action. Again, we can achieve this by using XML. In this particular case, we are going to create a new XML file named `adminhtml.xml`:

1. Navigate to your module `etc` folder.
2. Create a new file named `adminhtml.xml`.
3. Place the following content in the file located at `app/code/local/Mdg/Giftregistry/etc/adminhtml.xml`:

```
<?xml version="1.0"?>
<config>
  <menu>
    <mdg_giftregistry module="mdg_giftregistry">
      <title>Gift Registry</title>
      <sort_order>71</sort_order>
      <children>
        <items module="mdg_giftregistry">
          <title>Manage Registries</title>
          <sort_order>0</sort_order>
          <action>adminhtml/giftregistry/index</action>
        </items>
      </children>
    </mdg_giftregistry>
  </menu>
</config>
```

Note that while the standard is to have this configuration added inside the `adminhtml.xml` file, you are likely to encounter extensions where this standard is not followed. This configuration can be located inside the `config.xml` file.

This configuration code creates a new main level menu and a new child-level option under it. We are also specifying which action the menu should be mapped to, in this case, the index action of our `giftregistry` controller.

If we refresh the backend now, we should see a new gift registry menu added to the top-level navigation.

# Permissions and ACL

Sometimes we need to restrict access to certain features of our module, or even the whole module, based on the admin rule. Magento allows us to do this by using a power feature called Access Control List (ACL). Each role in the Magento backend can have different permissions and different ACLs.

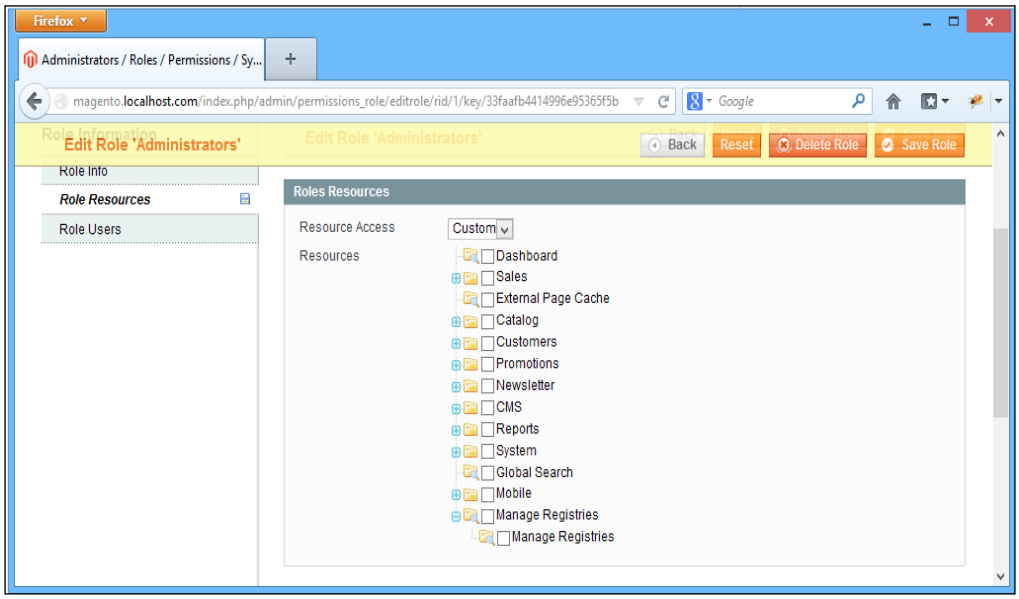
The first step to enable ACLs with our custom module is to define which resources should be restricted by the ACL. Not so surprisingly, this is controlled by the configuration XML files. Perform the following steps:

1. Open the `adminhtml.xml` configuration file.
2. Add the following code after the menu path `app/code/local/Mdg/Giftregistry/etc/adminhtml.xml`:

```
<config>
  <acl>
    <resources>
      <admin>
        <children>
          <giftregistry translate="title"
            module="mdg_giftregistry">
            <title>Gift Registry</title>
            <sort_order>300</sort_order>
            <children>
              <items translate="title"
                module="mdg_giftregistry">
                <title>Manage Registries</title>
                <sort_order>0</sort_order>
              </items>
            </children>
          </giftregistry>
```

```
            </children>
          </admin>
        </resources>
      </acl>
    </config>
```

Now, we go to the Magento backend by navigating to **System | Permissions | Roles**. Next, we select the administrator's role and try to set **Role Resources** at the bottom of the list. We will see the new ACL resources we created:




By doing this, we gain granular control over which operations each user has access to.

If we click on the **Manage Registries** menu, we should get a blank page. As we haven't created the corresponding grid block, layouts, and templates, we should see a completely blank page.

So, let's start by creating the blocks that we need for our new grid. The way we create our `giftregistry` grid will be slightly different from what we did for our **Customers** tab.

We need to create a grid container block and a grid block. The grid container is used to hold the grid header, the buttons, and the grid content, while the grid block is only in charge of rendering the grid with pagination, filtering, and mass actions.

Perform the following steps:

1. Go to your block `Adminhtml` folder.
2. Create a new block named `Registries.php`.
3. Add the following code to the block located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries.php`:

```
<?php
class Mdg_Giftregistry_Block_Adminhtml_Registries extends
  Mage_Adminhtml_Block_Widget_Grid_Container
{
public function __construct(){
  $this->_controller = 'adminhtml_registries';
  $this->_blockGroup = 'mdg_giftregistry';
  $this->_headerText = Mage::helper('mdg_giftregistry')
    ->__('Gift Registry Manager');
  parent::__construct();
  }
}
```

One important thing we are setting up in the `construct` function inside our grid container is the protected value of `_controller` and `_blockGroup`. Both are used by the Magento grid container to identify the corresponding grid block.

It is important to clarify that `$this->_controller` is not the actual controller's name but the `block` class' name, and `$this->_blockGroup` is actually the module's name.

Let's continue by creating the grid block that as we learned previously.
It has three main functions, namely `_construct`, `_prepareCollection()`, and `_prepareColumns()`. However, in this case, we will add a new function called `_prepareMassActions()`, which allow us to modify selected sets of records without having to edit each individually. Perform the following steps:

1. Navigate to your block's `Adminhtml` folder and create a new folder called `Registries`.
2. Under the `Model` folder, create a new block called `Grid.php`.
3. Add the following code in the block located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Grid.php`:

```
<?php
class Mdg_Giftregistry_Block_Adminhtml_Registries_Grid
  extends Mage_Adminhtml_Block_Widget_Grid
{
  public function __construct(){
    parent::__construct();
```

```
    $this->setId('registriesGrid');
    $this->setDefaultSort('event_date');
    $this->setDefaultDir('ASC');
    $this->setSaveParametersInSession(true);
  }

  protected function _prepareCollection(){
    $collection =
      Mage::getModel('mdg_giftregistry/entity')
      ->getCollection();
    $this->setCollection($collection);
    return parent::_prepareCollection();
  }

  protected function _prepareColumns()
  {
    $this->addColumn('entity_id', array(
      'header'   => Mage::helper('mdg_giftregistry')
        ->__('Id'),
      'width'    => 50,
      'index'    => 'entity_id',
      'sortable' => false,
    ));

    $this->addColumn('event_location', array(
      'header'   => Mage::helper('mdg_giftregistry')
        ->__('Location'),
      'index'    => 'event_location',
      'sortable' => false,
    ));

    $this->addColumn('event_date', array(
      'header'   => Mage::helper('mdg_giftregistry')
        ->__('Event Date'),
      'index'    => 'event_date',
      'sortable' => false,
    ));

    $this->addColumn('type_id', array(
      'header'   => Mage::helper('mdg_giftregistry')
        ->__('Event Type'),
      'index'    => 'type_id',
      'sortable' => false,
    ));
    return parent::_prepareColumns();
```

```
    }

    protected function _prepareMassaction(){
    }
}
```

This grid code is very similar to what we created before for the **Customers** tab with the exception that, this time, we are not specifically filtering by a customer record. Also, this time, we are also creating a grid container block instead of implementing a custom block.

Finally, in order to show the grid in our controller action, we need to perform the following steps:

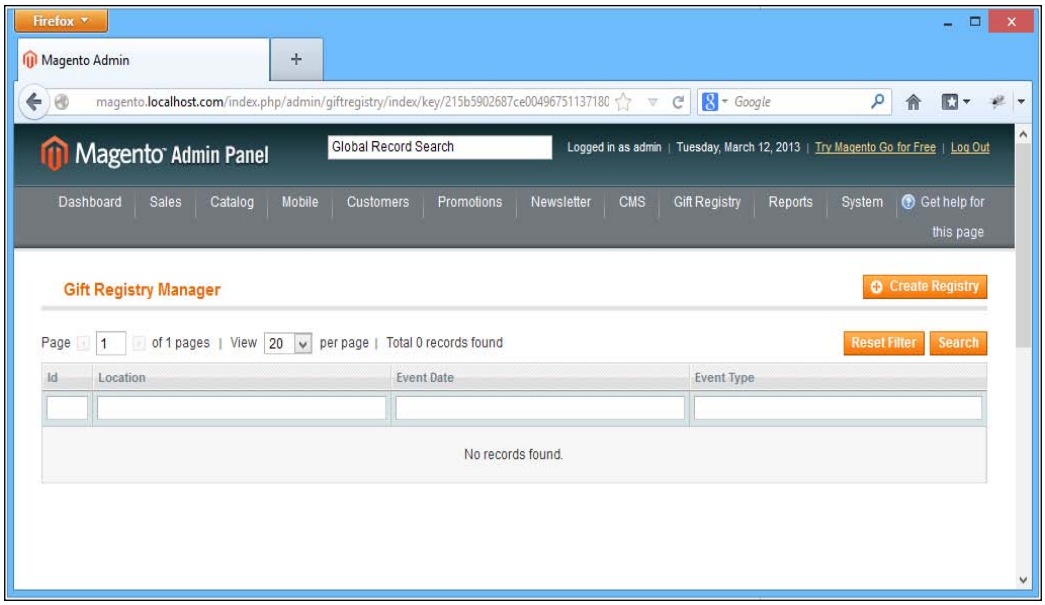
1. Open the `giftregistry.xml` file inside the `adminhtml` layout folder.
2. Add the following code in the `giftregistry.xml` file located at `app/code/design/adminhtml/default/default/layout/giftregistry.xml`:

```
…
  <adminhtml_giftregistry_index>
    <reference name="content">
      <block type="mdg_giftregistry/adminhtml_registries"
        name="registries" />
    </reference>
  </adminhtml_giftregistry_index>
…
```

As we are using a grid container, we only need to specify the grid container block; Magento will take care of loading the matching grid container.

There is no need to specify or create a template file for the grid or the grid container. Both blocks automatically load the base templates from the `adminhtml/default/default` theme.

Now, we can check our newly added gift registry by going to the backend. To do so, navigate to **Gift Registry** | **Manage Registries** and to the screen shown in the following screenshot:




# Updating in bulk with mass actions

When creating our base grid block, we defined a function called `_prepareMassactions()`. Mass actions provide an easy way of manipulating multiple records from the grid. In our case, for now, let's just implement a mass delete action. Perform the following steps to do so:

1. Open the `Giftregistry` grid block.
2. Replace the `_prepareMassaction()` function with the following code in this block located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Grid.php`:

```
protected function _prepareMassaction(){
  $this->setMassactionIdField('entity_id');
  $this->getMassactionBlock()
    ->setFormFieldName('registries');

  $this->getMassactionBlock()->addItem('delete', array(
    'label'     => Mage::helper('mdg_giftregistry')
      ->__('Delete'),
    'url'       => $this->getUrl('*/*/massDelete'),
    'confirm'   => Mage::helper('mdg_giftregistry')
      ->__('Are you sure?')
  ));
  return $this;
}
```

The way mass actions work is that they pass a series of selected IDs to our specified controller action (in this case `massDelete()`). Inside, the `massDelete()` action will add code to iterate through the registry collection and delete each of the specified registries. Perform the following steps:

1. Open the `GiftregistryController.php` file.
2. Replace the blank `massDelete()` action with the following code in the file located at `app/code/local/Mdg/Giftregistry/controllers/Adminhtml/GiftregistryController.php`:

```
…
public function massDeleteAction()
{
  $registryIds = $this->getRequest()
    ->getParam('registries');
    if(!is_array($registryIds)) {
      Mage::getSingleton('adminhtml/session')
        ->addError(Mage::helper('mdg_giftregistry')
        ->__('Please select one or more registries.'));
    } else {
      try {
        $registry =
          Mage::getModel('mdg_giftregistry/entity');
        foreach ($registryIds as $registryId) {
          $registry->reset()
                   ->load($registryId)
                   ->delete();
        }
        Mage::getSingleton('adminhtml/session')
          ->addSuccess(
        Mage::helper('adminhtml')->__('Total of %d
          record(s) were deleted.', count($registryIds))
        );
        } catch (Exception $e) {
        Mage::getSingleton('adminhtml/session')
          ->addError($e->getMessage());
        }
      }
    $this->_redirect('*/*/index');
}
…
```

**Challenge**: Add two new mass actions to change the status of the registries to enabled or disabled. To see the answer with the complete code and full breakdown, visit `http://www.magedevguide.com/`.

Finally, we also want to be able to edit the records listed in our grid. For that, we need to add a new function to our registries' grid class. This function is called `getRowUrl()` and is used to specify the action to be taken when clicking on a grid row. In our particular case, we want to map that function to the `editAction()` function. Perform the following steps:

1. Open the `Grid.php` file.
2. Add the following function to the file located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Grid.php`:

```
…
public function getRowUrl($row)
{
  return $this->getUrl('*/*/edit', array('id' => $row
    ->getEntityId()));
}
…
```

# The form widget

So far, we have a working gift registry grid, but right now, we aren't able to do much more than just getting the list of all the available registries or deleting registries in bulk. We need a way of getting the details for a specific registry. We can map this to the edit controller action.

The edit controller action will display the registry-specific details and will also allow us to modify the registry details and status. We need to create a few blocks and templates for this action.

In order to view and edit the registry information, we must implement a form widget block. Form widgets work in a similar fashion to the grid widget blocks and need to have a form block and a form container block that extend the `Mage_Adminhtml_Block_Widget_Form_Container` class.

In order to create the form container, let's take the following steps:

1. Navigate to the `Registries` folder.
2. Create a new class file named `Edit.php`.
3. Add the following code to the class file located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Edit.php`:

```
class Mdg_Giftregistry_Block_Adminhtml_Registries_Edit extends
Mage_Adminhtml_Block_Widget_Form_Container
{
  public function __construct(){
    parent::__construct();
    $this->_objectId = 'id';
    $this->_blockGroup = 'registries';
    $this->_controller = 'adminhtml_giftregistry';
    $this->_mode = 'edit';

    $this->_updateButton('save', 'label',
      Mage::helper('mdg_giftregistry')->__('Save
        Registry'));
    $this->_updateButton('delete', 'label',
      Mage::helper('mdg_giftregistry')->__('Delete
      Registry'));
  }

  public function getHeaderText(){
    if(Mage::registry('registries_data') &&
      Mage::registry('registries_data')->getId())
      return Mage::helper('mdg_giftregistry')->__("Edit
        Registry '%s'", $this
        ->htmlEscape(Mage::registry('registries_data')
        ->getTitle()));
      return Mage::helper('mdg_giftregistry')->__('Add
        Registry');
    }
}
```

Like the grid widget, the form container widget will automatically identify and load the matching form block.

One additional protected attribute that is being declared in the form container is the `mode` attribute. This protected attribute is used by the container to specify the location of the form block.

We can find the code responsible for the creation of the form block inside the `Mage_Adminhtml_Block_Widget_Form_Container` class:

```
$this->getLayout()->createBlock($this->_blockGroup . '/' . $this
  ->_controller . '_' . $this->_mode . '_form')
```

Now that we have created the form container block, we can proceed to create the matching form block:

1. Navigate to the `Registries` folder.
2. Create a new folder called `Edit`.
3. Inside the `Edit` folder, create a new file called `Form.php`.
4. Add the following code to the file located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Edit/Form.php`:

```
<?php
class Mdg_Giftregistry_Block_Adminhtml_Registries_Edit_Form
  extends Mage_Adminhtml_Block_Widget_Form
{
  protected function _prepareForm()
  {
    $form = new Varien_Data_Form(array(
      'id' => 'edit_form',
      'action' => $this->getUrl('*/*/save', array(
        'id' => $this->getRequest()->getParam('id')
      )),
      'method' => 'post',
      'enctype' => 'multipart/form-data'
    ));
    $form->setUseContainer(true);
    $this->setForm($form);

    if(Mage::getSingleton('adminhtml/session')
      ->getFormData()) {
      $data = Mage::getSingleton('adminhtml/session')
        ->getFormData();
      Mage::getSingleton('adminhtml/session')
        ->setFormData(null);
    } elseif(Mage::registry('registry_data'))
      $data = Mage::registry('registry_data')->getData();

    $fieldset = $form->addFieldset('registry_form', array(
      'legend' => Mage::helper('mdg_giftregistry')
        ->__('Gift Registry information')
    ));
```

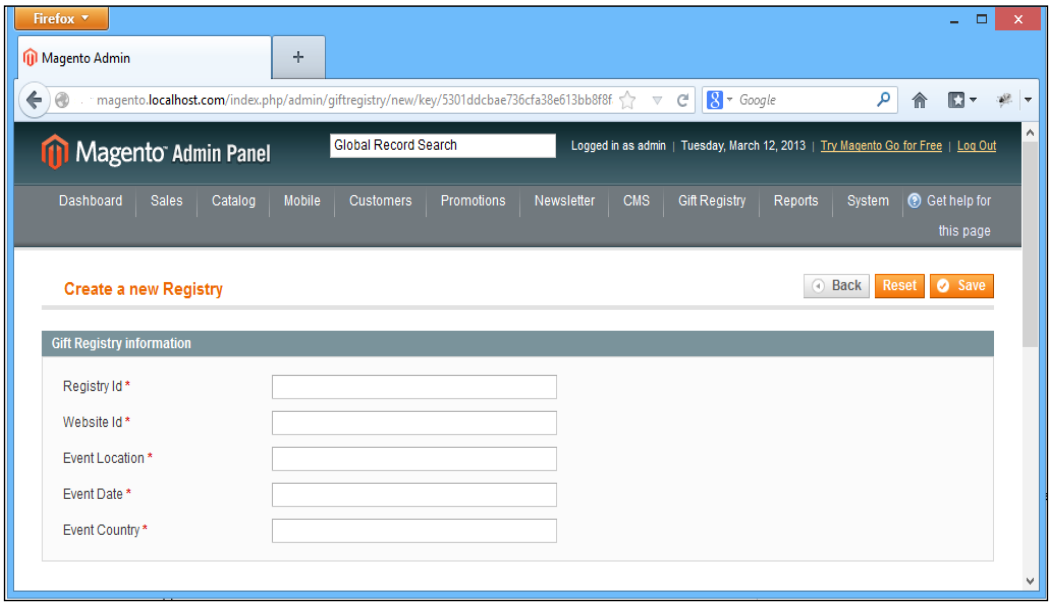
```
        $fieldset->addField('type_id', 'text', array(
          'label' => Mage::helper('mdg_giftregistry')
            ->__('Registry Id'),
          'class' => 'required-entry',
          'required' => true,
          'name' => 'type_id'
        ));

        $fieldset->addField('website_id', 'text', array(
          'label' => Mage::helper('mdg_giftregistry')
            ->__('Website Id'),
          'class' => 'required-entry',
          'required' => true,
          'name' => 'website_id'
        ));

        $fieldset->addField('event_location', 'text', array(
          'label' => Mage::helper('mdg_giftregistry')
            ->__('Event Location'),
          'class' => 'required-entry',
          'required' => true,
          'name' => 'event_location'
        ));

        $fieldset->addField('event_date', 'text', array(
          'label' => Mage::helper('mdg_giftregistry')
            ->__('Event Date'),
          'class' => 'required-entry',
          'required' => true,
          'name' => 'event_date'
        ));

        $fieldset->addField('event_country', 'text', array(
          'label' => Mage::helper('mdg_giftregistry')
            ->__('Event Country'),
          'class' => 'required-entry',
          'required' => true,
          'name' => 'event_country'
        ));

        $form->setValues($data);
        return parent::_prepareForm();
      }
    }
```

We also need to modify our layout file and tell Magento to load our form container:

Copy the following code to the `giftregistry.xml` layout file located at `app/code/design/adminhtml/default/default/layout/giftregistry.xml`:

```
<?xml version="1.0"?>
<layout version="0.1.0">
  …
  <adminhtml_giftregistry_edit>
    <reference name="content">
      <block type="mdg_giftregistry/adminhtml_registries_edit"
        name="new_registry_tabs" />
    </reference>
  </adminhtml_giftregistry_edit>
  …
```

We can check our progress at this point by going into the Magento backend and clicking on one of our example registries. We should see the following form:




However, there seems to be an issue. None of the data is loaded; we just have an empty form. We have to modify our `editAction()` controller in order to load the data.

# Loading the data

Let's start by modifying the `editAction()` function inside our `GiftregistryController.php` file located at `app/code/local/Mdg/Giftregistry/controllers/Adminhtml/GiftregistryController.php`:

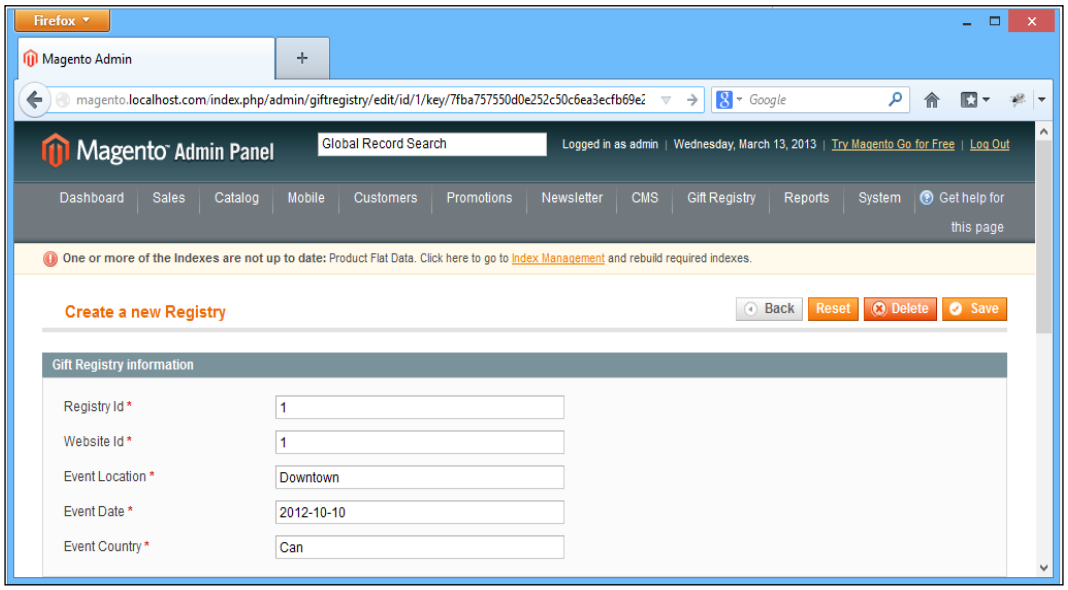
```
…
public function editAction()
{
  $id = $this->getRequest()->getParam('id', null);
  $registry  = Mage::getModel('mdg_giftregistry/entity');

  if ($id) {
    $registry->load((int) $id);
    if ($registry->getId()) {
      $data = Mage::getSingleton('adminhtml/session')
        ->getFormData(true);
      if ($data) {
        $registry->setData($data)->setId($id);
      }
    } else {
          Mage::getSingleton('adminhtml/session')
            ->addError(Mage::helper('awesome')->__('The Gift
            Registry does not exist'));
          $this->_redirect('*/*/');
        }
    }
    Mage::register('registry_data', $registry);

    $this->loadLayout();
    $this->getLayout()->getBlock('head')->setCanLoadExtJs(true);
    $this->renderLayout();
}
```

What we are doing inside our `editAction()` controller is checking for a registry with the same ID, and if it exists, we load that registry entity and make it available to our form. Previously, when adding the form code to the `Form.php` file located at `app/code/local/Mdg/Giftregistry/Block/Adminhtml/Registries/Edit/Form.php`, we included the following code:

```
…
if (Mage::getSingleton('adminhtml/session')->getFormData()){
  $data = Mage::getSingleton('adminhtml/session')
    ->getFormData();
  Mage::getSingleton('adminhtml/session')->setFormData(null);
}elseif(Mage::registry('registry_data'))
```

```
    $data = Mage::registry('registry_data')->getData();
…
```

Now, we can test our changes by reloading the form:




# Saving the data

Now that we have created the form to edit a registry, we need to create the corresponding action to process and save the data posted by the form. We can use the `saveAction()` function to handle this. Perform the following steps:

1. Open the `GiftregistryController.php` class.
2. Replace the blank `saveAction()` function with the following code to the file located at `app/code/local/Mdg/Giftregistry/controllers/Adminhtml/GiftregistryController.php`:

```
public function saveAction()
{
  if ($this->getRequest()->getPost())
  {
    try {
      $data = $this->getRequest()->getPost();
      $id = $this->getRequest()->getParam('id');

      if ($data && $id) {
```

```
            $registry =
              Mage::getModel('mdg_giftregistry/entity')
              ->load($id);
            $registry->setData($data);
            $registry->save();
            $this->_redirect('*/*/edit', array('id' => $this
              ->getRequest()->getParam('registry_id')));
          }
        } catch (Exception $e) {
          $this->_getSession()->addError(
            Mage::helper('mdg_giftregistry')->__('An error
              occurred while saving the registry data. Please
              review the log and try again.')
          );
          Mage::logException($e);
          $this->_redirect('*/*/edit', array('id' => $this
            ->getRequest()->getParam('registry_id')));
          return $this;
        }
      }
    }
```

Let's break down what this code does step by step:

1. It checks whether the request has valid post data.
2. It checks that both the `$data` and the `$id` variables are set.
3. If both variables are set, we load a new `registry` entity and set the data.
4. Finally, we try to save the `registry` entity.

The first thing we do is check that the data posted is not empty and that we are getting a registry ID as part of the parameters. We also check whether the registry ID is a valid instance of the registry entity.

# Summary

In this chapter, we learned how to modify and extend the Magento backend in accordance with our specific needs.

While extending, the frontend extends the functionality that the customers and users can use. Extending the backend allows us to control this custom functionality and how customers interact with it.

Grids and forms are important parts of the Magento backend and, by using them properly, we can add a lot of functionality without having to write a lot of code or reinventing the wheel.

Finally, we learned how to use the permissions and Magento ACL to control and restrict the permissions of our custom extension and Magento in general.

In the next chapter, we will dive deep into the Magento API and learn how to extend it to manipulate our registry data using several methods such as SOAP, XML-RPC, and REST.

# 5
# The Magento API

In the previous chapter, we extended the Magento backend and learned how to use some of the backend components, so that store owners can manage and manipulate the gift registry data of each customer.

In this chapter, we will go over the following topics:

- The Magento Core API
- The multiple API protocols available (**REST**, **SOAP**, and **XML-RPC**)
- How to use the Core API
- How to extend the API to implement a new functionality
- How to restrict parts of the API to specific web user roles

While the backend provides an interface for day-to-day operations, sometimes, we will need to access and transmit data to and from third-party systems. Magento already provides the API functionality for most of the core functionalities, but for our custom gift registry extension, we will need to extend the `Mage_Api` functionality.

## The Core API

Often, while talking about the API, I heard developers talk about the Magento SOAP API, the Magento XML-RPC API, or the RESTful API, but there is the important fact that these are not separate APIs for each of these protocols. Instead, Magento has a single Core API.

As you might notice, Magento is built mostly around abstraction and configuration (mostly XML), and the Magento API is no exception. We have a single Core API and adapters for each of the different protocol types. This is incredibly flexible, and if we want to, we can implement our adapter for another protocol.

The core Magento API gives us the ability to manage products, categories, attributes, orders, and invoices; this is done by exposing three of the core modules:

- `Mage_Catalog`
- `Mage_Sales`
- `Mage_Customer`

The API supports three different types: SOAP, XML-RPC, and REST. Now, if you have done web development outside Magento and with other APIs, it is most likely that these APIs have been RESTful APIs.

Before we jump into the specifics of the Magento API architecture, it is important that we understand the differences between each of the supported API types.

# XML-RPC

XML-RPC was one of the first supported protocols by Magento, and is the oldest of them all. This protocol has a single endpoint on which all the functions are called and accessed. The definition for XML-RPC is quoted on Wikipedia as follows:

> *XML-RPC is a remote procedure call (RPC) protocol that uses XML to encode its calls and HTTP as a transport mechanism.*

Since there is only a single endpoint, XML-RPC is easy to use and maintain; its purpose is to be a simple and effective protocol to send and receive data; and implementation uses straightforward XML to encode and decode a remote procedure call along with the parameters.

However, this comes at a cost, and there are several problems with the whole XML-RPC protocol:

- Lack of discoverability and documentation.
- Anonymous parameters, XML-RPC relies on the order of the parameters to differentiate them.
- Simplicity is both the greatest strength and the greatest issue with XML-RPC. While most of the tasks can easily be achieved with XML-RPC some tasks will require you to bend over backwards to achieve something that should be straightforward to implement.

Soap was designed to address XML-RPC limitations and provide a more robust protocol.

For more information about XML-RPC, you can refer to `http://en.wikipedia.org/wiki/XML-RPC`.

# SOAP

SOAP v1 was one of the first supported protocols by Magento along with XML-RPC, and SOAP v2 has been supported since the release of **Magento CE 1.3**.

The definition for SOAP is quoted on Wikipedia as follows:

> *SOAP, originally an acronym for Simple Object Access protocol, is a protocol specification for exchanging structured information in the implementation of web services in computer networks.*

A SOAP request is an `HTTP POST` request that contains a SOAP envelope, header, and body.

The core of SOAP is the **Web Services Description Language** (**WSDL**), which is XML. WSDL is used to describe the functionality of the web service, in this case, our API methods. This is achieved by using the following series of predetermined objects:

- `types`: The `types` elements are used to describe the data transmitted with the API; the `type` elements are defined using XML Schema, a special language for this purpose
- `message`: The `message` element is used to specify the information needed to perform each operation; in the case of Magento, our API methods will always use a request and a respond `message`
- `portType`: The `portType` elements are used the define the operations that can be performed and the corresponding messages
- `port`: The `port` element is used to define the connection point; in the case of Magento, a simple string is used
- `service`: The `service` element is used to specify which functions are exposed through the API
- `binding`: The `binding` elements are used to define the operations and the interface with the SOAP protocol

For more information about the SOAP protocol, you can refer to `http://en.wikipedia.org/wiki/SOAP`.

All the WSDL configuration is contained inside each module's `wsdl.xml` file; for example, let's take a look at an excerpt of the `Catalog Product` API, located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions xmlns="http://schemas.xmlsoap.org/wsdl/"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:typens="urn:{{var wsdl.name}}"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" name="{{var
  wsdl.name}}" targetNamespace="urn:{{var wsdl.name}}">
  <types>
    <schema xmlns="http://www.w3.org/2001/XMLSchema"
      targetNamespace="urn:Magento">
      ...
      <complexType name="catalogProductEntity">
        <all>
          <element name="product_id" type="xsd:string" />
          <element name="sku" type="xsd:string" />
          <element name="name" type="xsd:string" />
          <element name="set" type="xsd:string" />
          <element name="type" type="xsd:string" />
          <element name="category_ids"
            type="typens:ArrayOfString" />
          <element name="website_ids"
            type="typens:ArrayOfString" />
        </all>
      </complexType>
    </schema>
  </types>
  <message name="catalogProductListResponse">
    <part name="storeView"
      type="typens:catalogProductEntityArray" />
  </message>
  ...
  <portType name="{{var wsdl.handler}}PortType">
    ...
    <operation name="catalogProductList">
      <documentation>Retrieve products list by
        filters</documentation>
      <input message="typens:catalogProductListRequest" />
      <output message="typens:catalogProductListResponse" />
    </operation>
    ...
  </portType>
  <binding name="{{var wsdl.handler}}Binding" type="typens:{{var
    wsdl.handler}}PortType">
    <soap:binding style="rpc"
      transport="http://schemas.xmlsoap.org/soap/http" />
```

```
    ...
    <operation name="catalogProductList">
      <soap:operation soapAction="urn:{{var
        wsdl.handler}}Action" />
      <input>
        <soap:body namespace="urn:{{var wsdl.name}}"
          use="encoded" encodingStyle=
          "http://schemas.xmlsoap.org/soap/encoding/" />
      </input>
      <output>
        <soap:body namespace="urn:{{var wsdl.name}}"
          use="encoded" encodingStyle=
          "http://schemas.xmlsoap.org/soap/encoding/" />
      </output>
    </operation>
    ...
  </binding>
  <service name="{{var wsdl.name}}Service">
    <port name="{{var wsdl.handler}}Port" binding="typens:{{var
      wsdl.handler}}Binding">
      <soap:address location="{{var wsdl.url}}" />
    </port>
  </service>
</definitions>
```

Using WSDL, we can document, list, and support more complex data types.

# The RESTful API

The RESTful API is a new addition to the family of protocols supported by Magento and is only available on **Magento CE 1.7** or higher.

The definition for a RESTful web service can be quoted as follows:

> *A RESTful web service (also called a RESTful web API) is the web service implemented using HTTP and the principles of REST.*

A RESTful API can be defined by the following three aspects:

- It makes use of the standard of HTTP methods, such as `GET`, `POST`, `DELETE`, and `PUT`
- It exposes the URIs formatted in a directory-like structure
- It uses JSON or XML to transfer information

The REST API supports the response in two formats, which are XML and JSON.

One the advantages that REST has over SOAP and XML-RPC is that all interaction with the REST API is done through the HTTP protocol, which means that it can be used by virtually any programming language.

The Magento REST API has the following characteristics:

- Resources are accessed by making an HTTP request to the Magento API service
- The service will reply with the data for the request, a status indicator, or even both
- All resources can be accessed by using `https://magento.localhost.com/api/rest/` as URL
- Resources return **HTTP status codes**, such as `HTTP Status Code 200`, to indicate success on a response or `HTTP Status Code 400` to indicate a bad request
- Requests to a particular resource are done by adding a particular path to the base URL (`https://magento.localhost.com/api/rest/`)

REST uses **HTTP verbs** to manage the states of resources. In the Magento implementation, four verbs are available: `GET`, `POST`, `PUT`, and `DELETE`. For this reason, using the RESTful API is easy in most cases.

# Using the API

Now that we have clarified each of the available protocols, let's explore what we can do with the Magento API and how we can use it with each of the available protocols.

We will use the product endpoint as an example to access and work with the different API protocols.

The examples are provided in PHP and use the three different protocols. For complete examples in other programming languages, check out `http://magedevguide.com`.

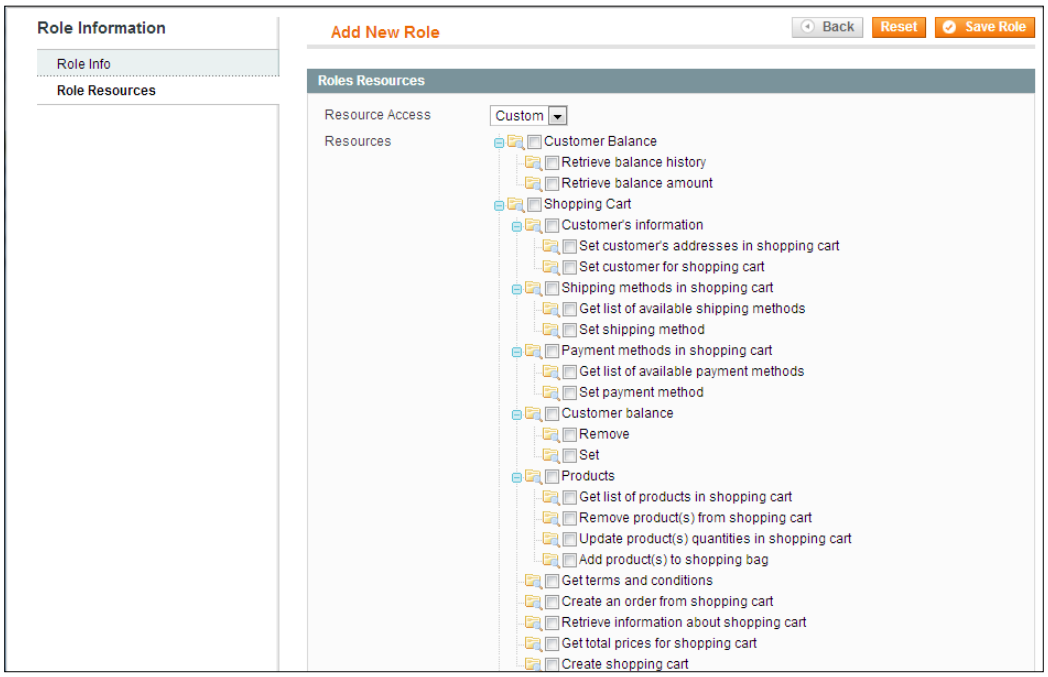
# Setting up the API credentials for XML-RPC/SOAP

Before we get started we, need to create a set of web service credentials in order to access the API functions.

The first thing that we need to set up is the API user role. **Roles** control the permissions for the API using **Access Control List** (**ACL**). By implementing this design pattern, Magento is able to restrict certain parts of its API to specific users.

Later on this chapter, we will learn how we can add our custom functions to the ACL and secure our custom extensions API methods. For now, we just need to create a role with full permissions:

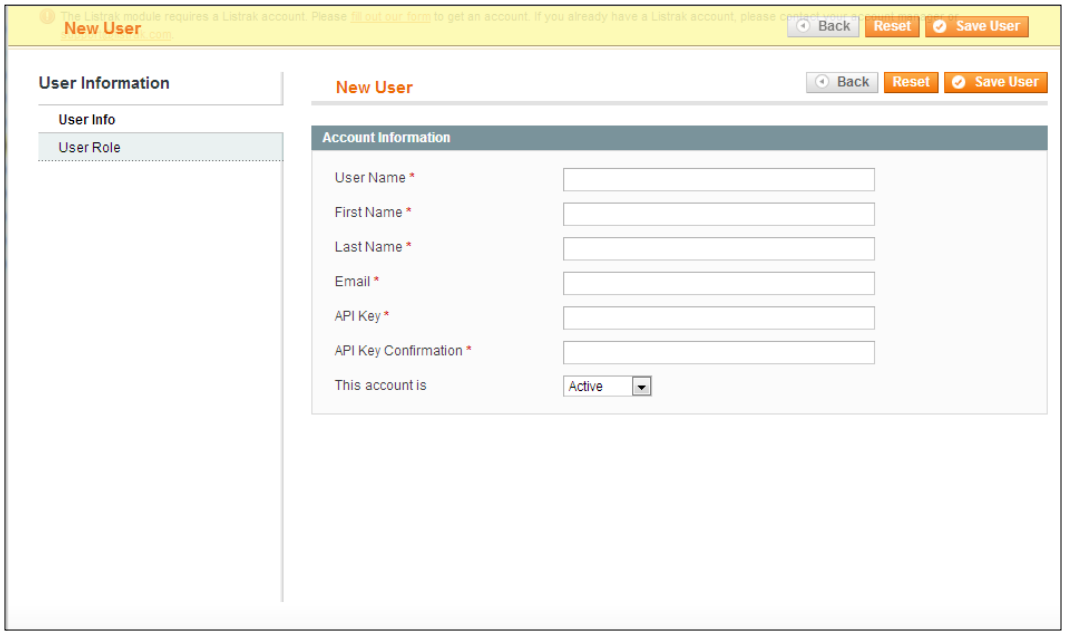
1. Go to the Magento backend.
2. Navigate to **System** | **Web Services** | **Roles** from the main navigation menu.
3. Click on the **Add New Role** button.
4. As shown in the following screenshot, you will be requested to provide a role name and specify the role resources:




5. By default, the **Resource Access** option is set to **Custom** and no resources are selected. In our case, we will change the **Resource Access** option by selecting **All** from the drop-down menu.
6. Click on the **Save Role** button.

Now that we have a valid role in our store, let's proceed to create a web API user:

1. Go to the Magento backend.
2. Navigate to **System** | **Web Services** | **Users** from the main navigation menu.
3. Click on the **Add New User** button.
4. As shown in the following screenshot, you will be asked for the user information:




5. In the **API Key** and **API Key Confirmation** fields, input your desired password.
6. Click on the **User Role** tab.
7. Select the user role that we just created.
8. Click on the **Save User** button.

The reason that we need to create username and role to access the API is that every single API function requires a **session token** to be passed as a parameter.

For this reason, every time we need to use the API, the first call that we have to make is to the `login` function, which will return a valid session token id.

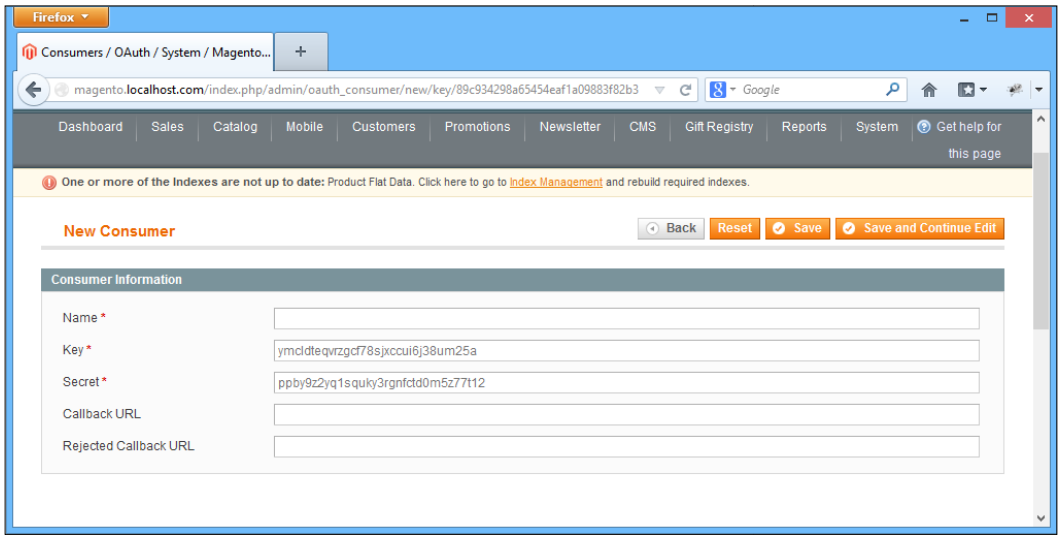
# Setting up the REST API credentials

The new RESTful API is slightly different in terms of authentication; instead of using the traditional Magento web service users, it uses a three-legged **OAuth 1.0** protocol to provide authentication.

OAuth works by asking the user to authorize its application. When the user registers an application, he/she needs to fill in the following fields:

- **User**: This refers to a customer who has an account with Magento, and can user the services with the API.
- **Consumer**: This refers to a third-party application that uses OAuth to access the Magento API.
- **Consumer key**: This refers to a unique value used to identify a user with Magento.
- **Consumer secret**: This refers to a secret used by the customer to guarantee the ownership of the consumer key. This value is never passed on the request.
- **Request token**: This value is used by the consumer (application) to obtain authorization from the user to access the API resources.
- **Access token**: This is returned in exchange of the request token and on successful authentication.

Let's proceed to register our application by going to **System** | **Web Services** | **REST - OAuth Consumers**, and selecting **Add New** in the **Admin** panel. We will get the following screen:




One important thing to notice is that a callback URL must be defined, to which the user will be redirected after successfully authorizing the application.

So, our first step is to learn how to get this session token ID on each of the available API protocols:

- To get session the token ID in XML-RPC, we need to execute the following code:

```
$apiUser = 'username';
$apiKey = 'password';
$client = new
  Zend_XmlRpc_Client('http://ourhost.com/api/xmlrpc/');
// We authenticate ourselves and get a session token id
$sessionId = $client->call('login', array($apiUser,
  $apiKey));
```

- To get a session token ID in SOAP v2, we need to execute the following code:

```
$apiUser = 'username';
$apiKey = 'password';
$client = new
  SoapClient('http://ourhost.com/api/v2_soap/?wsdl');
// We authenticate ourselves and get a session token id
$sessionId = $client->login($apiUser, $apiKey);
```

- To get a session token ID in REST, we need to execute the following code:

```
$callbackUrl =
  "http://magento.localhost.com/oauth_admin.php";
$temporaryCredentialsRequestUrl =
  "http://magento.localhost.com/oauth/
  initiate?oauth_callback=" . urlencode($callbackUrl);
$adminAuthorizationUrl =
  'http://magento.localhost.com/admin/oAuth_authorize';
$accessTokenRequestUrl =
  'http://magento.localhost.com/oauth/token';
$apiUrl = 'http://magento.localhost.com/api/rest';
$consumerKey = 'yourconsumerkey';
$consumerSecret = 'yourconsumersecret';

session_start();

$authType = ($_SESSION['state'] == 2) ?
  OAUTH_AUTH_TYPE_AUTHORIZATION : OAUTH_AUTH_TYPE_URI;
$oauthClient = new OAuth($consumerKey, $consumerSecret,
  OAUTH_SIG_METHOD_HMACSHA1, $authType);

$oauthClient->setToken($_SESSION['token'],
  $_SESSION['secret']);
```

# Loading and reading data

The `Mage_Catalog` module product endpoint has the following exposed methods that we can use to manage products:

- `catalog_product.currentStore`: This can be used to set/get the current store view
- `catalog_product.list`: This retrieves the products list using filters
- `catalog_product.info`: This retrieves a product
- `catalog_product.create`: This creates a new product
- `catalog_product.update`: This updates a product
- `catalog_product.setSpecialPrice`: This sets a special price for a product
- `catalog_product.getSpecialPrice`: This gets a special price for a product
- `catalog_product.delete`: This deletes a product

Right now, the functions that are of particular interest to us are `catalog_product.list` and `catalog_product.info`. Let's see how we can use the API to retrieve product data from our staging store.

To retrieve product data from our staging store in XML-RPC, execute the following code:

```
…
$result = $client->call($sessionId, 'catalog_product.list');
print_r ($result);
…
```

To retrieve product data from our staging store in SOAP v2, execute the following code:

```
…
$result = $client->catalogProductList($sessionId);
print_r($result);
…
```

To retrieve product data from our staging store in REST, execute the following code:

```
…
$resourceUrl = $apiUrl . "/products";
$oauthClient->fetch($resourceUrl, array(), 'GET', array('Content-
  Type' => 'application/json'));
$productsList = json_decode($oauthClient->getLastResponse());
…
```

Regardless of the protocol, we will get back a list of all the products' **SKUs** (short for **Stock Keeping Units**), but what if we want to filter that product list based on an attribute? Well, the Magento lists functions that allows us to do this by passing a parameter. That said, let's see how we can add filters to our product list call.

To add filters to our product list call in XML-RPC, execute the following code:

```
…
$result = $client->call('catalog_product.list', array($sessionId,
$filters);
print_r ($result);
…
```

To add filters to our product list call in SOAP v2, execute the following code:

```
…
$result = $client->catalogProductList($sessionId,$filters);
print_r($result);
…
```

Using REST, things are not that simple, and it is not possible to retrieve a product collection filtered by an attribute. However, we can retrieve all the products that belong to a specific category

To add filters to our product list call in REST, execute the following code:

```
…
$categoryId = 3;
$resourceUrl = $apiUrl . "/products/category_id=" . categoryId;
$oauthClient->fetch($resourceUrl, array(), 'GET', array('Content-
  Type' => 'application/json'));
$productsList = json_decode($oauthClient->getLastResponse());
…
```

# Updating data

Now that we can retrieve product information from the Magento API, we can start updating the content of each product.

The `catalog_product.update` method will allow us to modify any of the product attributes; the function call takes the following parameters:

To update data in XML-RPC, execute the following code:

```
…
$productId = 200;
$productData = array( 'sku' => 'changed_sku', 'name' => 'New
  Name', 'price' => 15.40 );
$result = $client->call($sessionId, 'catalog_product.update',
  array($productId, $productData));
print_r($result);
…
```

To update data in SOAP v2, execute the following code:

```
…
$productId = 200;
$productData = array( 'sku' => 'changed_sku', 'name' => 'New
  Name', 'price' => 15.40 );
$result = $client->catalogProductUpdate($sessionId,
  array($productId, $productData));
print_r($result);
…
```

To update data in REST, execute the following code:

```
…
$productData = json_encode(array(
  'type_id'           => 'simple',
  'attribute_set_id'  => 4,
  'sku'               => 'simple' . uniqid(),
  'weight'            => 10,
  'status'            => 1,
  'visibility'        => 4,
  'name'              => 'Test Product',
  'description'       => 'Description',
  'short_description' => 'Short Description',
  'price'             => 29.99,
  'tax_class_id'      => 2,
));
$oauthClient->fetch($resourceUrl, $productData,
  OAUTH_HTTP_METHOD_POST, array('Content-Type' =>
  'application/json'));
$updatedProduct = json_decode($oauthClient-
  >getLastResponseInfo());
…
```

# Deleting a product

Deleting products using the API is very simple, and is probably one of the most common operations.

To delete products in XML-RPC, execute the following code:

```
…
$productId = 200;
$result = $client->call($sessionId, 'catalog_product.delete',
  $productId);
print_r($result);
…
```

To delete products in SOAP v2, execute the following code:

```
…
$productId = 200;
$result = $client->catalogProductDelete($sessionId, $productId);
print_r($result);
…
```

To delete the code in REST, execute the following code:

```
…
$productData = json_encode(array(
  'id'           => 4
));
$oauthClient->fetch($resourceUrl, $productData,
  OAUTH_HTTP_METHOD_DELETE, array('Content-Type' =>
  'application/json'));
$updatedProduct = json_decode($oauthClient-
  >getLastResponseInfo());
…
```

# Extending the API

Now that we have a basic understanding of how to use the Magento Core API, we can proceed to extend and add our custom functionality. In order to add new API functionality, we have to modify/create the following files:

- `wsdl.xml`
- `api.xml`
- `api.php`

In order to make our registries accessible for third-party systems, we need to create and expose the following functions

- `giftregistry_registry.list`: This retrieves a list of all the registry IDs; it takes an optional customer ID parameter
- `giftregistry_registry.info`: This retrieves all the registry information; it takes a required registry_id parameter
- `giftregistry_item.list`: This retrieves a list of all the registry item IDs associated with a registry; it takes a required `registry_id` parameter
- `giftregistry_item.info`: This retrieves the product and detailed information of a registry item; it takes a required `item_id` parameter

There's a challenge here. So far, we have only added reading operations; try to include API methods to update, delete, and create registries and registry items. To see the answer with the complete code and full breakdown, refer to `http://www.magedevguide.com/`.

Our first step is to implement the API class and the required functions:

1. Navigate to the `Model` directory.
2. Create a new class called `Api.php` at `app/code/local/Mdg/Giftregistry/Model/Api.php`, and place the following placeholder content inside it:

```
<?php
class Mdg_Giftregisty_Model_Api extends
  Mage_Api_Model_Resource_Abstract
{
  public function getRegistryList($customerId = null)
  {

  }

  public function getRegistryInfo($registryId)
  {

  }

  public function getRegistryItems($registryId)
  {

  }

  public function getRegistryItemInfo($registryItemId)
  {

  }
}
```

3. Create a new directory called `Api/`.
4. Inside `Api/`, create a new class called `V2.php` at `app/code/local/Mdg/Giftregistry/Model/Api/V2.php` and place the following placeholder content inside it:

```
<?php
class Mdg_Giftregisty_Model_Api_V2 extends
  Mdg_Giftregisty_Model_Api
{

}
```

The first thing you might notice is that `V2.php` extends the API class that we just created. The only difference is that the `V2` class is used by the `SOAP_v2` protocol, while the regular API class is used for all other requests.

Let's update the API class with some working code located at `app/code/local/Mdg/Giftregistry/Model/Api.php`:

```
<?php
class Mdg_Giftregisty_Model_Api extends
  Mage_Api_Model_Resource_Abstract
{
  public function getRegistryList($customerId = null)
  {
    $registryCollection =
      Mage::getModel('mdg_giftregistry/entity')->getCollection();
    if (!is_null($customerId)) {
      $registryCollection->addFieldToFilter('customer_id',
        $customerId);
    }
    return $registryCollection;
  }

  public function getRegistryInfo($registryId)
  {
    if (!is_null($registryId)) {
      $registry = Mage::getModel('mdg_giftregistry/entity')
        ->load($registryId);
      if ($registry) {
        return $registry;
      } else {
        return false;
      }
    } else {
      return false;
    }
  }

  public function getRegistryItems($registryId)
  {
    if (!is_null($registryId)) {
      $registryItems = Mage::getModel('mdg_giftregistry/item')
        ->getCollection();
      $registryItems->addFieldToFilter('registry_id',
        $registryId);
      Return $registryItems;
```

```
    } else {
      return false;
    }
  }

  public function getRegistryItemInfo($registryItemId)
  {
    if (!is_null($registryItemId)) {
      $registryItem = Mage::getModel('mdg_giftregistry/item')
        ->load($registryItemId);
      if ($registryItem) {
        return $registryItem;
      } else {
        return false;
      }
    } else {
      return false;
    }
  }
}
```

As we can see from the preceding code, we are not doing anything new. Each function is in charge of loading either a collection of Magento objects, or a specific object based on the required parameters.

In order to expose this new function to the Magento API, we need to configure the XML files we created previously. Let's start by updating `api.xml`:

1. Open the `api.xml` file.
2. Add the following XML code to this file located at `app/code/local/Mdg/Giftregistry/etc/api.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<config>
  <api>
    <resources>
      <giftregistry_registry translate="title"
        module="mdg_giftregistry">
        <model>mdg_giftregistry/api</model>
        <title>Mdg Giftregistry Registry functions</title>
        <methods>
          <list translate="title"
            module="mdg_giftregistry">
            <title>getRegistryList</title>
            <method>getRegistryList</method>
```

```
            </list>
            <info translate="title"
              module="mdg_giftregistry">
              <title>getRegistryInfo</title>
              <method>getRegistryInfo</method>
            </info>
          </methods>
        </giftregistry_registry>
        <giftregistry_item translate="title"
          module="mdg_giftregistry">
          <model>mdg_giftregistry/api</model>
          <title>Mdg Giftregistry Registry Items
            functions</title>
          <methods>
            <list translate="title"
              module="mdg_giftregistry">
              <title>getRegistryItems</title>
              <method>getRegistryItems</method>
            </list>
            <info translate="title"
              module="mdg_giftregistry">
              <title>getRegistryItemInfo</title>
              <method>getRegistryItemInfo</method>
            </info>
          </methods>
        </giftregistry_item>
      </resources>
      <resources_alias>
        giftregistry_registry>giftregistry_registry
          </giftregistry_registry>
        <giftregistry_item>giftregistry_item
          </giftregistry_item>
      </resources_alias>
      <v2>
        <resources_function_prefix>
          <giftregistry_registry>giftregistry_registry
            </giftregistry_registry>
          <giftregistry_item>giftregistry_item
            </giftregistry_item>
        </resources_function_prefix>
      </v2>
    </api>
  </config>
```

There is one more file we need to update in order to make sure the SOAP adapters pick up our new API functions:

1. Open the `wsdl.xml` file.
2. Since WSDL is normally very long in extend, we will break it down in several places. Let's start by defining the skeleton of the `wsdl.xml` file, located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<definitions xmlns="http://schemas.xmlsoap.org/wsdl/"
  xmlns:soap="http://schemas.xmlsoap.org/wsdl/soap/"
  xmlns:soapenc="http://schemas.xmlsoap.org/soap/encoding/"
  xmlns:typens="urn:{{var wsdl.name}}"
  xmlns:wsdl="http://schemas.xmlsoap.org/wsdl/"
  xmlns:xsd="http://www.w3.org/2001/XMLSchema" name="{{var
  wsdl.name}}" targetNamespace="urn:{{var wsdl.name}}">
  <types />
  <message name="gitregistryRegistryListRequest" />
  <portType name="{{var wsdl.handler}}PortType" />
  <binding name="{{var wsdl.handler}}Binding"
    type="typens:{{var wsdl.handler}}PortType">
    <soap:binding style="rpc"
      transport="http://schemas.xmlsoap.org/soap/http" />
  </binding>
  <service name="{{var wsdl.name}}Service">
    <port name="{{var wsdl.handler}}Port"
      binding="typens:{{var wsdl.handler}}Binding">
      <soap:address location="{{var wsdl.url}}" />
    </port>
  </service>
</definitions>
```

3. This is the basic placeholder where we have all the main nodes that we defined at the beginning of the chapter. The first thing that we have to define is the custom data type that our API will use, located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
…
<schema xmlns="http://www.w3.org/2001/XMLSchema"
  targetNamespace="urn:Magento">
  <import
    namespace="http://schemas.xmlsoap.org/soap/encoding/"
    schemaLocation=
    "http://schemas.xmlsoap.org/soap/encoding/"/>
  <complexType name="giftRegistryEntity">
    <all>
```

```
        <element name="entity_id" type="xsd:integer"
          minOccurs="0" />
        <element name="customer_id" type="xsd:integer"
          minOccurs="0" />
        <element name="type_id" type="xsd:integer"
          minOccurs="0" />
        <element name="website_id" type="xsd:integer"
          minOccurs="0" />
        <element name="event_date" type="xsd:string"
          minOccurs="0" />
        <element name="event_country" type="xsd:string"
          minOccurs="0" />
        <element name="event_location" type="xsd:string"
          minOccurs="0" />
      </all>
    </complexType>
    <complexType name="giftRegistryEntityArray">
      <complexContent>
        <restriction base="soapenc:Array">
          <attribute ref="soapenc:arrayType"
            wsdl:arrayType="typens:giftRegistryEntity[]" />
        </restriction>
      </complexContent>
    </complexType>
    <complexType name="registryItemsEntity">
      <all>
        <element name="item_id" type="xsd:integer"
          minOccurs="0" />
        <element name="registry_id" type="xsd:integer"
          minOccurs="0" />
        <element name="product_id" type="xsd:integer"
          minOccurs="0" />
      </all>
    </complexType>
    <complexType name="registryItemsArray">
      <complexContent>
        <restriction base="soapenc:Array">
          <attribute ref="soapenc:arrayType"
            wsdl:arrayType="typens:registryItemsEntity[]" />
        </restriction>
      </complexContent>
    </complexType>
  </schema>
  …
```

Complex data types allow us to map which attributes and objects are transmitted through the API.

4. Messages allow us to define which of the complex types are transmitted on each API call request and response. Let's proceed by adding the respective messages in our `wsdl.xml` file located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
…
<message name="gitregistryRegistryListRequest">
  <part name="sessionId" type="xsd:string" />
  <part name="customerId" type="xsd:integer"/>
</message>
<message name="gitregistryRegistryListResponse">
  <part name="result"
    type="typens:giftRegistryEntityArray" />
</message>
<message name="gitregistryRegistryInfoRequest">
  <part name="sessionId" type="xsd:string" />
  <part name="registryId" type="xsd:integer"/>
</message>
<message name="gitregistryRegistryInfoResponse">
  <part name="result" type="typens:giftRegistryEntity" />
</message>
<message name="gitregistryItemListRequest">
  <part name="sessionId" type="xsd:string" />
  <part name="registryId" type="xsd:integer"/>
</message>
<message name="gitregistryItemListResponse">
  <part name="result" type="typens:registryItemsArray" />
</message>
<message name="gitregistryItemInfoRequest">
  <part name="sessionId" type="xsd:string" />
  <part name="registryItemId" type="xsd:integer"/>
</message>
<message name="gitregistryItemInfoResponse">
  <part name="result" type="typens:registryItemsEntity"/>
</message>
…
```

5. One important thing to notice is that each request message will always include a `sessionId` that is used to validate and authenticate each request. On the other hand, the response is used to specify which complex data types or values are returned. Adding the respective messages in our `wsdl.xml` file located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
…
<portType name="{{var wsdl.handler}}PortType">
  <operation name="giftregistryRegistryList">
    <documentation>Get Registries List</documentation>
    <input
      message="typens:gitregistryRegistryListRequest" />
    <output
      message="typens:gitregistryRegistryListResponse" />
  </operation>
  <operation name="giftregistryRegistryInfo">
    <documentation>Get Registry Info</documentation>
    <input
      message="typens:gitregistryRegistryInfoRequest" />
    <output
      message="typens:gitregistryRegistryInfoResponse" />
  </operation>
  <operation name="giftregistryItemList">
    <documentation>getAllProductsInfo</documentation>
    <input message="typens:gitregistryItemListRequest" />
    <output message="typens:gitregistryItemListResponse" />
  </operation>
  <operation name="giftregistryItemInfo">
    <documentation>getAllProductsInfo</documentation>
    <input message="typens:gitregistryItemInfoRequest" />
    <output message="typens:gitregistryItemInfoResponse" />
  </operation>
</portType>
…
```

6. The next thing that is required to properly add a new API endpoint is to define the bindings, which are used to specify the methods that are exposed. Adding the respective messages in our `wsdl.xml` file located at `app/code/local/Mdg/Giftregistry/etc/wsdl.xml`:

```
…
<operation name="giftregistryRegistryList">
  <soap:operation soapAction="urn:{{var
    wsdl.handler}}Action" />
  <input>
```

```
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </input>
    <output>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </output>
  </operation>
  <operation name="giftregistryRegistryInfo">
    <soap:operation soapAction="urn:{{var
      wsdl.handler}}Action" />
    <input>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </input>
    <output>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </output>
  </operation>
  <operation name="giftregistryItemList">
    <soap:operation soapAction="urn:{{var
      wsdl.handler}}Action" />
    <input>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </input>
    <output>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </output>
  </operation>
  <operation name="giftregistryInfoList">
    <soap:operation soapAction="urn:{{var
      wsdl.handler}}Action" />
    <input>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </input>
```

```
    <output>
      <soap:body namespace="urn:{{var wsdl.name}}"
        use="encoded" encodingStyle=
        "http://schemas.xmlsoap.org/soap/encoding/" />
    </output>
  </operation>
  …
```

You can see the complete `wsdl.xml` in one piece at `http://magedevguide.com/chapter6/wsdl`.

Even after we broke it down, the WSDL code can still seem overwhelming. To be honest, it took me some time to get used to such a massive XML file, so let's review what each section does:

- `types`: These are used to describe the data transmitted with the API; types are defined using XML Schema, a special language for this purpose
- `message`: This is used to specify the information needed to perform each operation; in the case of Magento, our API methods will always use a request and respond message
- `portType`: This is used to define the operations that can be performed and the corresponding messages
- `port`: This is used to define the connection point; in the case of Magento, a simple string is used
- `service`: This is used to specify which functions are exposed through the API
- `bindings`: These are used to define the operations and the interface with the SOAP protocol

# Extending the REST API

So far, we have only worked on extending the SOAP and XML-RPC parts of the API; the process involved in extending the RESTful API is slightly different.

The REST API was introduced with Magento Community Edition 1.7 and Enterprise Edition 1.12.

In order to expose the new API methods to the REST API, we need to create a new file called `api2.xml`; the configuration in this file is a little more complex than the normal `api.xml`, so we will break it down after adding the full code:

1. Create a new file called `api2.xml` under the `etc/` folder.
2. Open `api2.xml`.
3. Copy the following code in `api2.xml` located at `app/code/local/Mdg/Giftregistry/etc/api2.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<config>
  <api2>
    <resource_groups>
      <giftregistry translate="title"
        module="mdg_giftregistry">
        <title>MDG GiftRegistry API calls</title>
        <sort_order>30</sort_order>
        <children>
          <giftregistry_registry translate="title"
            module="mdg_giftregistry">
            <title>Gift Registries</title>
            <sort_order>50</sort_order>
          </giftregistry_registry>
          <giftregistry_item translate="title"
            module="mdg_giftregistry">
            <title>Gift Registry Items</title>
            <sort_order>50</sort_order>
          </giftregistry_item>
        </children>
      </giftregistry>
    </resource_groups>
    <resources>
      <giftregistryregistry translate="title"
        module="mdg_giftregistry">
        <group>giftregistry_registry</group>
        <model>mdg_giftregistry/api_registry</model>
        <working_model>mdg_giftregistry/api_registry
          </working_model>
        <title>Gift Registry</title>
        <sort_order>10</sort_order>
        <privileges>
          <admin>
            <create>1</create>
            <retrieve>1</retrieve>
```

```
            <update>1</update>
            <delete>1</delete>
          </admin>
        </privileges>
        <attributes translate="product_count"
          module="mdg_giftregistry">
          <registry_list>Registry List</registry_list>
          <registry>Registry</registry>
          <item_list>Item List</item_list>
          <item>Item</item>
        </attributes>
        <entity_only_attributes />
        <exclude_attributes />
        <routes>
          <route_registry_list>
            <route>/mdg/registry/list</route>
            <action_type>collection</action_type>
          </route_registry_list>
          <route_registry_entity>
            <route>/mdg/registry/:registry_id</route>
            <action_type>entity</action_type>
          </route_registry_entity>
          <route_registry_list>
            <route>/mdg/registry_item/list</route>
            <action_type>collection</action_type>
          </route_registry_list>
          <route_registry_list>
            <route>/mdg/registry_item/:item_id</route>
            <action_type>entity</action_type>
          </route_registry_list>
        </routes>
        <versions>1</versions>
      </giftregistryregistry>
    </resources>
  </api2>
</config>
```

One important thing to notice is that we are defining a route node inside this configuration file. This is treated by Magento as a frontend route, and is used to access the RESTful API function. Also, notice that we don't need to create a new controller for this to work.

Now, we also need to include a new class to handle the REST requests and implement each of the defined privileges:

1. Create a new class called `V1.php` under `Model/Api/Registry/Rest/Admin`.
2. Open the `V1.php` class located at `app/code/local/Mdg/Giftregistry/Model/Api/Registry/Rest/Admin/V1.php` and copy the following code:

```
<?php

class Mdg_Giftregistry_Model_Api_Registry_Rest_Admin_V1 extends
  Mage_Catalog_Model_Api2_Product_Rest
{
  /**
  * @return stdClass
   */
  protected function _retrieve()
  {
    $registryCollection =
      Mage::getModel('mdg_giftregistry/entity')->getCollection();
    return $registryCollection;
  }
}
```

# Securing the API

Securing our API is already part of the process of creating our module, and is also handled by the configuration. The way Magento restrict access to their API is using ACL.

As we learned earlier, these ACL allows us to set up roles with access to different parts of the API. Now what we have to do is make our new custom functions available to the ACL:

1. Open the `api.xml` file.
2. Add the following code after the `</v2>` node located at `app/code/local/Mdg/Giftregistry/etc/api.xml`:

```
<?xml version="1.0" encoding="UTF-8"?>
<acl>
  <resources>
    <giftregistry translate="title"
      module="mdg_giftregistry">
      <title>MDG Gift Registry</title>
      <sort_order>1</sort_order>
```

```
        <registry translate="title"
          module="mdg_giftregistry">
          <title>MDG Gift Registry</title>
          <list translate="title" module="mdg_giftregistry">
            <title>List Available Registries</title>
          </list>
          <info translate="title" module="mdg_giftregistry">
            <title>Retrieve registry data</title>
          </info>
        </registry>
        <item translate="title" module="mdg_giftregistry">
          <title>MDG Gift Registry Item</title>
          <list translate="title" module="mdg_giftregistry">
            <title>List Available Items inside a
              registry</title>
          </list>
          <info translate="title" module="mdg_giftregistry">
            <title>Retrieve registry item data</title>
          </info>
        </item>
      </giftregistry>
    </resources>
  </acl>
```

# Summary

While we learned how to extend Magento to add new functionalities to both store owners and customers in previous chapters, knowing how to extend and work with the Magento API opens a world of possibilities.

Using the API, we can integrate Magento with third-party systems, such as ERP and **Point of Sale** (**POS**) both by importing and exporting data.

In the next chapter, we will learn how to properly build a test for all the code we have been building so far, and we will also explore multiple testing frameworks.

# 6
# Testing and Quality Assurance

So far, we have covered all the steps required to create a Magento extension:

- Magento fundamentals
- Frontend development
- Backend development
- Extending and working with APIs

However, we omitted a critical step in the development of any extension or custom code: testing and quality assurance. Despite the fact that Magento is a complex platform, it lacks any out-of-the-box testing.

For this reason, proper testing and quality assurance is often overlooked by most of the Magento developers, either due to a lack of information, or because of the large overhead of some of the testing tools, and while there are not many tools available for running a proper test with Magento, the ones that exist are of very high quality.

In this chapter, we will take a look at the different options available to test our Magento code, and we will also build some very basic tests for our custom extension.

So, let's go over the topics covered in this chapter:

- The different testing frameworks and tools available for Magento
- The importance of testing our Magento code
- How to set up, install, and use Ecomdev PHPUnit extension
- How to set up, install, and use Magento Mink to run functional tests

# Testing Magento

Before we start writing any test, it is important that we understand the concepts related to testing and, more particularly, to each of the available methodologies.

# Unit testing

The idea behind unit testing is to write tests for certain areas (units) of our code, so that we can verify that the code works as expected and the function is returning expected values.

> *" In computer programming, unit testing is a method by which individual units of source code, sets of one or more computer program modules together with associated control data, usage procedures, and operating procedures, are tested to determine if they are fit for use."*
>
> *– Wikipedia*

Another advantage of writing unit tests is that by doing this, we are more likely to write code that is easier to test.

This means that our code tends to be broken down into smaller but more specialized functions. As we continue to write more and more tests, we start building a test suite that can be run against our codebase every time we introduce any changes or functionalities; this is known as **regression testing**.

# Regression testing

Regression testing mostly refers to the practice of rerunning existing test suites after making code changes to verify that a new functionality is not introducing new bugs.

> *"Regression testing is a type of software testing that seeks to uncover new software bugs, or regressions, in existing functional and non-functional areas of a system after changes, such as enhancements, patches or configuration changes, have been made to them."*
>
> *– Wikipedia*

In the particular case of a Magento store or any e-commerce site, we want to perform regression testing on critical features of the store, such as checkout, customer registration, adding to the cart, and so on.

# Functional testing

Functional testing is more concerned with testing and verifying that the application returns the appropriated output based on a specific input rather than what happens internally.

> *"Functional testing is a type of black box testing that bases its test cases on the specifications of the software component under test. Functions are tested by feeding them input and examining the output, and internal program structure is rarely considered."*
>
> *– Wikipedia*

This is especially important for e-commerce websites like ours, where we want to test the site as the customer would experience it.

# Test-driven development

A testing methodology that has gained popularity in recent years and is now coming to Magento is known as **TDD** or **test-driven development**.

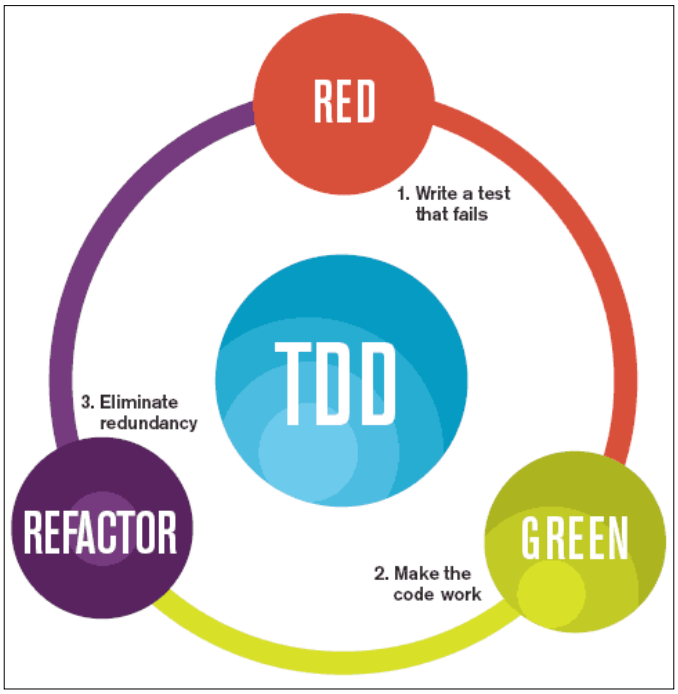
> *"Test-driven development (TDD) is a software development process that relies on the repetition of a very short development cycle: first the developer writes an (initially failing) automated test case that defines a desired improvement or new function, then produces the minimum amount of code to pass that test and finally refactors the new code to acceptable standards."*
>
> *– Wikipedia*

The basic concept behind TDD is to first write a failing test, and then write only enough code to pass the test; this generates very short development cycles and helps streamline the code.

A more complete approach is often referred to as the **red-green-refactor cycle**. The idea behind it is as follows:

- **Red**: This writes a small amount of test code—often, no more than a few lines
- **Green**: This writes a small amount of production code—only enough code to make sure the test passes
- **Refactor**: This cleans up the mess and improves the code. Now that we have a working test, we can make changes with confidence.

An illustration of the red-green-refactor cycle is as follows:




Ideally, you want to start the development of your modules and extensions using TDD in Magento. We omitted this in previous chapters due the fact that it would add unnecessary complexity and confuse the reader.

For a complete tutorial on TDD with Magento from scratch, refer to `http://magedevguide.com/getting-started-with-tdd`.

# Tools and testing frameworks

As mentioned previously, there are several frameworks and tools available to test PHP and Magento code:

- `Ecomdev_PHPUnit`: This extension is just amazing. The developers at Ecomdev created an extension that integrates PHPUnit with Magento and also adds Magento-specific assertions to PHPUnit without having to modify core files or affect the database.
- `Magento_Mink`: Mink is a PHP library for the Behat framework that allows you to write functional and acceptance tests; Mink also allows you to write tests that simulate user behavior and browser interaction.

- `Magento_TAF`: This stands for **Magento Test Automation Framework** and is the official testing tool provided by Magento. It includes over 1,000 functional tests and is very powerful. Unfortunately, it has a major drawback; it has a large overhead and a steep learning curve.

# Unit testing with PHPUnit

Before `Ecomdev_PHPUnit`, testing Magento with PHPUnit was problematic and really not very practical. Out of the different methods that were available, almost all required core code modifications or made developers jump through hoops to set up basic PHPUnits.

## Installing Ecomdev_PHPUnit

The easiest way to install `Ecomdev_PHPUnit` is to grab a copy directly from the GitHub repository. Let's write the following command on our console:

```
git clone git://github.com/IvanChepurnyi/EcomDev_PHPUnit.git
```

Now, copy the file to your Magento root folder.

Composer and Modman are alternative options available for installation; for more information on each, refer to `http://magedevguide.com/module-managers`.

Finally, we need to set the configuration to instruct the PHPUnit extension which database is to be used; `local.xml.phpunit` is a new file added by `Ecomdev_PHPUnit`, and it holds all the extension-specific configurations and specifies the name of the test database.

The file location is `app/etc/local.xml.phpunit`:

```
<?xml version="1.0"?>
<config>
    <global>
        <resources>
            <default_setup>
                <connection>
                   <dbname><![CDATA[magento_unit_tests]]></dbname>
                </connection>
            </default_setup>
        </resources>
    </global>
    <default>
        <web>
            <seo>
```

```
                <use_rewrites>1</use_rewrites>
            </seo>
            <secure>
                <base_url>[change me]</base_url>
            </secure>
            <unsecure>
                <base_url>[change me]</base_url>
            </unsecure>
            <url>
                <redirect_to_base>0</redirect_to_base>
            </url>
        </web>
    </default>
    <phpunit>
        <allow_same_db>0</allow_same_db>
    </phpunit>
</config>
```

You will need to create a new database to run tests, and replace the example configuration values in the `local.xml.phpunit` file.

By default, this extension does not allow you to run the test on the same database. Keeping the test database separate from the development and production allows us to run our test with confidence.

# Setting up the configuration for our extension

Now that we have the PHPUnit extension installed and set up, we need to prepare our gift registry extension to run unit tests. This can be done by performing the following steps:

1. Open the `Giftregistry` extension of the `config.xml` file.
2. Add the following code to this file located at `app/code/local/Mdg/Giftregistry/etc/config.xml`:

```
…
<phpunit>
        <suite>
            <modules>
                    <Mdg_Giftregistry/>
            </modules>
         </suite>
</phpunit>
…
```

This new configuration node allows the PHPUnit extension to recognize the extension and run the matching tests.

We also need to create a new directory called `Test` alongside the module directory that we will use to place all our test files. One of the advantages of using `Ecomdev_PHPUnit` as compared to previous methods is that this extension follows the Magento standards.

This means that we have to keep the same module directory structure inside the `Test` folder:

```
Test/
Model/
Block/
Helper/
Controller/
Config/
```

Based on the naming convention for each test case, the class would be named as follows:

```
[Namespace]_[Module Name]_Test_[Group Directory]_[Entity Name]
```

Each test class must extend one of the following three base test classes:

- `EcomDev_PHPUnit_Test_Case`: This is used to test helpers, models, and blocks
- `EcomDev_PHPUnit_Test_Case_Config`: This is used to test the module configuration
- `EcomDev_PHPUnit_Test_Case_Controller`: This is used to test the layout rendering process and the controller logic

A reference is available at `http://www.ecomdev.org/wp-content/uploads/2011/05/EcomDev_PHPUnit-0.2.0-Manual.pdf`.

# The anatomy of a test case

Before jumping ahead and trying to create our first test, let's break down one of the examples provided by `Ecomdev_PHPUnit`:

```
<?php
class EcomDev_Example_Test_Model_Product extends
  EcomDev_PHPUnit_Test_Case
{
    /**
```

```
         * Product price calculation test
         *
         * @test
         * @loadFixture
         * @doNotIndexAll
         * @dataProvider dataProvider
         */
        public function priceCalculation($productId, $storeId)
        {
            $storeId = Mage::app()->getStore($storeId)->getId();
            $product = Mage::getModel('catalog/product')
                ->setStoreId($storeId)
                ->load($productId);
            $expected = $this->expected('%s-%s', $productId,
              $storeId);
            $this->assertEquals(
                $expected->getFinalPrice(),
                $product->getFinalPrice()
            );
            $this->assertEquals(
                $expected->getPrice(),
                $product->getPrice()
            );
        }
    }
```

The first important thing to notice in the example test class is the comment annotations:

```
    …
    /**
         * Product price calculation test
         *
         * @test
         * @loadFixture
         * @doNotIndexAll
         * @dataProvider dataProvider
         */
    …
```

These annotations are used by the PHPUnit extension to identify which class functions are tests, and also allow us to set up specific settings to run each test. Let's take a look at some of the available annotations:

- `@test`: This identifies a class function as a PHPUnit test
- `@loadFixture`: This specifies the use of fixtures
- `@loadExpectation`: This specifies the use of expectations
- `@doNotIndexAll`: By adding this annotation, we are telling PHPUnit test that it should not run any index after loading the fixtures
- `@doNotIndex [index_code]`: By adding this annotation, we can instruct PHPUnit not to run a specific index

So now, you are probably a bit confused. Fixtures? Expectations? What are these?

**Fixtures** are **Yet Another Markup Language** (**YAML**) files that represent databases or configuration entities.

**Expectations** are useful if we don't want to have hardcoded values in our tests and are also specified in YAML values.

For more information about the YAML markup, refer to `http://magedevguide.com/yaml`.

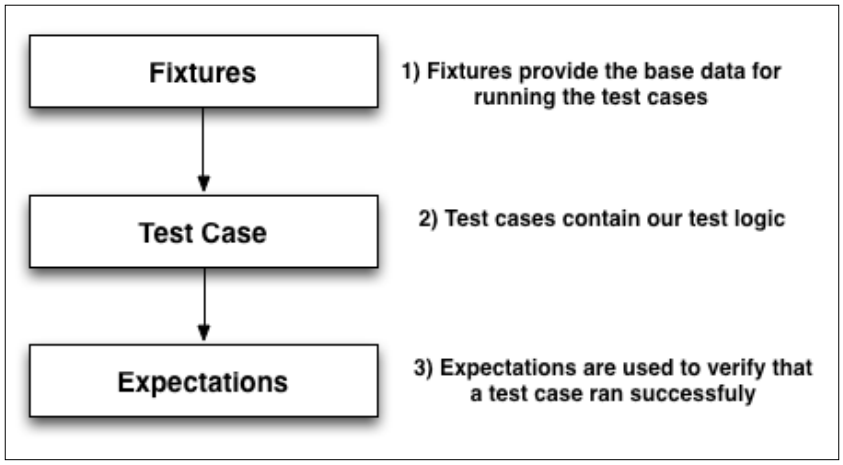
So, as we can see, fixtures provide the data for to be processed by the tests, and expectations are used to check whether the results returned by the test are what we are expecting to see.

Fixtures and expectations are stored inside each `Test` type directory. By following the preceding example, we would have a new directory called `Product/`. Inside it, we need a new directory for expectations and one for our fixtures.

Let's take a look at the revised folder structure:

```
Test/
Model/
    Product.php
    Product/
        expectations/
        fixtures/
Block/
Helper/
Controller/
Config/
```

The following illustration demonstrates the use of fixtures, expectations, and test cases:




## Creating a unit test

For our first unit test, let's create a very basic test that allows us to test the gift registry models that we previously created.

As we mentioned earlier, `Ecomdev_PHPUnit` uses a separate database to run all the tests. For this, we need to create a new fixture that will provide all the data for our test case:

1. Open the `Test/Model` folder.
2. Create a new folder called `Registry`.
3. Inside the `Registry` folder, create a new folder called `fixtures`.
4. Create a new file called `registryList.yaml` at `app/code/local/Mdg/Giftregistry/Test/Model/fixtures/registryList.yaml` and paste the following code in it:

```
scope:
  website: # Initialize websites
    - website_id: 2
      code: default
      name: Test Website
      default_group_id: 2
  group: # Initializes store groups
    - group_id: 2
      website_id: 2
```

```
        name: Test Store Group
        default_store_id: 2
        root_category_id: 2 # Default Category
    store: # Initializes store views
      - store_id: 2
        website_id: 2
        group_id: 2
        code: default
        name: Default Test Store
        is_active: 1
eav:
   customer_customer:
     - entity_id: 1
       entity_type_id: 3
       website_id: 2
       email: test@magentotest.com
       group_id: 2
       store_id: 2
       is_active: 1
   mdg_giftregistry_entity:
     - entity_id: 1
       customer_id: 1
       type_id: 2
       website_id: 2
       event_date: 12/12/2012
       event_country: Canada
       event_location: Dundas Square
       created_at: 21/12/2012
     - entity_id: 2
       customer_id: 1
       type_id: 3
       website_id: 2
       event_date: 01/01/2013
       event_country: Canada
       event_location: Eaton Center
       created_at: 21/12/2012
```

This might not look like it, but we are adding a lot of information with this fixture, and are creating the following fixture data:

- A website scope
- A store group
- A store view
- A customer record
- Two gift registries

Using fixtures, we are creating data on the fly that will be available for our test case. This gives us the consistency to run the test multiple times against the same data and the flexibility to easily change it.

Now, you might be wondering how the PHPUnit extension knows how to pair a test case with a specific fixture.

There are two ways in which the extension loads fixtures: one is by specifying the fixture inside the comment annotations, and if the fixture name is not specified, the extension searches a fixture with the same name as the test case function being executed.

With this knowledge, let's create our first test case:

1. Navigate to the `Test/Model` folder.
2. Create a new test class called `Registry.php`.
3. Add the following base code to this file located at `app/code/local/Mdg/Giftregistry/Test/Model/Registry.php`:

```
<?php
class Mdg_Giftregistry_Test_Model_Registry extends EcomDev_
PHPUnit_Test_Case
{
    /**
     * Listing available registries
     *
     * @test
     * @loadFixture
     * @doNotIndexAll
     * @dataProvider dataProvider
     */
    public function registryList()
    {

    }
}
```

We just created the base function, but we have not added any logic yet. Before we do that, let's take a look at what actually constitutes a test case.

Test cases work using assertions to evaluate and test our code. Assertions are special functions that our test cases inherit from the parent `TestCase` class. Among the default assertions available, we have:

- `assertEquals()`
- `assertGreaterThan()`
- `assertGreaterThanOrEqual()`
- `assertLessThan()`
- `assertLessThanOrEqual()`
- `assertTrue()`

Now, these default assertions are great if we want to check variables' values, search for an array key, check attributes, and so on. However, testing Magento code using only this type of assertions can prove difficult or even impossible. This is where `Ecomdev_PHPUnit` comes to the rescue.

Not only has this extension integrated PHPUnit with Magento cleanly and by following their standards, but it also adds Magento-specific assertions to the PHPUnit tests. Let's take a look at some of the assertions added by the extension:

- `assertEventDispatched()`
- `assertBlockAlias()`
- `assertModelAlias()`
- `assertHelperAlias()`
- `assertModuleCodePool()`
- `assertModuleDepends()`
- `assertConfigNodeValue()`
- `assertLayoutFileExists()`

These are only a few of the assertions available, and as you can see, they give a lot of power to build comprehensive tests.

Now that we know a little more about how PHPUnit test cases work, let's proceed to create our first Magento `TestCase` class:

1. Navigate to the `Registry.php` test case class that we created earlier.
2. Add the following code to the `registryList()` function.

   The file location is `app/code/local/Mdg/Giftregistry/Test/Model/Registry.php`:

```
    /**
     * Listing available registries
     *
     * @test
     * @loadFixture
     * @doNotIndexAll
     * @dataProvider dataProvider
     */
    public function registryList()
    {
        $registryList = Mage::getModel('mdg_giftregistry/entity')-
>getCollection();
        $this->assertEquals(
            2,
            $registryList->count()
        );
    }
```

This is a very basic test; the only thing that we are doing is loading a registry collection—in this case, all the registries available—and then running an assertion to check whether the collection count matches.

However, this is not very useful. It would be even better if we were able to load only the registries that belong to a specific user (our test user) and check the collection size. That said, let's change the code a little bit in the file located at `app/code/local/Mdg/Giftregistry/Test/Model/Registry.php`:

```
    /**
     * Listing available registries
     *
     * @test
     * @loadFixture
     * @doNotIndexAll
     * @dataProvider dataProvider
     */
```

```
    public function registryList()
    {
        $customerId = 1;
        $registryList = Mage::getModel('mdg_giftregistry/entity')
->getCollection()
->addFieldToFilter('customer_id', $customerId);
        $this->assertEquals(
            2,
            $registryList->count()
        );
    }
```

Just by changing a few lines of code, we created a test that allows us to verify that our registry collections are working properly, and are correctly linked to a customer record.

Run the following command in your shell:

```
$ phpunit
```

If everything went as expected, we should see the following output:

```
PHPUnit 3.4 by Sebastian Bergmann

.

Time: 1 second

Tests: 1, Assertions: 1, Failures 0
```

You can also run `$ phpunit -colors` for a nicer output.

Now, we only need a test to verify that the registry items are working properly:

1. Navigate to the `Registry.php` test case class that we created earlier.
2. Add the following code to the `registryItemsList()` function to the Registry.php file located at `app/code/local/Mdg/Giftregistry/Test/Model/Registry.php`:

```
    /**
     * Listing available items for a specific registry
     *
     * @test
     * @loadFixture
     * @doNotIndexAll
     * @dataProvider dataProvider
     */
    public function registryItemsList()
    {
```

```
        $customerId = 1;
        $registry   = Mage::getModel('mdg_giftregistry/entity')
->loadByCustomerId($customerId);

        $registryItems = $registry->getItems();
        $this->assertEquals(
            3,
            $registryItems->count()
        );
    }
```

We will also need a new fixture for our new test case:

1. Navigate to the `Test/Model` folder.
2. Open the `Registry` folder.
3. Create a new file called `registryItemsList.yaml` located at `app/code/local/Mdg/Giftregistry/Test/Model/fixtures/ registryItemsList.yaml`:

```
scope:
  website: # Initialize websites
    - website_id: 2
      code: default
      name: Test Website
      default_group_id: 2
  group: # Initializes store groups
    - group_id: 2
      website_id: 2
      name: Test Store Group
      default_store_id: 2
      root_category_id: 2 # Default Category
  store: # Initializes store views
    - store_id: 2
      website_id: 2
      group_id: 2
      code: default
      name: Default Test Store
      is_active: 1
eav:
   customer_customer:
     - entity_id: 1
       entity_type_id: 3
       website_id: 2
       email: test@magentotest.com
```

```
        group_id: 2
        store_id: 2
        is_active: 1
    mdg_giftregistry_entity:
      - entity_id: 1
        customer_id: 1
        type_id: 2
        website_id: 2
        event_date: 12/12/2012
        event_country: Canada
        event_location: Dundas Square
        created_at: 21/12/2012
    mdg_giftregistry_item:
      - item_id: 1
        registry_id: 1
        product_id: 1
      - item_id: 2
        registry_id: 1
        product_id: 2
      - item_id: 3
        registry_id: 1
        product_id: 3
```

Let's run our test suite:

```
$phpunit --colors
```

We should see both tests pass:

```
PHPUnit 3.4 by Sebastian Bergmann

.

Time: 4 second

Tests: 2, Assertions: 2, Failures 0
```

Finally, let's replace our hardcoded variables with proper expectations.

1. Navigate to the module `Test/Model` folder.
2. Open the `Registry` folder.
3. Inside the `Registry` folder, create a new folder called `expectations`.
4. Create a new file called `registryList.yaml` at `app/code/local/Mdg/Giftregistry/Test/Model/expectations/registryList.yaml`:

   ```
   count: 2
   ```

Wasn't that easy? Well, it was so easy that we will do it again for the `registryItemsList` test case:

1. Navigate to the module `Test/Model` folder.
2. Open the `Registry` folder.
3. Create a new file called `registryItemsList.yaml` inside the `expectations` folder.

   The file location is `app/code/local/Mdg/Giftregistry/Test/Model/expectations/registryItemsList.yaml`:

   ```
   count: 3
   ```

Finally, the last thing that we need to do is update our test case class to use the expectations. Make sure that the update file located at `app/code/local/Mdg/Giftregistry/Test/Model/Registry.php` has the following code:

```
<?php
class Mdg_Giftregistry_Test_Model_Registry extends EcomDev_PHPUnit_
Test_Case
{
    /**
     * Product price calculation test
     *
     * @test
     * @loadFixture
     * @doNotIndexAll
     * @dataProvider dataProvider
     */
    public function registryList()
    {
        $customerId = 1;
        $registryList = Mage::getModel('mdg_giftregistry/entity')
                ->getCollection()
                ->addFieldToFilter('customer_id', $customerId);
        $this->assertEquals(
            $this->_getExpectations()->getCount(),$this->_
getExpectations()->getCount(),
            $registryList->count()
        );
    }
    /**
     * Listing available items for a specific registry
     *
     * @test
```

```
         * @loadFixture
         * @doNotIndexAll
         * @dataProvider dataProvider
         */
        public function registryItemsList()
        {
            $customerId = 1;
            $registry   = Mage::getModel('mdg_giftregistry/entity')-
            >loadByCustomerId($customerId);

            $registryItems = $registry->getItems();
            $this->assertEquals(
                $this->_getExpectations()->getCount(),
                $registryItems->count()
            );
        }
    }
```

The only change here is that we are replacing the hardcoded value inside our assertions with the expectations values. If we ever need to make any changes, we don't need to change our code; we can just update the expectations and fixtures.

# Functional testing with Mink

So far, we have learned how to run unit tests against our code. While unit tests are great to test individual parts of our code and the logic, when it comes to large applications such as Magento, it is important to test from the user perspective.

Functional testing mostly involves black box testing, and is not concerned about the source code of the application.

In order to perform functional testing, we can use **Mink**. Mink is a simple PHP library that can virtualize a web browser. Mink works using different drivers; it supports the following drivers out of the box:

- `GoutteDriver`: Goutte is a pure-php headless browser, written by the creator of the Symfony framework
- `SahiDriver`: Sahi is a new JS browser controller that is quickly replacing Selenium
- `ZombieDriver`: This is a browser emulator written in Node.js, and is currently limited to only one browser (Chromium)

- `SeleniumDriver`: This is currently the most popular browser driver; the original version relies on a third-party server to run the tests
- `Selenium2Driver`: The current version of Selenium is fully supported in Python, Ruby, Java, and C#

## Magento Mink installation and setup

Using Mink with Magento is extremely easy, thanks to Johann Reinke, who created a Magento extension that facilitates Mink's integration with Magento.

We will install this extension using `modgit`, a module manager inspired by Modman. Modgit allow us to deploy Magento extensions directly from a GitHub repository without creating symlinks.

Installing modgit can be achieved with three lines of commands:

```
wget -O modgit https://raw.github.com/jreinke/modgit/master/modgit
chmod +x modgit
sudo mv modgit /usr/local/bin
```

Wasn't that easy? Now, we can proceed to install Magento Mink, which is even easier thanks to modgit:

1. Navigate to the Magento root directory.
2. Run the following commands:

   ```
   modgit init
   modgit -e README.md clone mink https://github.com/jreinke/magento-mink.git
   ```

That's it; modgit will take care of installing the file for us directly from the GitHub repository.

# Creating our first test

Mink tests are also stored in the `Test` folder; let's create the base skeleton of our Mink test class:

1. Navigate to the `Test` folder in our module root.
2. Create a new directory called `Mink`.
3. Inside the `Mink` directory, create a new PHP class called `Registry.php`.

4. Copy the following code at the `Registry.php` file, located at `app/code/local/Mdg/Giftregistry/Test/Mink/Registry.php`:

```
<?php
class Mdg_Giftregistry_Test_Mink_Registry extends JR_Mink_Test_
Mink
{
    public function testAddProductToRegistry()
    {
        $this->section('TEST ADD PRODUCT TO REGISTRY');
        $this->setCurrentStore('default');
        $this->setDriver('goutte');
        $this->context();

        // Go to homepage
        $this->output($this->bold('Go To the Homepage'));
        $url = Mage::getStoreConfig('web/unsecure/base_url');
        $this->visit($url);
        $category = $this->find('css', '#nav .nav-1-1 a');
        if (!$category) {
            return false;
        }

        // Go to the Login page
        $loginUrl = $this->find('css', 'ul.links li.last a');
        if ($loginUrl) {
            $this->visit($loginUrl->getAttribute('href'));
        }

        $login = $this->find('css', '#email');
        $pwd = $this->find('css', '#pass');
        $submit = $this->find('css', '#send2');

        if ($login && $pwd && $submit) {
            $email = 'user@example.com';
            $password = 'password';
            $this->output(sprintf("Try to authenticate '%s' with
password '%s'", $email, $password));
            $login->setValue($email);
            $pwd->setValue($password);
            $submit->click();
            $this->attempt(
                $this->find('css', 'div.welcome-msg'),
                'Customer successfully logged in',
```

```
                    'Error authenticating customer'
                );
            }

            // Go to the category page
            $this->output($this->bold('Go to the category list'));
            $this->visit($category->getAttribute('href'));
            $product = $this->find('css', '.category-products li.first
a');
            if (!$product) {
                return false;
            }

            // Go to product view
            $this->output($this->bold('Go to product view'));
            $this->visit($product->getAttribute('href'));
            $form = $this->find('css', '#product_registry_form');
            if ($form) {
                $addToCartUrl = $form->getAttribute('action');
                $this->visit($addToCartUrl);
                $this->attempt(
                    $this->find('css', '#btn-add-giftregistry'),
                    'Product added to gift registry successfully',
                    'Error adding product to gift registry'
                );
            }
        }
    }
```

Just at first glance, you can tell that this functional test is quite different from the unit tests that we built previously. Although it seems like a lot of code it is quite simple, the previous test is even broken down in code blocks. Let's break down what the previous test is doing:

1. Set up the browser driver and the current store.
2. Go to the home page and check for a valid category link.
3. Try to log in as a test user.
4. Go to a `category` page.
5. Open the first product in that category.
6. Try to add the product to the customer gift registry.

This test makes a few assumptions and expects a valid customer with an existing gift registry.

There are some considerations that we have to keep in mind when creating Mink tests:

- Each test class must extend `JR_Mink_Test_Mink`
- Each test function must start with the `test` keyword

Finally, the only thing that we have to do is run our tests. We can do this by going to the command line and running the following command:

```
$ php shell/mink.php
```

If everything was successful, we should see a something similar to the following output:

```
---------------------- SCRIPT START --------------------------------
Found 1 file
------------- TEST ADD PRODUCT TO REGISTRY ------------------------
Switching to store 'default'
Now using Goutte driver
---------------------------------- CONTEXT -----------------------------
-------
website: base, store: default
Cache info:
config            Disabled  N/A       Configuration
layout            Disabled  N/A       Layouts
block_html        Disabled  N/A       Blocks HTML output
translate         Disabled  N/A       Translations
collections       Disabled  N/A       Collections Data
eav               Disabled  N/A       EAV types and attributes
config_api        Disabled  N/A       Web Services Configuration
config_api2       Disabled  N/A       Web Services Configuration
ecomdev_phpunit   Disabled  N/A       Unit Test Cases

Go To the Homepage [OK]
Try to authenticate user@example.com with password password [OK]
Go to the category list [OK]
Go to product view [OK]
Product added to gift registry successfully
```

# Summary

In this chapter, we went over the basics of Magento testing. The purpose of this chapter was not to build complex tests or dive too deep, but get our feet wet and get a clear idea of what we can do to test our extensions.

We covered several important topics in this chapter and learned that having proper test suites and tools can save us from future headaches and improve the quality of our code.

# 7
# Deployment and Distribution

Welcome to the last chapter of this book; we have come far and learned a lot along the way. By now, you should have a clear idea about everything involved in working with and developing custom extensions for Magento—well, almost everything.

As for any other Magento developer, your code will eventually need to be promoted to production or maybe packaged for distribution. In this chapter, we will see the different techniques, tools, and strategies that are available to us.

The final objective of this chapter is to give you the tools and skills to perform deployments with confidence and with little or no downtime.

## The road toward zero-downtime deployment

Deploying to production is probably one of the most dreaded tasks for developers, and more often than not, it will be done improperly.

But what is zero-downtime deployment? Promoting to production with the confidence that the code has been properly tested and is ready the ideal that all Magento developers should aspire to achieve.

This is achieved not by a single process or tool, but by a combination of techniques, standards, and tools. In this chapter, we will learn the following:

- Distributing our extension through Magento Connect
- The role of version control systems on deployment
- Proper practices to branch and merge changes

# Making it right from scratch

In the previous chapter, we learned how testing can not only enhance our workflow, but also save us from future headaches, unit tests, and integration tests; automated tools are at our disposition to ensure that our code is properly tested.

Writing tests means more than just putting together a few tests and calling it done; we are responsible for thinking about all the possible edge cases that might affect our code and writing tests for each for them.

# Ensure that what you see is what you get

In the first chapter of this book, we dived right into setting up our development environment, which is a very important task. In order for us to guarantee that we deliver quality and tested code, we must be able to develop and test our code in an environment as close to production as possible.

To illustrate the importance of this environment, I'll use an example. In the early days of Magento, I often heard that developers would work on their local environments, creating new extensions from scratch. They finished development and testing on their local staging, and everything seemed to be working properly.

One of the commonly accepted workflows is:

- Start development on the developer's local machine, which is running a virtual machine that resembles the production environment as much as possible
- Changes are tested and approved on a staging environment that is an as close as possible copy of production
- Finally, changes are deployed to the production environment

So, it was now time for the developers to promote their code to production, and they confidently did that. Of course, it was working on the local system, so it had to work in production, right? In these particular situations, this wasn't the case; what happened instead was that as soon the new code was loaded into production, the store would crash, saying the autoloader wasn't able to find the class.

What happened? Well, here, the problem was that the developers' local environment was Windows and the name of the extension folder was in **CamelCase**, for example `MyExtension`, but they were using **capitalized** text (`Myextension`) internally in the class names.

Now, this will work just fine in Windows because the file does not distinguish between uppercased, capitalized, or lowercased folder names, while a Unix-based system, such as most of the web servers, does make a distinction on the folder and file naming.

While this example may look silly, it illustrates the need for a standardized development environment quite well. There are many parts and "moving pieces" in a Magento installation; a different version of PHP or an extra Apache module that is enabled in production but not staging, can make a world of difference.

# Magento naming conventions

Magento uses standardized class naming conventions based on the class location in the filesystem. This standardization enables automatic class loading instead of using the more traditional `require_once` and `include_once` functions.

For example, the `Mage_Catalog_Model_Product` class is located in the `app/code/core/Mage/Catalog/Model/Product.php` location; the Magento autoloader is smart enough to replace the underscore (_) characters with the directory separators.

# Ready means ready

When do we decide that our code is actually ready to enter production, and what does "ready" really mean? Each developer might have a different definition of what ready and "done" actually mean. When working on a new module or extending Magento, we should always define what ready means for this particular feature/code.

So, we are getting somewhere now, and we know that in order move to production, we have to:

- Test our code and make sure we have covered all the edge cases
- Make sure the code follows the standards and guidelines
- Make sure it has been tested and developed in an environment as close to production as possible

# Version control systems

**Version control systems** (**VCS**) are the lifeblood of any developer, and while the field might be a bit divided among Git and SVN enthusiasts (no mention for you, mercurial guys), the basic functionalities are still the same.

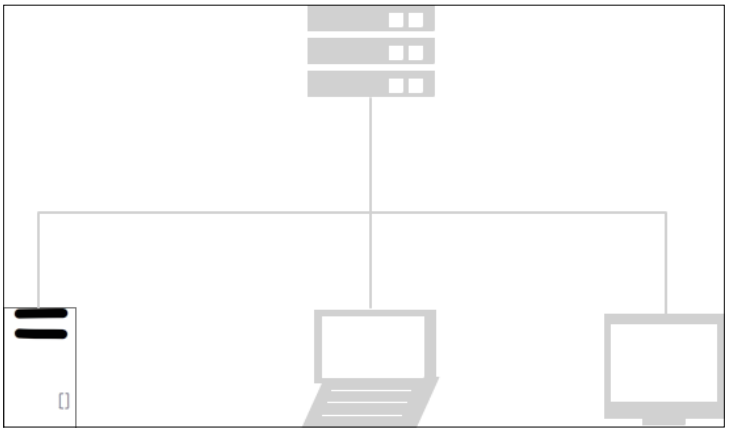
Let's quickly go over the differences between each VCS and the advantages and disadvantages of each.

# Subversion

**Subversion** (**SVN**) is a powerful system and has been around for quite some time, is very well known, and is and widely used.

SVN is a centralized VCS; by this we mean that there is single main source that is recognized as "good" all developers' checkout and push changes to and from this central source.

While this makes changes easier to track and maintain, it has a serious disadvantage. As it is centralized, it means that we have to be in constant touch with the central repository, working remotely or without an Internet connection, which is not possible. This is illustrated in the following figure:

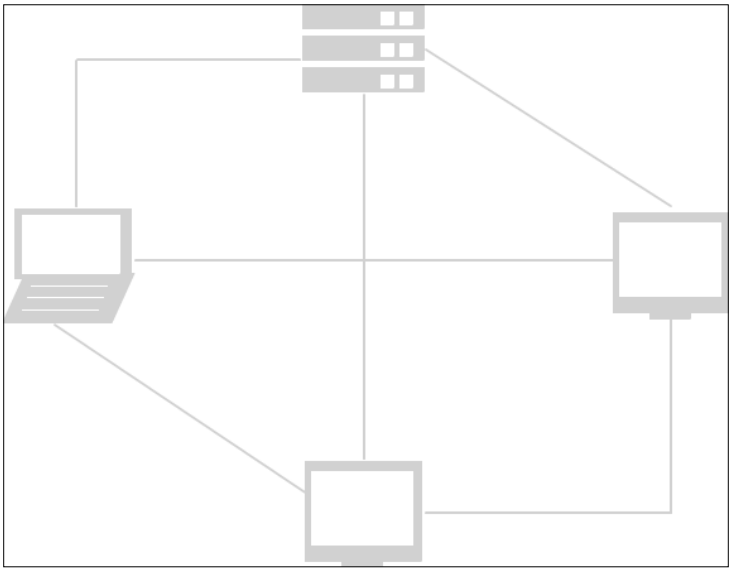


# Git

Git is a much younger VCS and has been rising in popularity for a few years now, mostly due to the wide adoption by the open source community and the popularity of GitHub (`www.github.com`).

A critical difference between SVN and Git is that Git is a decentralized version control system. By this, we mean that there is no central authority or main repo; each developer has a full copy of the repository locally.

The decentralization makes Git faster, in addition to having a better and more powerful **branching** system other than VCS. Also, working remotely or without an Internet connection is possible:



Regardless of which VCS we choose, the most powerful and sometimes overlooked feature of any VCS is still available: the ability to create branches or branching.

Branching allows us to experiment and work on new features without breaking the stable code in our trunk or master. Creating a branch takes a snapshot of the current trunk/master code where we can make any changes and tests.

Now, branching is only part of the equation. Once we are comfortable with our code changes and we have properly tested every edge case, we need a way to reintegrate these changes into our main code base.

**Merging** give us this ability to reintegrate all our branch modifications by running a few commands.

By integrating branches and merging changes into our workflow, we gain flexibility and the freedom to work on a different set of changes, features, and bug fixes without interfering with experimental or work in progress code.

Also, as we will learn, version control can also help us perform seamless promotions and keep our code up to work across multiple Magento installations with ease.

# Distribution

You might want to freely distribute your extension or maybe make it available commercially, but how could you guarantee that the code is properly installed each time without having to check it yourself? And what about the updates or upgrades? Not all storeowners are tech savvy or capable of changing files on their own.

Fortunately, Magento comes out of the box with its package manager and extension marketplace called Magento Connect.

Magento Connect allows developers and solution partners to share their open source and commercial contributions with the community and is not restricted to only custom modules; we can find the following types of resources in the Magento Connect marketplace:

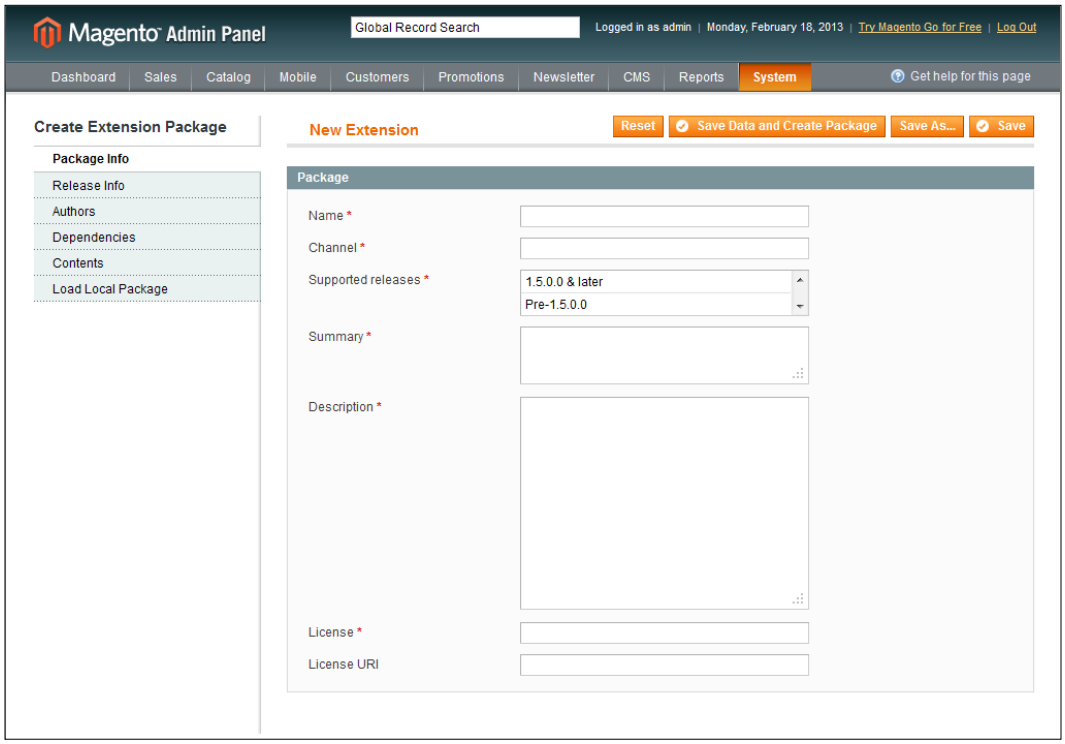
- Modules
- Language packs
- Custom themes

# Packing our extension

One of the core features of Magento Connect is that it allows us to package our extensions directly from the Magento backend.

To package our extension, perform the following steps:

1. Log in to the Magento backend.
2. From the backend, navigate to **System** | **Magento Connect** | **Package Extensions**.




As we can see, the **Create Extension Package** section is composed of six different sections.

# Package Info

**Package Info** is used to specify the general extension information, such as the name, description, and versions of Magento that are supported. The subsections are:

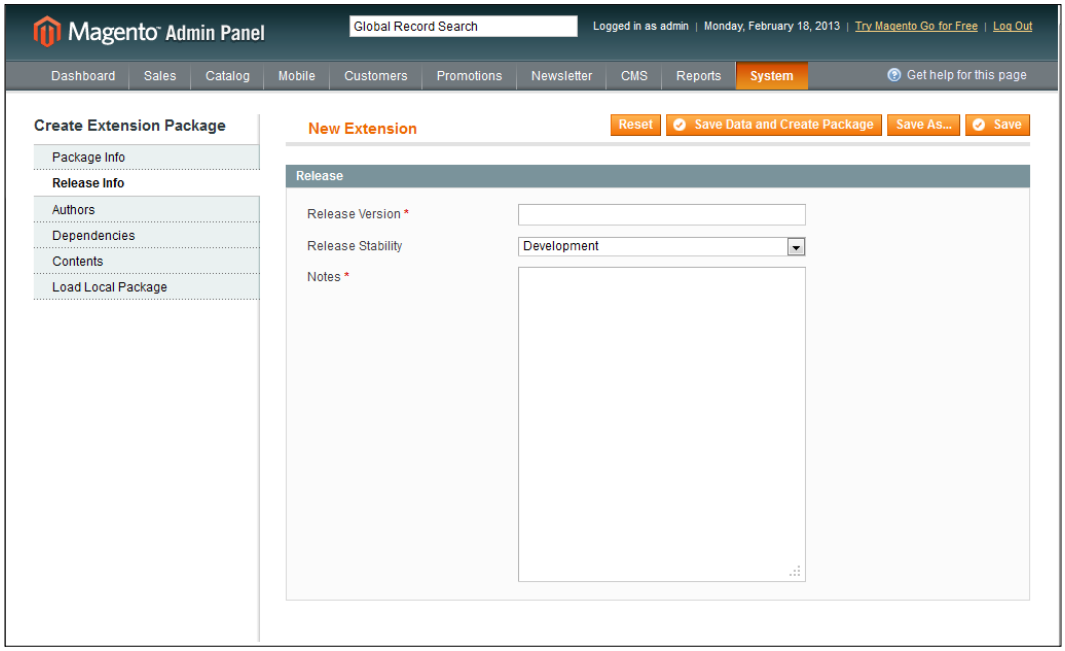
- **Name**: The standard practice is to keep the name simple and use words
- **Channel**: This refers to the code pool for the extension; as we mentioned in previous chapters, extensions designed for distribution should use the **community** channel
- **Supported releases**: Select which version of Magento should be supported for our extension
- **Summary**: This is a brief description of the extension used for the extension review process
- **Description**: This is a detailed description of the extension and its functionality

- **License**: This is used for the extension, and some of the available options are:
  - **Open Software License** (**OSL**)
  - **Mozilla Public License** (**MPL**)
  - **Massachusetts Institute of Technology License** (**MITL**)
  - GNU **General Public License** (**GPL**)
  - Any other license if your extension is to be distributed commercially
- **License Url**: This is the link to the license text

More information on the different license types can be found at `http://www.magedevguide.com/license-types`.

# Release Info

The following screenshot shows the screen for **Release Info**:

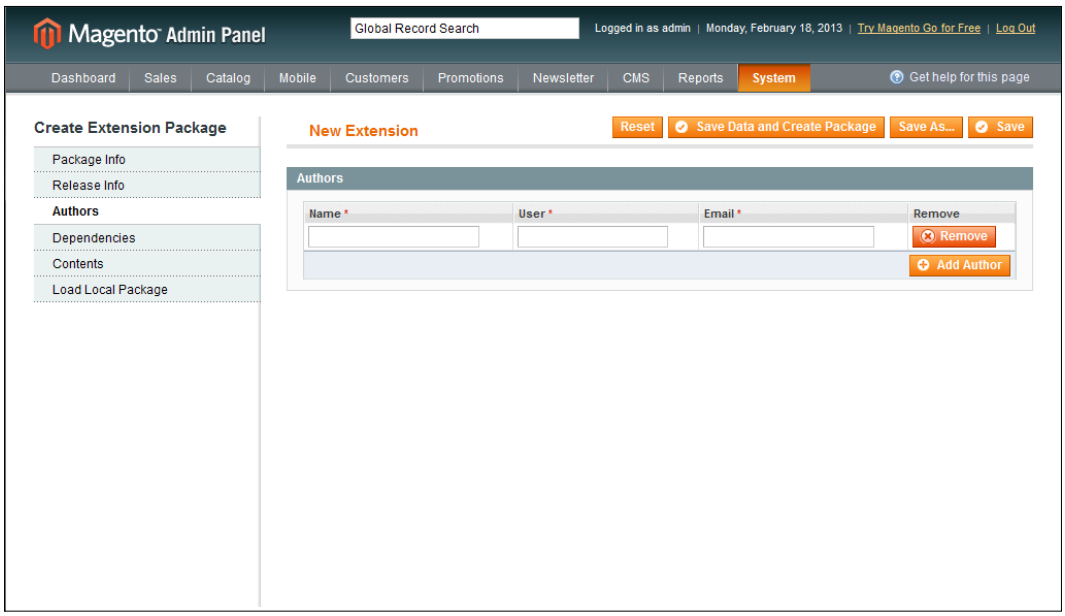


The **Release Info** section contains important data about the current package release:

- **Release Version**: In the initial release, this can be any arbitrary number; however, it is important that the version is incremented with each release. Magento Connect will not allow you to update the same version twice.
- **Release Stability**: Three options are available (**Stable**, **Beta** and **Alpha**).
- **Notes**: With this, we can release all the specific notes, if any.

# Authors

The following screenshot shows the screen for **Authors**:

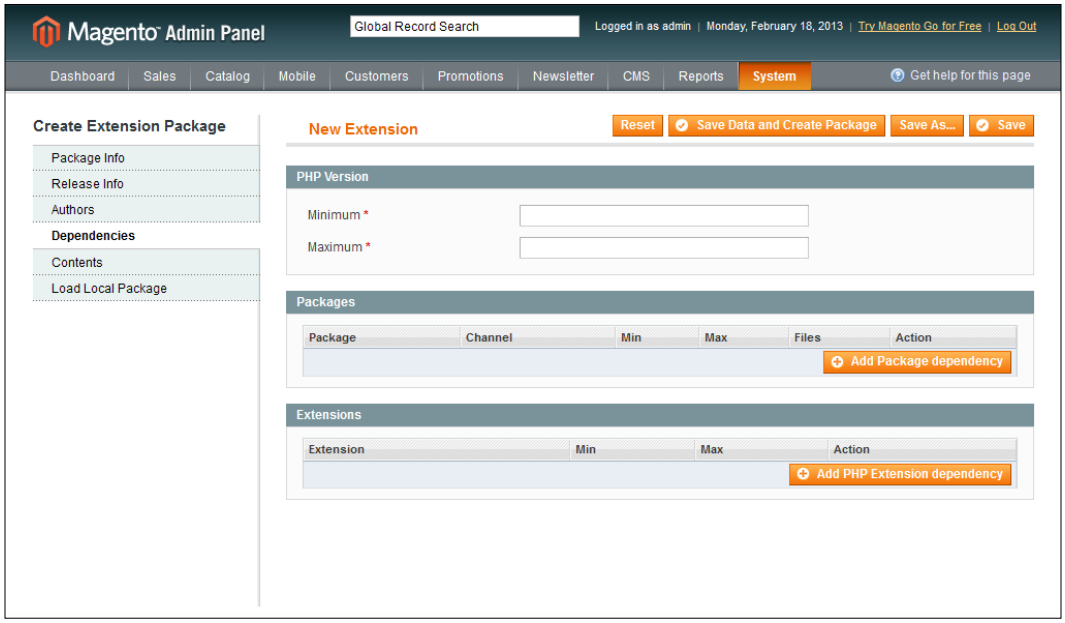



In this section, the author(s) information is specified; each author information has the following fields:

- **Name**: This specifies the author's full name
- **User**: This specifies the Magento username
- **Email**: This specifies the contact e-mail address

# Dependencies

The following screenshot shows the screen for **Dependencies**:



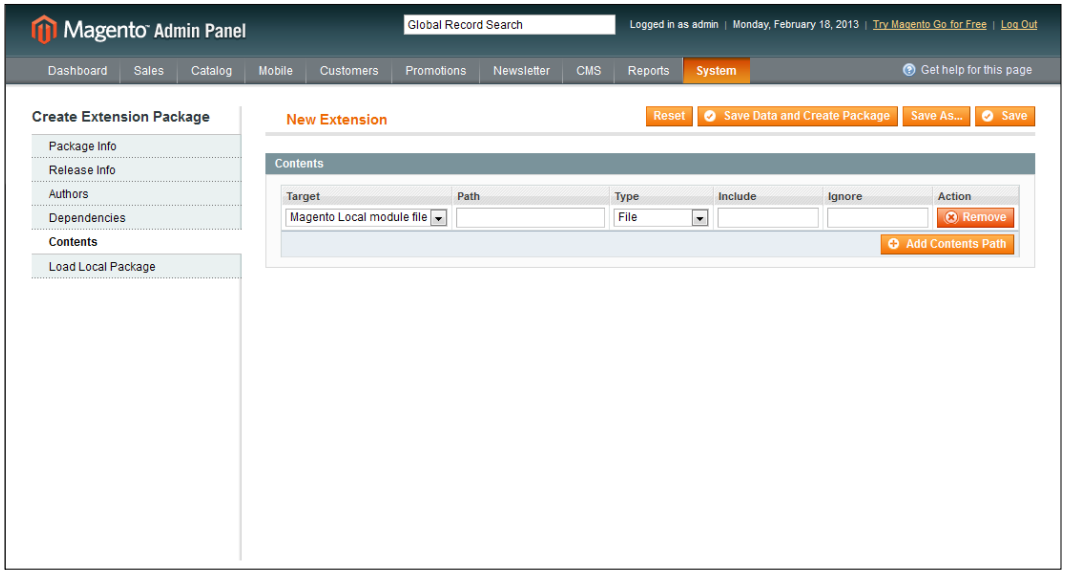

There are three types of dependencies that are used when packaging a Magento extension:

- **PHP Version**: This is the **Minimum** and **Maximum** version of the PHP that is supported for this extension
- **Packages**: This is used to specify any other packages that are required for this extension
- **Extensions**: With this, we can specify whether a specific PHP extension is required for our extension to work

If a package dependency is not met, Magento Connect will offer to install the required extension because PHP extensions' Magento Connect will throw an error and will stop the installation.

# Contents

The following screenshot shows the screen for **Contents**:




The **Contents** section allows us to specify each file and folder that forms part of the extension package.

This is the most important section in the extension packaging process, and it's also the easiest to mess up.

Each content entry has the following fields:

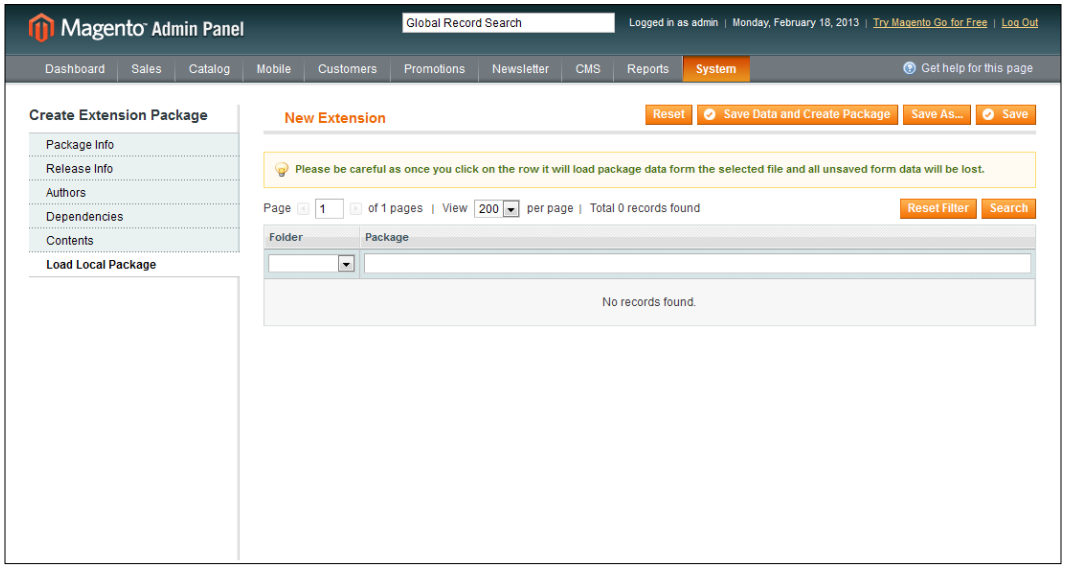
- **Target**: This is the target base directory; it is used to specify the base path to search the file. The following options are available:
    - **Magento Core team module file - ./app/code/core**
    - **Magento Local module file - ./app/code/local**
    - **Magento Community module file - ./app/code/community**

- **Magento Global Configuration - ./app/etc**
- **Magento Locale language file - ./app/locale**
- **Magento User Interface (layouts, templates) - ./app/design**
- **Magento Library file - ./lib**
- **Magento Media library - ./media**
- **Magento Theme Skin (Images, CSS, JS) - ./skin**
- **Magento Other web accessible file - ./**
- **Magento PHPUnit test - ./tests**
- **Magento other - ./**

- **Path**: This is the filename and/or path relative to our the specified target
- **Type**: Two options are available for us, **File** or **Recursive dir**
- **Include**: This field takes a regular expression that allows us to specify which files are to be included
- **Ignore**: This field takes a regular expression that allows to specify which files are to be excluded

# Load Local Package

The following screenshot shows the screen for **Load Local Package**:



This section allows us to load packaged extensions; as we have not packaged any extensions, the list is currently empty.

Let's go ahead and package our gift registry extension; ensure that you fill in all the fields and then click on **Save Data and Create Package**. This will package and save the extension in the `magento_root/var/connect/` folder.

The extension package file contains all the sources files and source code needed; additionally, a new file is created with each package, called `package.xml`. This file contains all the information about the extension and the detailed structure of the files and folders.

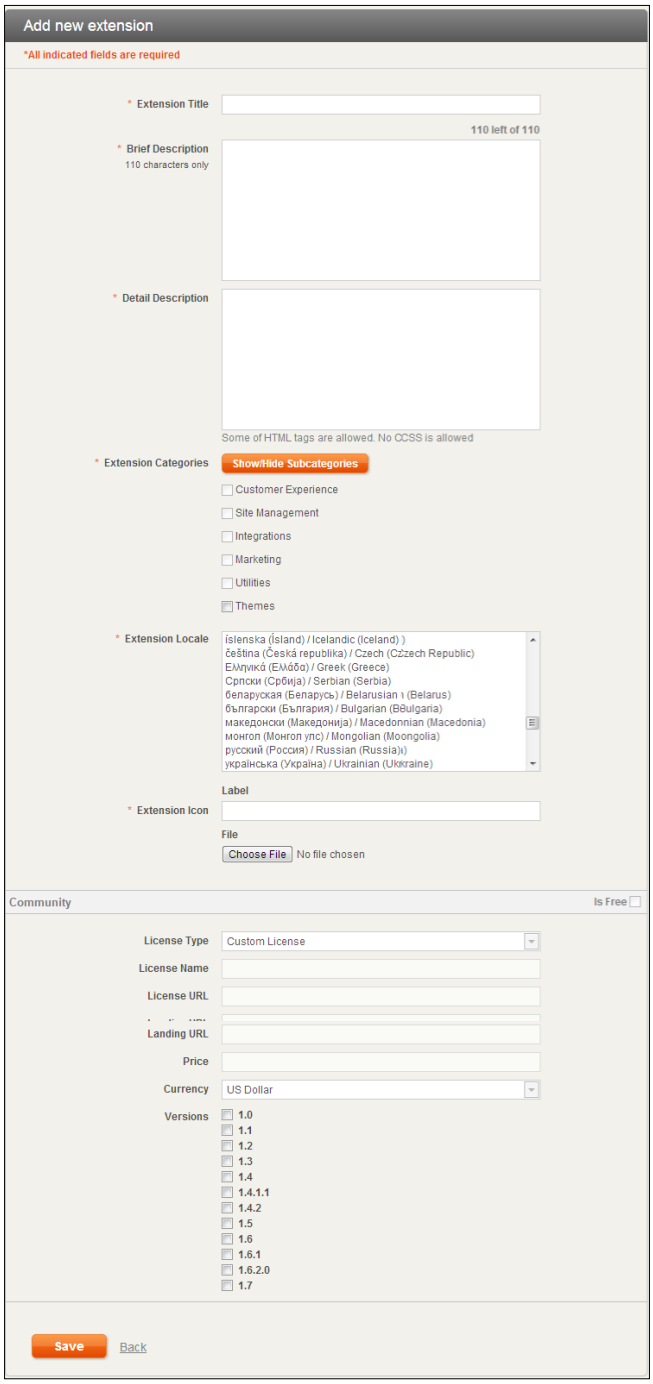
# Publishing our extension

Finally, in order to make our extension available, we have to create an extension profile in Magento Connect.

To create an extension profile, perform the following steps:

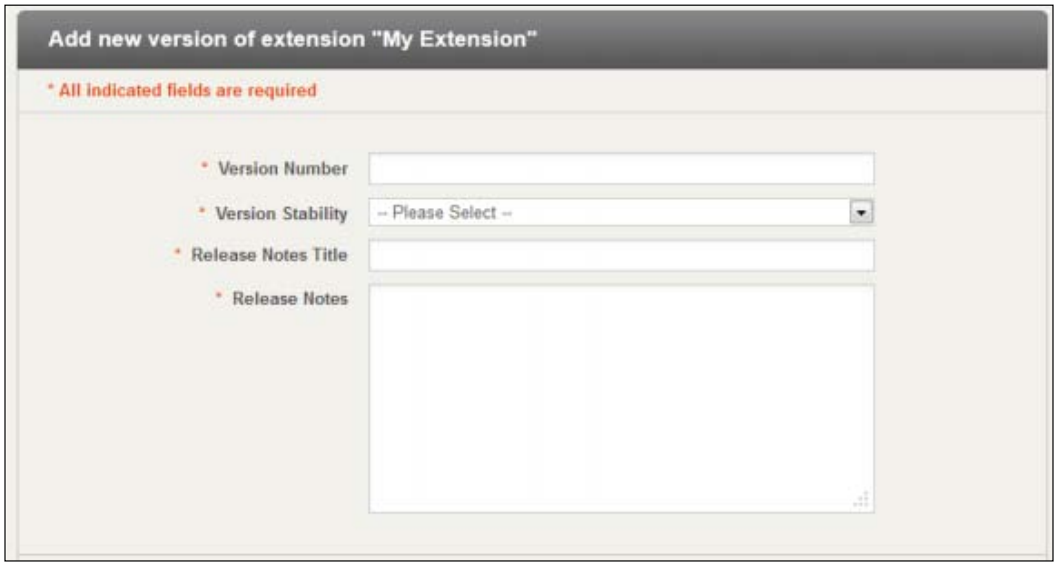
1. Log in to `magentocommerce.com`.
2. Click on the **MY ACCOUNT** .link.
3. Click on the **Developers** link in the left-side navigation.
4. Click on **Add a New Extension**.

The **Add new extension** screen looks something like the following:



It is important to notice that the extension key field must be the exact same name you used while generating the package.

Once the extension profile has been created, we can proceed to upload our extension package; all the fields should match the ones specified during the extension packaging process.




Finally, once we are done, we can click on the **Submit for Approval** button.
An extension can have the following statuses:

- **Submitted**: This means the extension was submitted for review
- **Not Approved**: This means there was a problem with the extension; you will also receive an e-mail explaining the reason why the extension was not approved
- **Live**: This means the extension has been approved and is available through Magento Connect
- **Offline**: You can take your extension offline at any time from your account extension manager

# Summary

In this chapter, we learned how to deploy and share our custom extensions. There are many different methods that we can use to share and deploy our code to production environments.

This is the book's final chapter. We learned a lot about Magento development, and while we covered a lot of ground, this book is only meant to be a stepping stone on a long journey.

Magento is not an easy framework to learn, and while it can be a daunting experience, I encourage you to keep trying and learning.

# A
# Hello Magento

The following example will give us a quick and easy introduction to the world of creating Magento extensions. We will create a simple "Hello World" module that will allow us to display a "Hello World!" message when we visit a specific URL in our store.

## The configuration

Creating a barebones extension in Magento requires at least two files: `config.xml` and the module declaration file. Let's go ahead and create each of our files.

The first file is used to declare the module to Magento. Without this file, Magento would not be aware of any extension files.

The file location is `app/etc/modules/Mdg_Hello.xml`.

```
<?xml version="1.0"?>
<config>
    <modules>
        <Mdg_Hello>
            <active>true</active>
            <codePool>local</codePool>
        </Mdg_Hello>
    </modules>
</config>
```

The second XML file is called `config.xml` and is used to specify all the extension configurations, such as routes, blocks, models, and helper class names. For our example, we are only going to be working with controllers and the routes.

Let's create the configuration file with the following code:

The file location is `app/code/local/Mdg/Hello/etc/config.xml`.

```
<?xml version="1.0"?>
<config>

    <modules>
        <Mdg_Hello>
            <version>0.1.0</version>
        </Mdg_Hello>
    </modules>
    <frontend>
        <routers>
            <mdg_hello>
                <use>standard</use>
                <args>
                    <module>Mdg_Hello</module>
                    <frontName>hello</frontName>
                </args>
            </mdg_hello>
        </routers>
    </frontend>
</config>
```

Our extension can now be loaded by Magento and you can enable or disable our extension by navigating to **Magento Backend at System | Configuration | Advanced**.

# The controller

At its core, Magento is a **Model-View-Controller** (**MVC**) framework, so in order to make our new route functional, we have to create a new controller that will respond to this specific route. To do this, perform the following steps:

1. Navigate to the extension root directory.
2. Create a new folder called `controllers`.
3. Inside the `controllers` folder create a file called `IndexController.php`.
4. Copy the following code:

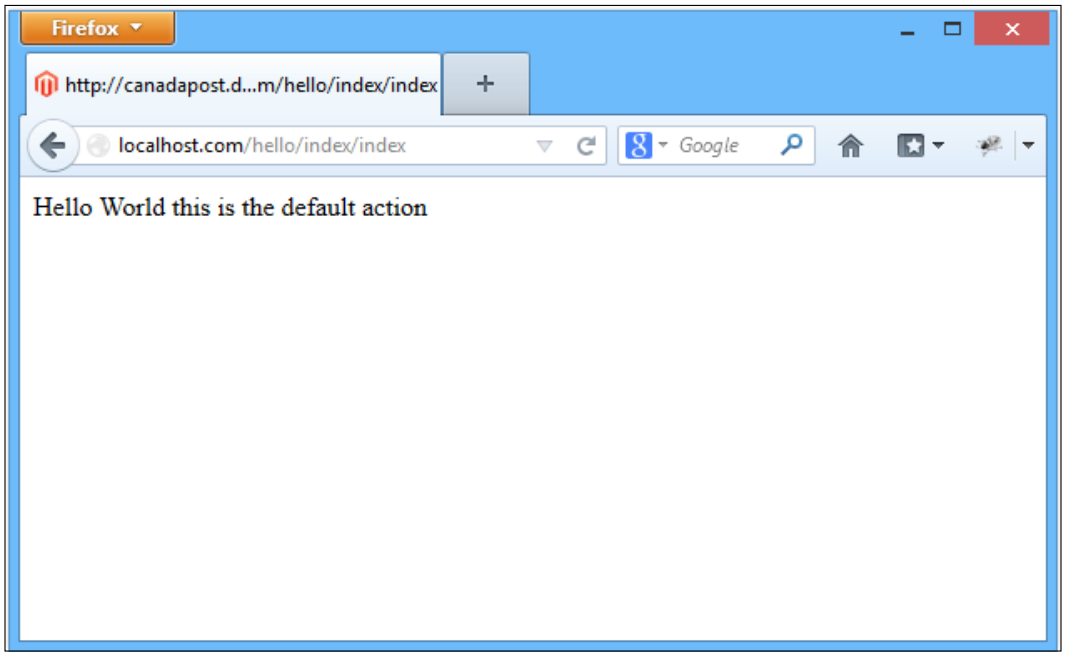
   The file location is `app/code/local/Mdg/Hello/controllers/IndexController.php`.

   ```
   <?php
   class Mdg_Hello_IndexController extends Mage_Core_Controller_
   Front_Action
   {
   ```

```
        public function indexAction()
    {
        echo 'Hello World this is the default action';
        }
}
```

# Testing the route

Now that we have created our router and controller, we can test it out by opening `http://magento.localhost.com/hello/index/index`, for which we should see the following screen:




By default, Magento will use both the index controller and index action as defaults for each extension. So, if we go to `http://magento.localhost.com/hello/index/index`, we should see the same screen as the one shown in previous screenshot.

To conclude our introduction to the creation of the Magento module, let's add a new route to our controller:

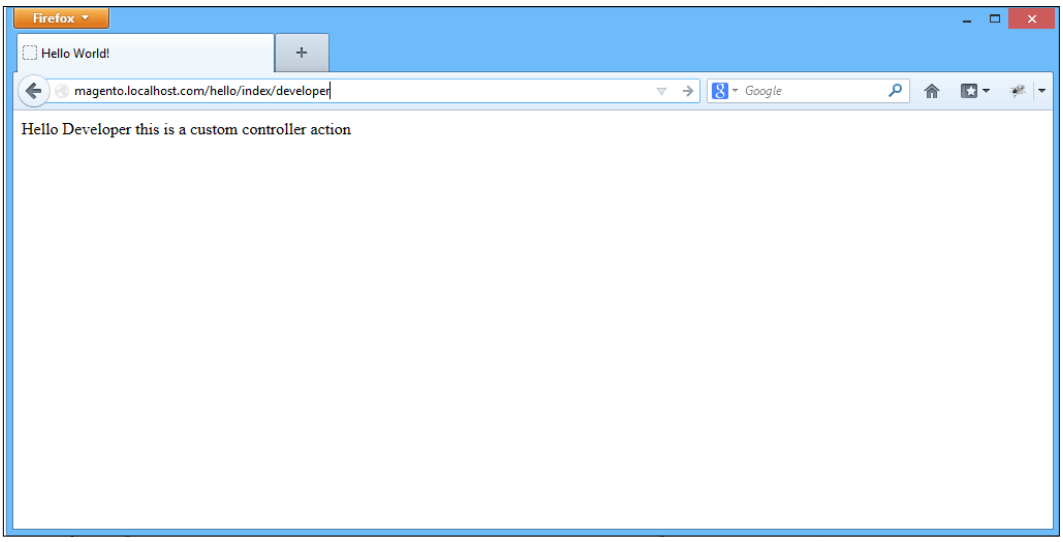
1. Navigate to the extension root directory.
2. Open `IndexController.php`.

3. Copy the following code:

   The file location is `app/code/local/Mdg/Hello/controllers/IndexController.php`.

```
<?php
class Mdg_Hello_IndexController extends Mage_Core_Controller_
Front_Action
{
     public function indexAction()
  {
     echo 'Hello World this is the default action';
     }

     public function developerAction()
     {
         echo 'Hello Developer this is a custom controller
action';
     }
}
```

   Finally, let's test it out and load the new action route by going to `http://magento.localhost.com/hello/index/developer`.



# B

# Understanding and Setting Up Our Development Environment

In this appendix, we will go over the stack of technologies involved in running Magento and learn how to set up a proper environment for development. The following topics will be covered in this appendix:

- LAMP virtual machine
- Setting up and using VirtualBox
- Setting up and using Vagrant
- IDEs and version control systems

We will also learn how to set up a LAMP virtual machine from scratch and how to automate this process entirely using Vagrant and Chef.

## LAMP from scratch

**LAMP** (**Linux, Apache, MySQL, and PHP**) is a solution stack of open source technologies that are used to build a web server and are the current standard for the running of Magento.

For a more detailed list of requirements, refer to `www.magentocommerce.com/system-requirements`.

Although nginx has seen a wider range of adoption among Magento developers, at the time of writing this book, Apache2 is still the community-accepted standard. We will focus on working with it.

As developers, there are multiple challenges and nuances of setting up and maintaining our development environment, such as the following:

- Matching your development and production environments
- Maintaining a consistent environment between different platforms and team members
- Setting up a new environment can take several hours
- Not all developers have the knowledge or experience required to set up a LAMP server on their own

We can resolve the first two points with the help of Oracle's VirtualBox (`www.virtualbox.org`). VirtualBox is powerful and widely popular virtualization engine that will allow us to create virtual machines. VMs can also be shared between developers and across all major operating systems.

# Getting VirtualBox

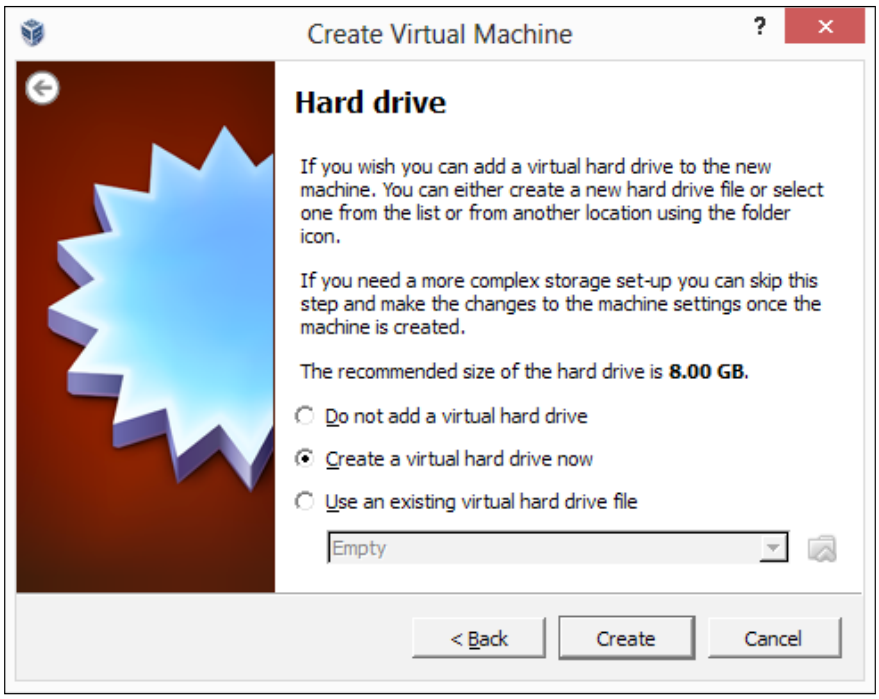
VirtualBox is open source, and it is supported across all platforms. It can be downloaded directly from `www.virtualbox.org/wiki/Downloads`.

Now, we will proceed to set up a Linux virtual machine. We have selected Ubuntu server 12.04.2 LTS for its ease of use and widely available support. First, download the ISO file from `www.ubuntu.com/download/server`; either 64-bit or 32-bit versions will work.

To create a new Linux virtual machine, perform the following steps:

1. Start the VirtualBox manager and click on the **New** button in the top-left corner:

2. A wizard dialog will pop up and guide us through the steps to create a bare virtual machine. The wizard will ask us for the basic information to set up the virtual machine:
    - **VM Name**: This defines how we will name our virtual machine; let's name it `Magento_dev 01`
    - **Memory**: This is the value of system memory that will be assigned to the guest operating system when our VM starts, in order to run a full LAMP server; 1 GB or more is recommended
    - **Operating System Type**: This is the type of OS that we will install later; in our case, we want to select **Linux/Ubuntu**, and depending on our selection, VirtualBox will enable or disable certain VM options
3. Next, we need to specify a virtual hard disk. Select **Create a virtual hard drive now**.




4. There are many hard disk options available, but for most purposes, selecting **VDI** (which is **VirtualBox Disk Image**) will suffice. This will create a single file on our host operating system.

5. We now need to select the type of storage on the physical drive. We are provided with two options:
    - **Dynamically allocated**: The disk image will grow automatically as the files and usage on our guest operating system grow
    - **Fixed Size**: This option will limit the size of the virtual disk from the start
6. Next, we will need to specify the size of our virtual hard disk. We want to adjust the size depending on how many Magento installations we plan to use.

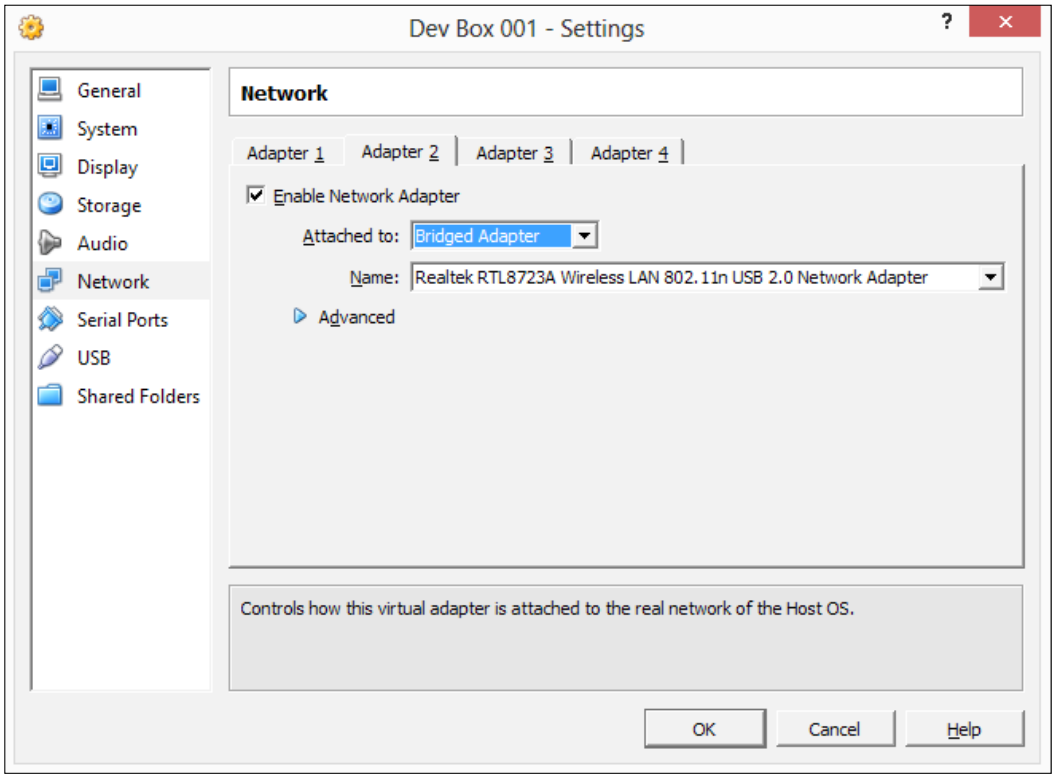
In general, we want to keep at least 2 GB per Magento installation and another 3 GB if we are running the database server on the same installation. This is not to say that all this space will be used at once or whether it will even be used at all, but Magento installations can use a lot of disk space once product images and cache files are factored in.

7. Finally, we just need to click on the **Create** button.

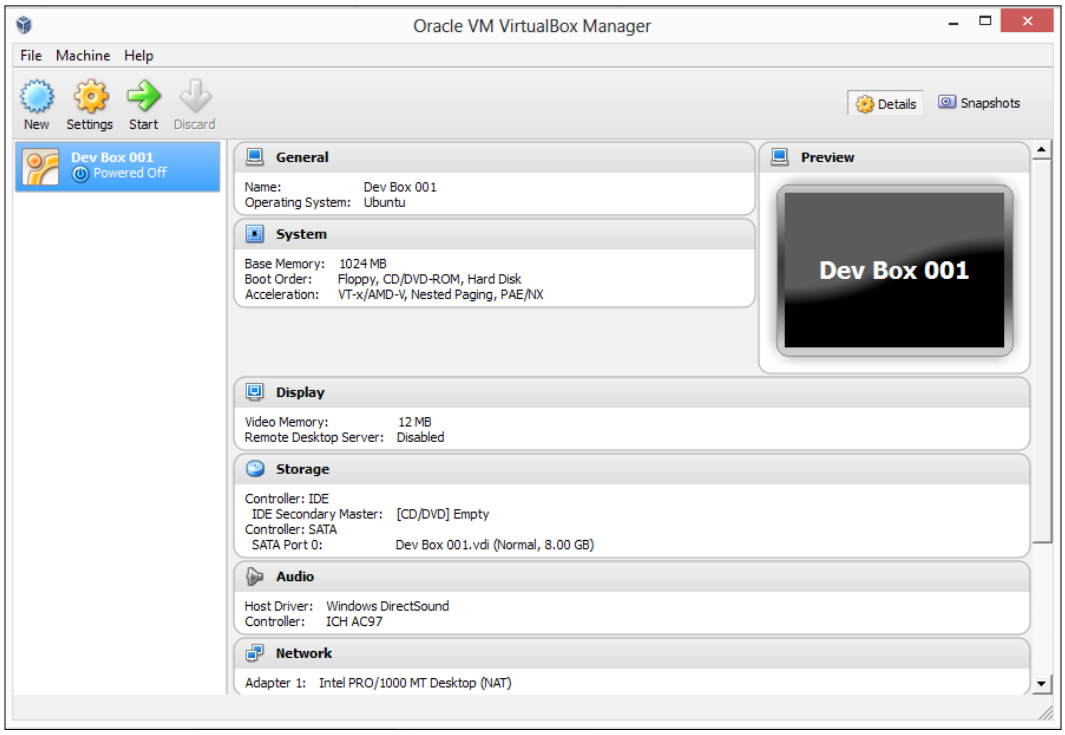
The main difference between the fixed size hard disk and the dynamically allocated hard disk is that the fixed size hard disk will reserve the space on the physical hard drive right from the start, whereas the dynamically allocated hard disk will grow incrementally until it gets to the specified limits.

The newly created box will appear on the left-hand side navigation menu, but before we start our recently created VM, we need to make some changes:

1. Select our newly created VM and click on the **Settings** button on the top.
2. Open the **Network** menu and select **Adapter 2**. We want to set this box up as a bridged adapter to our main network interface. This will allow us to connect remotely using **SSH**.



3. Go to the **System** menu and change the **Boot Order** value, so that the CD/DVD-ROM boots first.
4. In the **Storage** menu, select one of the empty IDE controllers and mount our previously downloaded Ubuntu ISO image.

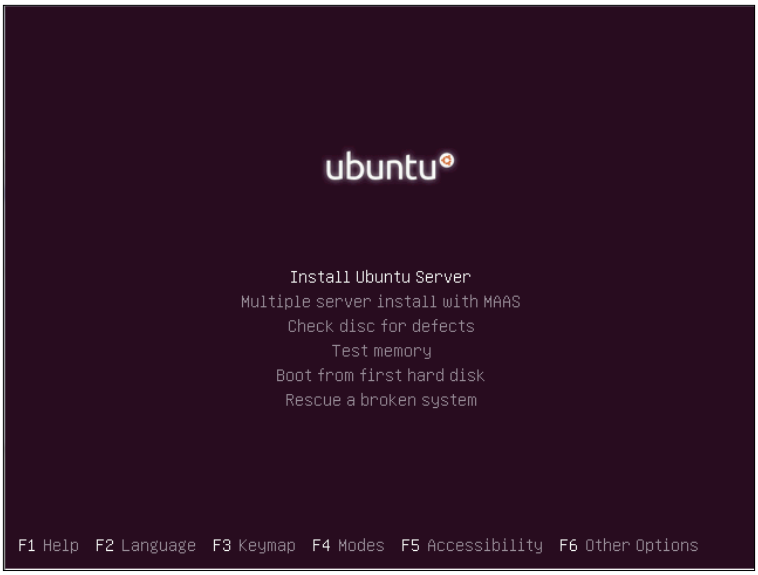



# Booting our virtual machine

At this point, we have successfully installed and configured our VirtualBox instance and are now ready to boot our new virtual machine for the first time. To do this, just select the VM in the left sidebar and click on the **Start** button at the top.

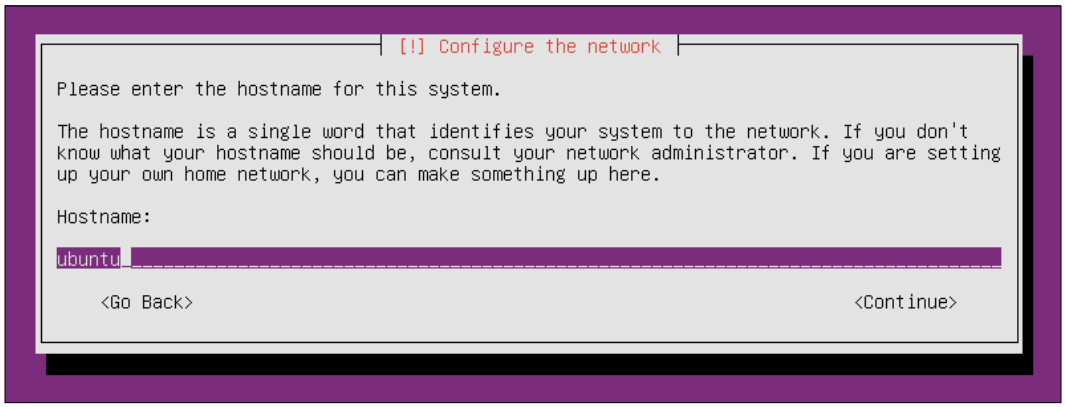
A new window will pop up with an interface to the VM. Ubuntu will take a few minutes to boot up.

Once Ubuntu has finished booting up, we will see two menus. The first menu will allow us to select the language, and the second one is the main menu that provides several options. In our case, we just want to proceed with **Install Ubuntu Server**:

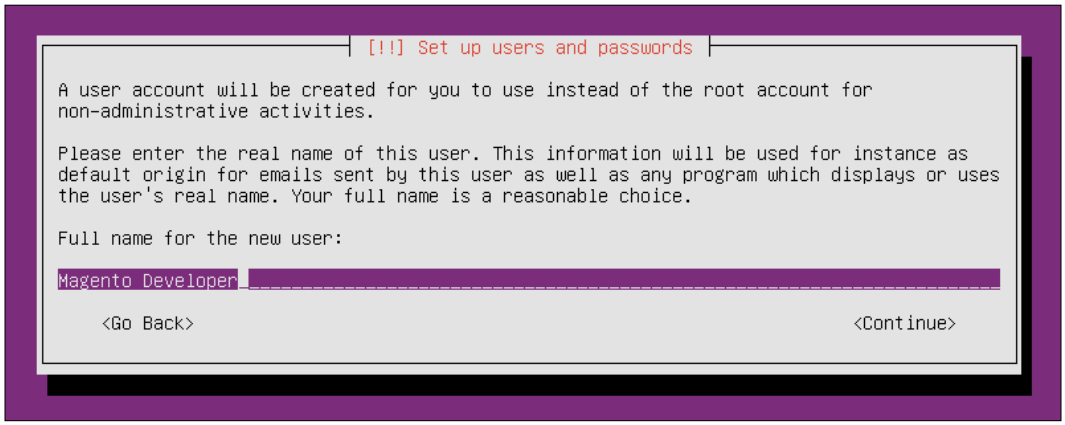



We should now see the Ubuntu installation wizard, which will ask for our language and keyboard settings. After selecting the appropriate settings for our country and language, the installer will proceed to load all the necessary packages in the memory. This can take a few minutes.

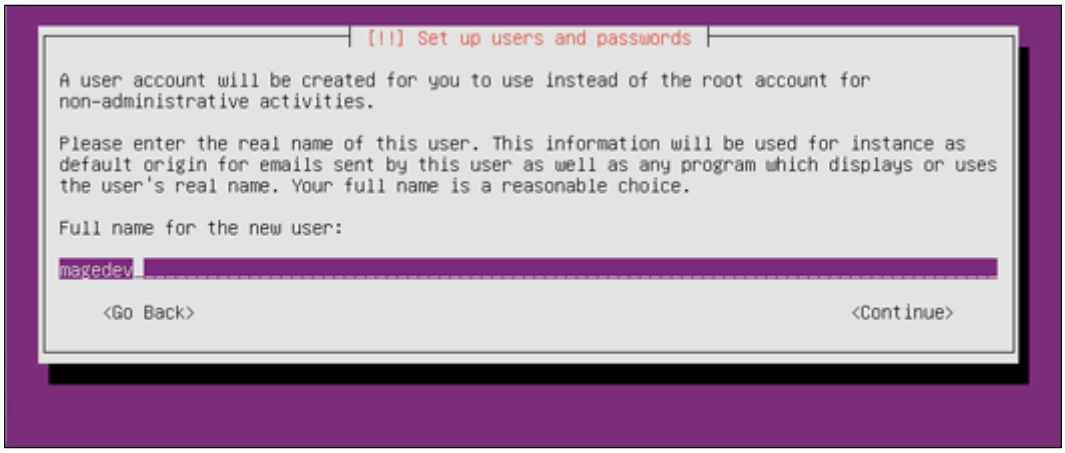
Ubuntu will proceed to configure our main network adapter, and once the automatic configuration is done, we will be asked to set up the hostname for the virtual machine. We can leave the hostname to the default settings.



The next screen will request that we enter the full name of our user; for this example, let's use `Magento Developer`.

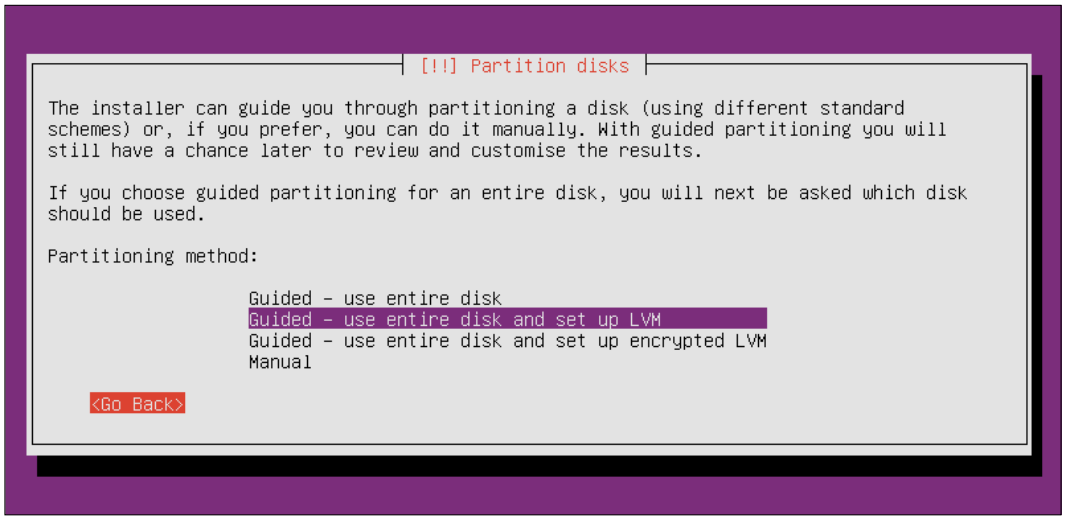



Next, we will be asked to create a username and password. Let's use `magedev` as our username.

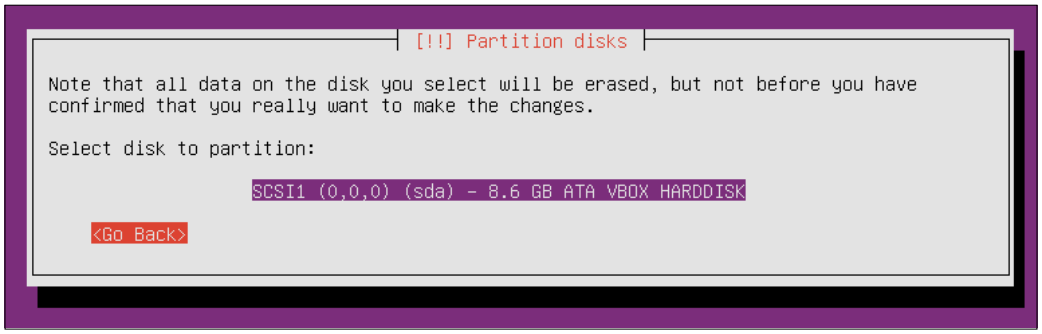


Let's set `magento2013` as our password.

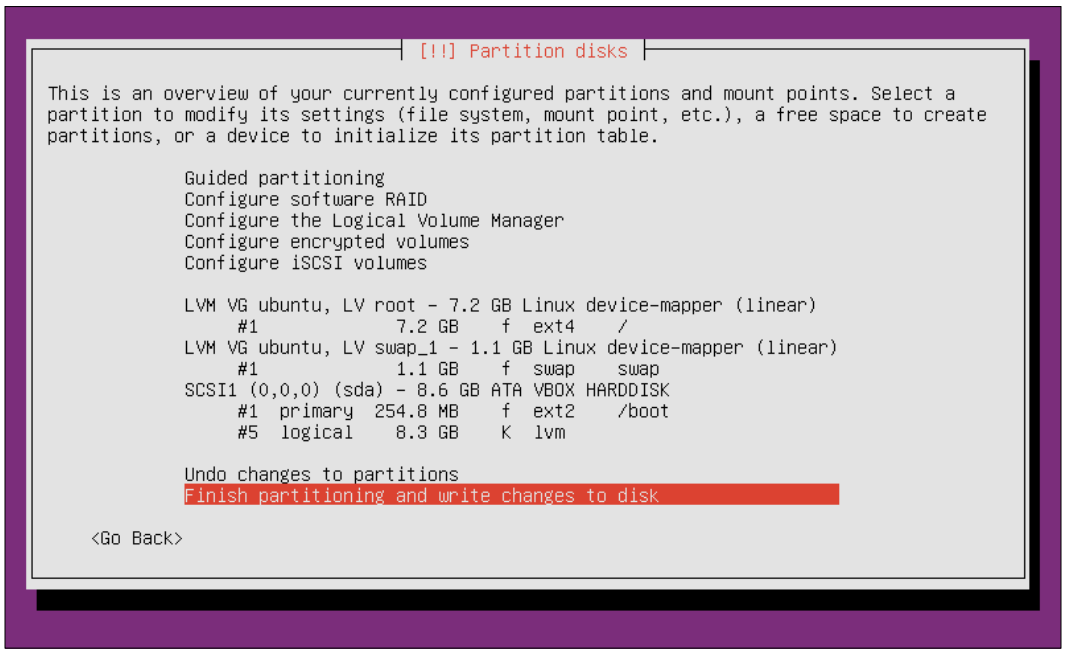

On the next screens, we will be asked to confirm our password and set up the correct time zone. After entering the right values, the installation wizard will show the following screen, asking about our partition settings:



In our case, we want to select **Guided – use entire disk and set up LVM**; let's confirm that we are partitioning our virtual disk.



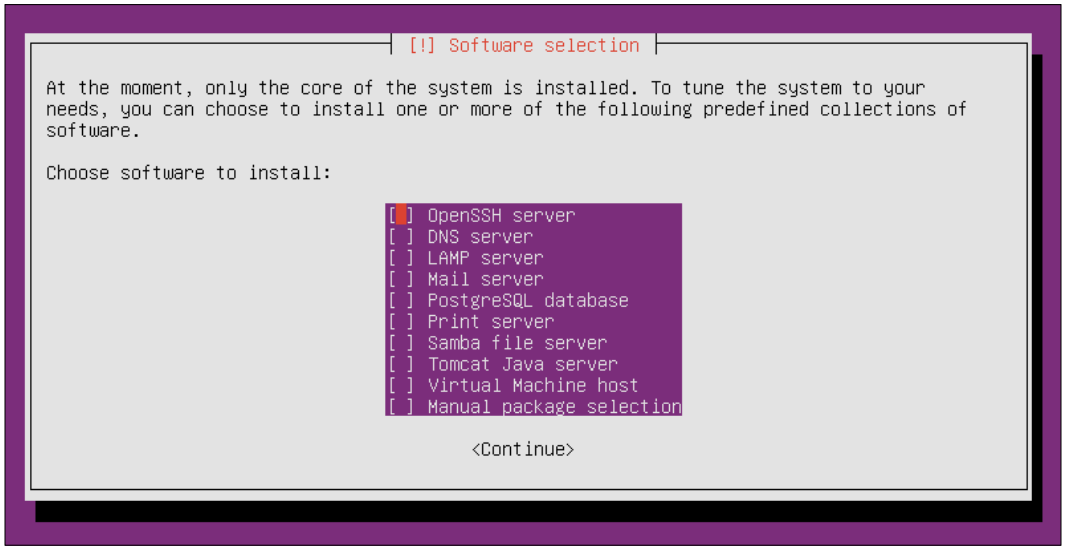

We will be asked to confirm our changes a final time; select **Finish partitioning and Write changes to the disk**.




The installation wizard will ask us to select predefined packages to install; one of the available options is **LAMP server**.

Although this is highly convenient, we don't want to install the LAMP server that comes prepackaged with our Ubuntu CD; we will be installing all the LAMP components manually, to guarantee that they are set up to specific needs and are up to date with the latest patches.

However, for this, we will need an SSH server; select **OpenSSH server** from the list and click on **Continue**.




The installation of Ubuntu is complete, and it will reboot into our newly installed virtual box.

We are almost ready to proceed with the installation of the rest of our environment, but first, we need to update our package manager repository definitions, log in to the console, and run the following command:

```
$ sudo apt-get update
```

**APT** stands for **Advance Packaging Tool** and is one of the core libraries included with most Debian GNU/Linux distributions; `apt` greatly simplifies the process of installing and maintaining software on our systems.

Once `apt-get` has finished updating all the repository sources, we can proceed with the installation of the other components of our LAMP server.

# Installing Apache2

Apache is an HTTP server. Currently, it is used to host over 60 percent of the websites on the Web and is the accepted standard for the running of Magento stores. There are many guides and tutorials available online in order to fine-tune and tweak Apache2 to increase Magento's performance.

Installing apache is as simple as running the following command:

```
$ sudo apt-get install apache2 -y
```

This will take care of installing Apache2 and all the required dependencies for us. If everything has been installed correctly, we can now test it by opening our browser and entering `http://192.168.36.1/`.

By default, Apache runs as a service and can be controlled with the following commands:

```
$ sudo apache2ctl stop
$ sudo apache2ctl start
$ sudo apache2ctl restart
```

You should now see Apache's default web page with the **It Works!** message.

# Installing PHP

**PHP** is a server-side scripting language and stands for **PHP Hypertext Processor**. Magento is implemented on PHP5 and Zend Framework, and we would need to install PHP and some additional libraries in order to run it.

Let's use `apt-get` again and run the following commands in order to get PHP5 and all the necessary libraries installed:

```
$ sudo apt-get install php5 php5-curl php5-gd php5-imagick php5-imap
php5-mcrypt php5-mysql -y
$ sudo apt-get install php-pear php5-memcache -y
$ sudo apt-get install libapache2-mod-php5 -y
```

The first command installed not only PHP5, but it also installed additional packages required by Magento in order to connect with our database and manipulate images.

The second command will install PEAR, a PHP package manager, and a PHP memcached adapter.

Memcached is high-performance, distributed memory caching system; this is an optional caching system for Magento.

The third command installs and sets up the PHP5 module for Apache.

We can finally test that our PHP installation is working by running the following command:

```
$ php -v
```

# Installing MySQL

MySQL is a popular choice of database for many web applications, and Magento is no exception. We will need to install and set up MySQL as part of the development stack:

```
$ sudo apt-get install mysql-server mysql-client -y
```

During the installation, we will be asked to enter a root password; use `magento2015`. Once the installation has finished, we should have a MySQL service instance running in the background. We can test it by trying to connect to the MySQL server:

```
$ sudo mysql -uroot -pmagento2015
```

If everything is installed correctly, we should see the following `mysql` server prompt:

```
mysql>
```

At this point, we have a fully functional LAMP environment that can be used not only to develop and work on Magento websites, but also for any other kind of PHP development.

# Putting everything together

At this point, we have a basic LAMP setup up and running. However, to work with Magento, we would need to perform some configuration changes and additional setup.

The first thing that we will need to do is create a location to store our development sites files, so we will run the following commands:

```
$ sudo mkdir -p /srv/www/magento_dev/public_html/
$ sudo mkdir /srv/www/magento_dev/logs/
$ sudo mkdir /srv/www/magento_dev/ssl/
```

This will create the necessary folder structure for our first Magento site. Now, we need to check out the latest version of Magento. We can quickly get the files using **SVN**.

We would need to install SVN first on our server with the following command:

```
$ sudo apt-get install subversion -y
```

Once the installer has finished, open the `magento_dev` directory and run the `svn` command to get the latest version files:

```
$ cd /srv/www/magento_dev
$ sudo svn export --force http://svn.magentocommerce.com/source/
branches/1.9 public_html/
```

We will also need to fix some of the permissions on our new Magento copy:

```
$ sudo chown -R www-data:www-data public_html/
$ sudo chmod -R 755 public_html/var/
$ sudo chmod -R 755 public_html/media/
$ sudo chmod -R 755 public_html/app/etc/
```

Next, we need to create a new database for our Magento installation. Let's open our `mysql` shell:

```
$ sudo mysql -uroot -pmagento2015
```

Once in the mysql shell, we can use the create command, which should be followed by the type of entity (database or table) we want to create and the database name in order to create a new database:

```
mysql> create database magento_dev;
```

Although we could use the root credentials to access our development database, this is not a recommended practice to follow because it could compromise not only a single site, but also full database server. MySQL accounts are restricted based on privileges we want, in order to create a new set of credentials that has privileges limited to only our working database:

```
mysql> GRANT ALL PRIVILEGES ON magento_dev.* TO 'mage'@'localhost'
IDENTIFIED BY 'dev2015$#';
```

Now, we need to properly set up Apache2 and enable some additional modules; fortunately, this version of Apache comes with a set of useful commands:

- `a2ensite`: This creates symlinks between the `vhosts` files in the `site-available` folder and the `sites-enabled` folder in order to allow the Apache server to read these files.

- `a2dissite`: This removes the symlinks created the by the `a2ensite` command. It effectively disables the site.
- `a2enmod`: This is used to create symlinks between the `mods-enabled` directory and the module configuration files.
- `a2dismod`: This will remove the symlinks from `mods-enabled`. This command will prevent the module from being loaded by Apache.

Magento uses the `mod_rewrite` module to generate URLs. The `mod_rewrite` module uses a rule-based rewriting engine to rewrite request URLs on the fly.

We can enable `mod_rewrite` with the `a2enmod` command:

```
$ sudo a2enmod rewrite
```

The next step will require that we create a new virtual host file under the `site-available` directory:

```
$ sudo nano /etc/apache2/sites-available/magento.localhost.com
```

The `nano` command will open a shell text editor, where we can set up the configuration for our virtual domain:

```
<VirtualHost *:80>
   ServerAdmin magento@locahost.com
   ServerName magento.localhost.com
   DocumentRoot /srv/www/magento_dev/public_html

   <Directory /srv/www/magento_dev/public_html/>
      Options Indexes FollowSymlinks MultiViews
      AllowOverride All
      Order allow,deny
      allow from all
   </Directory>
   ErrorLog /srv/www/magento_dev/logs/error.log
   LogLevel warn
</VirtualHost>
```

To save the new virtual host file, press *Ctrl* + *O* and then press *Ctrl* + *X*. The virtual host file will tell Apache where it can find the site files and what permissions are to be given to it. In order for the new configuration changes to take effect, we need to enable the new site and restart Apache. We can use the following commands to do this:

```
$ sudo a2ensite magento.localhost.com
$ sudo apache2ctl restart
```

We are nearly ready to install Magento. We just need to set up a local mapping into our host system host file, using the following for Windows and Unix respectively:

Using Windows, we can do the following:

1. Open `C:\system32\drivers\etc\hosts` in Notepad.
2. Add the following line at the end of this file: `192.168.36.1 magento.localhost.com`.

Using Unix/Linux/OS X, we can do the following:

1. Open `/etc/hosts` using nano:

   ```
   $ sudo nano /etc/hosts
   ```

2. Add the following line at the end of this file: `192.168.36.1 magento.localhost.com`.

If you are facing problems making the necessary changes on your `hosts` files, refer to `http://www.magedevguide.com/hostfile-help`.

We now can install Magento by opening `http://magento.localhost.com` in our browser. Toward the end, we should see the installer wizard. Follow the steps as indicated by the wizard, and you are set to go!

# Up and running with Vagrant

Previously, we created a Magento installation wizard using a VM. Although using a VM gives us a reliable environment, setting our LAMP for each of our Magento staging installations can still be very complicated. This is especially true for developers who don't have experience working in a Unix/Linux environment.

What if we could get all the benefits of running a VM but with a completely automated setup process? What if we were able to have new VM instances created and configured on the fly for each of our staging websites?

This is possible using Vagrant in combination with Chef. We can create an automated VM without the need for extensive knowledge of Linux or the different LAMP components.

Currently, Vagrant supports VirtualBox 4.0.x, 4.1.x, and 4.2.x.

# Installing Vagrant

Vagrant can be downloaded directly from `downloads.vagrantup.com`. Furthermore, its packages and installers are available for multiple platforms. Once you have downloaded Vagrant, run the installation file.

Once we have installed both Vagrant and VirtualBox, starting a base VM is as simple as typing the following lines in the terminal or Command Prompt depending on the OS you use:

```
$ vagrant box add lucid32 http://files.vagrantup.com/lucid32.box
$ vagrant init lucid32
$ vagrant up
```

These commands will start a new Vagrant box with Ubuntu Linux installed. From this point onward, we could start installing our LAMP server as per normal. But why should we spend an hour to configure and set up a LAMP server for each project when we can use Chef to automatically do it? Chef is a configuration management tool written in Ruby that integrates into Vagrant.

To make it easier for developers to start working with Magento, I have created a Vagrant repository in GitHub called `magento-vagrant` that includes all the necessary cookbooks and recipes for Chef. The `magento-vagrant` repository also includes a new cookbook that will take care of the specific Magento setup and configuration.

In order to start working with `magento-vagrant`, you will need a working copy of Git.

In Ubuntu, run this command:

```
$ sudo apt-get install git-core -y
```

In Windows, we can use the native tool found at `http://windows.github.com/` to download and manage our repositories.

Regardless of the operating system that you are using, we will need to check out a copy of this repository into our local filesystem. We will use `C:/Users/magedev/Documents/mage-vagrant/` to download our repository. Inside the `mage-vagrant` folder, we will find the following files and directories:

- `cookbooks`
- `data_bags`
- `Public`
- `.vagrant`
- `Vagrantfile`

The `magento-vagrant` repository includes cookbooks for each of the components of our development environment, which will be installed automatically as soon as we start our new VagrantBox.

The only thing left to do now is to set up our development sites. The process to add new Magento sites to our vagrant installation has been simplified through the use of Vagrant and Chef.

Inside the `data_bags` directory, we have one file for each Magento installation inside our VagrantBox; the default repository comes with an example installation of Magento CE 1.7.

For each site, we will need to create a new JSON file containing all the settings that Chef will need. Let's take a look at the `magento-vagrant` default file.

The file location is `C:/Users/magedev/Documents/mage-vagrant/data_bags/sites/default.json`. Here are the contents of the file:

```
{
    "id": "default",
    "host": "magento.localhost.com",
    "repo": [
        "url": "svn.magentocommerce.com/source/branches/1.7",
        "revision": "HEAD"
```

```
        ],
      "database": [
          "name": "magento_staging",
          "username": "magento",
          "passwod": "magento2015$"
      ]
  }
```

This will automatically set up a Magento installation using the latest files from the Magento repository.

Adding new sites to our VagrantBox is just matter of adding a new JSON file to the corresponding site and restarting the VagrantBox.

Now that we have a running Magento installation, let's look into choosing a proper **Integrated Development Environment** (**IDE**).

# Choosing an IDE

Choosing the right IDE is mostly the matter of a developer's personal taste. However, choosing the right IDE can be critical for a Magento developer.

The challenge for the IDEs comes mostly from Magento's extensive usage of factory names. This makes the implementation of certain features difficult, such as code completion, also known as IntelliSense. Currently, there are two IDEs that excel in their native support for Magento: **NetBeans** and **PhpStorm**.

Although NetBeans is open source and has been around for a long time, PhpStorm has been taking the upper hand and gaining more support from the Magento Community.

Furthermore, the recent release of **Magicento**, a plugin specifically created to extend and integrate Magento into PhpStorm, has made it the best option currently available.

# Working with a version control system

The Magento code base is very extensive and is comprised of over 7,000 files and close to a million and a half lines of code. For this reason, working with a version control system is not only good practice, but also a necessity.

Version control systems are used to keep track of changes across multiple files and by multiple developers. Using a version control system, we gain access to very powerful tools.

Of the several version control systems available **(git**, **svn**, **mercurial**), Git deserves special attention due to its simplicity and flexibility. By releasing the upcoming version 2 of Magento on GitHub, a Git hosting service, the Magento core development team has recognized the importance that Git has among the Magento community.

For more information on Magento2, refer to `https://github.com/magento/magento2`.

GitHub now specifically includes a `.gitignore` file for Magento, which will ignore all the files in the Magento core and only keep track of our own code.

That said, there are a several version control concepts that we need to keep in mind when working with our Magento projects:

**Branching**: This allows us to work on new features without affecting our trunk (stable release).

**Merging**: This is used to move code from one place to another. Usually, this is done from a development brand in our trunk once the code is ready to be moved into production.

**Tagging**: This is used to create snapshots of a release.

# Summary

In this appendix, we learned about:

- Setting up and working with LAMP environments
- Setting development environments across multiple platforms
- Creating and provisioning Vagrant virtual machines
- Working with Chef recipes
- Using version control systems for Magento development

Having a proper environment is the first step toward starting development for Magento and is an integral part of our Magento toolbox.

Now that we have a development environment set up and ready to use, it's time to dive deep into Magento's fundamental concepts. These concepts will give us the necessary tools and knowledge required to develop with Magento.

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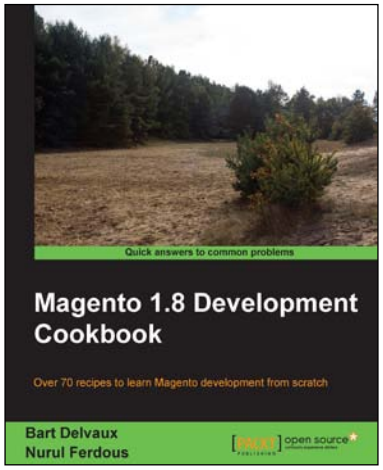


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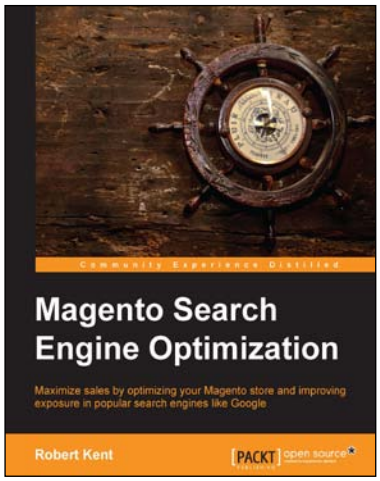


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