



Zend Framework and Access Control

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Zend Framework facilitates development of PHP applications that require authentication and access control by providing flexible and extensible components built using the object-oriented features of PHP 5.



Topics Overview

- Introduction to Zend Framework
- Authenticating with Zend_Auth
- Access control lists with Zend_Acl
- Putting it all together with MVC
- Example Application
- Q & A

Introduction to Zend Framework

- Designed to facilitate building web applications and web services with object-oriented PHP 5
- Open Source
 - New BSD license is business-friendly
 - Free for development and distribution
 - CLA process assures that the code is free of legal issues

Introduction to Zend Framework

- “Extreme simplicity”
- Use-at-will architecture
- Designed for extensibility
- Extensive documentation and testing
- Continuous community involvement

Introduction to Zend Framework

- Class Library – over 150,000 lines of code
- Documentation – over 500 pages
- Quality & Testing – over 4,200 unit tests
- Over 2,000,000 downloads
- Supports PHP 5.1.4 and later

Authenticating with Zend_Auth

- Authentication – determining whether an entity is actually what it purports to be, based on some set of credentials
- Zend_Auth is designed to support authenticating the requester through an adapter for an authentication mechanism (e.g., HTTP Basic/Digest, database table, LDAP)

Authenticating with Zend_Auth

- Zend_Auth adapters implement **Zend_Auth_Adapter_Interface**:

```
class MyAuthAdapter implements Zend_Auth_Adapter_Interface
{
    /**
     * Performs an authentication attempt
     * @throws Zend_Auth_Adapter_Exception
     * @return Zend_Auth_Result
     */
    public function authenticate()
    {
    }
}
```

Authenticating with Zend_Auth

- Authentication results are returned as a **Zend_Auth_Result** object, which provides:
 - `boolean isValid()`
 - `integer getCode()`
 - `mixed getIdentity()`
 - `array getMessages()`

Authenticating with Zend_Auth

- Two ways to authenticate against a Zend_Auth adapter:
 - Indirectly, through `Zend_Auth::authenticate()`
 - Directly, through the adapter's `authenticate()` method
- By indirect usage the authenticated identity is automatically saved to persistent storage (e.g., the PHP session)
- Direct usage of Zend_Auth adapters allows the user to decide what to do upon authentication

Authenticating with Zend_Auth

- Zend_Auth implements the Singleton pattern; exactly one instance of the Zend_Auth class is available at any time:

```
assert(Zend_Auth::getInstance() instanceof Zend_Auth);
```

- Exactly one request per PHP execution lifetime
- Operators **new** and **clone** are unavailable

Authenticating with Zend_Auth

- Zend_Auth automatically persists a successfully authenticated identity to the PHP session
- Override this behavior by passing an object that implements **Zend_Auth_Storage_Interface** to **Zend_Auth::setStorage()**
- If automatic identity storage is undesirable, developers may directly authenticate against a Zend_Auth adapter

Authenticating with Zend_Auth

- Using a Zend_Auth adapter indirectly:

```
$authAdapter = new MyAuthAdapter($username, $password);  
$auth = Zend_Auth::getInstance();  
$result = $auth->authenticate($authAdapter);  
if (!$result->isValid()) {  
    foreach ($result->getMessages() as $message) {  
        echo "$message\n";  
    }  
}
```

- Authenticated identity saved automatically

Authenticating with Zend_Auth

- Other useful Zend_Auth methods:
 - `hasIdentity()`
 - `getIdentity()`
 - `clearIdentity()`

Authenticating with Zend_Auth

- Using a Zend_Auth adapter directly:

```
$authAdapter = new MyAuthAdapter($username, $password);  
$result = $authAdapter->authenticate();  
if (!$result->isValid()) {  
    foreach ($result->getMessages() as $message) {  
        echo "$message\n";  
    }  
}
```

- No automatic storage of authenticated identity

Access Control Lists with Zend_Acl

- Zend_Acl provides Access Control Lists functionality and privileges management
- Object-oriented design supports controlling access to certain protected objects by other requesting objects
- Persistence does not require any backend technology; instances are serializable

Access Control Lists with Zend_Acl

- Definitions
 - A **Resource** is an object to which access is controlled
 - A **Role** is an object that may request access to a Resource
- **Roles request access to Resources**
- Roles and Resources must be added to the ACL before applying any rules upon them or querying against them
- Specify rules with **allow()** and **deny()**
- Query the ACL with **isAllowed()**

Access Control Lists with Zend_Acl

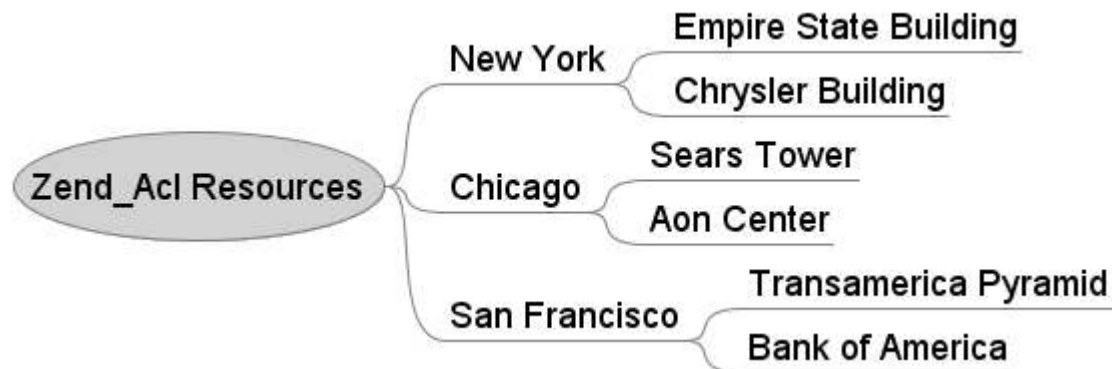
- Resource objects must implement **Zend_Acl_Resource_Interface**:

```
class MyResource implements Zend_Acl_Resource_Interface
{
    /**
     * @return string
     */
    public function getResourceId()
    {}
}
```

- Zend_Acl includes **Zend_Acl_Resource**

Access Control Lists with Zend_Acl

- Resources may be organized in a hierarchy:



- Rules are inherited from parent resources

Access Control Lists with Zend_Acl

- Example inheritance between resources:

```
<?php
$acl = new Zend_Acl();

$acl->addRole(new Zend_Acl_Role('guest'));

$acl->add(new Zend_Acl_Resource('New York'))
    ->add(new Zend_Acl_Resource('Empire State Building'), 'New York')
    ->add(new Zend_Acl_Resource('Chrysler Building'), 'New York');

$acl->allow('guest', 'New York')
    ->deny('guest', 'Empire State Building');

echo $acl->isAllowed('guest', 'Empire State Building') ?
    'allowed' : 'denied';
echo $acl->isAllowed('guest', 'Chrysler Building') ?
    'allowed' : 'denied';
```

Access Control Lists with Zend_Acl

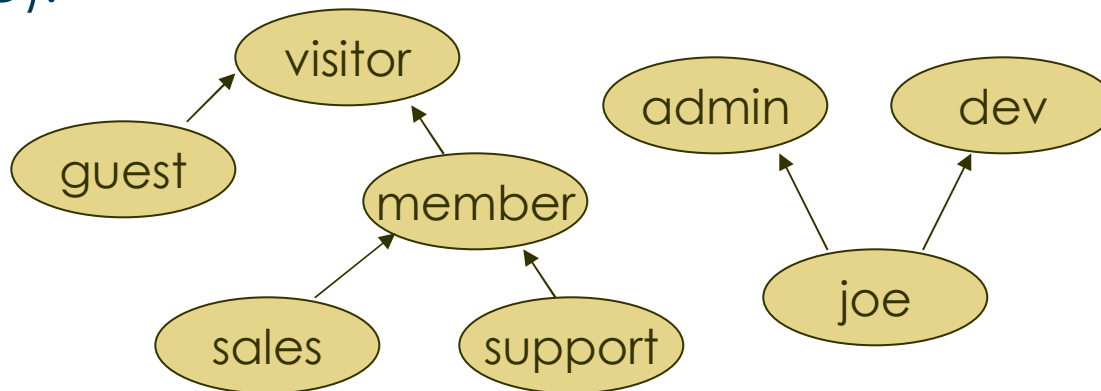
- Role objects must implement **Zend_Acl_Role_Interface**:

```
class MyRole implements Zend_Acl_Role_Interface
{
    /**
     * @return string
     */
    public function getRoleId()
    {}
}
```

- Zend_Acl includes **Zend_Acl_Role**

Access Control Lists with Zend_Acl

- Roles may be organized in a directed acyclic graph (DAG):



- Access control rules are inherited from parent roles
- Multiple inheritance ambiguity resolution

Access Control Lists with Zend_Acl

- Example role inheritance ambiguity resolution:

```
$acl = new Zend_Acl();

$acl->addRole(new Zend_Acl_Role('guest'))
    ->addRole(new Zend_Acl_Role('member'))
    ->addRole(new Zend_Acl_Role('admin'));

$parents = array('guest', 'member', 'admin');
$acl->addRole(new Zend_Acl_Role('someUser'), $parents);

$acl->add(new Zend_Acl_Resource('someResource'));

$acl->deny('guest', 'someResource');
$acl->allow('member', 'someResource');

echo $acl->isAllowed('someUser', 'someResource') ? 'allowed' : 'denied';
```

Access Control Lists with Zend_Acl

- Supports "privileges" upon resources (e.g., "view" privilege upon an "article" resource)
- Usage is completely optional
- Privileges are string identifiers, not objects
- Privileges are specified with allow/deny rules

```
$acl->allow($someRole, $someResource, 'view');  
$acl->deny($someRole, $someResource, array('edit', 'delete'));  
if ($acl->isAllowed($someRole, $someResource, 'view')) {  
    ...  
}
```

Access Control Lists with Zend_Acl

- Rules may be removed from the ACL using **removeAllow()** and **removeDeny()**
- Specify the role(s), resource(s), and privilege(s) to which the removed rule must no longer apply

```
$acl = new Zend_Acl();  
$acl->allow(null, null, array('privilege 1', 'privilege 2'));  
assert(!$acl->isAllowed());  
assert($acl->isAllowed(null, null, 'privilege 1'));  
assert($acl->isAllowed(null, null, 'privilege 2'));  
$acl->removeAllow(null, null, 'privilege 1');  
assert(!$acl->isAllowed(null, null, 'privilege 1'));  
assert($acl->isAllowed(null, null, 'privilege 2'));
```

Access Control Lists with Zend_Acl

- Assertions provide support for conditional rules
- Examples:
 - Allow between 8:00am and 5:00pm
 - Deny from specific IPs or networks
 - Allow only the author to edit an article
- Pass an instance of **Zend_Acl_Assert_Interface** to **allow()**/**deny()**
- The rule applies if and only if **assert()** returns **true**

Access Control Lists with Zend_Acl

- An example assertion class for screening requests from abusive IP addresses:

```
class My_Acl_Assert_DirtyIP implements Zend_Acl_Assert_Interface
{
    public function assert(Zend_Acl $acl,
                          Zend_Acl_Role_Interface $role = null,
                          Zend_Acl_Resource_Interface $resource = null,
                          $privilege = null)
    {
        return $this->_isDirtyIP($_SERVER['REMOTE_ADDR']);
    }

    protected function _isDirtyIP($address)
    {}
}
```

Access Control Lists with Zend_Acl

- Using a "DirtyIP" assertion object to deny access to known abusive IP addresses:

```
$acl = new Zend_Acl();  
$acl->deny(null, null, null, new My_Acl_Assert_DirtyIP());
```

- If the requesting IP is blacklisted, then access is denied

Putting it all together with MVC

- Zend Framework provides implementations of the Front Controller and Model-View-Controller (MVC) patterns
- Zend_Acl does not require use of the Front Controller or MVC, but it is useful to integrate access control rules with their controllers
- TIMTOWTDI, so we present an example

Putting it all together with MVC

- Configure the Front Controller
 - Set action controllers directory
 - Register plug-ins (e.g., authentication and authorization)
 - Set other options (e.g., throwing exceptions, returning the response)
- Set up the ACL for action controllers
- Set up any custom routes
- Dispatch the Front Controller

Example Application

- Home page has personalized greeting
- Login form
- Logout feature
- User accounts stored in MySQL
- Users can change their own passwords and display names

Example Application

- Create the database and user account storage table:

```
CREATE DATABASE `myapp`;  
CREATE TABLE `myapp`.`user` (  
  `id` int(10) unsigned NOT NULL auto_increment,  
  `username` char(32) NOT NULL,  
  `password` char(32) NOT NULL,  
  `fullname` char(32) NOT NULL,  
  PRIMARY KEY (`id`),  
  UNIQUE KEY `username` (`username`)  
) COMMENT='user accounts';
```

Example Application

- Add an administrative user and a regular user to the new table:

```
INSERT INTO user (username, password, fullname)
VALUES ('admin', MD5('admin'), 'Administrator'),
('someuser', MD5('someuser'), 'Some User');
```

Example Application

- The application will route all requests that do not correspond to an existing file or directory to the PHP application
- Using Apache and mod_rewrite, the following **.htaccess** file would work as desired:

```
RewriteEngine on
RewriteCond %{SCRIPT_FILENAME} !-f
RewriteCond %{SCRIPT_FILENAME} !-d
RewriteRule ^(.*)$ index.php/$1
```

Example Application

- The `index.php` file contains simply the following:

```
<?php  
require_once 'application/library/My/App.php' ;  
My_App::getInstance()->run();
```

- The application class will take care of setting up the Front Controller and dispatching the request

Example Application

- The interesting parts of

My_App::getInstance() ->run():

```
$frontController = Zend_Controller_Front::getInstance();  
$frontController->throwExceptions(true)  
    ->registerPlugin(new My_Controller_Plugin_Auth())  
    ->returnResponse(true);
```

- Continue to set up the ACL...

Example Application

- Add resources and roles, and create the rules needed to enforce the application requirements

```
$acl = $this->getAcl();

$acl->add(new Zend_Acl_Resource('index'))
    ->add(new Zend_Acl_Resource('login'))
    ->add(new Zend_Acl_Resource('logout'))
    ->add(new Zend_Acl_Resource('profile'))

    ->addRole(new Zend_Acl_Role('anonymous'))
    ->addRole(new Zend_Acl_Role('member'), 'anonymous')
    ->addRole(new Zend_Acl_Role('admin'), 'member')

    ->allow()
    ->deny(null, 'profile')
    ->allow('member', 'profile');
```

Example Application

- Now, dispatch the request and catch any resulting exception:

```
try {  
    $response = $frontController->dispatch();  
    $response->sendResponse();  
} catch (Exception $e) {  
    echo $e->getMessage();  
}
```

- For this example, the exception is simply printed, but production applications should log the occurrence of an exception (see `Zend_Log`)

Example Application

- The Front Controller has an Auth plugin:

```
class My_Controller_Plugin_Auth extends Zend_Controller_Plugin_Abstract
{
    public function preDispatch(Zend_Controller_Request_Abstract $request)
    {
        $auth = Zend_Auth::getInstance();

        if ($auth->hasIdentity()) {
            switch ($auth->getIdentity()->username) {
                case 'admin':
                    $role = 'admin';
                    break;
                default:
                    $role = 'member';
                    break;
            }
        } else {
            $role = 'anonymous';
        }

        // (continued on next slide)
    }
}
```

Example Application

```
$request = $this->getRequest();

$controllerName = $request->getControllerName();

$acl = My_App::getInstance()->getAcl();

if (!$acl->has($controllerName)) {
    throw new Exception('Sorry, the requested controller does not'
        . ' exist as an ACL resource');
}

if (!$acl->isAllowed($role, $controllerName,
    $request->getActionName())) {
    $request->setControllerName('index')
        ->setActionName('denied')
        ->setDispatched(false);
}
}
```

Example Application

- The application controllers extend the following class:

```
class My_Controller_Action extends Zend_Controller_Action
{
    public function preDispatch()
    {
        $view =
Zend_Controller_Action_HelperBroker::getStaticHelper('viewRenderer')->view;

        $auth = Zend_Auth::getInstance();
        if ($view->authenticated = $auth->hasIdentity()) {
            $view->user = new My_Model_User($auth->getIdentity());
        } else {
            $view->user = new My_Model_User();
        }

        $view->baseUrl = Zend_Controller_Front::getInstance()->getBaseUrl();
    }

    public function __call($name, $args)
    {
        throw new Exception('Sorry, the requested action does not exist');
    }
}
```

Example Application

- Operate the application's functionality:
 - Home page (index/index)
 - Personalized greeting
 - Layout view script prints date and time
 - Shows "Edit Profile" link only to authenticated users

Example Application

- Login function (login/index)
 - Requires username of between 3 and 32 alphabetic characters
 - Requires password of at least 5 characters
 - Recalls the most recent reasons for login failure
 - POSTs to login/process, which redirects to login/index
 - Authenticated users do not see login form
- Logout feature (logout/index)

Example Application

- Edit Profile (profile/edit)
 - Only authenticated members are authorized due to ACL rule
 - Full name must be between 3 and 32 characters
 - Password must be at least 5 characters
 - Password must match verification field
 - Recalls the most recent reasons for failure to save profile data
 - POSTs to profile/edit/process, which redirects to profile/edit



Thank you!

Zend/PHP Conference & Expo 2007
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More on Zend Framework:
<http://framework.zend.com>