PWM Administrator's Guide

Updated for v1.5.5

http://code.google.com/p/pwm/

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Overview and Requirements

Welcome to PWM Administrator's Guide. PWM provides a feature rich, easy to manage, password self service web application for ldap directories.

Always check the PWM website for the latest version. The PWM website also has useful FAQs, support lists, and other helpful information as well as the most current version of this document.

PWM Website: http://code.google.com/p/pwm

This document describes the overall installation and setup of PWM. The PWM ConfigManager interface has detailed information about each of the many PWM configuration options.

Features

- Web based configuration manager with over 180 configurable settings
- Polished, intuitive end-user interface with as-you-type password rule enforcement
- Forgotten Password
    - Store Responses in local server, standard rdbms database, ldap server or Novell NMAS repository
    - Use Forgotten Password, Email/SMS Token/PIN, User attribute values, or any combination
- Stand-alone, easy to deploy, java web application
- Localized for Czech, Dutch, English, French, German, Italian, Polish, Portuguese, Spanish
- New User Registration / Account Creation

- New User Activation for first time password setting
- Administration modules including intruder-lockout manager, and online log viewer, daily stats viewer and user information debugging
- Easy to customize JSP HTML pages
- Support for large dictionary wordlists to enforce strong passwords
- Shared password history to prevent passwords from being reused organizationally
- Automatic LDAP server fail-over to multiple ldap servers
- Support for password replication checking and minimum time delays during password sets
- Based on LdapChai API
- Captcha support using reCaptcha
- Support for minimal, restricted and mobile browsers with no cookies, javascript or css
- Specialized skins for iPhone/Mobile devices

Requirements

PWM will work on any platform that meets the following minimum requirements:

- Java J2SE v1.5 (5.0) or greater.
- Java Servlet Container v2.3 (Tomcat v4x or greater).
- 64 MB of Java heap memory. Heavily utilized sites may require larger heap sizes.
- 1 GB of disk space for the pwmDB for default configurations.

The full Java JDK is required to both run and compile PWM. The JRE is not sufficient.

PWM is developed and tested on the following platforms:

- SUSE Linux 11 and Windows 7
- Sun Java v1.5 and v1.6
- Tomcat v5.0.28 and v6.0.20
- Internet Explorer 6,7,8 and Firefox 3.6 and Google Chrome Browser, iPhone Mobile Safari

PWM does not require a web server. Some administrators may chose to integrate tomcat with Apache, Microsoft IIS or other web server, but that is beyond the scope of this document. PWM is very lightweight and there will probably not be much performance difference with or without a web server, particularly if used with proxy server.

PWM has been known to work on JBoss and WebSphere. For non-tomcat containers such as these, PWM works best using an exploded archive directory. Alternatively, you can modify the *web.xml* to use a configuration file anywhere on the file system, and the configuration can in turn use a PwmDB directory that is anywhere on the file system.

Some operating systems (such as SLES) come equipped with a pre-installed version of tomcat and Java. Some administrators prefer to use the operating system instance of tomcat while others prefer a standalone tomcat instance for PWM. Keep in mind that the default tomcat settings found on tomcat downloaded directly from Apache's website are used to test and develop PWM.

Installation

Installation of PWM follows standard Java Servlet guidelines.

Most of the difficulty administrators have installing PWM is usually not with PWM itself, but with Java, Tomcat, or an optional web server.

Server Setup

On your platform of choice, ensure that Java v5.0 or better is installed. You can do this by typing "java -version" at the operating systems command prompt. If the response is something other than the java version, visit http://www.oracle.com/technetwork/java/index.html and download the latest Java v1.5.x or better J2SE JDK. PWM works even better with Java 6 (also known as 1.6). Make sure you have the JDK installed, the JRE does not contain enough libraries for JSP compilation.

The next step is to install tomcat. Tomcat can be found at http://jakarta.apache.org. Instructions for installing Tomcat vary from platform to platform, follow the documentation on apache's site. In order to proceed you should be able to access tomcat's welcome page from a web browser.

Finally, find tomcat's /webapps directory, usually located directly under the main tomcat directory. Copy the included pwm.war file into the /webapps directory. Some versions of tomcat may require a restart before the PWM application will deploy. Newer versions of tomcat provide web-based managers that allow servlet deployment from a browser and without restarts.

When tomcat starts up, it will deploy the war file into /webapps/pwm directory. Next, visit the pwm application with a browser. Assuming your browser and tomcat are on the same machine and your using the default tomcat port numbers, the url will be:

```
http://locahost:8080/pwm
```

Upon the initial PWM installation, a web-based configuration editor is available at:

```
http://localhost:8080/pwm/config/ConfigManager
```

Once a configuration is saved, PWM will operate in "Configuration Mode", which allows continued configuration changes to be made while you test PWM functionality. When all configuration changes are completed, you can Finalize the PWM configuration, which will lock the configuration and prevent any further changes via the web based ConfigManager. If you wish to make further changes to the configuration once the config is Finalized, you can follow the instructions on the ConfigManager screen. These steps require access to the server file system.

Beyond configuring PWM, you may also need to make changes to your LDAP directory schema and rights/permissions. Information about schema and rights modifications for particular directories can be found below, or by visiting the pwm-general Google Group.

Important! Be sure to sign up the pwm-announce Google Group. This group is used for sending infrequent notices when new PWM releases are available. As security related fixes are discovered and updated by PWM users, it is important to keep note of updates.

Making a new WAR file

For a variety of reasons, it may be desirable to deploy a customized WAR file, you can use the included ant script to repackage a new WAR file after you have modified any of the PWM files.

Even if you can modify the servlet files after they are deployed, it's still a good idea to modify the original source and build your own pwm.war. That way, it will be available as a backup.

With this process, you can have a pwm.war file that is completely customized for your environment. You do not need ant on your server, you can follow these steps on your workstation, and then deploy the resulting war file on your server. It is even okay if your workstation and server are different operating systems.

To build a new pwm.war file, follow the following steps:

1. Make sure you have Java v1.5 SDK or better installed.
2. Set an environment variable for JDK_HOME to the JDK install directory.
3. Download and install Apache Ant
4. Make sure ant is in your path. Running "ant -version" should produce results.
5. Download PWM and unzip the pwm.zip directory
6. Make any changes to PWM desired (jsp edits, configuration changes, etc)
7. At the root of the pwm directory (where the build.xml file is located), run the following commands:

```
ant clean
ant makeWAR
```

8. Deploy the resulting pwm.war file. On tomcat this means deleting the webapps/pwm directory (if any) placing pwm.war file in the webaps directory, and restarting tomcat.

(Newer versions of tomcat allow deploying war files through a web interface without restarting tomcat.

Novell eDirectory Integration

PWM was robust support for Novell eDirectory. The following features are supported:

- Read Universal Password policies and traditional password settings
- Correctly handle intruder lockout scenarios
- Read Universal Password challenge set policies, including localized policies.
- Write forgotten password responses to NMAS for compatibility with Novell forgotten password clients
- Read forgotten password responses from NMAS for use by forgotten passwords (Requires Novell UserApp (RBPM))

PWM is only able to utilize existing stored NMAS responses for forgotten passwords when Novell UserApp (RBPM) is available. PWM utilizes web services available in IDM UserApp to validate user responses. This feature is optional. If UserApp is not available, PWM will use it's own saved challenge/responses for user response validation.

eDirectory Schema

PWM uses eDirectory attributes to store data about users, including last password change time, last time PWM sent email notices about password expiration, and secret question/answer.

PWM includes a "edirectory-schema.ldif" file in the schema directory that has the standard PWM schema extensions. The schema included uses an auxiliary class that is added to users as they use PWM, so the auxiliary class and attributes are removable from eDirectory in the future.

Using the ICE command line the schema file can be imported with a command something like this:

```
ice -SLDIF -f edirectory-schema.ldif -DLDAP -s 192.168.1.1 -d cn=admin,o=o -w password
```

The ldif file can be imported using the ConsoleOne wizard, iManager, the ICE command line, and standard "ldapmodify" tools.

If you do not wish to use the standard PWM schema, all the attributes used by PWM can be changed in the PWM configuration to attributes that are already available in the directory.

eDirectory Rights

PWM requires permission to perform operations in eDirectory.
PWM uses two different eDirectory logins, one is a generic proxy user that is used for certain operations, preAuthenticaton operations.
Once the user is authenticated most operations will be performed with the user's connection and permissions.

The ldif file eDirectoryRights.ldif is included that offers a sample basic configuration of a proxy user and also sets ACL for users that are required by PWM.

For a default configuration, the following rights are required for the proxy user to the user container(s):

- Browse rights to [Entry Rights]
- Read and Compare rights to pwmResponseSet and CN (or otherwise configured naming attribute)
- Read and Compare and Write rights to objectClass, passwordManagement, pwmEventLog and pwmLastPwdUpdate
- Read and Compare rights to any attribute used by ActivateUser servlet

For a default configuration, the following rights are required for each user to their own user entry:

- Browse rights to [Entry Rights]
- Read and Compare and Write rights to pwmResponseSet
- Read and Compare and Write rights to any attributes used in the UpdateAttributes servlet

To assign rights to each user, it is best to use the [this] security entry. Assigning rights to a parent level container to modify pwmResponseSet will allow any user in the container to modify the value of this attribute for any other user in the container, and thus allow a password reset by any user. See the eDirectoryRights.ldif file for an example of the [this] security entry.

Optionally, PWM should also have rights to read the password. This is configured as part of the eDirectory password policies. Normally, when a user uses PWM's Forgotten Password recovery feature, pwm will set the user's password to a randomly generated value during the recovery process. It does this so that when the user actually does type set a new password, the PWM can authenticate as the user using the random password, and then change the password using the user's credentials.

This process allows the directory to apply normal change password effects such as correctly setting the password expiration. However, if PWM is able to read the password of the user, it

will not set an intermediate temporary password on the user.

PWM provides extensive logging to help troubleshoot installation and configuration issues. For best results during installation, set the log levels to "trace" in the log4jconfig.xml file, and monitor the output.

eDirectory Interaction

With the default configuration, PWM performs all operations against eDirectory using generic LDAP calls unless NMAS support is enabled.

Enabling NMAS allows for better error reporting and integration with eDirectory.

Many operations are preformed using the proxy user specified in the PWM Configuration. However, if the Always Use Proxy is set to true, then PWM will not bind as the user. Authentications will be handled using ldap compare.

If the option to store NMAS responses is enabled, then whenever a user saves their responses using PWM, they will also be stored in NMAS. This allows for Novell forgotten password clients to use the same responses. However, PWM itself can not directly use these responses for forgotten password.

OpenLDAP Integration

There are a few modifications that may be needed to the OpenLDAP configuration file, /etc/ldap/slapd.conf. Note that these modifications here are suggested as a template and may need to be customized to your own requirements.

For example, if pwm is configured to enable New User Registration and use the cn attribute to test for object name uniqueness, then the following configuration edit would allow PWM to perform the ldap equality check from PWM.

```
# Index cn to allow equality checks from the pwm webapp. This is
# used by the new user registration module to check whether a given
# username (cn) already exists in the LDAP directory.
index           cn eq
```

Access control rules

Configuring access control rules properly for pwm can be challenging. The following ruleset can be used as a reference. It has been tested to verify that users (or the PWM Admin) does not have any more privileges to the directory than absolutely required, but this configuration

should be examined closely to ensure it does not allow any excess privileges in your environment.

```
# The userPassword by default can be changed
# by the entry owning it if they are authenticated.
# Others should not be able to see it, except the
# admin entry below
#
# NOTE: this is mostly standard OpenLDAP configuration.
# The pwmadmin line can probably be omitted.
access to attrs=userPassword,shadowLastChange
        by dn="cn=admin,dc=domain,dc=com" write
        by dn="cn=pwmadmin,dc=domain,dc=com" write
        by anonymous auth
        by self write
        by * none

# Grant access to subtree "ou=Accounts, dc=domain, dc=com"
# which contains the accounts created by pwm. Change
# this path to match your LDAP directory.
#
# Note that here we have two "classes" of pwm users. The
# dn="cn=pwmadmin,dc=domain,dc=com" user is used during
# the initial phases of new user registration to create
# the user into the directory. This is why the pwmadmin
# account needs to have write access to this subtree.
#
# Right after the user is created, pwm binds to OpenLDAP
# as the newly created user, so "by anonymous auth" is
# required. The user also needs to be able modify it's own
# data, so "by self write" is also needed. If it's missing,
# the user's password and/or personal information cannot be
# created/edited. This also prevents the new user
# registration from working properly.
access to dn.subtree="ou=Accounts,dc=domain,dc=com"
        by dn="cn=admin,dc=domain,dc=com" write
        by dn="cn=pwmadmin,dc=domain,dc=com" write
        by anonymous auth
        by self write
        by * none

# NOTE: this is standard OpenLDAP stuff
access to dn.base="" by * read

# The admin dn has full write access, pwmadmin has full read access.
# The pwmadmin entry may not be required. Feel free to experiment.
access to *
        by dn="cn=admin,dc=domain,dc=com" write
        by dn="cn=pwmadmin,dc=domain,dc=com" read
        by * none
```

Schema extensions

Pwm contains a few schemas extensions which are distributed as LDIF files, however some of the settings are Novell eDirectory-specific, so these templates can instead be used on for OpenLDAP. The following are changes made to the */etc/ldap/schema* file.

```
# /etc/ldap/schema/pwm.schema
#
# We try to define OID's "correctly" as outlined here:
#
# http://www.openldap.org/doc/admin23/schema.html
#
# 1.3.6.1.4.1   base OID
# 591242        organization idenfifier
# 1             if an objectclass
# 2             if an attribute
# yyyy.mm.dd    date of creation
# n             extra identifier
#
attributetype ( 1.3.6.1.4.1.591242.2.2010.04.16.1
        NAME 'pwmEventLog'
        SYNTAX 1.3.6.1.4.1.1466.115.121.1.40 )

attributetype ( 1.3.6.1.4.1.591242.2.2010.04.16.2
        NAME 'pwmResponseSet'
        SYNTAX 1.3.6.1.4.1.1466.115.121.1.40 )

attributetype ( 1.3.6.1.4.1.591242.2.2010.04.16.3
        NAME 'pwmLastPwdUpdate'
        SYNTAX 1.3.6.1.4.1.1466.115.121.1.24 )

attributetype ( 1.3.6.1.4.1.591242.2.2010.04.16.4
        NAME 'pwmGUID'
        SYNTAX 1.3.6.1.4.1.1466.115.121.1.15 )

objectclass ( 1.3.6.1.4.1.591242.1.2010.04.16.1
        NAME 'pwmUser'
        AUXILIARY
        MAY ( pwmLastPwdUpdate $ pwmEventLog $ pwmResponseSet $
                pwmGUID )
```

This allows pwm to track pwm-specific attributes for each user.

Active Directory Integration

PWM has support for standard change password functionality against active directory.

Forgotten Password support also functions correctly with PWM. Because many AD sites find extending the AD schema to be impractical, the recommended approach for AD integration is to use an RDBMs database to store user's challenge/response answers. This allows PWM to support forgotten password functionality with AD without extending the schema.

Web Integration and Page Flow

PWM has been designed and tested to work well with portals and web access gateways.

PWM uses a very simple page flow model, with limited opportunity for configuration or changes. However, the settings that are available combined with some creative HTTP redirecting can allow for very customized scenarios.

It is helpful to not think of PWM as a standard web application with meaningful user navigation; instead the general intent is to place the user on a PWM page, complete a function, then redirect the user elsewhere. This keeps with the notion that password functions are typically not regarded as something the user desires to do, but rather an interruption or "security-wall" around the desired content.

PWM uses two configurable URLs, the **logoutURL** and **forwardURL**. These URLs are configured as part of PWM's general configuration. However, they can be overridden for any particular session by including the HTTP parameters *forwardURL* or *continueURL* on any request during the session.

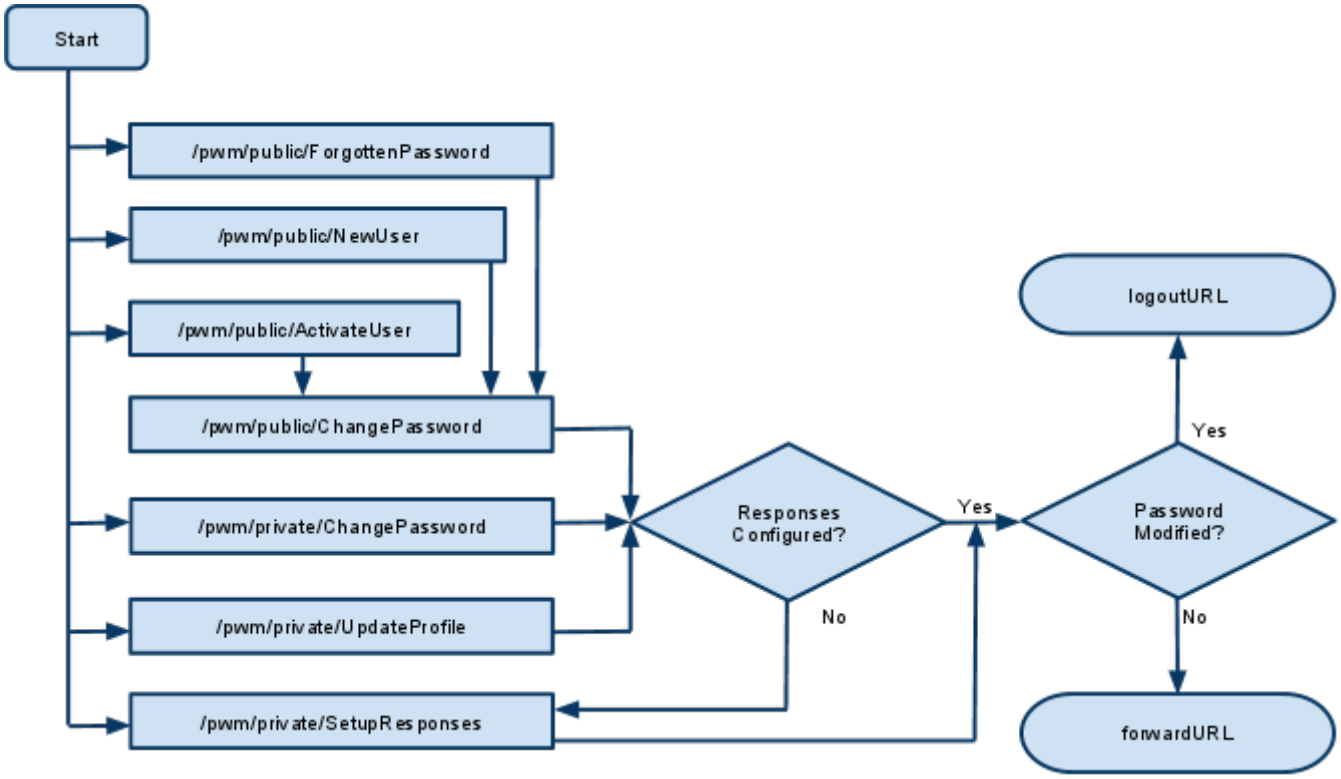
After completing a function, the user will be redirected to the *forwardURL*, except if the password has been modified and the Logout After Password Change setting is set to true. In that case, the user will be redirected to the *logoutURL* instead.

There are two exceptions where a user is not immediately redirected to the *forwardURL*.

The first is when the Check Expiration During Authentication setting is set to true and the user's password has been determined to be expired. If this is the case, then the user is redirected to the change password screen (or possibly the password expiration warning page if the expiration is within the Expire Warn Time window. After the password change is completed, the user is then redirected back to the *forwardURL*/*logoutURL* except if:

The second exception is when Force Setup of Challenge Responses setting is set to true, the user matches Challenge Response Query Match and the user does not have valid pwm responses configured. In this case, the user is redirected to the setup responses module. Once compete, the user is then redirected back to the *forwardURL*/*logoutURL*.

Standard PWM Page Flow



Access Gateways

PWM Supports HTTP-Basic authentication. If an http "Authorization" header is present, PWM will use the credentials in the header to authenticate the user. It is best practice to use the entire user DN as the username, but simple usernames will also be accepted and PWM will attempt to search the directory for the correct user.

Some parts of PWM need to be publicly accessible, such as forgotten password modules and new user registration. To support this, configure the following urls as public or restricted by your proxy or gateway configuration

Assuming PWM is setup so the user enters the following url to access PWM:

```
http://password.example.com/pwm
```

Add the following protected URLs:

URL	Mode
`password.example.com/*`	Public
`password.example.com/pwm/private/*`	Restricted

`password.example.com/pwm/admin/*`	Restricted
`password.example.com/pwm/config/*`	Restricted

If your access gateway supports it, you should configure it to redirect to PWM if the password is expired.

For expired password URL use:

```
http://password.example.com/pwm/private/ChangePassword?passwordExpired=true
```

Optionally you can modify your login page to add links to the public NewUser page or Forgotten Password page.

Request Parameters

A variety of commands to PWM can be specified as parameters on URLs. Parameters are case sensitive. These request parameters can be placed on any link that will access PWM. An example follows:

```
http://password.example.com/pwm/private/ChangePassword?
passwordExpired=true&forwardURL=http://www.example.com
```

Parameter	Example	Effect
passwordExpired	`passwordExpired=true`	Setting this parameter will make PWM override the state of the user's password expiration.
forwardURL	`forwardURL=http%3A%2F%2Fwww.example.com%2Fmain.html`	Set the forwardURL to "http://www.example.com/main.html". The value must be URL Encoded.
logoutURL	`logoutURL=%2Fpwm`	Sets the logoutURL to "/pwm". The value must be URL Encoded.
pwmLocale	`pwmLocale=en`	Given a valid browser locale code, PWM will switch to the given locale for display of all localized text

Command Servlet

The CommandServlet allows you to redirect a user to PWM and have it perform some specific

command. Typically, you would use the CommandServlet functions during a user's login sequence to a portal or some other landing point.

Ideally, these functions work best when used with a proxy, access gateway, or some other device that will auto-authenticate the user. Otherwise, the user will have to authenticate to PWM during every login.

CommandServlet calls can be combined with any of the request parameters described above, such as the *forwardURL* parameter.

For example, the user login redirect sequence may proceed as follows:

URL Example	Comment
`http://portal.example.com`	Initial request from browser
`http://portal.example.com/Login`	Access gateway redirects to login page
`http://portal.example.com/`	Access gateway redirects back to portal root
`http://portal.example.com/index.html`	Web server redirects to index.html
`http://password.example.com/pwm/private/CommandServlet?processAction=checkAll&forwardURL=http%3A%2F%2Fportal.example.com%2Fportalpage.html`	index.html has meta redirect to PWM checkAll CommandServlet with a URLEncoded forwardURL value.
http://portal.example.com/portal/main.html	PWM redirects back to the actual portal URL

The *index.html* described above would have the following content:

```
<html>
  <head>
   <meta http-equiv="REFRESH" content="0; URL=http://password.example.com/
pwm/private/CommandServlet?

processAction=checkAll&forwardURL=http%3A%2F%2Fportal.example.com%2Fportalpage.html
"/>
  </head>
  <body>
   <p>If your browser doesn't automatically load, click

<a href="http://password.example.com/pwm/private/CommandServlet?

processAction=checkAll&forwardURL=http%3A%2F%2Fportal.example.com%2Fportalpage.html
">here</a>.
   </p>
  </body>
```

```
</html>
```

Commands

checkExpire *http://password.example.com/pwm/private/CommandServlet?processAction=checkExpire*

Checks the user's password expiration. If the expiration date is within the configured threshold, the user will be required to change password.

checkResponses *http://password.example.com/pwm/private/CommandServlet?processAction=checkResponses*

Checks the user's challenge responses. If no responses are configured, the user will be required to set them up.

checkProfile *http://password.example.com/pwm/private/CommandServlet?processAction=checkProfile*

Checks the user's profile. If the user's attributes do not meet the configured requirements, the user will be required to set their profile attributes.

checkAll
http://password.example.com/pwm/private/CommandServlet?processAction=checkAll

Calls checkExpire, checkResponses and checkProfile consecutively.

Internationalization

PWM is fully internationalized, and comes with several localized languages. Only pages and configuration options that affect end users are internationalized. Most administrator screens are not localized or internationalized.

PWM uses the Java PropertyResourceBundle strategy for managing localized text. The locale of the user is determined by examining the first HTTP request sent by the browser. Any locale information in ldap is not evaluated. Thus, PWM responds in the configured locale of the browser.

Browser locale selection can be overridden by setting a “pwmLocale” parameter in any request. The value must be an ISO language code like “en”, “fr”, etc.

Additionally, a user can select a locale by right-clicking on the current locale displayed in the footer of most PWM pages.

Display Page Configuration

The default display strings can be overridden as part of the PWM configuration. Using the PWM Configuration Manager, select Display from the menu and edit the display, messages or error strings displayed to users.

Challenge Questions

PWM takes special consideration for Challenge/Response settings. Different challenges can be configured for each potential locale. Not only can the challenges be different, but the number of challenges, and number of random challenges can be different as well.

PWM will determine which set of challenges to use based on the locale of the browser during the SetupResponses process. Responses stored in ldap are tied to the locale of the challenge sets. Forever after, PWM will display and check the challenges of the user based on the locale they were entered in. For example, if a user sets up their responses in French, and then logs into pwm to recover their passwords from an English web browser, the challenges will display in French, and the user must enter the French responses.

If the user then sets up responses in a different language, the new language responses will overwrite the old responses.

Alternative translations

For some languages, multiple versions of the default localisation may be provided. Alternative versions could be provided because a language allows for both a formal and an informal form of communication, or a dialect is used for which no official locale is defined.

Only one version of a locale (language, region) can be used at a time. Therefore, alternative translations are available in the `supplemental/i18n` folder of the PWM distribution.

In order to use the alternative translation, there are two options:

- Copy the alternative version (e.g. `supplemental/i18n/Display_nl-colloquial.properties` and `supplemental/i18n/Message_nl-colloquial.properties`) over the standard version within the source distribution (to e.g. `servlet/src/password/pwm/config/Display_nl.properties` and `servlet/src/password/pwm/config/Message_nl.properties`). Then rebuild and deploy the WAR file.

- Copy the alternative version over the already deployed language files, found under `/WEB-INF/classes/password/pwm/config`. Then restart the PWM application.

Wordlists

PWM is capable of checking user entered passwords and dis-allowing those found in a predefined password dictionary wordlist. The dictionary in use is configured by settng the "password.WordlistFile" setting in pwmSetting.properties.

The wordlist is a ZIP file containing one or more plain text files with one word per line. To facilitate the speedy checking of the dictionary during password changes, PWM compiles the wordlist into a local embedded database (PwmDB). By default, PWM uses the BerkelyDB embedded database, and stores its files in the WEB-INF/pwm-db directory. With logging set to trace, PWM will output the status of the wordlist compile to the log. The compile process only needs to run once unless the wordlist ZIP file is modified.

The default distribution of PWM contains a wordlist that includes about 8 million words of common passwords found in many systems. Larger worldlists containing tens of millions of words with a variety of languages are available on the PWM website. PWM has been tested with wordlists over 50 million words, however the initial wordlist compile time can be excessive.

Seedlists are used by pwm to generate random passwords for users. The seedlists are used as a basis for a new random password, but are sufficiently modified to gaurentee randomness and also to meet the configured policy for the user.

Global Password History

A seperate wordlist dictionary is used to provide a global password wordlist history. This wordlist is not pre-populated by any file, instead it is populated with a user's old password during any password change.

This has the effect of preventing any two users from using the same password over time. For security reasons, only the user's old password is stored. Administrators should evalute this feature closely before enabling it. This setting is controlled with the Shared Password History Age setting in the PWM Configuration. PWM will periodically purge the global password history of any passwords older than this age. A value of several months or years is appropriate. The unit for the setting is in seconds.

PWM Database (pwmDB)

To store wordlists, event logs and statistics, pwmDB uses an on-disk embedded database.

Several different database types are available. The default is the BerekelyDB embedded database. The default settings are intended to be self-sufficient, and should not require any administrator interaction or maintenance. The pwmDB location and other settings are configured in the advanced section of the PWM Configuration.

PWM Command Line Tools

PWM offers a command line tool for various functionality. The command line tool is called from a script in PWM's "WEB-INF" directory.

Script	Description
`PwmCommand.bat`	Windows BAT file script wrapper for calling PWM Command Line tools
`PwmCommand.sh`	Linux/Unix shell script wrapper for calling PWM Command Line tools

Running the PwmCommand script wrapper will output a list of the various commands and options available. Before running the script you will need to set the JAVA_HOME environment variable.

You may need to grant the PwmCommand.sh execute permissions by running:

```
chmod a+x PwmCommand.sh
```

Policies

PWM uses a matrix of configurations for determining the correct password and challenge/response policies for determining a policy for a given set. PWM gives detailed information about discovered policies during authentication time at the TRACE log level.

Password Policy

Each password policy setting is available in the PWM Configuration. These password policies represent "minimum" policies that will be applied to the user. If the setting the directory type is Novell eDirectory and the Configuration setting Read eDirectory Password Policy is set to true, then PWM will attempt to locate a Universal Password policy configured for the user. If one is found then the policy is merged with the settings in the policies set in the PWM Configuration. The most restrictive of any two settings are used.

When using eDirectory, PWM will attempt to read the legacy password policy settings directly from the user object in the case where the user does not have a Universal Password policy assigned.

For example, if the PWM Configuration contains a setting of Password Minimum Length set to 5 and the Universal Password policy has a setting of 4, then the minimum password length for the user will be 5.

Challenge Policy

For challenge questions, pwm can read both the PWM Configuration, as well as the configuration stored in eDirectory Universal Password policies. The behavior is disable in the eDirectory configuration settings.

Challenge policies can be localized for the the users language.

If localized policies are discovered in the ldap directory, PWM will honor them.

PWM can also be configured to require that all random password questions be required to be entered at setup time. In this case, the questions are presented randomly to the user when trying to reset a forgotten password. This is the standard behavior with eDirectory challenges.

Alternatively, PWM can allow the user to provide responses for only the minimum number of required random responses at setup time. Then, only those responses will be required when resetting a forgotten password. This behavior reflects more common forgotten password scenarios encountered on the Internet, but is less secure.

Logging

PWM uses Apache Log4j. Log4j is a common logging java engine for Java. Log4j allows logging to a variety of destinations such as files, syslog, nt event log, databases and others.

Logging levels available (in order of severity):

1. trace
2. debug
3. info
4. error
5. warn
6. fatal

For normal operations, "info" level should be sufficient. "trace" level is recommended during initial configuration. Logging is controlled by editing the PWM Configuration. Alternatively, PWM can be configured to register a log4j xml configuration file. A default sample configuration *lof4jconfig.xml* is included.

The default logging configuration logs info level to stdout. When used with tomcat, this will log to tomcat's logs/catalina.out file.

PWM also stores a temporary log of recent events in the pwmDB. This log is accessible in the administrator screens and is useful for checking recent pwm activity.

Captchas

PWM has integrated support for Captcha protection. The captcha makes it more difficult for a hacker to launch an automated attack against PWM. PWM uses the online reCaptcha service for captcha generation and validation. You will need to configure a reCaptcha account to use the service. reCaptcha accounts are free.

The online service approach insures that the captcha technology is continuously improved to make it difficult to be compromised. The reCaptcha account parameters are configured in the PWM Configuration.

SMS Notifications

As of version 1.5.4 SMS notifications will be available in several parts of the application:

- Password recovery
- New User account creation
- New Guest account creation

For SMS notifications, you need to have access to an HTTP or HTTPS based SMS gateway service. Many paid services are available on the Internet.

Configuration

The configuration is set up to be usable for many different service providers. The following configuration options are available.

- **Enable SMS Messages**: this button will enable or disable (default) the SMS functionality globally. If disabled all other SMS related settings will be ignored.
- **SMS Priority Over Email**: this setting determines when SMS messages will be sent, if enabled. There are four possibilities:
    - both: try to send both SMS and email
    - emailfirst: try to send email; if no email address is available, try SMS
    - smsfirst: try to send SMS; if no SMS number is available, try email
    - smsonly: try to send SMS; if no SMS number is available, do not try email
- **User SMS Number Attribute**: enter the LDAP attribute name for the mobile phone number to be used for SMS notifications. This number should be in full international format, i.e. a plus sign, country code, region code (without zero) and subscriber number: e.g. +31612345678. Some other formats can be recognized and reformatted into the international format, combined with the default country code (below). For example a Dutch mobile phone number starts with 06, the Dutch country code is 31. A

mobile phone number like 06-12345678 would be rewritten to +31612345678.

- **Maximum SMS Queue Age**: this setting determines the maximum life time in seconds of unsent SMS messages in the outgoing queue. If an SMS message can not be sent for a period longer than configured here, the message will be discarded. The default is 300 seconds (5 minutes).
- **SMS Gateway**: set the HTTP or HTTPS address for the SMS gateway. The address should include 'http://' or 'https://', the server name and full path, but no question mark or parameters. Parameters need to be configured at the SMS Request Data setting. Example: https://sms.example.com/gateway/.
- **SMS Gateway User** and **SMS Gateway Password**: these settings are used as the authentication credentials for the SMS gateway. The user name and password can be used for "basic authentication" (part of the HTTP protocol) or as parameters for the SMS request data (see below). If no authentication is required, because of IP address based access, fill in some dummy values.
- **HTTP(S) Method**: data can be sent as part of the request or as additional content. If the data is to be sent as parameters after the SMS Gateway URL, use the GET method. If the data is to be sent as form data, XML or SOAP, use the POST method.
- **SMS Gateway Authentication Method**: if the SMS gateway uses HTTP basic authentication, set this to basic, otherwise use request. In case of request, the username and password usually need to be part of the request data.
- **SMS Request Data**: this is the data sent to submit the SMS message. Possible formats are HTTP parameters for GET requests and POST form data, plain ASCII or XML and SOAP. The data can include several parameters that will be replaced before submission. All parameters are surrounded by percent signs. These parameters are available:
    - %USER%: authentication user name
    - %PASS%: authentication password
    - %SENDERID%: sender identification
    - %TO%: recipient SMS number
    - %REQUESTID%: randomly generated request identifier
    - %MESSAGE%: the message to be sent
- **SMS Data Content Type**: set the MIME type for POST data. This setting will be ignored when using the GET request method. A MIME type is formatted as a main type name, a slash and a subtype name, for example:
    - text/plain: text documents
    - text/xml: XML and SOAP documents
    - application/x-www-form-urlencoded
- **SMS Data Content Encoding:** select the way to encode field replacement data. Often data contains characters that are considered special for specific content types. For example you cannot use < or > in XML data. These characters have to be replaced with < and >. PWM can use the Java built in URLencoder and Apache Common's String Escape Utils to encode text values, if required. The following encodings are supported:
    - NONE: no encoding, use at your own risk
    - CSV: escape for comma separated values
    - HTML: for HTML data

    - JAVA: for Java String representations
    - JAVASCRIPT: recommended for JSON formatted documents
    - SQL: turn single-quotes (') into double single-quotes ('')
    - URL: (default) recommended for GET requests and POST with form data
    - XML: for XML and/or SOAP services
- **Maximum SMS Text Length**: normally, an SMS message can contain up to 160 characters, that will use 140 bytes, because of special encoding. For UTF-8 messages, the number of characters is reduced to 70. On the other hand, some service providers allow sending longer messages that will be split up and put back together by the receiving mobile phone. 140 is a safe setting for most situations when using a latin alfabet and really short messages.
  Messages exceeding the maximum length will be split and sent as separate messages. Note that this may result in messages being received in a different order! Therefore it is recommended to use the largest possible size, that your service provider and mobile network operators support, if you expect to sent long messages.
  Please, contact your service provider for the maximum recommended message length.
- **Response Regular Expressions**: in order to recognize a successfully sent message, you can enter one or more regular expression[1]. If any of these messages matches the received response, the message is considered to be submitted successfully and will be removed from the queue. If no expression matches, the submission will be retried until the message expires.
  If no expressions are entered, any attempt to send the message will be considered successful, as long as the gateway service responds.
  Note that you have to match an entire line. You can use .* at the beginning and end of the expression to fill up the expression. For example use ^OK:\s.* to match any string starting with "OK:" a whitespace character (\s) and then any other characters. The expressions are case sensitive.
- **SMS Sender ID**: service providers often allow senders to specify a sender identification. This can be either a phone number or an alphanumeric string (e.g. ExampleCom). The service provider usually has to verify or accept the sender identification. Please contact your service provider for allowed values for the sender identification.
- **SMS Phone Number Format**: set the phone number format accepted by the SMS gateway, normally a variation of a full international format. The following variants are possible:
    - plain: country code (e.g. 1 for USA) plus subscriber number (e.g. 12312345): 112312345
    - plus: as plain, but with a plus sign as a prefix: +112312345
    - zeros: as plain, but prefixed with a double zero: 00112312345
- **Default SMS Country Code**: If the recipient SMS number is not in international format, the recipient number will be prefixed with the default country code.
- **Request ID Characters**: If a request allows or requires a unique request identifier, PWM can generate a random value. Specify the characters that can be used in the

[1]See http://download.oracle.com/javase/tutorial/essential/regex/ for more information.

request id.
- **Request ID Length**: Specify the length of the request id.
- **Challenge Token SMS Text**: Set the text to be sent for password recovery. Use %TOKEN% as a placeholder for the password recovery token to be sent.

Example configurations

Clickatell

For Clickatell, the easiest way is the HTTP(S) GET API[2]. To configure your service for this API, use the following settings:

- Set the gateway URL to: https://api.clickatell.com/http/sendmsg
- Enter your username and password
- Select the GET method
- Use request as the authentication method
- Set the request data to:
  `user=%USER%&password=%PASS%&api_id=XXXX&to=%TO%&text=%MESSAGE%`
  Don't forget to replace XXXX with the API id provided. Optionally, you can add "`&concat=2`" or "`&concat=3`" to allow longer messages (up to 406 characters).
- Set the request content data encoding to `URL`.
- Set the response regular expression to `^ID: [A-Za-z0-9]+`
- Set the phone number format to `plain`.
- Specify the maximum message length as 140 for single length messages (no `concat` option, or `concat=1`), 273 for double length messages (`concat=2`) or 406 for tripple length messages (`concat=3`).

Custom SOAP service

An example custom made SOAP service could accept a SOAP document like below:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/envelope/"
xmlns:ws="http://ws.sms.example.com/">
 <soapenv:Header/>
 <soapenv:Body>
   <ws:sendTextMessage>
       <sender>ExampleCom</sender>
       <to>+155512345678</to>
       <text>Your token is M7Spe0Vt</text>
   </ws:sendTextMessage>
 </soapenv:Body>
</soapenv:Envelope>
```

You could use the following settings:

- Set the gateway URL to your custom web service address.

[2]See http://www.clickatell.com/downloads/http/Clickatell_HTTP.pdf for full API documentation.

- Enter your username and password.
- Select the POST method.
- Use basic as the authentication method if your service requires HTTP authentication, otherwise select request if the authentication parameters are included in the request data or the access is IP address based.
- Set the request data to the full SOAP message, with fields to be replaced. For example:

```
<soapenv:Envelope xmlns:soapenv="http://schemas.xmlsoap.org/soap/
envelope/" xmlns:ws="http://ws.sms.example.com/">
 <soapenv:Header/>
 <soapenv:Body>
   <ws:sendTextMessage>
       <sender>%SENDERID%</sender>
       <to>%TO%</to>
       <text>%MESSAGE%</text>
   </ws:sendTextMessage>
 </soapenv:Body>
</soapenv:Envelope>
```

- Set the request data content type to `text/xml` and the request data encoding to `XML`.
- Set the response regular expression to something suitable that matches a success message, or leave empty to accept any response. Example:
  `.*<status level="response".*`
- Set the phone number format to the required format.
- Specify the maximum message length.

Appendix A: Troubleshooting

PWM is designed to be as easy to operate as possible. But sometimes, errors will occur, especially during the initial configuration. These steps may be helpful in self-diagnosing the problem.

1) Assuming PWM is starting okay, the first place to check for problems is the PWM health page. The health page can be accessed at the following url:

`/pwm/public/health.jsp`

This same health screen is shown when configuring PWM, and can alert you to configuration problems or unreachable services.

2) If PWM isn't starting okay and you are using tomcat, the tomcat temporary/work directories may be corrupt or have outdated files. Stop tomcat, delete the `tomcat/temp` and `tomcat/work` directory contents, then start tomcat again. This problem is especially likely when

changing tomcat or PWM builds/versions.

3) Check out the PWM log. If using tomcat, the log data will typically be in the `tomcat/logs/catalina.out` file, although some tomcat installations may log to different files. By default, PWM is set to log at level "INFO" only, which is often not useful for debugging. Edit the PWM configuration logging settings and set the **STDOUT Log Level** setting to "TRACE".

4) Check the log file (if possible) of your ldap directory. Many times problems with PWM aren't problems with PWM at all but with the ldap directory.

Appendix B: Error Codes

Error	Description
5001	An incorrect password was used.
5002	Incorrect response value (or attribute) was used.
5003	User is already authenticated.
5004	User is not authenticated, and authentication is required.
5006	Username is invalid or the user does not have any responses configured.
5007	The response answer contains a word that is in the wordlist.
5008	The response answer is too short.
5009	The response answer is too long.
5010	The response answer is a duplicate.
5011	The response question is a duplicate.
5012	A required response question is missing.
5013	A required HTTP parameter is missing on the request.
5014	A configuration field has an incorrect value.
5015	An unexpected error occured.
5016	The username cannot be matched to an LDAP distinguished name.
5017	The LDAP directory is not reachable.
5018	User did not supply correct values during activation.
5019	The requested services is not available or is disabled.
5020	The Basic-Authentication header has changed during the HTTP session.
5021	The user attempting activation is not permitted due to the LDAP query match.
5022	There is no challenge policy available for the user.
5023	Too many incorrect login attempts have been attempted by the user.
5024	The source address has had too many incorrect login attempts.

5025	The HTTP session has had to many incorrect login attempts.
5026	PWM was unable to set the temporary password for the user during recovery.
5027	The user is not authorized to perform the action
5028	PWM was unable to verify the user's HTTP session.
5029	A required response value is missing.
5030	A random response value is missing.
5031	The captcha response is incorrect.
5032	There was a problem communicating with the remote captcha service.
5033	The PWM configuration file is invalid.
5034	The form nonce is incorrect.
5036	Unable to send token due to missing address/number.
5037	The user supplied token is incorrect.
5038	The entered current password is incorrect.
5039	Error while shutting down a PWM service or database.
5040	The user GUID is unreadable or not able to be written.
5041	The user supplied token has expired.
5042	Multiple LDAP distinguished names found for the user supplied username.
5043	Only the original manager who created the user may update this user.
5044	Non secure HTTP requests are not permitted.
5045	Unable to write the response to the configured storage message.
5046	Unable to unlock the user account.
5047	Unable to update the users profile.
5048	Unable to activate the user.
5049	Unable to create the new user.
5050	Unable to activate the user
5051	The remote database is unavialable.
5052	The local PwmDB database is unavailable.

Guide A: Integrating PWM with Java Security Manager

Introduction

Configuring Tomcat's Java Security Manager (JSM) properly can be very painful and it seems most people just don't bother using it. However, Security Manager makes it very difficult for any potential security holes in PWM to be used for malicious purposes. For generic information about the JSM take a look at these pages:

- http://java.sun.com/developer/onlineTraining/Programming/JDCBook/appA.html
- http://tomcat.apache.org/tomcat-5.5-doc/security-manager-howto.html
- http://java.sun.com/j2se/1.4.2/docs/guide/plugin/developer_guide/debugger.html

As the JSM rulesets are highly dependent on both the underlying OS, web container and PWM versions, this article is split into generic and specific sections.

Generic debugging techniques for Tomcat

The biggest problem with JSM integration is that it's often not obvious what Security Manager rules you need to add to make things works. You almost certainly have to add JSM debugging to Tomcat command-line. On Debian this is done by editing /etc/default/tomcat*<version*>:

```
JAVA_OPTS="-Djava.awt.headless=true -Xmx128M -Djava.security.debug=access"
```

After Tomcat is restarted, it starts spitting out "access allowed/denied" messages to it's logs. On Debian Lenny this is _/var/log/syslog_, and on Debian Squeeze _/var/log/tomcat6/catalina.out_. You can weed out failures with something like this:

```
$ tail -n 15000 <logfile>|grep "access denied"|cut -d " " -f 7-|sort|uniq -u
```

Alternatively, you can activate real-time monitoring with

```
$ tail -n 0 -f <logfile> |grep "access denied"
```

before restarting Tomcat. In either case, you should get notices like this:

```
access: access denied (java.lang.management.ManagementPermission monitor)
access: access denied (java.util.PropertyPermission
org.apache.commons.logging.diagnostics.dest read)
access: access denied (java.util.PropertyPermission
```

```
org.apache.commons.logging.LogFactory.HashtableImpl read)
access: access denied (java.util.PropertyPermission
org.apache.commons.logging.LogFactory read)
access: access denied (java.util.PropertyPermission
org.apache.commons.logging.Log.allowFlawedContext read)
access: access denied (java.util.PropertyPermission
org.apache.commons.logging.Log.allowFlawedDiscovery read)
access: access denied (java.util.PropertyPermission
org.apache.commons.logging.Log.allowFlawedHierarchy read)
access: access denied (java.util.PropertyPermission org.apache.commons.logging.Log
read)
access: access denied (java.util.PropertyPermission org.apache.commons.logging.log
read)
```

After spotting these failures, convert them into matching security manager rules and restart Tomcat. Repeat this as many times as necessary. Note that this setup can easily create gigabytes worth of useless logs, so remember to switch off debugging before going to production.

On Debian and many other distributions Tomcat's JSM rules are stored in _/etc/tomcat*<version*>/policy.d_. These ruleset fragments are converted into the active ruleset stored in _/var/cache/tomcat*<version*>/catalina.policy_ or similar.
It's probably a good idea to make sure the pwm-specific policy file loads after the default policy files, so name it something like "50user.policy". Also make sure the file has the same permissions as the existing policy files or it may not load properly.

Pwm 1.4.2 on Debian Lenny

The additional ruleset below allows pwm to work properly under JSM under Debian Lenny + Tomcat 5.5.26 from Debian repos. It depends on the default Debian rules being loaded first.

Note that this ruleset has only been tested with pwm utilizing the following features:

- Create new user
- Update attributes
- Change password
- CAPTCHA

```
// ========== PWM-specific settings ====================================
//
// Put this into a separate file, e.g. /etc/tomcat5.5/policy.d/50user.policy
//

grant {
       // With this everything works great, but it's terribly insecure
```

```
      //permission java.security.AllPermission;

      // This gets us past the first error
      permission java.lang.RuntimePermission "createClassLoader";

      // This gets us past pwm-db access issues. It seems we cannot use "<snip>/
pwm/META-INF/pwm-db/-" without the whole
      // Tomcat breaking. Apparently this happens because the pwm-db directory is
created on the fly and Security Manager
      // can't find it when it launches -> everything breaks badly.
      //
      // This set of FilePermissions seems to work and prevents the webapp from
_writing_ to META-INF/context.xml,
      // which contains security-related settings (e.g. host/subnet-based
filtering rules)
      permission java.io.FilePermission "/var/lib/tomcat5.5/webapps/pwm/META-INF/
*", "read, execute";
      permission java.io.FilePermission "/var/lib/tomcat5.5/webapps/pwm/META-INF/
pwm-db", "read, write, delete, execute";
      permission java.io.FilePermission "/var/lib/tomcat5.5/webapps/pwm/META-INF/
pwm-db/-", "read, write, delete, execute";
      permission java.io.FilePermission "/var/lib/tomcat5.5/webapps/pwm/WEB-INF/
classes/-", "read";

      // Misc FilePermissions
      permission java.io.FilePermission "/usr/share/javazi/
ZoneInfoMappings", "read";
      permission java.io.FilePermission "/usr/share/tomcat5.5/server/classes/org/
apache/jk/common/HandlerRequest.class", "read";
      permission java.io.FilePermission "/usr/share/tomcat5.5/server/classes/org/
apache/tomcat/util/buf/DateTool.class", "read";
      permission java.io.FilePermission "/WEB-INF/classes/org/apache/log4j/
-", "read";

      // Misc RuntimePermissions
      permission java.lang.RuntimePermission "defineClassInPackage.java.lang";
      permission
java.lang.RuntimePermission "defineClassInPackage.org.apache.jasper.runtime";
      permission
java.lang.RuntimePermission "accessClassInPackage.sun.util.logging.*";
      permission
java.lang.RuntimePermission "accessClassInPackage.org.apache.tomcat.*";

      // Misc PropertyPermissions
      permission java.util.PropertyPermission "elementAttributeLimit", "read";
      permission java.util.PropertyPermission "entityExpansionLimit", "read";
      permission
java.util.PropertyPermission "javax.xml.parsers.DocumentBuilderFactory", "read";
      permission java.util.PropertyPermission "maxOccurLimit", "read";
      permission java.util.PropertyPermission "user.timezone", "write";
      permission java.util.PropertyPermission "memAdmin", "read";
      permission java.util.PropertyPermission "memLock", "read";
      permission java.util.PropertyPermission "memTree", "read";
      permission java.util.PropertyPermission "memTxn", "read";
```

```
      permission java.util.PropertyPermission "memTreeAdmin", "read";
      permission java.util.PropertyPermission "sun.arch.data.model", "read";

      // reCAPTCHA-specific PropertyPermissions
      permission java.util.PropertyPermission "httpclient.*", "read";
      permission
java.util.PropertyPermission "apache.commons.httpclient.*", "read";
      permission java.util.PropertyPermission "java.class.path", "read";
      permission java.util.PropertyPermission "user.name", "read";

      // reCAPTCHA-specific SocketPermissions
      permission java.net.SocketPermission "*","connect,resolve";

      // Misc SocketPermissions
      permission java.net.SocketPermission "127.0.0.1:389", "connect, resolve";

      // Log4j-specific properties
      permission java.util.PropertyPermission "log4j.*", "read";

      // BerkeleyDB-specific properties
      permission java.util.PropertyPermission "je.*", "read";
      permission java.util.PropertyPermission "JEDiagnostics", "read";
      permission java.util.PropertyPermission "JEMonitor", "read";

      // Misc permissions
      permission java.util.logging.LoggingPermission "control";
      permission ng.reflect.ReflectPermission "suppressAccessChecks";

};
```

Pwm 1.5.3 / SVN revision 160 on Debian Squeeze

A few modifications are needed to adapt Lenny's ruleset for Squeeze, Tomcat6 and pwm 1.5.3+. Note that this ruleset has only been tested with pwm utilizing the following features only:

- Create new user
- Update attributes
- Change password
- Password reset with email token
- CAPTCHA

```
// ========== PWM-specific settings ====================================

grant {

      // This gets us past the first error
      permission java.lang.RuntimePermission "createClassLoader";
```

```
      // Added between 1.4.2 and 1.5.2
      permission java.lang.RuntimePermission "modifyThread";

      // This gets us past pwm-db access issues. It seems we cannot use "<snip>/
pwm/META-INF/pwm-db/-" without the whole
      // Tomcat breaking. Apparently this happens because the pwm-db directory is
created on the fly and Security Manager
      // can't find it when it launches -> everything breaks badly.
      //
      // This set of FilePermissions seems to work and prevents the webapp from
_writing_ to META-INF/context.xml,
      // which contains security-related settings (e.g. host/subnet-based
filtering rules)
      permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/META-INF/
*", "read, execute";
      // pwm-db moved from META-INF to WEB-INF between pwm 1.4.2 and 1.5.2; also
renamed from pwm-db to pwmDB
      permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/WEB-INF/
pwmDB", "read, write, delete, execute";
      permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/WEB-INF/
pwmDB/-", "read, write, delete, execute";
      permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/WEB-INF/
classes/-", "read";
      // permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/WEB-INF/
lib/*", "read";

      // Next two added between 1.4.2 and 1.5.2
      permission java.io.FilePermission "/usr/lib/jvm/java-6-openjdk/jre/lib/
*", "read";
      permission java.io.FilePermission "/var/lib/tomcat6/webapps/pwm/WEB-INF/
-", "write";

      // Misc FilePermissions
      permission java.io.FilePermission "/usr/share/javazi/
ZoneInfoMappings", "read";
      // Next two missing
      //permission java.io.FilePermission "/usr/share/tomcat6/server/classes/org/
apache/jk/common/HandlerRequest.class", "read";
      //permission java.io.FilePermission "/usr/share/tomcat6/server/classes/org/
apache/tomcat/util/buf/DateTool.class", "read";
      permission java.io.FilePermission "/usr/share/tomcat6/.mailcap", "read";
      permission java.io.FilePermission "/WEB-INF/classes/org/apache/log4j/
-", "read";

      // Misc RuntimePermissions
      permission java.lang.RuntimePermission "defineClassInPackage.java.lang";
      permission
java.lang.RuntimePermission "defineClassInPackage.org.apache.jasper.runtime";
      permission
java.lang.RuntimePermission "accessClassInPackage.sun.util.logging.*";
      permission
java.lang.RuntimePermission "accessClassInPackage.org.apache.tomcat.*";
      permission java.lang.RuntimePermission "getFileSystemAttributes";
```

```
      // Misc PropertyPermissions
      permission java.util.PropertyPermission "*", "read,write";
      //permission java.util.PropertyPermission "elementAttributeLimit", "read";
      //permission java.util.PropertyPermission "entityExpansionLimit", "read";
      //permission
java.util.PropertyPermission "javax.xml.parsers.DocumentBuilderFactory", "read";
      //permission java.util.PropertyPermission "maxOccurLimit", "read";
      //permission java.util.PropertyPermission "user.timezone", "write";
      //permission java.util.PropertyPermission "memAdmin", "read";
      //permission java.util.PropertyPermission "memLock", "read";
      //permission java.util.PropertyPermission "memTree", "read";
      //permission java.util.PropertyPermission "memTxn", "read";
      //permission java.util.PropertyPermission "memTreeAdmin", "read";
      //permission java.util.PropertyPermission "sun.arch.data.model", "read";
      // Next two added to pwm 1.4.2 rules for pwm 1.5.2
      //permission
java.util.propertyPermission "org.apache.commons.logging", "read";
      //permission
java.util.PropertyPermission "com.google.gson.annotation_cache_size_hint", "read";

      // reCAPTCHA-specific PropertyPermissions
      //permission java.util.PropertyPermission "httpclient.*", "read";
      //permission
java.util.PropertyPermission "apache.commons.httpclient.*", "read";
      //permission java.util.PropertyPermission "java.class.path", "read";
      //permission java.util.PropertyPermission "user.name", "read";

      // reCAPTCHA-specific SocketPermissions
      permission java.net.SocketPermission "*","connect,resolve";

      // Misc SocketPermissions
      permission java.net.SocketPermission "127.0.0.1:389", "connect, resolve";

      // Log4j-specific properties
      permission java.util.PropertyPermission "log4j.*", "read";

      // BerkeleyDB-specific properties
      permission java.util.PropertyPermission "je.*", "read";
      permission java.util.PropertyPermission "JEDiagnostics", "read";
      permission java.util.PropertyPermission "JEMonitor", "read";

      // Misc permissions
      permission java.util.logging.LoggingPermission "control";
      // Obsolete in pwm 1.5.2?
      permission ng.reflect.ReflectPermission "suppressAccessChecks";
      // Next two added to pwm 1.4.2 rules for pwm 1.5.2
      permission java.lang.reflect.ReflectPermission "suppressAccessChecks";
      permission java.lang.management.ManagementPermission "monitor";

};
```

Guide B: PWM behind an Apache reverse proxy

Introduction

There are several good reasons to place PWM behind a reverse proxy:

- Blocking certains PWM functions for good (e.g. /admin, /config)
- Masking PWM server's real DNS name, e.g. to avoid having to buy a separate SSL certificate

PWM does not require Apache or any other reverse proxy, so this type of configuration is optional.

These instructions were written using Apache 2.2 running on Linux Debian Lenny, with PWM svn revision 160 running on Linux Debian Squeeze and Tomcat 6.

Configuring PWM server

On PWM,most configuration is related to security. You have three options:

- Let Apache contact PWM using insecure HTTP protocol (e.g. port 8080 or 8180). This setup will become slightly more secure if firewall (or Tomcat) is used to block access from IPs other than that of Apache.
- Allow Tomcat/PWM access only using HTTPS. This will require additional configuration at the Apache end. This can be made more secure by limiting access to the webserver's IP.
- Secure Apache <-- --> Tomcat/pwm connection using VPN such as OpenVPN
- Block all other access to PWM.

In the PWM configuration make sure to turn Enable Session Verification to false, or reverse proxying will not work properly.

Configuring the webserver

Adding reverse proxy support to Apache is relatively easy. Go to `/etc/apache2/sites-available` and place something like this to the appropriate section:

```
# Reverse proxying setup for other webservers running on localhost
# or on remote servers. Configuration details available here:
#
# http://httpd.apache.org/docs/2.2/mod/mod_proxy.html

# Reverse proxies don't need to allow proxy requests
ProxyRequests Off

# Proxy access control - not very important in reverse proxies
# as the target servers have been predefined by the sysadmin
<Proxy *>
        Order deny,allow
        Allow from all
</Proxy>

# No need to proxy SSL-enabled servers (yet)
#SSLProxyEngine On

# This is required to connect to SSL-enabled servers not running
# on port 443
#AllowCONNECT 8443

# Block access to administrative functions, see
#
# http://httpd.apache.org/docs/2.2/mod/mod_proxy.html#proxypass
ProxyPass /pwm/admin !
ProxyPass /pwm/config !

# Map local server URL to a remote server URL. We're using HTTP through
# secure VPN connection.
ProxyPass /pwm http://<pwm-server-ip>:8080/pwm

# This rewrites HTTP headers etc. so that proxied server's
# responses point the client back to this server, not the
# proxied server
ProxyPassReverse /pwm http://<pwm-server-ip>:8080/pwm
```

Note that using any other path than /pwm will not work, at least out of the box. For example, submitting the CAPTCHA form will fail with "Form submitted with incorrect pwmFormID value" error.