Hardening the Content Management System

Application Scanning

A web application scanner will look for typical mistakes made in PHP applications: XSS, CSRF and SQL injections, and more. We use AppScan, but many free application scanners are available. You should scan any component you code yourself, or 3rd party component, that is not part of the HUBzero release. Also, if you modify a component in a HUBzero release, you should scan it for vulnerabilities the change may have introduced. If you find a vulnerability in the HUBzero release itself, please file a ticket at hubzero.org!
CMS-Controlled Fail2Ban Jail

Configuration and Details

Objective

To have the CMS handle user login banning in an attempt to deter brute force attacks.

CMS Configuration Page

The following settings are accessible from the CMS administrative backend.

<table>
<thead>
<tr>
<th>Component</th>
<th>Defaults</th>
<th>Password</th>
<th>Registration</th>
<th>Permissions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum Reset Count</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time in Hours (reset count)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Maximum Failed Login Attempts</td>
<td>3</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time in Hours (failed attempts)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts per IP</td>
<td>25</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Time in Hours (accounts per IP)</td>
<td>1</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Allow User Registration
  - If set to Yes, new Users allowed to self-register.
- New User Registration Group
  - The default group that will be applied to New Users Registering via the frontend.

These options are accessible by going to the User Menu Members and Member Options.
User Password Reset Limit

The number of password resets per time period is limited. If the user attempts to reset their password at a threshold deemed by the HUB administrator as excessive, the following message is displayed.

User Failed Login Limit

The number of failed logins per time period is limited. If the user attempts to reset their password at a threshold deemed by the HUB administrator as excessive, the following message is displayed. This means that an individual's account is temporarily blocked until the time period expires.
**IPbased Blocked User Limit**

When the threshold of blocked user accounts per IP network is met, the CMS will trigger a Fail2Ban rule which will block incoming requests from an IP address for a period of time. This is the last line of defense as blocking an IP address may have unintended consequences such as blocking a NATed IP address which several valid users are using to access the hub.

**Assumptions**

This approach assumes that the system administrator has configured a jail and a system user account to execute (with sudo) Fail2Ban via the fail2banclient utility.

On Debian Hosts, Fail2Ban should be version 0.9.5.
Setup & Configuration

There are a number of subsystems which need to be configured for this scheme to work properly.

sudo Configuration

A privileged user which can execute:

(root) NOPASSWD: /usr/bin/fail2banclient set hublogin banip [09.]*
(root) NOPASSWD: /usr/bin/fail2banclient set hublogin unbanip [09.]*

This can be accomplished by adding a sudoers rule in /etc/sudoers.d/ that looks like:

wwwdata   ALL=(root)NOPASSWD: /usr/bin/fail2banclient set hublogin banip [09.]*

Fail2Ban Configuration

The system administrator should configure Fail2Ban to create jails which the CMS can add offending IP address into. The amount of time that the ban is valid is configured in Fail2Ban.

The CMS will simply add IP addresses to the Fail2Ban jail which will trigger the Ban Action as specified in the rule set.

The following configuration are more of an example than anything. A seasoned system
administrator will have crafted better rules.

[Sample] Jail Configuration

#
# JAILS
# /etc/fail2ban/jail.local
#

[hublogin] enabled = true
port = http,https filter = hublogin
logpath = /var/log/messages banaction = hubloginfailure bantime = 600
findtime = 1
maxretry = 1

[Sample] Filter Configuration

/etc/fail2ban/filter.d/hublogin.conf

# Fail2Ban configuration file
#

[Definition]
# Option: failregex

# Notes.: Regexp to catch known spambots and software alike. Please verify
#         that it is your intent to block IPs which were driven by
#         abovementioned bots.

# Values: TEXT

#

We choose something that will never happen

# Since the CMS will control IP’s placed in the jails failregex =
^<HOST>thisfilterwillneverbefound

# Option: ignoreregex

# Notes.: regex to ignore. If this regex matches, the line is ignored.

# Values: TEXT

#

ignoreregex =


[Sample] Action Configuration

# Fail2Ban configuration file

# cat /etc/fail2ban/action.d/hubloginfailure.conf [INCLUDES]

before = iptablescommon.conf
[Definition]

# Option:   actionstart
# Notes.:   command executed once at the start of Fail2Ban.
# Values:   CMD
#

actionstart = iptables N fail2banhublogin
iptables A INPUT j DROP
iptables I INPUT p tcp j fail2banhublogin

# Option:   actionstop
# Notes.:   command executed once at the end of Fail2Ban
# Values:   CMD
#

actionstop = iptables D fail2banhublogin p tcp j fail2banhublogin iptables F fail2banhublogin
iptables X fail2banhublogin

# Option:   actioncheck
# Notes.:   command executed once before each actionban command
# Values:   CMD
#

HARDENING THE CONTENT MANAGEMENT SYSTEM

actioncheck = iptables n L fail2banhublogin | grep q fail2banhublogin

# Option:  actionban
# Notes.:  command executed when banning an IP. Take care that the
#          command is executed with Fail2Ban user rights.
# Tags:    <ip>   IP address
#          <failures>   number of failures
#          <time>   unix timestamp of the ban time
# Values:  CMD
#
actionban = iptables I fail2banhublogin p tcp dport 443 s <ip> j DROP
iptables I fail2banhublogin p tcp dport 80 s <ip> j DROP

# Option:  actionunban
# Notes.:  command executed when unbanning an IP. Take care that the
#          command is executed with Fail2Ban user rights.
# Tags:    <ip>   IP address
#          <failures>   number of failures
#          <time>   unix timestamp of the ban time
# Values:  CMD
#
actionunban = iptables D fail2banhublogin p tcp dport 443 s <ip> j DROP iptables D fail2banhublogin p tcp dport 80 s <ip> j DROP
# Defaut name of the chain

name = DEFAULT

# Option: protocol
# Notes.: internally used by config reader for interpolations.
# Values: [ tcp | udp | icmp | all ] Default: tcp

protocol = tcp

# Option: chain
# Notes: specifies the iptables chain to which the fail2ban rules should be
# added
# Values: STRING Default: INPUT chain = INPUT

[Sample] Banned IP address results

root@example:/var/www/example# fail2banclient status
hublogin Status for the jail: hublogin

  | Filter
HARDENING THE CONTENT MANAGEMENT SYSTEM

- Currently failed: 0
- Total failed: 4
- File list: /var/log/messages

Actions
- Currently banned: 1
- Total banned: 4
- Banned IP list: 192.168.226.1

root@example:/var/www/example# iptables L Chain INPUT (policy DROP)

<table>
<thead>
<tr>
<th>target</th>
<th>prot</th>
<th>opt</th>
<th>source</th>
<th>destination</th>
<th>fail2banhublogin</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEPT</td>
<td>all</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:ssh</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:smtp</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:mysql</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:ldap</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:http</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:https</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:httpalt</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:830:831</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:http</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:https</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:httpalt</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>tcp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td>tcp dpt:1170</td>
</tr>
<tr>
<td>DROP</td>
<td>icmp</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
<td></td>
</tr>
</tbody>
</table>

Chain FORWARD (policy DROP)

<table>
<thead>
<tr>
<th>target</th>
<th>prot</th>
<th>opt</th>
<th>source</th>
<th>destination</th>
</tr>
</thead>
<tbody>
<tr>
<td>ACCEPT</td>
<td>all</td>
<td></td>
<td>10.0.0.0/8</td>
<td>anywhere</td>
</tr>
<tr>
<td>ACCEPT</td>
<td>all</td>
<td></td>
<td>anywhere</td>
<td>anywhere</td>
</tr>
</tbody>
</table>
User Impact

When a large number of people intend on using the CMS, it may be wise to temporarily disable this feature (e.g. conference, class activity, etc). In the past, many conference goers have mistyped their password in a short period of time creating a false positive for normal Fail2Ban operation. This risk is mitigated by the fact that the number of blocked users is observed before triggering Fail2Ban.