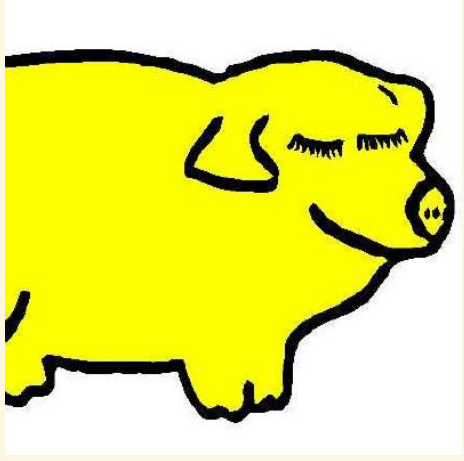
SECURITY IN DRUPAL: WHAT CAN GO WRONG?

Benji Fisher

March 13, 2026 - DrupalCamp NJ

INTRODUCTION

ABOUT ME



- Benji Fisher
- @benjifisher on d.o
- @benjifisher on GitHub
- @benjifisher on GitLab

Usability group, Migration subsystem, Security team

FOLLOW ALONG

- https://slides.benjifisher.info/ (GitLab Pages)

OUTLINE

- Introduction
- What is the OWASP Top Ten?
- What is Drupal?
- A01:2025 – Broken Access Control
- A02:2025 – Security Misconfiguration
- A03:2025 – Software Supply Chain Failures
- A04:2025 – Cryptographic Failures
- A05:2025 – Injection
- …

OUTLINE (CONTINUED)

- …
- A06:2025 – Insecure Design
- A07:2025 – Authentication Failures
- A08:2025 – Software or Data Integrity Failures
- A09:2025 – Security Logging and Alerting Failures
- A10:2025 – Mishandling of Exceptional Conditions
- Conclusion

ATTRIBUTION

These slides borrow from some of Peter Wolanin's "Cracking Drupal" presentations and from https://owasp.org/. According to the standard footer,

> *Unless otherwise specified, all content on the site is Creative Commons Attribution-ShareAlike v4.0 and provided without warranty of service or accuracy.*

All of my slide decks have a similar license.

WHAT IS THE OWASP TOP TEN?

OPEN WORLDWIDE APPLICATION SECURITY PROJECT (OWASP)

The Open Worldwide Application Security Project (OWASP) is a nonprofit foundation that works to improve the security of software.

source: https://owasp.org/about/

OWASP is not Drupal-specific. Let's "get off the island"!

OWASP TOP TEN

The OWASP Top 10 is a standard awareness document for developers and web application security. It represents a broad consensus about the most critical security risks to web applications.

source: https://owasp.org/www-project-top-ten/

The list is updated every few years: 2017, 2021, 2025.

WHAT IS DRUPAL?

DRUPAL: A CONTENT MANAGEMENT SYSTEM

Drupal is a web-based content management system (CMS):

> *Enter data in my forms. I will save it to the database, then generate web pages.*

Hacker:

DRUPAL: EXPLOITS OF A MOM

Hacker:

Name: Robert'); DROP TABLE Stude

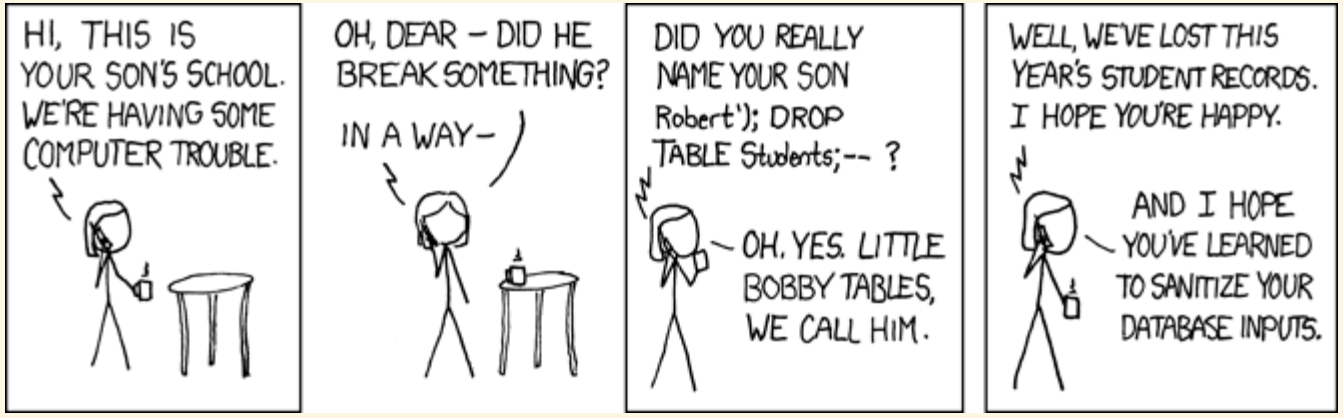
Then

```
$sql = "INSERT INTO Students (name) VALUES('$name')";
```

will become

```
$sql = "INSERT INTO Students (name) VALUES('Robert');
        DROP TABLE Students; --')";
```

XKCD 327 (EXPLOITS OF A MOM)



source: https://xkcd.com/327/

DRUPAL: AN ACTIVE, INTERNATIONAL OSS PROJECT

The Drupal community is one of the largest open source communities in the world. We're more than 1,000,000 passionate developers, designers, trainers, strategists, coordinators, editors, and sponsors working together.

source: https://www.drupal.org/about

DRUPAL: TAKE SECURITY SERIOUSLY

The security team is an all-volunteer group of individuals who work to improve the security of the Drupal project. Members of the team come from countries across 4 continents … The team was formalized in 2005 with a mailing list and has had 4 team leads in that time period.

A01:2025 – BROKEN ACCESS CONTROL

TYPES OF VULNERABILITY

1. Information disclosure
2. Edit/Delete by unauthorized user
3. Cross-Site Request Forgery (CSRF)
4. … and more

HORROR STORIES (CUSTOM MODULES)

One site had custom access control for `/user/1/edit`. The access function left off a “not” and granted access to anyone *except* User 1.

Q: How to protect yourself?

CUSTOM MODULES

How do you avoid horror stories?

- Code review
- Automated tests for every custom page/custom access
- Avoid custom code!

If customers knew the true cost of custom code, they would ask for less of it.

CROSS-SITE REQUEST FORGERY (CSRF)

- mysite.com: `<img src="https://example.com/node/123/delet`
- admin for example.com visits mysite.com

Questions:

- Why does this attack not work?
- What incorrect assumptions expose a similar vulnerability?

HOW TO AVOID CSRF

- Use confirmation forms.
- Expect users to tweak URLs: `.../edit`, `.../delete`
  and more.
- Do not assume form requests come from the form you
  created.
- Use CSRF tokens: CSRF access checking
- Remember: forms are hard! Web CMS is a terrible idea

CSRF IN DRUPAL

SA-CORE-2021-006:

- **Project**: Drupal core
- **Date**: 2021-September-15
- **Security risk**: Moderately critical 10⁄25 AC:Basic/A:User/CI:None/II:Some/E:Theoretical/TD:D
- **Vulnerability**: Cross Site Request Forgery
- **CVE IDs**: CVE-2020-13673

SA-CORE-2021-006 (CONTINUED)

The Drupal core Media module allows embedding internal and external media in content fields. In certain circumstances, the filter could allow an unprivileged user to inject HTML into a page when it is accessed by a trusted user with permission to embed media. In some cases, this could lead to cross-site scripting.

SA-CORE-2021-006 (FIX)

Solution: upgrade to Drupal 9.2.6, 9.1.13, or 8.9.19.

Commit b230624e5b:

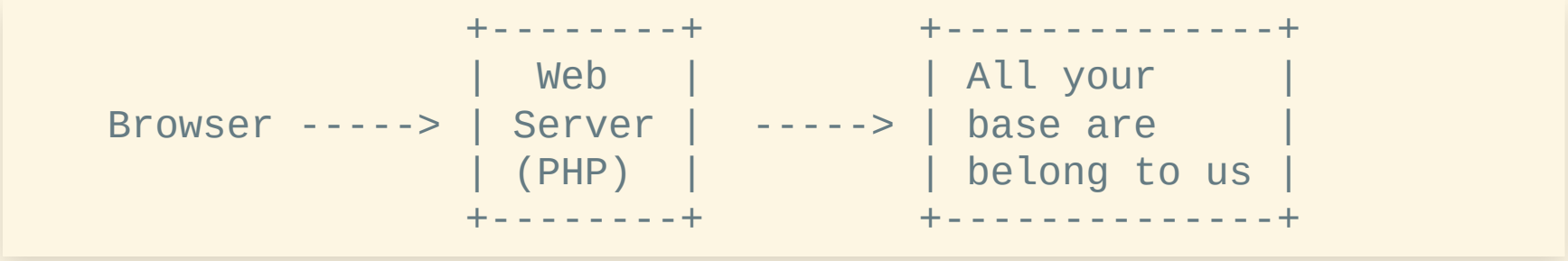
- When editing a WYSIWYG field with a Media embed, add a CSRF token to the header of the jQuery request.
- Validate the token in the code that responds to that request.

SSRF: WHAT GOES WRONG

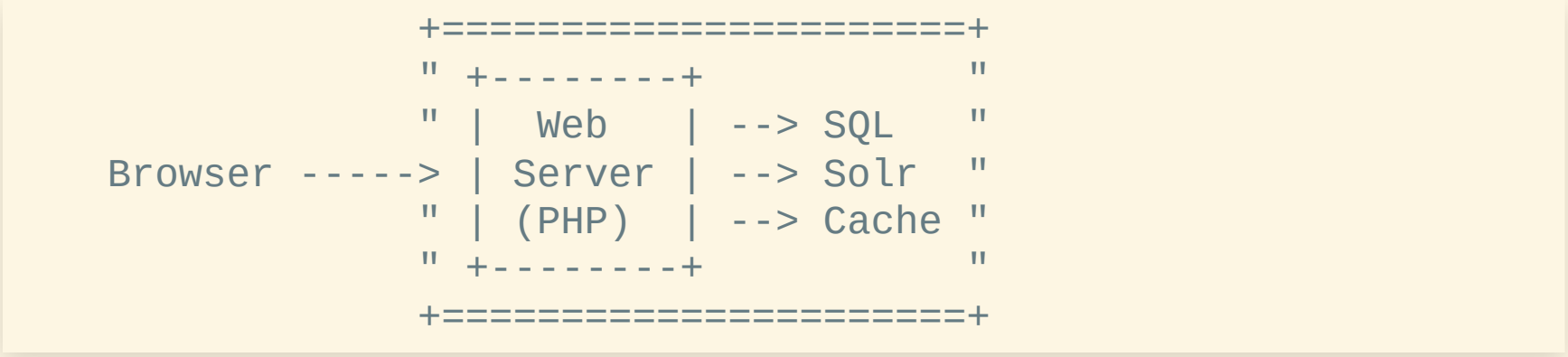
The web server receives a URL or similar request from an upstream component and retrieves the contents of this URL, but it does not sufficiently ensure that the request is being sent to the expected destination.

source: CWE-918: Server-Side Request Forgery (SSRF)

SSRF: SORT OF LIKE PHISHING



SSRF: CIRCLE OF TRUST



SSRF IN DRUPAL: SA-CONTRIB-2023-015

The File Chooser Field allows users to upload files using 3rd party plugins such as Google Drive and Dropbox.

This module fails to validate user input sufficiently which could under certain circumstances lead to a Server Side Request Forgery (SSRF) vulnerability leading to Information Disclosure. In uncommon configurations and scenarios, it might lead to Remote Code Execution.

SSRF: SA DETAILS

- **Project**: File Chooser Field
- **Date**: 2023-May-17
- **Security risk**: Moderately critical 14/25 AC:Basic/A:User/CI:Some/II:None/E:Exploit/TD:All
- **Vulnerability**: Server Side Request Forgery, Information Disclosure
- **Affected versions**: < 1.13

SSRF: THE UPDATE (PART 1)

VULNERABLE CODE

```
// file: plugins/Dropbox.php.
public function download($destination, $url) {
  return system_retrieve_file($url, $destination);
}
```

FIXED CODE

```
public function download($destination, $url) {
  if (strpos($url, 'https://dl.dropboxusercontent...')
=== 0) {
    return system_retrieve_file($url, $destination);
  }
  return FALSE;
}
```

SSRF: THE UPDATE (PART 2)

VULNERABLE CODE

```
            // file: file_chooser_field.field.inc.
            [$phpClassName, $remote_file] = explode("::::",
$file_url);
            $local_file = file_chooser_field_plugin_method(...);
            // ..
```

FIXED CODE

```
            [$phpClassName, $remote_file] = explode("::::",
$file_url);
            $trusted_plugins =
file_chooser_field_load_plugin_class_names();
            if (!in_array($phpClassName, $trusted_plugins)) {
              return FALSE;
            }
            $local_file = file_chooser_field_plugin_method(...);
```

```
if (!$local_file) {
  return FALSE;
}
```

A02:2025 – SECURITY MISCONFIGURATION

CONFIGURATION: WHAT GOES WRONG

- Missing appropriate security hardening across any par of the application stack …
- Unnecessary features are enabled or installed …
- Default accounts and their passwords are still enabled and unchanged.
- Error handling reveals stack traces …
- The server does not send security headers or directives, or they are not set to secure values.

source: A02:2025 - Security Misconfiguration

FILE EXECUTION: SA-CORE-2013-003

Drupal core [adds] a .htaccess file into the files directories that stops execution of PHP scripts on the Apache web server. This protection is only necessary if there is a vulnerability on the site or on a server that allows users to upload malicious files. … This release includes new configuration to prevent PHP execution on several additional common Apache configurations.

source: SA-CORE-2013-003

FILE EXECUTION: THE FIX

File: `sites/default/files/.htaccess` (as of Drupal 7.24)

```
# Existing lines:
Options None
Options +FollowSymLinks
SetHandler Drupal_Security_Do_Not_Remove_See_SA_2006_006

# New lines:
<Files *>
  SetHandler Drupal_Security_Do_Not_Remove_See_SA_2013_003
</Files>
<IfModule mod_php5.c>
  php_flag engine off
</IfModule>
```

IN CASE YOU WERE WONDERING

File: `sites/default/files/.htaccess` (as of Drupal 11.1.4)

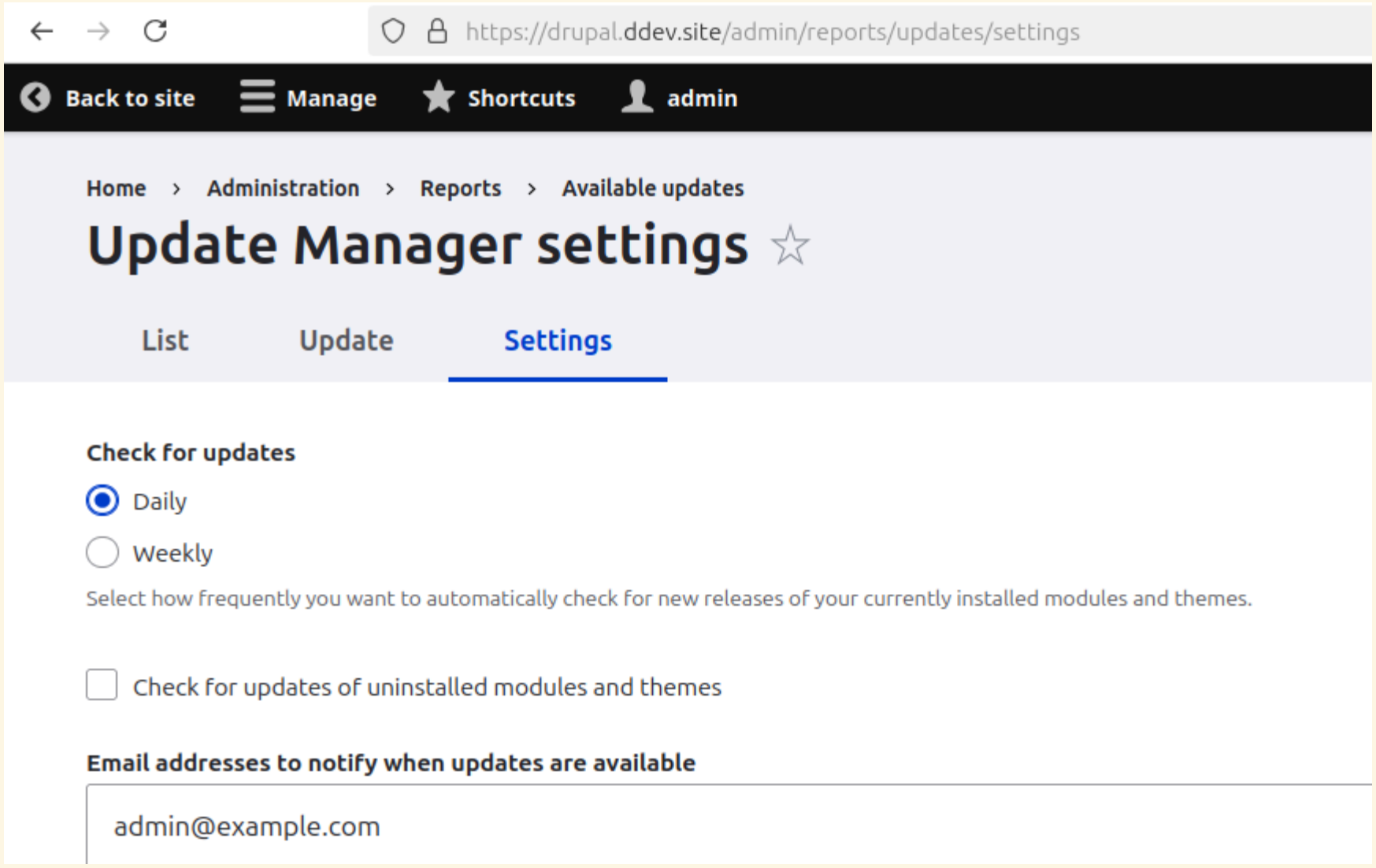
```
# Was Options None; Options +FollowSymLinks
Options -Indexes -ExecCGI -Includes -MultiViews

SetHandler Drupal_Security_Do_Not_Remove_See_SA_2006_006
<Files *>
  SetHandler Drupal_Security_Do_Not_Remove_See_SA_2013_003
</Files>

# Was mod_php5.c
<IfModule mod_php.c>
  php_flag engine off
</IfModule>
```

THE REST OF THE FILESYSTEM

```
▸ vendor/
▾ web/
  ▸ core/
  ▸ modules/
  ▸ profiles/
  ▾ sites/
    ▾ default/
      ▸ files/
  ▸ themes/
    autoload.php
    index.php
    robots.txt
    update.php
  composer.json
  composer.lock
```

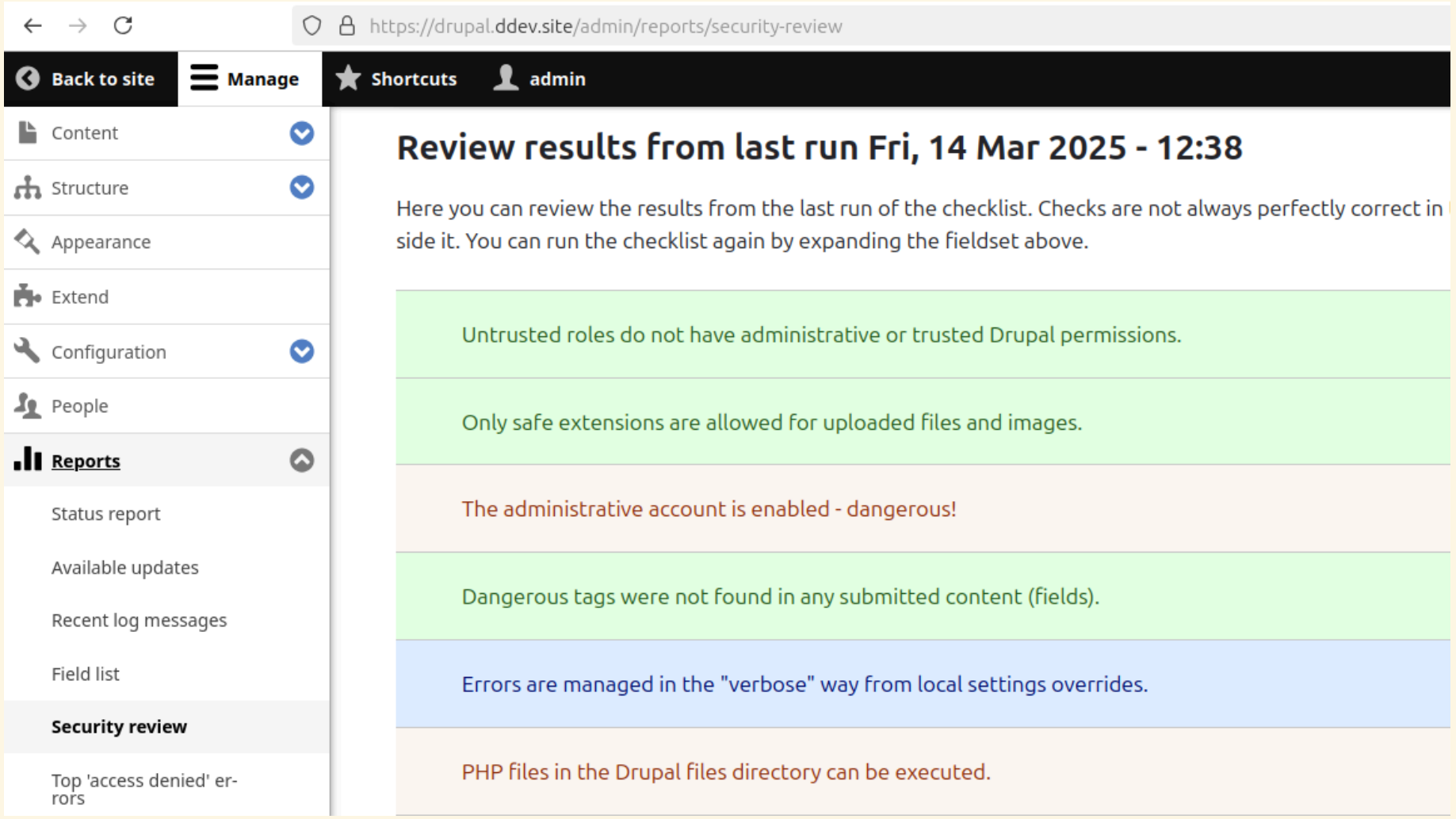
Who has permission to write to each file/directory?

AUTOMATIC UPDATES


https://drupal.ddev.site/admin/reports/updates/settings
Back to site
Manage
Shortcuts
admin
Home › Administration › Reports › Available updates
Update Manager settings
List
Update
Settings
Check for updates
Daily
Weekly
Select how frequently you want to automatically check for new releases of your currently installed modules and themes.
Check for updates of uninstalled modules and themes
Email addresses to notify when updates are available
admin@example.com

SECURITY REVIEW

Security Review

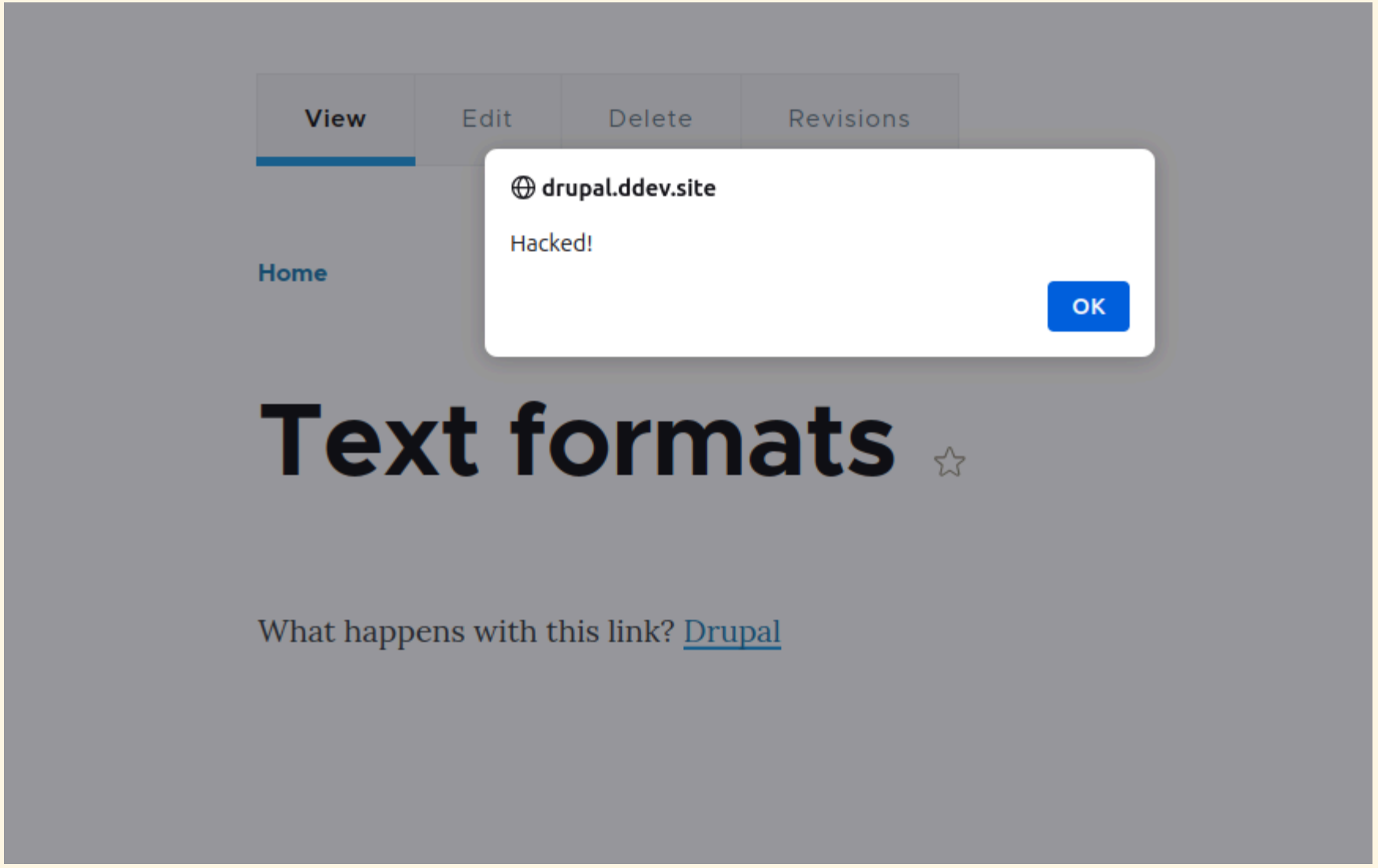

https://drupal.ddev.site/admin/reports/security-review
Back to site
Manage
Shortcuts
admin
Content
Structure
Appearance
Extend
Configuration
People
Reports
Status report
Available updates
Recent log messages
Field list
Security review
Top 'access denied' errors
Review results from last run Fri, 14 Mar 2025 - 12:38
Here you can review the results from the last run of the checklist. Checks are not always perfectly correct in
side it. You can run the checklist again by expanding the fieldset above.
Untrusted roles do not have administrative or trusted Drupal permissions.
Only safe extensions are allowed for uploaded files and images.
The administrative account is enabled - dangerous!
Dangerous tags were not found in any submitted content (fields).
Errors are managed in the "verbose" way from local settings overrides.
PHP files in the Drupal files directory can be executed.

BACK TO BASICS

What happens with this markup?

```
<p>
  What happens with this link?
  <a onmouseover="alert('Hacked!')"
  href="https://www.drupal.org">Drupal</a>
</p>
```

UNSAFE HTML


View
Edit
Delete
Revisions
drupal.ddev.site
Hacked!
OK
Home
Text formats
What happens with this link? Drupal

BACK TO BASICS: TEXT FORMATS

Which users/roles have access to these text formats?

- Full HTML
- Basic HTML
- Restricted HTML
- Plain text

(Standard profile/recipe)

BACK TO BASICS: PERMISSIONS

Some permissions are “restricted”.

> *Warning: Give to trusted roles only; this permission has security implications.*

- Administer comment types and settings
- Synchronize configuration
- Export configuration
- Import configuration
- Translate configuration
- Delete any file …

MORE RESTRICTED PERMISSIONS

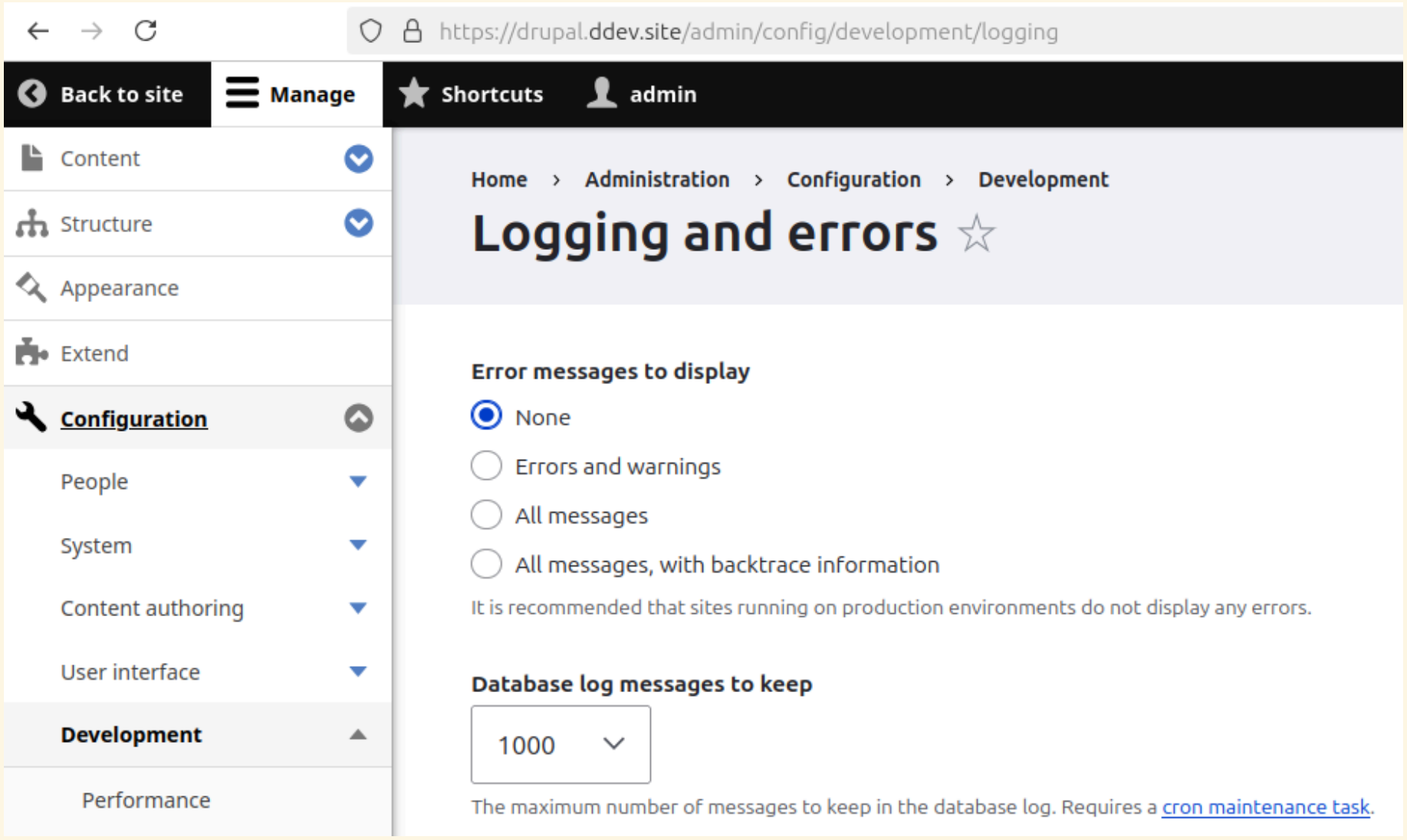
- Administer text formats and filters
- Configure any layout
- Translate interface text
- Bypass content access control
- Administer content types
- Administer content
- Administer site configuration
- Administer themes
- Administer software updates
- View site reports
- Link to any page …

A FEW MORE RESTRICTED PERMISSIONS

- Administer actions
- Administer roles and permissions
- Administer account settings
- Administer users
- Select method for cancelling account
- Administer views

ERRORS AND STACK TRACES

Do not show stack traces on production


https://drupal.ddev.site/admin/config/development/logging
Back to site
Manage
Shortcuts
admin
Content
Structure
Appearance
Extend
Configuration
People
System
Content authoring
User interface
Development
Performance
Home › Administration › Configuration › Development
Logging and errors
Error messages to display
None
Errors and warnings
All messages
All messages, with backtrace information
It is recommended that sites running on production environments do not display any errors.
Database log messages to keep
1000
The maximum number of messages to keep in the database log. Requires a cron maintenance task.

A03:2025 – SOFTWARE SUPPLY CHAIN FAILURES

THE BEST KEPT SECRET IN WEB SECURITY

The secret:

The most important thing is to do all the boring stuff you *already know*.

It is a lot like …

CLICK BAIT?

How to live a longer, healthier life!

It takes just 4 minutes a day!

Does that seem too good to be true?

BRUSH YOUR TEETH!

- Two minutes, two times a day.
- Best advice you will get today.
- Also floss.
- You really will live a longer, healthier life.

WEB SECURITY HYGIENE

- Use good passwords. Have a policy.
- Keep your software up to date.
- Unless hosting is your core business, do not run your own servers.

DRUPAL: KNOW THE SCHEDULE

- Security release windows: Wednesdays 12-5 ET
- Drupal core updates (patch versions): third Wednesdays
- Drupal core updates (minor versions): June and December
- Minor versions are supported for one year.

DRUPAL: KNOW THE CHANNELS

- Web: Security advisories
- RSS: https://drupal.org/security/rss.xml, https://drupal.org/security/contrib/rss.xml, https://drupal.org/security/psa/rss.xml
- Email: https://www.drupal.org/user (Edit > My newsletters)
- Slack: `#security-team` channel in Drupal Slack

Unofficial: @drupalsecurity on X, Mastodon

DRUPAL: KNOW THE DIFFERENCE

- Major version (Drupal 10 to Drupal 11): disruptive
- Minor version (10.2 to 10.3): less disruptive, new features
- Patch version (10.2.3 to 10.2.4): should not be disruptive, bug fixes
- Security release (10.2.9 to 10.2.10): not disruptive (best effort)

DRUPAL: TRUST THE SECURITY TEAM

Two choices:

1. Read the SA, decide whether it impacts your site. If so, update.
2. Update your site.

Either way, you are trusting the security team:

1. They anticipated all the possible exploits.
2. The update is not disruptive.

DRUPAL AND SYMFONY

Q: Why was Drupal 9 EOL scheduled for Nov. 2023?

A: Drupal 9 used Symfony 4, which was EOL in Nov. 2023.

A04:2025 – CRYPTOGRAPHIC FAILURES

CRYPTOGRAPHY: WHAT GOES WRONG?

- data transmitted in clear text
- old or weak cryptographic algorithms or protocols
- encryption not enforced
- deprecated hash functions such as MD5 or SHA1

source: A04:2025 - Cryptographic Failures

KEEP IT SIMPLE

Unless you are a cryptography maven, do not try to do it yourself. Know when to call for an expert!

Q: What data need protection?

WHAT TO PROTECT?

- Passwords
- API keys
- Personally identifiable information (PII)
- Business secrets

PII includes Social Security numbers, credit cards, health information.

HTTP AND HTTPS

- Do not manage your own servers unless that is your business.
- HTTPS provides encryption and authentication.
- Enforce HTTPS: Strict-Transport-Security header (HSTS).
  - CDN (Cloudflare, Fastly, …)
  - Server
  - Security Kit module
- SSL is insecure. Use TLS 1.2+

SSL LABS

For example, drupal.org SSL Labs report

https://www.ssllabs.com/ssltest/analyze.html?d=drupal.org&s=151.101.194.217

Qualys. SSL Labs

Home Projects Qualys Free Trial Contact

You are here: Home > Projects > SSL Server Test > drupal.org > 151.101.194.217

SSL Report: drupal.org (151.101.194.217)

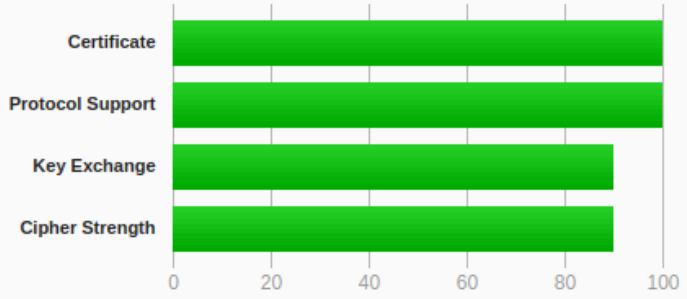
Assessed on: Sat, 19 Nov 2022 00:20:30 UTC | Hide | Clear cache

Scan Another »

Summary

Overall Rating

A+



Visit our documentation page for more information, configuration guides, and books. Known issues are documented here.

This site works only in browsers with SNI support.

HTTP Strict Transport Security (HSTS) with long duration deployed on this server. MORE INFO »

DRUPAL UPDATE INFORMATION

… not to be confused with Automatic Updates/Project Browser initiative

In `Drupal\update\UpdateFetcher`:

```
          /**
           * URL to check for updates, if a given project
doesn't define its own.
           */
          const UPDATE_DEFAULT_URL =
'http://updates.drupal.org/release-history';
```

We did not fix that until Issue #1538118 2020-11-05.
Drupal 7 was fixed 2023-06-06.

API KEYS

- Use API keys for external services: SMTP, translation, ..
- Like long passwords
- Do not commit to your repository.
  - If you do, look up BFG Git (Big Friendly Giant).
- Securing Authentication Credentials in the "Security in Drupal" guide
  - Use environment variables.
  - Add `settings.php` value from external file.
  - Use contributed modules for key management.

PASSWORDS IN DRUPAL

- User management is one of Drupal's strengths. Do not "roll your own".
- Rule #1 (of many): do not store passwords in the database (nor the file system).
  - Store hashed (or encrypted) passwords.
- Rule #2: Make it secure even with the hashed passwords.
  - Add "salt" before hashing.
  - Use an expensive hash function.

EXAMPLE: PASSWORD HASHES IN UMAMI

```
MariaDB [db]> SELECT uid, name, pass FROM users_field_data WHERE
uid < 4\G
*************************** 1. row ***************************
 uid: 0
name:
pass: NULL
*************************** 2. row ***************************
 uid: 1
name: admin
pass:
$argon2id$v=19$m=65536,t=4,p=1$RlRTbjl4em5XVldmT1hCbg$6D8JRWnKOmf
*************************** 3. row ***************************
 uid: 2
name: Gregorio Sánchez
pass:
```

PASSWORD HASHING IN DRUPAL

- Before Drupal 10.1: custom password hashing
- Drupal 10.1 to 11.3: standard `password_hash()` and `PASSWORD_DEFAULT` (`bcrypt`)
- Drupal 11.4 (maybe): configurable, defaults to `PASSWORD_DEFAULT`
- Drupal 12.0 (RTBC): configurable, defaults to `argon2`

In PHP, `PASSWORD_DEFAULT` has been `bcrypt` for a long time. It has problems, and there are better options.

PASSWORD HASHING IN DRUPAL (REFERENCES)

- Change record for 10.1: Password hashing is changed
- Q&A: Password Compatibility module (docs for core module)
- RTBC issue: Switch to argon2 as the default password hashing algorithm
- Change record (draft): Default password hashing algorithm is now argon2id
- Contrib module: PHP Password (if you cannot wait to stop using `bcrypt`)

A05:2025 – INJECTION

INJECTION: WHAT GOES WRONG

- User-supplied data is not validated, filtered, or sanitized by the application.
- Dynamic queries … are used directly in the interpreter.
- Hostile data is used within … search parameters to extract additional, sensitive records.
- Hostile data is directly used or concatenated. …

source: A05:2025 - Injection

INJECTION IN DRUPAL: SA-CORE-2014-005

Drupal 7 includes a database abstraction API to ensure that queries executed against the database are sanitized to prevent SQL injection attacks.

A vulnerability in this API allows an attacker to send specially crafted requests resulting in arbitrary SQL execution. … this can lead to privilege escalation, arbitrary PHP execution, or other attacks.

This … can be exploited by anonymous users.

source: SA-CORE-2014-005

INJECTION: MY RESPONSE

Because of the severity of the vulnerability and the simplicity of the update, we tested … and updated the site today.

source: my e-mail to boss and site owner (paraphrase)

INJECTION: THE UPDATE

VULNERABLE CODE

```
foreach ($data as $i => $value) {
  $new_keys[$key . '_' . $i] = $value;
}
```

FIXED CODE

```
foreach (array_values($data) as $i => $value) {
  $new_keys[$key . '_' . $i] = $value;
}
```

(comment snipped from both)

INJECTION: THE NEXT STEP

```
                // Update the query with the new placeholders.
                // preg_replace is necessary to ensure the
replacement does not affect
                // placeholders that start with the same exact
text. For example, if the
                // query contains the placeholders :foo and
:foobar, and :foo has an
                // array of values, using str_replace would affect
both placeholders,
                // but using the following preg_replace would only
affect :foo because
                // it is followed by a non-word character.
                $query = preg_replace(
                  '#' . $key . '\b#',
                  implode(', ', array_keys($new_keys)),
```

(line breaks added)

A04:2025 – INSECURE DESIGN

A07:2025 – AUTHENTICATION FAILURES

A08:2025 – SOFTWARE OR DATA INTEGRITY FAILURES

A09:2025 – SECURITY LOGGING AND ALERTING FAILURES

A10:2025 – MISHANDLING OF EXCEPTIONAL CONDITIONS

CONCLUSION

SUMMARY

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- What is the OWASP Top Ten?
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SUMMARY (CONTINUED)

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REFERENCES

- Benji's slide decks and source files
- OWASP Top Ten and OWASP Top 10:2025
- Drupal Security Team
- Drupal core release cycle: major, minor, and patch releases
- Security advisories

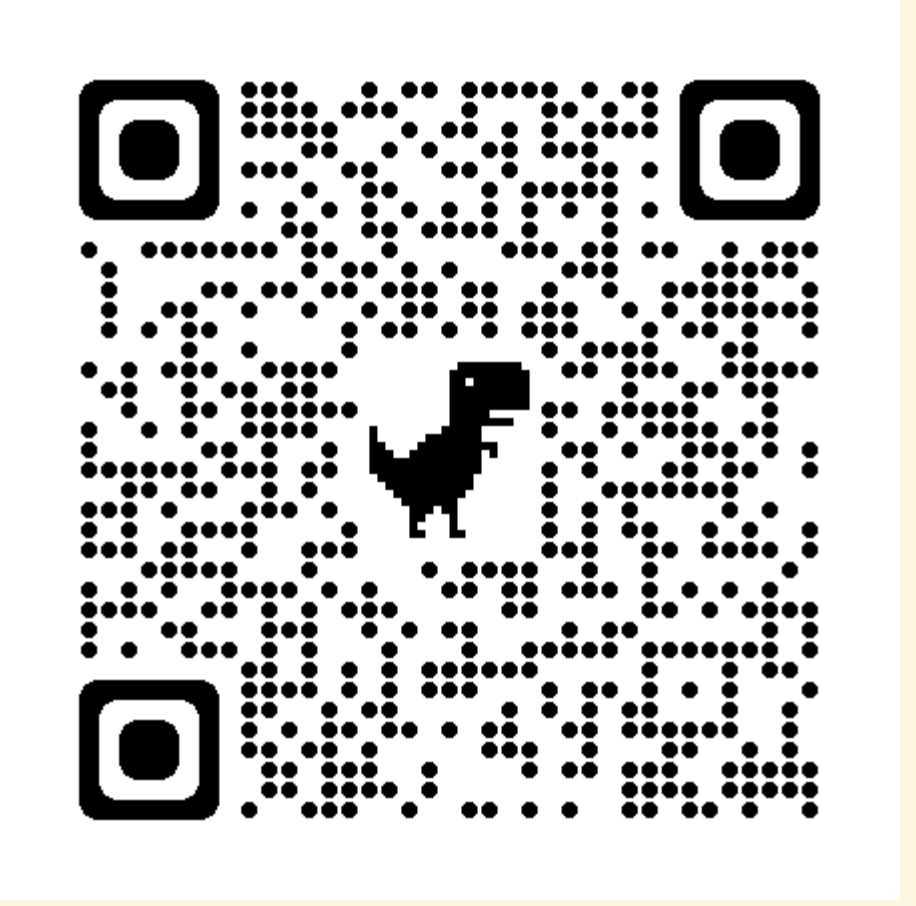
CONTRIB MODULES

- Security Review: Check your site for misconfiguration
- Paranoia: No PHP `eval ( )` from the web interface
- Security Kit: Content Security Policy, Origin checks against CSRF, XSS
- Two-factor Authentication (TFA): Two-factor authentication for Drupal sites

THANKS

- Peter Wolanin (`@pwolanin`) for permission to borrow parts of his presentation.
- Dave Long (`@longwave`) for suggesting SA-CORE-2013-003 as an example of misconfiguration.

QUESTIONS



COPYLEFT