# 25 TOOLS & EXTRA TACTICS FOR APP SECURITY

## FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

2023

# table of **contents**

app security

OWASP

tools

reconnaissance

monitoring

# chapter 1

# why should I bother?

Since you already opened this ebook, we assume **you do bother**. No one wants to be woken up in the middle of the night with the message “We’ve been hacked”.

If you are **a software developer** working on a web or mobile app, this ebook will help you **check step by step, if your product is secured**.

If you are **an app owner**, this ebook is full of insights into **what skills and security tactics you should expect** from your software security team.

Let your app live long and securely! 🖖

# chapter 2

# how should I **start**?

Time to kick off the **Secure Software Development Lifecycle** in your organization. Beginnings don't have to be hard! Let's start with **the easiest security tactics** that you can implement almost right away.

**Secure Software Development Lifecycle (SDLC)**

A framework that maps the whole development process, incorporating security in all stages of the lifecycle. Makes security one of the most important phases of SDLC. Related also to DevSecOps.

# LOW-HANGING SECURITY FRUITS

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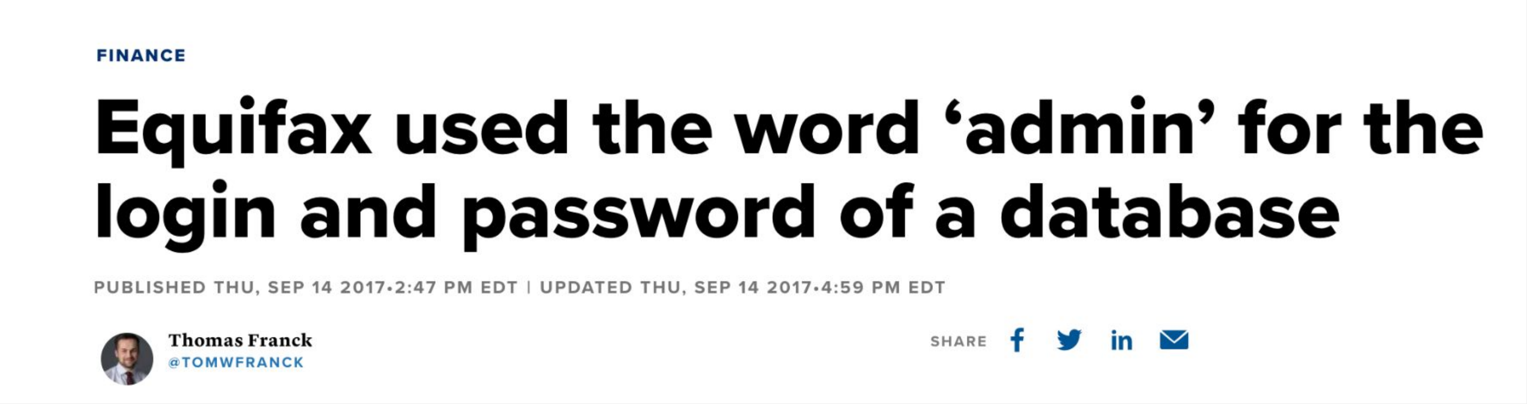
# Verify login credentials

Ensure that **all admin accounts don’t have default login credentials** or **easy-to-break credentials** such as login: admin, password: admin.

Avoid this mistake 👇



FINANCE

## Equifax used the word ‘admin’ for the login and password of a database

PUBLISHED THU, SEP 14 2017•2:47 PM EDT | UPDATED THU, SEP 14 2017•4:59 PM EDT

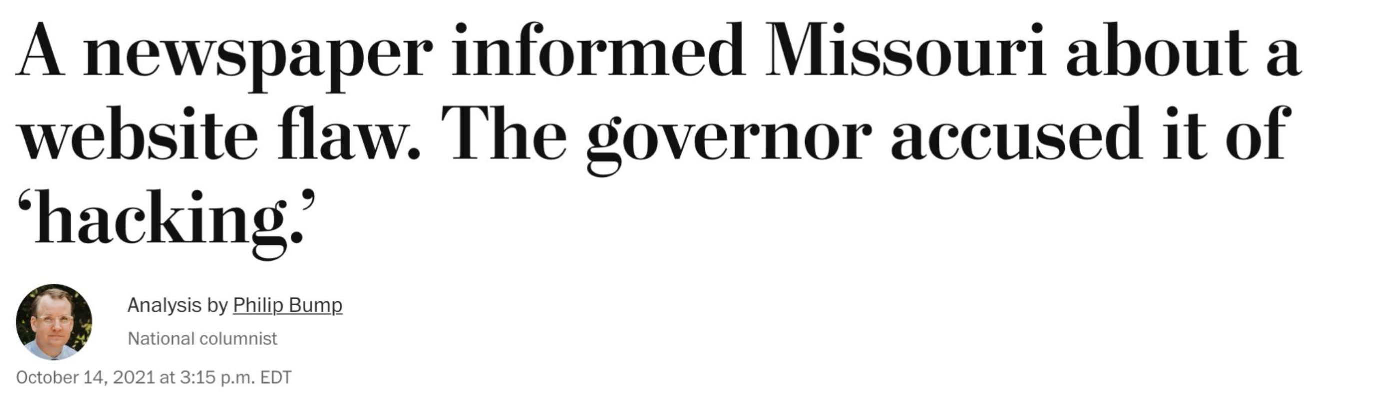
Thomas Franck
@TOMWFRANCK

Source: cnbc.com

# Delete sensitive data from code

Check out if **test credentials or sensitive data arent's hard coded** in the frontend code comments.

Avoid this mistake 👇



A newspaper informed Missouri about a website flaw. The governor accused it of 'hacking.'

Analysis by Philip Bump

National columnist

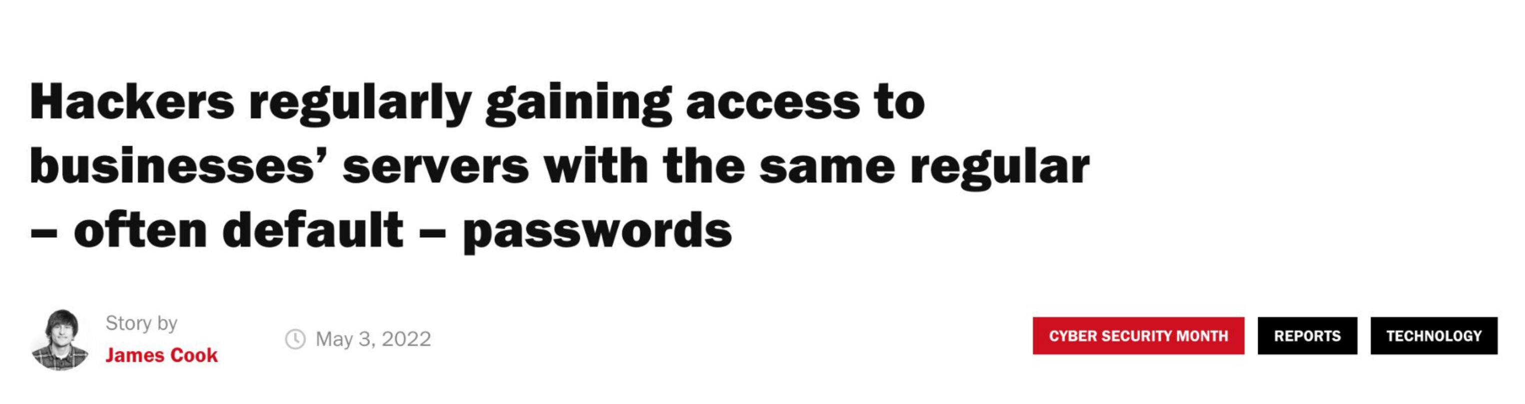
October 14, 2021 at 3:15 p.m. EDT

Source: washingtonpost.com

# Check CI/CD credentials

If you use **CI/CD providers and other external tools or dashboards**, ensure that any default accounts **don't have easy-breaking credentials**.

Avoid this mistake 👇



## Hackers regularly gaining access to businesses' servers with the same regular – often default – passwords

Story by
James Cook

May 3, 2022

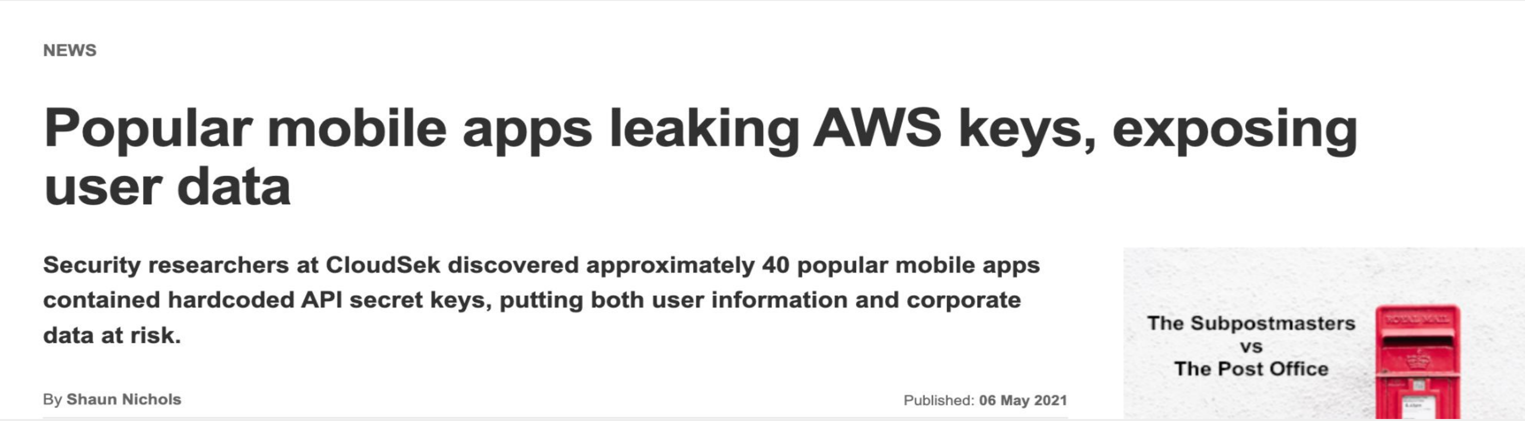
CYBER SECURITY MONTH | REPORTS | TECHNOLOGY

Source: businessleader.co.uk

# Remove secrets from repo

Verify if **any secrets** e.g. AWS keys, passwords, etc. **aren't checked-in in repositories**.

Avoid this mistake 👇



NEWS

## Popular mobile apps leaking AWS keys, exposing user data

**Security researchers at CloudSek discovered approximately 40 popular mobile apps contained hardcoded API secret keys, putting both user information and corporate data at risk.**

By **Shaun Nichols**

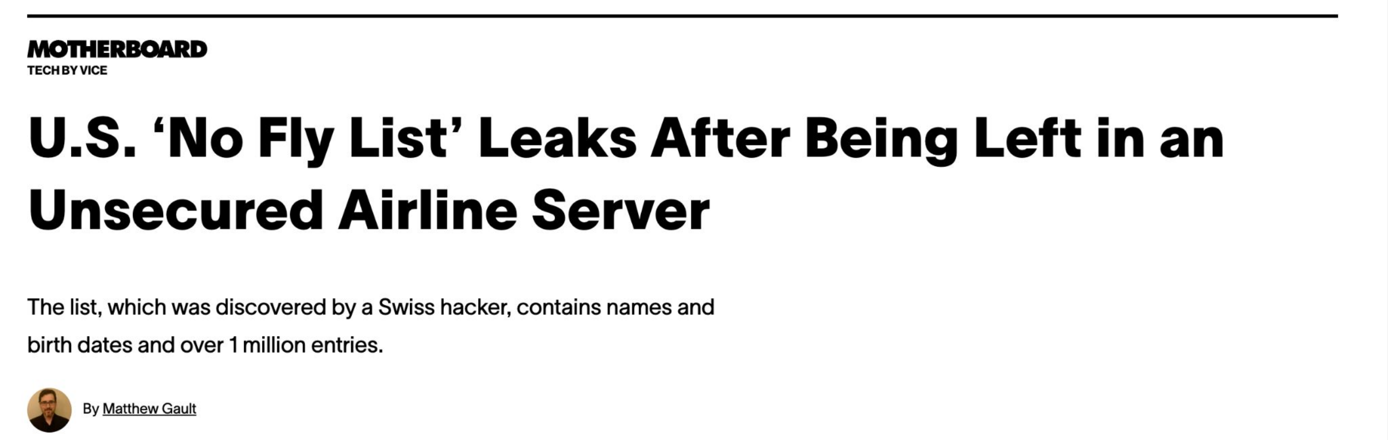
Published: **06 May 2021**

Source: techtarget.com

# Ensure ports aren’t exposed

Make sure that the services you use **don’t have any unwanted exposed ports**.

Avoid this mistake 👇



MOTHERBOARD
TECH BY VICE

## U.S. ‘No Fly List’ Leaks After Being Left in an Unsecured Airline Server

The list, which was discovered by a Swiss hacker, contains names and birth dates and over 1 million entries.

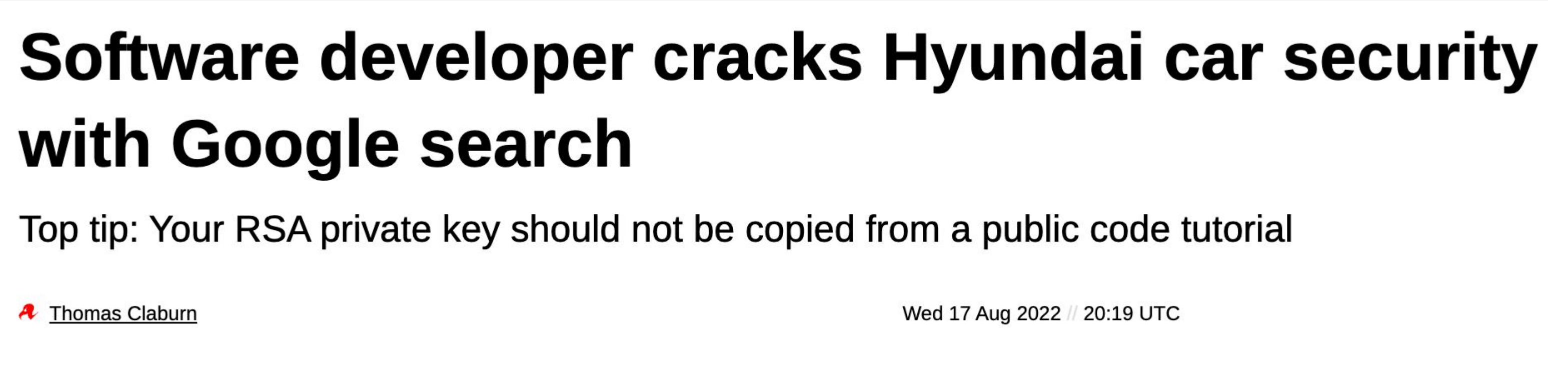
By Matthew Gault

Source: vice.com

# Don’t go with keys from tutorials

When you use crypto, **don’t take keys from any tutorials**.

Avoid this mistake 👇



## Software developer cracks Hyundai car security with Google search

Top tip: Your RSA private key should not be copied from a public code tutorial

Thomas Claburn

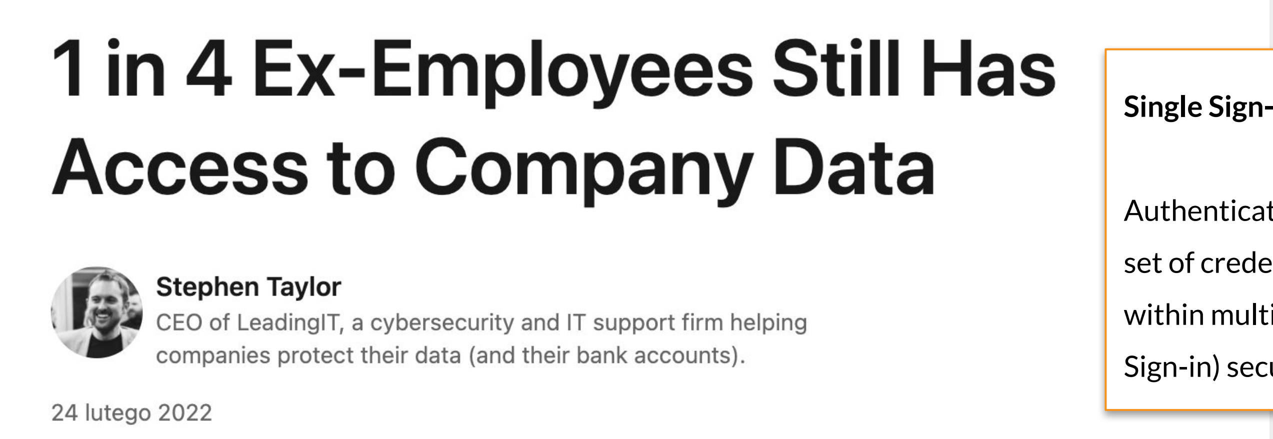
Wed 17 Aug 2022 // 20:19 UTC

Source: theregister.com

# Withdraw access

Remember to **regularly withdraw access to any tools**, from ex-employees or people who simply don't need them, to reduce the attack surface. Consider **using a Single Sign-On** for all your services.

Avoid this mistake 👇



1 in 4 Ex-Employees Still Has Access to Company Data

**Stephen Taylor**
CEO of LeadingIT, a cybersecurity and IT support firm helping companies protect their data (and their bank accounts).

24 lutego 2022

**Single Sign-On**

Authentication method using one set of credentials to authenticate within multiple services (ex. Google Sign-in) securely.

Source: linkedin.com

# chapter 3

# introduction to OWASP

Luckily, resources about the app security aren't some secret knowledge. It's the opposite – there are **lots of materials online**. What's more important – **there are trusted sources to follow**. We encourage you to take a comprehensive look at the materials published by OWASP and the community built around it.

**OWASP (The Open Web Application Security Project)**

OWASP is a non-profit organization whose aim is to improve the security of software. It is the number one security source for software developers and innovators. OWASP shares knowledge through countless open-source projects, docs, and educational events.

# TOP OWASP OPEN-SOURCE RESOURCES TO FOLLOW

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# OWASP TOP 10

10 most popular vulnerabilities to be discovered in web apps. If you want to start from the security basics, this is the place to go. Here you will find the first 10 things you need to do to ensure your app is secure.

check more

# OWASP ASVS

ASVS stands for Applications Security Verification Standards.

OWASP ASVS is a standard checklist by OWASP. It touches on different aspects of web app software development. Follow the list and step-by-step check if your app meets dozens of security standards described by OWASP.

check more

# OWASP MASVS

OWASP MASVS stands for Mobile Application Security Verification Standard.

This is another OWASP standard checklist made exclusively for mobile application security. If you work with mobile, that's another document to read for you.

**check more**

### A Tip for App Owners

Include in your contract with the development team **a requirement to follow security standards levels listed in OWASP ASVS or/and OWASP MASVS.** There are three security levels stated in the document. You can choose the level you want the software agency to meet.

That's a great way to **ensure, at the very beginning, that your software team will prioritize security**. Remember to keep up with updates on these documents because they are being refactored.

# OWASP Cheat Sheet

Top security standards and processes in a nutshell. If you have to fill in some blanks after reading OWASP ASVS and OWASP MASVS, the cheat sheet will come in handy.

check more

Life is too short • AppSec is tough • Cheat!

The Cheat Sheet is developed by security experts. In theory, everyone can contribute. Naturally, all pull requests are verified by project leaders.

The author of this ebook also contributed to the Cheat Sheet. We encourage you to share your knowledge in the future too!

# chapter 4

# automated security testing

A huge part of your security activity should be automated security testing. Discover tools that will help you conduct these tests. **Tools that we present are open source or offer a free plan,** so you can test them and decide if they are worth to be used on daily basis.

Automatic security tools are divided into multiple categories such as:

- SAST (Static Application Security Testing) tools.
- DAST (Dynamic Application Security Testing) tools.
- Dependency tracking tools.
- Secret leak detection tools.

We will present a couple of examples of software for every category. It's up to you to decide which tools suit you best. Our **recommendation is to use all of them**.

# Before you start

For the purpose of learning, **we will show you the examples of vulnerabilities with OWASP Juice Shop**. It is **an app dedicated to discovering security weak spots**. If you want to learn how to find security holes, this app has been developed especially for this purpose. Feel free to use it. Wherever it is not possible to show some vulnerability via Juice Shop, you can use google.com due to its openness to a bug bounty program (only for presentation/learning purposes).

Always use your own resources to test if you are not sure! Have in mind that **it might be illegal to use any tools mentioned in this ebook to exploit vulnerabilities** found on particular websites. Therefore always look for their security policy or check if they have the bug bounty program open.

# STATIC APPLICATION SECURITY TESTING TOOLS

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# SAST tools to consider

SAST tools scan your app’s code and notify you about any vulnerabilities such as SQL injections, outdated algorithms, or strings with possible passwords.

☆ *Also, even with paid tools author tries to embrace free plans and shows you the usage of them to make security scanning more community popular and make security “shift-left” in SDLC. Presenting 3 different tools with 3 different limitations, so you can choose something for you and your team. The author assumes your code is a close source with a basic plan in Github/Gitlab.*

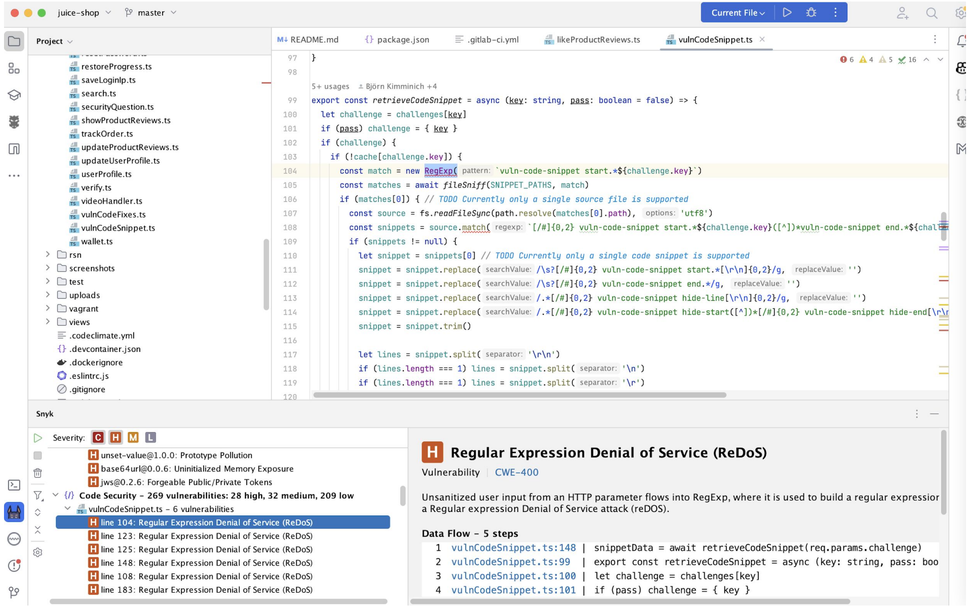
**Static Application Security Testing (SAST)**

Automatic application scanner, analyzing source code, container images, etc. to find security issues.

# Snyk

Snyk is paid SAST tool. The **free version enables ~100 scans a month**. Still, even if you are not considering a paid version (or want to run checks only locally, not on CI/CD server), you should definitely consider it in a format of plugin to your favourite IDE.

**check this tool**



```
 97 }
 98
 99 export const retrieveCodeSnippet = async (key: string, pass: boolean = false) => {
100   let challenge = challenges[key]
101   if (pass) challenge = { key }
102   if (challenge) {
103     if (!cache[challenge.key]) {
104       const match = new RegExp( pattern: `vuln-code-snippet start.*${challenge.key}`)
105       const matches = await fileSniff(SNIPPET_PATHS, match)
106       if (matches[0]) { // TODO Currently only a single source file is supported
107         const source = fs.readFileSync(path.resolve(matches[0].path),  options: 'utf8')
108         const snippets = source.match( regexp: `[/#]{0,2} vuln-code-snippet start.*${challenge.key}([^])*vuln-code-snippet end.*${chal
109         if (snippets != null) {
110           let snippet = snippets[0] // TODO Currently only a single code snippet is supported
111           snippet = snippet.replace( searchValue: /\s?[/#]{0,2} vuln-code-snippet start.*[\r\n]{0,2}/g,  replaceValue: '')
112           snippet = snippet.replace( searchValue: /\s?[/#]{0,2} vuln-code-snippet end.*/g,  replaceValue: '')
113           snippet = snippet.replace( searchValue: /.*[/#]{0,2} vuln-code-snippet hide-line[\r\n]{0,2}/g,  replaceValue: '')
114           snippet = snippet.replace( searchValue: /.*[/#]{0,2} vuln-code-snippet hide-start([^])*[/#]{0,2} vuln-code-snippet hide-end[\r\r
115           snippet = snippet.trim()
116
117           let lines = snippet.split( separator: '\r\n')
118           if (lines.length === 1) lines = snippet.split( separator: '\n')
119           if (lines.length === 1) lines = snippet.split( separator: '\r')
120
```

Snyk

Severity: C H M L

- H unset-value@1.0.0: Prototype Pollution
- H base64url@0.0.6: Uninitialized Memory Exposure
- H jws@0.2.6: Forgeable Public/Private Tokens

{/} **Code Security – 269 vulnerabilities: 28 high, 32 medium, 209 low**

vulnCodeSnippet.ts – 6 vulnerabilities

- H line 104: Regular Expression Denial of Service (ReDoS)
- H line 123: Regular Expression Denial of Service (ReDoS)
- H line 125: Regular Expression Denial of Service (ReDoS)
- H line 148: Regular Expression Denial of Service (ReDoS)
- H line 108: Regular Expression Denial of Service (ReDoS)
- H line 183: Regular Expression Denial of Service (ReDoS)

**H Regular Expression Denial of Service (ReDoS)**

Vulnerability | CWE-400

Unsanitized user input from an HTTP parameter flows into RegExp, where it is used to build a regular expressior
a Regular expression Denial of Service attack (reDOS).

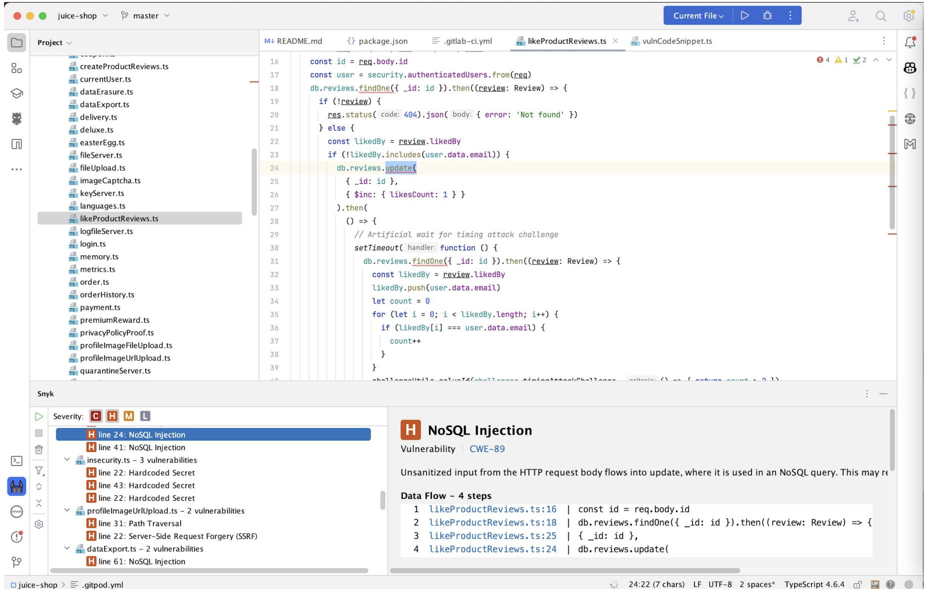
**Data Flow – 5 steps**

```
1  vulnCodeSnippet.ts:148 |  snippetData = await retrieveCodeSnippet(req.params.challenge)
2  vulnCodeSnippet.ts:99  |  export const retrieveCodeSnippet = async (key: string, pass: boo
3  vulnCodeSnippet.ts:100 |  let challenge = challenges[key]
4  vulnCodeSnippet.ts:101 |  if (pass) challenge = { key }
```

*Example of Code Security Scan – ReDos vulnerability found.*

# Snyk

Onboarding is quite easy – **create an account in the Snyk cloud portal**. Then, upon downloading the plugin you have to authenticate yourself in the app. When you are done, voila – you can use Snyk on your codebase.



createProductReviews.ts
currentUser.ts
dataErasure.ts
dataExport.ts
delivery.ts
deluxe.ts
easterEgg.ts
fileServer.ts
fileUpload.ts
imageCaptcha.ts
keyServer.ts
languages.ts
likeProductReviews.ts
logfileServer.ts
login.ts
memory.ts
metrics.ts
order.ts
orderHistory.ts
payment.ts
premiumReward.ts
privacyPolicyProof.ts
profileImageFileUpload.ts
profileImageUrlUpload.ts
quarantineServer.ts

```
16    const id = req.body.id
17    const user = security.authenticatedUsers.from(req)
18    db.reviews.findOne({ _id: id }).then((review: Review) => {
19      if (!review) {
20        res.status( code: 404).json( body: { error: 'Not found' })
21      } else {
22        const likedBy = review.likedBy
23        if (!likedBy.includes(user.data.email)) {
24          db.reviews.update(
25            { _id: id },
26            { $inc: { likesCount: 1 } }
27          ).then(
28            () => {
29              // Artificial wait for timing attack challenge
30              setTimeout( handler: function () {
31                db.reviews.findOne({ _id: id }).then((review: Review) => {
32                  const likedBy = review.likedBy
33                  likedBy.push(user.data.email)
34                  let count = 0
35                  for (let i = 0; i < likedBy.length; i++) {
36                    if (likedBy[i] === user.data.email) {
37                      count++
38                    }
39                  }
```

```
H line 24: NoSQL Injection
H line 41: NoSQL Injection
insecurity.ts – 3 vulnerabilities
  H line 22: Hardcoded Secret
  H line 43: Hardcoded Secret
  H line 22: Hardcoded Secret
profileImageUrlUpload.ts – 2 vulnerabilities
  H line 31: Path Traversal
  H line 22: Server-Side Request Forgery (SSRF)
dataExport.ts – 2 vulnerabilities
  H line 61: NoSQL Injection
```

**H NoSQL Injection**

Vulnerability | CWE-89

Unsanitized input from the HTTP request body flows into update, where it is used in an NoSQL query. This may re

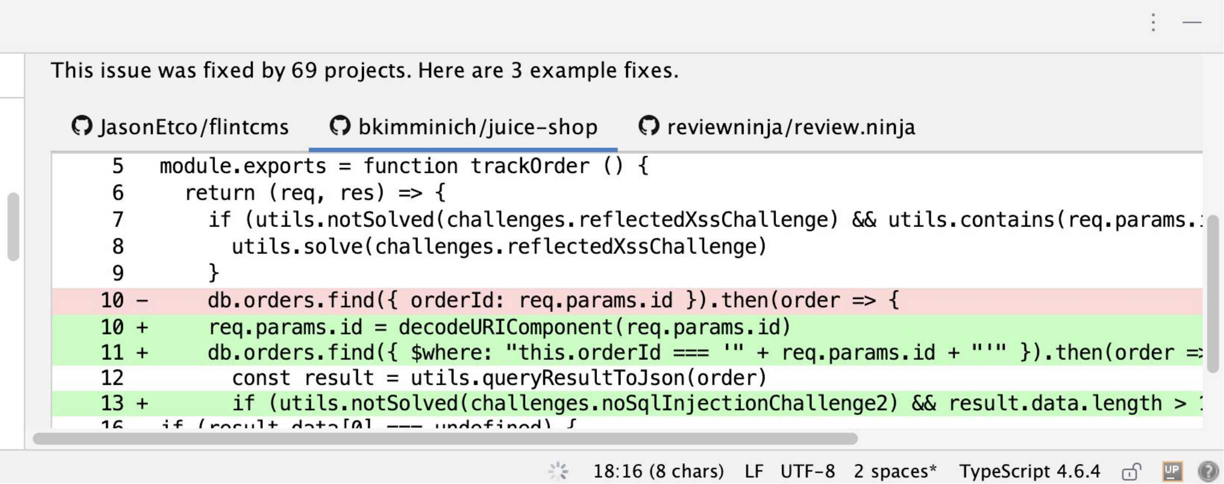
**Data Flow – 4 steps**

```
1  likeProductReviews.ts:16  |  const id = req.body.id
2  likeProductReviews.ts:18  |  db.reviews.findOne({ _id: id }).then((review: Review) => {
3  likeProductReviews.ts:25  |  { _id: id },
4  likeProductReviews.ts:24  |  db.reviews.update(
```

*Example of Code Security Scan – NoSQL vulnerability found.*

# Snyk

When scanning for code security, it gives you the severity of the issue, what is the issue exactly, and how to fix those.



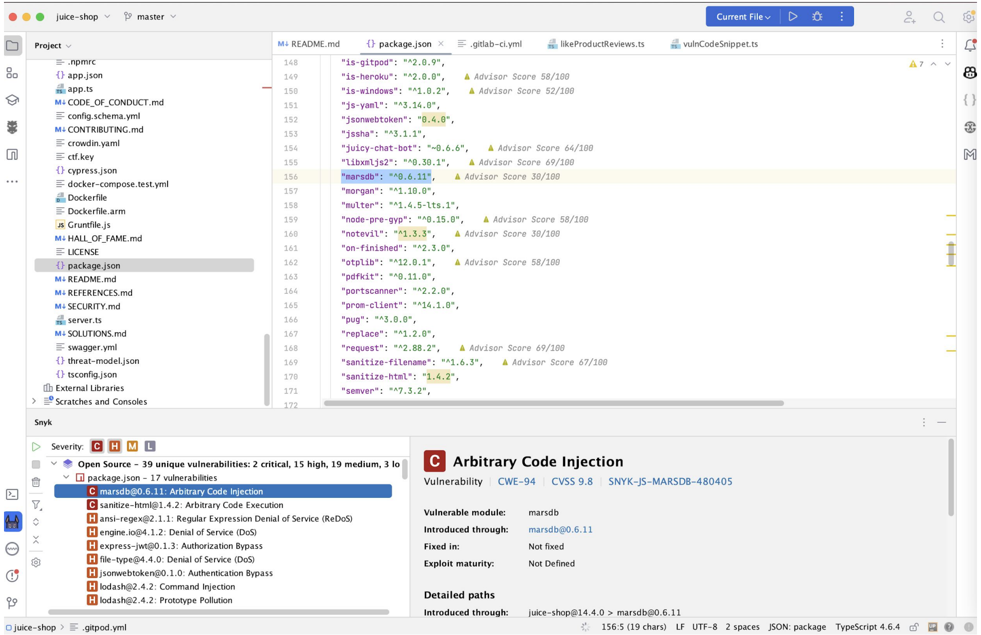
This issue was fixed by 69 projects. Here are 3 example fixes.

```diff
  module.exports = function trackOrder () {
    return (req, res) => {
      if (utils.notSolved(challenges.reflectedXssChallenge) && utils.contains(req.params.
        utils.solve(challenges.reflectedXssChallenge)
      }
-     db.orders.find({ orderId: req.params.id }).then(order => {
+     req.params.id = decodeURIComponent(req.params.id)
+     db.orders.find({ $where: "this.orderId === '" + req.params.id + "'" }).then(order =>
        const result = utils.queryResultToJson(order)
+       if (utils.notSolved(challenges.noSqlInjectionChallenge2) && result.data.length >
  if (result.data[0] === undefined) {
```

Example of Snyk "How to fix" functionality.

# Snyk

It also scans your dependencies and gives you an advisor score of the package taking into consideration security issues, maintenance, etc.



```
"is-gitpod": "^2.0.9",
"is-heroku": "^2.0.0",    Advisor Score 58/100
"is-windows": "^1.0.2",    Advisor Score 52/100
"js-yaml": "^3.14.0",
"jsonwebtoken": "0.4.0",
"jssha": "^3.1.1",
"juicy-chat-bot": "~0.6.6",    Advisor Score 64/100
"libxmljs2": "^0.30.1",    Advisor Score 69/100
"marsdb": "^0.6.11",    Advisor Score 30/100
"morgan": "^1.10.0",
"multer": "^1.4.5-lts.1",
"node-pre-gyp": "^0.15.0",    Advisor Score 58/100
"notevil": "^1.3.3",    Advisor Score 30/100
"on-finished": "^2.3.0",
"otplib": "^12.0.1",    Advisor Score 58/100
"pdfkit": "^0.11.0",
"portscanner": "^2.2.0",
"prom-client": "^14.1.0",
"pug": "^3.0.0",
"replace": "^1.2.0",
"request": "^2.88.2",    Advisor Score 69/100
"sanitize-filename": "^1.6.3",    Advisor Score 67/100
"sanitize-html": "1.4.2",
"semver": "^7.3.2",
```

Severity: C H M L

Open Source – 39 unique vulnerabilities: 2 critical, 15 high, 19 medium, 3 lo

package.json – 17 vulnerabilities

- C marsdb@0.6.11: Arbitrary Code Injection
- C sanitize-html@1.4.2: Arbitrary Code Execution
- H ansi-regex@2.1.1: Regular Expression Denial of Service (ReDoS)
- H engine.io@4.1.2: Denial of Service (DoS)
- H express-jwt@0.1.3: Authorization Bypass
- H file-type@4.4.0: Denial of Service (DoS)
- H jsonwebtoken@0.1.0: Authentication Bypass
- H lodash@2.4.2: Command Injection
- H lodash@2.4.2: Prototype Pollution

C **Arbitrary Code Injection**

Vulnerability | CWE-94 | CVSS 9.8 | SNYK-JS-MARSDB-480405

**Vulnerable module:** marsdb
**Introduced through:** marsdb@0.6.11
**Fixed in:** Not fixed
**Exploit maturity:** Not Defined

**Detailed paths**

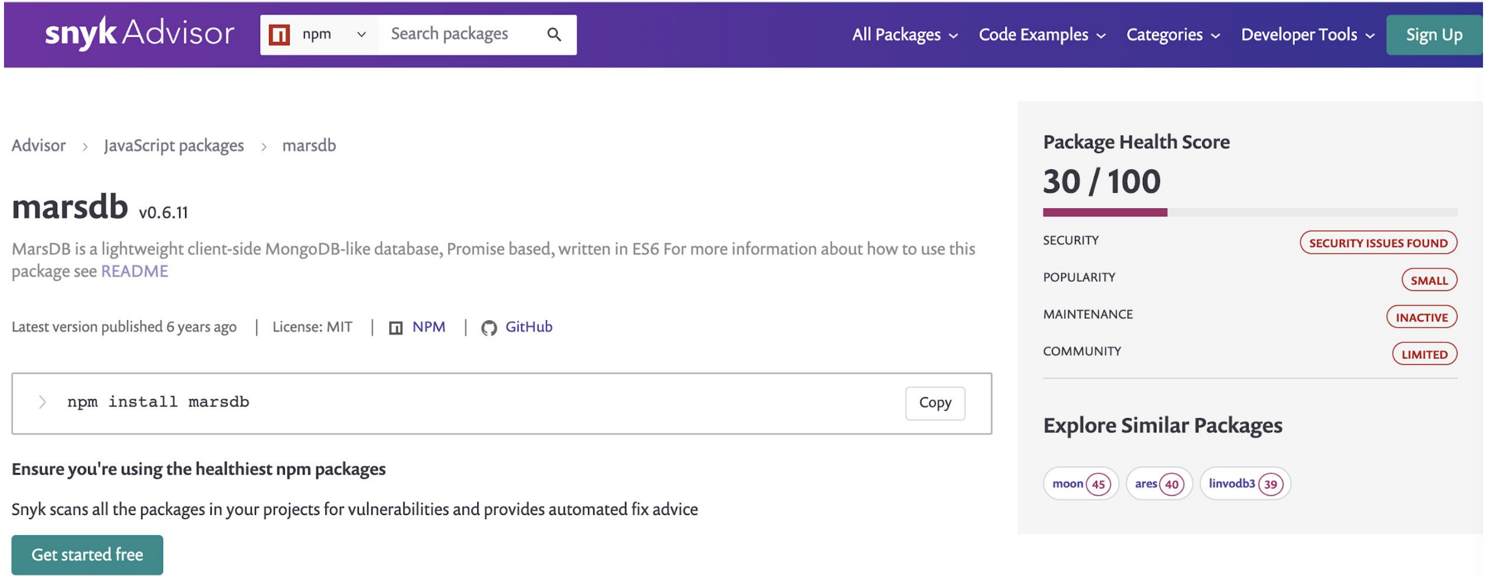
**Introduced through:** juice-shop@14.4.0 > marsdb@0.6.11

juice-shop > .gitpod.yml    156:5 (19 chars)  LF  UTF-8  2 spaces  JSON: package  TypeScript 4.6.4

*Example of Dependency scan – code execution in package marsdb.*

# Snyk

You should definitely **consider at least a free version** to check up on your project for issues that you might not be aware of! You can also easily **scan your CI/CD**, **add new team members** to your project but you have to **bear the limits in mind**.



Advisor › JavaScript packages › marsdb

marsdb v0.6.11

MarsDB is a lightweight client-side MongoDB-like database, Promise based, written in ES6 For more information about how to use this package see README

Latest version published 6 years ago | License: MIT | NPM | GitHub

```
> npm install marsdb
```

Ensure you're using the healthiest npm packages

Snyk scans all the packages in your projects for vulnerabilities and provides automated fix advice

Package Health Score

30 / 100

| | |
|---|---|
| SECURITY | SECURITY ISSUES FOUND |
| POPULARITY | SMALL |
| MAINTENANCE | INACTIVE |
| COMMUNITY | LIMITED |

Explore Similar Packages

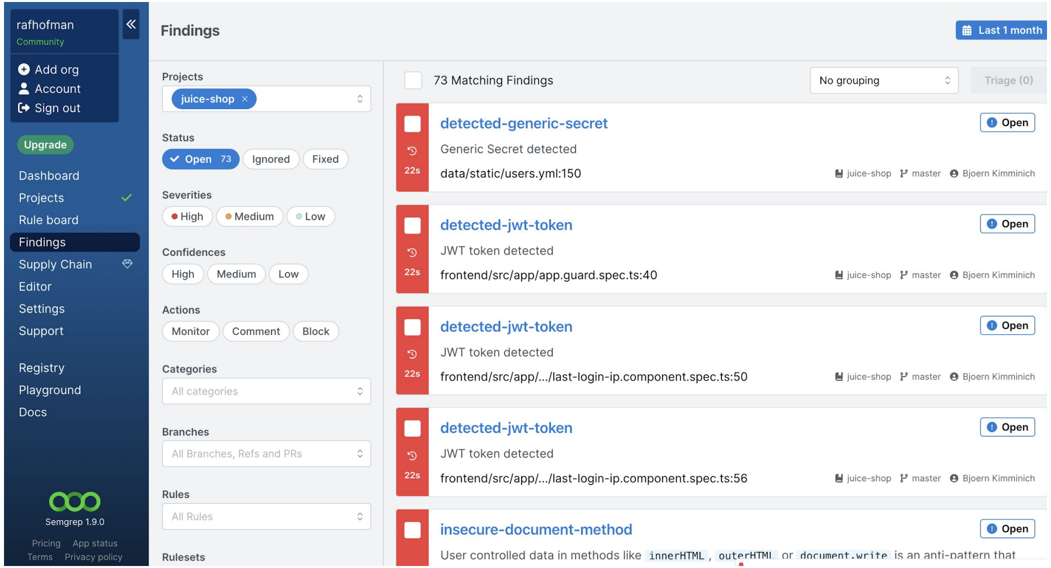
moon 45 | ares 40 | linvodb3 39

*Example Snyk Advisory Score for package marsdb.*

# Semgrep

Semgrep is the next paid SAST tool, but is **available as SaaS for free for teams of up to 20 persons** (based on developers who made commits in the last 30 days).

**check this tool**



Projects: juice-shop ×

Status: ✓ Open 73 | Ignored | Fixed

Severities: ● High | ● Medium | ● Low

73 Matching Findings

**detected-generic-secret** — Open
Generic Secret detected
data/static/users.yml:150 — 22s — juice-shop, master, Bjoern Kimminich

**detected-jwt-token** — Open
JWT token detected
frontend/src/app/app.guard.spec.ts:40 — 22s — juice-shop, master, Bjoern Kimminich

**detected-jwt-token** — Open
JWT token detected
frontend/src/app/.../last-login-ip.component.spec.ts:50 — 22s — juice-shop, master, Bjoern Kimminich

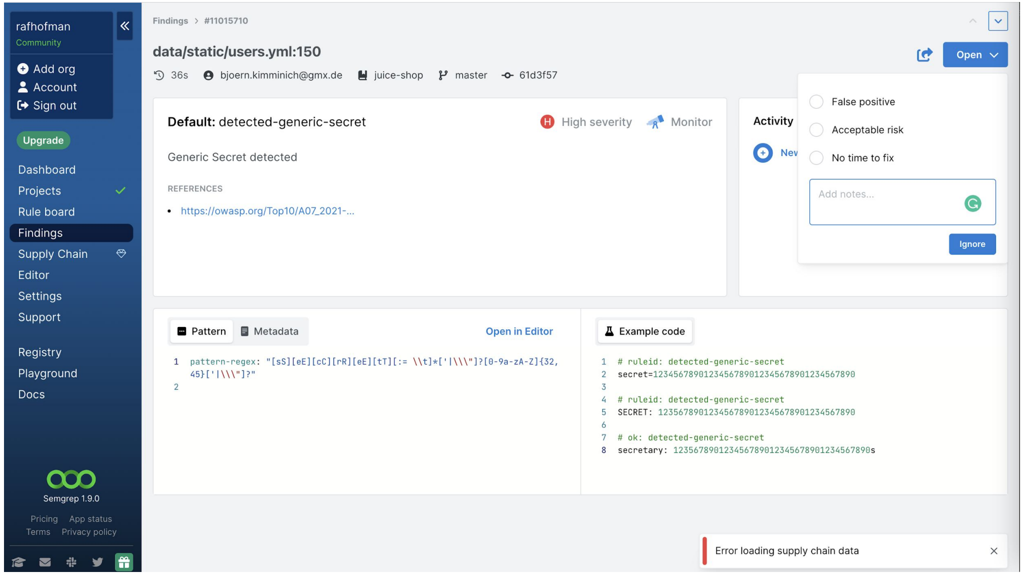
**detected-jwt-token** — Open
JWT token detected
frontend/src/app/.../last-login-ip.component.spec.ts:56 — 22s — juice-shop, master, Bjoern Kimminich

**insecure-document-method** — Open
User controlled data in methods like `innerHTML`, `outerHTML` or `document.write` is an anti-pattern that

*Semgrep Cloud platform - vulnerabilities.*

# Semgrep

Onboarding is also quite easy – you have to **create an account on Semgrep Cloud**. Then, register your scanner locally and scan the code. You also have the possibility to use the scanner with CI/CD pipeline and use the Web dashboard.



data/static/users.yml:150

36s · bjoern.kimminich@gmx.de · juice-shop · master · 61d3f57

**Default:** detected-generic-secret — H High severity — Monitor

Generic Secret detected

REFERENCES

- https://owasp.org/Top10/A07_2021-...

○ False positive
○ Acceptable risk
○ No time to fix

Add notes...

```
pattern-regex: "[sS][eE][cC][rR][eE][tT][:= \\t]*['|\\\"]?[0-9a-zA-Z]{32,45}['|\\\"]?"
```

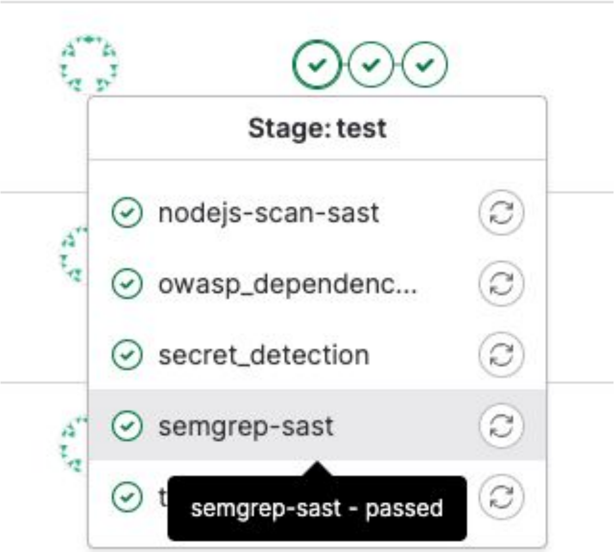
```
# ruleid: detected-generic-secret
secret=12345678901234567890123456789012345678 90

# ruleid: detected-generic-secret
SECRET: 1235678901234567890123456789012345678 90

# ok: detected-generic-secret
secretary: 1235678901234567890123456789012345678 90s
```

Error loading supply chain data

*Semgrep vulnerability details – secret detection.*

# Semgrep

Another option to use Semgrep as Open Source tool (without the limits) is for example built-in **GitLab Security Scanner**, which produces scanning report after job.



Stage: test

- nodejs-scan-sast
- owasp_dependenc...
- secret_detection
- semgrep-sast
- t

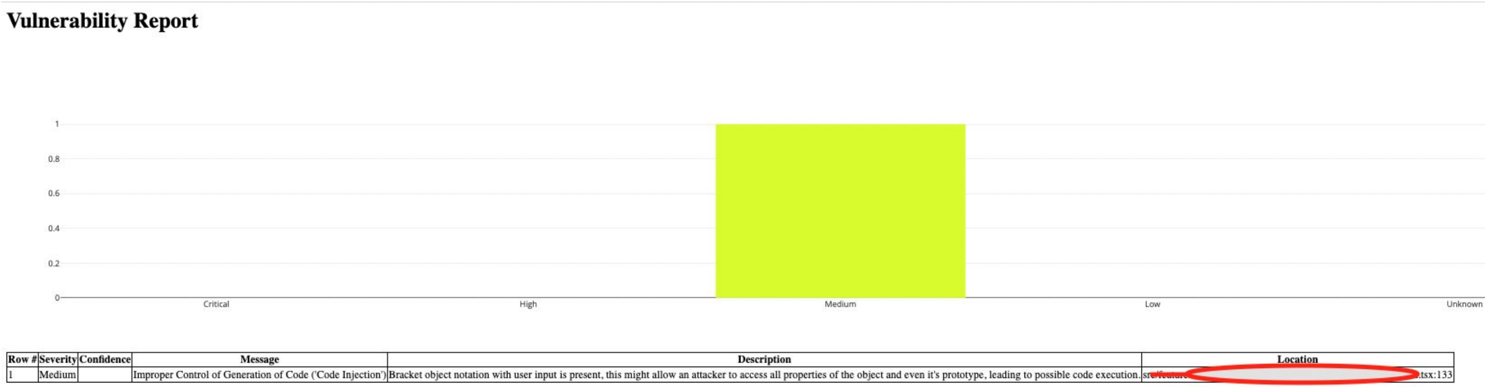
semgrep-sast - passed

*Semgrep open source built in Gitlab pipeline.*

# Semgrep

For using it in free mode you have to **parse the report JSON file** by yourself to create an HTML report.

For built-in Security UI, you will need a Gitlab Ultimate subscription.



**Vulnerability Report**

| Row # | Severity | Confidence | Message | Description | Location |
|---|---|---|---|---|---|
| 1 | Medium | | Improper Control of Generation of Code ('Code Injection') | Bracket object notation with user input is present, this might allow an attacker to access all properties of the object and even it's prototype, leading to possible code execution. | [redacted].tsx:133 |

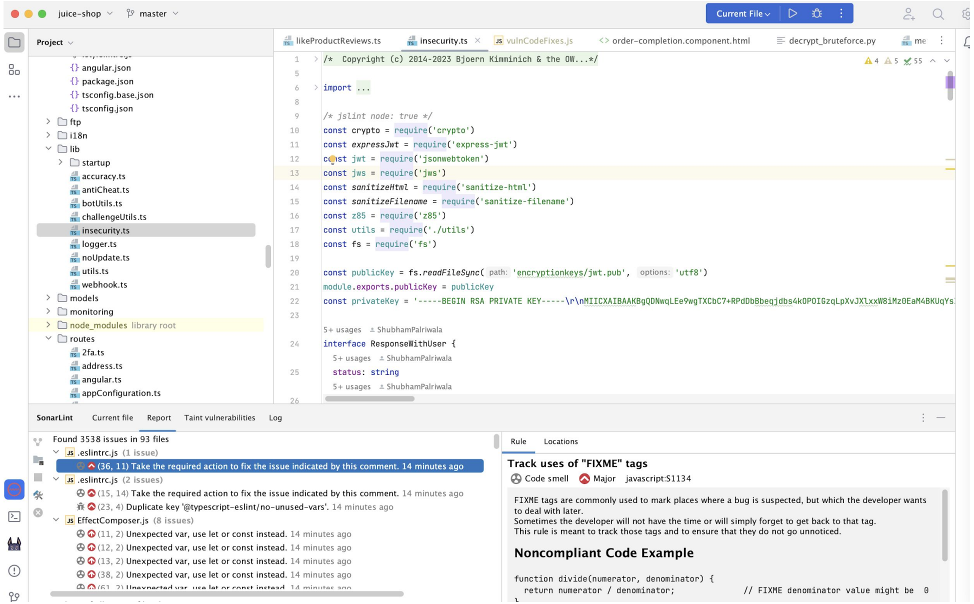
*Semgrep open source report example*

# SonarQube

Sonarqube, similarly to Snyk **has a free and paid version**. Sonarlint is a free IDE extension that will analyze your project similar to Snyk.

The problematic thing about it though is that the **rules set is quite limited when you are not using a local SonarQube server or SonarQube cloud.** So out of the box capabilities are in my opinion less powerful than Snyk.

**check this tool**



```
/*  Copyright (c) 2014-2023 Bjoern Kimminich & the OW...*/

import ...

/* jslint node: true */
const crypto = require('crypto')
const expressJwt = require('express-jwt')
const jwt = require('jsonwebtoken')
const jws = require('jws')
const sanitizeHtml = require('sanitize-html')
const sanitizeFilename = require('sanitize-filename')
const z85 = require('z85')
const utils = require('./utils')
const fs = require('fs')

const publicKey = fs.readFileSync( path: 'encryptionkeys/jwt.pub',  options: 'utf8')
module.exports.publicKey = publicKey
const privateKey = '-----BEGIN RSA PRIVATE KEY-----\r\nMIICXAIBAAKBgQDNwqLEe9wgTXCbC7+RPdDbBbeqjdbs4kOPOIGzqLpXvJXlxxW8iMz0EaM4BKUqYs

5+ usages  ShubhamPalriwala
interface ResponseWithUser {
  5+ usages  ShubhamPalriwala
  status: string
  5+ usages  ShubhamPalriwala
```

```
Found 3538 issues in 93 files
.eslintrc.js (1 issue)
    (36, 11) Take the required action to fix the issue indicated by this comment. 14 minutes ago
.eslintrc.js (2 issues)
    (15, 14) Take the required action to fix the issue indicated by this comment. 14 minutes ago
    (23, 4) Duplicate key '@typescript-eslint/no-unused-vars'. 14 minutes ago
EffectComposer.js (8 issues)
    (11, 2) Unexpected var, use let or const instead. 14 minutes ago
    (12, 2) Unexpected var, use let or const instead. 14 minutes ago
    (13, 2) Unexpected var, use let or const instead. 14 minutes ago
    (38, 2) Unexpected var, use let or const instead. 14 minutes ago
    (61, 2) Unexpected var, use let or const instead. 14 minutes ago
```

**Track uses of "FIXME" tags**

Code smell  Major  javascript:S1134

FIXME tags are commonly used to mark places where a bug is suspected, but which the developer wants to deal with later.
Sometimes the developer will not have the time or will simply forget to get back to that tag.
This rule is meant to track those tags and to ensure that they do not go unnoticed.

**Noncompliant Code Example**

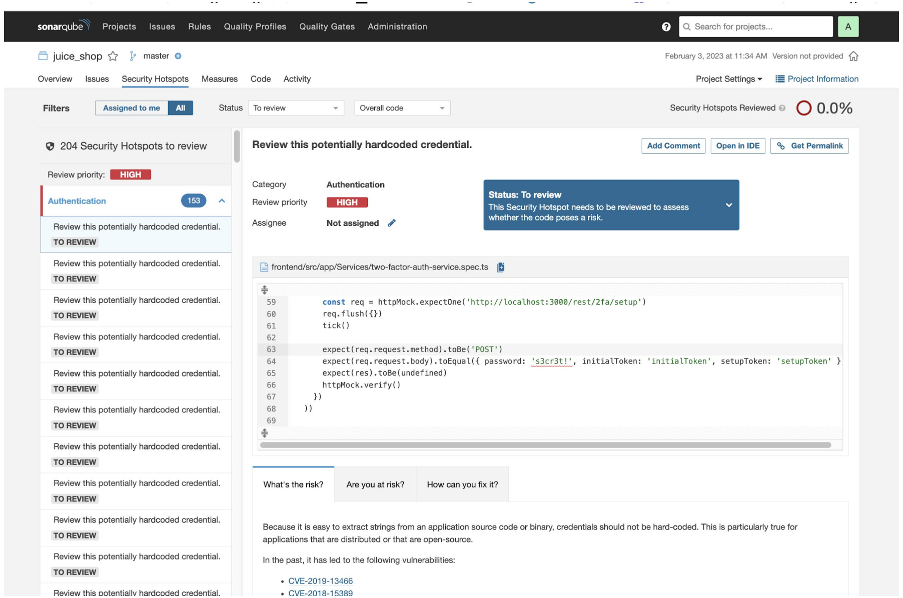
```
function divide(numerator, denominator) {
  return numerator / denominator;              // FIXME denominator value might be  0
}
```

*Sonarlint example findings*

# SonarQube

What you can do though to enjoy free linting with extended rules set is **download the SonarQube Community Edition and run a server locally**. It is more cumbersome to set up than Snyk, but you are not limited to a number of scans.

In my case, it required running the docker image with community edition, logging in with default credentials (then changing them 🙂) and configuring the scanner with the project. As a result, you will have **a nice UI with code quality security issues**:



204 Security Hotspots to review

Review priority: HIGH

Authentication 153

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.
TO REVIEW

Review this potentially hardcoded credential.

**Review this potentially hardcoded credential.**

Category: **Authentication**
Review priority: **HIGH**
Assignee: **Not assigned**

**Status: To review**
This Security Hotspot needs to be reviewed to assess whether the code poses a risk.

frontend/src/app/Services/two-factor-auth-service.spec.ts

```
      const req = httpMock.expectOne('http://localhost:3000/rest/2fa/setup')
      req.flush({})
      tick()

      expect(req.request.method).toBe('POST')
      expect(req.request.body).toEqual({ password: 's3cr3t!', initialToken: 'initialToken', setupToken: 'setupToken' }
      expect(res).toBe(undefined)
      httpMock.verify()
    })
  ))

```

Because it is easy to extract strings from an application source code or binary, credentials should not be hard-coded. This is particularly true for applications that are distributed or that are open-source.

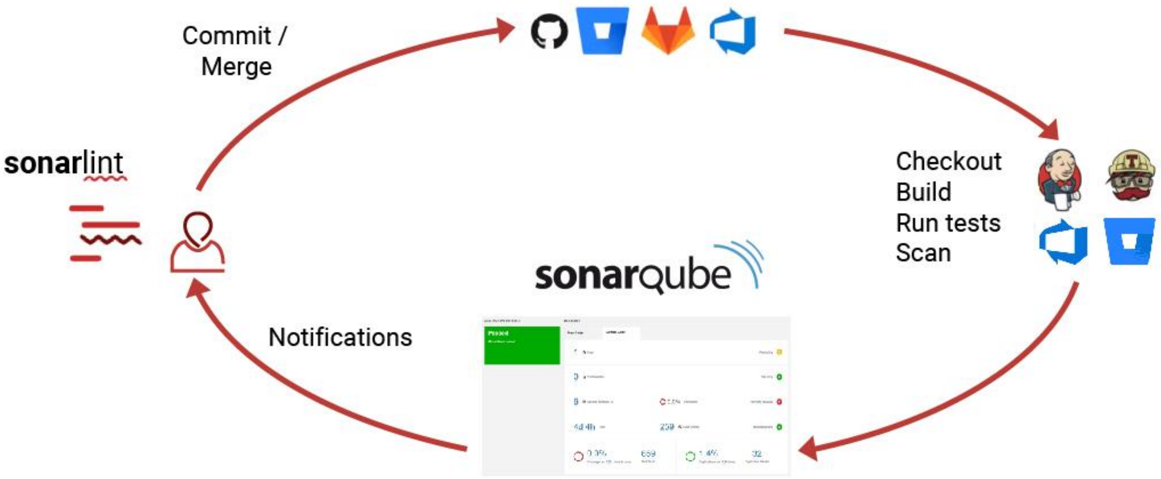
In the past, it has led to the following vulnerabilities:

- CVE-2019-13466
- CVE-2018-15389

*Self hosted SonarQube instance - vulnerability list.*

# SonarQube

What is nice, you can **configure the server for your team**, expose it to them and start to manage the issues together. Also, you can combine it with your CI/CD, adding one step forward to the complication of setup.



*Source: docs.sonarqube.org*

# SAST tools – final thoughts

SAST tools are great solutions out there **especially if you want to scan your code as a developer** (incorporate it in your development process). Adding more users, working on security as a team, making it interactive for pull requests, etc. costs either more effort or more money. Still, **taking into account that such great tools can be used for free it is a bargain** to do so. For security purposes, I would suggest:

- **Snyk** plugin for l**ocal development** due to its multi-purpose and power.
- **Semgrep** App for **CI/CD if your development team is small (up to 20 developers)** and you are able to create an organization via SCM (Github, Gitlab). Semgrep for CI/CD as a standalone app if you do not have that possibility or your team extends 20 developers.
- **SonarQube** for **CI/CD scans** as self-hosted Community Edition **if your team is bigger** (but requires some time to set it up).

# DYNAMIC APPLICATION SECURITY TESTING TOOLS

FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

2023

# DAST tools to consider

DAST tools are used to **test your application from outside**. Often they have the possibility to **proxy the requests, record them, tamper with them, replay them, inject parameters, build a site map** by crawling, etc.

**Dynamic Application Security Testing (DAST)**

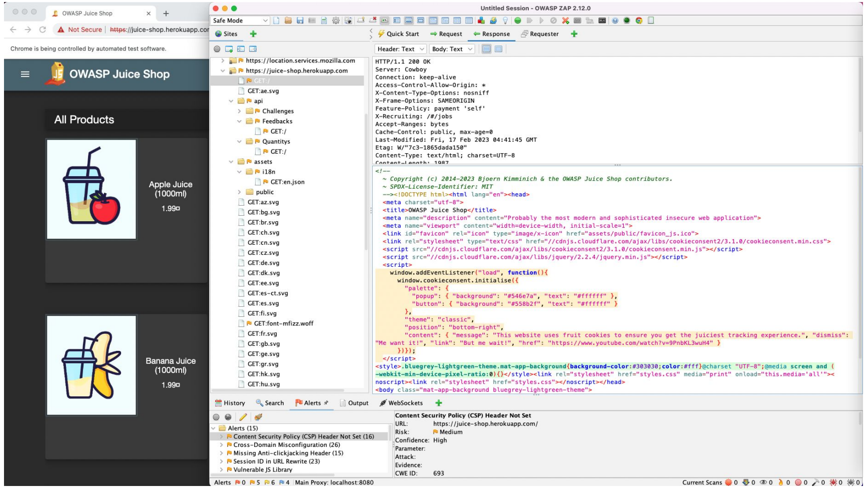
The process of app scanning to analyze security based on running the app (dynamically).

# OWASP ZAP (Zed Attack Proxy)

It is a freeware tool. It gives you the possibility to **run the ZAP proxy with a browser of your choice**. When you start navigating the page, **a site map is created**.

Also, the **automatic scanner for requests is ongoing, so it warns you when a security issue arises** – a security header is missing (for example Strict Transport Security not enforced) or data is exposed.

**check this tool**



```
HTTP/1.1 200 OK
Server: Cowboy
Connection: keep-alive
Access-Control-Allow-Origin: *
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
X-Recruiting: /#/jobs
Accept-Ranges: bytes
Cache-Control: public, max-age=0
Last-Modified: Fri, 17 Feb 2023 04:41:45 GMT
Etag: W/"7c3-1865dada150"
Content-Type: text/html; charset=UTF-8
Content-Length: 1987
```

```
<!--
  ~ Copyright (c) 2014-2023 Bjoern Kimminich & the OWASP Juice Shop contributors.
  ~ SPDX-License-Identifier: MIT
  --><!DOCTYPE html><html lang="en"><head>
  <meta charset="utf-8">
  <title>OWASP Juice Shop</title>
  <meta name="description" content="Probably the most modern and sophisticated insecure web application">
  <meta name="viewport" content="width=device-width, initial-scale=1">
  <link id="favicon" rel="icon" type="image/x-icon" href="assets/public/favicon_js.ico">
  <link rel="stylesheet" type="text/css" href="//cdnjs.cloudflare.com/ajax/libs/cookieconsent2/3.1.0/cookieconsent.min.css">
  <script src="//cdnjs.cloudflare.com/ajax/libs/cookieconsent2/3.1.0/cookieconsent.min.js"></script>
  <script src="//cdnjs.cloudflare.com/ajax/libs/jquery/2.2.4/jquery.min.js"></script>
  <script>
    window.addEventListener("load", function(){
      window.cookieconsent.initialise({
        "palette": {
          "popup": { "background": "#546e7a", "text": "#ffffff" },
          "button": { "background": "#558b2f", "text": "#ffffff" }
        },
        "theme": "classic",
        "position": "bottom-right",
        "content": { "message": "This website uses fruit cookies to ensure you get the juiciest tracking experience.", "dismiss":
"Me want it!", "link": "But me wait!", "href": "https://www.youtube.com/watch?v=9PnbKL3wuH4" }
      })});
  </script>
<style>.bluegrey-lightgreen-theme.mat-app-background{background-color:#303030;color:#fff}@charset "UTF-8";@media screen and (
-webkit-min-device-pixel-ratio:0){}</style><link rel="stylesheet" href="styles.css" media="print" onload="this.media='all'"><
noscript><link rel="stylesheet" href="styles.css"></noscript></head>
<body class="mat-app-background bluegrey-lightgreen-theme">
```

Alerts (15)
- Content Security Policy (CSP) Header Not Set (16)
- Cross-Domain Misconfiguration (26)
- Missing Anti-clickjacking Header (15)
- Session ID in URL Rewrite (23)
- Vulnerable JS Library

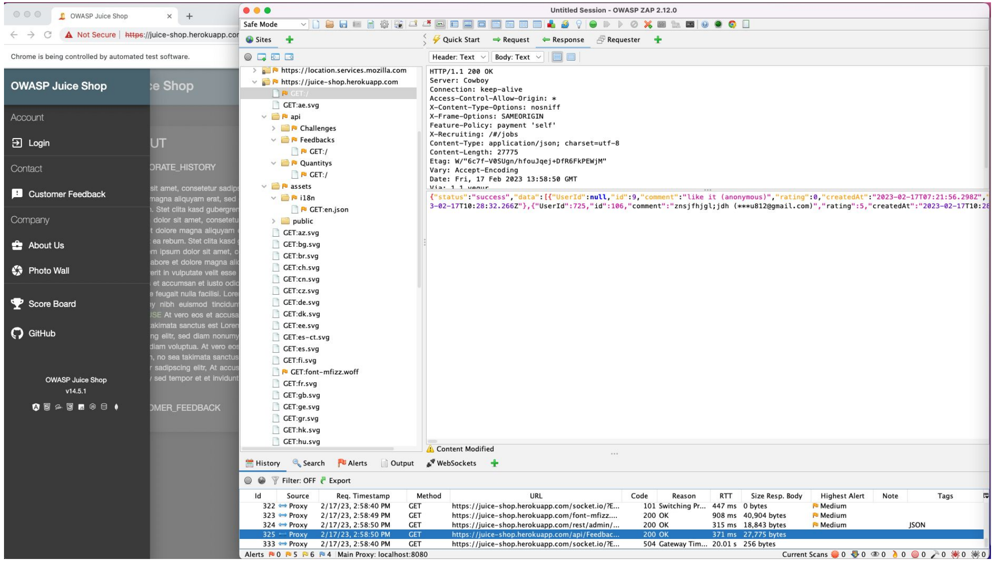
**Content Security Policy (CSP) Header Not Set**
URL: https://juice-shop.herokuapp.com/
Risk: Medium
Confidence: High
Parameter:
Attack:
Evidence:
CWE ID: 693

Alerts 0 5 6 4 Main Proxy: localhost:8080 Current Scans 0 0 0 0 0 0 0 0

*Juice Shop UI - Response, Alerts example.*

# OWASP ZAP (Zed Attack Proxy)

You can either **do the navigation manually or you can use the ZAP Spider tool to build a site map**. ZAP **keeps a history of requests.** You can send given requests to the request editor and re-try it with a changed payload.



```
https://location.services.mozilla.com
https://juice-shop.herokuapp.com
  GET:/
  GET:ae.svg
  api
    Challenges
    Feedbacks
      GET:/
    Quantitys
      GET:/
  assets
    i18n
      GET:en.json
    public
  GET:az.svg
  GET:bg.svg
  GET:br.svg
  GET:ch.svg
  GET:cn.svg
  GET:cz.svg
  GET:de.svg
  GET:dk.svg
  GET:ee.svg
  GET:es-ct.svg
  GET:es.svg
  GET:fi.svg
  GET:font-mfizz.woff
  GET:fr.svg
  GET:gb.svg
  GET:ge.svg
  GET:gr.svg
  GET:hk.svg
  GET:hu.svg
```

```
HTTP/1.1 200 OK
Server: Cowboy
Connection: keep-alive
Access-Control-Allow-Origin: *
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
X-Recruiting: /#/jobs
Content-Type: application/json; charset=utf-8
Content-Length: 27775
Etag: W/"6c7f-V0SUgn/hfouJqej+DfR6FkPEWjM"
Vary: Accept-Encoding
Date: Fri, 17 Feb 2023 13:58:50 GMT
Via: 1.1 vegur
```

{"status":"success","data":[{"UserId":null,"id":9,"comment":"like it (anonymous)","rating":0,"createdAt":"2023-02-17T07:21:56.298Z","
3-02-17T10:28:32.266Z"},{"UserId":725,"id":106,"comment":"znsjfhjgl;jdh (***u812@gmail.com)","rating":5,"createdAt":"2023-02-17T10:28

Content Modified

| Id | Source | Req. Timestamp | Method | URL | Code | Reason | RTT | Size Resp. Body | Highest Alert | Note | Tags |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 322 | Proxy | 2/17/23, 2:58:40 PM | GET | https://juice-shop.herokuapp.com/socket.io/?E... | 101 | Switching Pr... | 447 ms | 0 bytes | Medium | | |
| 323 | Proxy | 2/17/23, 2:58:49 PM | GET | https://juice-shop.herokuapp.com/font-mfizz.... | 200 | OK | 908 ms | 40,904 bytes | Medium | | |
| 324 | Proxy | 2/17/23, 2:58:50 PM | GET | https://juice-shop.herokuapp.com/rest/admin/... | 200 | OK | 315 ms | 18,843 bytes | Medium | | JSON |
| 325 | Proxy | 2/17/23, 2:58:50 PM | GET | https://juice-shop.herokuapp.com/api/Feedbac... | 200 | OK | 371 ms | 27,775 bytes | | | |
| 333 | Proxy | 2/17/23, 2:58:40 PM | GET | https://juice-shop.herokuapp.com/socket.io/?E... | 504 | Gateway Tim... | 20.01 s | 256 bytes | | | |

Alerts 0 5 6 4 Main Proxy: localhost:8080 Current Scans 0 0 0 0 0 0 0 0

*Juice Shop site map.*

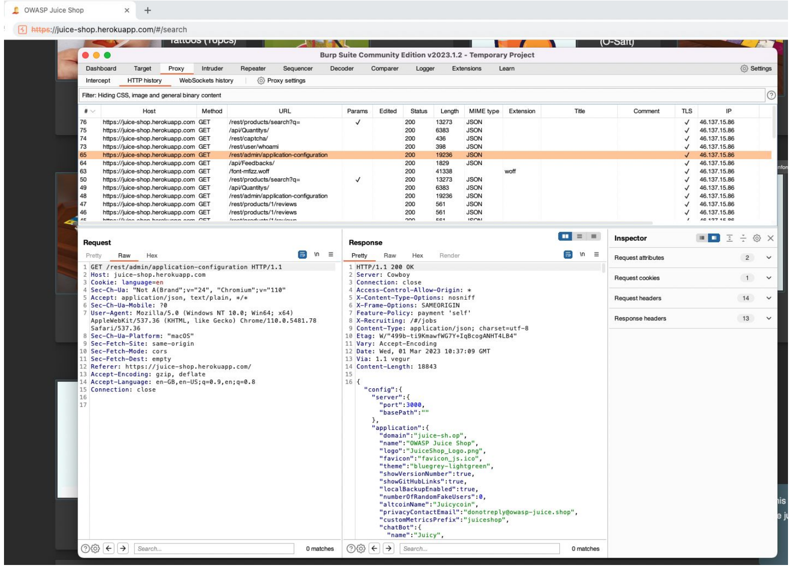
# Burp Suite Community Edition

It is an **alternative to OWASP ZAP**. It has more extensions and better community support. It is also **easier to navigate the app and documentation** (no wonder – this is a paid tool).

However, in Community Edition you are getting support for only some of the features (e.g. Repeater).

To start open a web browser from Burp Community Edition App. Requests should be visible upon HTTP history.

**check this tool**



| # | Host | Method | URL | Params | Edited | Status | Length | MIME type | Extension | Title | Comment | TLS | IP |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 76 | https://juice-shop.herokuapp.com | GET | /rest/products/search?q= | ✓ | | 200 | 13273 | JSON | | | | ✓ | 46.137.15.86 |
| 75 | https://juice-shop.herokuapp.com | GET | /api/Quantitys/ | | | 200 | 6383 | JSON | | | | ✓ | 46.137.15.86 |
| 74 | https://juice-shop.herokuapp.com | GET | /rest/captcha/ | | | 200 | 436 | JSON | | | | ✓ | 46.137.15.86 |
| 73 | https://juice-shop.herokuapp.com | GET | /rest/user/whoami | | | 200 | 398 | JSON | | | | ✓ | 46.137.15.86 |
| 65 | https://juice-shop.herokuapp.com | GET | /rest/admin/application-configuration | | | 200 | 19236 | JSON | | | | ✓ | 46.137.15.86 |
| 64 | https://juice-shop.herokuapp.com | GET | /api/Feedbacks/ | | | 200 | 1829 | JSON | | | | ✓ | 46.137.15.86 |
| 63 | https://juice-shop.herokuapp.com | GET | /font-mfizz.woff | | | 200 | 41338 | | woff | | | ✓ | 46.137.15.86 |
| 50 | https://juice-shop.herokuapp.com | GET | /rest/products/search?q= | ✓ | | 200 | 13273 | JSON | | | | ✓ | 46.137.15.86 |
| 49 | https://juice-shop.herokuapp.com | GET | /api/Quantitys/ | | | 200 | 6383 | JSON | | | | ✓ | 46.137.15.86 |
| 48 | https://juice-shop.herokuapp.com | GET | /rest/admin/application-configuration | | | 200 | 19236 | JSON | | | | ✓ | 46.137.15.86 |
| 47 | https://juice-shop.herokuapp.com | GET | /rest/products/1/reviews | | | 200 | 561 | JSON | | | | ✓ | 46.137.15.86 |
| 46 | https://juice-shop.herokuapp.com | GET | /rest/products/1/reviews | | | 200 | 561 | JSON | | | | ✓ | 46.137.15.86 |

```
GET /rest/admin/application-configuration HTTP/1.1
Host: juice-shop.herokuapp.com
Cookie: language=en
Sec-Ch-Ua: "Not A(Brand";v="24", "Chromium";v="110"
Accept: application/json, text/plain, */*
Sec-Ch-Ua-Mobile: ?0
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64)
AppleWebKit/537.36 (KHTML, like Gecko) Chrome/110.0.5481.78
Safari/537.36
Sec-Ch-Ua-Platform: "macOS"
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: cors
Sec-Fetch-Dest: empty
Referer: https://juice-shop.herokuapp.com/
Accept-Encoding: gzip, deflate
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8
Connection: close
```

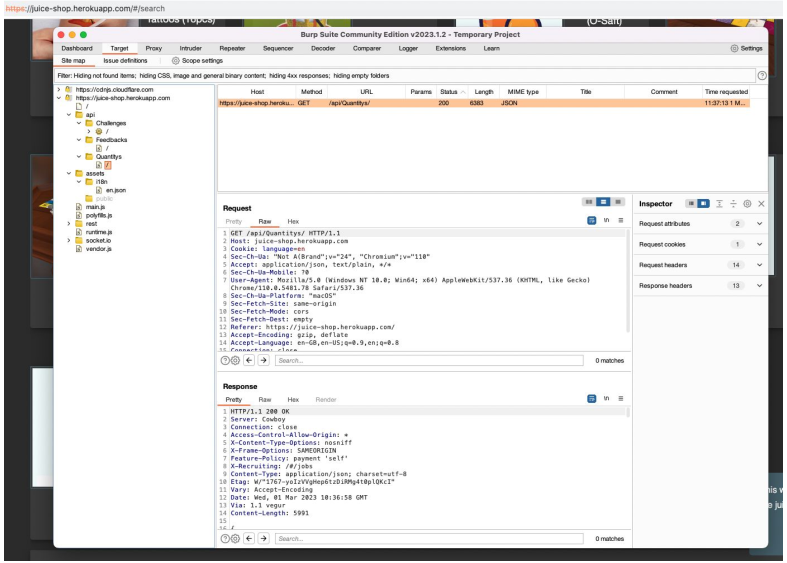
```
HTTP/1.1 200 OK
Server: Cowboy
Connection: close
Access-Control-Allow-Origin: *
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
X-Recruiting: /#/jobs
Content-Type: application/json; charset=utf-8
Etag: W/"499b-ti9KmawfWG7Y+IqBcogANHT4LB4"
Vary: Accept-Encoding
Date: Wed, 01 Mar 2023 10:37:09 GMT
Via: 1.1 vegur
Content-Length: 18843

{
  "config":{
    "server":{
      "port":3000,
      "basePath":""
    },
    "application":{
      "domain":"juice-sh.op",
      "name":"OWASP Juice Shop",
      "logo":"JuiceShop_Logo.png",
      "favicon":"favicon_js.ico",
      "theme":"bluegrey-lightgreen",
      "showVersionNumber":true,
      "showGitHubLinks":true,
      "localBackupEnabled":true,
      "numberOfRandomFakeUsers":0,
      "altcoinName":"Juicycoin",
      "privacyContactEmail":"donotreply@owasp-juice.shop",
      "customMetricsPrefix":"juiceshop",
      "chatBot":{
        "name":"Juicy",
```

*Analyzing HTTP history with Burp Suite.*

# Burp Suite Community Edition

Same as with ZAP by navigating the page you **build a page map that you use later**. You can later send a request to the o Repeater tool, change it and send it again.

Apart from that, in the community edition you also have an option to **inject various payloads (Intruder), check token randomness (Sequencer), decode the data (Decoder) or compare it (Comparer).**



Filter: Hiding not found items; hiding CSS, image and general binary content; hiding 4xx responses; hiding empty folders

| Host | Method | URL | Params | Status | Length | MIME type | Title | Comment | Time requested |
|---|---|---|---|---|---|---|---|---|---|
| https://juice-shop.heroku... | GET | /api/Quantitys/ | | 200 | 6383 | JSON | | | 11:37:13 1 M... |

Request

```
GET /api/Quantitys/ HTTP/1.1
Host: juice-shop.herokuapp.com
Cookie: language=en
Sec-Ch-Ua: "Not A(Brand";v="24", "Chromium";v="110"
Accept: application/json, text/plain, */*
Sec-Ch-Ua-Mobile: ?0
User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko)
Chrome/110.0.5481.78 Safari/537.36
Sec-Ch-Ua-Platform: "macOS"
Sec-Fetch-Site: same-origin
Sec-Fetch-Mode: cors
Sec-Fetch-Dest: empty
Referer: https://juice-shop.herokuapp.com/
Accept-Encoding: gzip, deflate
Accept-Language: en-GB,en-US;q=0.9,en;q=0.8
Connection: close
```

Response

```
HTTP/1.1 200 OK
Server: Cowboy
Connection: close
Access-Control-Allow-Origin: *
X-Content-Type-Options: nosniff
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
X-Recruiting: /#/jobs
Content-Type: application/json; charset=utf-8
Etag: W/"1767-yoIzVVgHep6tzDiRMg4t0plQKcI"
Vary: Accept-Encoding
Date: Wed, 01 Mar 2023 10:36:58 GMT
Via: 1.1 vegur
Content-Length: 5991

{
```

*Juice Shop site map.*

# DAST tools – final thoughts

Which tool you should you choose? My advice is to **play a little bit with OWASP ZAP and Burp Suite and choose one that suits your needs best**. Both of them have support for basic proxing, editing of the requests which might be enough for start.

b.

# DEPENDENCY TRACKING TOOLS TO CONSIDER

FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

2023

# Dependency tracking tools to consider

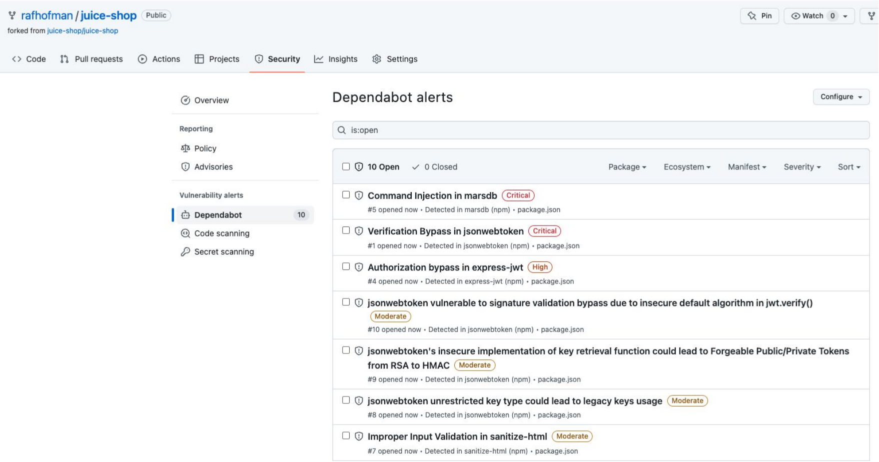
These tools will notify you about any vulnerabilities. The best practice is to **merge them into your pipeline**. Dependency tracking tools **ensure that you have security updates.** They can notify you to install them or even do it automatically for you. If you can’t merge this tool into your pipeline, then **run it regularly**, for example before a commit with Githooks.

# Dependabot

GitHub's tool that sends you **alerts** when your repository uses a vulnerable dependency or malware. Nice thing is that Dependabot is **built in the GitHub repo, available for all repository types**.

Not only do you receive notifications that packages are outdated but dependable can run pull requests. Based on the test results you can decide whether to merge them or not. **Must have for GitHub repos**! It's possible for other providers but you have to do more work to integrate it.

**check this tool**



Dependabot alerts

is:open

□ 10 Open ✓ 0 Closed

□ Command Injection in marsdb Critical
#5 opened now • Detected in marsdb (npm) • package.json

□ Verification Bypass in jsonwebtoken Critical
#1 opened now • Detected in jsonwebtoken (npm) • package.json

□ Authorization bypass in express-jwt High
#4 opened now • Detected in express-jwt (npm) • package.json

□ jsonwebtoken vulnerable to signature validation bypass due to insecure default algorithm in jwt.verify() Moderate
#10 opened now • Detected in jsonwebtoken (npm) • package.json

□ jsonwebtoken's insecure implementation of key retrieval function could lead to Forgeable Public/Private Tokens from RSA to HMAC Moderate
#9 opened now • Detected in jsonwebtoken (npm) • package.json

□ jsonwebtoken unrestricted key type could lead to legacy keys usage Moderate
#8 opened now • Detected in jsonwebtoken (npm) • package.json

□ Improper Input Validation in sanitize-html Moderate
#7 opened now • Detected in sanitize-html (npm) • package.json

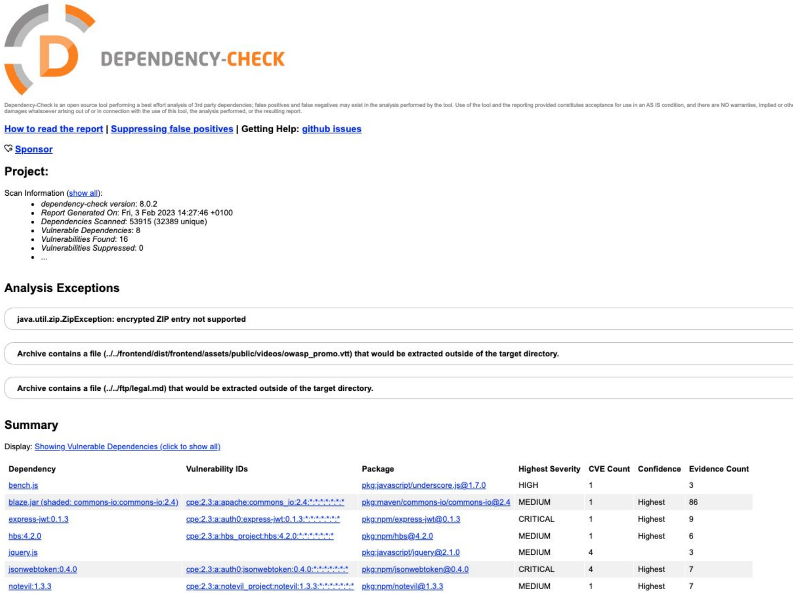
*Outdated dependencies list by dependabot.*

# OWASP Dependency Check

It is an open source and free software, more platform agnostic than Dependabot. You can **easily incorporate it in your CI/CD pipeline** and generate an **HTML report** about dependencies afterward.

**It checks and downloads the whole NVD vulnerabilities database**, so you have to configure it correctly (otherwise it will be time-consuming work). You can also run it on a local development machine.

check this tool



DEPENDENCY-CHECK

Dependency-Check is an open source tool performing a best effort analysis of 3rd party dependencies; false positives and false negatives may exist in the analysis performed by the tool. Use of the tool and the reporting provided constitutes acceptance for use in an AS IS condition, and there are NO warranties, implied or othe
damages whatsoever arising out of or in connection with the use of this tool, the analysis performed, or the resulting report.

How to read the report | Suppressing false positives | Getting Help: github issues

Sponsor

**Project:**

Scan Information (show all):

- *dependency-check version*: 8.0.2
- *Report Generated On*: Fri, 3 Feb 2023 14:27:46 +0100
- *Dependencies Scanned*: 53915 (32389 unique)
- *Vulnerable Dependencies*: 8
- *Vulnerabilities Found*: 16
- *Vulnerabilities Suppressed*: 0
- ...

**Analysis Exceptions**

**java.util.zip.ZipException: encrypted ZIP entry not supported**

**Archive contains a file (../../frontend/dist/frontend/assets/public/videos/owasp_promo.vtt) that would be extracted outside of the target directory.**

**Archive contains a file (../../ftp/legal.md) that would be extracted outside of the target directory.**

**Summary**

Display: Showing Vulnerable Dependencies (click to show all)

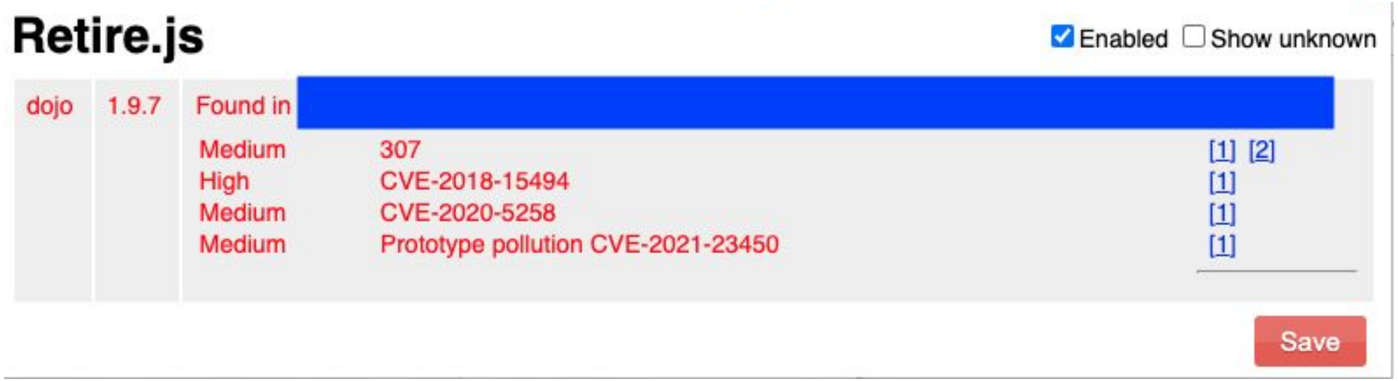
| Dependency | Vulnerability IDs | Package | Highest Severity | CVE Count | Confidence | Evidence Count |
|---|---|---|---|---|---|---|
| bench.js | | pkg:javascript/underscore.js@1.7.0 | HIGH | 1 | | 3 |
| blaze.jar (shaded: commons-io:commons-io:2.4) | cpe:2.3:a:apache:commons_io:2.4:*:*:*:*:*:*:* | pkg:maven/commons-io/commons-io@2.4 | MEDIUM | 1 | Highest | 86 |
| express-jwt:0.1.3 | cpe:2.3:a:auth0:express-jwt:0.1.3:*:*:*:*:*:*:* | pkg:npm/express-jwt@0.1.3 | CRITICAL | 1 | Highest | 9 |
| hbs:4.2.0 | cpe:2.3:a:hbs_project:hbs:4.2.0:*:*:*:*:*:*:* | pkg:npm/hbs@4.2.0 | MEDIUM | 1 | Highest | 6 |
| jquery.js | | pkg:javascript/jquery@2.1.0 | MEDIUM | 4 | | 3 |
| jsonwebtoken:0.4.0 | cpe:2.3:a:auth0:jsonwebtoken:0.4.0:*:*:*:*:*:*:* | pkg:npm/jsonwebtoken@0.4.0 | CRITICAL | 4 | Highest | 7 |
| notevil:1.3.3 | cpe:2.3:a:notevil_project:notevil:1.3.3:*:*:*:*:*:*:* | pkg:npm/notevil@1.3.3 | MEDIUM | 1 | Highest | 7 |

*Outdated dependencies list by OWASP dependency check.*

# Retire.js

Dependency check tool for client JS code. You can install a Chrome extension to analyze the code of visited websites.

**check this tool**



## Retire.js

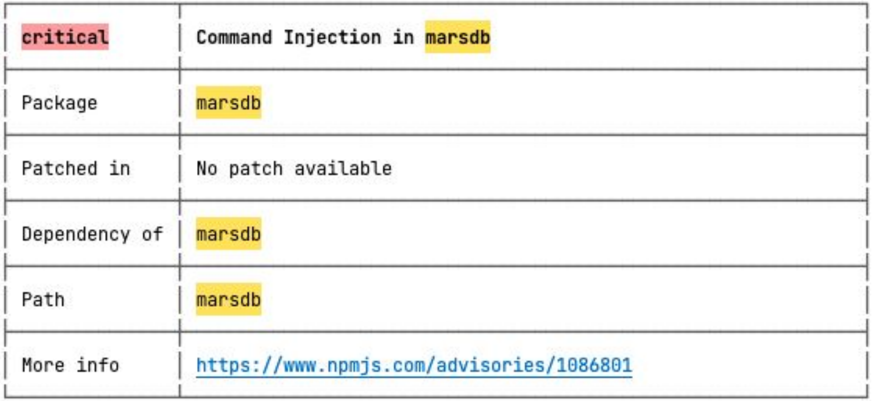
☑ Enabled ☐ Show unknown

| dojo | 1.9.7 | Found in | | |
|---|---|---|---|---|
| | | Medium | 307 | [1] [2] |
| | | High | CVE-2018-15494 | [1] |
| | | Medium | CVE-2020-5258 | [1] |
| | | Medium | Prototype pollution CVE-2021-23450 | [1] |

*Outdated dependencies on example site with Retire.js extension.*

# Built-in tools

OWASP dependency check is a great tool. Yet, as mentioned, it might be time-consuming to use. **Another option is to use built-in tools in your package manager**. The scan will be targeted on one technology only. However, you don't have to worry about download times. For example, an npm-audit or a yarn audit tool can be used for the JS stack.



| | |
|---|---|
| critical | Command Injection in marsdb |
| Package | marsdb |
| Patched in | No patch available |
| Dependency of | marsdb |
| Path | marsdb |
| More info | https://www.npmjs.com/advisories/1086801 |

*Outdated dependencies list by yarn audit.*

# SECRET LEAK DETECTION TOOLS

FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

2023

# Secret leak detection tools to consider

These types of automation tools will help you discover any secret leaks. Types of secrets are:

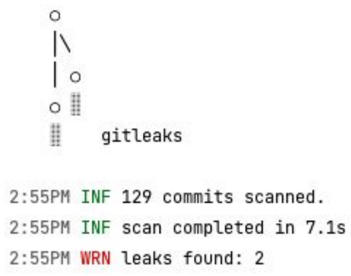
- Database password,
- JWT key,
- API keys (e.g. AWS Access Key ID & Secret, Google Maps, Twilio Account_sid and Auth Token).

**All of presented tools are free or offer a free plan**. You will be able to test tool’s potential to decide whether you want to upgrade a plan or not. We won’t be surprised if you find these tools essential at your work. 🙂

# Gitleaks

It can be installed **locally or on CI/CD server**. In all Gitlab plans available **for free as Secret Leaks scanning tool**. You can also configure it as a **pre-commit hook.**

**check this tool**



```
    ○
    │╲
    │ ○
    ○ ░
    ░    gitleaks

2:55PM INF 129 commits scanned.
2:55PM INF scan completed in 7.1s
2:55PM WRN leaks found: 2
```

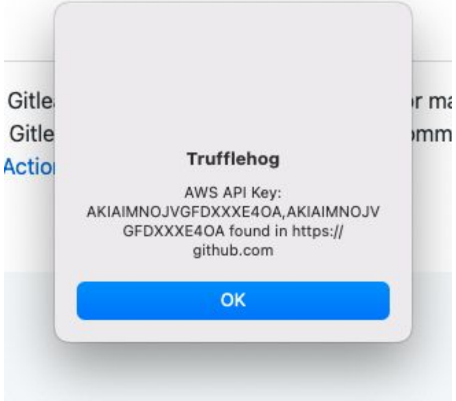
*Secret found on page by Gitleaks.*

# TruffleHog

It is another option to consider after Gitleaks. It is slightly more sophisticated but on the other hand, gives you more options to **customize output/view the leak**. For example, there is a possibility to verify with an e.g. AWS provider that those are indeed correct secrets leaked from their site (TruffleHog is calling GetCallerIdentityApi).

What is interesting is **TruffleHog Chrome Extension which shows secret leaks on websites**. It can scan .git and .env leaked files.

**check this tool**



Trufflehog

AWS API Key: AKIAIMNOJVGFDXXXE4OA,AKIAIMNOJVGFDXXXE4OA found in https://github.com

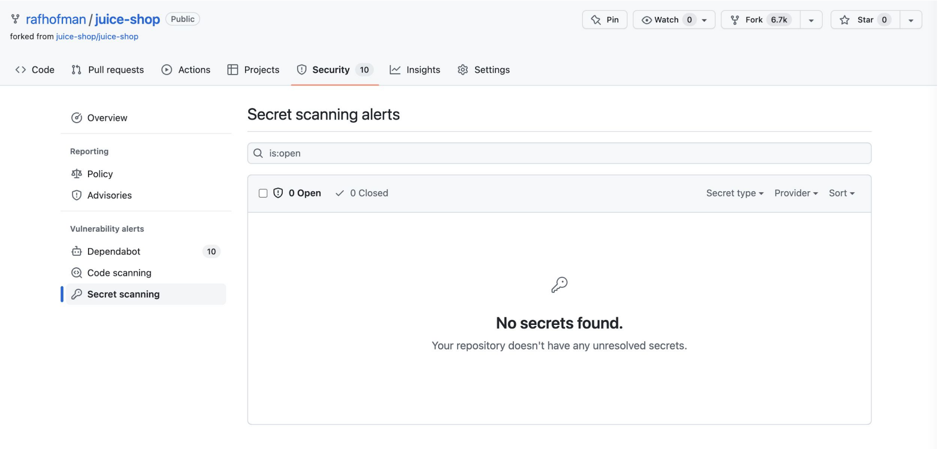
*Secrets found by TruffleHog extension – page had printed AWS secrets.*

# GitHub Secret Scanning

Secret scanning alerts that runs automatically to notify you about secret leads on GitHub.com. Recently available for all repositories.

If you use GitHub, make sure you enabled this feature.

**check this tool**



Secret scanning alerts

No secrets found.

Your repository doesn't have any unresolved secrets.

*Secret scanning alerts.*

# chapter 5

# infrastructure reconnaissance

Applications don’t exist in a vacuum. Behind every solution is the infrastructure. Recently software developers are becoming more and more responsible for IT operations. A part of that is securing your infrastructure. We gathered **tools that are useful for infrastructure reconnaissance**.

These are publicly accessible and free tools and **everyone can check your infrastructure with them**. So make sure that they don’t show any vulnerabilities of your app **before someone else discovers them**.

# INFRASTRUCTURE RECONNAISSANCE TOOLS

FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

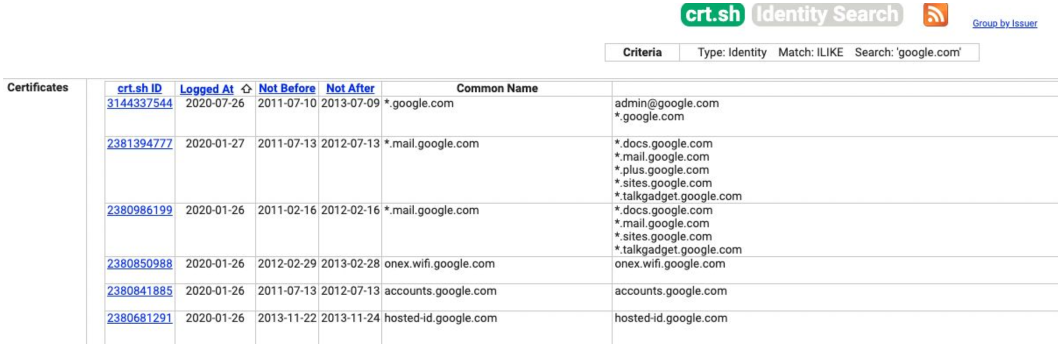
2023

# crt.sh

A tool for subdomains reconnaissance. Here you can **insert your domain to see all subdomains**. Crt.sh will make you quickly realize that **your staging domains aren't something others cannot find**. Confirm that all your environments and all your tools have **strong credentials or are not accessible without VPN**.

Another thing to note is that depending on your domain naming, one can know what you are working on and with whom. If that is a secret, keep it to yourself.

check this tool



| Criteria | Type: Identity Match: ILIKE Search: 'google.com' |
|---|---|

Certificates

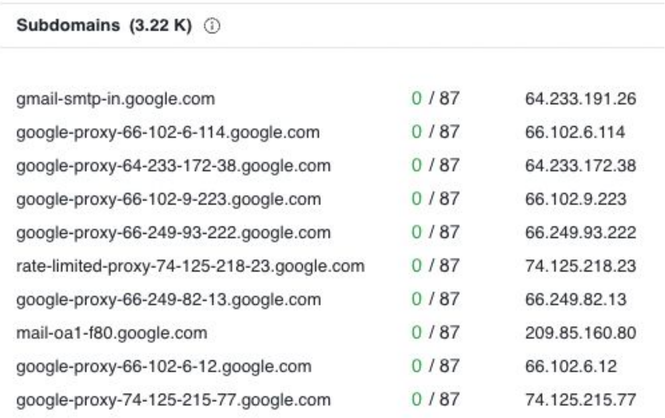
| crt.sh ID | Logged At ⇧ | Not Before | Not After | Common Name | |
|---|---|---|---|---|---|
| 3144337544 | 2020-07-26 | 2011-07-10 | 2013-07-09 | *.google.com | admin@google.com<br>*.google.com |
| 2381394777 | 2020-01-27 | 2011-07-13 | 2012-07-13 | *.mail.google.com | *.docs.google.com<br>*.mail.google.com<br>*.plus.google.com<br>*.sites.google.com<br>*.talkgadget.google.com |
| 2380986199 | 2020-01-26 | 2011-02-16 | 2012-02-16 | *.mail.google.com | *.docs.google.com<br>*.mail.google.com<br>*.sites.google.com<br>*.talkgadget.google.com |
| 2380850988 | 2020-01-26 | 2012-02-29 | 2013-02-28 | onex.wifi.google.com | onex.wifi.google.com |
| 2380841885 | 2020-01-26 | 2011-07-13 | 2012-07-13 | accounts.google.com | accounts.google.com |
| 2380681291 | 2020-01-26 | 2013-11-22 | 2013-11-24 | hosted-id.google.com | hosted-id.google.com |

*List of possible subdomains registered for google.com.*

# VirusTotal

It's a subdomain reconnaissance tool too. **Compared to crt.sh it also shows domain IPs.**

**check this tool**



**Subdomains (3.22 K)** ⓘ

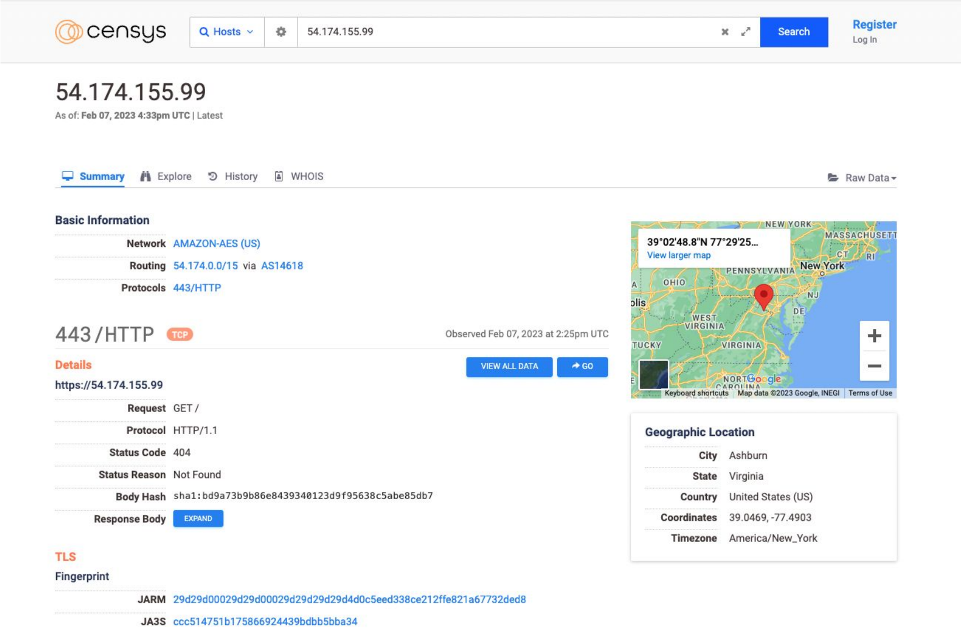
| | | |
|---|---|---|
| gmail-smtp-in.google.com | 0 / 87 | 64.233.191.26 |
| google-proxy-66-102-6-114.google.com | 0 / 87 | 66.102.6.114 |
| google-proxy-64-233-172-38.google.com | 0 / 87 | 64.233.172.38 |
| google-proxy-66-102-9-223.google.com | 0 / 87 | 66.102.9.223 |
| google-proxy-66-249-93-222.google.com | 0 / 87 | 66.249.93.222 |
| rate-limited-proxy-74-125-218-23.google.com | 0 / 87 | 74.125.218.23 |
| google-proxy-66-249-82-13.google.com | 0 / 87 | 66.249.82.13 |
| mail-oa1-f80.google.com | 0 / 87 | 209.85.160.80 |
| google-proxy-66-102-6-12.google.com | 0 / 87 | 66.102.6.12 |
| google-proxy-74-125-215-77.google.com | 0 / 87 | 74.125.215.77 |

*List of possible subdomains with IPs registered for google.com.*

# Censys

It's a search engine that you can use, for example, to **scan any IP address and check open ports, software versions, location of the servers**, etc. It's highly recommended to scan your site to see if you do not have any unnecessary open ports or outdated software versions that do have CVE.

**check this tool**



54.174.155.99

54.174.155.99

As of: Feb 07, 2023 4:33pm UTC | Latest

Basic Information

| | |
|---|---|
| Network | AMAZON-AES (US) |
| Routing | 54.174.0.0/15 via AS14618 |
| Protocols | 443/HTTP |

443 /HTTP TCP

Observed Feb 07, 2023 at 2:25pm UTC

Details

https://54.174.155.99

| | |
|---|---|
| Request | GET / |
| Protocol | HTTP/1.1 |
| Status Code | 404 |
| Status Reason | Not Found |
| Body Hash | sha1:bd9a73b9b86e8439340123d9f95638c5abe85db7 |
| Response Body | EXPAND |

TLS

Fingerprint

| | |
|---|---|
| JARM | 29d29d00029d29d00029d29d29d29d4d0c5eed338ce212ffe821a67732ded8 |
| JA3S | ccc514751b175866924439bdbb5bba34 |

Geographic Location

| | |
|---|---|
| City | Ashburn |
| State | Virginia |
| Country | United States (US) |
| Coordinates | 39.0469, -77.4903 |
| Timezone | America/New_York |

*Censys result of IP analysis of Juice Shop app example hosting server.*

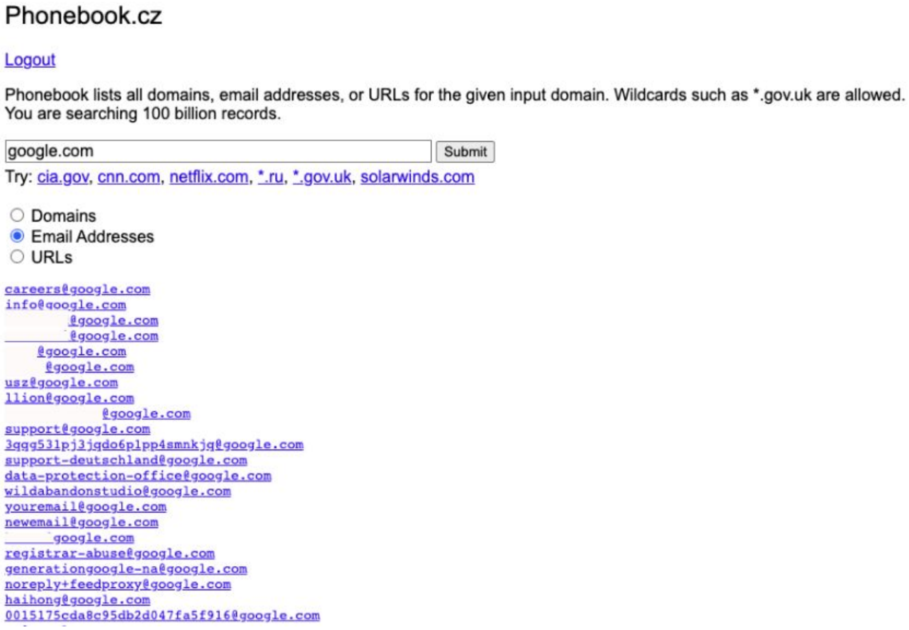
# Phonebook.cz

Apart from listing all domains, phonebook.cz also **shows email addresses from the scanned domains.** It's a great way to check what email addresses could be found on your website and remove the ones you don't want to be public.

check this tool

**A Tip for App Owners**

Find out if any unnecessary emails are listed in phonebook.cz and delete them from your app's code. This might reduce the risk of phishing attacks against your employees.



Phonebook.cz

Logout

Phonebook lists all domains, email addresses, or URLs for the given input domain. Wildcards such as *.gov.uk are allowed.
You are searching 100 billion records.

google.com  Submit

Try: cia.gov, cnn.com, netflix.com, *.ru, *.gov.uk, solarwinds.com

○ Domains
● Email Addresses
○ URLs

```
careers@google.com
info@google.com
        @google.com
        @google.com
    @google.com
     @google.com
usz@google.com
llion@google.com
            @google.com
support@google.com
3qqg531pj3jqdo6plpp4smnkjq@google.com
support-deutschland@google.com
data-protection-office@google.com
wildabandonstudio@google.com
youremail@google.com
newemail@google.com
      google.com
registrar-abuse@google.com
generationgoogle-na@google.com
noreply+feedproxy@google.com
haihong@google.com
0015175cda8c95db2d047fa5f916@google.com
```

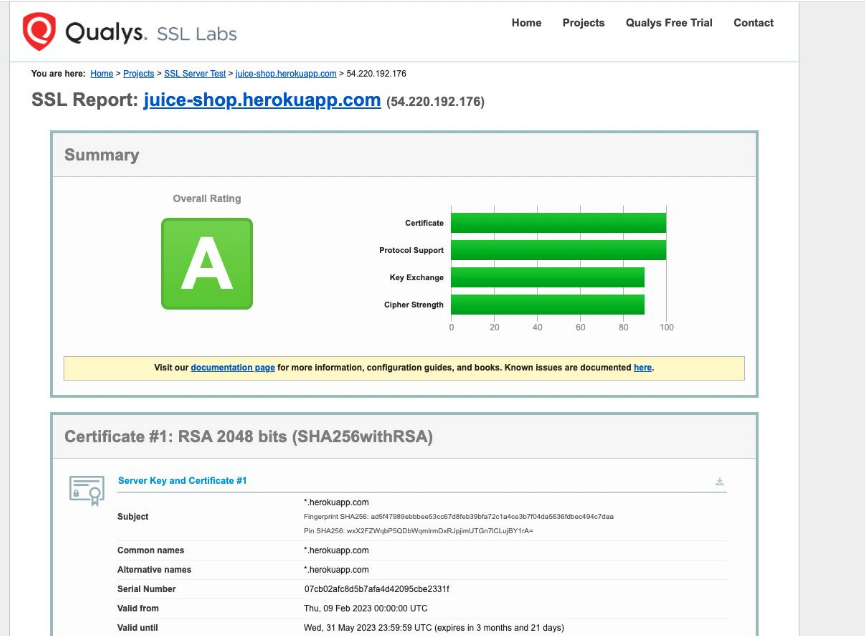
*List of email addresses found on google.com domain.*

# SSL Labs (TLS check)

On this website you can **analyze the configuration of your SSL certificate**. Here you can easily check out if your server certificate is trusted, what TLS protocols are supported, and what might be the security issues.

Yet again, everyone can check it so be certain that you have all certificate issues covered.

**check this tool**



You are here: Home > Projects > SSL Server Test > juice-shop.herokuapp.com > 54.220.192.176

SSL Report: juice-shop.herokuapp.com (54.220.192.176)

Summary

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

Certificate #1: RSA 2048 bits (SHA256withRSA)

Server Key and Certificate #1

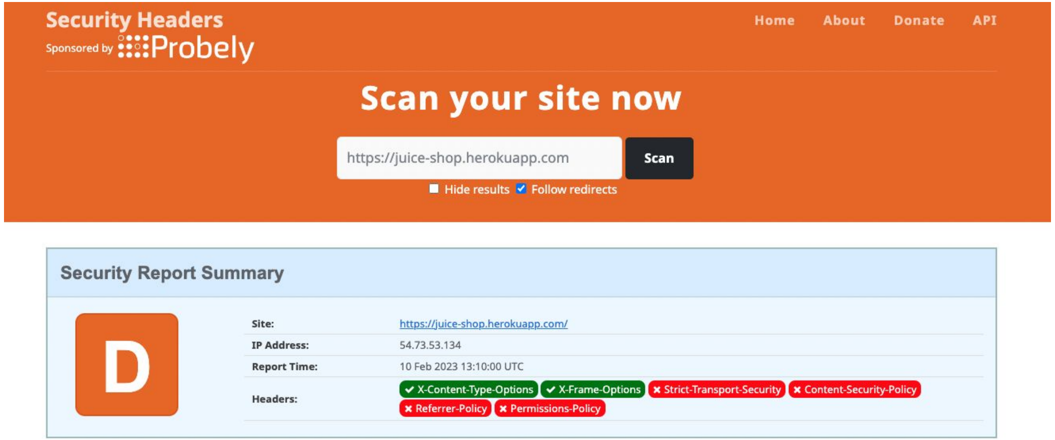
| | |
|---|---|
| Subject | *.herokuapp.com<br>Fingerprint SHA256: ad5f47989ebbbee53cc67d8feb39bfa72c1a4ce3b7f04da5636fdbec494c7daa<br>Pin SHA256: wxX2FZWqbP5QDbWqmlrmDxRJpjimUTGn7lCLujBY1rA= |
| Common names | *.herokuapp.com |
| Alternative names | *.herokuapp.com |
| Serial Number | 07cb02afc8d5b7afa4d42095cbe2331f |
| Valid from | Thu, 09 Feb 2023 00:00:00 UTC |
| Valid until | Wed, 31 May 2023 23:59:59 UTC (expires in 3 months and 21 days) |

*SSL score for Juice Shop example page hosting.*

# Security Headers

This tool will help you check if your **web app has the correct security headers configured.** Scan your page and then read more information about each header on the site.

check this tool



https://juice-shop.herokuapp.com

☐ Hide results ☑ Follow redirects

Security Report Summary

D

| | |
|---|---|
| Site: | https://juice-shop.herokuapp.com/ |
| IP Address: | 54.73.53.134 |
| Report Time: | 10 Feb 2023 13:10:00 UTC |
| Headers: | ✓ X-Content-Type-Options ✓ X-Frame-Options ✗ Strict-Transport-Security ✗ Content-Security-Policy ✗ Referrer-Policy ✗ Permissions-Policy |

*Security Headers score for Juice Shop example page hosting.*

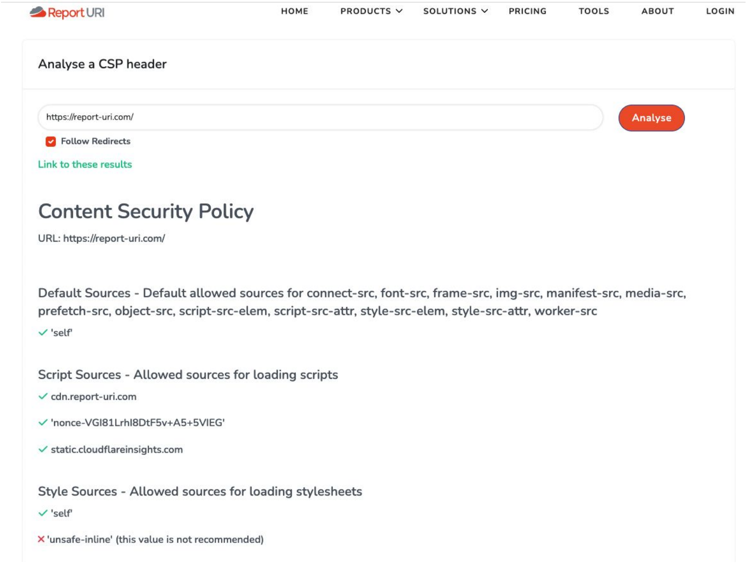
# Report URI

When you use the previous tool you will know that the **CSP header might be of use**. 😉 To check it you can use Report URI analyzer.

**check this tool**

### Content Security Policy (CSP)

It is a security header, sent by the backend which specifies the security policy that the client should follow when loading scripts, styles, images, etc. It might stop e.g. XSS attack when a script is loaded from a malicious site.



Analyse a CSP header

https://report-uri.com/

☑ Follow Redirects

Link to these results

Content Security Policy

URL: https://report-uri.com/

Default Sources - Default allowed sources for connect-src, font-src, frame-src, img-src, manifest-src, media-src, prefetch-src, object-src, script-src-elem, script-src-attr, style-src-elem, style-src-attr, worker-src

✓ 'self'

Script Sources - Allowed sources for loading scripts

✓ cdn.report-uri.com

✓ 'nonce-VGI81LrhI8DtF5v+A5+5VIEG'

✓ static.cloudflareinsights.com

Style Sources - Allowed sources for loading stylesheets

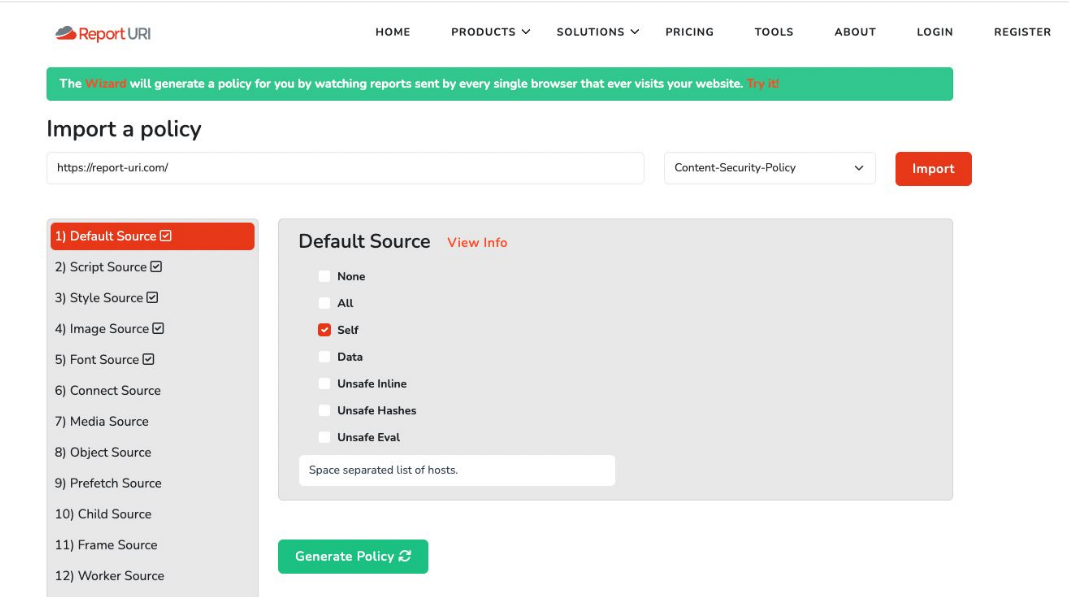
✓ 'self'

✗ 'unsafe-inline' (this value is not recommended)

*CSP header check on example page.*

# Report URI

To **generate a policy** (even based on existing data) you can use Report URI generator.



The Wizard will generate a policy for you by watching reports sent by every single browser that ever visits your website. Try it!

Import a policy

https://report-uri.com/ | Content-Security-Policy | Import

1) Default Source ☑
2) Script Source ☑
3) Style Source ☑
4) Image Source ☑
5) Font Source ☑
6) Connect Source
7) Media Source
8) Object Source
9) Prefetch Source
10) Child Source
11) Frame Source
12) Worker Source

Default Source View Info

- ☐ None
- ☐ All
- ☑ Self
- ☐ Data
- ☐ Unsafe Inline
- ☐ Unsafe Hashes
- ☐ Unsafe Eval

Space separated list of hosts.

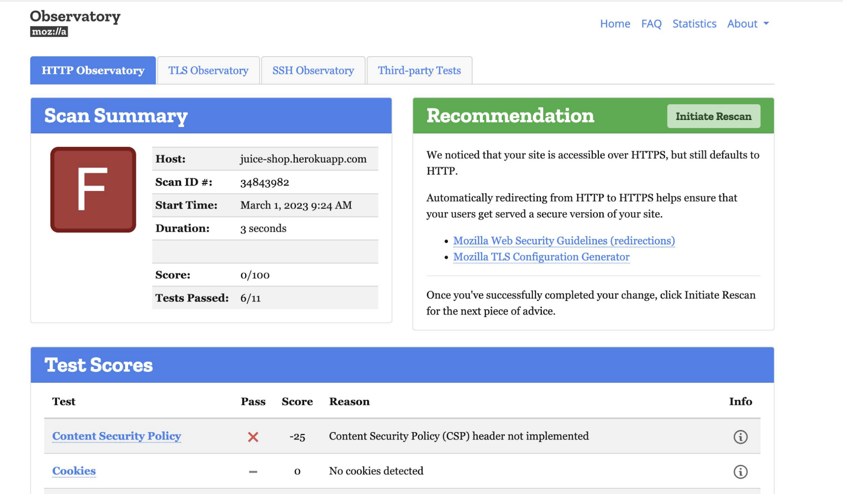
Generate Policy

*CSP header generator.*

# Mozilla Observatory

The tool, in a way, aggregates previous websites so you get an option to **check headers, do TLS scan, and see third parity analysis.**

**check this tool**



## Scan Summary

F

| | |
|---|---|
| **Host:** | juice-shop.herokuapp.com |
| **Scan ID #:** | 34843982 |
| **Start Time:** | March 1, 2023 9:24 AM |
| **Duration:** | 3 seconds |
| | |
| **Score:** | 0/100 |
| **Tests Passed:** | 6/11 |

## Recommendation

Initiate Rescan

We noticed that your site is accessible over HTTPS, but still defaults to HTTP.

Automatically redirecting from HTTP to HTTPS helps ensure that your users get served a secure version of your site.

- Mozilla Web Security Guidelines (redirections)
- Mozilla TLS Configuration Generator

Once you've successfully completed your change, click Initiate Rescan for the next piece of advice.

## Test Scores

| Test | Pass | Score | Reason | Info |
|---|---|---|---|---|
| Content Security Policy | ✗ | -25 | Content Security Policy (CSP) header not implemented | ⓘ |
| Cookies | – | 0 | No cookies detected | ⓘ |

*Scan summary for Juice Shop.*

# chapter 6

# infrastructure security

Apart from using the security tools, you should also **follow grand rules** which will help you **maintain your infrastructure secure**.

At Bright Inventions we mostly use AWS as a cloud infrastructure provider, thus will present some security features based on it. These are the only tools mentioned in this ebook which are paid (no free trials included), because they are a part of AWS cloud services.

## OWASP Kubernetes Top 10

Standards for one of main deployment and management of containerized apps. It might also be worth taking a look into OWASP Container Security Verification Standard (similar to ASWS but for containers). Last but not least OWASP Cheat Sheet Series might be your friend here.

check more

## AWS Foundational Security Best Practices standard

In 2020 AWS provided it as a part of Security Hub, so similar to SAST you can have automatic checks in place. You can also download this list as a document to do a checklist for your environment.

If you want to do a quick check-up, here is also a shorter checklist for your use:

check more

# OUT-OF-THE-BOX CLOUD SECURITY

FREE EBOOK FOR DEVELOPERS, APP OWNERS, STARTUPS AND LARGER COMPANIES

by bright inventions

2023

# AWS Shield

A distributed denial-of-service (DDoS) protection for your AWS apps. By default standard plan is activated.

**Distributed denial-of-service (DDoS)**

A flooding server with malicious requests
to exceed. As a result, its capacity to handle requests
is unavailable.

**check more**

# AWS WAF (Web Application Firewall)

A web application firewall. It helps you **define a rule set of which requests should be blocked and which ones should go through**.

Imagine that your app is prone to SQL injection. If you have AWS WAF with OWASP rules enabled, WAF will detect such a malicious request and block it.

**check more**

# AWS KMS (Key Management Service)

KMS is used for encrypting/decrypting your data. By using it, **you can encrypt your secrets or environmental variables**. Also, thanks to KMS your data can be encrypted at rest when stored in S3, RDS or EBS.

check more

**A Tip for App Owners**

Encryption of sensitive private data is usually legally required. Check what data you should encrypt and do it easily with KMS.

# AWS ECR (Elastic Container Registry)

When storing Docker images in ECR you can enable automatic security scans of your docker images.

check more

# The power of backup

Make use of backups as a malicious actor can delete or encrypt your resources.

# AWS IAM

You can use IAM (Identity and Access Management) to control the access of users to your infrastructure. Allow only for session manager access when login in to machines, enable SSO etc. which all allows for better granularity and security.

check more

# AWS GuardDuty

AWS GuardDuty uses ML to analyze anomaly detection.

It's worth to mention that this tool ultimately informed LastPass about suspicious behaviour during recent cyber attack according to the company's update.

check more

# Infrastructure security – final thoughts

There are also many other tools for infrastructure security. You will find a full list of those at aws.amazon.com.

All those tools are paid (more or less) but are easy to activate and use within your organization. Consider activating some of them when your app requires certain things legally or when it grows bigger and becomes a target for attackers.

Are you building something on AWS and do not know where to start with security? Check this curated list from AWS.

# chapter 7

# security monitoring

We’ve shown you how to deeply analyze your apps and how to make crucial security improvements. Now what?

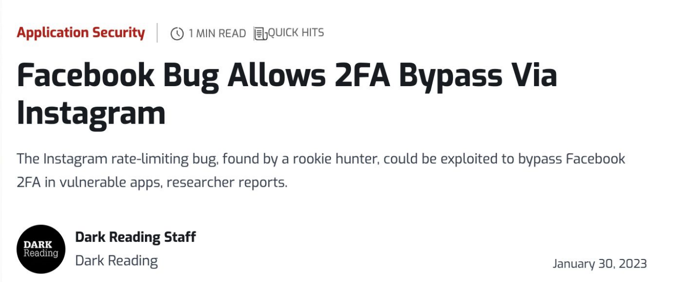
Find tips on **what and how to monitor in order to prevent future vulnerabilities & breaches**.

# Log security issues to monitor

Examples:

- authorization failures,
- authentication failures,
- password attempts for account exceeded,
- rate limit for endpoint exceeded,
- failure of input validation.

Avoid this mistake 👇



Application Security | 1 MIN READ QUICK HITS

## Facebook Bug Allows 2FA Bypass Via Instagram

The Instagram rate-limiting bug, found by a rookie hunter, could be exploited to bypass Facebook 2FA in vulnerable apps, researcher reports.

Dark Reading Staff
Dark Reading

January 30, 2023

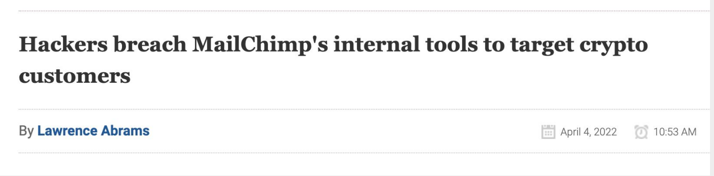
Source: darkreading.com

# Business activity logs to monitor

Examples:

- user who authorized some actions,
- log of users' actions, warning if some actions threshold is exceeded,
- user who canceled some actions.

Avoid this mistake 👇



**Hackers breach MailChimp's internal tools to target crypto customers**

By Lawrence Abrams April 4, 2022 10:53 AM

Source: bleepingcomputer.com

# Infrastructure logs to monitor

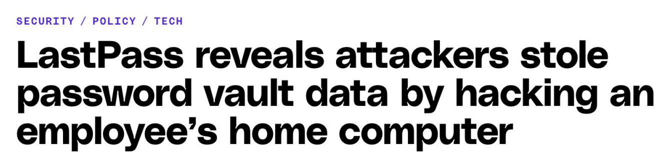
Examples:

- who deleted some resources,
- who and when checked some resources,
- who logged in to some machine.

Log those actions as events in logs and use your cloud provider dashboards and alarms. Consider enabling extra protection from your Cloud provider. For AWS use CloudTrail or AWS GuardDuty.

When logging, use centralized place to do it and do a sanitization of the logs.

Avoid this mistake 👇



SECURITY / POLICY / TECH

**LastPass reveals attackers stole password vault data by hacking an employee's home computer**

Source: theverge.com

# Do not log sensible information

Examples:

- passwords,
- keys,
- login credentials,
- biometric information.

**Do not log too much information.** We cannot express it enough. Don’t make it that easy for a possible attacker. As always, **if looking for more information, refer to OWASP Cheat Sheet**.

# the end

Now you know the **tools and tactics to ensure your app's higher quality.** We believe that security is a part of quality assurance. You should **pay attention to security, just like you pay attention to testing** (we hope you do 🙂).

Don’t forget to check the Tool directory where we listed every mentioned tool.

Also, find Software security resources gathered in one place for you.

If you have any questions or want to share some feedback, contact us via info@brightinventions.pl or find us on Facebook, LinkedIn and Instagram.

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Do you want to know more about Rafał? Read an interview.

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**Bright Inventions** is a software consulting studio based in Gdansk, Poland **operating since 2012**. Our expertise in **mobile, web, blockchain and IOT** systems has been highly appreciated by our clients from **UK, Germany, Netherlands, Norway, Israel** and more.

**Contact us if you want to estimate your software solution.**

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# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| Snyk | SAST tool | No | Yes | $0-98 per dev/month | Scanning code for security issues. | Automated security testing |
| Semgrep | SAST tool | Yes | Yes | Prices aren't listed on the website. | Easy to set up and connect to CI/CD. Built-in as a security scanner in Gitlab. | Automated security testing |
| SonarQube | SAST tool | Yes | Yes | Developer Plan starts from 150$ per month | Setting up a free community edition server on the local machine. | Automated security testing |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| OWASP ZAP | DAST tool | Yes | - | - | Running the ZAP proxy with a browser of your choice. | Automated security testing |
| Burp Suite Community Edition | DAST tool | No | Yes, as a Community Edition | Pro version costs €449.00 / per user yearly. | A free version of Burp Suite Professional. It has more extensions and better community support compared to OWASP Zap. | Automated security testing |
| Dependabot | Dependency tracking tool | Yes | - | - | Out of the box for Github users. Free to use for all GitHub repositories. | Automated security testing |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| OWASP Dependency Check | Dependency tracking tool | Yes | - | - | It can be incorporated in CI/CD pipeline to generate an HTML report about dependencies. | Automated security testing |
| Retire.js | Dependency tracking tool | Yes | - | - | It also works as a Chrome extension to analyze visited websites. | Automated security testing |
| Gitleaks | Secret leak detection tools | Yes | - | - | In all Gitlab plans available for free as Secret Leaks scanning tool. | Automated security testing |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| TruffleHog | Secret leak detection tools | Yes | Yes | Prices aren't listed on the website. | It works as a Chrome extension which shows secret leaks on websites. | Automated security testing |
| GitHub Secret Scanning | Secret leak detection tools | No | - | Free on all public repositories. | Secret scanning alerts for GitHub repositories. | Automated security testing |
| crt.sh | Infrastructure reconnaissance tools | Yes | - | - | Here you can insert your domain to see all subdomains. | Infrastructure reconnaissance |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| VirusTotal | Infrastructure reconnaissance tools | No | - | - | A subdomain reconnaissance tool which also shows domain IPs. | Infrastructure reconnaissance |
| Censys | Infrastructure reconnaissance tools | No | Yes | Prices aren't listed on the website. | An search engine that could be used for Infra reconnaissance. | Infrastructure reconnaissance |
| Phonebook.cz | Infrastructure reconnaissance tools | No | - | - | It lists  domains and shows email addresses from the scanned domains. | Infrastructure reconnaissance |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| SSL Labs | Infrastructure reconnaissance tools | No | - | - | It analyzes the configuration of SSL certificate. | Infrastructure reconnaissance |
| Security Headers | Infrastructure reconnaissance tools | No | - | - | It checks if the web app has the correct security headers configured | Infrastructure reconnaissance |
| Report URI | Infrastructure reconnaissance tools | No | - | - | It analyzes a CSP header. | Infrastructure reconnaissance |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| Mozilla Observatory | Infrastructure reconnaissance tools | Yes | - | - | HTTP, TLS, SSH Observatory and Third-party tests. | Infrastructure reconnaissance |
| AWS Shield | Infrastructure security tools | No | Yes<br>As AWS Shield Standard | $3,000.00 / per month for AWS Shield Advanced | DDoS protection for your AWS apps. | Infrastructure security |
| AWS WAF | Infrastructure reconnaissance tools | No | Yes | Depends on many factors. Better to verify on AWS website. | A web application firewall. | Infrastructure security |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| AWS KMS | Infrastructure security tools | No | Yes | $1/month (prorated hourly) | It is used used for encrypting/decrypting data. | Infrastructure security |
| AWS ECR | Infrastructure security tools | No | Yes | Storage is $0.10 per GB / month for data stored in private or public repositories. | Automatic security scans of your docker images | Infrastructure security |
| AWS IAM | Infrastructure security tools | No | No | If you already use AWS services, you can use IAM with no additional charge. | It helps to control the access of users to your infrastructure. | Infrastructure security |

# Tools directory

| Tool | Type | Open source | Free trial | Price range | Main feature | Ebook chapter |
|---|---|---|---|---|---|---|
| AWS GuardDuty | Infrastructure security tools | No | Yes | Depends on many factors. Better to verify on AWS website. | It analyzes anomaly detection. | Infrastructure security |

# Software security resources

| Resource | About | Ebook chapter |
|---|---|---|
| OWASP TOP 10 | 10 most popular dependencies to be discovered in web apps. | Introduction to OWASP |
| OWASP ASVS | A standard checklist by OWASP. Follow the list and step-by-step check if your app meets dozens of security standards described by OWASP. | Introduction to OWASP |
| OWASP MASVS | Another OWASP standard checklist made exclusively for mobile application security. | Infrastructure reconnaissance |
| OWASP Cheat Sheet | Top security standards and processes in a nutshell. | Introduction to OWASP |
| OWASP Kubernetes Top 10 | Standards for one of main deployment and management of containerized apps. | Infrastructure security |

# Software security resources

| Resource | About | Ebook chapter |
|---|---|---|
| OWASP Container Security Verification Standard | A framework of security requirements for Docker Containers. | Infrastructure security |
| AWS Foundational Security Best Practices standard | A security checklist provided by AWS. | Infrastructure security |
| AWS Security Documentation | AWS documentation that shows how to configure AWS services to meet security standards. | Infrastructure security |
| OWASP Logging Cheat Sheet | Security best practices for logging information. | Infrastructure security |
| Bright Inventions blog | A place where you can read about security, QA, mobile and web development. | - |