



SECURITY ASSESSMENT

RANJITHA MANJUNATH

Submitted to: Development Team
Security Analyst: Security Analyst Team

Date of Testing: 03/18/2021
Date of Report Delivery: 03/19/2021

Table of Contents

Contents

SECURITY ENGAGEMENT SUMMARY	2
ENGAGEMENT OVERVIEW	2
SCOPE.....	2
EXECUTIVE RISK ANALYSIS.....	2
EXECUTIVE RECOMMENDATION.....	2
SIGNIFICANT VULNERABILITY SUMMARY	5
High Risk Vulnerabilities	5
Medium Risk Vulnerabilities.....	5
Low Risk Vulnerabilities	5
SIGNIFICANT VULNERABILITY DETAIL.....	6
INFORMATION DISCLOSURE – SUSPICIOUS COMMENTS	6
TIMESTAMP DISCLOSURE – UNIX(23)	7
CROSS DOMAIN JAVASCRIPT SOURCE FILE INCLUSION.....	9
METHODOLOGY.....	10
ASSESSMENT TOOLSET SELECTION	10
ASSESSMENT METHODOLOGY DETAIL.....	10

Security Engagement Summary

Engagement Overview

The company Development team has requested the Vulnerability assessment from the security Analyst for better understanding of security risks in the web-application developed and also the understanding of risks which will be posing to the organization.

The main goal of this engagement by the development team is for the better understanding of security risks associated with the web-application and what security risk the web application is posing to the organization. Also, they wanted to understand what mitigations are possible to increase the security posture and reduce risk to the organization.

The engagement is completed by the Security analyst with proper information provided by the development team.

The assessment should be carried out once per quarter.

Scope

The systematic review of security weakness of the application developed is must necessary for the application to be secure.

The vulnerability report or assessment gives an idea on how secure system is and how we can make our application more stable. The application developed

The development team have developed an application before we market the software it is essential for the company to be aware of the security vulnerability.

Executive Risk Analysis

The risk of vulnerability listed in Executive Summary gives the overall risk. We can work on the highest priority first and consider the low-risk vulnerability later.

The risk levels were indicated to indicate if there are any immediate security risk so that we can work the solution as soon as possible to secure our data.

The executive summary form has been attached here for complete explanation:

Executive Recommendation

The Executive Summary form describes in brief the remediation effort. We have a medium risk which should be remediated first. The solution is described below.

Executive report:

Assessment Date:	PURPOSE/SCOPE
03/18/2021	The development team have developed an application before we market the software it is essential for the company to be aware of the security vulnerability.
Report Date	
03/18/2021	
Prepared By:	
Ranjitha Manjunath	
Executive Board	
Development Team	
Notable Risk	PROBLEM/OPPORTUNITY
Infomational,Medium,Low	<p>Vulnerability 1: Risk: Medium</p> <p>Cross-Domain misconfiguration</p> <p>Vulnerability 2: Risk: Low</p> <p>Cross-Domain Javascript Source File Inclusion</p> <p>Vulnerability 3: Risk: Informational</p> <p>Information Disclosure – Suspicious Comments</p> <p>Vulnerability 4: Risk: Informational</p> <p>Time stamp Disclosure</p>
	SOLUTION/PRODUCT
	<p>Solution to Vulnerability 1:</p> <p>Use Ip-whitelisting, making sure the data is unavailable in unauthenticated manner. The Access-Control-Allow-Origin HTTP header should be configured to restrictive set of domains.</p> <p>Solution to Vulnerability 2:</p> <p>Ensure JavaScript source files are loaded from only trusted sources. Also, make sure the sources can't be controlled by end users of the application.</p> <p>Solution to Vulnerability 3:</p> <p>Remove all comments that return information that may help an attacker and fix any underlying problems they refer to.</p>

Solution to Vulnerability 4:

Manually confirm that the timestamp data is not sensitive, and that the data cannot be aggregated to disclose exploitable patterns.

POTENTIAL IMPACTS

With the solutions provided we can have a secure application where there will be secure transmission of data and no unauthorized third-party interactions.

By not taking the preventive measure we could be exposed to information like personal or unauthorized data exposure

EXECUTION PLAN

The recommended action would be to work according to the risk level and mitigate the issue as solution is provided above.

Significant Vulnerability Summary

High Risk Vulnerabilities

- NO VULNERABILITY

Medium Risk Vulnerabilities

- CROSS DOMAIN MISCONFIGURATION

Low Risk Vulnerabilities

- CROSS DOMAIN JAVASCRIPT SOURCE FILE INCLUSION

Significant Vulnerability Detail

Information Disclosure - Suspicious Comments

Informational Risk

Vulnerability detail

- The Vulnerability has Informational risk.
- The vulnerability was found following a pattern: **\bSELECT\b** and detected in the element starting with: **"function_createForOfIteratorHelper(t,e){var n;if("undefined"==typeof Symbol||null==t[Symbol.iterator]){id(Array.isArray(t))||(n=**, see evidence field for the suspicious comment.
- The probability of exploit is not high as we can remove the comments which leads information for the attacker.
- This won't affect anyone as this is just informational.
- Solution is to remove all comments that return information for the attacker and fix any underlying problems they refer to.

The screenshot shows the OWASP ZAP 2.10.0 interface with the 'Information Disclosure - Suspicious Comments' alert selected in the Alerts tab. The alert details are as follows:

- URL:** http://localhost:3000/polyfills-es5.js
- Risk:** Informational
- Confidence:** Low
- Parameter:** None
- Attack:** Select
- Evidence:** Select
- CWE ID:** 200
- WASC ID:** 13
- Source:** Passive (10027 - Information Disclosure - Suspicious Comments)
- Description:** The response appears to contain suspicious comments which may help an attacker. Note: Matches made within script blocks or files are against the entire content not only comments.
- Other Info:** The following pattern was used: **\bSELECT\b** and was detected in the element starting with: **"function_createForOfIteratorHelper(t,e){var n;if("undefined"==typeof Symbol||null==t[Symbol.iterator]){id(Array.isArray(t))||(n=**, see evidence field for the suspicious comment/snippet.

Timestamp Disclosure - Unix(23)

Informational Risk

<<

Vulnerability detail

- The Vulnerability has Informational risk.
- The timestamp was disclosed by application/web server – Unix. The Evidence was identified when 33333333, which evaluates to: 1971-01-21 14:15:33
- Discuss the probability of exploit/attack.
- The probability of this risk is not high.
- This won't affect anyone as this is just informational.
- Remediation is to manually confirm that the timestamp data is not sensitive, and that the data cannot be aggregated to disclose exploitable patterns.

The screenshot shows the OWASP ZAP 2.10.0 interface. The top part displays a browser-like view of a page with the following header and body text:

```
HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Type: application/json; charset=UTF-8
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
Age: 0
Cache-Control: public, max-age=0
Last-Modified: Thu, 18 Jun 2020 20:26:44 GMT
ETag: W/"72ee172c1cfa9"
Content-Type: text/html; charset=UTF-8
Content-Length: 516846
Vary: Accept-Encoding
Date: Thu, 18 Mar 2021 18:29:19 GMT
Connection: keep-alive
```

The bottom part of the interface shows the "Alerts" tab selected, displaying a list of findings:

- Timestamp Disclosure - Unix (4)
- Cross-Domain Misconfiguration (30)
- Cross-Domain JavaScript Source File Inclusion (6)
- Information Disclosure - Suspicious Comments (1)
- Timestamp Disclosure - Unix (23)

Details for the "Timestamp Disclosure - Unix (23)" alert are expanded:

Timestamp Disclosure - Unix
URL: http://localhost:3000/styles.css
Type: Informational
Confidence: Low
Parameter:
Attack: 33333333
Evidence: 33333333
CVE ID: 200
WASC ID: 13
Source: Passive (10096 - Timestamp Disclosure)
Description:
A timestamp was disclosed by the application/web server - Unix

Other Info:
33333333, which evaluates to: 1971-01-21 14:15:33

Solution:
Manually confirm that the timestamp data is not sensitive, and that the data cannot be aggregated to disclose exploitable patterns.

Reference:
<http://projects.webappsec.org/w/page/13246936/Information%20Leakage>

Cross Domain Misconfiguration(30)

Medium

Vulnerability detail

- The Vulnerability has Medium risk.
- The CORS misconfiguration on the webserver permits cross domain read requests from arbitrary third party domains, using unauthenticated APIs on this domain. Web server implementations don't permit arbitrary third parties to read the response from authenticated APIs.
- The probability of exploit is medium. The vulnerability should be taken care as soon as possible.
- The departments and Company will be affected much from this as the domain will be cross configured.
- Solution is to ensure sensitive data is unavailable in an unauthenticated manner by using IP address white listing

The screenshot shows the OWASP ZAP 2.10.0 interface. The top menu bar includes File, Edit, View, Analyse, Report, Tools, Import, Online, and Help. The main window has tabs for Sites, Contexts, Default Context, and Sites. The Request tab is selected, showing a response header with various CORS-related headers like Access-Control-Allow-Origin, X-Content-Type-Options, X-Frame-Options, Feature-Policy, Accept-Ranges, Cache-Control, Last-Modified, ETag, Content-Type, Content-Length, and Vary. Below the header is the response body, which includes a copyright notice and an HTML document structure. The bottom pane displays the 'Alerts' section, where a single 'Cross-Domain Misconfiguration (30)' alert is listed. This alert details the URL (http://localhost:3000), Risk (Medium), Confidence (Medium), Parameter (None), Attack (None), Evidence (Access-Control-Allow-Origin: *), CWE ID (264), WASC ID (14), and Source (Passive (10098 - Cross-Domain Misconfiguration)). The Description explains that the CORS misconfiguration allows cross-domain read requests from arbitrary third-party domains. The Other Info section provides a detailed explanation of how this reduces the risk compared to authenticated APIs. The bottom status bar shows 'Alerts 0 1 2 Primary Proxy: localhost:8080' and 'Current Scans 0 0 0 0 0 0 0 0 0'.

Cross Domain JavaScript Source File Inclusion

Low

Vulnerability detail

- The Vulnerability has Low risk.
- The page had one or more script files from a third-party domain.
- The probability of exploit is Low as the exploit might not give important information to the user.
- The department will be affected as they have to reconfigure few scripts.
- Solution is to ensure JavaScript files are loaded from only trusted sources and the sources can't be controlled by end users of the application.

The screenshot shows the OWASP ZAP interface with the following details:

Request & Response Tab:

```
HTTP/1.1 200 OK
Access-Control-Allow-Origin: *
Content-Type: text/html; charset=UTF-8
X-Frame-Options: SAMEORIGIN
Feature-Policy: payment 'self'
Accept-Ranges: bytes
Cache-Control: public, max-age=9
Last-Modified: Thu, 18 Mar 2021 18:28:56 GMT
ETag: W/"785-178469983be"
Content-Type: text/html; charset=UTF-8
Content-Length: 925
Vary: Accept-Encoding
Date: Thu, 18 Mar 2021 18:29:18 GMT
Connection: keep-alive
```

Source Code View:

```
<!--
- Copyright (c) 2014-2020 Björn Kimminich.
- 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": {

```

Alerts Tab:

- Alerts (4)
- ↳ Cross-Domain Misconfiguration (30)
- ↳ Cross-Domain JavaScript Source File Inclusion (6)
- ↳ Information Disclosure - Suspicious Comments (6)
- ↳ Timestamp Disclosure - Unix (23)

Description:
The page includes one or more script files from a third-party domain.

Solution:
Ensure JavaScript source files are loaded from only trusted sources, and the sources can't be controlled by end users of the application.

Reference:

Methodology

The methodology for the assessment is followed by the steps described below

Initial Planning: The Planning was done by development team for the assessment.

Scanning: OWASP ZAP tool was used to scan the port localhost:3000. We found one medium risk vulnerability which should be taken care. And a low risk which is not so important. There are two informational risks.

The exploitable risk is the Cross Domain misconfiguration which will lead to requests and unauthorized requests from third party access.

Analysis: According to the Vulnerability report, we have one vulnerability at medium risk which should be taken care of, if not it might cause minor injury to the company. The remediation is explained above.

Remediation: The remediation of medium risk is explained. Overall as we have one medium risk the application is not much vulnerable but if we see overall, we have to take care of making system secure by considering the informational and low risks.

OWASP ZAP gave complete report of all three vulnerabilities and Kali Linux was the platform used.

Assessment Toolset Selection

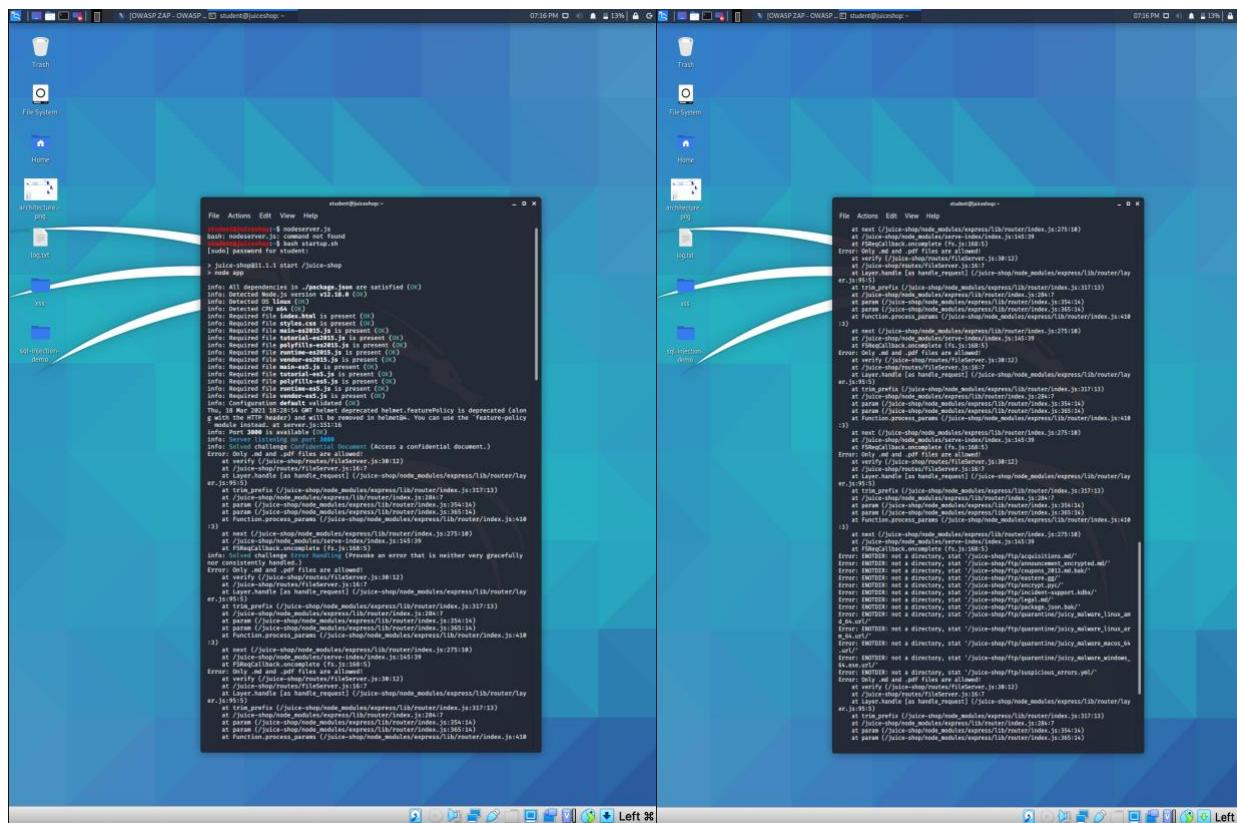
Kali Linux - Platform

Virtual box – Environment setup

OWASP ZAP – Scanning tool

Assessment Methodology Details

Below are the screenshots of all the commands and reports.



The screenshot shows the OWASP ZAP 2.10.0 interface with a running scan titled "StudentVM [Running]". The top navigation bar includes "Edit", "View", "Analyse", "Report", "Tools", "Import", "Online", and "Help". The main window displays a "Request" tab with a header and body text for a socket.io connection. The body text shows a GET request to http://localhost:3000/socket.io/?EIO=3&transport=websocket with various headers including User-Agent, Sec-WebSocket-Version, and cookie information. Below the request tab is a "History" tab showing a list of 399 requests with columns for Id, Req. Timestamp, Resp. Timestamp, Method, URL, Code, Reason, RTT, Size, Resp. Header, and Resp. Body. The requests are primarily GET and POST requests to http://localhost:3000/socket.io/?EIO=3&transport=websocket, with some 400 Bad Request errors. The bottom status bar indicates "Current Scans: 0" and "Num Requests: 399".

Id	Req. Timestamp	Resp. Timestamp	Method	URL	Code	Reason	RTT	Size	Resp. Header	Size	Resp. Body
1,819	3/18/21, 4:00:14 PM	3/18/21, 4:00:14 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	2 ms	129 bytes		0 bytes	
1,820	3/18/21, 4:00:15 PM	3/18/21, 4:00:15 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	3 ms	153 bytes		41 bytes	
1,821	3/18/21, 4:00:16 PM	3/18/21, 4:00:16 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	3 ms	246 bytes		103 bytes	
1,822	3/18/21, 4:00:16 PM	3/18/21, 4:00:16 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	2 ms	129 bytes		0 bytes	
1,823	3/18/21, 4:00:34 PM	3/18/21, 4:00:34 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	2 ms	153 bytes		41 bytes	
1,824	3/18/21, 4:00:35 PM	3/18/21, 4:00:35 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	3 ms	246 bytes		103 bytes	
1,825	3/18/21, 4:00:35 PM	3/18/21, 4:00:35 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	2 ms	129 bytes		0 bytes	
1,826	3/18/21, 4:00:36 PM	3/18/21, 4:00:36 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	2 ms	153 bytes		41 bytes	
1,827	3/18/21, 4:00:37 PM	3/18/21, 4:00:37 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	4 ms	246 bytes		103 bytes	
1,828	3/18/21, 4:00:37 PM	3/18/21, 4:00:37 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	8 ms	129 bytes		0 bytes	
1,829	3/18/21, 4:00:55 PM	3/18/21, 4:00:55 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	8 ms	153 bytes		41 bytes	
1,830	3/18/21, 4:00:56 PM	3/18/21, 4:00:56 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	6 ms	246 bytes		103 bytes	
1,831	3/18/21, 4:00:56 PM	3/18/21, 4:00:56 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	1 ms	129 bytes		0 bytes	
1,832	3/18/21, 4:00:57 PM	3/18/21, 4:00:57 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	2 ms	153 bytes		41 bytes	
1,833	3/18/21, 4:00:58 PM	3/18/21, 4:00:58 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	3 ms	246 bytes		103 bytes	
1,834	3/18/21, 4:00:58 PM	3/18/21, 4:00:58 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	5 ms	129 bytes		0 bytes	
1,835	3/18/21, 4:23:10 PM	3/18/21, 4:23:10 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	2 ms	153 bytes		41 bytes	
1,836	3/18/21, 4:23:11 PM	3/18/21, 4:23:11 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	4 ms	246 bytes		103 bytes	
1,837	3/18/21, 4:23:11 PM	3/18/21, 4:23:11 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	2 ms	129 bytes		0 bytes	
1,838	3/18/21, 4:23:12 PM	3/18/21, 4:23:12 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	3 ms	153 bytes		41 bytes	
1,839	3/18/21, 4:23:13 PM	3/18/21, 4:23:13 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	4 ms	246 bytes		103 bytes	
1,840	3/18/21, 4:23:13 PM	3/18/21, 4:23:13 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	2 ms	129 bytes		0 bytes	
1,841	3/18/21, 4:23:31 PM	3/18/21, 4:23:31 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	3 ms	153 bytes		41 bytes	
1,842	3/18/21, 4:23:32 PM	3/18/21, 4:23:32 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	200	OK	5 ms	246 bytes		103 bytes	
1,843	3/18/21, 4:23:32 PM	3/18/21, 4:23:32 PM	GET	http://localhost:3000/socket.io/?EIO=3&transp...	101	Switching ...	3 ms	129 bytes		0 bytes	
1,844	3/18/21, 4:23:33 PM	3/18/21, 4:23:33 PM	POST	http://localhost:3000/socket.io/?EIO=3&transp...	400	Bad Request	3 ms	153 bytes		41 bytes	

This concluded the vulnerability assessment methodology portion of this report.

