

# COMPLEX APPLICATIONS SECURITY ASSESSMENT

For: Slex

By: Hacken

Date: October 26<sup>th</sup>, 2023

## Table of Contents

<b>Introduction</b>	<b>1</b>
<b>Executive Summary</b>	<b>2</b>
<b>Security Assessment Overview</b>	<b>3</b>
Scope	4
Team Composition	5
Methodology	6
Objectives	7
Limitations and Assumptions	8
Disclaimer	9
Definitions & Abbreviations	10
<b>Summary of Findings</b>	<b>11</b>
<b>Remediation Check Protocol</b>	<b>12</b>
<b>Key Findings</b>	<b>13</b>
Web Applications Specific Vulnerabilities	14
<b>Appendix A. OWASP Testing Checklist</b>	<b>15</b>

This document contains confidential information about IT systems and the network infrastructure of the customer, as well as information about potential vulnerabilities and methods of their exploitation.

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

This confidential information is for internal use by the customer only and shall not be disclosed to third parties.

## Document

Name:	COMPLEX SECURITY ASSESSMENT FOR SLEX
Type:	Detailed Penetration Test Report
Revision:	Version 1
Date:	October 26 <sup>th</sup> , 2023

## Contractor Contacts

Role	Name	Email
Project Lead	Andrew Matiukhin	a.matiukhin@hacken.io

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

# Introduction

We thank Slex for allowing us to conduct a Web Application Security Assessment. This document outlines our methodology, limitations, and results of the security assessment.

# Executive Summary

Hacken OÜ (Consultant) was contracted by Slex (Customer) to perform a third-party, independent security assessment of their web applications.

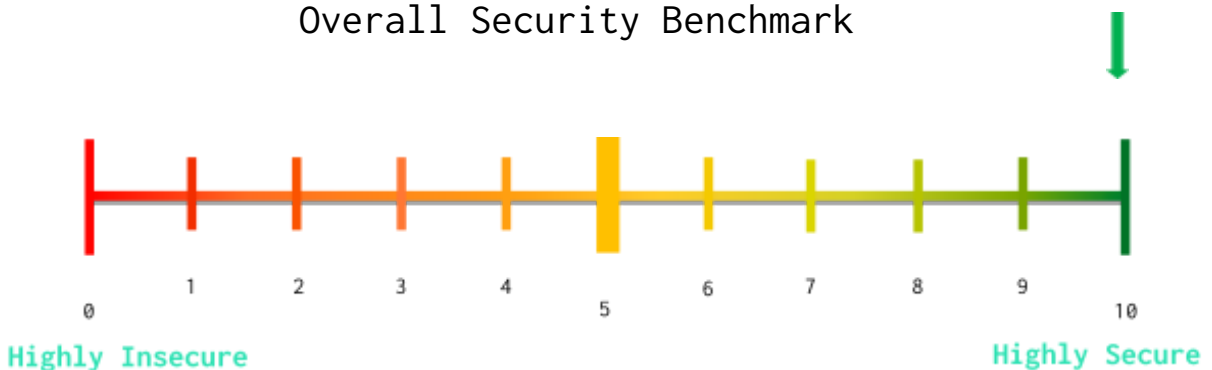
This report presents the findings of the security assessment of Web application & API security testing that was conducted between October 13<sup>st</sup>, 2023 - October 24<sup>th</sup>, 2023.

The purpose of the engagement was to utilize active exploitation techniques to evaluate the security of the web application against best practices and to validate its security mechanisms.

Next vulnerabilities and mistakes were identified during the assessment:

	Web	Overall	Unable to check
<b>Critical</b>	0	0	0
<b>High</b>	0	0	0
<b>Medium</b>	0	0	0
<b>Low</b>	0	0	0
<b>Informational</b>	0	0	0

## Overall Security Benchmark



Based on our understanding of the environment, as well as the nature of the vulnerabilities discovered, their exploitability, and the potential impact we have assessed the level of risk for your organization to be **Highly Secure**. No direct path of external attacker to full system compromise was discovered.

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

The overall rating of Customer Applications, after the security assessment by the Consultant’s Security Team, stands out to be 10 out of 10. The security assessment was carried out following the in-house test cases, manual methods, exploitation, and automated tools.

## Security Assessment Overview

### Scope

The following table provides a synopsis of target systems that were within the scope of this Security Assessment.

#	Name	Type
1	<a href="https://slex.io">slex.io</a> 3d Party components: <a href="https://hubspot.com">hubspot.com</a>	Web
2	Slex has provided private swagger api documentation	API + Documentation
3	<a href="https://wss3.slex.io">wss3.slex.io</a> <a href="https://private.slex.io">private.slex.io</a> <a href="https://web2.slex.io">web2.slex.io</a> <a href="https://wss2.slex.io">wss2.slex.io</a> <a href="https://wsstest.slex.io">wsstest.slex.io</a> <a href="https://slex.io">slex.io</a> <a href="https://about.slex.io">about.slex.io</a> <a href="https://support.slex.io">support.slex.io</a> <a href="https://api.slex.io">api.slex.io</a> <a href="https://wss.slex.io">wss.slex.io</a> <a href="https://kb.slex.io">kb.slex.io</a>	Subdomains Detected

Security Assessment start and end dates were coordinated by email according to the following table:

Testing start date:	October 13 <sup>sh</sup> , 2023
Testing end date:	October 24 <sup>th</sup> , 2023
Reporting:	October 26 <sup>th</sup> , 2023

### Team Composition

The project team consisted of 3 security experts with the following roles, certifications, and responsibilities:

Role	Responsibility
Project Manager	Customer communication Project delivery and quality control
Penetration Tester #1	Project planning and executing

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

(Lead Penetration tester, OSCP, Node.js, React, PHP, Websockets)	Penetration Testing Identify security and business risks for the application Preparing artefacts and deliverables Results Presentation
Penetration Tester #2 (Penetration tester, Java, PHP, Node.js, Databases)	Penetration Testing Identify security and business risks for infrastructure

## Methodology

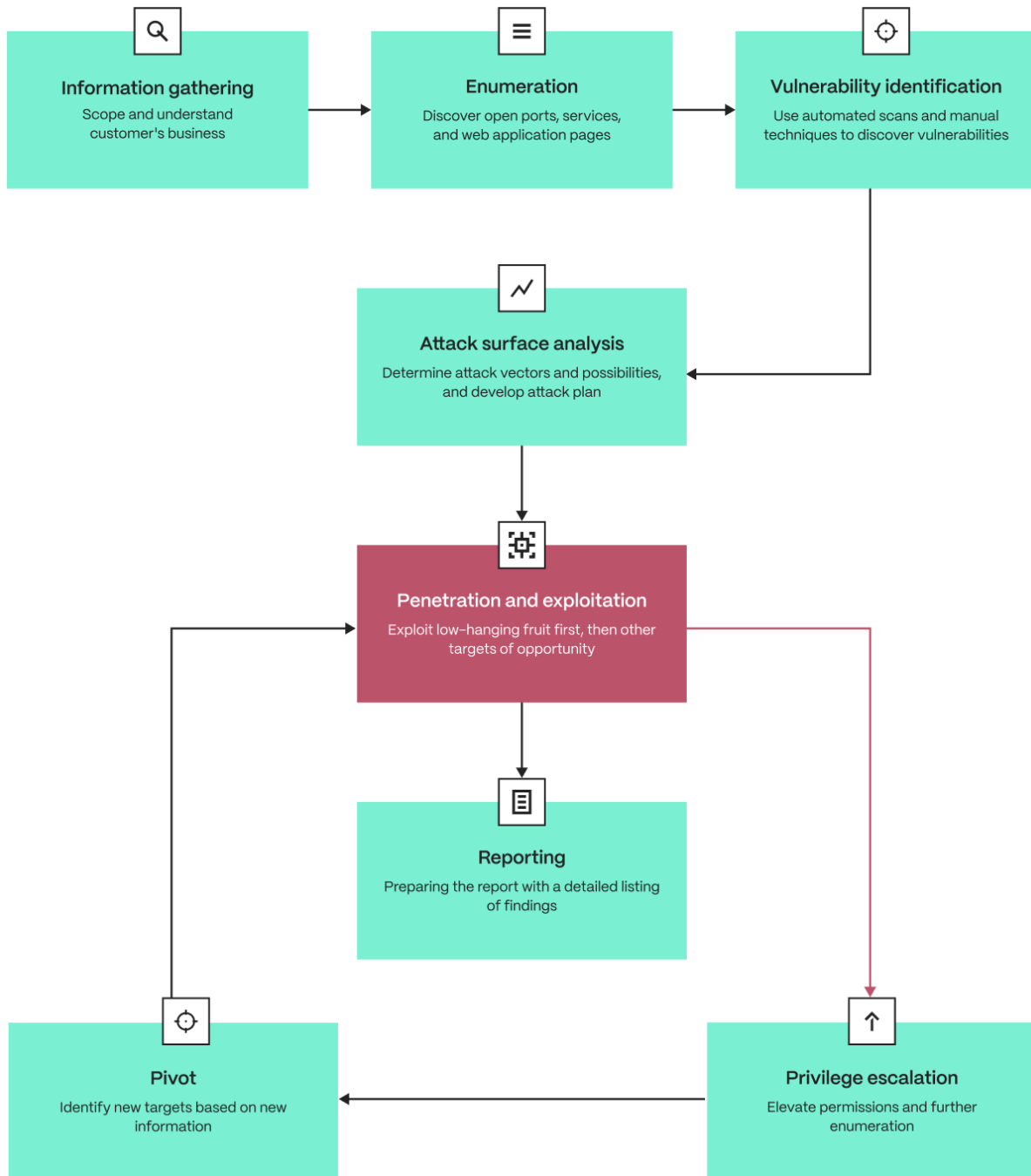
Our methodology for Security Assessment is based on our own experience, best practices in the area of information security, international methodologies, and guides such as PTES and OWASP.

Security Assessment has been conducted following workflow:

- Pre-engagement Interactions
- Gray box security assessment
  - Intelligence gathering activities against a target
  - Service detection and identification
  - Vulnerabilities detection, verification, and analysis
  - Business logic flows
  - The exploitation of vulnerabilities
  - Lateral movement and privilege escalation
- Mapping application code against industry best practices OWASP ASVS
- Preparing the final report with a detailed listing of findings, along with the related risks and recommendations.

The diagram below illustrates the standard security assessment methodology followed by Hacken Team. A cyclical approach to security assessment is leveraged so new information is incorporated into subsequent on the environment.

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.



## Objectives

Web application security assessment was conducted in a “gray box” mode (with an approved account) and had the following objectives:

- Identify technical and functional vulnerabilities
- Estimate their severity level (ease of use, impact on information systems)

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

- Modeling the “most likely” attack vectors against the Customer’s Information System
- Proof of concept and exploitation of vulnerabilities
- Draw up a prioritized list of recommendations to address identified weaknesses

## Limitations and Assumptions

This project is limited by the scope of this document

During this project, the Consultant will follow the following limitations:

- The operational impact to the networks will be maintained to the minimum and coordinated with the client
- No denial of service attacks will be used
- No active backdoor or Trojans will be installed
- No client data will be copied, modified, or destroyed

The following security tests shall be considered Out of Scope for this assessment:

- Internal networks assessment
- Denial of Service testing
- Physical Social Engineering testing

## Disclaimer

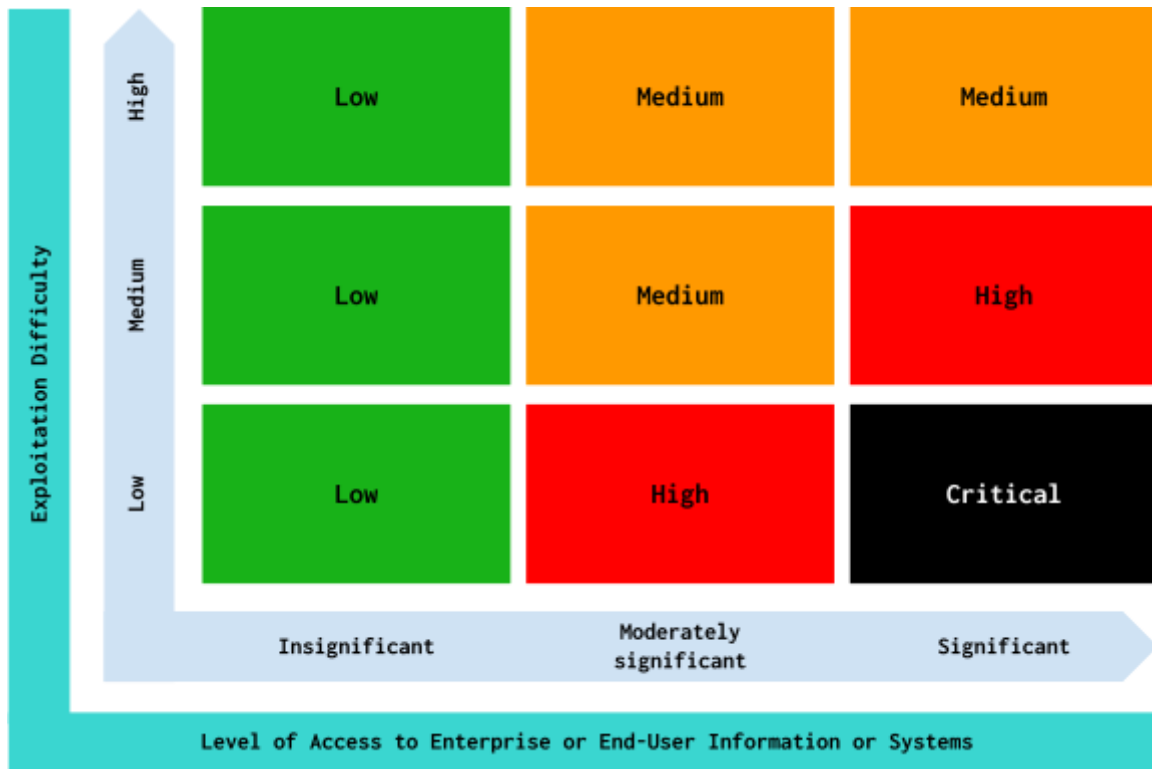
This security assessment was conducted for the Customer prod environment and is valid on the date of the report submission hereto. The description of findings, recommendations, and risks was valid on the date of submission of the report hereto. Any projection to the future of the report’s information is subject to risk due to changes in the Infrastructure architecture, and it may no longer reflect its logic and controls.

## Definitions & Abbreviations

The severity level (criticality level) of each vulnerability is determined based on the exploitation difficulty and the access level to an enterprise or end-user information system an attacker can gain in case of successful exploitation. The lower the exploitation difficulty level and the higher the access level which an attacker can get, the higher the vulnerability severity level will be. The matrix below illustrates the general methodology followed for identifying the severity level of each finding:


This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.







To be the CVSS Compliant Hacken Security Assessment Team utilizes the Common Vulnerability Scoring System (CVSS) values for each level of vulnerability, such a solution will help prioritize the fixing vulnerabilities approach and make the results of the Security Assessment more objective.



The table below fully describes each level of vulnerabilities and ties to CVSS:

Severity	Color Map	Description
Informational		This level refers to vulnerabilities that do not pose an immediate security risk or require exploitation. Instead, they provide valuable information or insights about the system's configuration, weaknesses, or potential areas for improvement. While they may not directly lead to a security breach, addressing these informational vulnerabilities can

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

Severity	Color Map	Description
		contribute to overall security enhancements and proactive risk mitigation efforts.
Low	 CVSS (0.1 - 3.9)	<p>This level encompasses vulnerabilities with a low exploitation difficulty and low level of access. These vulnerabilities pose a relatively lower risk to the system's security as they are easier to exploit and grant minimal access privileges to potential attackers. While they still require attention and remediation, their impact is limited due to the restricted level of access gained.</p>
Medium	 CVSS (4.0 - 6.9)	<p>Vulnerabilities falling under this level have a moderate exploitation difficulty but the access level which can be gained by the attacker is greater compared to low-level vulnerabilities. They represent a medium level of risk to the system's security. Although they may be more challenging to exploit compared to low-level vulnerabilities, they still do not pose an immediate and severe threat. Appropriate measures should be taken to address these vulnerabilities promptly to prevent potential exploitation.</p>

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

Severity	Color Map	Description
High	 CVSS (7.0 - 8.9)	<p>Vulnerabilities categorized as high-level vulnerabilities have a low exploitation difficulty and grant a higher access level for the attacker in case of successful exploitation. These vulnerabilities pose a significant risk to the system's security and require immediate attention. While they may be more challenging to exploit, their potential impact is substantial. Timely remediation and mitigation measures should be implemented to address these vulnerabilities effectively.</p>
Critical	 CVSS (9.0 - 10.0)	<p>This level encompasses vulnerabilities with a low exploitation difficulty but the highest access level granted to the attacker in case of successful exploitation. These vulnerabilities are considered critical and pose the most severe threat to the system's security. Immediate action should be taken to remediate and address these vulnerabilities to prevent potential unauthorized access and significant security breaches.</p>

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

## Summary of Findings

Value	Number of issues
Informational	0
Low	0
Medium	0
High	0
Critical	0
Unable to check	0

The following diagram illustrates the severity level of the vulnerabilities identified during the testing:

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

## Remediation Check Protocol

Issue Status Definition:

Status	Description
New	The issue has just been encountered by consultant. The remediation after the initial discovery was not yet made.
Acknowledged	The issue has not been fixed according to the given suggestion, or the implemented solution does not do enough to solve the issue.
Fixed	The issue has been fixed according to the given suggestion by the auditors.

Issue Status:

#	Finding	Status
1	-	-

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

## Key Findings

### Web Applications Specific Vulnerabilities

- **Critical** - CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:H/I:H/A:H
- **High** - CVSS:3.1/AV:N/AC:H/PR:N/UI:N/S:U/C:H/I:H/A:H
- **Medium** - CVSS:3.1/AV:N/AC:H/PR:L/UI:N/S:U/C:L/I:L/A:H
- **Low** - CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:L/I:N/A:N
- **Informational** - CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:L/I:N/A:N

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

## Appendix A. OWASP Testing Checklist

Category	Test Name	Result	Details
<b>Information Gathering</b>			
OTG-INFO-001	Conduct Search Engine Discovery and Reconnaissance for Information Leakage	Done	Manual testing
OTG-INFO-002	Fingerprint Web Server	Done	Done with whatweb and nmap
OTG-INFO-003	Review Webserver Metafiles for Information Leakage	Done	Manual testing
OTG-INFO-004	Enumerate Applications on Webserver	Done	Done with whatweb and nmap
OTG-INFO-005	Review Webpage Comments and Metadata for Information Leakage	Done	Done with dirbuster
OTG-INFO-006	Identify application entry points	Done	Done with Burp Suite
OTG-INFO-007	Map execution paths through application	Done	Done with Burp Suite
OTG-INFO-008	Fingerprint Web Application Framework	Done	Done with whatweb and nmap
OTG-INFO-009	Fingerprint Web Application	Done	Done with whatweb and nmap
OTG-INFO-010	Map Application Architecture (WAF, Application server, identify application architecture)	Tested	No vulnerability detected
<b>Configuration and Deploy Management Testing</b>			
OTG-CONFIG-001	Test Network/Infrastructure Configuration	Tested	No vulnerability detected
OTG-CONFIG-002	Test Application Platform Configuration	Tested	No vulnerability detected
OTG-CONFIG-003	Test File Extensions Handling for Sensitive Information	Tested	No vulnerability detected
OTG-CONFIG-004	Backup and Unreferenced Files for Sensitive Information	Tested	No vulnerability detected
OTG-CONFIG-005	Enumerate Infrastructure and Application Admin Interfaces	Tested	No vulnerability detected
OTG-CONFIG-006	Test HTTP Methods	Tested	No vulnerability detected
OTG-CONFIG-007	Test HTTP Strict Transport Security	Tested	No vulnerability detected
OTG-CONFIG-008	Test RIA cross domain policy	Tested	No vulnerability detected
<b>Identity Management Testing</b>			
OTG-IDENT-001	Test Role Definitions	Tested	No vulnerability detected

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

OTG-IDENT-002	Test User Registration Process	Tested	No vulnerability detected
OTG-IDENT-003	Test Account Provisioning Process	Tested	No vulnerability detected
OTG-IDENT-004	Testing for Account Enumeration and Guessable User Account	Tested	No vulnerability detected
OTG-IDENT-005	Testing for Weak or unenforced username policy	Tested	No vulnerability detected
OTG-IDENT-006	Test Permissions of Guest/Training Accounts	Tested	No vulnerability detected
OTG-IDENT-007	Test Account Suspension/Resumption Process	Tested	No vulnerability detected
<b>Authentication Testing</b>			
OTG-AUTHN-001	Testing for Credentials Transported over an Encrypted Channel	Tested	No vulnerability detected
OTG-AUTHN-002	Testing for default credentials	Tested	No vulnerability detected
OTG-AUTHN-003	Testing for Weak lock out mechanism	Tested	No vulnerability detected
OTG-AUTHN-004	Testing for bypassing authentication schema	Tested	No vulnerability detected
OTG-AUTHN-005	Test remember password functionality	Tested	No vulnerability detected
OTG-AUTHN-006	Testing for Browser cache weakness	Tested	No vulnerability detected
OTG-AUTHN-007	Testing for Weak password policy	Tested	No vulnerability detected
OTG-AUTHN-008	Testing for Weak security question/answer	Tested	No vulnerability detected
OTG-AUTHN-009	Testing for weak password change or reset functionalities	Tested	No vulnerability detected
OTG-AUTHN-010	Testing for Weaker authentication in alternative channel	Tested	No vulnerability detected
<b>Authorization Testing</b>			
OTG-AUTHZ-001	Testing Directory traversal/file include	Tested	No vulnerability detected
OTG-AUTHZ-002	Testing for bypassing authorization schema	Tested	No vulnerability detected
OTG-AUTHZ-003	Testing for Privilege Escalation	Tested	No vulnerability detected
OTG-AUTHZ-004	Testing for Insecure Direct Object References	Tested	No vulnerability detected
<b>Session Management Testing</b>			
OTG-SESS-001	Testing for Bypassing Session Management Schema	Tested	No vulnerability detected
OTG-SESS-002	Testing for Cookies attributes	Tested	No vulnerability detected

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.



OTG-SESS-003	Testing for Session Fixation	Tested	No vulnerability detected
OTG-SESS-004	Testing for Exposed Session Variables	Tested	No vulnerability detected
OTG-SESS-005	Testing for Cross Site Request Forgery	Tested	No vulnerability detected
OTG-SESS-006	Testing for logout functionality	Tested	No vulnerability detected
OTG-SESS-007	Test Session Timeout	Tested	No vulnerability detected
OTG-SESS-008	Testing for Session puzzling	Tested	No vulnerability detected
<b>Data Validation Testing</b>			
OTG-INPVAL-001	Testing for Reflected Cross Site Scripting	Tested	No vulnerability detected
OTG-INPVAL-002	Testing for Stored Cross Site Scripting	Tested	No vulnerability detected
OTG-INPVAL-003	Testing for HTTP Verb Tampering	Tested	No vulnerability detected
OTG-INPVAL-004	Testing for HTTP Parameter pollution	Tested	No vulnerability detected
OTG-INPVAL-005	Testing for SQL Injection	Tested	No vulnerability detected
OTG-INPVAL-006	Testing for LDAP Injection	Tested	No vulnerability detected
OTG-INPVAL-007	Testing for ORM Injection	Tested	No vulnerability detected
OTG-INPVAL-008	Testing for XML Injection	Tested	No vulnerability detected
OTG-INPVAL-009	Testing for SSI Injection	Tested	No vulnerability detected
OTG-INPVAL-010	Testing for XPath Injection	Tested	No vulnerability detected
OTG-INPVAL-011	IMAP/SMTP Injection	Tested	No vulnerability detected
OTG-INPVAL-012	Testing for Code Injection	Tested	No vulnerability detected
OTG-INPVAL-013	Testing for Command Injection	Tested	No vulnerability detected
OTG-INPVAL-014	Testing for Buffer overflow	Tested	No vulnerability detected
OTG-INPVAL-015	Testing for incubated vulnerabilities	Tested	No vulnerability detected
OTG-INPVAL-016	Testing for HTTP Splitting/Smuggling	Tested	No vulnerability detected
<b>Error Handling</b>			
OTG-ERR-001	Analysis of Error Codes	Tested	No vulnerability detected
OTG-ERR-002	Analysis of Stack Traces	Tested	No vulnerability detected
<b>Cryptography</b>			

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.

OTG-CRYPST-001	Testing for Weak SSL/TSL Ciphers, Insufficient Transport Layer Protection	Tested	No vulnerability detected
OTG-CRYPST-002	Testing for Padding Oracle	Tested	No vulnerability detected
OTG-CRYPST-003	Testing for Sensitive information sent via unencrypted channels	Tested	No vulnerability detected
<b>Client Side Testing</b>			
OTG-CLIENT-001	Testing for DOM based Cross Site Scripting	Tested	No vulnerability detected
OTG-CLIENT-002	Testing for JavaScript Execution	Tested	No vulnerability detected
OTG-CLIENT-003	Testing for HTML Injection	Tested	No vulnerability detected
OTG-CLIENT-004	Testing for Client Side URL Redirect	Tested	No vulnerability detected
OTG-CLIENT-005	Testing for CSS Injection	Tested	No vulnerability detected
OTG-CLIENT-006	Testing for Client Side Resource Manipulation	Tested	No vulnerability detected
OTG-CLIENT-007	Test Cross Origin Resource Sharing	Tested	No vulnerability detected
OTG-CLIENT-008	Testing for Cross Site Flashing	Tested	No vulnerability detected
OTG-CLIENT-011	Test Web Messaging	Tested	No vulnerability detected
OTG-CLIENT-012	Test Local Storage	Tested	No sensitive data stored in Local or Session storage detected
<b>Business Logic Testing</b>			
OTG-BUSLOGIC-001	Test Business Logic Data Validation	Tested	No vulnerability detected
OTG-BUSLOGIC-002	Test Ability to Forge Request	Tested	No vulnerability detected
OTG-BUSLOGIC-003	Test Integrity Checks	Tested	No vulnerability detected
OTG-BUSLOGIC-004	Test for Process Timing	Tested	No vulnerability detected
OTG-BUSLOGIC-005	Test Numbers of Times a Function Can be Used Limits	Tested	No vulnerability detected
OTG-BUSLOGIC-006	Test for the Circumvention of Work Flows	Tested	No vulnerability detected
OTG-BUSLOGIC-007	Test Upload of Unexpected File Types	Tested	No vulnerability detected
OTG-BUSLOGIC-008	Test Upload of Malicious Files	Tested	No vulnerability detected

This document is proprietary and confidential. No part of this document may be disclosed in any manner to a third party without the prior written consent of Hacken.