



Security Assessment & VAPT — Comprehensive Report

Project / Lab: Security Assessment (Vulnerability Assessment & Penetration Testing)

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Environment: Kali Linux (attacker), Metasploitable3 (target), VirtualBox



1. Executive Summary

Summarize the engagement in 3–6 sentences:

- Scope: Internal network testing of Metasploitable3 VM (IP: 10.0.2.15), host-only network; web services, SSH, FTP, and custom services tested.
- Approach: Vulnerability scanning (OpenVAS, Nikto), discovery (Nmap), exploitation (Metasploit), and manual verification.
- Key findings: e.g., “3 high CVSS vulnerabilities (outdated Apache/Tomcat, FTP anonymous write), 4 medium, 2 low.”
- Risk posture: Overall rating (High / Medium / Low) and recommended next steps: patching, configuration hardening, remove test services.

2. Objectives & Scope

Objective: Evaluate system security using open-source tools, identify and prioritise vulnerabilities, and produce remediation guidance.

Scope: IP ranges, specific VMs/services in-scope (e.g., 192.168.153.129, ports 21,22,80,8080,3306).

Out of scope: Host OS of the attacker machine, destructive attacks on production, social engineering.

3. Methodology (VAPT Phases)

1. Planning

- Define scope and rules of engagement.
- Tools used list and versions.
- Example: Dradis CE for reporting .

2. Discovery

- Passive: Banner grabbing, WHOIS (where applicable).
- Active: nmap -sC -sV -p- -T4 192.168.153.129 and targeted scans (web, ftp).

3. Vulnerability Scanning

- OpenVAS/GVM: full host scan for CVEs and CVSS.
- Nikto for web server misconfigurations: nikto.
- OWASP ZAP for web app dynamic scans (if web app present).



4. Attack / Exploitation

- Verify exploitability with Metasploit where safe and permitted.
- Keep exploitation limited to non-destructive verification (proof-of-concept).

5. Post-exploitation & Evidence

- Capture non-sensitive proof such as service banners, service versions, and proof files.

6. Reporting

- Produce executive-friendly summary and technical appendix with reproduced commands, screenshots, and CVE/CVSS data.

Security Standards & Compliance

Objective: Align with regulations using resources.

In the realm of regulatory compliance and security standards, three significant frameworks stand out: the General Data Protection Regulation (GDPR), the Health Insurance Portability and Accountability Act (HIPAA), and ISO/IEC 27001. Each of these standards plays a crucial role in protecting data, ensuring privacy, and maintaining the integrity of information systems across various industries.

General Data Protection Regulation (GDPR)

The GDPR is a comprehensive data protection regulation enacted by the European Union (EU) to safeguard the personal data of individuals within the EU and the European Economic Area (EEA). Implemented in May 2018, it replaces the 1995 Data Protection Directive and introduces stringent data protection requirements for organizations operating within or interacting with the EU.

Key principles of the GDPR include:

- **Lawfulness, Fairness, and Transparency:** Data processing must be lawful and transparent to the data subject.
- **Purpose Limitation:** Data must be collected for specified, explicit, and legitimate purposes.
- **Data Minimization:** Only data necessary for the intended purpose should be collected.
- **Accuracy:** Personal data must be accurate and kept up to date.
- **Storage Limitation:** Data should not be retained longer than necessary.



- **Integrity and Confidentiality:** Data must be processed securely to protect against unauthorized access or loss.

The GDPR also mandates the appointment of a Data Protection Officer (DPO) for certain organizations, requires data breach notifications within 72 hours, and grants individuals rights such as data access, rectification, erasure, and portability.

Health Insurance Portability and Accountability Act (HIPAA)

HIPAA is a United States legislation enacted in 1996 to protect sensitive patient health information from being disclosed without the patient's consent or knowledge. It applies to healthcare providers, health plans, healthcare clearinghouses, and business associates of these entities.

HIPAA comprises several rules, including:

- **Privacy Rule:** Establishes national standards for the protection of individually identifiable health information.
- **Security Rule:** Sets standards for securing electronic protected health information (ePHI).
- **Breach Notification Rule:** Requires covered entities to notify affected individuals, the Secretary of Health and Human Services, and, in some cases, the media of a breach of unsecured PHI.
- **Enforcement Rule:** Provides standards for the enforcement of all the Administrative Simplification Rules.

Compliance with HIPAA involves implementing administrative, physical, and technical safeguards to ensure the confidentiality, integrity, and availability of ePHI.

ISO/IEC 27001

ISO/IEC 27001 is an international standard for information security management systems (ISMS). It provides a systematic approach to managing sensitive company information, ensuring its confidentiality, integrity, and availability.

The standard is based on a risk management process and includes requirements for:

- **Information Security Policies:** Establishing policies and objectives for information security.
- **Risk Assessment and Treatment:** Identifying risks and implementing measures to mitigate them.



- **Leadership and Commitment:** Top management must demonstrate leadership and commitment to the ISMS.
- **Support and Operation:** Providing the necessary resources and ensuring the ISMS is effectively implemented and maintained.
- **Performance Evaluation:** Monitoring and measuring the effectiveness of the ISMS.
- **Improvement:** Continuously improving the ISMS by addressing non-conformities and implementing corrective actions.

ISO/IEC 27001 certification demonstrates an organization's commitment to information security and provides assurance to customers and stakeholders that security best practices are being followed.

(References: [Overview of GDPR, HIPAA, and ISO 27001 : Course Cloud Security Fundamentals: Protecting Data in the Cloud / Cursa](#))

Lab Title: Risk Assessment Basics

Objective:

Prioritize identified vulnerabilities by calculating their severity and categorizing them into risk levels.

Explanation:

1. CVSS Calculator (Common Vulnerability Scoring System):

- **Purpose:** The CVSS calculator helps assign a standardized numerical score (from **0.0** to **10.0**) to each vulnerability, indicating how severe it is.
- **Tool:** Use the official **NVD CVSS Calculator** (available at <https://nvd.nist.gov/vuln-metrics/cvss/v3-calculator>).
- **Process:**
 1. Identify the vulnerability (for example, from Nmap or Nessus scan results).
 2. Open the CVSS calculator and fill in metrics such as:
 - **Attack Vector (AV)** – Network, Adjacent, Local, or Physical
 - **Attack Complexity (AC)** – Low or High
 - **Privileges Required (PR)** – None, Low, or High
 - **User Interaction (UI)** – Required or None
 - **Confidentiality, Integrity, and Availability Impact (CIA)** – None, Low, or High



3. The calculator generates a **CVSS Base Score**, typically classified as:

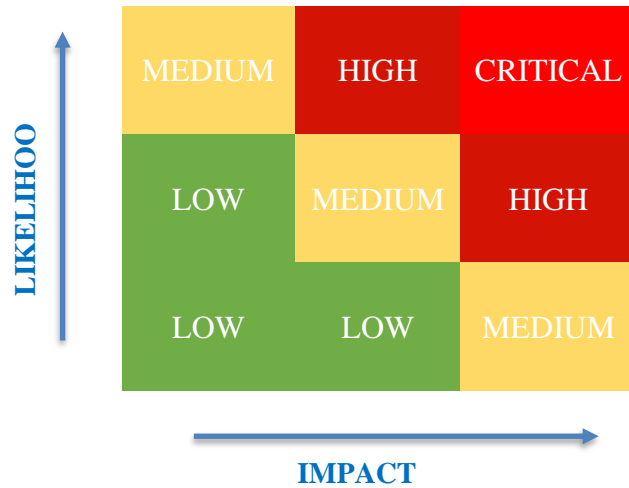
- **0.0–3.9 → Low**
- **4.0–6.9 → Medium**
- **7.0–8.9 → High**
- **9.0–10.0 → Critical**

2. Risk Matrix (Spreadsheet-Based Risk Categorization):

- **Purpose:** Helps visualize and prioritize risks based on their **likelihood** and **impact**.
- **Tool:** Create a matrix in **Google Sheets** or **Microsoft Excel**.
- **Process:**
 1. Define two axes:
 - **Likelihood (Low, Medium, High)**
 - **Impact (Low, Medium, High)**
 2. Assign each vulnerability to a cell in the matrix according to its **CVSS score** or expert judgment.
 3. Use color coding for quick visualization:
 - **Red → High Risk**
 - **Yellow → Medium Risk**
 - **Green → Low Risk**
 4. Document each vulnerability's:
 - Description
 - CVSS Score
 - Risk Level (High/Medium/Low)
 - Recommended Mitigation



Risk Matrix





Common Vulnerabilities

Objective: Identify flaws in labs/tools.

1) Network Vulnerabilities — Misconfigurations & Open Ports

What / Why: Unnecessary open ports, weak/default service configs, or exposed admin interfaces let attackers enumerate and exploit services.

How to I detect

- Full TCP port and service scan (fast):

```
nmap -sS -sV -p- --min-rate 500 192.168.153.129 -oA scans/target-allports
```
- Quick top-ports + service detection:

```
nmap -sV -p21,22,23,25,80,139,445,3306,8080 192.168.153.129
```
- Identify common misconfigurations with NSE scripts:

```
nmap --script vuln,default 192.168.153.129 -oN scans/nse-vuln.txt
```

What to look for

- Open/unused ports (e.g., telnet/ftp/samba/mysql exposed).
- Services with banners showing old versions.
- Anonymous FTP writable directories (ftp-anon NSE).
- SMB with guest access or insecure shares.

Non-destructive tests

- Check ftp anon:

```
nmap --script ftp-anon -p21 192.168.153.129
```
- Check SMB:

```
smbclient -L //192.168.153.129 -N (lists shares)
```

Remediation

- Close unused ports; disable unnecessary services.
- Apply vendor patches and update packages.
- Restrict admin interfaces to management network or IP ACLs.
- Use firewall rules (iptables/nftables) to limit access.



Appendix

```
File Actions Edit View Help
(unknown@DarkDeath)-[~]
$ mkdir
(unknown@DarkDeath)-[~]
$ mkdir scans
(unknown@DarkDeath)-[~]
$ nmap -ss -sV -p- --min-rate 500 192.168.153.129 -oA scans/target-allports
Starting Nmap 7.95 ( https://nmap.org ) at 2025-11-13 04:50 PST
Nmap scan report for 192.168.153.129
Host is up (0.00076s latency).
Not shown: 65525 filtered tcp ports (no-response)
PORT      STATE SERVICE      VERSION
21/tcp    open  ftp          ProFTPD 1.3.5
22/tcp    open  ssh          OpenSSH 6.6.1p1 Ubuntu 2ubuntu2.10 (Ubuntu Linux; protocol 2.0)
80/tcp    open  http         Apache httpd 2.4.7
445/tcp    open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
631/tcp    open  ipp          CUPS 1.7
3000/tcp   closed ppp
3306/tcp   open  mysql        MySQL (unauthorized)
3500/tcp   open  http         WEBrick httpd 1.3.1 (Ruby 2.3.7 (2018-03-28))
6697/tcp   open  irc          UnrealIRCd
8181/tcp   open  http         WEBrick httpd 1.3.1 (Ruby 2.3.7 (2018-03-28))
MAC Address: 00:0C:29:AF:55:C5 (VMware)
Service Info: Hosts: 127.0.0.1, UBUNTU, irc.TestIRC.net; OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 109.99 seconds
(unknown@DarkDeath)-[~]
$
```

```
File Actions Edit View Help
(unknown@DarkDeath)-[~]
$ nmap -sV -p21,22,23,25,80,139,445,3306,8080 192.168.153.129
Starting Nmap 7.95 ( https://nmap.org ) at 2025-11-13 04:53 PST
Nmap scan report for 192.168.153.129
Host is up (0.00036s latency).
PORT      STATE SERVICE      VERSION
21/tcp    open  ftp          ProFTPD 1.3.5
22/tcp    open  ssh          OpenSSH 6.6.1p1 Ubuntu 2ubuntu2.10 (Ubuntu Linux; protocol 2.0)
23/tcp    filtered telnet
25/tcp    filtered smtp
80/tcp    open  http         Apache httpd 2.4.7 ((Ubuntu))
139/tcp   filtered netbios-ssn
445/tcp   open  netbios-ssn Samba smbd 3.X - 4.X (workgroup: WORKGROUP)
3306/tcp   open  mysql        MySQL (unauthorized)
8080/tcp   filtered http-proxy
MAC Address: 00:0C:29:AF:55:C5 (VMware)
Service Info: Host: UBUNTU; OSs: Unix, Linux; CPE: cpe:/o:linux:linux_kernel

Service detection performed. Please report any incorrect results at https://nmap.org/submit/ .
Nmap done: 1 IP address (1 host up) scanned in 7.57 seconds
(unknown@DarkDeath)-[~]
$
```




```
File Actions Edit View Help

Disclosure date: 2009-09-17
References:
  https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2007-6750
  http://ha.ckers.org/slowloris/
http-enum:
  /: Root directory w/ listing on 'apache/2.4.7 (ubuntu)'
  /phpmyadmin/: phpMyAdmin
  /uploads/: Potentially interesting directory w/ listing on 'apache/2.4.7 (ubuntu)'
445/tcp open  microsoft-ds
631/tcp open  ipp
http-robots.txt: 1 disallowed entry
_/
ssl-date: 2025-11-13T12:57:16+00:00; 0s from scanner time.
http-slowloris-check:
  VULNERABLE:
    Slowloris DOS attack
    State: LIKELY VULNERABLE
    IDs: CVE:CVE-2007-6750
    Slowloris tries to keep many connections to the target web server open and hold
    them open as long as possible. It accomplishes this by opening connections to
    the target web server and sending a partial request. By doing so, it starves
    the http server's resources causing Denial Of Service.

Disclosure date: 2009-09-17
References:
  https://cve.mitre.org/cgi-bin/cvename.cgi?name=CVE-2007-6750
  http://ha.ckers.org/slowloris/
ssl-cert: Subject: commonName=ubuntu
Not valid before: 2018-07-29T13:37:47
Not valid after: 2028-07-26T13:37:47
http-methods:
  Potentially risky methods: PUT
http-title: Home - CUPS 1.7.2
3000/tcp closed ppp
3306/tcp open  mysql
8181/tcp open  intermapper
```

```
File Actions Edit View Help

Host script results:
smb-os-discovery:
  OS: Windows 6.1 (Samba 4.3.11-Ubuntu)
  Computer name: ubuntu
  NetBIOS computer name: UBUNTU\x00
  Domain name: \x00
  FQDN: ubuntu
  System time: 2025-11-13T12:57:02+00:00
  clock-skew: mean: 2s, deviation: 4s, median: 0s
smb-vuln-ms10-061: false
smb2-security-mode:
  3:1:1:
    Message signing enabled but not required
smb-vuln-regsvc-dos:
  VULNERABLE:
    Service regsvc in Microsoft Windows systems vulnerable to denial of service
    State: VULNERABLE
    The service regsvc in Microsoft Windows 2000 systems is vulnerable to denial of service caused by a null defference
    pointer. This script will crash the service if it is vulnerable. This vulnerability was discovered by Ron Bowes
    while working on smb-enum-sessions.

smb-vuln-ms10-054: false
smb-security-mode:
  account_used: guest
  authentication_level: user
  challenge_response: supported
  message_signing: disabled (dangerous, but default)
smb2-time:
  date: 2025-11-13T12:56:55
  start_date: N/A

Nmap done: 1 IP address (1 host up) scanned in 383.58 seconds

(unknown@DarkDeath)-[~]
$
```



```
File Actions Edit View Help
[unknown@DarkDeath: ~]
$ nmap --script ftp-anon -p21 192.168.153.129
Starting Nmap 7.95 ( https://nmap.org ) at 2025-11-13 05:21 PST
Nmap scan report for 192.168.153.129
Host is up (0.00053s latency).

PORT      STATE SERVICE
21/tcp    open  ftp
MAC Address: 00:0C:29:AF:55:C5 (VMware)

Nmap done: 1 IP address (1 host up) scanned in 0.27 seconds

[unknown@DarkDeath: ~]
$
```



2) Web Vulnerabilities — SQL Injection (SQLi)

What / Why: Unsanitized inputs allow attackers to inject SQL that the app runs — can exfiltrate, modify, or destroy data.

OWASP Juice Shop as docker

<http://192.168.153.135:3000/#/login>

How to detect

Try to input ' or 1=1-- as email and . as password

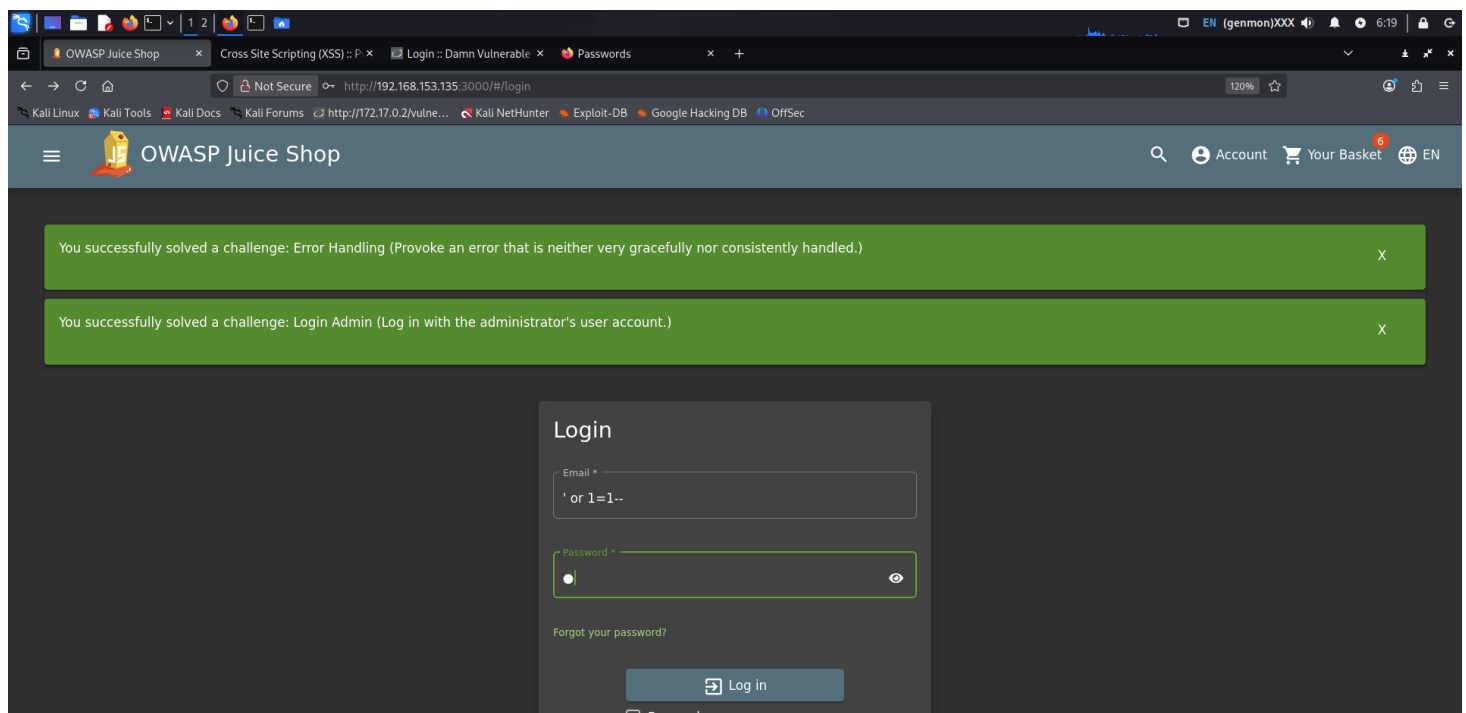
Result:

I have successfully entered to the admin user.

Remediation

- Use parameterized queries / prepared statements.
- Enforce least privilege on DB accounts.
- Input validation & output encoding.
- Web Application Firewall (WAF) as an additional layer.

Appendix





OWASP Juice Shop

You successfully solved a challenge: Error Handling (Provoke an error that is neither very gracefully nor consistently handled.)

You successfully solved a challenge: Login Admin (Log in with the administrator's user account.)




Account: admin@juice-sh.op

Orders & Payment

Privacy & Security

Logout

All Products

	Apple Juice (1000ml) 1.99€		Apple Pomace 0.89€		Banana Juice (1000ml) 1.99€
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Web Vulnerabilities — Cross-Site Scripting (XSS)

What / Why: App reflects attacker-provided JavaScript back to other users. Can steal cookies, session tokens, or perform actions.

How to detect

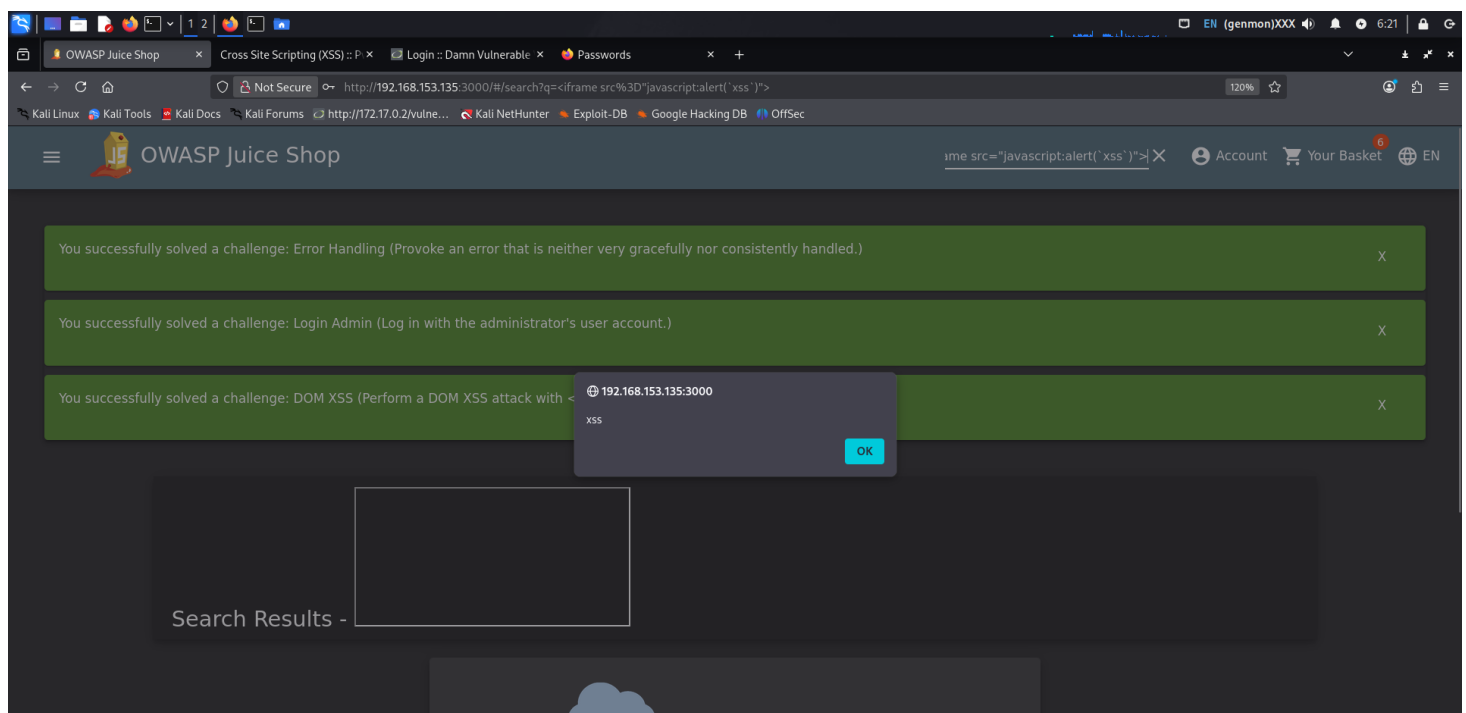
- Manual payloads (reflective XSS quick check):
Enter `<iframe src="javascript:alert(`xss`) ">` into input fields and observe whether the script executes.
- Another one

```
<iframe width="100%" height="166" scrolling="no"
frameborder="no" allow="autoplay"
src="https://w.soundcloud.com/player/?url=https%3A//api.s
oundcloud.com/tracks/771984076&color=%23ff5500&auto_play=
true&hide_related=false&show_comments=true&show_user=true
&show_reposts=false&show_teaser=true"></iframe>
```

Remediation

- Escape/encode user output (HTML entity encode).
- Use Content Security Policy (CSP) to reduce impact.
- Validate and sanitize input on server-side (never rely only on client-side).

Appendix





Browser screenshot showing the OWASP Juice Shop website. The address bar displays a URL with a payload: `http://192.168.153.135:3000/#/search?q=%3Ciframe%20width%3D%22100%25%22%20height%3D%22166%22%20scrolling%3D%22no%22%20frameborder%3D%22%20allow%3D%22autoplay%22%20src%3D%22https%3A%2F%2Fw.soundcloud.com%2Fplayer%2Furl=https%3A%2F%2Fapi.soundcloud.com%2Ftracks%2F771984076&color=%23ff5500&auto_play=true&hide_related=false&show_comments=true&show_user=true&show_reposts=false&show_teaser=true%22%3E%3C%2Fiframe%3E%3E`. The page shows a success message: "You successfully solved a challenge: Bonus Payload (Use the bonus payload <iframe width='100%' height='166' scrolling='no' frameborder='no' allow='autoplay' src='https://w.soundcloud.com/player/?url=https%3A//api.soundcloud.com/tracks/771984076&color=%23ff5500&auto_play=true&hide_related=false&show_comments=true&show_user=true&show_reposts=false&show_teaser=true'></iframe> in the DOM XSS challenge.)". Below the message, the "Search Results -" section displays a search result for "OWASP Juice Shop Jingle" by "braimee". The result includes a thumbnail of the OWASP Juice Shop logo and a SoundCloud player interface showing the audio waveform and playback controls. The player has 165K plays.



6. Documentation Fundamentals

Objective:

- Learn how to create professional and structured reports for security assessments using available tools.

Explanation:

Documentation is a critical part of security testing. It ensures that all findings are clearly recorded, organized, and communicated to stakeholders or clients. Well-documented reports improve clarity, reduce errors, and help in remediation planning.

Tools:

1. Dradis CE (Community Edition)
 - Purpose: Collaborative reporting and evidence management for penetration tests.
 - Key Features:
 - Team collaboration on findings.
 - Centralized storage for screenshots, logs, and notes.
 - Built-in report templates for PDF, Word, or HTML outputs.
 - Learning Tip: Start with free templates from GitHub or the Dradis CE documentation to create sample reports.
2. CherryTree
 - Purpose: Hierarchical note-taking tool for technical findings.
 - Key Features:
 - Organize notes with headings, sub-headings, and tables.
 - Attach screenshots, code snippets, or evidence.
 - Export notes in various formats for reporting.
3. Other Standard Tools:
 - Microsoft Word, LibreOffice Writer, or Markdown editors can also be used for creating structured reports.
 - Templates for pentest reports are widely available online.



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