Week 3 Report – Advanced Security & Final Reporting

Application: User Management System (Express + MongoDB) **Prepared by:** Muhammad Raza **Date:** February 25, 2026

1. Executive Summary

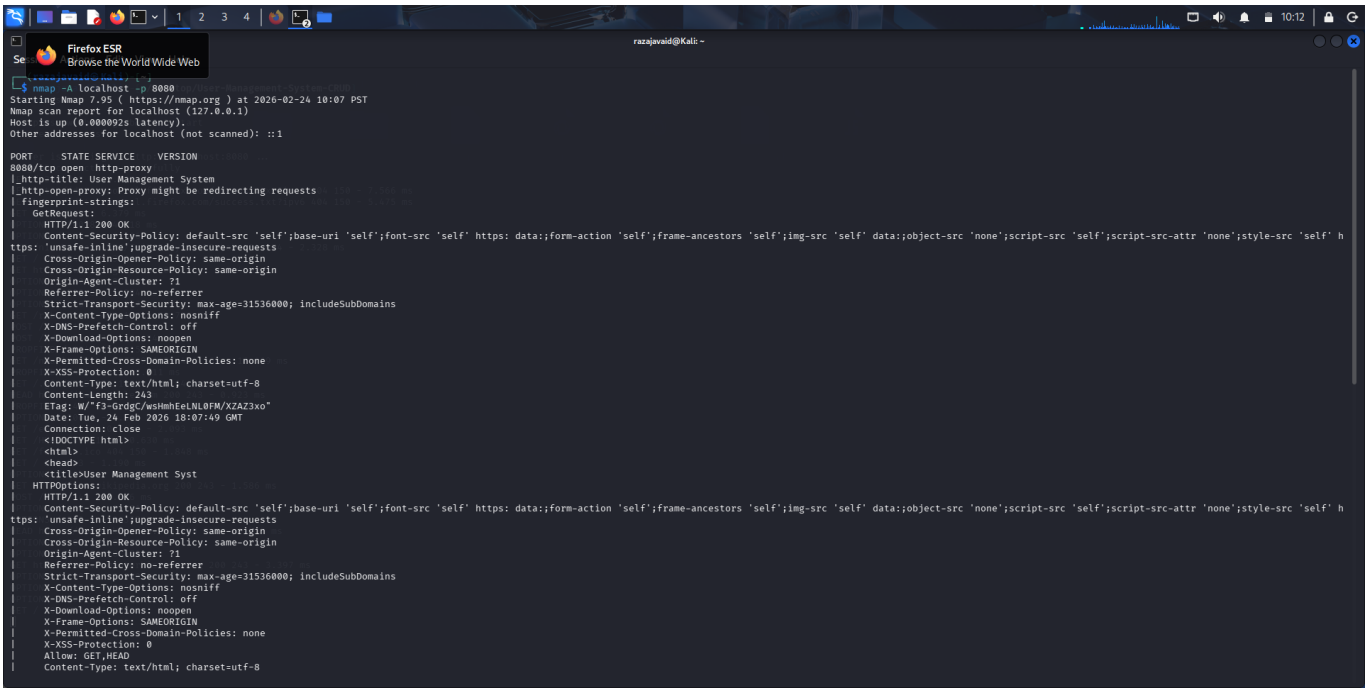
In Week 3 the team concentrated on advanced validation, penetration testing, logging/monitoring and final documentation. Key deliverables included:

- Penetration testing (network and browser-based).
- Winston logging integration.
- Security checklist and repository clean-up.
- Formal reports and evidence packaging.

Area	Outcome
Network scan	Nmap confirmed only port 8080 open; Helmet headers present
Browser tests	XSS & NoSQL injection blocked; password policy enforced
Logging	Requests & errors recorded in `security.log`
Documentation	Checklist and three reports completed

2. Penetration Testing

2.1 Nmap Scan



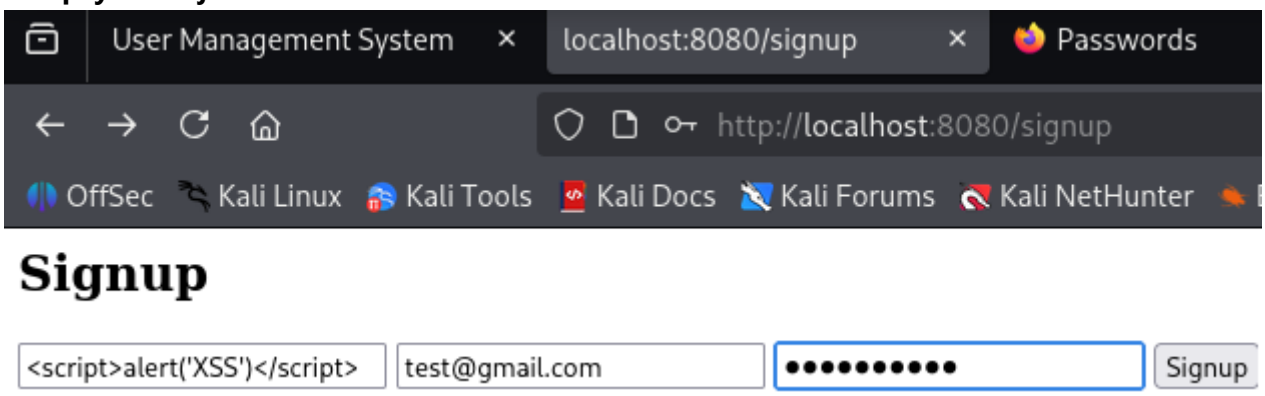
- Port **8080** open serving the application.

- Headers detected: `Content-Security-Policy`, `Strict-Transport-Security`, `X-Frame-Options`, etc.
- Confirms Helmet middleware is active and only the intended service is exposed.

2.2 Browser-Based Testing

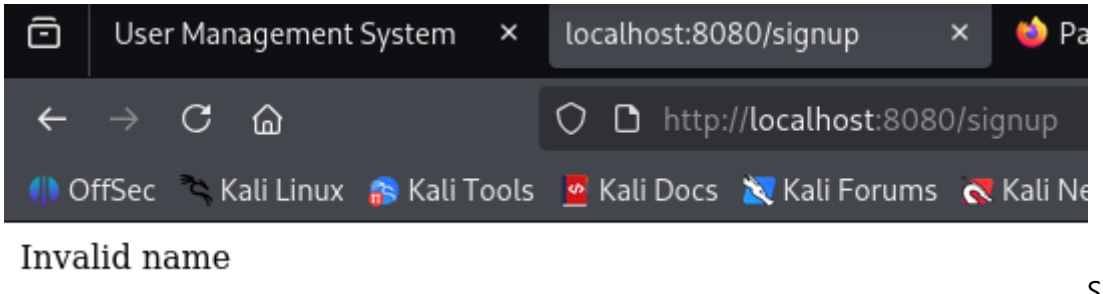
The screenshots are now displayed inline with descriptions to improve readability:

- **XSS payload injection**



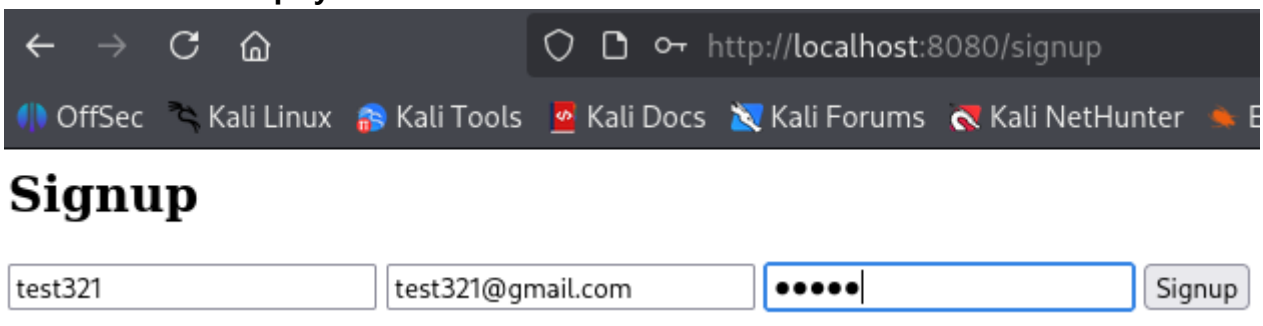
  The input field containing `<script>alert('XSS')</script>` was rejected, so no script execution occurred.

- **Invalid name characters**



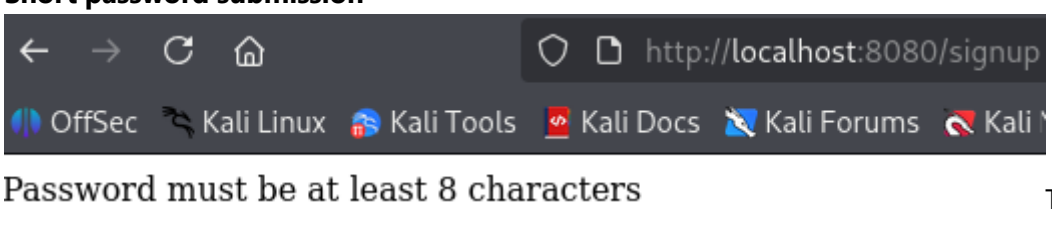
  Submitting a name with prohibited symbols produced an *Invalid name* error.

- **Weak credentials displayed**



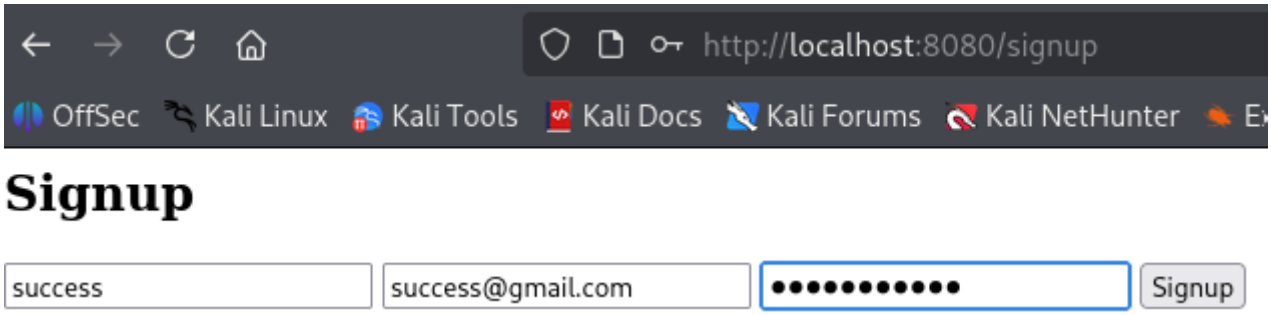
  The browser warned that the supplied password was weak.

- **Short password submission**

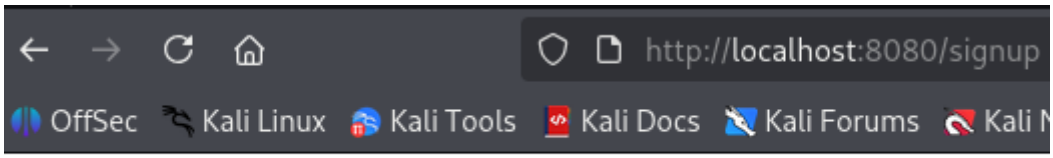


  Trying to register with `12345` triggered the message *Password must be at least 8 characters*.

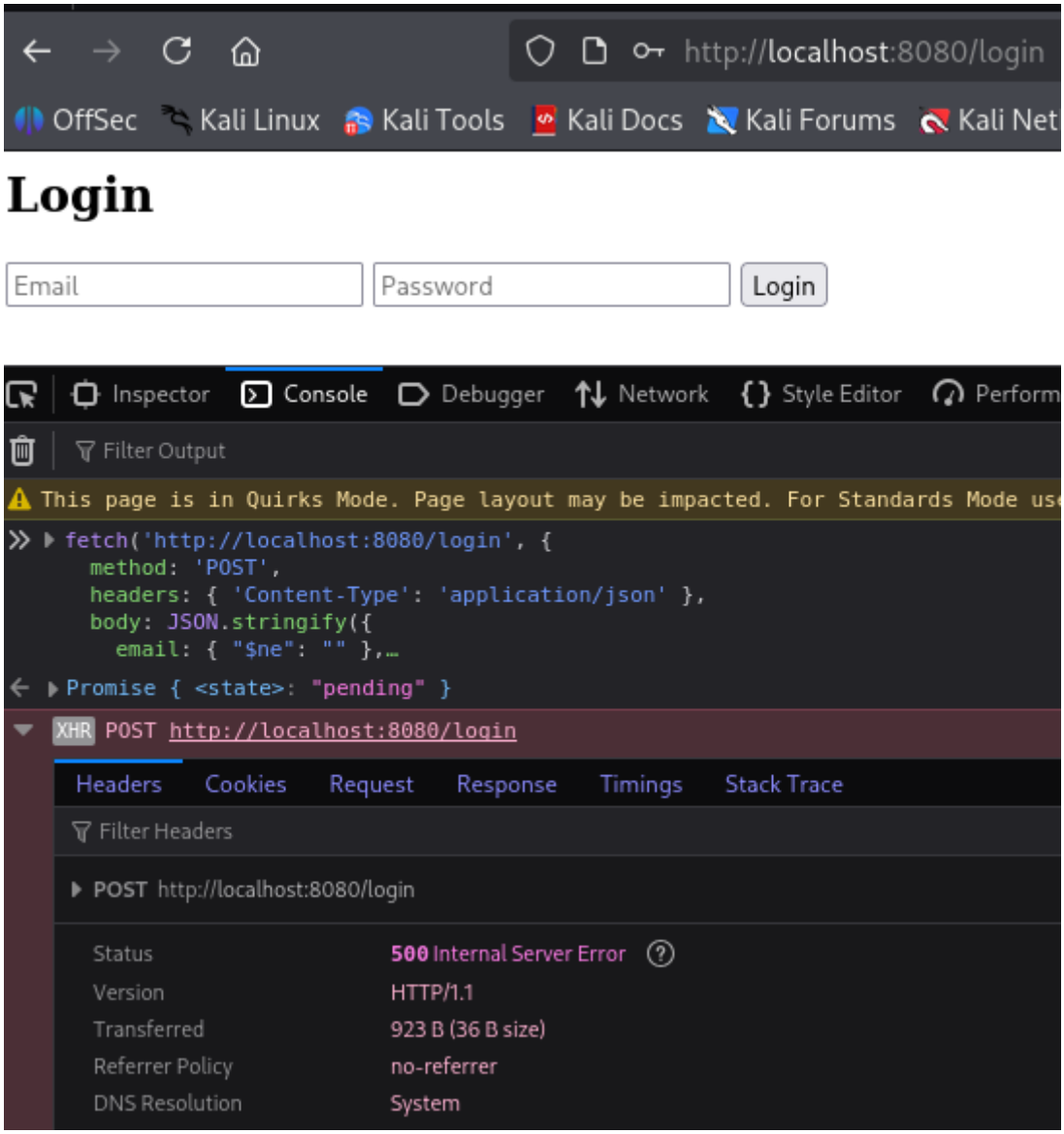
- **Correct signup form**



The form populated as expected with valid values.



- **Successful signup**
  The confirmation displayed *Signup successful: success* after valid input.
- **NoSQL injection attempt in console**



A crafted payload caused a 500 error, indicating the server rejects malformed query objects.

Each screenshot confirms that input validation, CSP, and sanitisation defend against common browser-based attacks.

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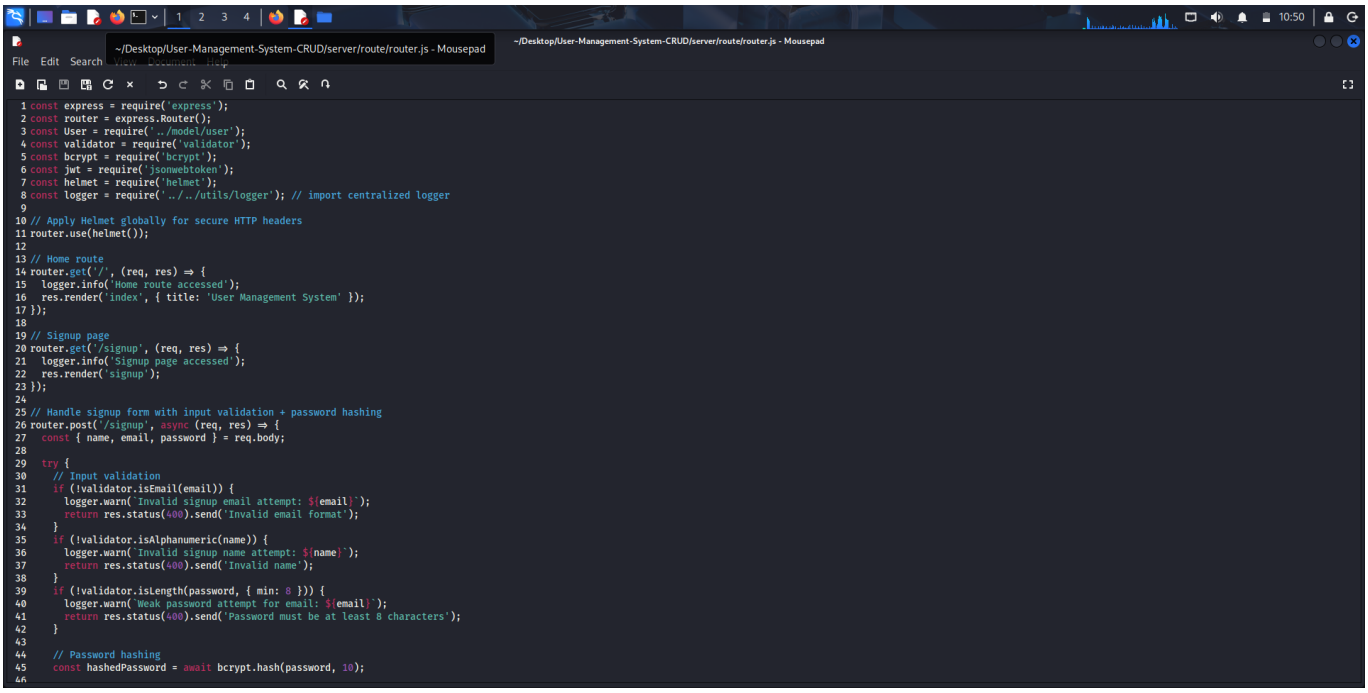
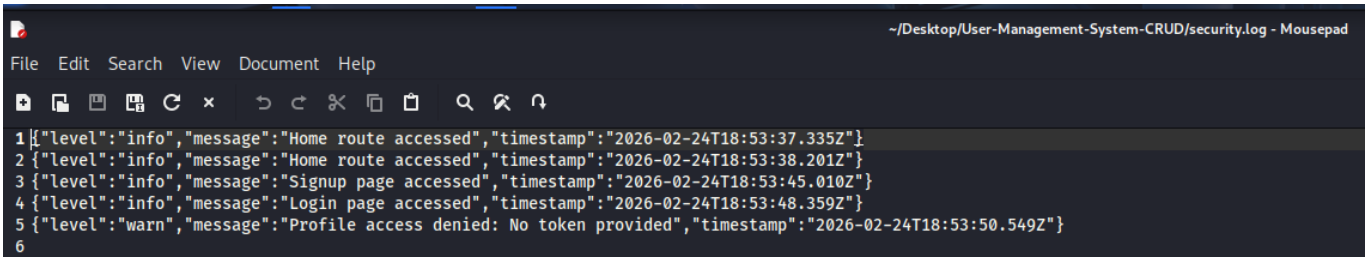
3. Logging & Monitoring



- Winston added to `router.js` with log levels for routes, signup/login and errors.

- Terminal output showing messages such as *Home route accessed* and *Profile access denied: No token provided*.



- `security.log` stores structured JSON events with timestamps, levels (`info`, `warn`) and descriptive messages.

- Provides an audit trail for suspicious activity.

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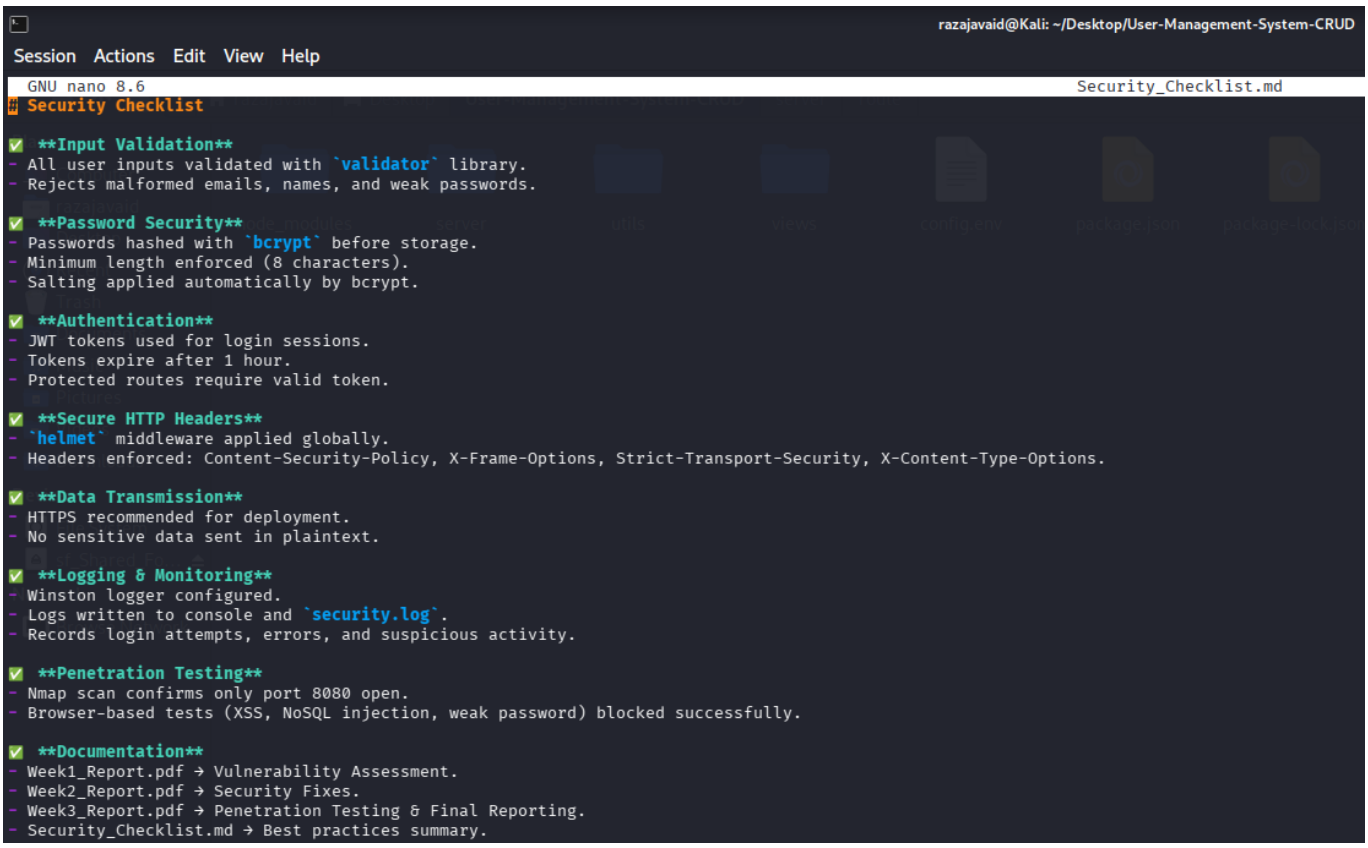
4. Security Checklist



The markdown checklist covers:

- Input validation & output encoding
- Password hashing & strength rules
- Authentication & authorization
- Secure headers (Helmet) and HTTPS
- Logging & monitoring
- Penetration testing procedures
- Documentation & reporting

A table of the main checklist items is included in the `Security_Checklist.md` file.

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5. Final Submission

Deliverables prepared for review:

Item	Location / Description
GitHub repository	Complete source, configs, and README files
Week 1 report	`Week1_Report.pdf` – vulnerability assessment
Week 2 report	`Week2_Report.pdf` – security fixes

Item	Location / Description
Week 3 report	`Week3_Report.pdf` – this document
Security checklist	`Security_Checklist.md`
Screenshots	`docs/screenshots` folder embedded in reports

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6. Conclusion

Week 3 activities validated that the security measures implemented in Week 2 are effective:

- Penetration testing showed resilience against XSS, NoSQL injection and weak passwords.
- Logging delivered visibility into application behaviour and potential abuse.
- Documentation artefacts (checklist and reports) complete the project lifecycle: **Identify** → **Fix** → **Validate** → **Document**.

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7. References

- Nmap Network Scanner
- Winston Logging Library
- OWASP Top 10 – 2021
- OWASP XSS Prevention Cheat Sheet
- Node.js Security Checklist
- Helmet.js Security
- Security checklist template

Additional resources documented in the `Security_Checklist.md` file.