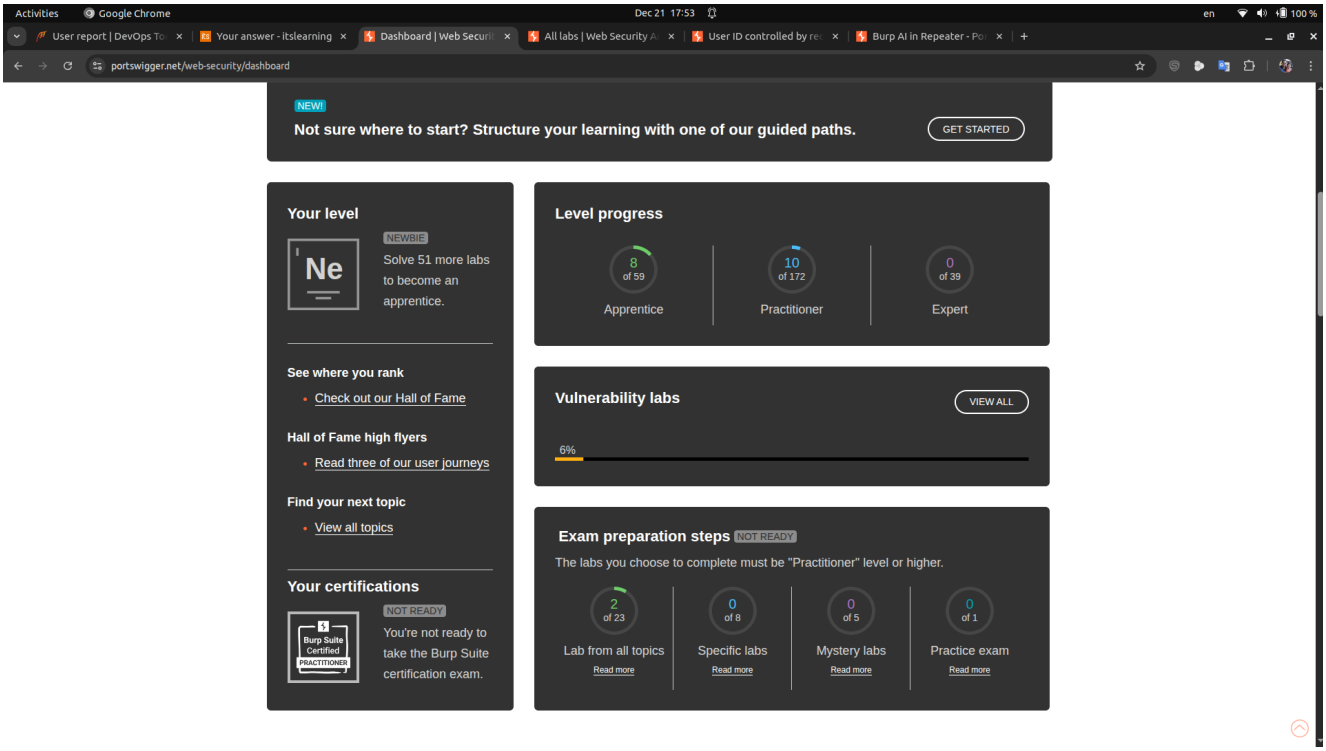
Final Report

PortSwigger

Screenshot of Completed Labs:



Completed Labs List:

SQL Injection

- SQL injection vulnerability in WHERE clause allowing retrieval of hidden data
- SQL injection vulnerability allowing login bypass
- SQL injection attack, querying the database type and version on Oracle
- SQL injection attack, querying the database type and version on MySQL and Microsoft
- SQL injection attack, listing the database contents on non-Oracle databases
- SQL injection attack, listing the database contents on Oracle
- SQL injection UNION attack, determining the number of columns returned by the query
- SQL injection UNION attack, finding a column containing text
- SQL injection UNION attack, retrieving data from other tables
- SQL injection UNION attack, retrieving multiple values in a single column

Access Control Vulnerabilities

- Unprotected admin functionality
- Unprotected admin functionality with unpredictable URL
- User role can be modified in user profile
- User ID controlled by request parameter

Authentication

- Username enumeration via different responses
- Password reset broken logic
- Username enumeration via subtly different responses
- Username enumeration via response timing

The Booking System Project

Phase 1: Initial Security Assessment

What was done:

- Deployed the booking system using Docker Compose.
- Performed a comprehensive vulnerability assessment using OWASP ZAP.
- The ZAP scan identified the following issues with part1 (zap_report_round1.md):
  - **High risk:**
    - Path Traversal (on /register, POST username)
    - SQL Injection (on /register, POST username)
  - **Medium risk:**
    - Absence of Anti-CSRF Tokens (on /register form)
    - Content Security Policy (CSP) Header Not Set (on / and /register)
    - Missing Anti-clickjacking Header (on / and /register)
  - **Low risk:**
    - Application Error Disclosure (HTTP 500 Internal Error on /register)
    - X-Content-Type-Options Header Missing (on multiple static resources)
- The ZAP scaned with part2 (zap_report_round2.md).

What worked:

- ZAP scans provided detailed and actionable findings for all major vulnerability categories.

- PortSwigger tests gave insight into SQL injection, access control vulnerabilities, authentication, etc.
- The Dockerized environment ensured consistent and reproducible testing.

What didn't work:

- Initial testing with Chrome header did not detect SQL injection risk.

Most time-consuming:

- Identifying Chrome header issue with ZAP.

What I learned:

- Gained a basic understanding of security risks and how to test a web application.
- Automated tools like ZAP are essential for uncovering a wide range of vulnerabilities, from critical injection flaws to missing security headers.
- Even simple web applications can have multiple layers of security issues that require both technical and configuration fixes.

Phase 2: Password Cracking

What was done:

- Used hashcat with `rockyou.txt` and `crackstation.txt` to crack password hashes (Phase2/Phase 2: Password Cracking.md).
- ZAP test also done (zap_report_round3.md).
- Compared dictionary and non-dictionary attacks.

What worked:

- Dictionary attacks were fast and effective for weak passwords.

What didn't work:

- Brute-force attacks were impractical for longer passwords.

Most time-consuming:

- Running hashcat on large wordlists. On my computer, it was not possible to run ?a?a?... for more than 7 combinations. Finally, I cracked the remaining passwords using another dictionary list.

What I learned:

- Password length and complexity are critical for security.

Phase 3: Authorization & Endpoint Testing

What was done:

- Conducted comprehensive authorization and endpoint testing for the booking system using browser-based manual testing, OWASP ZAP, and endpoint discovery tools (Gobuster, wfuzz, ffuf).
- Verified role-based access control for Guest, Reserver, and Administrator roles, and compared actual behavior to official specifications.
- Discovered and tested all accessible pages, functions, and API endpoints, including hidden/unlinked endpoints.
- For full details, see the Phase 3 Authorization & Endpoint Testing Report and zap_report_round4.md.

What worked:

- Most endpoints enforced role-based access as specified, with no authentication bypasses or privilege escalation vulnerabilities found.
- Automated scans (OWASP ZAP) did not detect any high or medium risk vulnerabilities; only informational alerts were noted.
- Error messages were generic and did not leak sensitive information.

What didn't work:

- Some API endpoints (e.g., `/api/users`, `/api/reservations`) were over-permissive and accessible to all roles, including guests, potentially exposing sensitive data or functionality.
- Backend checks for resource creation and reservation logic were inconsistently enforced (e.g., resource names not unique, double booking possible, inconsistent admin actions).
- UI and API access controls were not always aligned; some API endpoints were accessible even when UI pages were not.

Most time-consuming:

- Mapping all endpoints (including hidden/unlinked ones) and testing each role's access to every endpoint.
- Verifying backend business logic and cross-checking UI/API consistency.

What I learned:

- The importance of thorough endpoint discovery and role-based access testing, including both UI and API layers.
- Even when UI appears secure, backend APIs may expose additional risks if not properly restricted.

- Regular manual and automated security testing is essential to maintain robust access controls and prevent over-permissive exposure.

Phase 4: Privacy, GDPR, and Policies

What was done:

- Drafted and reviewed privacy policy, cookie policy, terms of service, and GDPR checklist (see Phase4).

What worked:

- Policies were aligned with GDPR requirements.

What didn't work:

- Ensuring all technical controls matched policy statements required extra review.

Most time-consuming:

- Mapping data flows and verifying compliance.

What I learned:

- Legal and technical compliance must go hand-in-hand.

Reflection

> This project and tasks provided hands-on experience in identifying, exploiting, and remediating common web vulnerabilities. I also learned how use cybersecurity software and tools. With beginning collapsed confidence about web application. But with time I learned the importance of both technical and policy controls in building secure systems. The iterative process of testing, fixing, and retesting was invaluable for understanding real-world security challenges.

Logbook

- **GitHub Repository:** https://github.com/Muditha-Kumara/IT00AK39-3005-Cybersecurity-and-data-privacy
- **Log Book:** https://github.com/Muditha-Kumara/IT00AK39-3005-Cybersecurity-and-data-privacy/blob/main/README.md
- **Total hours spent:** 104.4
- **Hours per topic:**

- PortSwigger Labs: 10.4
- Phase 1 (Assessment): 30
- Phase 2 (Password Cracking): 22
- Phase 3 (Authorization): 23
- Phase 4 (Policies & GDPR): 12
- Reporting & Documentation: 7

Feedback

- The course provided a comprehensive overview of both offensive and defensive security.
- More real-world case studies and activities would further enhance learning.
- The hands-on labs and project-based approach were especially valuable.
- Used more time to teach docker configuration. I think have to use that times to teach related to this important subject.