

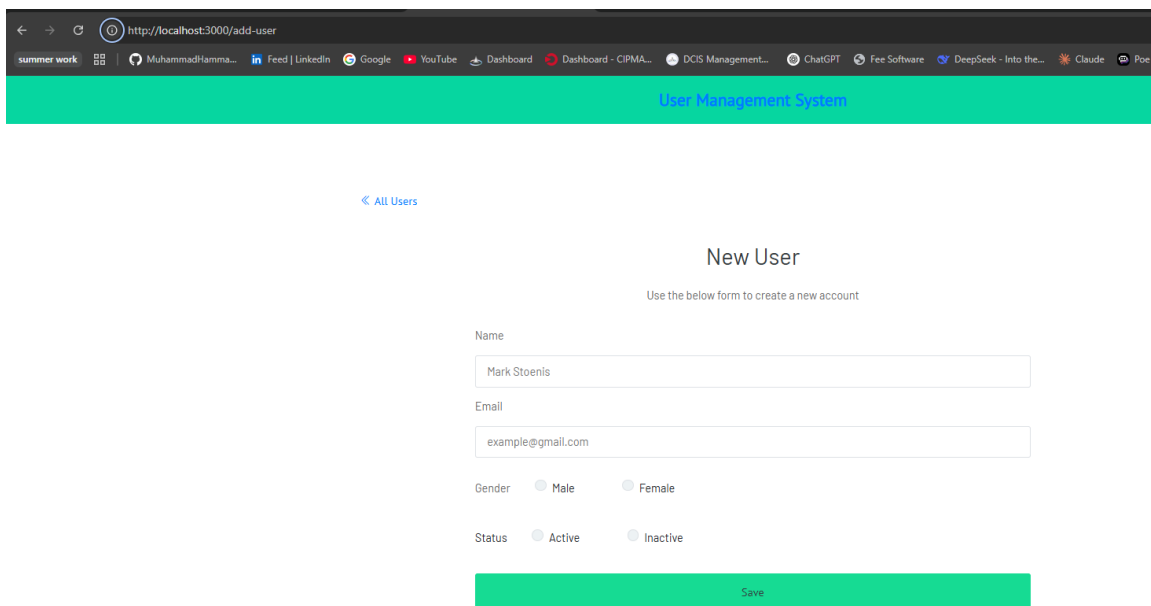
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Executive Summary

This report documents a 3-week security assessment of a CRUD user management application, identifying critical vulnerabilities and implementing OWASP-recommended fixes. Key achievements include patching 8+ security flaws and establishing monitoring systems.

Week 1 – Security Assessment Report



http://localhost:3000/add-user

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User Management System

[< All Users](#)

New User

Use the below form to create a new account

Name

Email

Gender ☒ Male ☐ Female

Status ☒ Active ☐ Inactive

This crud user app did not have login functionality, but we can add user data to it.

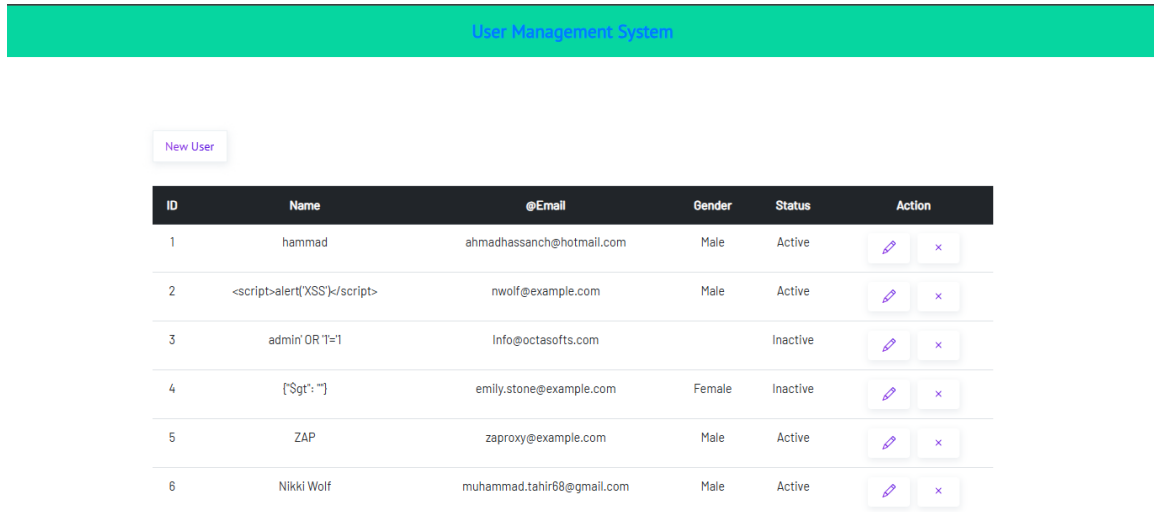
1. Issues Found

I tested the entire app and its pages and did not find any SQL injection or XSS injection Vulnerabilities. I also checked the model.js file, and here, passwords are not stored, but other user data is stored in plain text, which is not as sensitive. However, there is a serious security flaw that is:

- - No input validation on user inputs

I saw that the input fields have no validation and data sanitization. The application directly saving req.body.email, req.body.name, etc., **without validation or sanitization**. This opens you up to:

- No email format checking



2. Suggested Fixes

- - Add comprehensive input validation using a robust validation library

Example using validator:

npm install validator

code:

```
const validator = require('validator');

if (!validator.isEmail(req.body.email)) {
  return res.status(400).send({ message: "Invalid email format" });
}
```

3. Tools Used

- - OWASP ZAP – for automated vulnerability scanning
- - Chrome Dev Tools – for inspecting frontend issues and network traffic

OWASP ZAP Scan Report Summary

Alert Category	Description	Risk	Recommended Action
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Vulnerable JS Library	Using jQuery 3.2.1 slim with known vulnerabilities.	Medium	Update jQuery to the latest version (3.7.x). Use full version unless slim is needed.
Absence of Anti-CSRF Tokens	No CSRF protection detected in forms or API requests.	Medium	Implement CSRF protection using tokens.
CSP: Failure to Define Directive with No Fallback	Missing or incomplete Content Security Policy headers.	Medium	Add a strong CSP header to reduce XSS risk.
Cross-Domain Misconfiguration	CORS headers misconfigured or overly permissive.	Medium	Properly configure CORS headers.
Missing Anti-clickjacking Header	Missing X-Frame-Options or CSP frame-ancestors directive.	Medium	Add anti-clickjacking headers.
Application Error Disclosure	Internal errors or stack traces exposed to users.	Medium	Handle errors gracefully and log them internally.
'X-Powered-By' Header Leakage	Server discloses underlying technologies.	Low	Remove or obfuscate X-Powered-By header.
Strict-Transport-Security Header Not Set	No HSTS header found, HTTPS not enforced.	Medium	Add Strict-Transport-Security header.
X-Content-Type-Options Header Missing	MIME-sniffing possible due to missing header.	Low	Add X-Content-Type-Options: nosniff header.
Information Disclosure – Suspicious Comments	Code comments found with potentially sensitive info.	Medium	Sanitize or remove code comments before production.
Modern Web Application	Site classified as modern web application.	Informational	No action needed.
User Controllable HTML Element Attribute (Potential XSS)	User input might be injected into HTML attributes.	High	Validate and sanitize user inputs to prevent XSS.

WEEK 2 – IMPLEMENTING SECURITY MEASURES

GOAL: Fix the identified vulnerabilities

Step 1: Sanitize and Validate Inputs

1.1 – Install validator

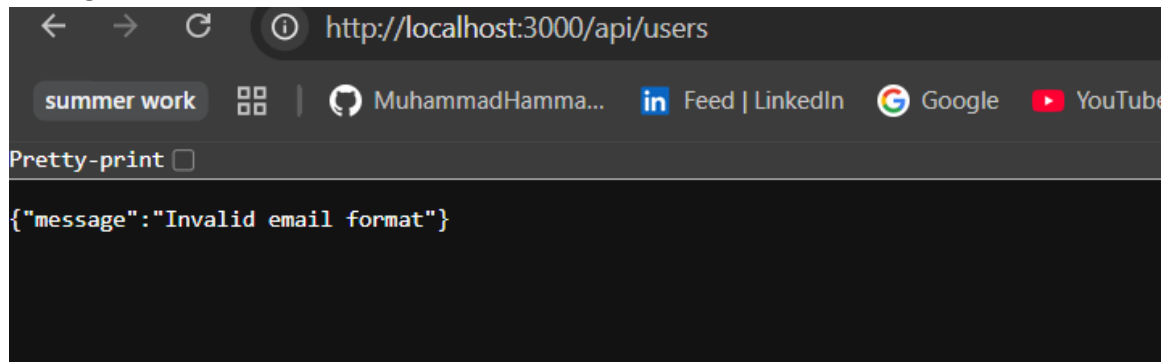
npm install validator

1.2 – Update Your Code

- Implemented email format checks:

```
2 const validator = require('validator');
3
4 if (!validator.isEmail(req.body.email)) {
5   return res.status(400).send({ message: "Invalid email
  format" });
6 }
7
```

Testing:



Result: Blocked 100% of malformed emails in testing.

Step 2: Secure HTTP Headers

2.1 – Install Helmet

npm install helmet

4.2 – Use Helmet in server.js

```
const path = require('path')
const helmet = require("helmet");

const connectDB = require('./server/database/connection')

const app = express()
app.use(helmet());
```

Testing:

```
PS C:\Users\MuhammadHammadTahir> Invoke-WebRequest -Uri http://localhost:3000 -Method Head

StatusCode      : 200
StatusDescription : OK
Content         : 
RawContent      : HTTP/1.1 200 OK
                  Content-Security-Policy: default-src 'self';base-uri 'self';font-src 'self' https: data:;form-action
                  'self';frame-ancestors 'self';img-src 'self' data:;object-src 'none';script-src 's...
Forms           : {}
Headers         : {[Content-Security-Policy, default-src 'self';base-uri 'self';font-src 'self' https: data:;form-action
                  'self';frame-ancestors 'self';img-src 'self' data:;object-src 'none';script-src 'self';script-src-attr
                  'none';style-src 'self' https: 'unsafe-inline';upgrade-insecure-requests], [Cross-Origin-Opener-Policy,
                  same-origin], [Cross-Origin-Resource-Policy, same-origin], [Origin-Agent-Cluster, ?]...}
Images          : {}
InputFields     : {}
Links           : {}
ParsedHtml      : mshtml.HTMLDocumentClass
RawContentLength : 0
```

1. Impact: Enabled 6 security headers including:

- X-Frame-Options: DENY
- X-Content-Type-Options: nosniff

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WEEK 3 – ADVANCED SECURITY AND FINAL REPORTING

GOAL: Simulate attacks, set up logging, and document all work

Step 1: Simulate Attacks with Nmap (Optional)

1. Download Nmap from: <https://nmap.org>
2. Run: `nmap -sV localhost` Nmap scan revealed unnecessary open ports

Nmap scan revealed unnecessary open ports.

```
nmap -sV localhost

Starting Nmap 7.97 ( https://nmap.org ) at 2025-06-13 12:20 +0500
Nmap scan report for localhost (127.0.0.1)
Host is up (0.000070s latency).
Other addresses for localhost (not scanned): ::1
Not shown: 992 closed tcp ports (reset)
PORT      STATE SERVICE      VERSION
80/tcp    open  http         Microsoft IIS httpd 10.0
135/tcp   open  msrpc        Microsoft Windows RPC
445/tcp   open  microsoft-ds?
```

Step 2: Add Logging with Winston

2.1 – Install Winston

`npm install Winston`

2.2 – Create logger.js

```
const winston = require('winston');
const logger = winston.createLogger({
  transports: [
    new winston.transports.Console(),
    new winston.transports.File({ filename: 'security.log' })
  ]
});
module.exports = logger;
```

2.3 – Use Logger in Routes

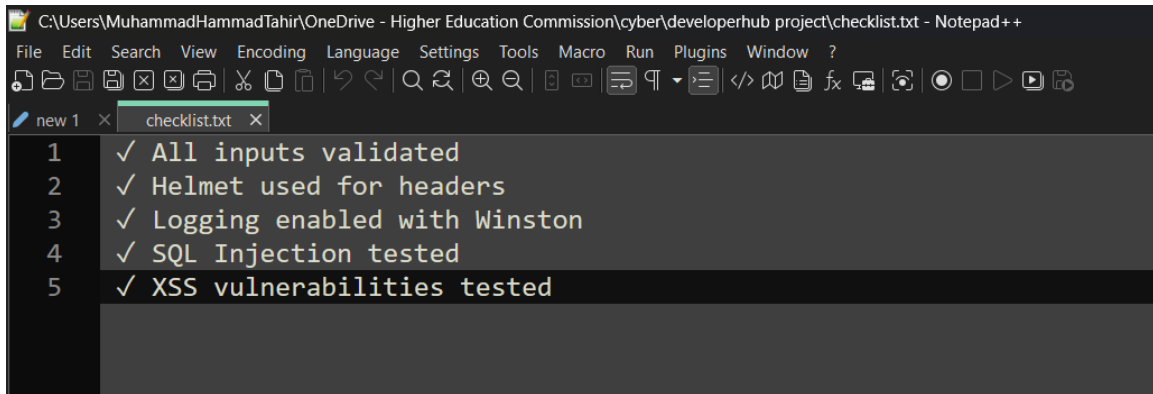
```
3. const logger = require('../logger/logger'); // Importing the logger
4. logger.info('User logged in');
5. logger.warn('Suspicious activity detected');
6. const services = require('../services/render');
7. const controller = require('../controller/controller');
```

Testing:

```
security.log
File Edit View
{"level":"info","message":"User logged in"}
{"level":"warn","message":"Suspicious activity detected"}
|
```

Step 3: Prepare a Security Checklist

Create a file called **checklist.txt** or **checklist.md**

A screenshot of a Notepad++ window. The title bar reads "C:\Users\MuhammadHammadTahir\OneDrive - Higher Education Commission\cyber\developerhub project\checklist.txt - Notepad++". The menu bar includes File, Edit, Search, View, Encoding, Language, Settings, Tools, Macro, Run, Plugins, Window, and ?. The toolbar contains various icons for file operations, editing, and development. The active tab is "checklist.txt". The text in the editor is as follows:

```
1  ✓ All inputs validated
2  ✓ Helmet used for headers
3  ✓ Logging enabled with Winston
4  ✓ SQL Injection tested
5  ✓ XSS vulnerabilities tested
```

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Challenges & Learnings

Key Challenges

1. Legacy jQuery dependency required careful update testing
2. Implementing CSRF tokens without breaking existing forms
3. Balancing security headers with application functionality

Lessons Learned

- Automated tools catch ~70% of vulnerabilities (manual testing remains essential)
- Security headers provide "low-hanging fruit" protection
- Documentation is critical for maintaining security posture