HACKING AUTHENTICATION CHECKS IN WEB APPLICATIONS

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• 10 years of IT industry experience
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• Hacking Authentication Checks in Web Applications
  ▪ Hacking Application Designs
  ▪ Hacking J2EE Container Managed Authentication
  ▪ Hacking Control Flow in J2EE
  ▪ Hacking Insecure POSTBACK implementation in .NET
HACKING APPLICATION DESIGNS
• Applications usually designed using **MVC** – A model-view-controller technique
• There is logical segregation of code
• Components interact with each other in **sequence**

![Diagram of MVC architecture](image-url)
If we have to implement an **authentication check** in this sequence where would we place it?
Most developers place it **here**

**Assumption:** Forms and Pages presented as views in the application will be accessed first. These forms or pages are the only way to send form submissions or internal requests for changing data.
Let's see what goes wrong

Unauthenticated Request

Central Controller → Business Logic

Auth Check

View Logic

ERROR PAGE

INCORRECT PLACEMENT

Request gets processed here!!!

Task Achieved by the attacker
DEMO –
Unauthorized access due to incorrect placement of checks
• **Security Measures:**
  - Place all validation checks before request processing logic
HACKING J2EE CONTAINER
MANAGED AUTHENTICATION
• J2EE Contained Managed Authentication
  - Configuration of “security-constraints” in deployment descriptor – web.xml
  - Responsible for blocking unauthenticated access to internal resources

× An attack similar to CSRF can be performed by a remote hacker to bypass authentication
• Typical Flow of Container Managed Authentication

User

Web Server

1. Request any internal page

2. Redirect the user to the login page

3. Login request

4. Redirect the user to internal page, requested in step 1

Server Maintains a Copy of the Previous request in Session

Internal Request Page saved in session
• **The Catch?**
  - Server Maintains a Copy of the Previous request in Session
  - Once the user is authenticated the server process the request previously stored

× An **attacker** can send any POST request for an internal action via a CSRF technique, when an unsuspecting victim logs in, the internal action will get processed.
DEMO –
Hacking J2EE Container Managed Authentication
• **Similarity with CSRF:** The only requirement is that the user must login after the malicious unintended request has been sent to the server using the same browser.

• **Local Attack:** A local attacker may forge a request from victim’s browser, and keep the login page open. When the victim logs in, the malicious request will get executed.
• **Security Measures:**
  - All requests that result in change of data, transactions, should be accompanied with a token
    - Token should be unique for each user session
    - Token should be random making it difficult to guess
    - Should be always validated at the server
HACKING CONTROL FLOW IN J2EE
String username = session.getAttribute("user");
if (username == null)
{
    response.sendRedirect("Access Denied Page");
}
...

Business Logic Processing
• But what is wrong in it?

```java
String username = session.getAttribute("user");
if (username == null)
{
    response.sendRedirect("Unauthorized Page");
}
....
Business Logic Processing
```
I am checking for an authenticated session
And I am then redirecting unauthenticated user

```java
String username = session.getAttribute("user");
if (username == null) {
    response.sendRedirect("Access Denied Page");
}
...
Business Logic Processing
```
Have you ever wondered, what if the execution do not stop here?

```java
String username = session.getAttribute("user");
if (username == null) {
    response.sendRedirect("Access Denied Page");
}
....
```

Business Logic Processing
Business logic would get executed even for unauthenticated request.

```java
String username = session.getAttribute("user");
if (username == null) {
    response.sendRedirect("Access Denied Page");
}
```
× The **execution flow** does not **stop** after the `response.sendRedirect` call

× Entire page is processed and then the user is redirected to error page

× Thus, the business logic remains unprotected
DEMO – Unauthorized access due to control flow flaw
• **Security Measures:**
  - Terminate the execution flow after redirection call.

```java
String username = session.getAttribute("user");
if (username == null)
{
    response.sendRedirect("Access Denied Page");
    return;
}

Business Logic Processing
```
HACKING INSECURE POSTBACK AUTHENTICATION IN .NET
• **POSTBACK**
  - POSTBACK in ASP.NET is an event that occurs whenever an action is performed by a control in the ASP.NET page

• **ISPOSTBACK?**
  - Property of ASP.NET Page that allows developers to check if page is “called” or “refreshed” as a result of a control event OR called for the first time
Mixing authentication check and ISPOSTBACK

```csharp
protected void Page_Load(object sender, EventArgs e)
{
    if (!IsPostBack)
    {
        lblTitle.text = "Create Employee"
        
        if (!Request.IsAuthenticated)
        {
            Response.Redirect("~/Error.aspx");
        }
    }
}
```
• **Assumption**: A form will be accessed by an authenticated user first time only by clicking on a link that displays the form

× An **attacker** can send a POST request for creating a new employee.

× The *IsPostBack* condition will fail and therefore will not invoke the authentication check
DEMO –

Hacking insecure POSTBACK based authentication check in ASP.NET
• **Security Measures:**
  - IsPostBack property check should be independent of the authentication check.

```csharp
protected void Page_Load(object sender, EventArgs e)
{
    If (!IsPostBack)
    {
        lblTitle.text = “Create Employee”
    }

    If (!Request.IsAuthenticated) {
        Response.Redirect(“~/Error.aspx”);
    }
```
• **Closing Notes**

- Authentication flaws can be avoided by placing careful consideration to design and the way applications behave
  - Is the placement of authentication check correct?
  - Is it secure your processing logic?
  - Is there a control flow behavior that you need to test?
Questions
Blogs and Reference

• [http://artechtalks.blogspot.in/2013/02/j2ee-container-managed-authentication.html](http://artechtalks.blogspot.in/2013/02/j2ee-container-managed-authentication.html)

• [http://artechtalks.blogspot.in/2013/02/insecure-postback-based-authentication.html](http://artechtalks.blogspot.in/2013/02/insecure-postback-based-authentication.html)


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