

Ethical Hacking in Action

Exploiting Vulnerabilities in a Pet Adoption Website

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Abstract

For our comps, we have designed and implemented a path of vulnerabilities leading to intrusion into a server of a pet adoption website. Through this demo, our goal is to illustrate how these attacks work, educate ethical hackers, and raise awareness about common vulnerabilities.

Outside the server

Cracking Admin's Password

admin:\$5\$dcjLV402R8a\$ec3cb65a8a7888dbdec994e3d013a16...

what does this mean?

- user is "admin"
- password is encrypted with SHA-256, \$5\$

what is sha-256?

- hashing algorithm

how to decode it?

- you cannot!
- hashing algorithms are designed to go "one-way"

a brute-force approach to obtaining admin's decrypted password

rainbow tables

- rockyou.txt
- 14 million passwords

hashcat script

for each possible password in rockyou
if sha256(salt || possible password) == digest

Blind SQL Injection

The attacker can ask the database true or false questions and determine the answer based on what the website displays (rather than on the explicit results of the query)

```
http://192.168.64.5/pet.php?id=2 AND (SELECT  
ascii(SUBSTR((SELECT password FROM users),1,1))) = 102
```

```
SELECT name, type, breed, age, sex, vaccinations,  
description FROM pets WHERE id = 2 AND (SELECT  
ascii(SUBSTR((SELECT password FROM users),1,1))) = 102
```

True



Name: Cotton
Type: Bunny
Age: 1
Sex: Male
Breed: Holland Lop

False

Name:
Type:
Age:
Sex:
Breed:

Through a series of true/false questions, the attacker can eventually extract the admin's password hash

Discussion Questions:

- How to prevent this?
- When is it appropriate to use blind SQL injection instead of simpler attack?

File Upload Attack

Once logged in as admin, the attacker can add pets to the database and upload files. To prevent attacks, the site validates a file's type and size

However, by changing the initial bytes of a file's header, the attacker can convince a server that a malicious php webshell is a harmless image.

Add a New Pet

Name:

Type:

Age:

Vaccinations up to date: ☐

Description:

Upload Picture:

Setuid and \$PATH Injection

The setuid command allows a user to run a specific program with elevated permissions.

Admin can run this code as root ->

```
setuid(0);  
system("apt update");  
system("apt upgrade");
```

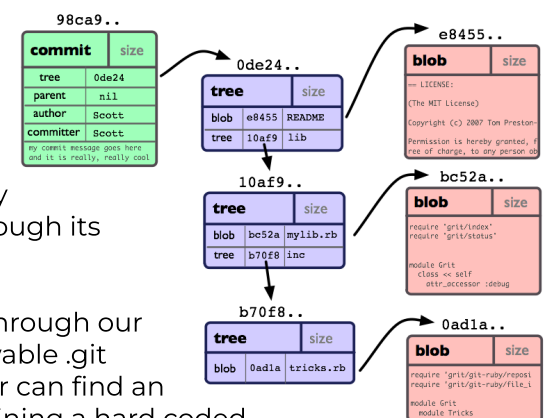
```
mkdir /tmp/foo  
echo /bin/sh > /tmp/foo/apt  
PATH=/tmp/foo:$PATH
```

<- Adjusting \$PATH changes 'apt' reference, enabling root shell access.

Exposed .git Folder

Despite removing all hard coded passwords from our website's git repository, its history can be fully reconstructed through its .git folder.

Thus, by looking through our site's publicly viewable .git folder, the attacker can find an old commit containing a hard coded password for the admin account on the server.



```
Commit eba3433b1b5406f6e375733686ff5ce21fb9e958  
Author: ForeverFriendsAdoption  
Tree: 87c594a751c68fb3291ec4c9cdfb21bc97c6e530
```

Getting rid of hard coded passwords

Discussion questions:

- How does .git store the entire repository's history?
- How is this vulnerability exploited?
- How can I protect myself and my passwords?

Root Permissions

Citations and Acknowledgments

Thank you Jeff Ondich for all your help advising us on our comps. Please scan the QR code to see our references.

