

## Web Security III

### Question 1 *Web Security Wrap-Up: UI-Based Attacks and Privacy* ()

#### (a) Phishing

A phishing attacker tries to gain sensitive user information by tricking users into going to a fake version of a website they trust. The attacker might convince the user to go to what *appears* to be their bank and to enter their username and password.

- i. What are some ways that attackers try to fool users about the site they are going to? How do they convince people to click on links to sites?
- ii. What are some defenses you should employ against phishing?

#### **Solution:**

- i. Attacks include:

Sub domains that look like top level domains.

Look alike UNICODE urls: bankofamerca.com, bankofthevest.com

Look alike unicode characters.

Mentioning recent information. Compromising an email account and then sending emails to people that account has recently corresponded with.

- ii. Defenses include:

Use a browser-integrated password manager, it will automatically fail to fill in your password if the website is not legitimate.

Do not click on unexpected links in emails.

If your bank sends you an email about your account, go to your browser and separately type in the banks url, or call them. Do not click on links to sensitive sites that others provide you.

Type sensitive domains directly into the address bar, or create a short cut that way and then use it.

Some phishing emails or sites are not very well crafted. Subtle language or spelling errors, that should be out of place for the legitimate site, can be a warning sign that you should heed.

(b) **Web Tracking**

What kind of information do sites gain about you when you visit them? How could a business learn about many of the sites you visit and construct a detailed profile of you based on your web habits?

**Solution:** Technical information: the time of the request, your browser, OS, language, screen size, screen resolution, IP, and general location from your IP address.

What you requested: a search term, a news article.

The site also receives any cookies for that domain, allowing it to provide continuity of an activity that spans several pages, or required a login.

A business that provides ad analytics services can have client websites provide any information about you to the ad company as part of an image request. They can also plant and retrieve cookies associated with your identity any time you visit a client website, even if you never visit the ad company's website yourself.

## Question 2 *Clickjacking*

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In this question we'll investigate some of the click-jacking methods that have been used to target smartphone users.

- (a) In many smartphone browsers, the address bar containing the page's URL can be hidden when the user scrolls. What types of problems can this cause?

**Solution:** If the real address bar is hidden, it's much easier for an attacker to create and place their own on the website, fooling victims into thinking they're browsing on sites they aren't. JavaScript can scroll the page, hiding the address bar as soon as the page loads, allowing an attacker complete freedom to place a fake address bar.

For more info, check out

[https://www.usenix.org/legacy/event/upsec/tech/full\\_papers/niu/niu\\_html/niu\\_html.html](https://www.usenix.org/legacy/event/upsec/tech/full_papers/niu/niu_html/niu_html.html) (section 4.2.2)

- (b) Smartphone users are used to notifications popping up over their browsers as texts and calls arrive. How can attackers use this to their advantage?

**Solution:** By simulating an alert or popup on the website, an attacker can fool users into clicking malicious links. This can allow attackers to pose as phone applications such as texting apps or phone apps, which enables phishing.

- (c) QR codes haven't taken off and become ubiquitous like some thought they would. Can you think of any security reasons why this might be the case?

**Solution:** QR codes placed in public places are perfect targets for people with malicious websites. They can post their own, pretending to be links to useful websites, and instead linking to phishing sites. Or, they can modify and paste over existing codes, which only keen observers would notice.

### Question 3 *Introduction to Networking*

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- (a) **TCP and UDP** The transmission control protocol (TCP) and user datagram protocol (UDP) are two of the primary protocols of the Internet protocol suite.
- i. How do TCP and UDP relate to IP (Internet protocol)? Which of these protocols are encapsulated within (or layered atop) one another? Could all three be used simultaneously?
  - ii. What are the differences between TCP and UDP? Which is considered “best effort”? What does that mean?

#### **Solution:**

- i. TCP and UDP both exist within the transport layer, which is one layer above IP (network layer). Either can be encapsulated in IP, referred to as TCP/IP and UDP/IP. TCP and UDP are alternatives; neither would normally be encapsulated within the other.
- ii. TCP provides a *connection-oriented, reliable, bytestream* service. It includes sophisticated rate-control enabling it to achieve high performance but also respond to changes in network capacity. UDP provides a *datagram-oriented, unreliable* service. (Datagrams are essentially individual packets.) The main benefit of UDP is that it is lightweight.

“Best effort” refers to a delivery service that simply makes a single attempt to deliver a packet, but with no guarantees. IP provides such a service, and because UDP simply encapsulates its datagrams directly into IP packets with very little additional delivery properties, it, too, provides “best effort” service.