Overtaking Google Desktop

Leveraging XSS to Raise Havoc

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Presentation Outline

- Background
- Google Desktop Overview
- Overtaking Google Desktop – Step by Step
- Impact
  - What harm can a malicious attacker do?
  - Attack characteristics
- Lessons learned
- Q&A

Background

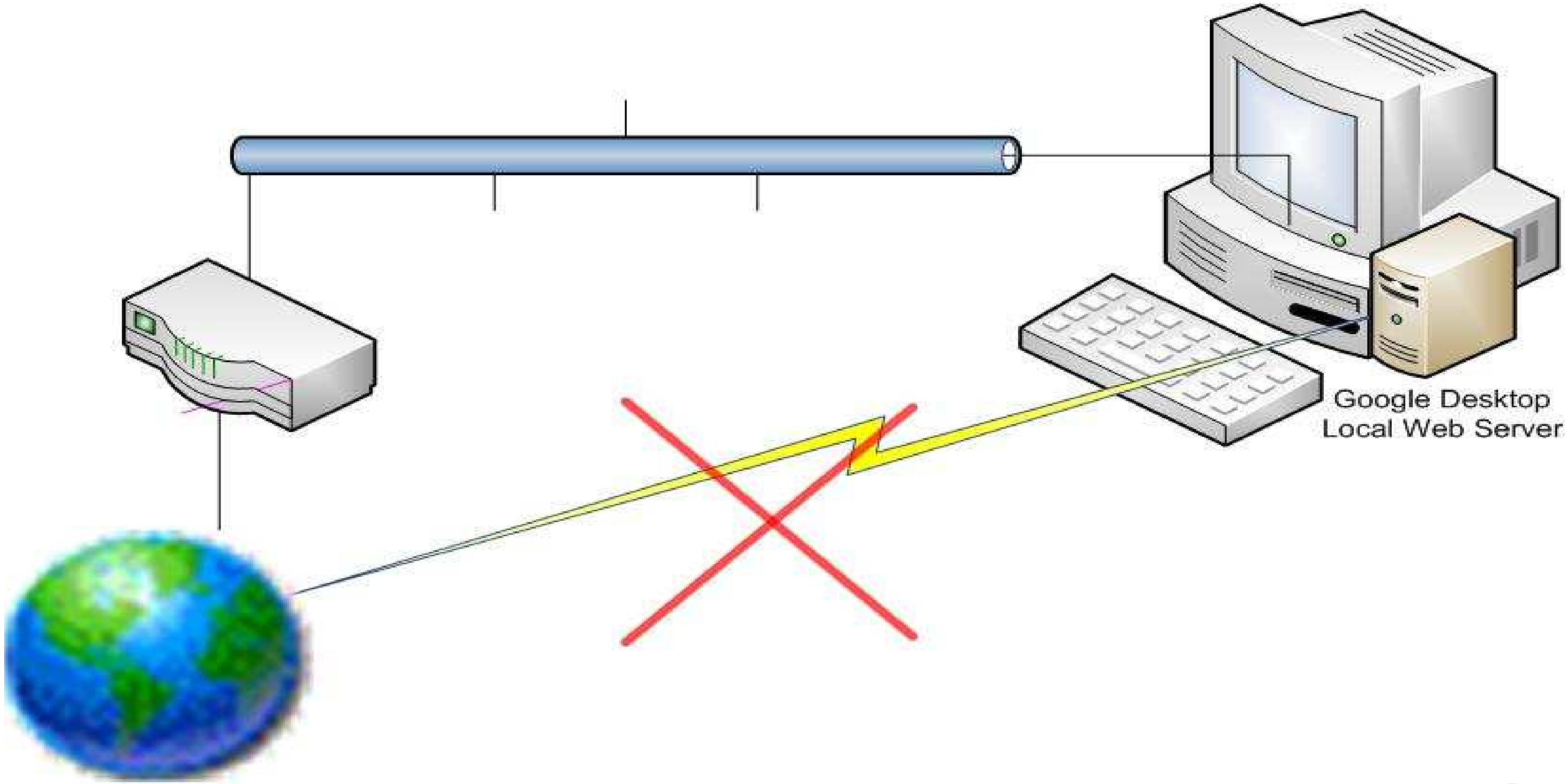
- XSS
  - The most widespread web-application vulnerability
    - *WASC Web Application Security Statistics Project* (http://www.webappsec.org/projects/statistics/)
  - Used to be perceived as an identity theft attack
  - XSS has so much more to offer. It has teeth!
    - Change settings and steal data from attacked victim account
    - Web worms (Samy)
- What we are about to see…
  - Stealth attack
  - Sensitive information theft from the local computer
  - Command execution

Google Desktop - Overview

- Purpose: provide an easily to use and powerful search capability on local and other personal content
- Some traits:
  - Runs a local web-server for interaction (port 4664)
    - Google.com like interface
  - Uses a service to run the indexing
  - User interface is almost purely web
  - Preferences control what to index, and indexing can be broad
    - Office documents, media files, web history cache, chat sessions, etc.
    - Easily extendible
  - Special integration with Google.com

Google Desktop Security Mechanisms

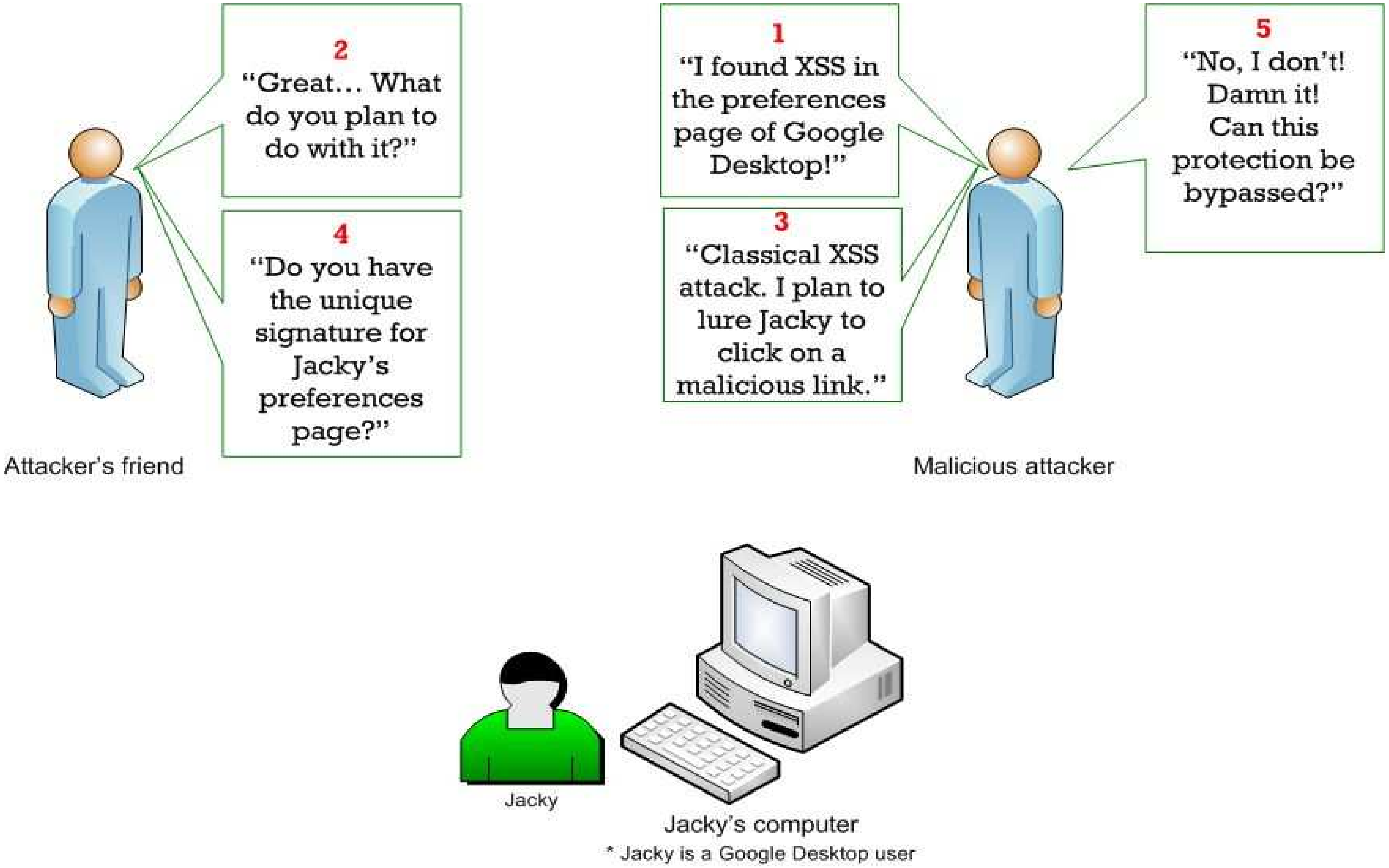
- Web server only accessible from localhost
  - Not available from network



Google Desktop Protection Mechanism (cont.)

- The main threats are XSS and XSRF attacks.
- Every request (except some images) has a unique signature
  - Signature is generated using a strong key stored in the registry
  - If signature doesn’t match query, request is denied
  - Key is different per installation
    - Signatures cannot be deduced from one installation to another.
  - A powerful protection against XSS and XSRF.

Signatures Protection Strength Example



2
"Great… What do you plan to do with it?"

4
"Do you have the unique signature for Jacky's preferences page?"

Attacker's friend

1
"I found XSS in the preferences page of Google Desktop!"

3
"Classical XSS attack. I plan to lure Jacky to click on a malicious link."

5
"No, I don't! Damn it! Can this protection be bypassed?"

Malicious attacker

Jacky

Jacky's computer

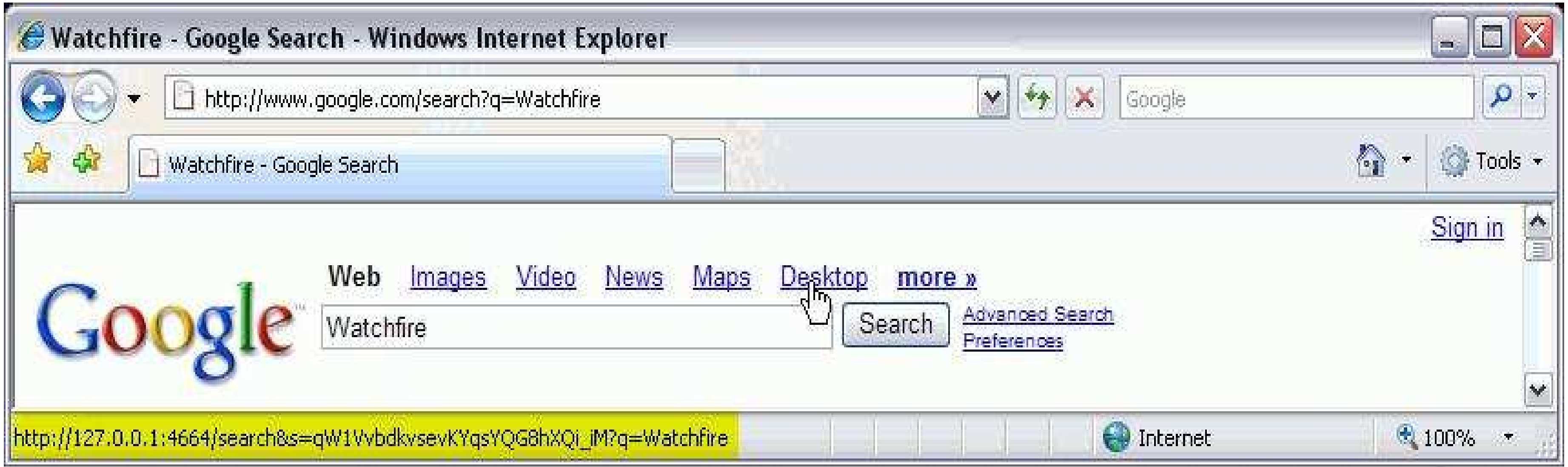
* Jacky is a Google Desktop user

Google Desktop Vulnerability – Sticky XSS

- Available through the “under” keyword
  - For searching under specific folders in the hard-drive or a network drive.
- XSS is Sticky
  - Saved in the history of the “under” option
- Stickiness applies to all search results
  - “Under” history shown on all search results (added for usability)
- Stickiness requires 3 “overwrites” to be cleared
- How can this vulnerability be exploited, given the protection mechanisms?
  - http://127.0.0.1:4664/search?q=under:**XSS_PAYLOAD**&flags=68&num=10&s=**9pKHqow9s-J4YfGgBjGF75g-ZwM**

Google Desktop & Google.com integration

- Google Desktop interjects between browser and website, and adds content
  - Google Desktop search results are displayed in Google.com's results
  - 'Desktop' link – our way in…



Watchfire - Google Search - Windows Internet Explorer

http://www.google.com/search?q=Watchfire

Watchfire

http://127.0.0.1:4664/search&s=qW1VvbdkvsevKYqsYQG8hXQi_iM?q=Watchfire

Google Desktop & Google.com integration: Our way in

- JavaScript on site has access to modified content
- Signature can be harvested
  - Interesting point: Google.com-originating searches all use the same signature
- This cannot be turned off…
  - Possible in newer versions
- Attacker needs control over victim's browser in Google.com context…

Google.com XSS Vulnerability

- Standard XSS
- For the purpose of demonstration, a UTF-7 XSS vulnerability on search page is used.
- Can apply to any XSS on Google.com and some of its subdomains
  - And there are plenty of those…

Complete overtaking process

- Perform Google.com XSS exploit
  - Through SPAM mail, talkback links, social networks worms, etc. – the usual way
- Injected JavaScript will do the rest…
  - Harvest the signature from the search results
  - Infect the local machine by issuing XXSed Google Desktop search query (using the acquired signature)
  - Hide all traces of that occuring…
- The system is now fully compromised!

What harm can a malicious attacker do?

- Take advantage of Google Desktop’s powerful search and indexing capabilities
  - Search for sensitive information
- Change user preferences to index more local information
- “Search Across Computers”
  - Hijacking information with style. ;)
- Execute commands through Google Desktop
  - Change preferences to index network drives
  - Complete takeover…

Web User Interface…

- Attacker controls what the victim sees!
- Hide changed preferences options
- Hide version
  - Make the user think he’s using a more current version
- Auto-correction if “under” parameter is used with other values
  - Makes sure the JavaScript malware remains active

Attack Characteristics

- Low footprint
  - No need for malicious binary code to be injected
  - The code is automatically executed by the browser when visiting legitimate Google Desktop Web pages
- Easy data leakage
  - Hijacked information can be covertly leaked back to the attacker via seemingly innocent encoded requests to an external Web site
- Almost undetectable
  - No mangled URL in the address bar
  - The attack continues to persist across sessions and across browsers

Lessons Learned

- XSS is a big issue
  - Very common
  - Very dangerous
    - Sticky XSS is even worse
  - Should be taken more seriously in the development process
- Applications like Google Desktop are risky
  - Access to sensitive information means greater risk for the user
  - RIA trend
- Integration between web applications and desktop applications is risky
  - The attack took advantage of this integration in order to overcome powerful protection mechanisms
  - Classical functionality/security tradeoff
- Antivirus vendors should find creative ways to fight JavaScript Malware

More Information

- Short Overview: http://download.watchfire.com/whitepapers/Google-Desktop-Short-Overview.pdf
- White paper: http://download.watchfire.com/whitepapers/Overtaking-Google-Desktop.pdf
- Video Demo (11 Minutes): http://download.watchfire.com/googledesktopdemo/index.htm

Questions?

Q & A

Thank you! ☺