Web Application Security & the Mobile World

OWASP

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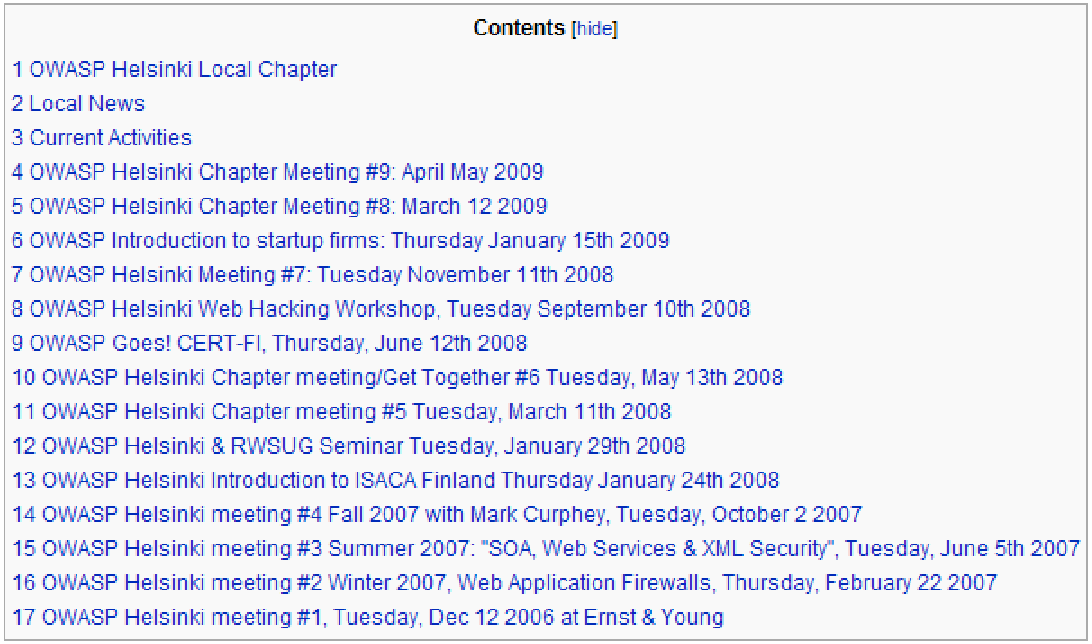
The OWASP Foundation
http://www.owasp.org

Why Mobile Web Security?

- Where’s the beef?
- History & background
- Converging landscape
- The road ahead

OWASP in Finland

- Chapter created late 2006
- Vibrant community
  - Co-operation with e.g. general IT & development communities
  - Networking
- One corporate member (☺)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1 OWASP Helsinki Local Chapter
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8 OWASP Helsinki Web Hacking Workshop, Tuesday September 10th 2008
9 OWASP Goes! CERT-FI, Thursday, June 12th 2008
10 OWASP Helsinki Chapter meeting/Get Together #6 Tuesday, May 13th 2008
11 OWASP Helsinki Chapter meeting #5 Tuesday, March 11th 2008
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13 OWASP Helsinki Introduction to ISACA Finland Thursday January 24th 2008
14 OWASP Helsinki meeting #4 Fall 2007 with Mark Curphey, Tuesday, October 2 2007
15 OWASP Helsinki meeting #3 Summer 2007: "SOA, Web Services & XML Security", Tuesday, June 5th 2007
16 OWASP Helsinki meeting #2 Winter 2007, Web Application Firewalls, Thursday, February 22 2007
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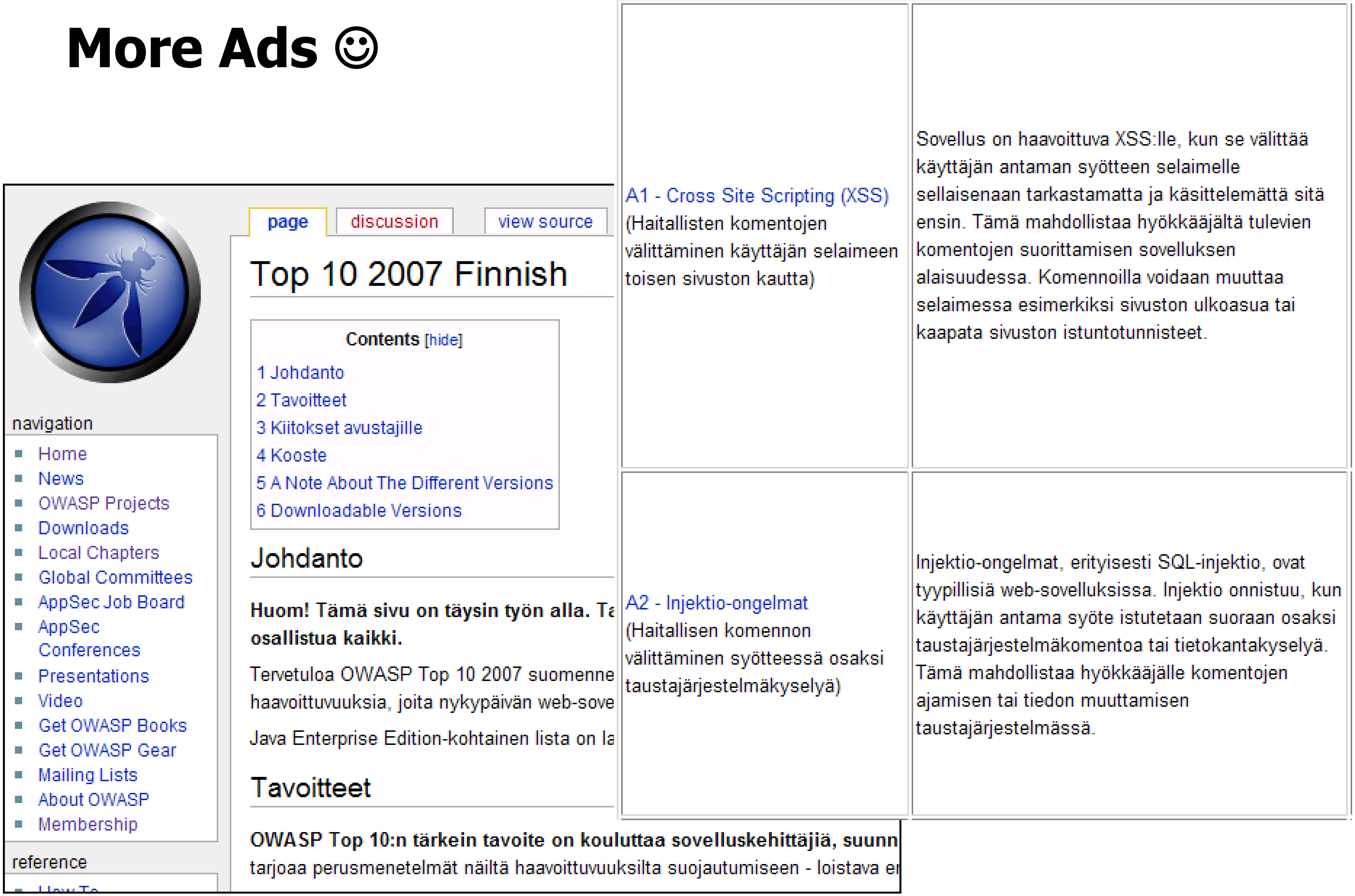
More Ads ☺



Top 10 2007 Finnish

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Johdanto

Huom! Tämä sivu on täysin työn alla. Ta osallistua kaikki.

Tervetuloa OWASP Top 10 2007 suomenne haavoittuvuuksia, joita nykypäivän web-sove

Java Enterprise Edition-kohtainen lista on la

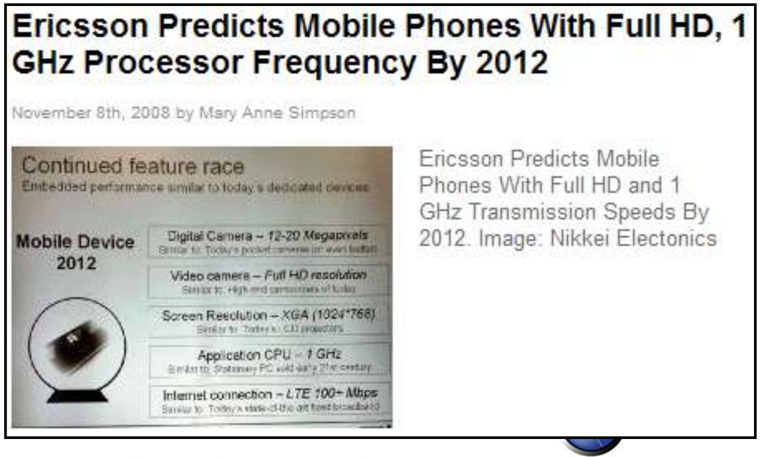
Tavoitteet

OWASP Top 10:n tärkein tavoite on kouluttaa sovelluskehittäjiä, suunn tarjoaa perusmenetelmät näiltä haavoittuvuuksilta suojautumiseen - loistava er

A1 - Cross Site Scripting (XSS) (Haitallisten komentojen välittäminen käyttäjän selaimeen toisen sivuston kautta)	Sovellus on haavoittuva XSS:lle, kun se välittää käyttäjän antaman syötteen selaimelle sellaisenaan tarkastamatta ja käsittelemättä sitä ensin. Tämä mahdollistaa hyökkääjältä tulevien komentojen suorittamisen sovelluksen alaisuudessa. Komennoilla voidaan muuttaa selaimessa esimerkiksi sivuston ulkoasua tai kaapata sivuston istuntotunnisteet.
A2 - Injektio-ongelmat (Haitallisen komennon välittäminen syötteessä osaksi taustajärjestelmäkyselyä)	Injektio-ongelmat, erityisesti SQL-injektio, ovat tyypillisiä web-sovelluksissa. Injektio onnistuu, kun käyttäjän antama syöte istutetaan suoraan osaksi taustajärjestelmäkomentoa tai tietokantakyselyä. Tämä mahdollistaa hyökkääjälle komentojen ajamisen tai tiedon muuttamisen taustajärjestelmässä.

Vive la Différence!

- Battery power
  - Limits CPU, screen
- Physical size & form
  - Input
  - Screen
  - Battery
  - Features
    - CPU+GPU, GPS, Wi-Fi, Camera, Networks, FM Radio …
- Connectivity



Ericsson Predicts Mobile Phones With Full HD, 1 GHz Processor Frequency By 2012

November 8th, 2008 by Mary Anne Simpson

Continued feature race

Embedded performance similar to today's dedicated devices

Mobile Device 2012

Digital Camera – *12-20 Megapixels*
Similar to: Today's pocket cameras or even better

Video camera – *Full HD resolution*
Similar to: High end camcorders of today

Screen Resolution – *XGA (1024*768)*
Similar to: Today's LCD projectors

Application CPU – *1 GHz*
Similar to: Stationary PC sold early 21st century

Internet connection – *LTE 100+ Mbps*
Similar to: Today's state-of-the art fixed broadband

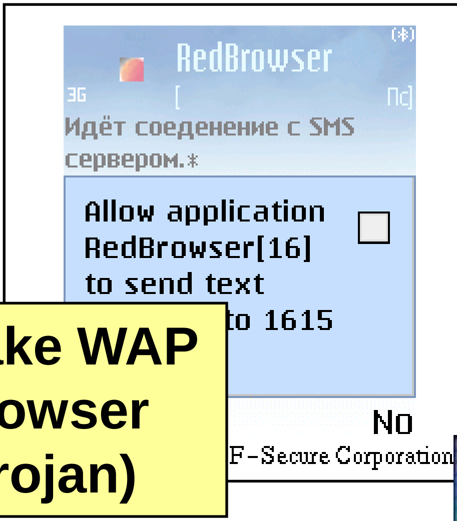
Ericsson Predicts Mobile Phones With Full HD and 1 GHz Transmission Speeds By 2012. Image: Nikkei Electonics

http://www.physorg.com/news145347471.html

Where's the Beef?

- Personal information
  - Calendar, contacts
  - Phone calls, text messages, bdays & shopping lists
- Financial information
  - 'Wallet', credit card or other such data
- Location information
  - GPS, Wi-Fi, BT, etc tracking
- Your Company Files
  - Locally stored data
  - Remotely accessed data
- Device has a value of its own

Somebody’s Always Trying



RedBrowser

3G

Идёт соеденение с SMS сервером.*

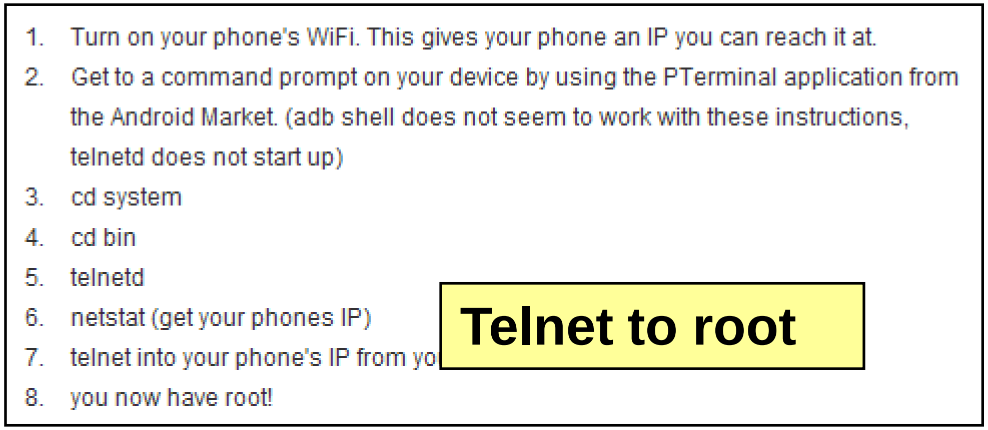
Allow application RedBrowser[16] to send text
to 1615 ☐

No

F-Secure Corporation

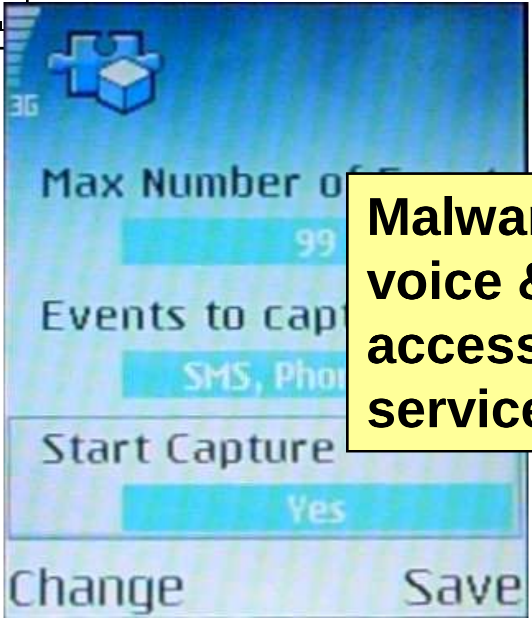
Fake WAP browser (Trojan)

http://www.talkandroid.com/364-g1-root-access-pterminal/



1. Turn on your phone's WiFi. This gives your phone an IP you can reach it at.
2. Get to a command prompt on your device by using the PTerminal application from the Android Market. (adb shell does not seem to work with these instructions, telnetd does not start up)
3. cd system
4. cd bin
5. telnetd
6. netstat (get your phones IP)
7. telnet into your phone's IP from yo
8. you now have root!

Telnet to root



3G

Max Number of E

99

Events to capt

SMS, Pho

Start Capture

Yes

Change

Save

Malware: Records voice & SMS, access via a www service

http://www.f-secure.com/v-descs/flexispy_a.shtml

Mobile Threats: Data

- Trojans, worms, viruses
  - Distribution via SMS/MMS messages, bluetooth etc.
    - Malicious apps calling to premium phone numbers
    - Stealing information
  - Typically may require user consent
- Platform/system attacks
  - Typically some type of privilege elevation
  - Cracking into something
  - Do stuff someone does not want you to do

Mobile Threats: Usage

- User
  - Malicious apps / Trojans
- Small is beautiful
  - Power management
    - Does the app keep polling something?
  - Cost management
    - Pay per use connections
  - Memory management
    - Execution & storage sizes
      - Content, Caches, etc.
- Denial of Service
  - Nasty stuff like malformed SMS/Email message that kills the phone
    - Or a jpg doing the same thing

Mobile Threats: Device

- SIMLock cracks
  - Remove the operator lockdown
- Alter IMEI identification code
  - Easier to resell stolen or unlocked device
- Theft
  - $$$
- Breakage
  - Who do you allow to fix it?

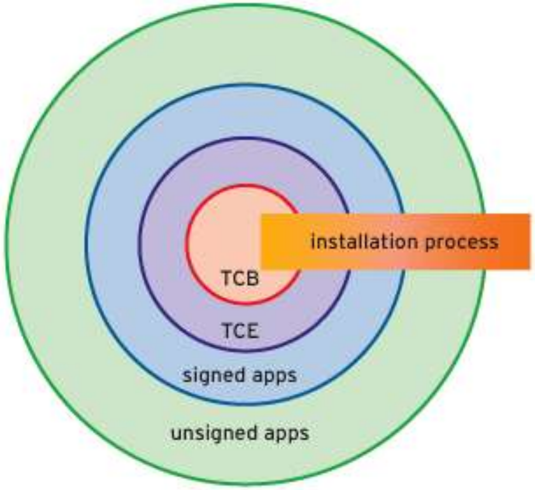
Mobile Threats: Offline Attacks

- Have the ‘capabilities’ you can’t have
  - Might be able to read/write/modify
- Similar to booting a Win machine with Linux
  - Which security model?
- Compromising
  - Confidentiality
  - Integrity

Mobile Security: System

(ok ok, a bit of a Symbian-skewed view)

- Secure HW base + boot
  - Identity
- Trusted Computing Base: OS core
  - User has no/limited access to the core OS
    - Caging system data
  - Trust models limiting API & file access
    - capabilities [Symbian-speak] / privileges



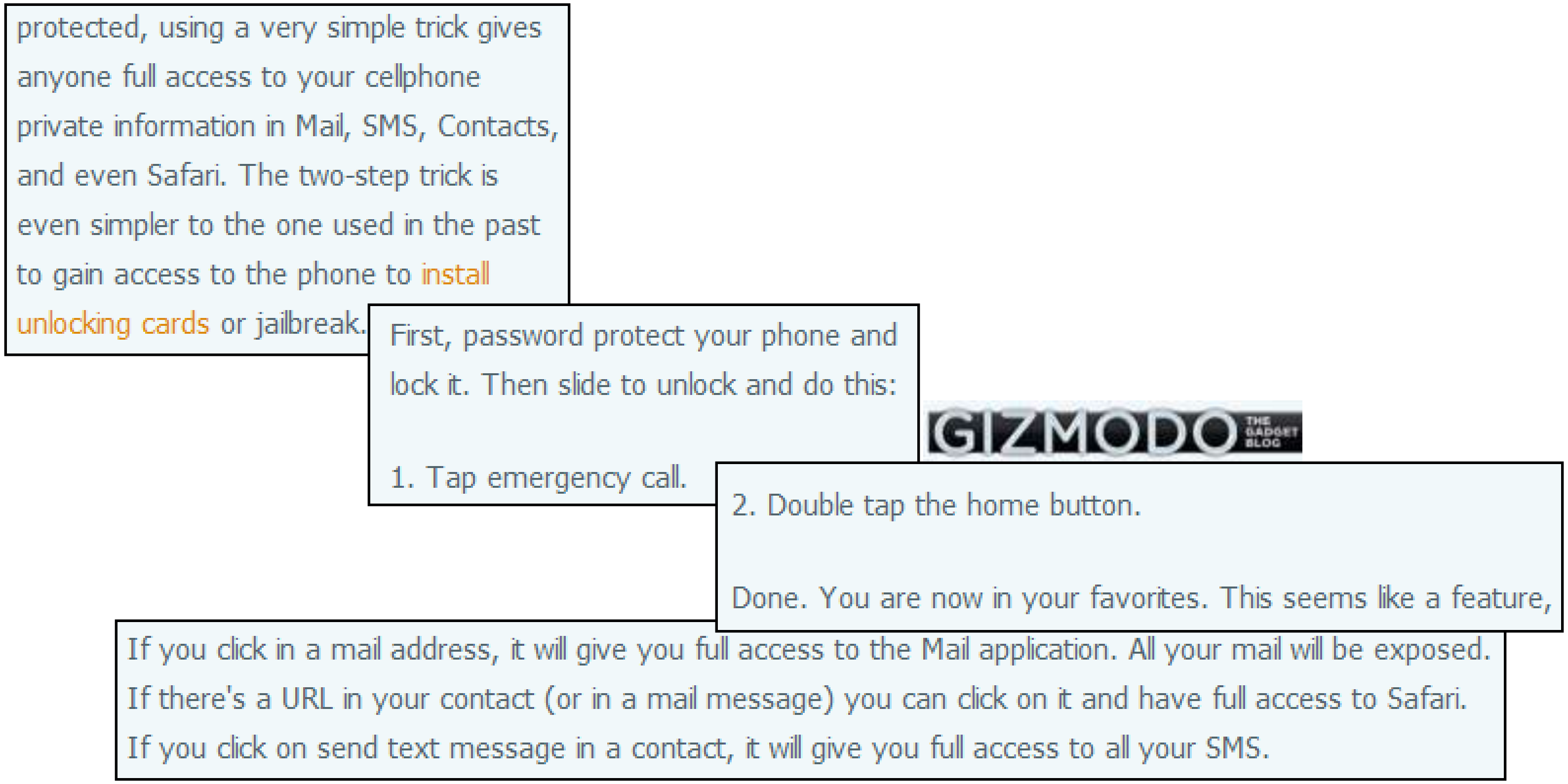
From: http://www.embedded.com/columns/technicalinsights/193100648?pgno=2

(By Regan Coleman, Dr. Dobb's Journal)

Mobile Security: Usage

- Tightly controlled installation of applications
  - Controlled availability of signing certificates
    - ‘Manufacturer’, ‘Developer’, etc. certificates
  - Controlled availability of rights in the system
- Tightly controlled usage
  - SIM locks
    - Operator substitutions
  - Potentially limited application availability or access
    - Access only to certain services or apps

“Sometimes, it’s not that techy”



protected, using a very simple trick gives anyone full access to your cellphone private information in Mail, SMS, Contacts, and even Safari. The two-step trick is even simpler to the one used in the past to gain access to the phone to install unlocking cards or jailbreak.

First, password protect your phone and lock it. Then slide to unlock and do this:

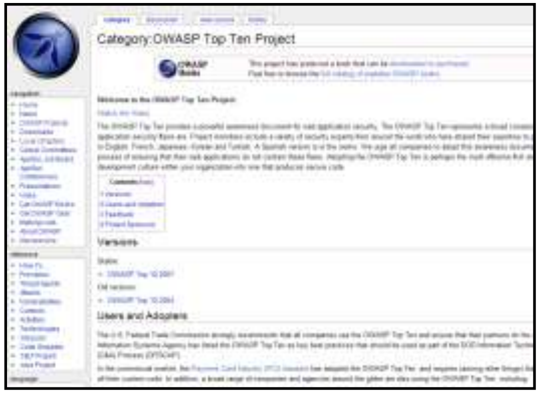
1. Tap emergency call.

2. Double tap the home button.

Done. You are now in your favorites. This seems like a feature,

If you click in a mail address, it will give you full access to the Mail application. All your mail will be exposed.
If there's a URL in your contact (or in a mail message) you can click on it and have full access to Safari.
If you click on send text message in a contact, it will give you full access to all your SMS.

What Do They Have in Common?



Category:OWASP Top Ten Project

OWASP Books

Versions

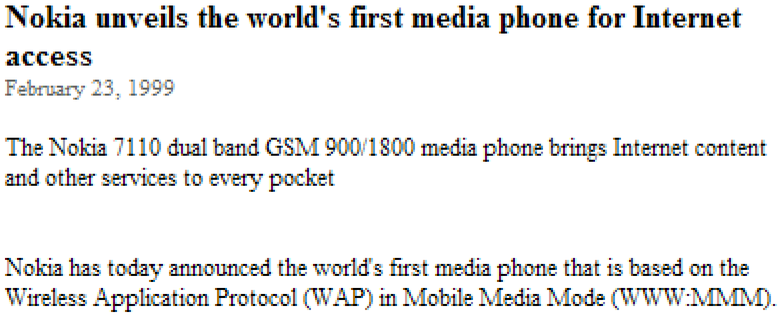
Users and Adopters

Pictures are from respective vendor web sites

But, first, a quick look back!

Web Access Creeping In (Early Days)

- There was this thing called WAP + WML
  - Wireless Application Protocol + Wireless Markup Language
    - Index.html + index.wml
  - 'Limited Success' (to be politically correct)
  - Most 'notable' security issue was the Wap Gap
- First mobile browsers
  - Limited by
    - Compatibility
    - Speed and cost of network access
    - System resources and capabilities
  - Very small target base



Nokia unveils the world's first media phone for Internet access

February 23, 1999

The Nokia 7110 dual band GSM 900/1800 media phone brings Internet content and other services to every pocket

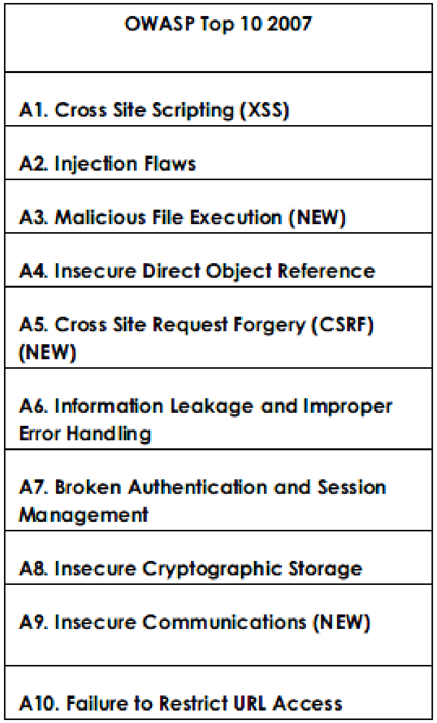
Nokia has today announced the world's first media phone that is based on the Wireless Application Protocol (WAP) in Mobile Media Mode (WWW:MMM).

Web Technology Usage Increases

- Started with GPRS, but a hit with 3G and WLAN
  - Run 10Gb at home and 64kb on mobile…? Naah
- HTTP, XML, Web Services utilized by client apps
  - Apps talking to a backend via web technology
  - Native or java clients
- Lots of existing applications
  - Web browser is a standard, basic app
- Pretty much any mobile now
  - Even many of the ‘low-end’ devices
- A whole lot of new users are entering the web
  - First user experience may come via a mobile

…And Related Security Issues

- Attacks against platform
  - Still *quite* proprietary
    - Substitution attacks
    - Various elevation of privilege attacks
    - Protocol weaknesses (e.g. file format)
    - Java implementation etc.
- Attacks against the application or the backend server
  - Protocol implementation (e.g. http, roap)
  - Intercepting and modifying XML contents
- Web attacks more difficult than in PC
  - Tightly controlled platform & HW
  - Proxy usage may differ from PC



OWASP Top 10 2007
A1. Cross Site Scripting (XSS)
A2. Injection Flaws
A3. Malicious File Execution (NEW)
A4. Insecure Direct Object Reference
A5. Cross Site Request Forgery (CSRF) (NEW)
A6. Information Leakage and Improper Error Handling
A7. Broken Authentication and Session Management
A8. Insecure Cryptographic Storage
A9. Insecure Communications (NEW)
A10. Failure to Restrict URL Access

And Once You Have a Fix

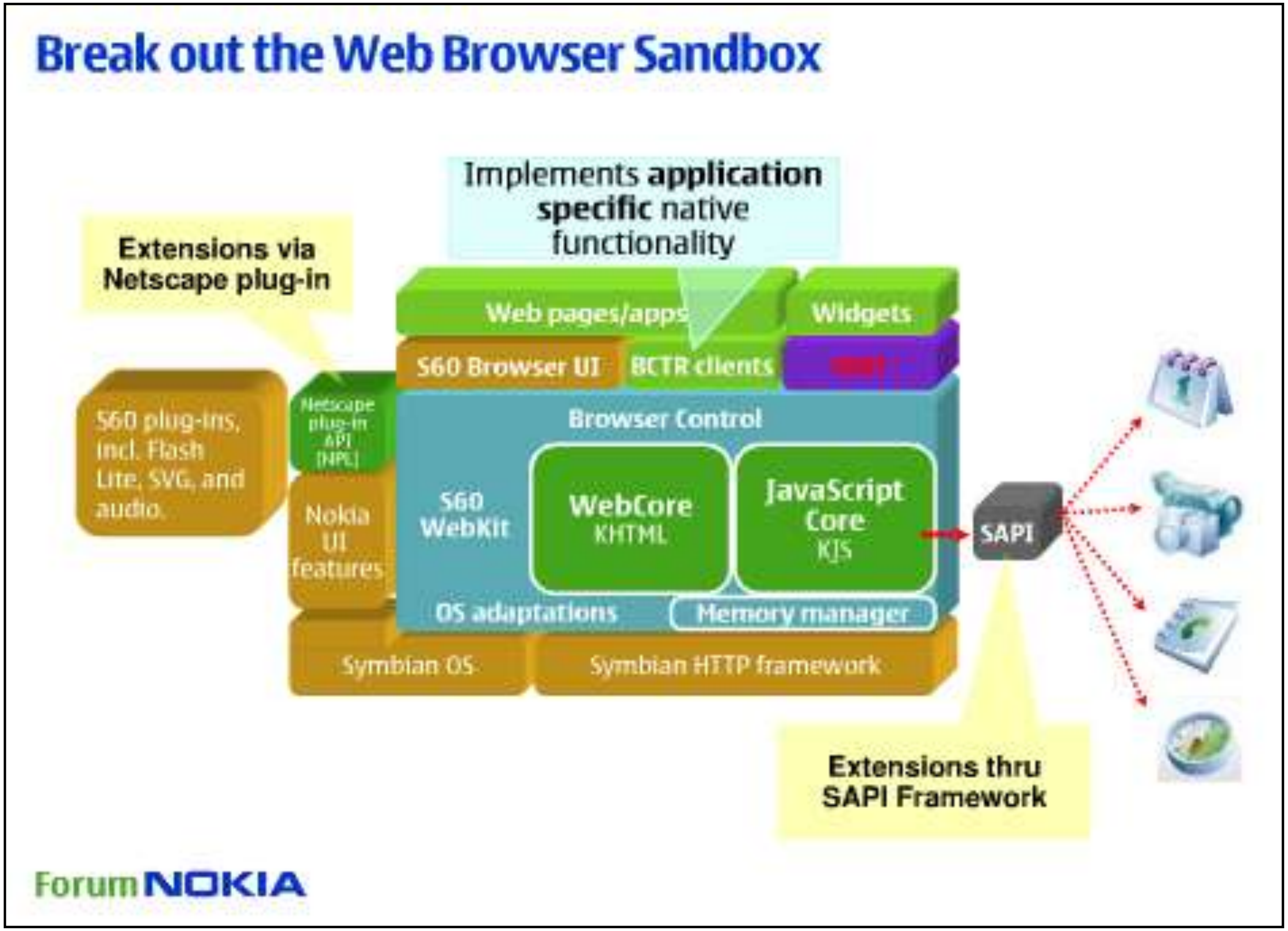
- You need to distribute it
  - Over The Air
  - Firmware updates, reflash the device
  - Package management, linux-based OS
  - Manually installable updated apps
- User awareness & ability

Adding Web Runtime & Widgets

- WRT engine
  - Browser-less support for web technologies
    - XHTML, JavaScript, CSS, …
- Widget
  - Requires a widget host engine (app), or
  - Standalone offline local app
- Easy to create
  - Lots of web developers
- A variety of widget engines exist
  - Lack of firm standardization

http://www.slideshare.net/dappelquist/nokia-webruntime-presentation-phong-vu-presentation

A Happy Marriage?



Break out the Web Browser Sandbox

Implements **application specific** native functionality

Extensions via Netscape plug-in

Web pages/apps

Widgets

S60 Browser UI

BCTR clients

S60 plug-ins, incl. Flash Lite, SVG, and audio.

Netscape plug-in API (NPL)

Nokia UI features

Browser Control

S60 WebKit

WebCore KHTML

JavaScript Core KJS

OS adaptations

Memory manager

Symbian OS

Symbian HTTP framework

SAPI

Extensions thru SAPI Framework

Forum NOKIA

http://www.slideshare.net/dappelquist/nokia-webruntime-presentation-phong-vu-presentation

Another Way of 'Webification'

- Nokia Mobile Web Server
  - Personal 'Mobisites'
- Apache web server ported to Symbian & S60 OS
  - Run your own web server from the mobile
- Designed for a gateway service
- So, do you need a waf for the phone as well? ☺

Original: www.modsecurity.org
(hope Ivan won't get upset); strictly 'gimpware'

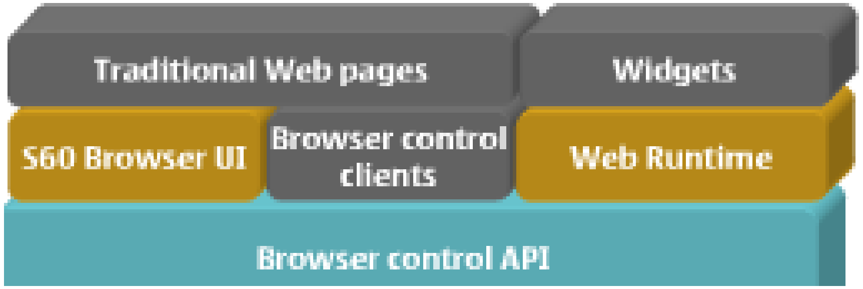
‘Webifying’ the Mobile Eco-System

- Use web technology to build the operating system
  - WebKit-based framework for web & apps
- Upcoming Palm Pre
  - Full ‘WebOS’
    - Utilizes web technology in the OS UI level
      - HTML5, JavaScript, CSS
      - ‘Native’ apps
    - You still e.g. need to sign apps

www.palm.com

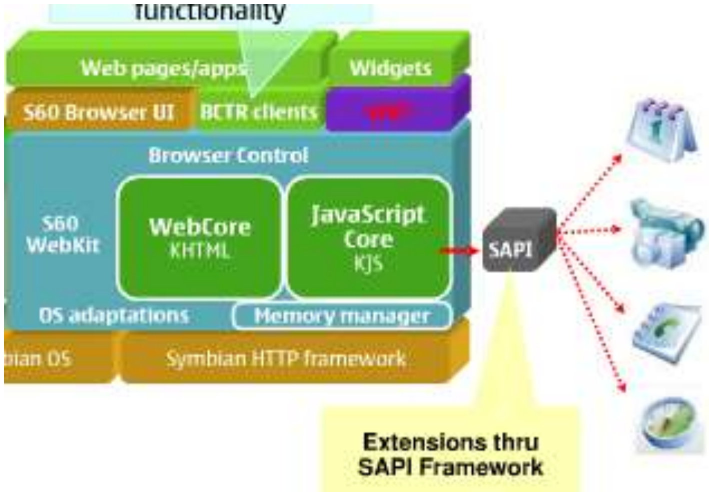
User Perspective: Browsing vs. Widget

- The User is likely comfortable with browsing the internet
  - But problems even understanding URLs
- Widget is locally-installed
  - More ‘personal’
  - Hidden connections



Web Code Accessing Device APIs

- Reliable app identification (AuthN, AuthZ)
  - Installation & execution
- Discovering the intent
  - Granting permissions
- Reliable isolation from others
  - Processes, APIs, stored or cached data
- Reaction to misbehavior
  - What can be done



Example APIs: BONDI

- ‘Under construction’
  - Least common denominator
- APIs (JavaScript)
  - Application Invocation
  - Messaging
  - User Interaction
  - File IO
  - Gallery
  - Device Status
  - System Events
  - Application Settings
  - Location
  - Camera
  - Communications Log
  - PIM

Governing the Permissions

- Separate authentication & authorization
- Moving towards a policy approach
  - Separate Policy (Permissions) from Mechanism (e.g. API)
    - Some access has required e.g. manufacturer / operator signing
  - Keep the framework as a framework
    - And put permissions in definable policies
- Certain dimensions missing from ‘PC’
  - Operators & variants

Governing the Permissions

- AuthN: e.g. origin-based vs. signature-based
- AuthZ: e.g. allow only trusted services privileged access?
  - If coming from URI ‘n’, allow access to API ‘z’?
  - If ‘x’-signed code (DN=x) and SSL cert ‘y’, allow…
- Declaring required permissions
  - a la AndroidManifest.xml
    - android.permission.CALL_EMERGENCY_NUMBERS

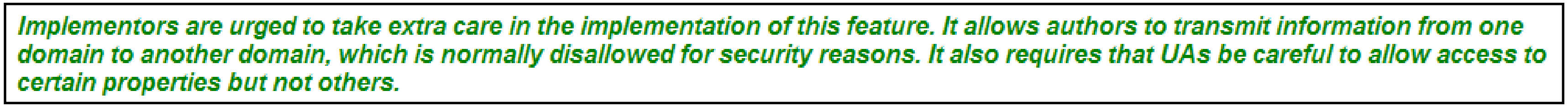
www.nena.org

Governing the Permissions

- Permission lifespan could be
  - One-time (‘consume’ immediately)
  - Session
  - Permanent
- And managed at
  - Installation-only (e.g. Android)
  - During process execution
    - E.g. by prompting user, via policy

Multiple/Cross -Origin

- Need to run code or retrieve content from multiple sources (cross-origin)
  - UI integration of various data sources
- Managing the trust
  - How does the web app handle trust
    - Trust everything coming from a 'trusted' source?
- Cross-document messaging
  - Communication between documents



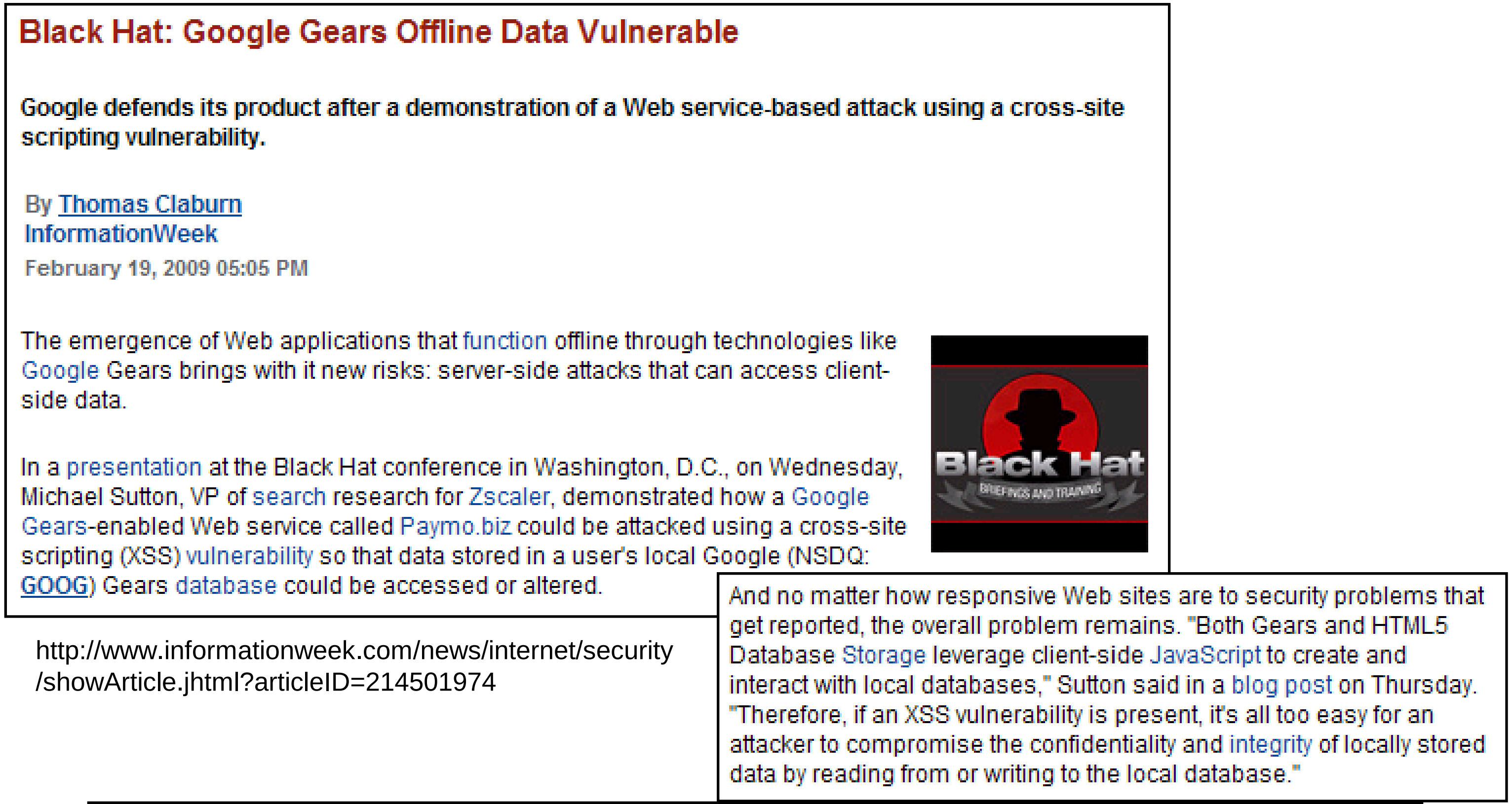
Implementors are urged to take extra care in the implementation of this feature. It allows authors to transmit information from one domain to another domain, which is normally disallowed for security reasons. It also requires that UAs be careful to allow access to certain properties but not others.

http://dev.w3.org/html5/spec/Overview.html

Offline Web & Persistent Storage

- Application cache (HTML5)
  - Offline content
- Persistent data storage (e.g. HTML5, Gears)
  - Beyond cookies
    - Session, local, DB
  - Large db sizes

Could These Things Happen IRL?



Black Hat: Google Gears Offline Data Vulnerable

Google defends its product after a demonstration of a Web service-based attack using a cross-site scripting vulnerability.

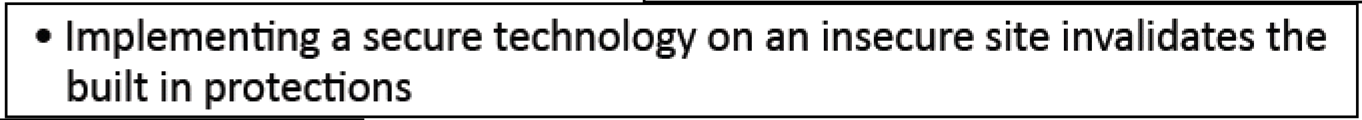
By Thomas Claburn
InformationWeek
February 19, 2009 05:05 PM

The emergence of Web applications that function offline through technologies like Google Gears brings with it new risks: server-side attacks that can access client-side data.

In a presentation at the Black Hat conference in Washington, D.C., on Wednesday, Michael Sutton, VP of search research for Zscaler, demonstrated how a Google Gears-enabled Web service called Paymo.biz could be attacked using a cross-site scripting (XSS) vulnerability so that data stored in a user's local Google (NSDQ: GOOG) Gears database could be accessed or altered.

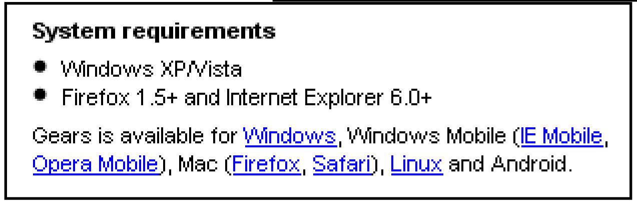
And no matter how responsive Web sites are to security problems that get reported, the overall problem remains. "Both Gears and HTML5 Database Storage leverage client-side JavaScript to create and interact with local databases," Sutton said in a blog post on Thursday. "Therefore, if an XSS vulnerability is present, it's all too easy for an attacker to compromise the confidentiality and integrity of locally stored data by reading from or writing to the local database."

http://www.informationweek.com/news/internet/security/showArticle.jhtml?articleID=214501974



- Implementing a secure technology on an insecure site invalidates the built in protections

http://zscaler.com/presentations/A%20Wolf%20in%20Sheep's%20Clothing.pdf



System requirements

- Windows XP/Vista
- Firefox 1.5+ and Internet Explorer 6.0+

Gears is available for Windows, Windows Mobile (IE Mobile, Opera Mobile), Mac (Firefox, Safari), Linux and Android.

http://gears.google.com/

The Road Ahead

- How to satisfy both the Mobile & PC-based needs?
- Common framework(s) in the works
  - Robust implementation
- W3C has a various working groups

What About Mobile Web App Developers?

- Most PC apps are web-based or web-enabled
  - Toolkits and platforms more mature
- Security in mobiles is not a new thing
  - Security understanding
- Shift in technologies
  - The implementation is changing
  - Different types of (& emerging) attack vectors
    - E.g. client side SQL injection, but even XSS
      - Anyone utilizing e.g. various local storage features
  - Test efforts need to evolve & keep up
- Reusing common, well-known standards

A Common Approach

- Initiatives
  - Such as, OMTP (BONDI), OpenAJAX, W3C, …
- OWASP is key source for web *app* security
  - De facto, but obviously PC/app-minded
  - Intrinsic Security Working Group

Why Is All This Important?

- Unified approach to:
- Protect the Consumer / User
  - While allowing a good consumer experience
  - Keeping personal property safe
- Protect the Business Ecosystem
  - Operators
  - Manufacturers
  - Content providers
  - Service providers
- Protect the Enterprise
  - Increased usage for business purposes

Thank You! A Dank!

OWASP

The OWASP Foundation
http://www.owasp.org

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