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Securing Your Android and iOS Mobile Applications

12/06/2013

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Mobile Security Trends

Your Mobile Device is Your…

Security concerns vary but are merged

Security concerns extending from device to application and data

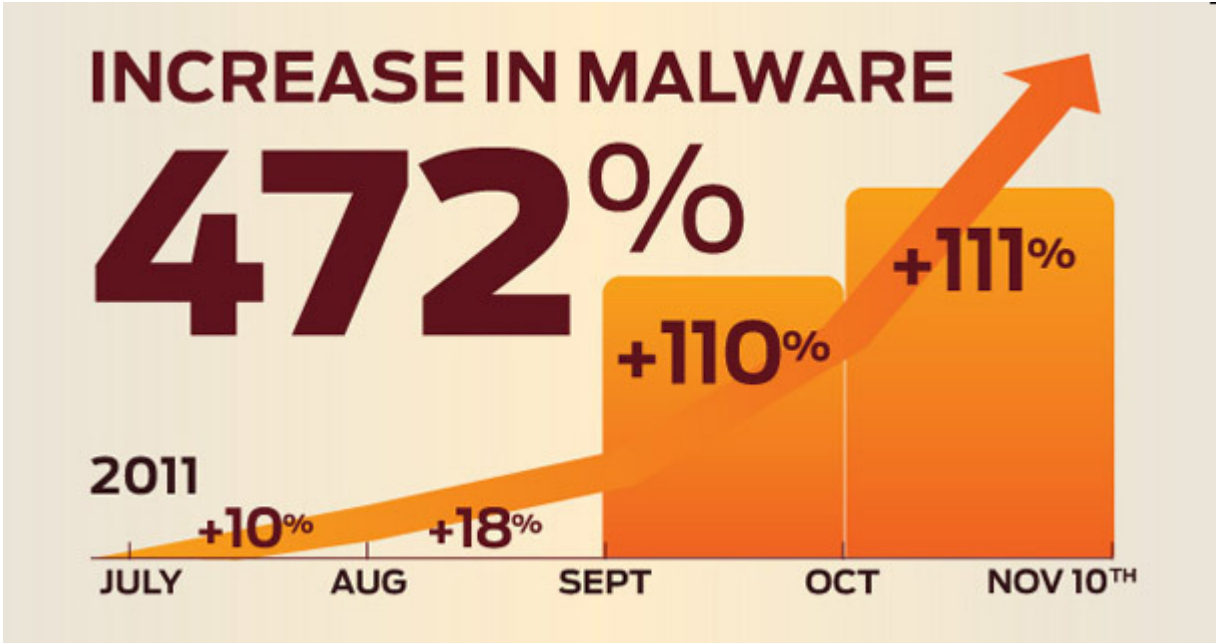
Hackers Follow the Money

When asked why he robbed banks, Sutton reportedly replied, "Because that's where the money is."

– Willie Sutton

Arnie Leven
http://www.condenaststore.com/-sp/I-steal-from-computers-cause-that-s-where-the-mone
is-Cartoon-Prints_i8638625_.htm

Mobile Malware Growing Exponentially



Source: Juniper Mobile Threat Report, 2/12

Spyware and SMS Trojans Top Two

Native Mobile Application Security Risks

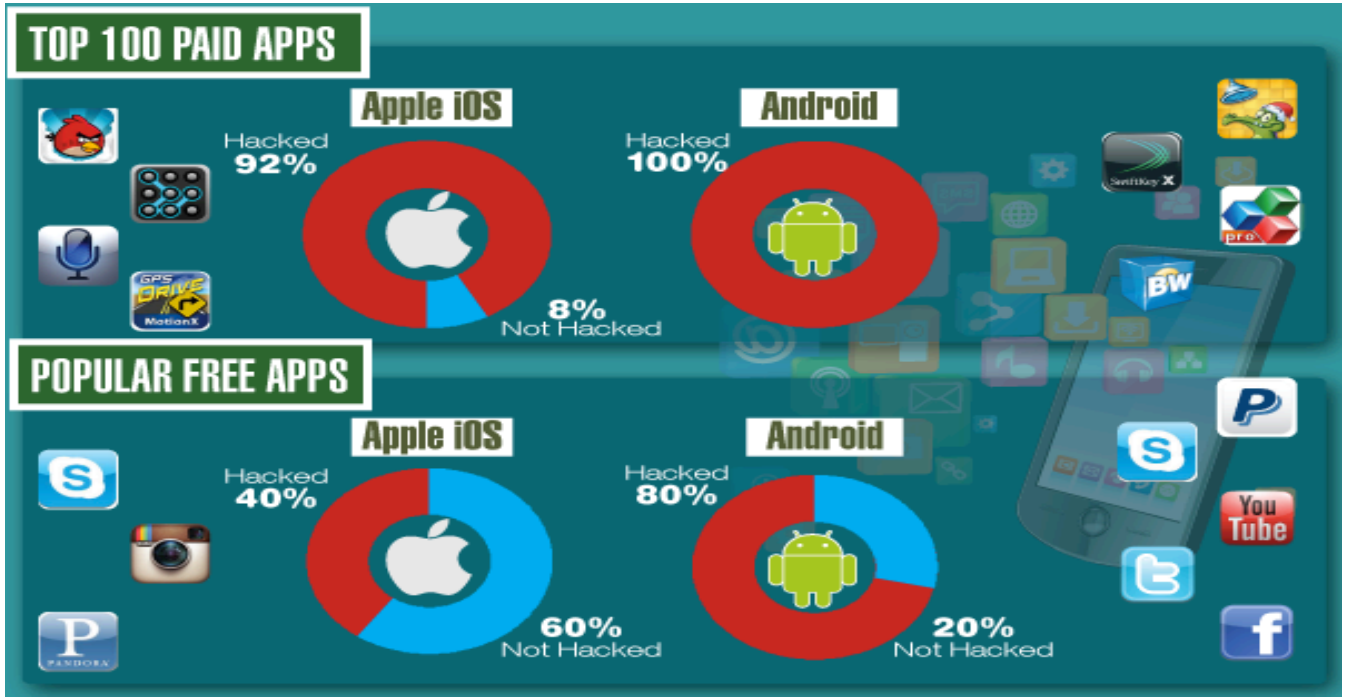
- Data leakage
- Confidentiality leaks
  - Private conversations leaked to public
  - Private contact information leaked to public
  - Location leaked to public
- Integrity violations
  - Corruption of local databases
  - Fraudulent use of application
- Abuse of privileges
  - Sending text messages
  - Placing calls
  - Surveillance of device's user

Which QR code is evil?

- QR Code contained a URL to download malware
- The malware sent SMS messages to a premium rate number (US $6 per message)

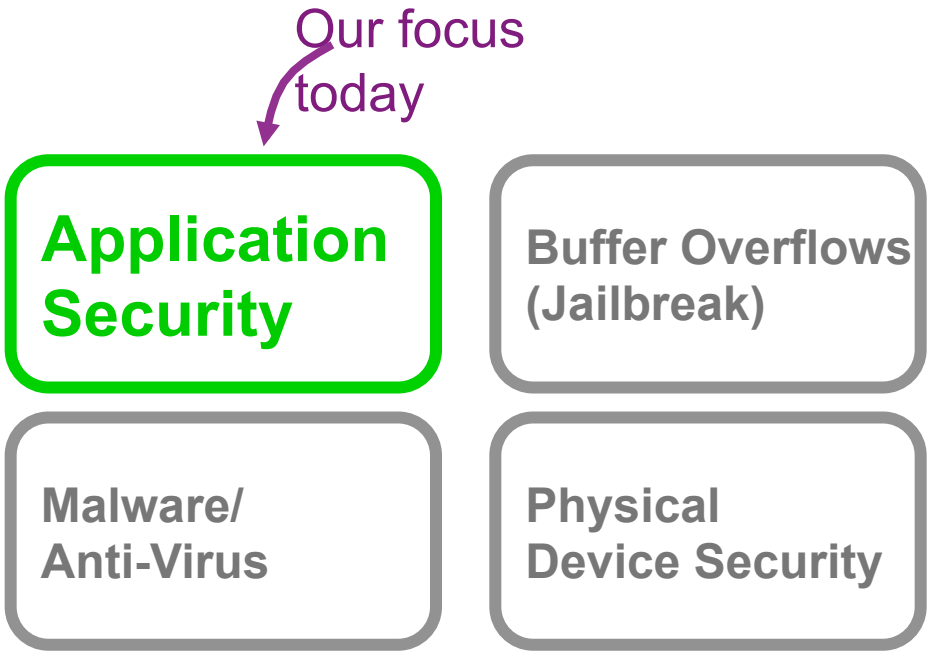
http://siliconangle.com/blog/2011/10/21/infected-qr-malware-surfaces-on-smartphones-apps/

No One Is Spared (…it's not just Android)



Source: Arxan State of Security in the App Economy – 2012

Mobile Security Can Mean Different Things



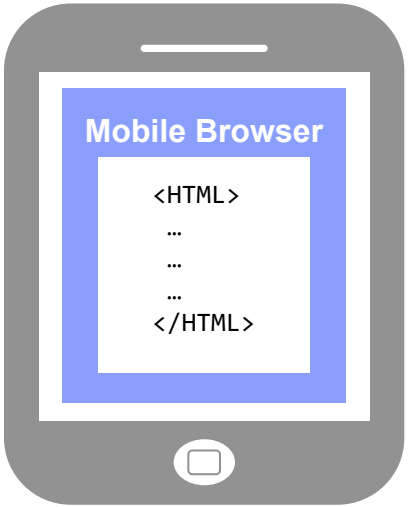
Android vs. iOS

	Android	iOS
Ecosystem	Linux / Java	Unix (Darwin) / Objective C
Vetting Process	Sorta	●
App Sandbox	●	●
Protection against memory corruption attacks	●	●
Data Encryption	●	●
Inter-app Communication	Very common (“Intents”, explicit vs. implicit)	Uncommon
Common Problems	Malware	Jailbreak

…but what about the other guys? Windows Phone 7/8, Blackberry 10? Apache Cordova (JS, HTML, CSS), IBM Worklight

Mobile Application Types

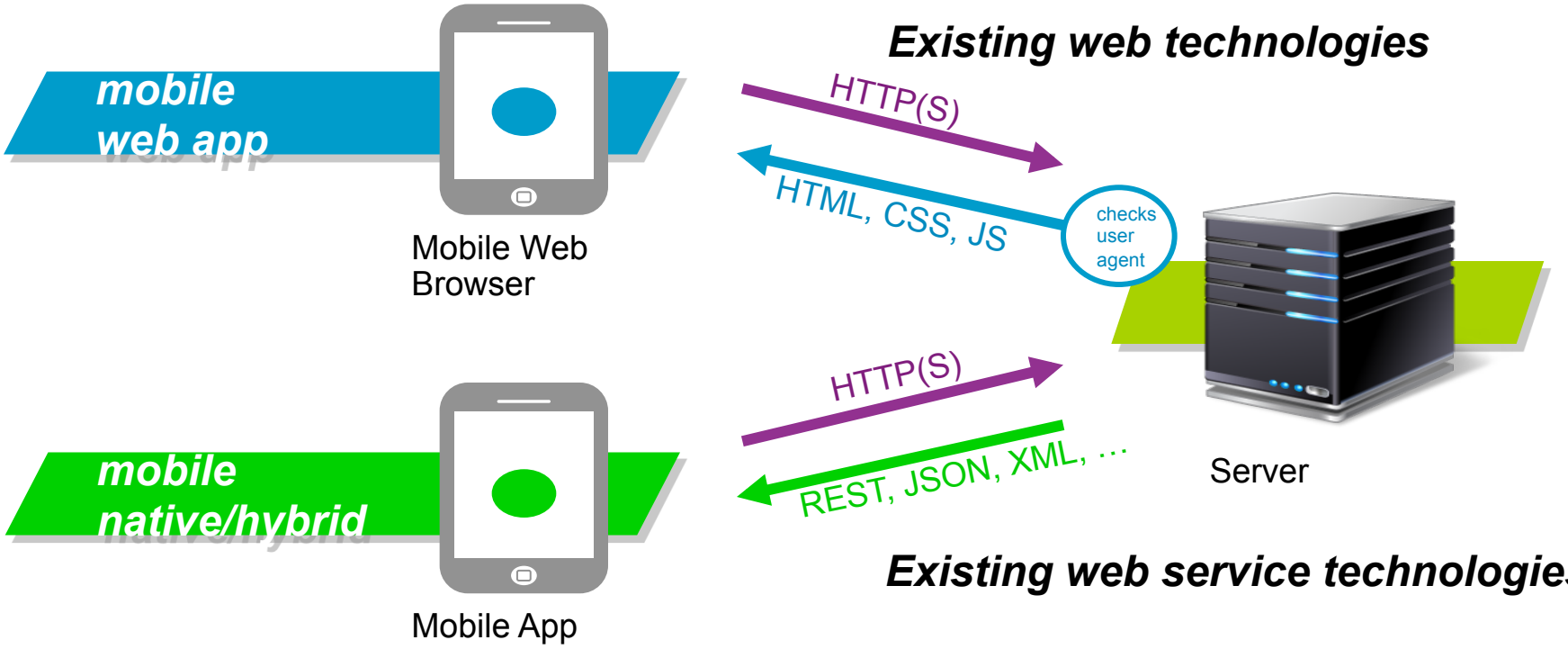
Mobile **Web** Apps



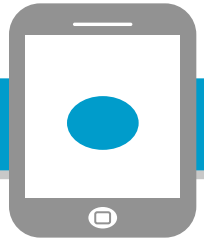
Mobile **Native** Apps

Mobile **Hybrid** Apps

Communication Architecture

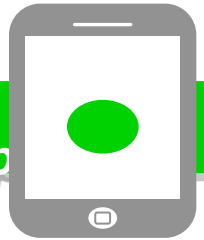


Mobile App Vulnerabilities



Client-side mobile web app

Same as “regular” web app client-side issues:
XSS, HTML5 issues, etc.



Client-side mobile native/hybrid app

Platform-specific:
XAS (hybrid), Insecure Local Storage, Unencrypted Comm., Client-side SQLi, Poor Auth., Improper Session Handling, Data Leakage, Information Disclosure, etc.

Server-side

Same as “regular” web apps:
SQL Injection, Path Traversal, Response Splitting, File Inclusion, OS Commanding, etc.

User vs. Enterprise Mobile Application Security Risk

User

- Threat from Malware (Trojans & Spyware)
- Fake Android marketplace
  - Malware bundled with valid app
- Phishing
- Unauthorized Use of:
  - Contact DB
  - Email
  - SMS (text messages)
  - Phone (placing calls)
  - GPS (public location)
  - **Data on device**

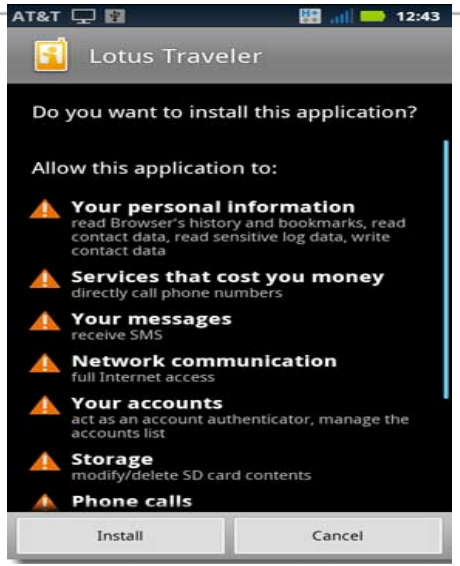
Enterprise

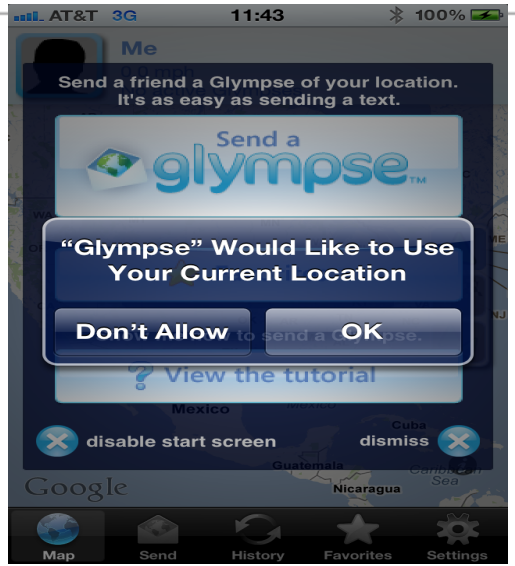
- BYOD
- Hackers looking for weaknesses
  - Easy access to applications
  - Reverse engineering
- **Data leakage**
  - Attack from malware
  - Account info on mobile device

OWASP Mobile Security Project: Top 10 Mobile Risks

1. **Insecure Data Storage**
2. Weak Server Side Controls
3. Insufficient Transport Layer Protection
4. Client Side Injection
5. Poor Authorization and Authentication
6. Improper Session Handling
7. Security Decisions Via Untrusted Inputs
8. Side Channel Data Leakage
9. Broken Cryptography
10. Sensitive Information Disclosure

Permissions Madness





- Users don't understand
- Permissions vary by OS & release
  - Path Address Book Upload
- Developers over permission
- Tyranny of the default

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IBM Mobile Applications Security Solutions

IBM MobileFirst Security

For Clients That Need To:

- Protect devices and data
- Defend the network
- Ensure secure access
- Safeguard mobile apps
- Preserve user experience without compromising security

IBM MobileFirst Security Offers:

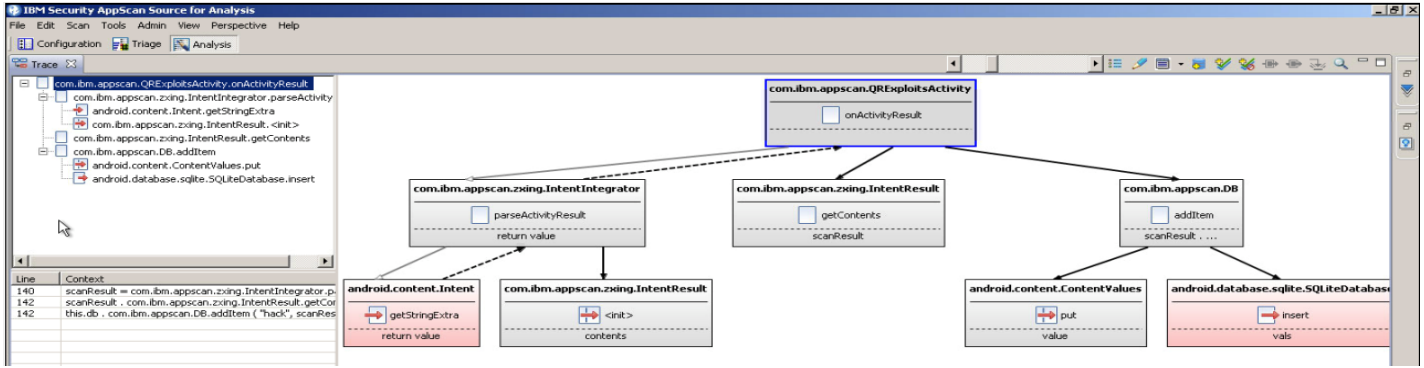
- ✓ Context aware risk-based access control
- ✓ Mobile threat protection
- ✓ Strong session management & Single Sign-on
- ✓ Vulnerability analysis for mobile apps
- ✓ Visibility and analysis of security events from the device, network, user and app behavior

IBM Security Access Manager for Mobile and Cloud

IBM AppScan

- State-of-the-art high-quality vulnerability analysis for mobile apps
- Native support extended for iOS to accelerate enterprise usage
- Enhanced support for JavaScript analysis in hybrid mobile apps
- Out-of-the-box support for IBM Worklight built apps to incorporate context aware risk-based access

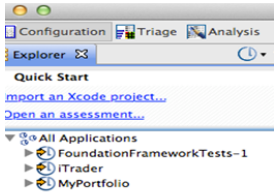
The most comprehensive mobile application security!

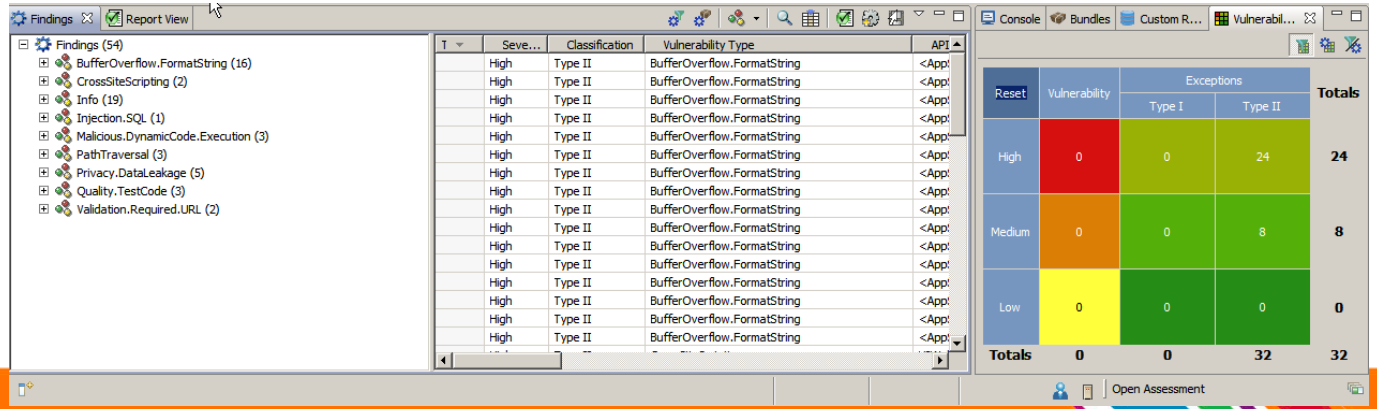


- Support for **Native Android** and **iOS** applications
- Security SDK research & risk assessment of over 40,000 APIs
- **Full** call and data flow analysis
  - Java
  - JavaScript
  - Objective-C
- **Identify** where sensitive **data** is being **leaked**
- Ensures applications are not susceptible to malware

Apple iOS Scanning

- Hot off the presses! Available in AppScan 8.7 March 2013
- Comprehensive Objective-C and JavaScript coverage
- Zero Config! (…sorta)
  - Drag and Drop Xcode import
- Native Mac OSX Support (10.7, 10.8)
- Automated Scanning (build integration)





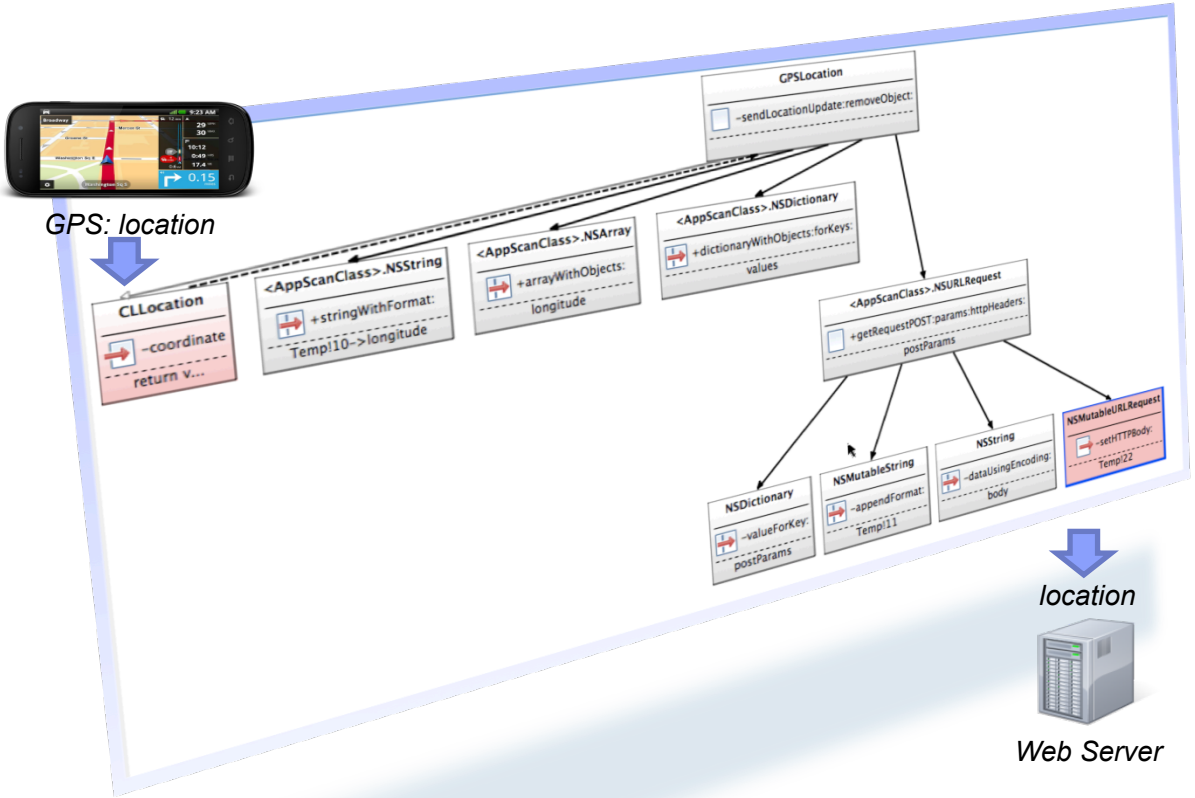
100% coverage of OWASP Mobile Top Ten

OWASP Mobile TOP 10		IBM Security AppScan Coverage
✓	**1. Insecure Data Storage**	Trace routes of sensitive data
✓	**2. Weak Server Side Controls**	Security scanning of server side code
✓	**3. Insufficient Transport Layer Protection**	Check for use of SSL/TLS
✓	**4. Client Side Injection**	Checks for common injection flaws including SQLi, HTMLi, and XSS
✓	**5. Poor Authentication and Authorization**	Track where IDs and Passwords enter/exit the system
✓	**6. Improper Session Handling**	Verify UUID is not used for session management
✓	**7. Security Decisions via Untrusted Inputs**	Track where data originates and how it is used
✓	**8. Side Channel Data Leakage**	Test for data leakage to log files, pasteboard, property lists, etc
✓	**9. Broken Cryptography**	Identify proper usage of cryptographic usage
✓	**10. Sensitive Information Disclosure**	Test for data leakage to peripherals, network, sockets, etc.

Common Problems That AppScan Can Detect in Mobile Applications

- Inter-Application Messaging
  - Not validating data before using it
  - Not removing confidential data before sending message
- Databases
  - Creating and using unsafe SQL
  - Using unsafe DB API's
- Data leakage
  - Sensitive data leaving the boundaries of the application
  - Sensitive data stored on the device in plain text
- Command Injection
  - Not validating data before executing it

Security by Design: GPS data source



#10 OWASP Mobile Top 10 Sensitive Information Disclosure

- Mobile app is collecting GPS location
- GPS data being sent via http request
- If hacker snoops the traffic coming into the web server, they would gain access to customer's location
- AppScan identifies sensitive information disclosures

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Mobile Security Case Study

Case Study: HTC America settles FTC charges

02/22/2013: HTC America has agreed to settle Federal Trade Commission charges that the company failed to take reasonable steps to secure the software it developed for its smartphones and tablet computers, introducing security flaws that placed sensitive information about millions of consumers at risk.

htc
quietly brilliant

Case Study: HTC America settles FTC charges

HTC America has customized the software on these devices in order to differentiate itself from competitors and to comply with the requirements of mobile network operators. These customizations have introduced security vulnerabilities.

FTC Charges: HTC America failed to…

1. Employ reasonable and appropriate security practices in the design and customization of the software on its mobile devices.
2. Provide its engineering staff with adequate security training
3. Review or test the software on its mobile devices for potential security vulnerabilities
4. Follow well-known and commonly accepted secure coding practices
5. Establish a process for receiving and addressing vulnerability reports from third parties.

Case Study: HTC America settles FTC charges

Consequences of Failures:

- Insecure implementation of two logging applications on HTC devices - Carrier IQ and HTC Loggers -> theft and leakage of private consumer data
- Introduction of programming flaws that allow third-party applications to bypass Android's permission-based security model.

Mobile Privacy Concerns Prompt Class Action Lawsuit Over Carrier IQ:
http://www.mobilemarketingwatch.com/mobile-privacy-concerns-prompt-class-action-lawsuit-over-carrier-iq-19839/

HTC settles with FTC over leaving Carrier IQ and other logging tools open to hackers:
http://www.theverge.com/2013/2/22/4017746/htc-settles-with-ftc-over-insecure-logging-software

Case Study: HTC America settles FTC charges

Consequences of Failures:

- Millions of HTC devices compromised sensitive device functionality, permitting malicious applications to:

- Read and Send SMS text messages
- Record audio
- Install additional malware onto a consumer's device
- Record and transmit data entered into or stored on the device:
  For example; Financial account numbers and related access codes or medical information such as text messages received from healthcare providers and calendar entries concerning doctor's appointments.
- Gain access to users geo-location data
- Read and Write private contact data on devices

Case Study: HTC America settles FTC charges

FTC Requirements:

- ❑ Develop and release software patches to fix vulnerabilities found in millions of HTC devices.
- ❑ Establish a comprehensive security program designed to address security risks during the development of HTC devices.
- ❑ Undergo independent security assessments every other year for the next 20 years.
- ❑ HTC America prohibited from making any false or misleading statements about the security and privacy of consumers' data on HTC devices.

Case Study: HTC America settles FTC charges

- FTC introduced ***Mobile App Developers: Start with Security***
  A new business guide that encourages app developers to aim for reasonable data security. Set of high-level secure coding best practices and guidelines.

IBM AppScan Source Edition can enforce these guidelines and more

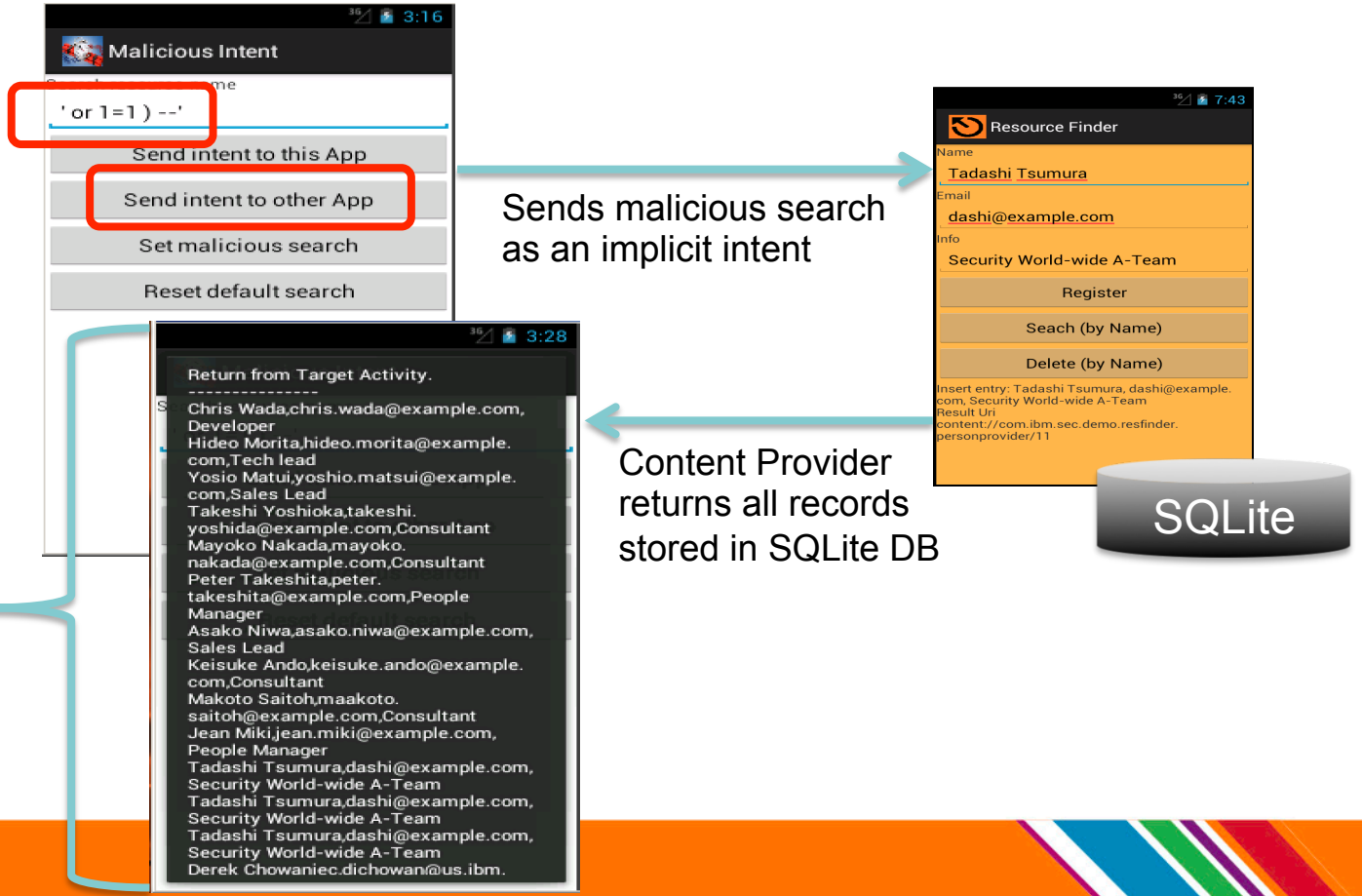
Link to full guide: http://business.ftc.gov/documents/bus83-mobile-app-developers-start-security

Case Study: HTC America settles FTC charges

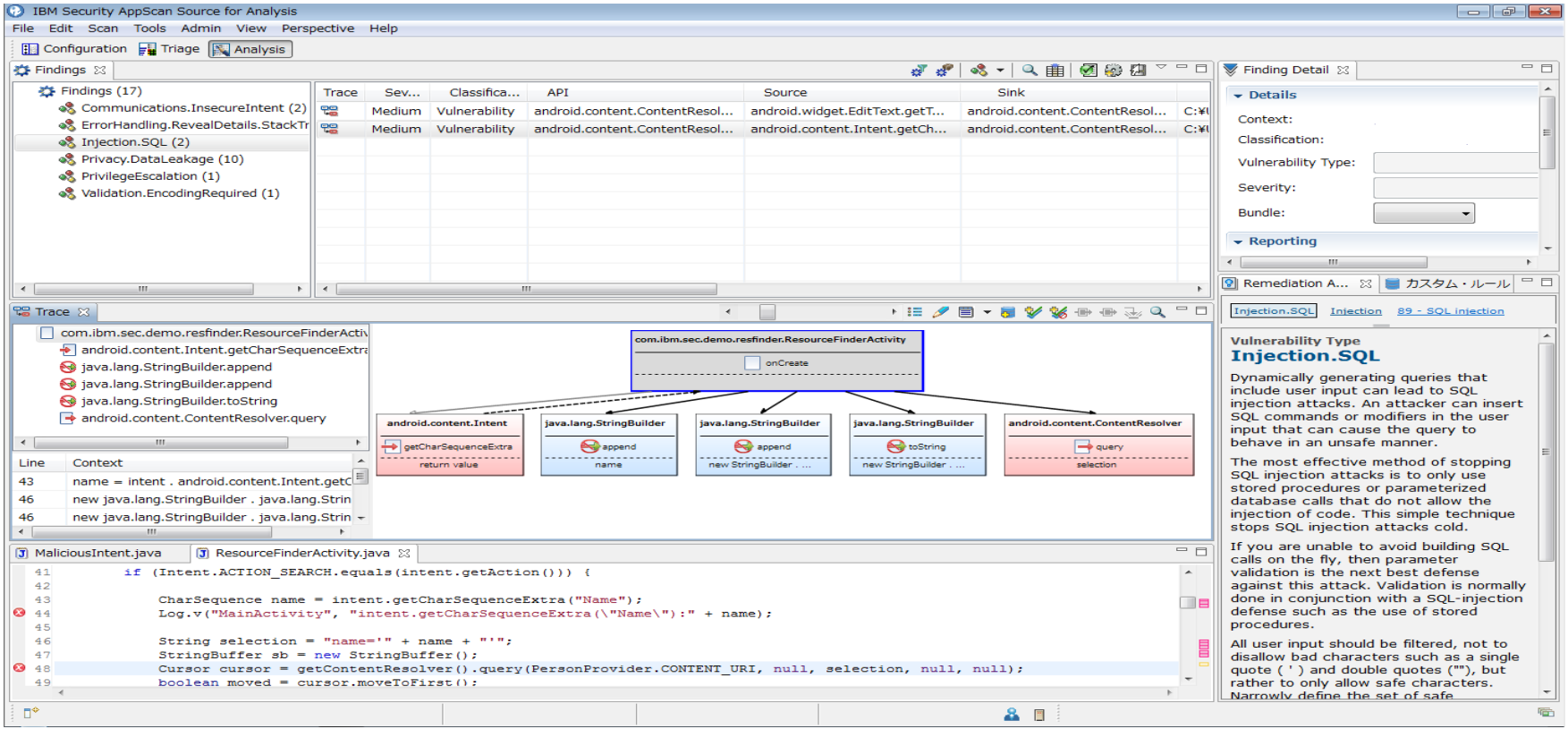
Enforcing FTC "Start with Security" Guidelines

- Use transit encryption for usernames, passwords, and other important data. Deploy SSL/TLS in the form of HTTPS
  - ✓ AppScan Source can identify code where SSL/TLS is not enforced
- Use due diligence on libraries and other third-party code
  - ✓ AppScan Source can scan third-party code and libraries for vulnerabilities
- Protecting data you store on a user's device.
  - ✓ AppScan Source can identify when no encryption or weak encryption is used
- Don't store passwords in plaintext
  - ✓ AppScan Source can identify issues with hard coded passwords and unprotected credentials
- Maintain and Protect server communication
  - ✓ AppScan Source can identify cross-site scripting, injection issues, etc.
- Application Permissions
  - ✓ AppScan Source can identify what permissions an application has been provided

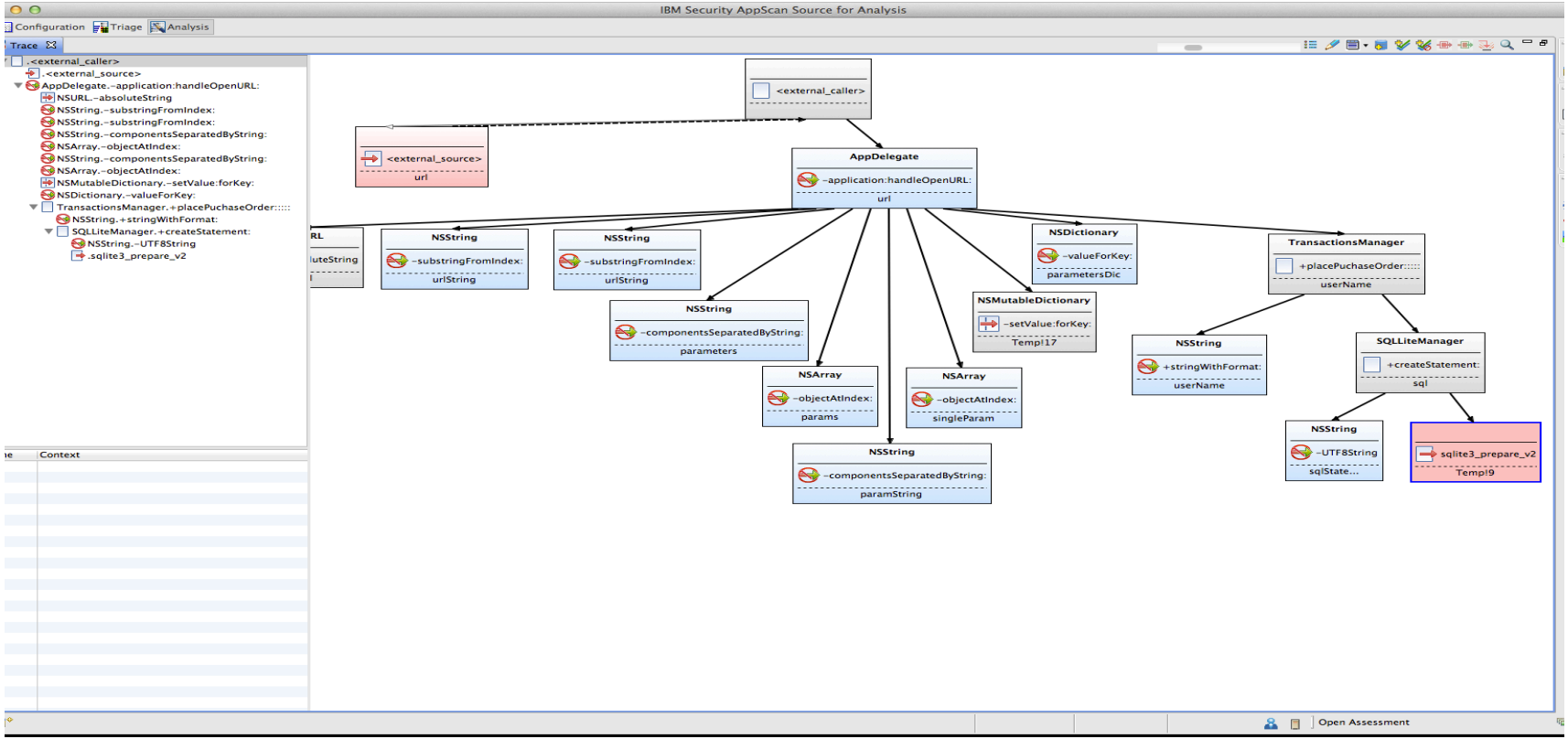
Example: SQL Injection from implicit intent



Example: Malicious intent reaches query method of content provider



SQLi (try finding this with a manual code review)



ibm.com/security