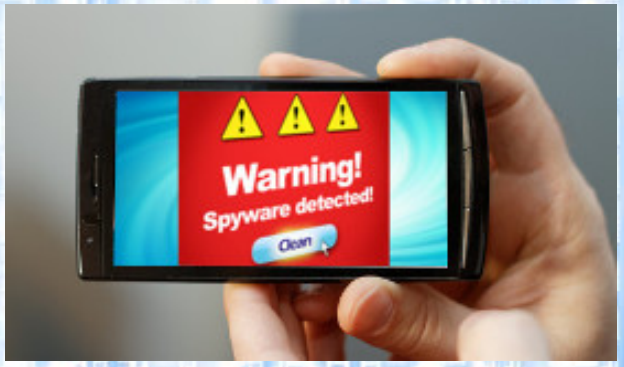

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Mobile Application and BYOD (Bring Your Own Device) Security Implications to Your Business

Dmitry Dessiatnikov

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Who Am I?

- President at Security Aim
- Specializing in web, mobile and network security assessments
- Penetration tester with web development and database administration background
- Salt Lake OWASP Chapter Leader
- Board Member UtahSec.org
- CISSP
- PCI QSA/ASV

Agenda

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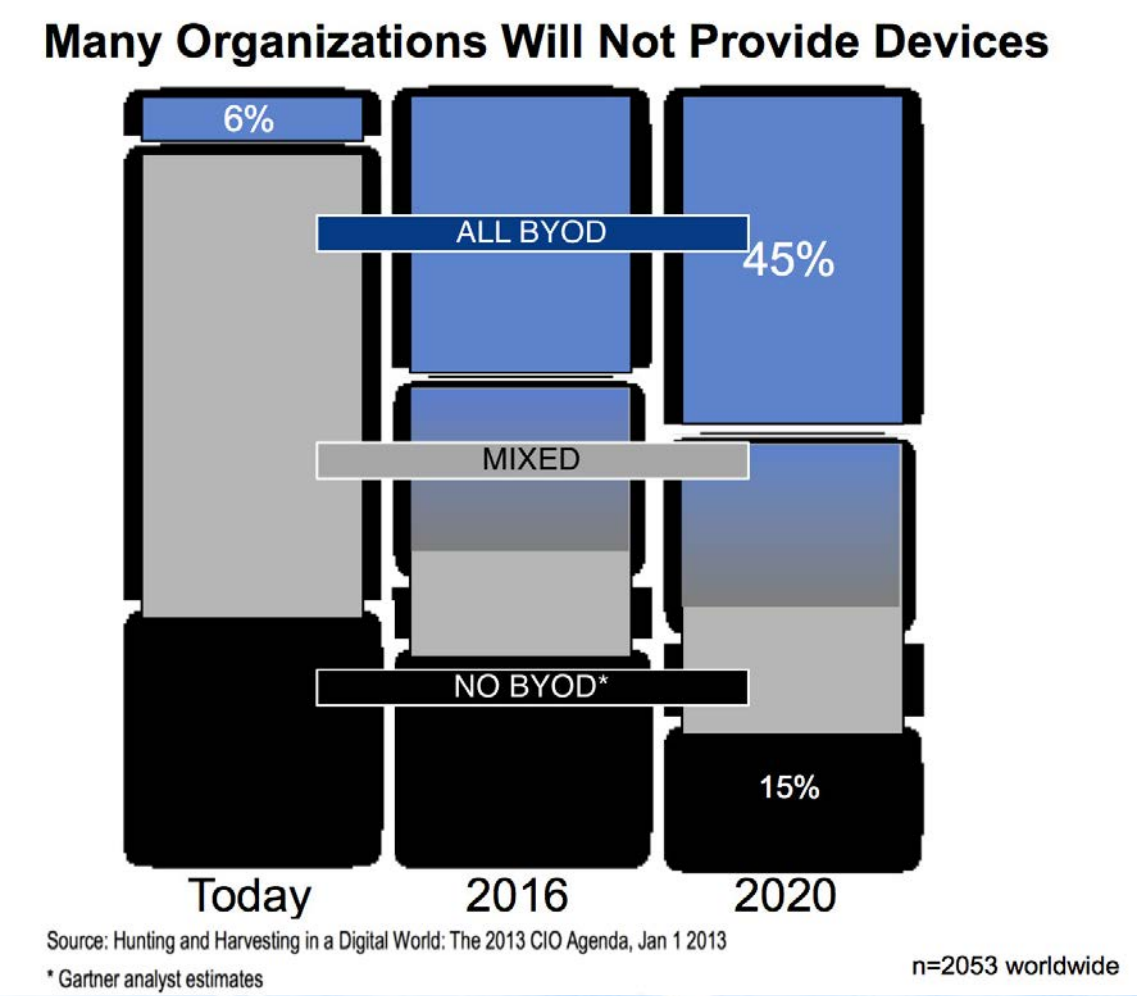
- Background – why should we care?
- BYOD – how is your business exposed?
- Tool release
- Demo – compromise Android phone
- OWASP TOP 10 Mobile Risks
- Examples of common attacks
- Demos – compromise iOS application
- Conclusions

Why should we care?



Source: Willis, David A. "Bring Your Own Device Program Best Practices (BYOD)." Gartner Webinars. Gartner, 14 Aug. 2013. Web. 08 Oct. 2013.

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Why should we care?

According to Gartner: "*Through 2014, employee-owned devices will be compromised by malware at more than double the rate of corporate-owned devices.*"

Source: "Bring Your Own Device", Gartner, Web. 08 Oct. 2013. http://www.gartner.com/technology/topics/byod.jsp

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Why is mobile a concern?

- Typically weak passwords because of not user friendly keyboard
- Mobile devices are online longer and taken more places because most users want to be reachable by phone
- Easier lost/stolen than desktops
- Mobile device defenses are immature
- Legitimate market for spyware

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Why is mobile a concern?

- Mobile network providers configure devices to prefer wi-fi hot spot over cellular data to get users off their network
- If wi-fi is not turned off device is attempting to connect automatically to saved SSIDs
- Mobile application session tokens do not expire for a long time

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Why is mobile a concern?

- While servers/PCs are often protected with firewall/AV/HID mobile devices are not
- Limitations of reviewed mobile AVs:
  - limited by sandbox
  - can't hook to system calls
  - can only do static code analysis and check for signatures of known malware
- Email – spam filtering/virus protection/anti-phishing
- SMS is the new agent for virus/spam/smishing

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Tool release – SE-SMSer

- Automates the process of sending out text messages with a trackable social engineering link
- Used for mobile social engineering assessments
- Uses Google Voice™ communications service, the registered trademark of Google Inc.
- Requires Google account credentials and access to the Google Voice™ communications service.
- Available at www.securityaim.com/resources

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Tool release – SE-SMSer

```
$ ruby SE-SMSer.rb
Usage: SE-SMSer.rb [-iuposthv]

SE-SMSer options:

    -i, --input=FILENAME             File containing one target phone number per
 line.
    -u, --username=USERNAME          Your Google account username
    -p, --password=PASSWORD          Your Google account password
    -o, --output=FILENAME            File containing the phone numbers of target
s to be social engineered and the hashes of those phone numbers that will be use
d to identify victims.
    -s, --sesite=SESITE              Social Engineering site URL without http://
. The link created will be URL/[shortened MD5 hash of the email address]
    -t, --timelag=TIMELAG            Pause in seconds between sending each text

    -h, --help                       Show this message.
    -v, --version                    Show version.
```

```
$ ruby SE-SMSer.rb -i targets.txt -u [redacted].com -p [redacted]
-o victims.txt -s securityaim.com -t 1
"Sending SMS to: [redacted]"
"Waiting for 1 seconds before sending the next SMS"
"The total number of sent text messages: 1"
```

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Tool release – SE-SMSer – Remote compromise of a non-rooted Android phone

DEMO

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Why is mobile a concern?

- As consumers we assume that the manufacturers of the mobile devices care about security of their customers' data and resources
- OS: Google, Apple, Microsoft, Nokia, etc.
- OEM: Apple, Samsung, LG, Microsoft, etc.
- MNO: Verizon, AT&T, T-Mobile, Sprint, etc.

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Android Specific Security Concerns

- For Android Open Source Project – the most common operating system in the world:
  - AOSP 4.0+ security features:
    - ASLR (Address Space Layer Randomization),
    - DEP (Data Execution Prevention)
    - On-device Encryption
  - OEM becomes the weaker link and focus of attacks
  - Purchased device has the latest firmware?

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Android Specific Security Concerns

- Out of the box Android phones come with pre-loaded applications
- Security of pre-loaded applications :
  - Installed by both OEMs and MNOs
  - Have default permissions not explicitly accepted by the users
  - Reviewed by security professionals?
  - Expose devices and data

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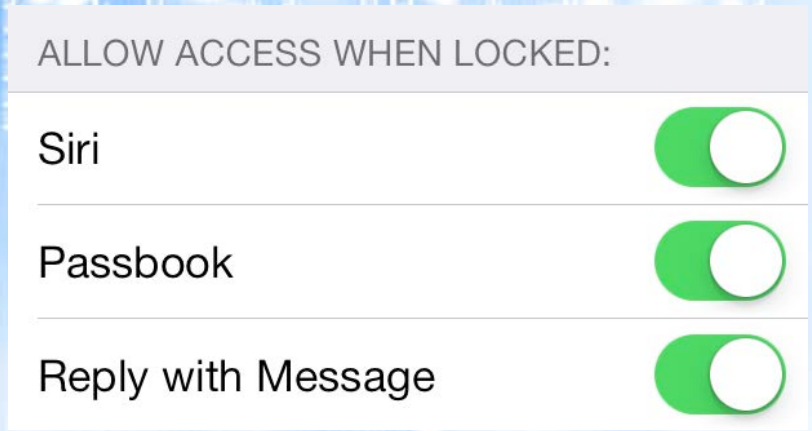
iOS Specific Security Concerns

- Apple Picking
- Additional functionality as “Siri” has security implications
- Default settings allow “access when locked” to:
  - Siri
  - Passbook
  - Reply with message
- Siri Proxy



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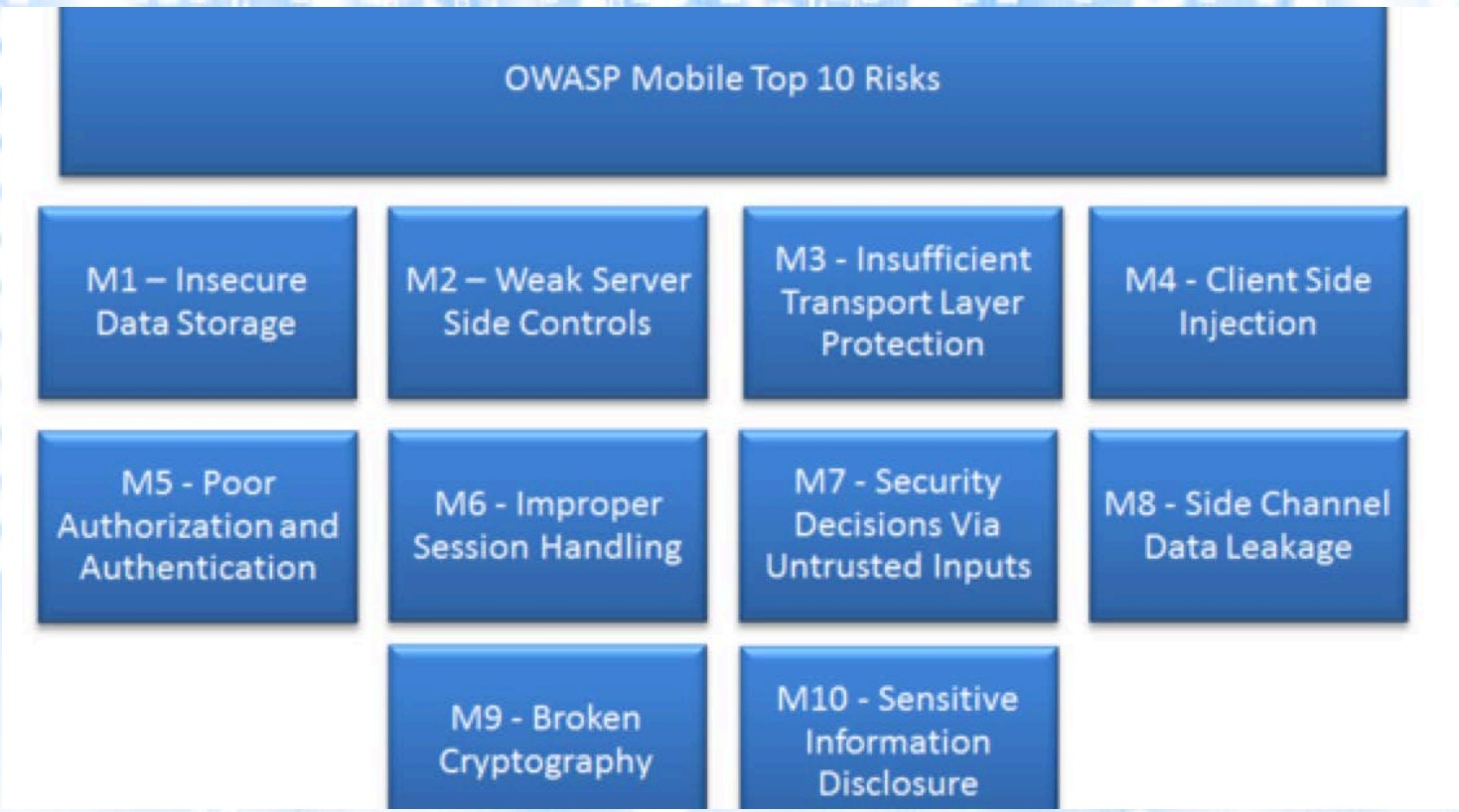
Why is mobile application security a concern?

- Lack of security training for mobile application developers
- Commonly outsourced
- Corporations exposed through unsecured services required for mobile applications to connect back

OWASP Mobile Security Project
Top Ten Mobile Risks



Source: Zach Lanier, Jim Manico, Ludovic Petit, Swapnil Deshmukh, and Beau Woods. "Projects/OWASP Mobile Security Project - Top Ten Mobile Risks." - *OWASP*. OWASP, n.d. Web. 14 Oct. 2013.

M1: Insecure Data Storage

- Lost/stolen device or malware infected
- Developers assume that users will not have access to the device file system
  - Credentials
  - Cookies
  - Location data
  - UDID/EMEI, Device Name, Network Connection Name
  - Personal Information: DoB, Address, Social, Credit Card Data
  - Application Data:
    - Stored application logs
    - Debug information
    - Cached application messages
    - Transaction histories

Source: Zach Lanier, Jim Manico, Ludovic Petit, Swapnil Deshmukh, and Beau Woods. "Projects/OWASP Mobile Security Project - Top Ten Mobile Risks." - *OWASP*. OWASP, n.d. Web. 14 Oct. 2013.

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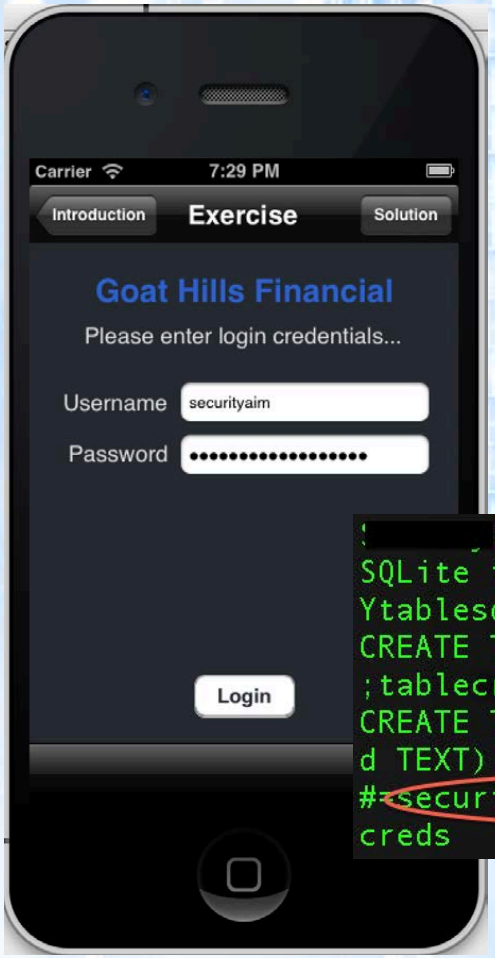
M1: Insecure Data Storage




```
:Documents          $ strings credentials.sqlite
SQLite format 3
Ytablesqlite_sequencesqlite_sequence
CREATE TABLE sqlite_sequence(name,seq)n
;tablecredscreds
CREATE TABLE creds (id INTEGER PRIMARY KEY AUTOINCREMENT, username TEXT, passwor
d TEXT)
#securityaimthispasswordisverystrong
creds
```

Credit: iGoat – Ken van Wyk (ken@krvw.com),
Sean Eidenmiller (sean@krvw.com)
KRvW Associatess, LLC

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M1: Insecure Data Storage

DEMO

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M2: Weak Server Side Controls

- Pressures for fast mobile deployment
- Applies to backend services
- Corporate environments exposed:
  - Insecure APIs and web services
  - Mobile clients are trusted
  - Lessons from web application security forgotten

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M3: Insufficient Transport Layer Protection

- Typical mobile application - client to server data exchange
- Data traverses multiple networks often without user/developer knowledge:
  - Carrier network
  - Internet
  - WiFi
- Often SSL/TLS is not implemented properly or used only during authentication

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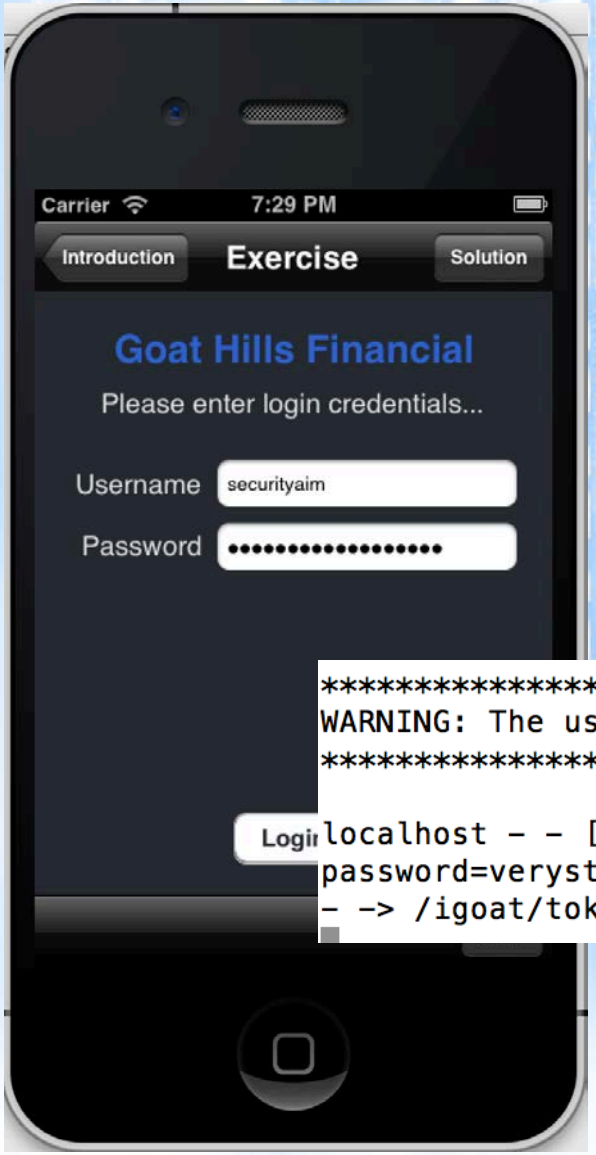
M3: Insufficient Transport Layer Protection




```
**********************************************************************************
WARNING: The user's login credentials were stolen by everyone on your Wi-Fi!
**********************************************************************************

localhost - - [14/Oct/2013:19:29:26 MDT] "GET /igoat/token?username=securityaim&
password=verystrongpassword HTTP/1.1" 200 0
- -> /igoat/token?username=securityaim&password=verystrongpassword
```

Credit: iGoat – Ken van Wyk (ken@krvw.com),
Sean Eidenmiller (sean@krvw.com)
KRvW Associatess, LLC

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M3: Insufficient Transport Layer Protection

DEMO

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M4: Client Side Injection

- Mobile application clients are trusted
- SQL Injection
- XSS
- Multi-user applications
- Shared device
- Paid-for-only content

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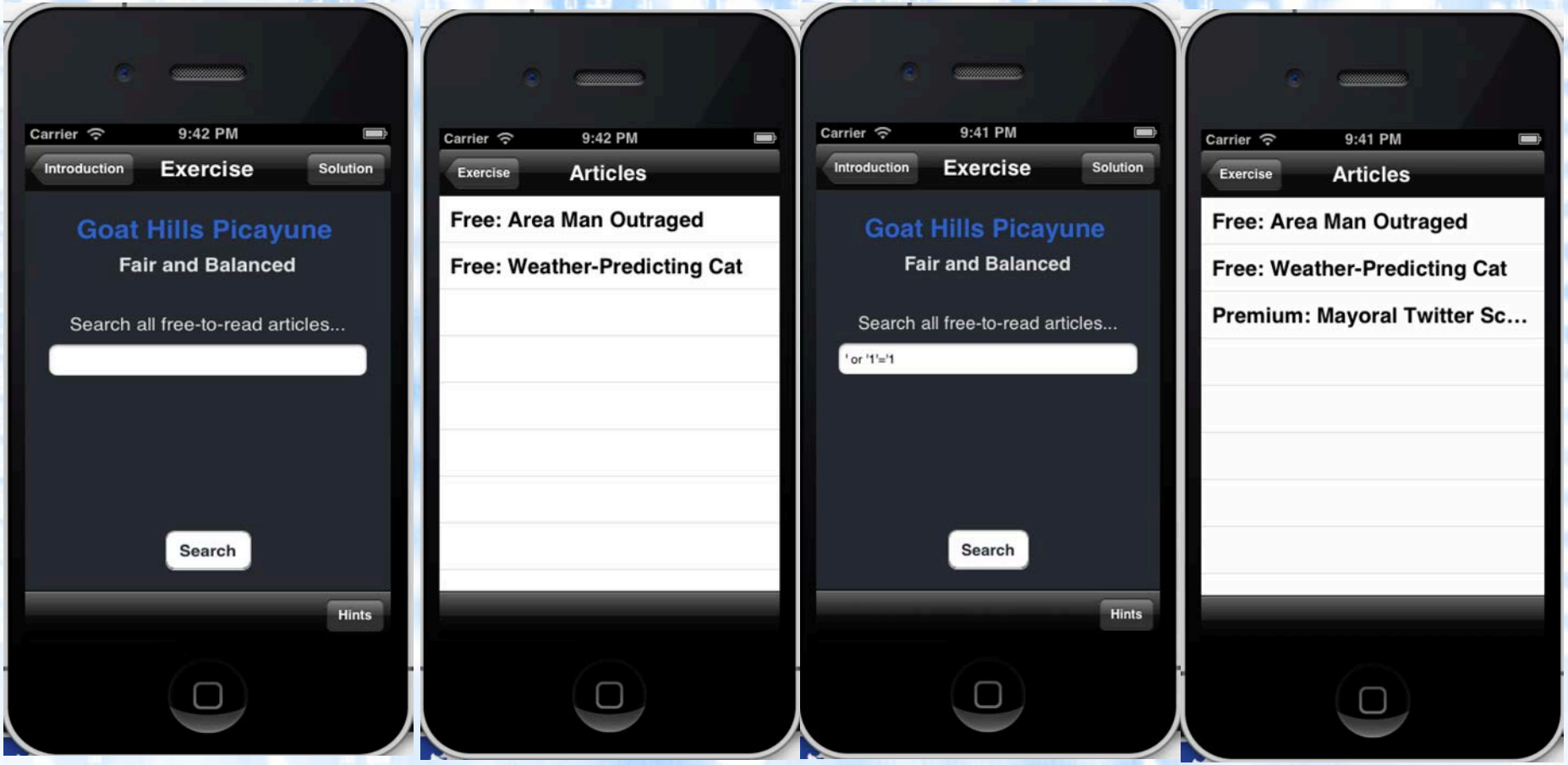
M4: Client Side Injection



Credit: iGoat – Ken van Wyk (ken@krvw.com), Sean Eidenmiller (sean@krvw.com) KRvW Associatess, LLC

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M4: Client Side Injection

DEMO

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M5: Poor Authorization and Authentication

- Making security decisions based on device specific identifiers that can't be revoked:
  - Phone number
  - IMEI
  - IMSI
  - UUID
- Assume hostile mobile platform
- Use of identifiers that can be easily spoofed

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M6: Improper Session Handling

- Longer expiration times or non-expiring mobile sessions
- Predictable session tokens/low entropy
- Session fixation
- Inability to expire tokens in case of lost/ stolen devices
- Device identifier used as session token

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M7: Security Decisions Via Untrusted Inputs

- Bypass security controls/models
- Sensitive actions should require re-authentication
- iOS – URL Scheme allow Safari to make phone calls or send SMS
- Android – Abusing Intents
- iOS Skype app – using XSS to make calls

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M8: Side Channel Data Leakage

- Developers love to collect data including sensitive data
- Data footprint is often unmanaged on mobile device:
  - Keystroke logging
    - Cut and paste
    - Autocomplete
    - Backgrounding
  - Crash can be caused to send sensitive data to system logs and sent off for troubleshooting
  - Web caches
  - Screenshots

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M8: Side Channel Data Leakage

DEMO

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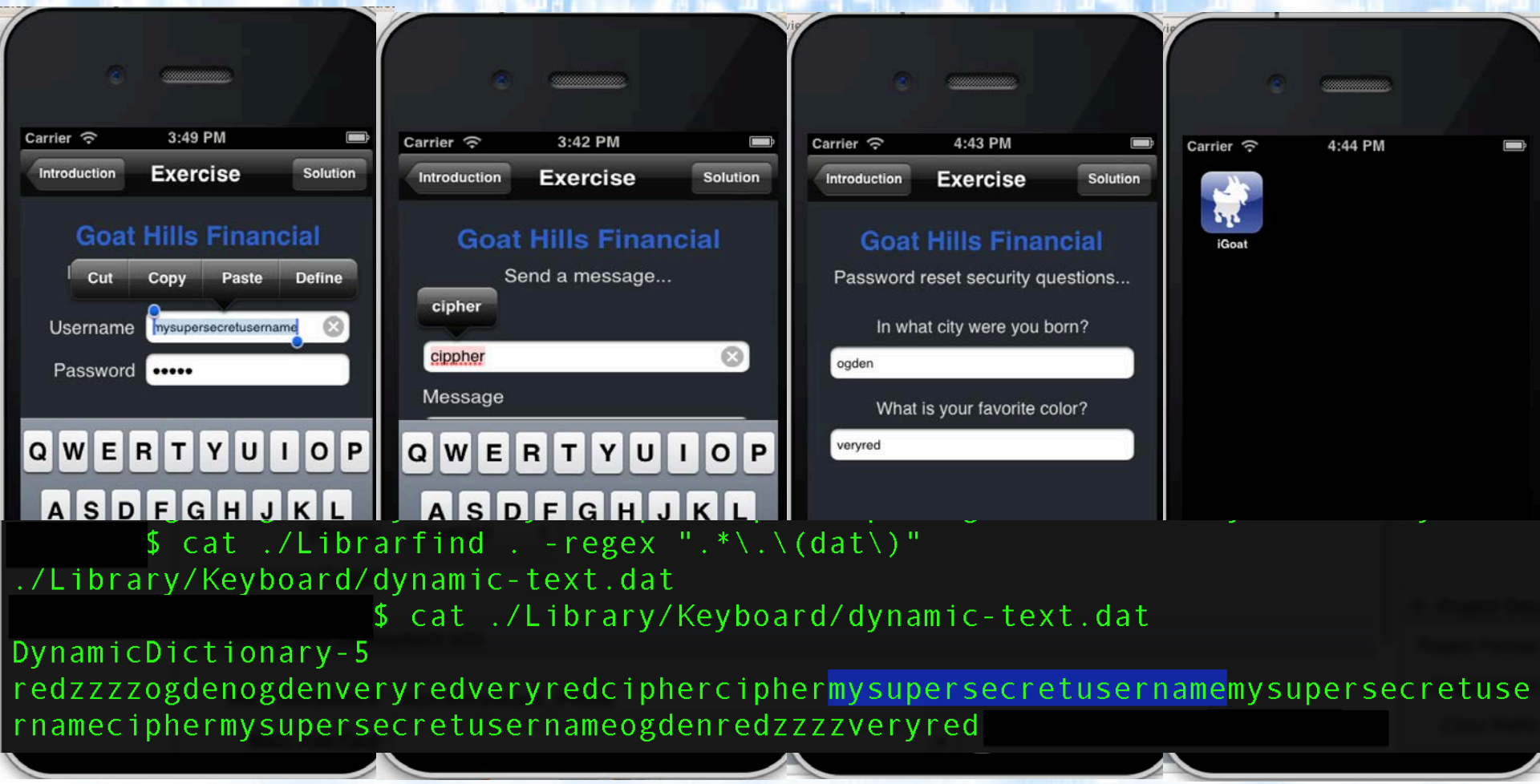
M8: Side Channel Data Leakage




```
$ cat ./Librarfind . -regex ".*\.\(dat\)"
./Library/Keyboard/dynamic-text.dat
$ cat ./Library/Keyboard/dynamic-text.dat
DynamicDictionary-5
redzzzzogdenogdenveryredveryredciphercippermysupersecretusernamemysupersecretuse
rnameciphermysupersecretusernameogdenredzzzzveryred
```

Credit: iGoat – Ken van Wyk (ken@krvw.com), Sean Eidenmiller (sean@krvw.com) KRvW Associatess, LLC

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M9: Broken Cryptography

- Improper implementation of strong crypto libraries
- Home grown crypto implementations, obfuscation, encoding, serilization
- Store key with encrypted data
- Applications use SSL but don't require a valid certificate
- Invalid certificate handling - ActiveSync

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M10: Sensitive Information Disclosure

- Mobile application code can be reverse engineered
- Hardcoded passwords in mobile application code
- Private API keys stored on the client

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Conclusion

- Be aware of the risks before you make significant time and financial investment
- Secure mobile application development training and testing is critical
- Don’t make assumptions about security
- To know if your mobile platform, framework, application is secure test it!

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Q & A

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