Whack-A-Mobile II

Mobile Penetration Testing with MobiSec

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- Security Consultant at Secure Ideas
- Info Sec related roles for past 12 years
- Co-Author of SEC571 Mobile Device Security
- Project Lead for the MobiSec Live Environment
- Co-Chair of the SANS Mobile Device Summit
- Avid Sailor - RC-27 "Daddio"

Kevin Johnson

- Security Consultant at Secure Ideas
- Author of SEC542/642/571
  - Web App PenTesting/Adv Web PenTesting/Mobile Security
- SANS Senior Instructor
- Open Source Project Lead
  - SamuraiWTF, Laudanum, Yokoso, WeaponizedFlash etc.
- Co-Chair of the SANS Mobile Device Summit

Thank You Chris Cuevas!

- Security Consultant at Secure Ideas
- Contributor to SamuraiWTF and MobiSec
- Co-Author of Sec571
- SANS Mentor
- Thanks for all the help on building & testing MobiSec
  - and for dressing up for this pic!

Let's Talk About...

- Overview of the MobiSec Live Environment
- MobiSec Structure & Testing Tools
- ADB is Your Friend for Talking Android
- Finding Data Nuggets on an Android Device
- Sniffing Traffic from an Android Emulator
- Capturing & Manipulating Web Requests
- Hooking Mobile Devices with BeEF
- What's New with MobiSec v1.1
- OWASP Mobile Security Project

MobiSec Live Environment

- What is it? Why did we do this?
- Similar to
  - SamuraiWTF
  - BackTrack
- DARPA CFT Project
- Open Source project
  - Version 1.0 released Feb 2012

MobiSec Design Objectives

- Live testing environment on Intel computers
- Based on an OS *everyone* is familiar with
- Open source and distributable
- Structure aligned to testing methodology
- Easy to find & use tools
- Include development kits and emulators
- Customizable
- Updateable
- Cool name and logo - "catch them all!" ☺

MobiSec Build

- Run as Live Environment from DVD/USB/VM
- Hardware or VM Settings Specs:
  - Single 32-bit processor / Two processors preferred
  - 1GB Memory / More is preferred
  - 15GB HD / More if you want to customize
  - USB (for Ubertooth and USB connect to devices)
  - 802.11 (for WiFi analysis)
- Download available at: http://sourceforge.net/p/mobisec

Mobile Testing Methodology

- We aligned the pen testing tools to a well known pen testing methodology
  - ✧ Reconnaissance
  - ✧ Mapping
  - ✧ Discovery
  - ✧ Exploitation

- If you're not using a testing methodology, then adopt a good one and USE IT!

MobiSec Structure

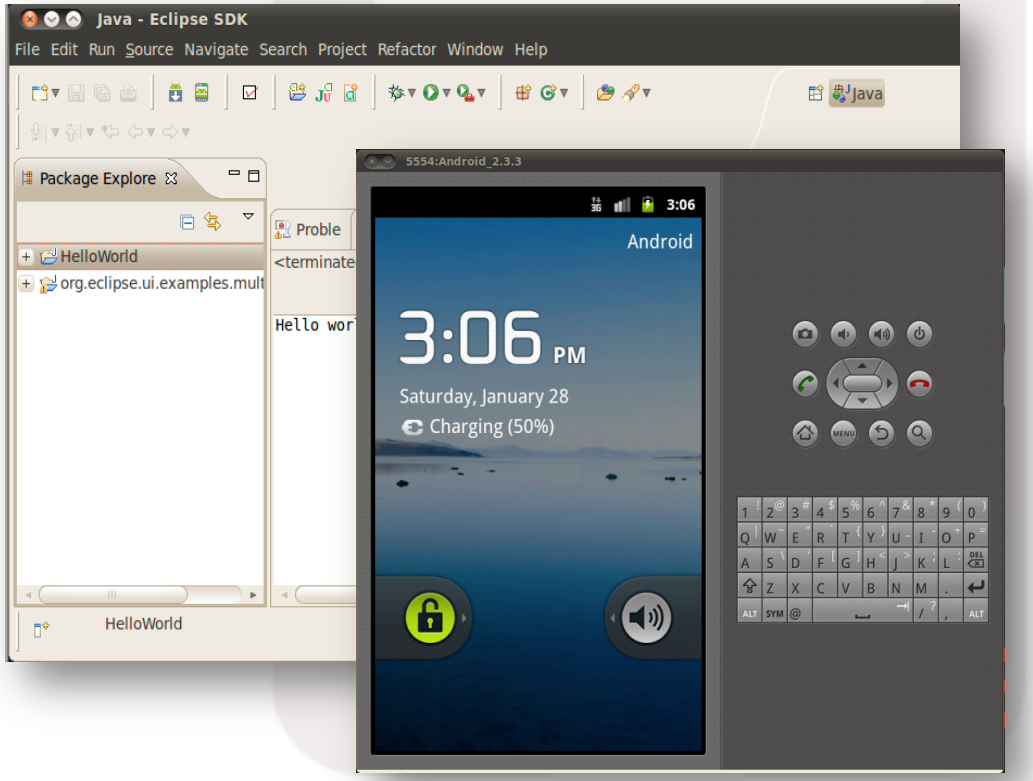
- MobiSec is organized to categorize tools:
  - Development Tools
  - Device Forensics
  - Penetration Testing
  - Reverse Engineering
  - Wireless Analyzers

- Menu and directory structure
  - Similar to other testing environments you're already use to ☺


Applications
Places
System
Wed Apr 4, 5:16 PM
mobisec
MobiSec
Accessories
Graphics
Internet
Office
Other
Ettercap
Development Tools
Device Forensics
Mobile Infrastructure
Penetration Testing
Reverse Engineering
Wireless Analyzers
Reconnaissance
Mapping
Discovery
Exploitation
MOBISEC

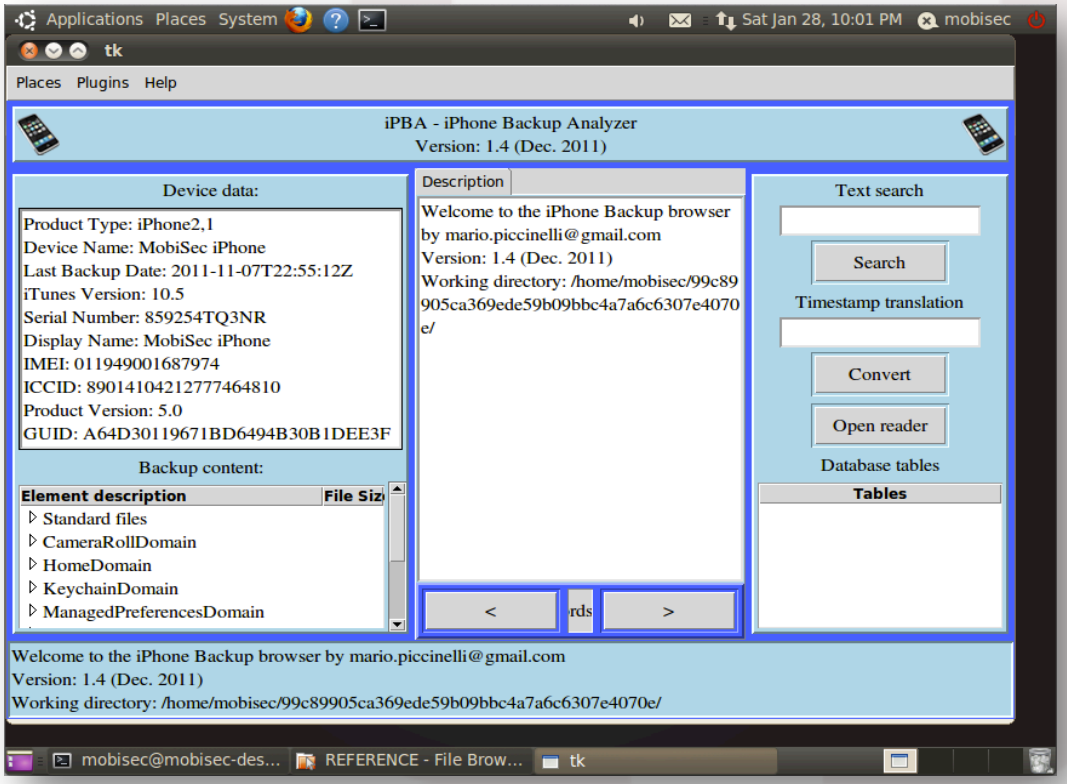
Development Tools

- Includes mobile device development environments, emulators and simulators
  - Android SDK
  - Android Emulators
  - Eclipse IDE
  - NEW AndroidLabs



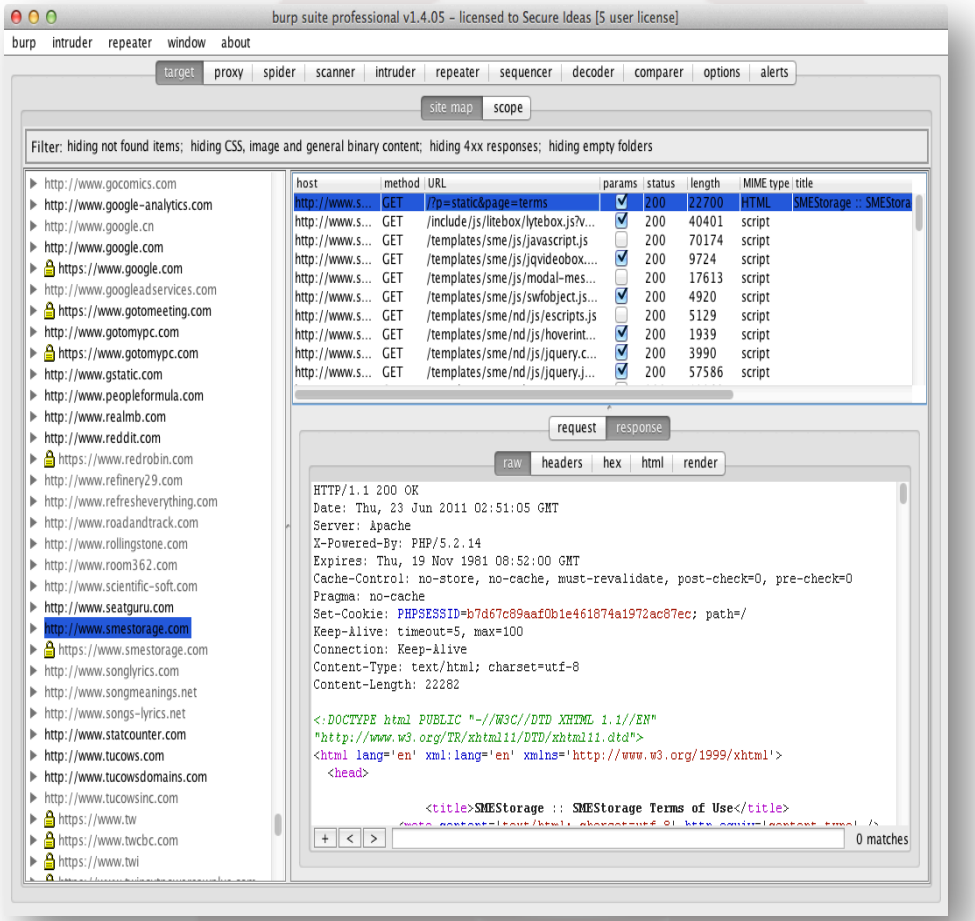
Forensics Tools

- Includes tools that provide the ability to perform forensics on mobile devices
  - BitPim
  - Foremost
  - iPhone Backup Analyzer
  - The Sleuth Kit
  - NEW SQLiteSpy



Penetration Testing Tools

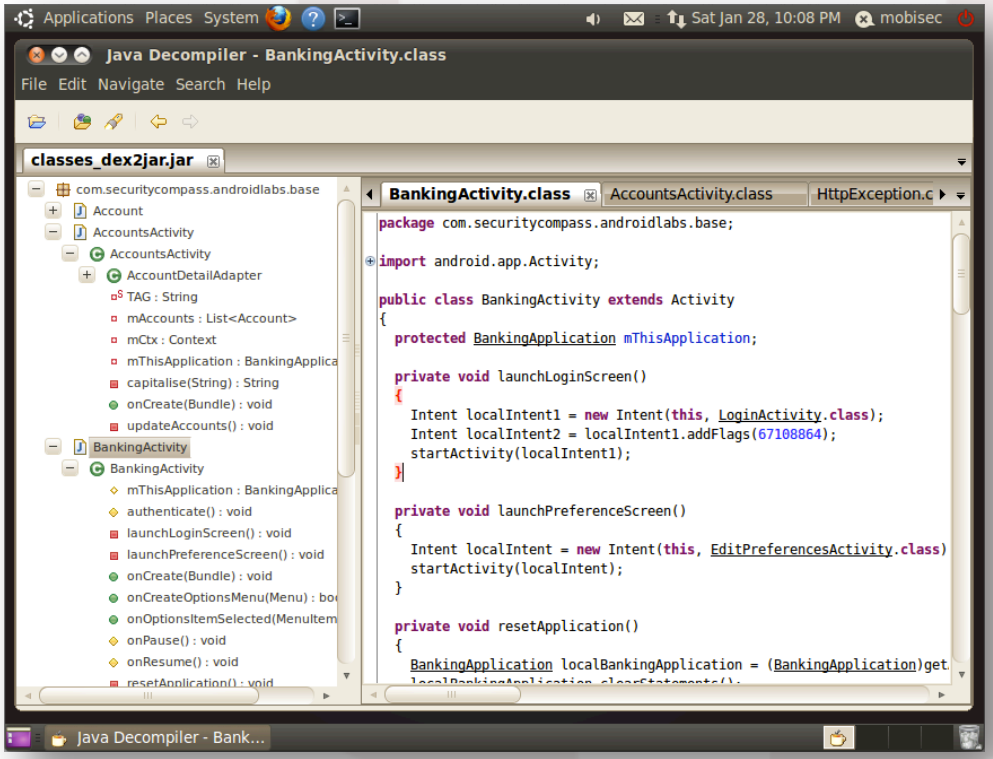
- Reconnaissance
  - Maltego CE, SEAT
- Mapping
  - CeWL, DirBuster, Fierce, Nikto, nmap
- Discovery
  - Burp,w3af, ZAP
- Exploitation
  - BeEF, Metasploit, SET



NEW Ettercap, iSniff, NetSed, SQLMap, SSLStrip

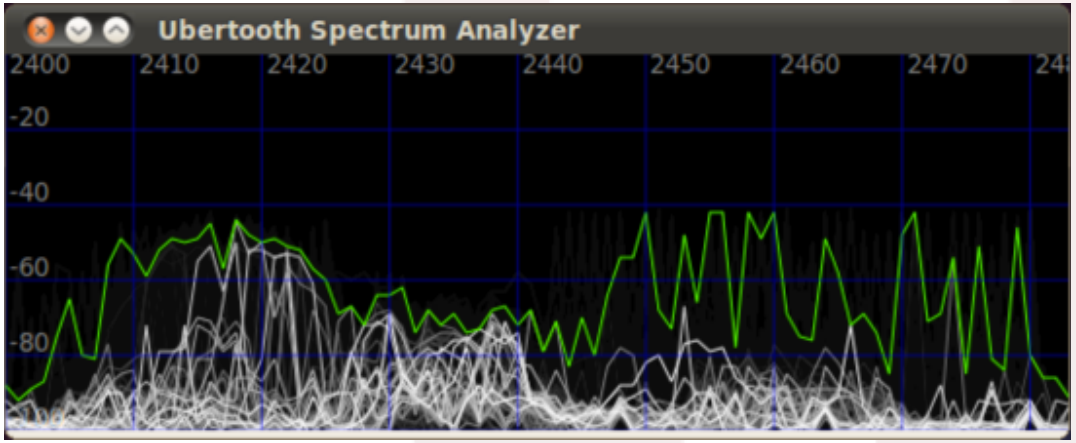
Reverse Engineering Tools

- Includes tools used for performing reverse engineering of mobile apps
  - APK Tool
  - Dex2Jar
  - Flawfinder
  - Java Decompiler
  - Strace



Wireless Analysis Tools

- Drivers and wireless tools for capturing and analyzing wireless traffic
  - Kismet
  - Ubertooth
  - Wireshark
  - NEW Aircrack-ng



Mobile Attack Vectors

- From SmartBombs talk earlier today: there are three major attack vectors for mobile testing:
  - **File System**
    What are apps writing to the file system?
    How is data stored?
  - **Transport Layer**
    How are apps communicating over the network?
    TCP and Third-party APIs
  - **Application Layer**
    How are apps communicating via HTTP and Web Services?
- Let's take a look at how MobiSec can be used…

Connect to Android Device via USB

- Connect android device via USB, and list with adb, but...

```
$ adb devices
List of devices attached
??????????? no permissions
```

- Enable USB debugging on the Android device
  - Settings -> Applications
- List connected USB devices
  - Is VM connected to USB devices?

```
$ lsusb
...
Bus 001 Device 002: ID 0955:7100
```

- Create /etc/udev/rules.d/51-android.rules

```
SUBSYSTEMS=="usb",ATTRS{idVendor}=="0955",ATTRS{idProduct}=="7100",MODE="0666"
```

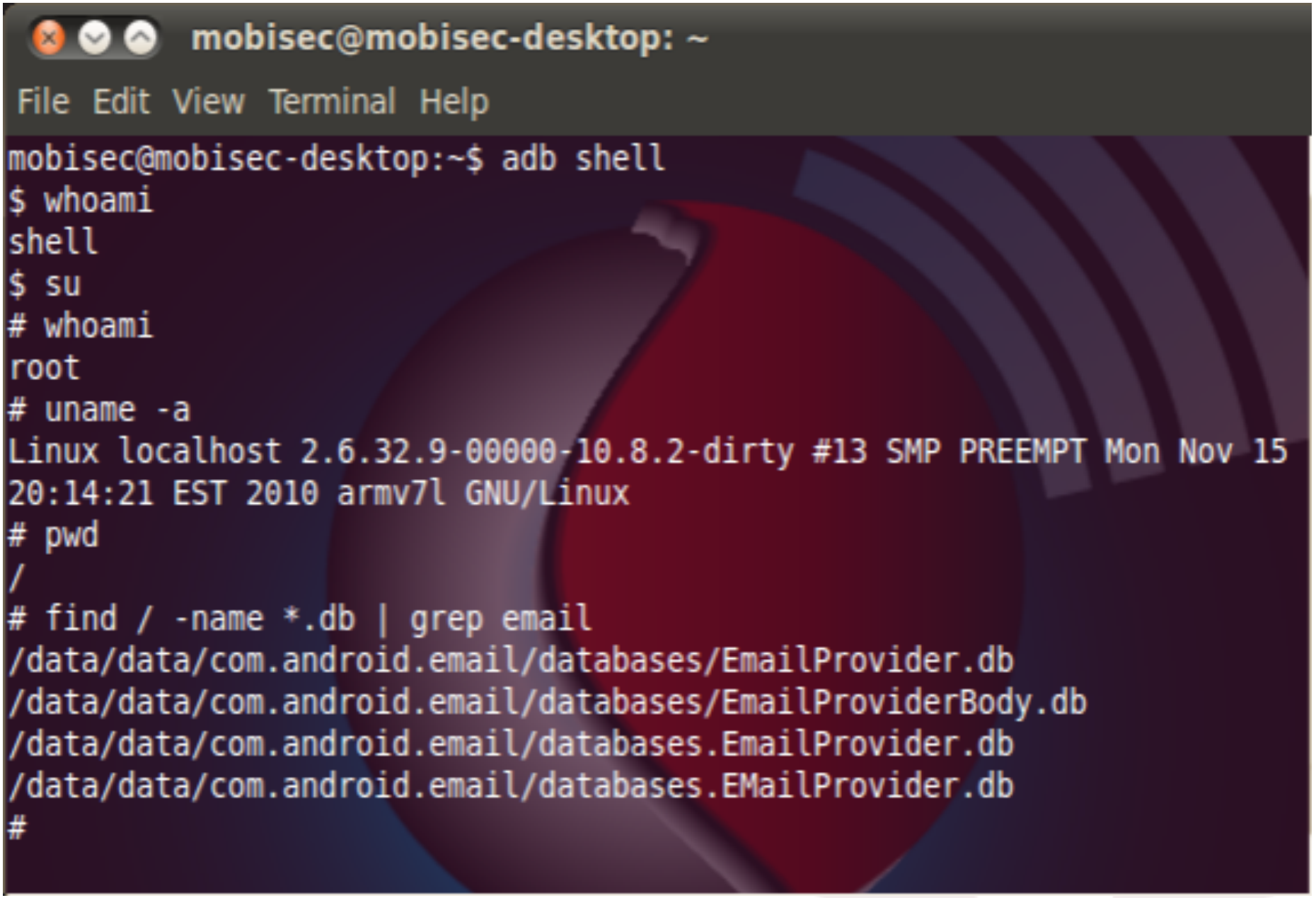
- Restart udev and adb server
- Try again...

```
$ sudo restart udev
$ adb kill-server
$ adb start-server
```

```
$ adb devices
List of devices attached
1714404641614517 device
```

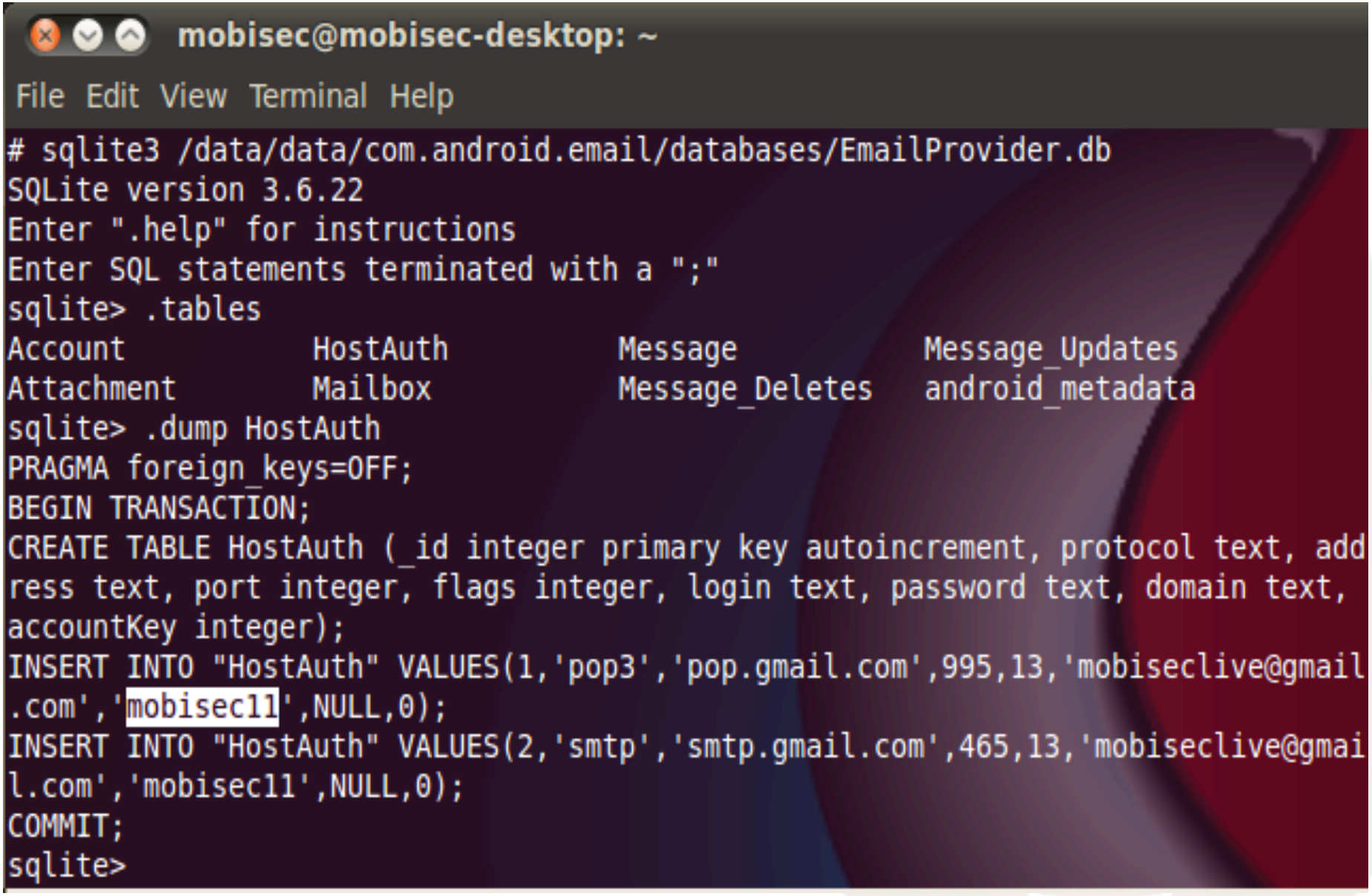
Getting shell on an Android Device

- adb shell to open shell on the device
  - defaults to connected device
- Uses shell account, can su to root, but prompted on the device
  - Can set default to always accept! ☺
- Use uname –a to get system info
- Use find to look for interesting database files
  - find / -name *.db | grep account
  - find / -name *.db | grep email


mobisec@mobisec-desktop: ~
File Edit View Terminal Help
mobisec@mobisec-desktop:~$ adb shell
$ whoami
shell
$ su
# whoami
root
uname -a
Linux localhost 2.6.32.9-00000-10.8.2-dirty #13 SMP PREEMPT Mon Nov 15
20:14:21 EST 2010 armv7l GNU/Linux
pwd
/
find / -name *.db | grep email
/data/data/com.android.email/databases/EmailProvider.db
/data/data/com.android.email/databases/EmailProviderBody.db
/data/data/com.android.email/databases.EmailProvider.db
/data/data/com.android.email/databases.EMailProvider.db
#

Using SQLite3 to Find Data

- Let's take a closer look at that Email database
  - sqlite3 /data/data/com.android.email/databases/EmailProvider.db
- SQLite3 provides simple SQL commands
  - sqlite> .databases (list attached databases)
  - sqlite> .tables (list tables)
  - sqlite> .dump <table> (dump table contents)
- Let's find the email account configurations
  - .dump HostAuth
  - notice the passwords in cleartext?


mobisec@mobisec-desktop: ~
File Edit View Terminal Help
sqlite3 /data/data/com.android.email/databases/EmailProvider.db
SQLite version 3.6.22
Enter ".help" for instructions
Enter SQL statements terminated with a ";"
sqlite> .tables
Account HostAuth Message Message_Updates
Attachment Mailbox Message_Deletes android_metadata
sqlite> .dump HostAuth
PRAGMA foreign_keys=OFF;
BEGIN TRANSACTION;
CREATE TABLE HostAuth (_id integer primary key autoincrement, protocol text, add
ress text, port integer, flags integer, login text, password text, domain text,
accountKey integer);
INSERT INTO "HostAuth" VALUES(1,'pop3','pop.gmail.com',995,13,'mobiseclive@gmail
.com','mobisec11',NULL,0);
INSERT INTO "HostAuth" VALUES(2,'smtp','smtp.gmail.com',465,13,'mobiseclive@gmai
l.com','mobisec11',NULL,0);
COMMIT;
sqlite>

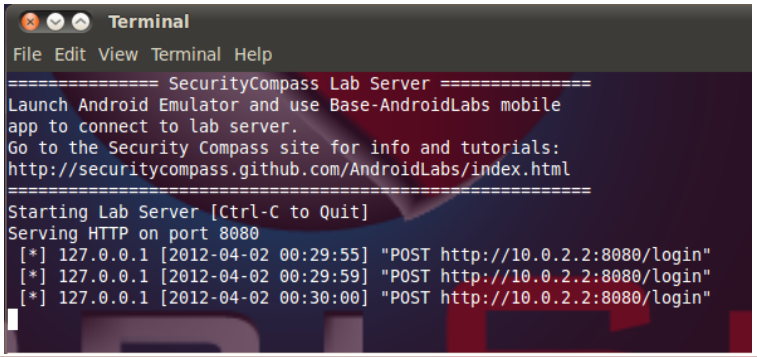
Android Emulators

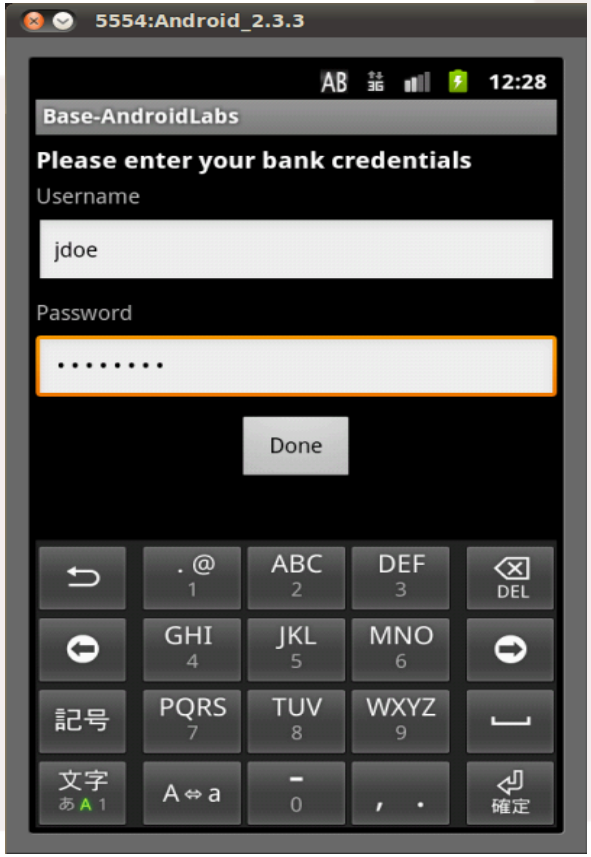
- Android SDK with Emulators
  - Android 2.1 (DroidBox), 2.3.3, 3.2, 4.03
  - Launch from menu under Emulators & Simulators
  - Launch from command line:
    android-emu.sh <21/233/32/403>
- Security Compass Lab Server 

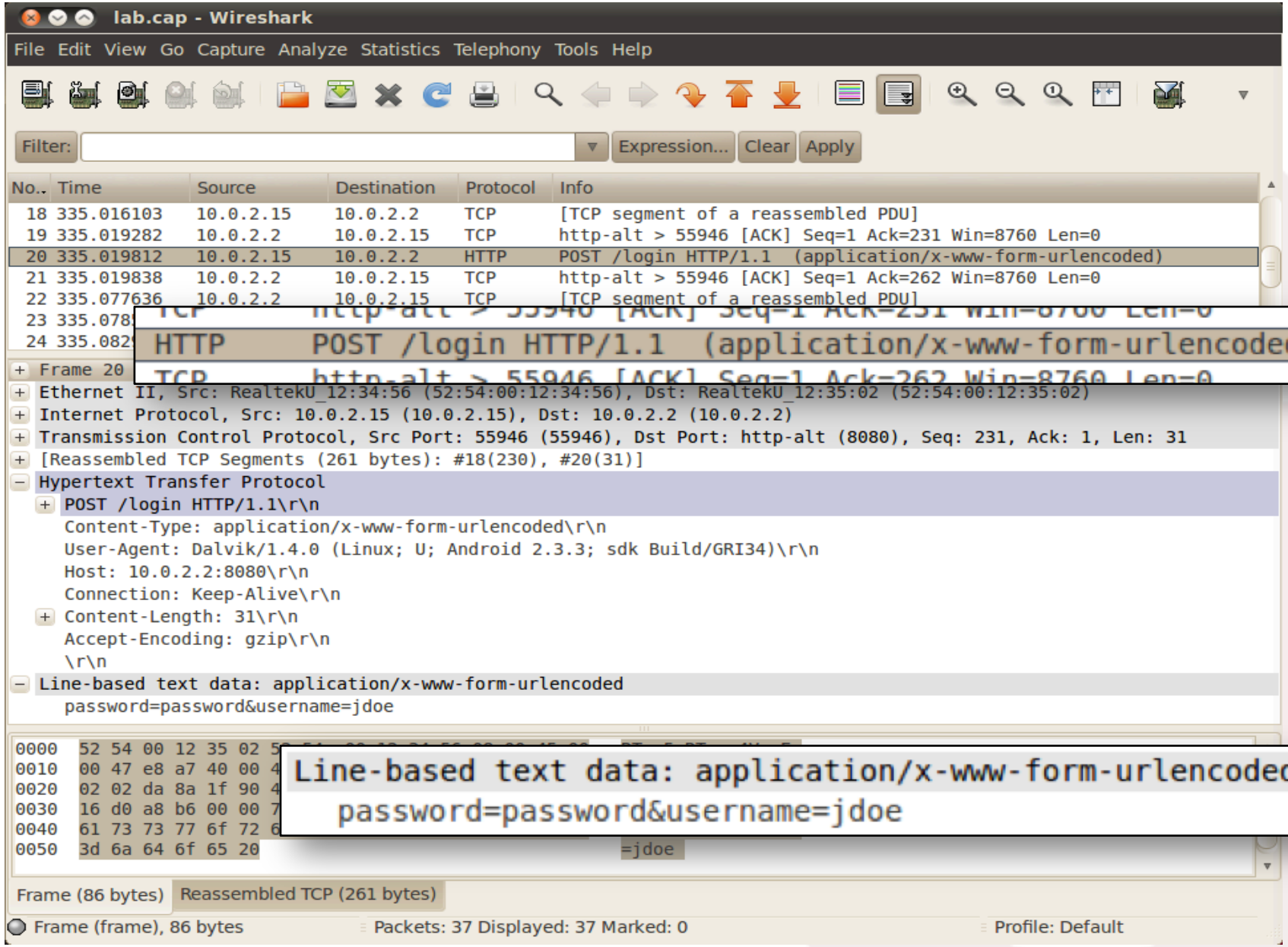
  - Simulates very poorly developed "banking" app
  - Already installed on the emulators ☺
  - Launch from menu or commandline:
    sc-labserver-http.sh or sc-labserver-https.sh

Let's Capture Some Packets

- Start emulator manually to capture tcp packets to .cap file
  - emulator –avd Android_2.3.3 –scale 0.75 –tcpdump ~/lab.cap
  - menu/script doesn't include -tcpdump arg
- Start Security Compass Lab Server (http)
- Launch Base-AndroidLabs app
  - Login to the app (jdoe/password)
- Launch Wireshark to view packets
  - wireshark ~/lab.cap



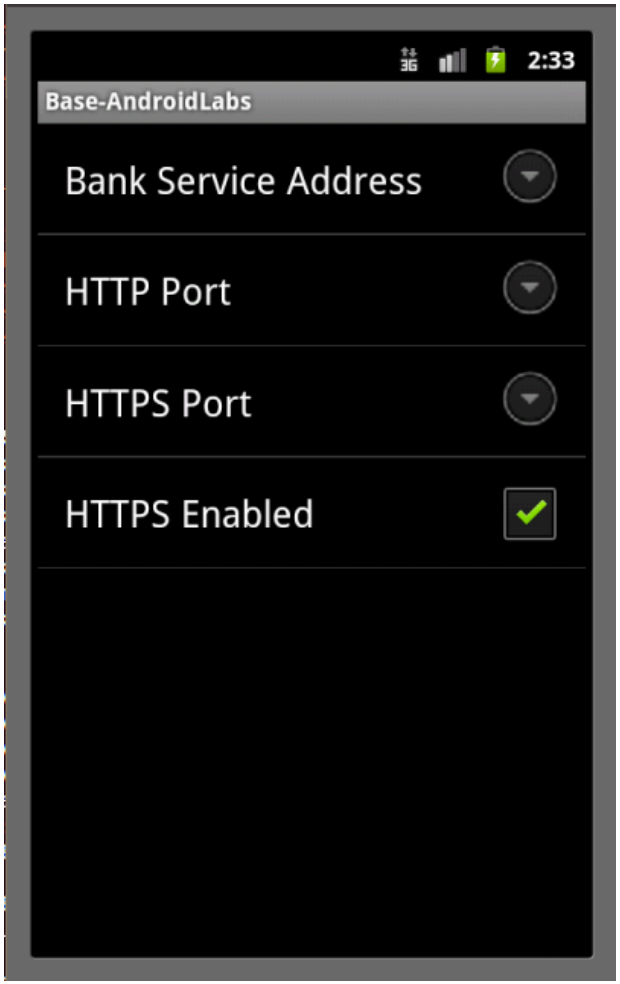


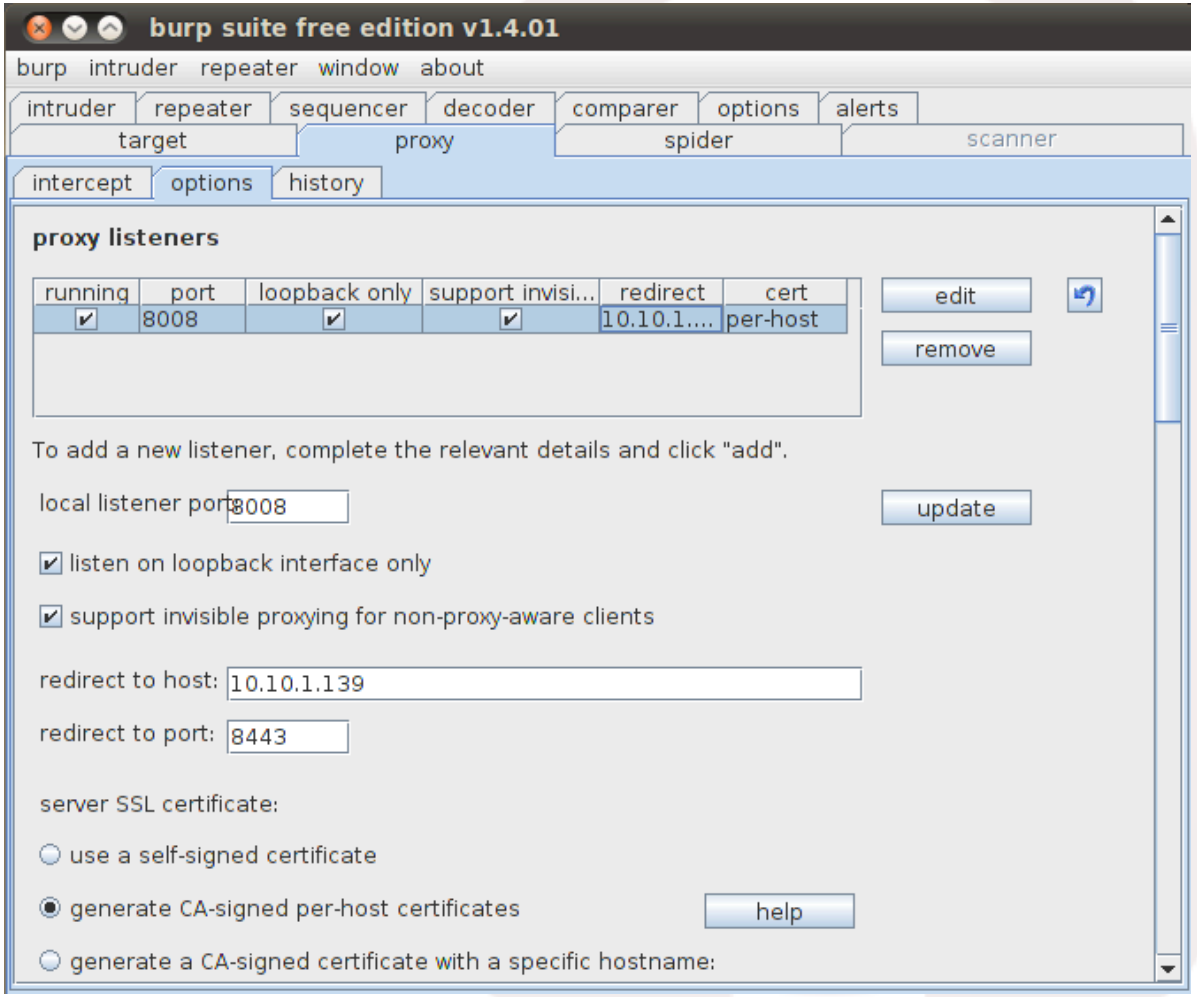

lab.cap - Wireshark
File Edit View Go Capture Analyze Statistics Telephony Tools Help
Filter: Expression... Clear Apply
No. Time Source Destination Protocol Info
18 335.016103 10.0.2.15 10.0.2.2 TCP [TCP segment of a reassembled PDU]
19 335.019282 10.0.2.2 10.0.2.15 TCP http-alt > 55946 [ACK] Seq=1 Ack=231 Win=8760 Len=0
20 335.019812 10.0.2.15 10.0.2.2 HTTP POST /login HTTP/1.1 (application/x-www-form-urlencoded)
21 335.019838 10.0.2.2 10.0.2.15 TCP http-alt > 55946 [ACK] Seq=1 Ack=262 Win=8760 Len=0
22 335.077636 10.0.2.2 10.0.2.15 TCP [TCP segment of a reassembled PDU]
HTTP POST /login HTTP/1.1 (application/x-www-form-urlencoded)
Frame 20
Ethernet II, Src: RealtekU_12:34:56 (52:54:00:12:34:56), Dst: RealtekU_12:35:02 (52:54:00:12:35:02)
Internet Protocol, Src: 10.0.2.15 (10.0.2.15), Dst: 10.0.2.2 (10.0.2.2)
Transmission Control Protocol, Src Port: 55946 (55946), Dst Port: http-alt (8080), Seq: 231, Ack: 1, Len: 31
[Reassembled TCP Segments (261 bytes): #18(230), #20(31)]
Hypertext Transfer Protocol
POST /login HTTP/1.1\r\n
Content-Type: application/x-www-form-urlencoded\r\n
User-Agent: Dalvik/1.4.0 (Linux; U; Android 2.3.3; sdk Build/GRI34)\r\n
Host: 10.0.2.2:8080\r\n
Connection: Keep-Alive\r\n
Content-Length: 31\r\n
Accept-Encoding: gzip\r\n
\r\n
Line-based text data: application/x-www-form-urlencoded
password=password&username=jdoe
0000 52 54 00 12 35 02
0010 00 47 e8 a7 40 00
0020 02 02 da 8a 1f 90
0030 16 d0 a8 b6 00 00
0040 61 73 73 77 6f 72
0050 3d 6a 64 6f 65 20
=jdoe
Line-based text data: application/x-www-form-urlencoded
password=password&username=jdoe
Frame (86 bytes) Reassembled TCP (261 bytes)
Frame (frame), 86 bytes Packets: 37 Displayed: 37 Marked: 0 Profile: Default

Intercepting Web Requests

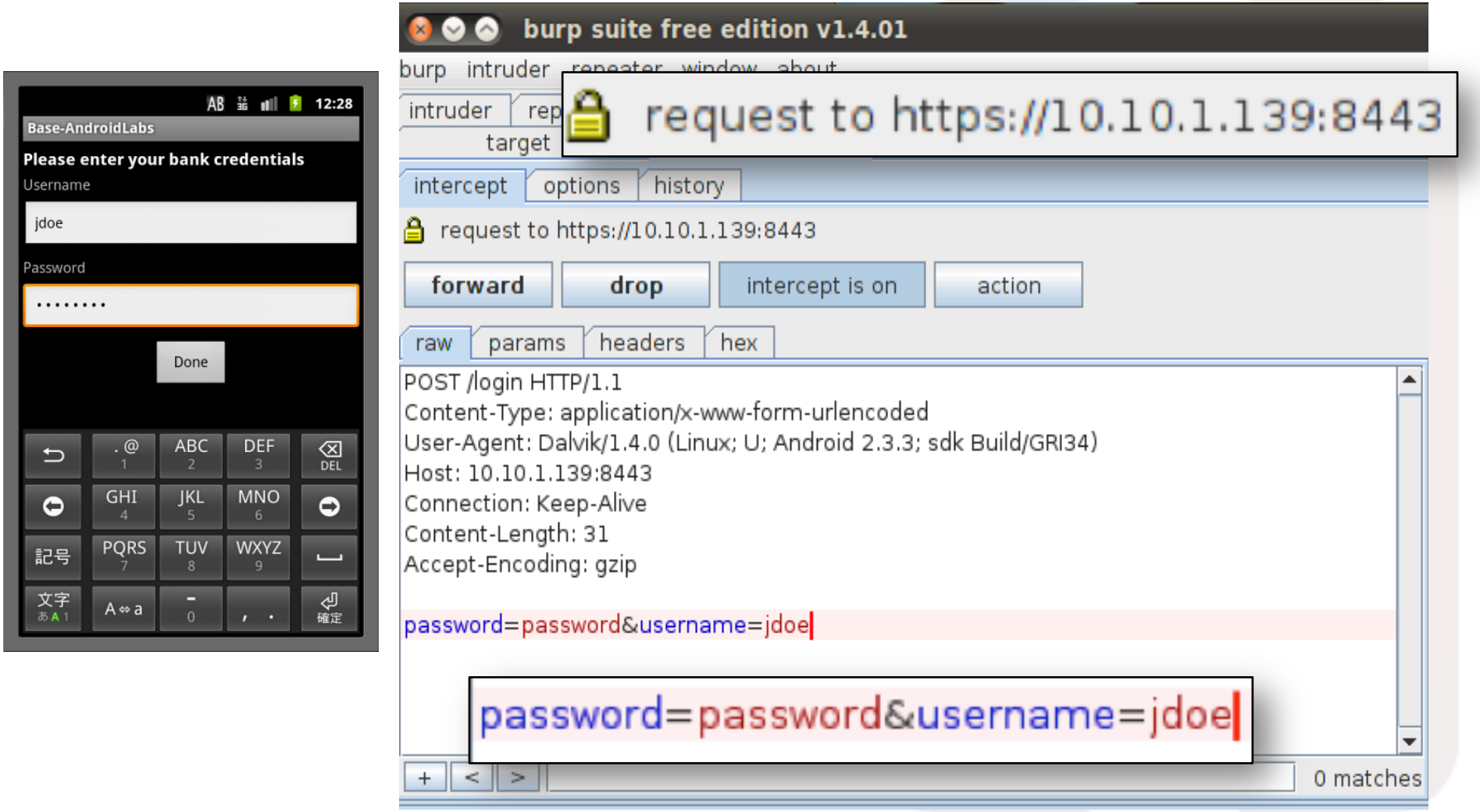
- Start emulator manually to route traffic through Burp
  - emulator –avd Android_2.3.3 –scale 0.75 –proxy localhost:8008
- Start AndroidLabs Lab Server (https)
  - sc-labserver-https.sh
- Configure Burp to intercept and forward traffic
  - Intercept port 8008
  - Forward to port 8443 (AndroidLabs SSL listen port)
  - Support invisible proxying
- Configure AndroidLabs mobile app on emulator
  - IP address of MobiSec (ethx)
  - Enable HTTPS

Mobile App & Burp Settings

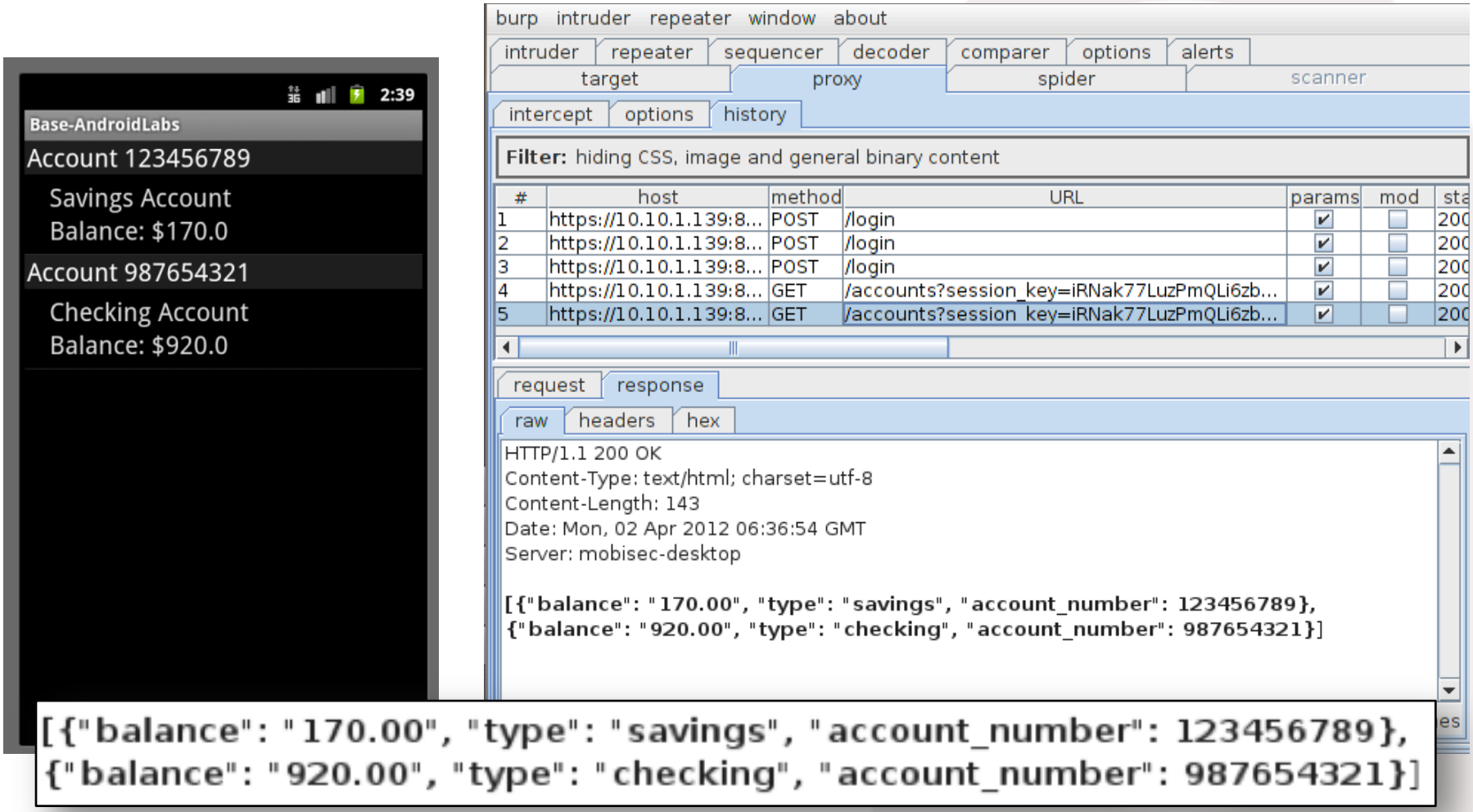




Authenticate & Intercept

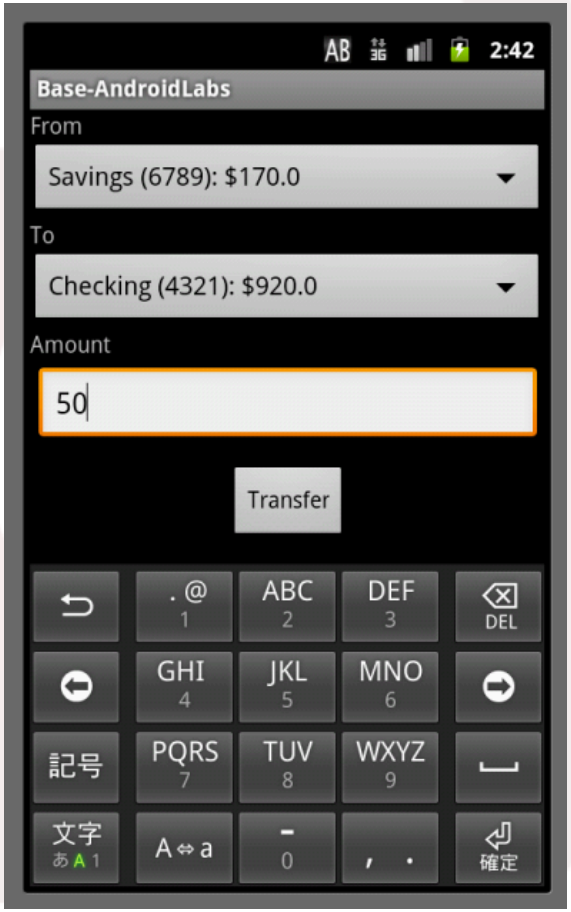


Intercept Account Balances

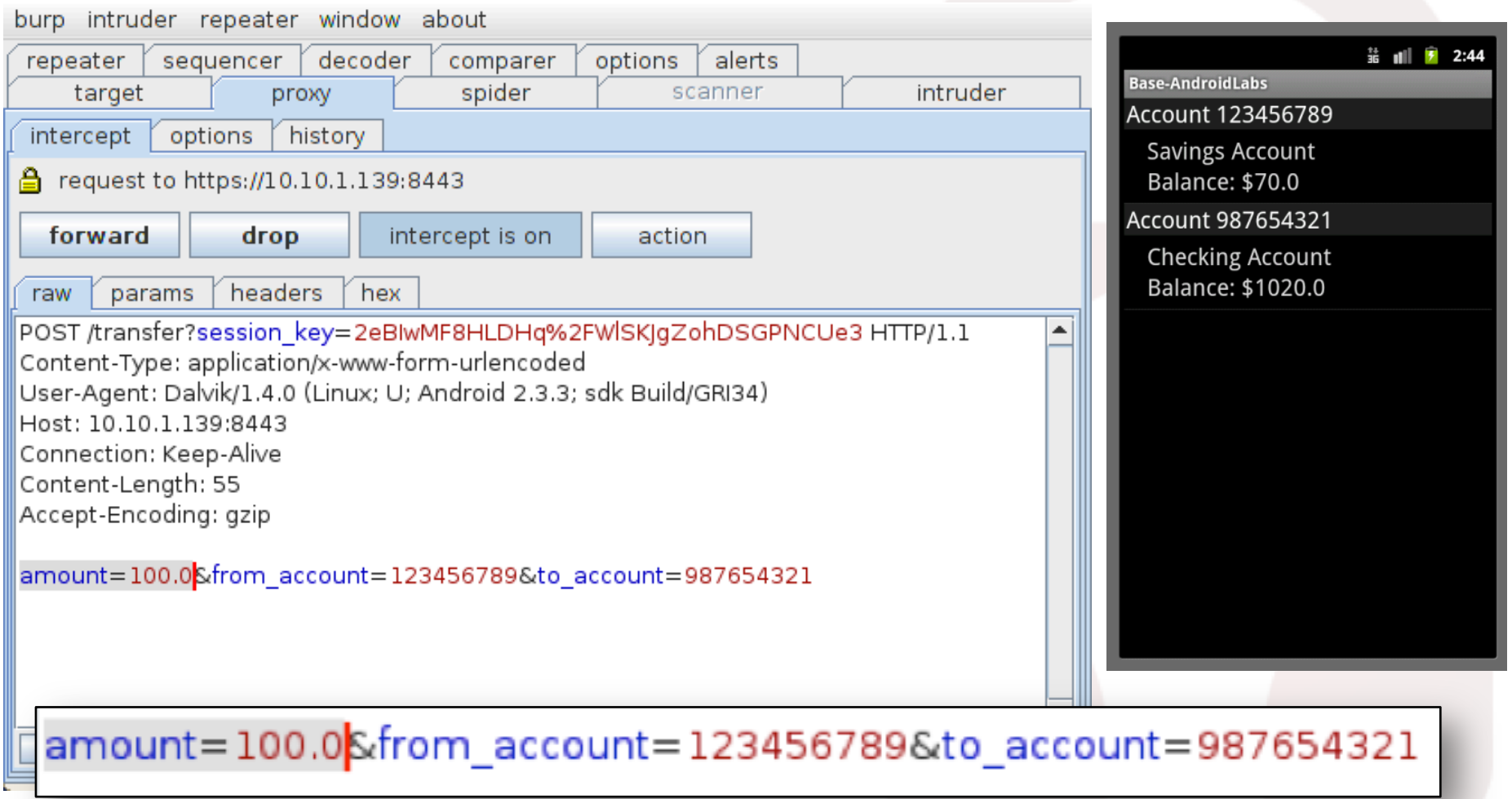


Manipulating Web Requests

- Select Transfer from AndroidLabs mobile app
  - Transfer $50 from Savings to Checking
- Manipulate request in Burp
  - Change "amount=50" to "amount=100"
  - Forward the request to LabServer
- Check the Balances



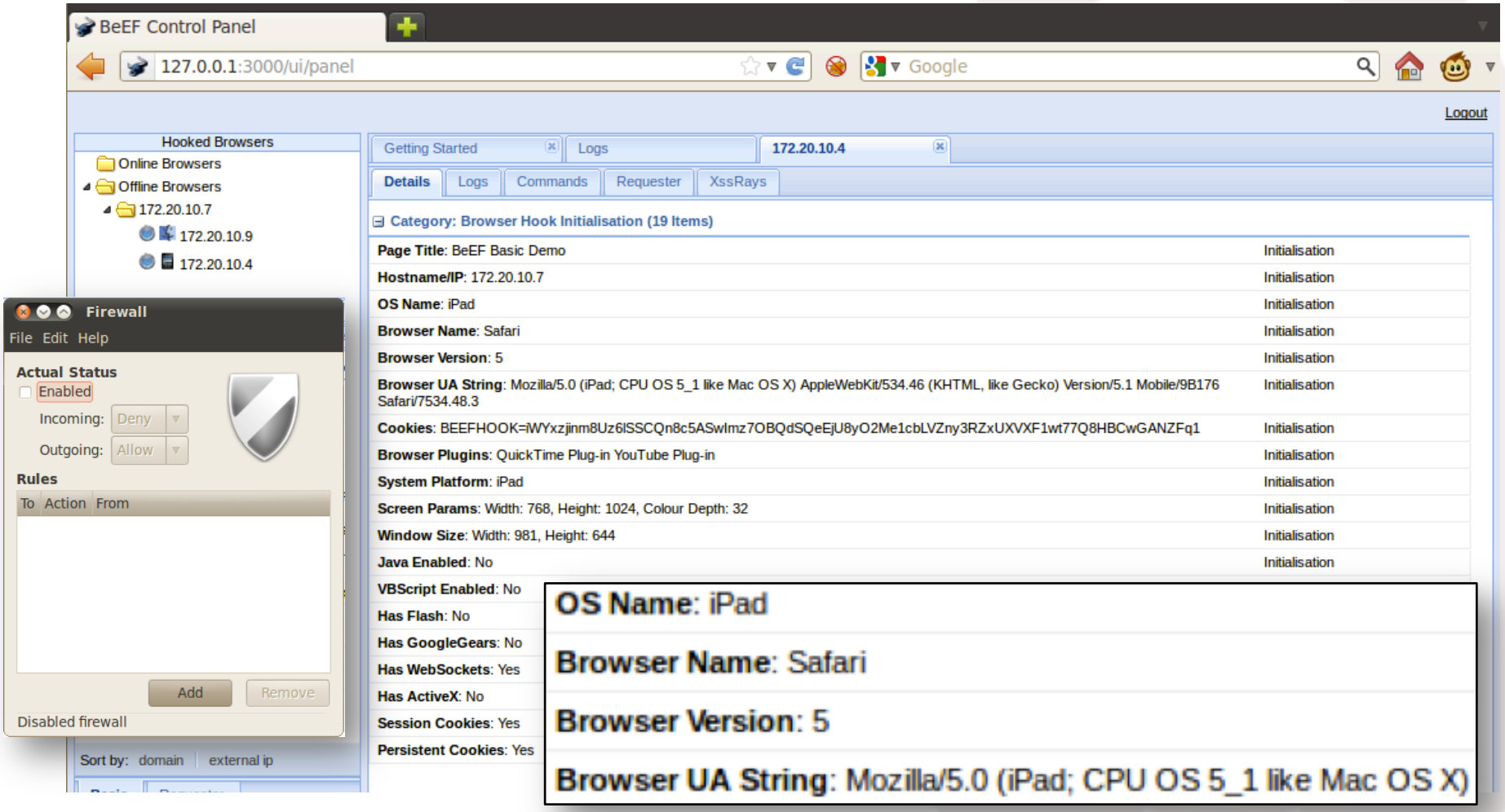
Change the Amount and Forward



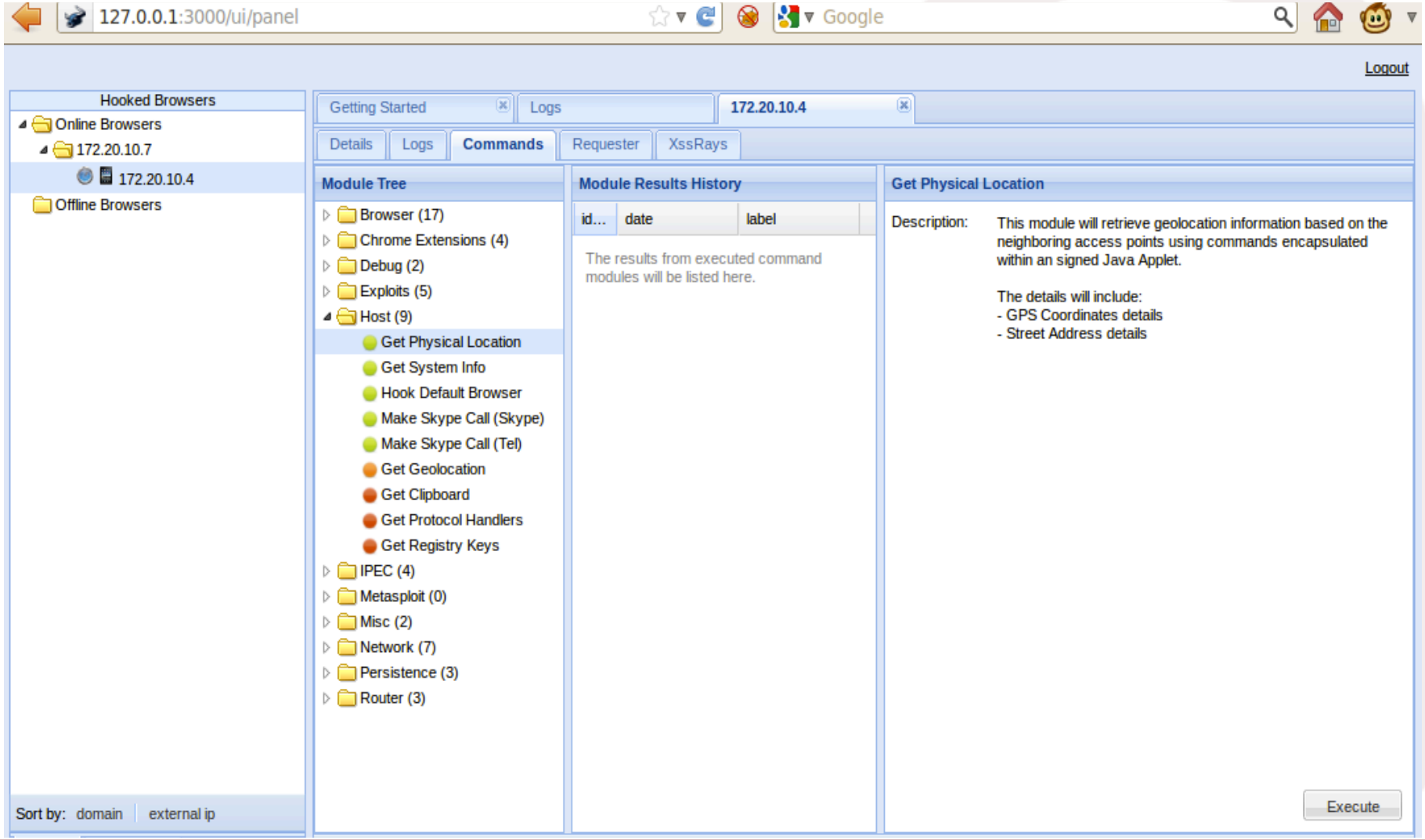
Using BeEF to Hook Mobile Devices

- Browser Exploitation Framework
- Social Engineer users to click on links
  - No one does that, right? ☺
- Hooked browser appears in BeEF console
  - Displays lots of details of the connected device
  - Commands send javascript to hook browser
  - Browser then responds back to BeEF

iPad hooked by BeEF



Lot's of Meaty Goodness



What's  in MobiSec 1.1

- Updates and added some new tools
  - Metasploit, SET, and Android SDK
  - Ettercap with GUI
  - SQLMap & SQLiteSpy
  - SSLStrip
  - iSniff & dsniff
  - A bunch of FireFox plug-ins
  - Changed the idle-time lockout to 30 mins ☺
  - And more...
- Look for MobiSec v1.1 release next week

- The OWASP Mobile Security project was announced in Q3 2010
  - Currently very active
- The project lead is Jack Mannino
  - https://www.owasp.org/index.php/OWASP_Mobile_Security_Project
- It is geared toward providing resources for developers and security teams
  - Tools, guidelines and standards
  - Mobile Security Top Ten

Questions?

- Follow @MobiSecLive on Twitter

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