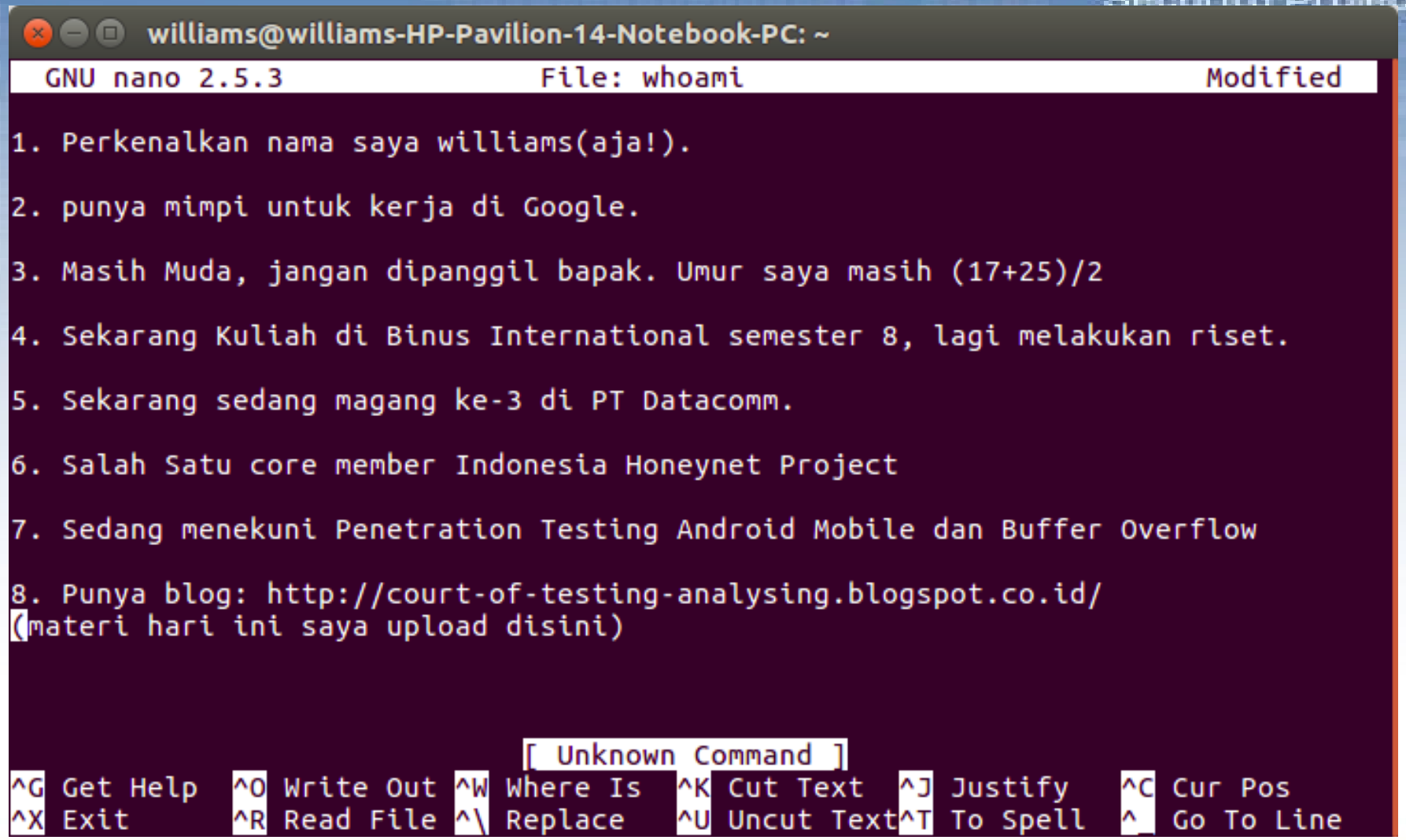
Android Mobile Application Pentesting

Williams
wyohanes96@gmail.com
OWASP
29 April 2018

OWASP
Open Web Application
Security Project

Who Am I ?

Who Am I


williams@williams-HP-Pavilion-14-Notebook-PC: ~
GNU nano 2.5.3 File: whoami Modified
1. Perkenalkan nama saya williams(aja!).
2. punya mimpi untuk kerja di Google.
3. Masih Muda, jangan dipanggil bapak. Umur saya masih (17+25)/2
4. Sekarang Kuliah di Binus International semester 8, lagi melakukan riset.
5. Sekarang sedang magang ke-3 di PT Datacomm.
6. Salah Satu core member Indonesia Honeynet Project
7. Sedang menekuni Penetration Testing Android Mobile dan Buffer Overflow
8. Punya blog: http://court-of-testing-analysing.blogspot.co.id/
(materi hari ini saya upload disini)
[Unknown Command]
^G Get Help ^O Write Out ^W Where Is ^K Cut Text ^J Justify ^C Cur Pos
^X Exit ^R Read File ^\ Replace ^U Uncut Text ^T To Spell ^_ Go To Line

Noted to all audience:

Semua materi yang diberikan dalam pertemuan hanya untuk tujuan pendidikan. Kerusakan yang terjadi pada suatu aplikasi sistem bukan merupakan tanggung jawab dari pengarang

Peace out yoo!

OWASP
Open Web Application Security Project

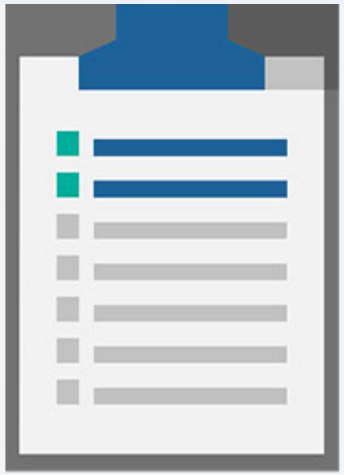
Android Mobile Application Security Testing


TARGET
ACQUIRED!

Source:

OWASP Open Web Application Security Project

OWASP Mobile Security Project



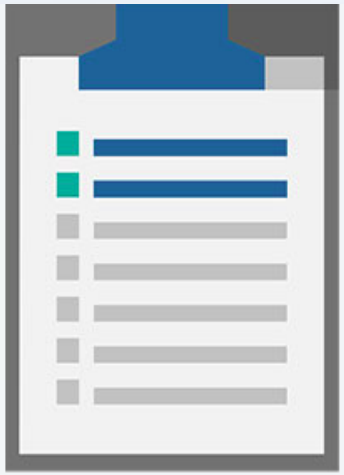
Mobile App Security Checklist

A checklist for use in security assessments. Also contains links to the MSTG test case for each requirement. The current release is version 1.0.

Source:

OWASP Open Web Application Security Project

OWASP Mobile Security Project



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FREE

OWASP Mobile top 10 Vulnerability

Top 10 Mobile Risks - Final List 2016

- M1: Improper Platform Usage
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- M3: Insecure Communication
- M4: Insecure Authentication
- M5: Insufficient Cryptography
- M6: Insecure Authorization
- M7: Client Code Quality
- M8: Code Tampering
- M9: Reverse Engineering
- M10: Extraneous Functionality

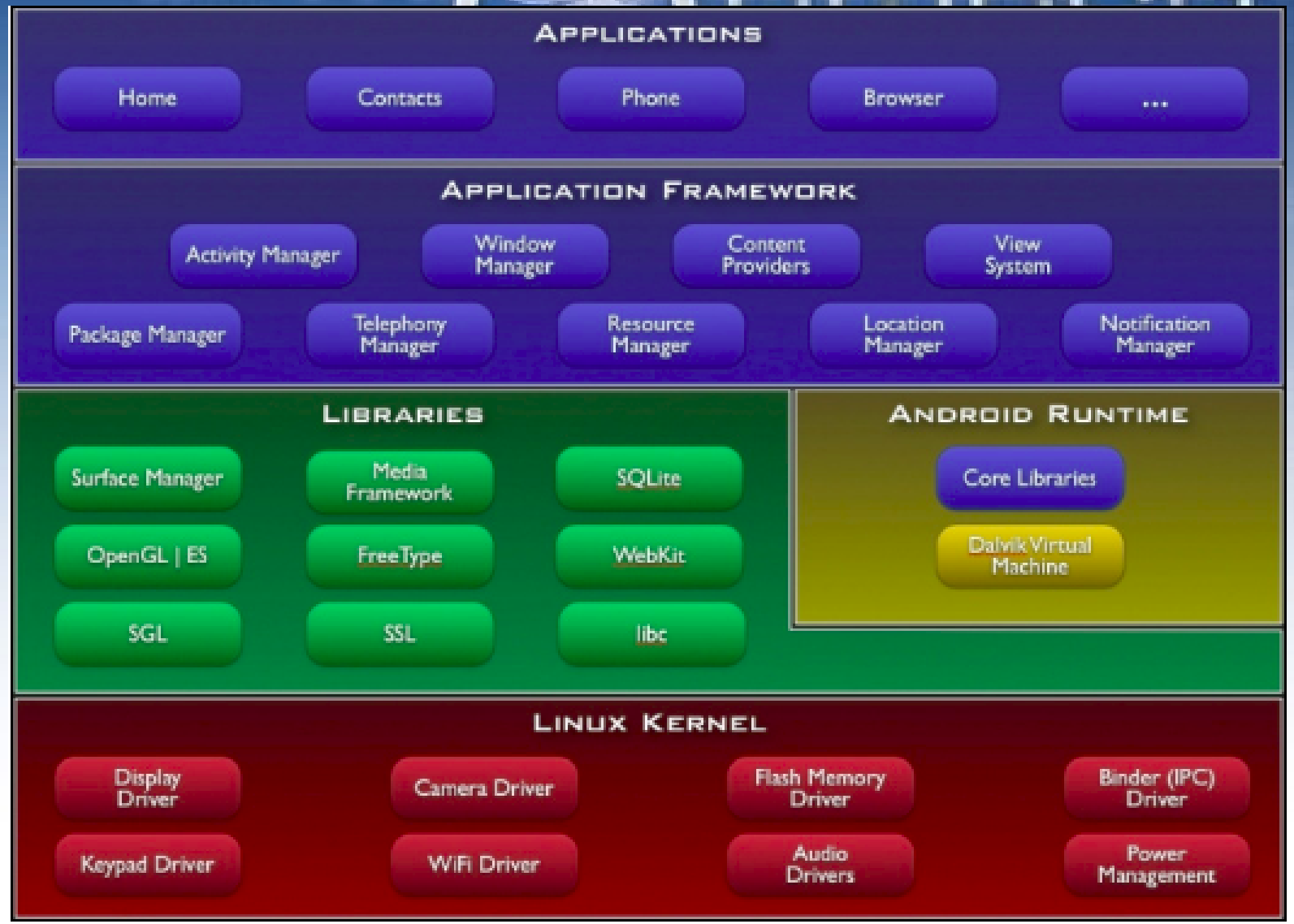
Application

Application framework

Native Libraries

Android Runtime

Linux Kernel



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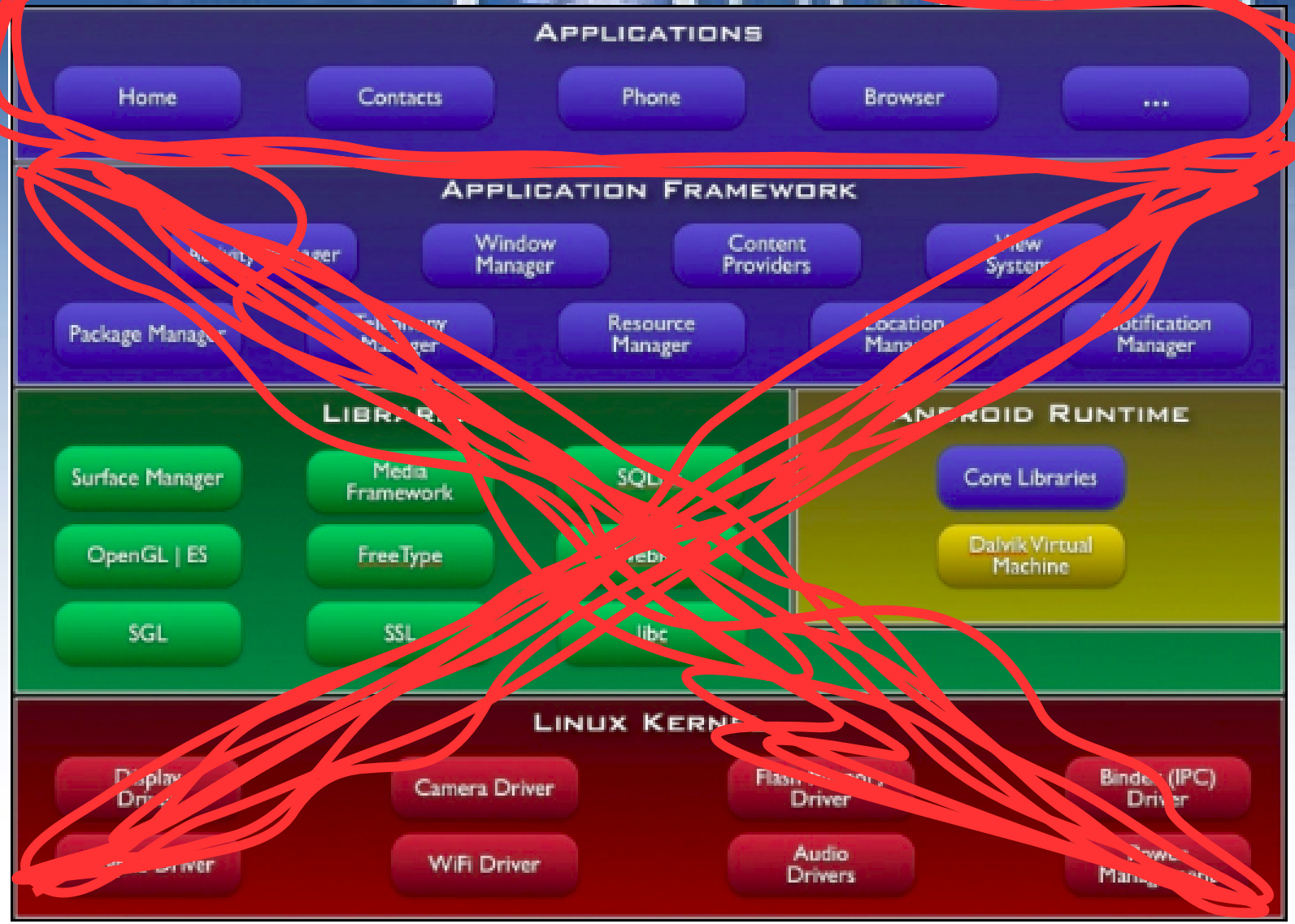
Linux Kernel



Android Application Package

It is just a zip file

Android Application Package

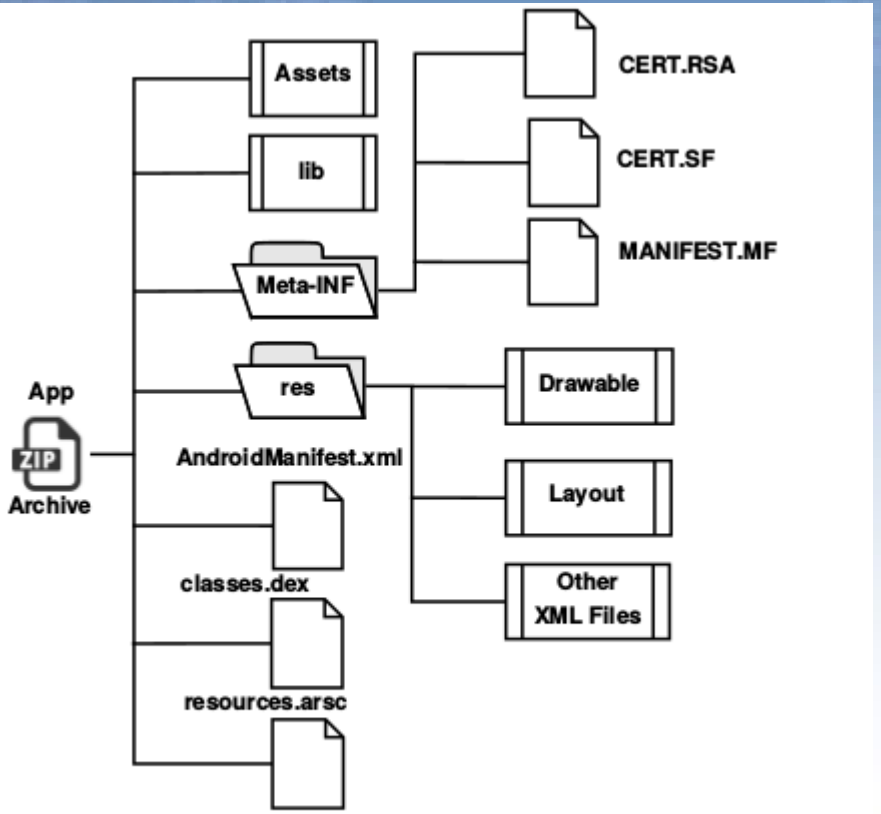


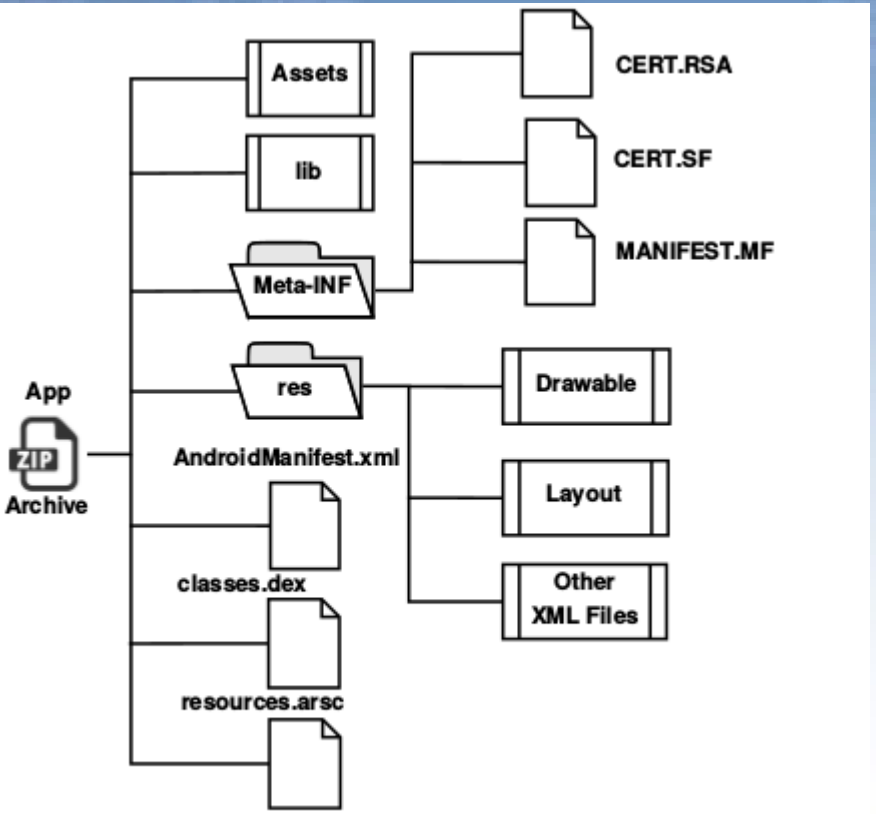
Fig. 2: Android PacKage (APK) Structure

A. App Structure

Android app is packaged into an APK `.apk`, a zip archive consisting several files and folders as shown illustrated in Figure 2. In particular, the `AndroidManifest.xml` stores the meta-data such as package name, permissions required, definitions of one or more components like Activities, Services, Broadcast Receivers or Content Providers, minimum and maximum version support, libraries to be linked etc.. Folder `res` stores icons, images, string/numeric/color constants, UI layouts, menus, animations compiled into the binary. Folder `assets` contains non-compiled resources. Executable file `classes.dex` stores the Dalvik bytecode to be executed on the Dalvik Virtual Machine. `META-INF` stores the signature of the app developer certificate to verify the third party developer identity.

Taken from: Android Security: A Survey of Issues, Malware Penetration and Defenses

Android Application Package



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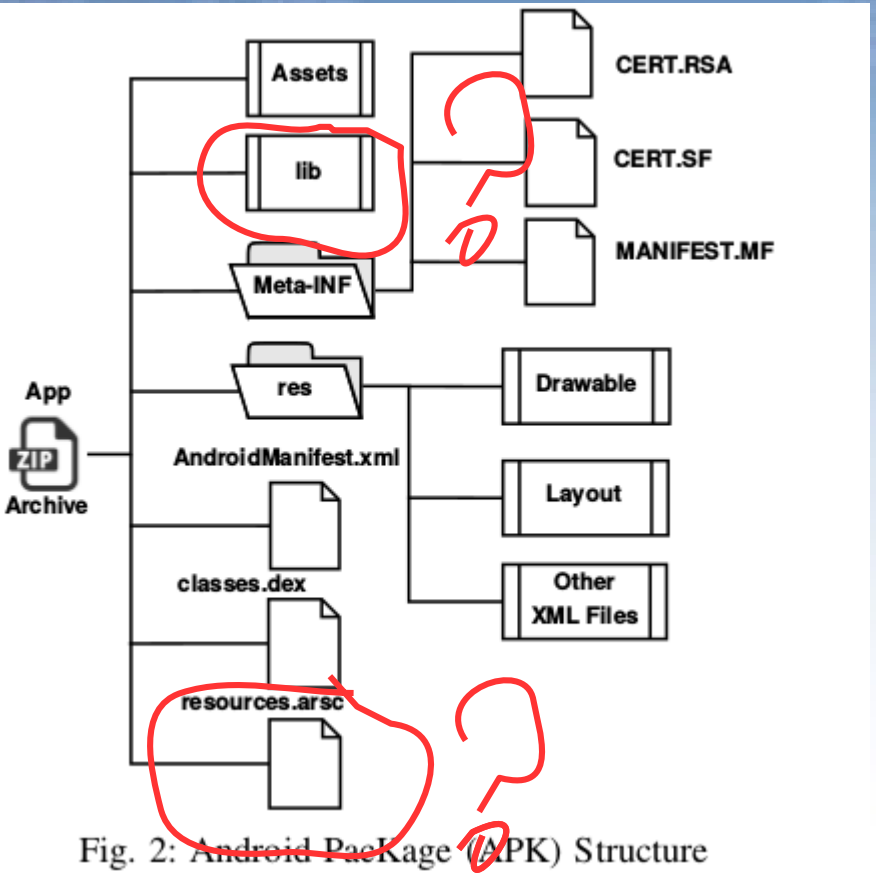
Android Application Package



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What is an ARSC file?

Application resource file used by programs developed for Google's Android mobile operating system; contains compiled resources in a binary format; may include images, strings, or other data used by the program; usually included in an .APK package file.

Taken from fileinfo.com

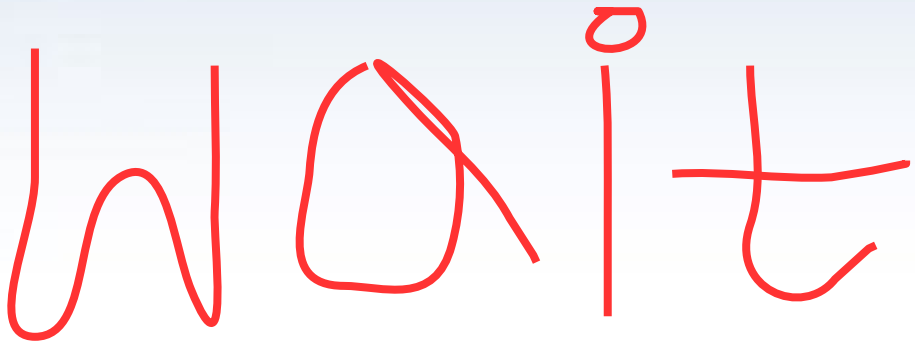
OWASP Mobile top 10 Vulnerability

Top 10 Mobile Risks - Final List 2016

- M1: Improper Platform Usage
- M2: Insecure Data Storage
- M3: Insecure Communication
- M4: Insecure Authentication
- M5: Insufficient Cryptography
- M6: Insecure Authorization
- M7: Client Code Quality
- M8: Code Tampering
- M9: Reverse Engineering
- M10: Extraneous Functionality

OWASP Mobile top 10 Vulnerability

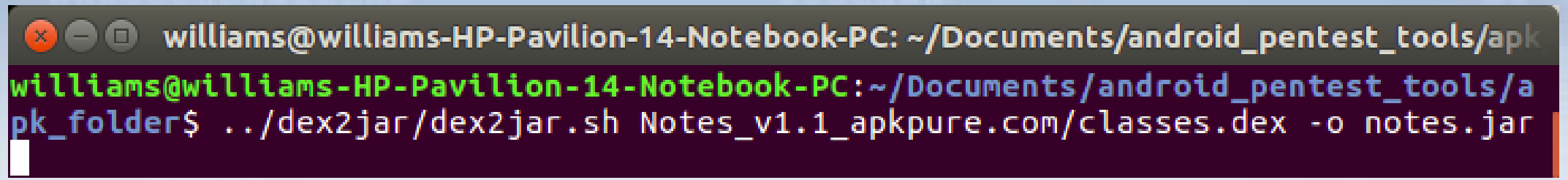
First step into android mobile application penetration testing is to try reverse engineer the application because once u get the code u already do half of the works



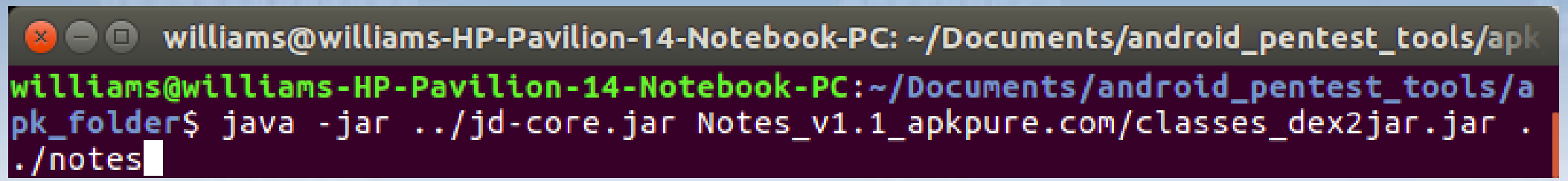
With APKTOOLS


```
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Documents/android_pentest_tools/apk
williams@williams-HP-Pavilion-14-Notebook-PC:~/Documents/android_pentest_tools/apk_folder$ java -jar ../apktool/apktool_2.3.0.jar decode --no-src Notes_v2.1.9_apkpure.com.apk
I: Using Apktool 2.3.0 on Notes_v2.1.9_apkpure.com.apk
I: Loading resource table...
I: Decoding AndroidManifest.xml with resources...
I: Loading resource table from file: /home/williams/.local/share/apktool/framework/1.apk
I: Regular manifest package...
I: Decoding file-resources...
W: Cant find 9patch chunk in file: "u/cs.9.png". Renaming it to *.png.
W: Cant find 9patch chunk in file: "a0/ct.9.png". Renaming it to *.png.
W: Cant find 9patch chunk in file: "m/cq.9.png". Renaming it to *.png.
```

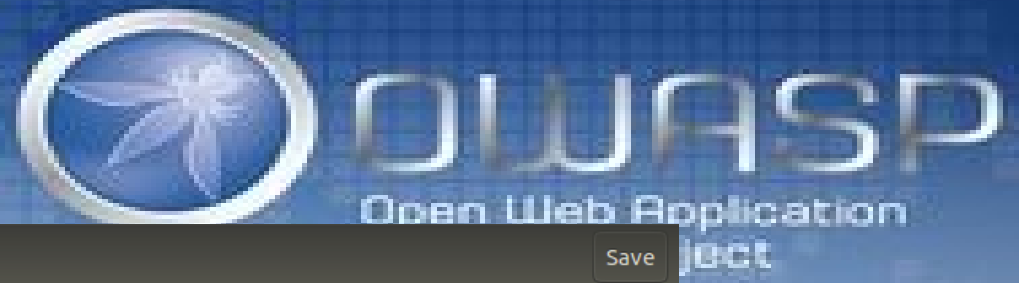
With Dex2jar



With jdx-core



With jdx-core



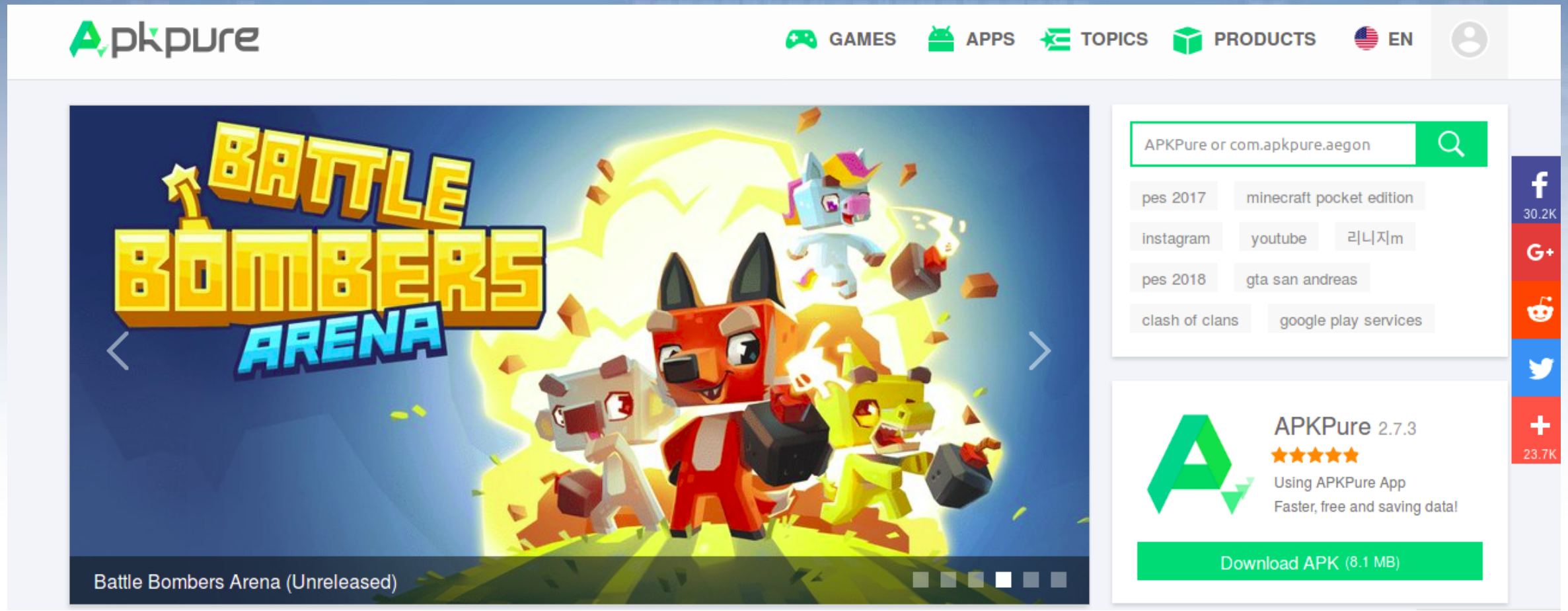
Open Save

```
      return;
      if (a == 0) {
        d();
      }
    }
  }
  a = 2;
  finish();
}

public void onCreate(Bundle paramBundle)
{
  super.onCreate(paramBundle);
  getWindow().setSoftInputMode(3);
  setContentView(2130903047);
  a();
  b = new c(this);
  Bundle localBundle = getIntent().getExtras();
  if (localBundle != null)
  {
    String str1 = localBundle.getString("android.intent.extra.SUBJECT");
    String str2 = localBundle.getString("android.intent.extra.TEXT");
    if (str1 != null) {
      e.setText(str1);
    }
    if (str2 != null) {
      f.setText(str2);
    }
    if ((str1 != null) || (str2 != null)) {
      break label127;
    }
  }
  label127:
  for (Long localLong = Long.valueOf(localBundle.getLong("_id"));; localLong = null)
  {
    d = localLong;
    if (d == null) {
      break;
    }
    a = 1;
```

Java Tab Width: 8 Ln 149, Col 44 INS

Where to get Free apk other than play store?



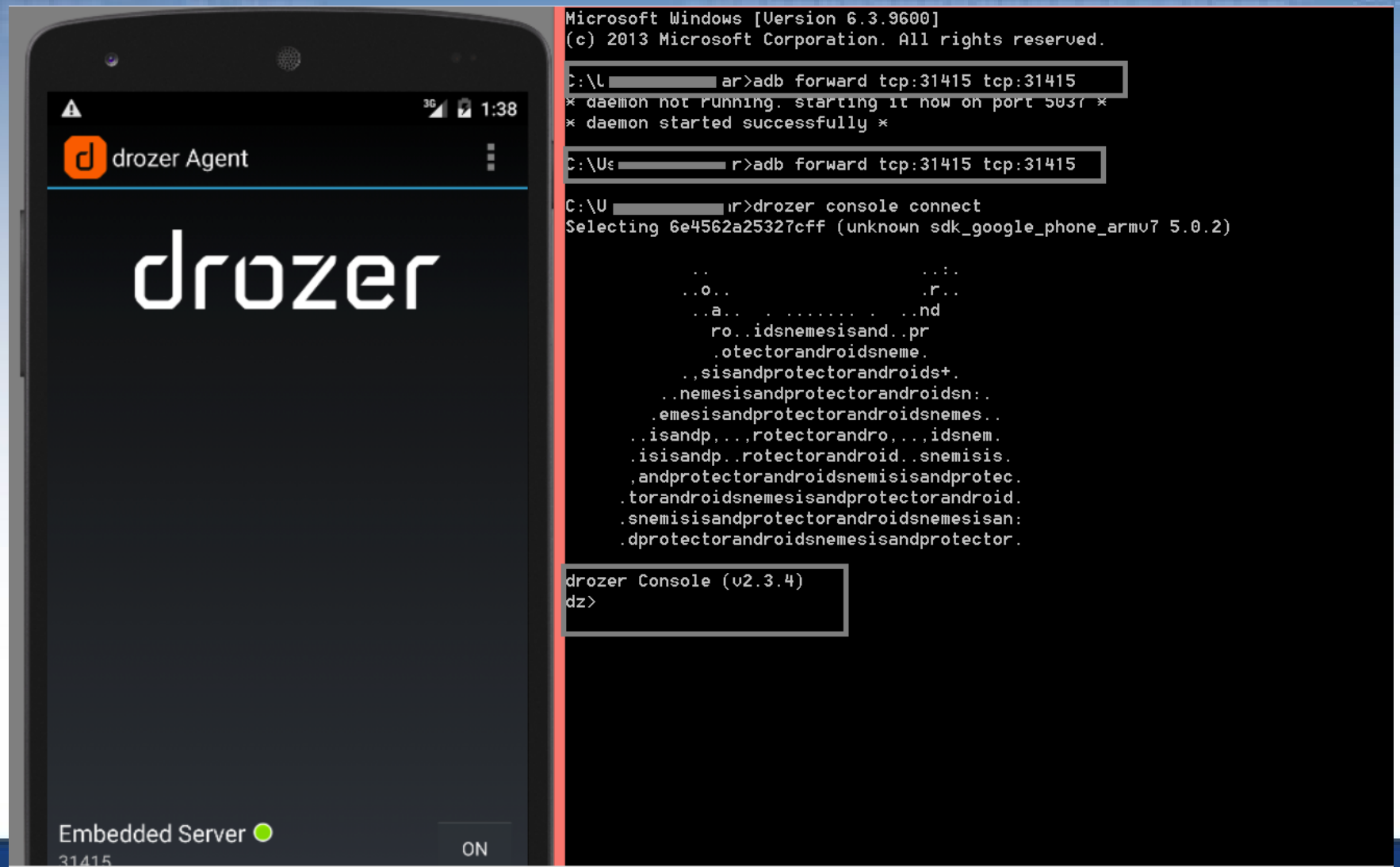
Taken from APKpure.com

Improper Platform Usage

Improper Platform Usage

Improper Platform Usage

A Good Tools that every android pentester must have



Taken from mac afee blog. All right reserved to the author

Target: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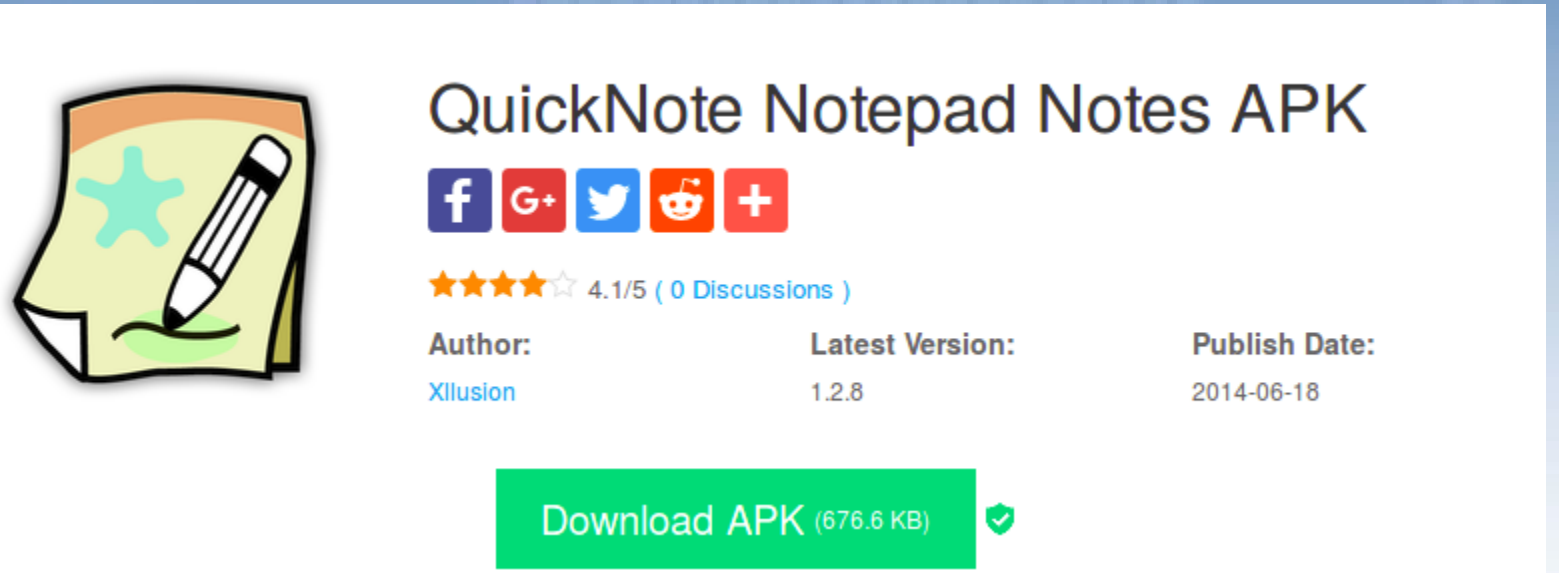
Security Project


QuickNote Notepad Notes APK
4.1/5 (0 Discussions)
Author:
XIlusion
Latest Version:
1.2.8
Publish Date:
2014-06-18
Download APK (676.6 KB)

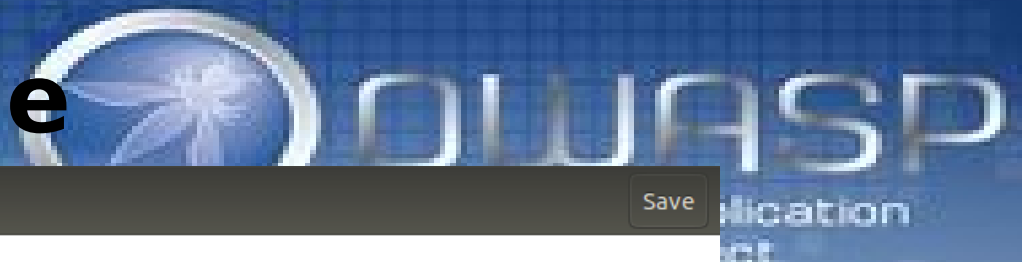
Improper Platform Usage


```
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Documents/android_pentest_tools/apk
dz> run app.activity.info -a com.xllusion.quicknote
Package: com.xllusion.quicknote
  com.xllusion.quicknote.QuickNote
    Permission: null
  com.xllusion.quicknote.EditNote
    Permission: null
  com.xllusion.quicknote.WidgetConfig
    Permission: null

dz>
```

```
<activity android:name=".EditImage" android:theme="@style/Theme.quicknote"/>
<activity android:name=".ViewImage" android:theme="@style/Theme.quicknote"/>
-<activity android:name=".EditNote" android:theme="@style/Theme.quicknote">
```

Improper Platform Usage



Open Save

```
      return;
      if (a == 0) {
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      }
    }
  }
  a = 2;
  finish();
}

public void onCreate(Bundle paramBundle)
{
  super.onCreate(paramBundle);
  getWindow().setSoftInputMode(3);
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    }
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    }
    if ((str1 != null) || (str2 != null)) {
      break label127;
    }
  }
  label127:
  for (Long localLong = Long.valueOf(localBundle.getLong("_id"));; localLong = null)
  {
    d = localLong;
    if (d == null) {
      break;
    }
    a = 1;
```

Java Tab Width: 8 Ln 149, Col 44 INS

Improper Platform Usage

OWASP
Open Web Application Security Project

```
williams@williams-HP-Pavilion-14-Notebook-PC: ~
Error: Argument expected after "android.intent.extra.TEXT"
nt.extra.SUBJECT dumbass -e android.intent.extra.TEXT dumbass                <
Starting: Intent { cmp=com.xllusion.quicknote/.EditNote (has extras) }
shell@E5803:/ $
```

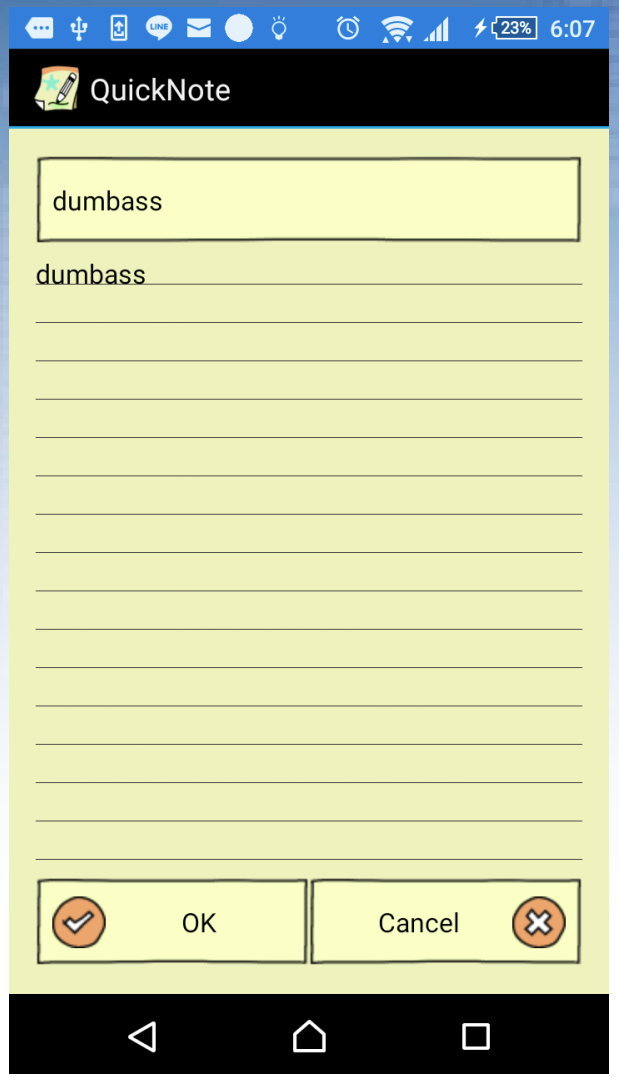
Package name and the activity

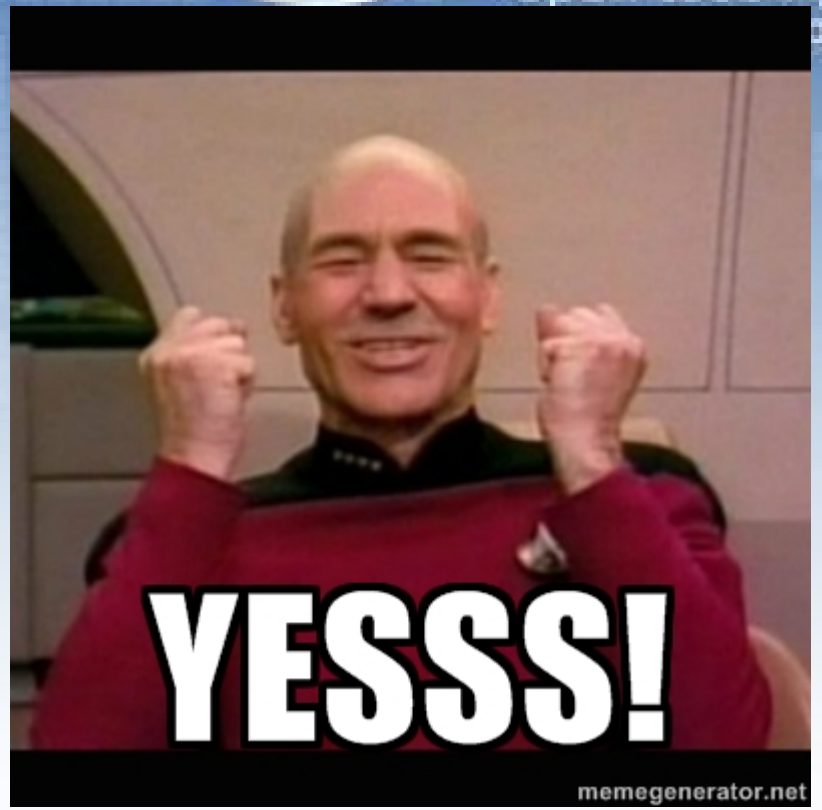
~# adb shell am start -n com.xllusion.quicknote/.EditNote -e android.intent.extra.SUBJECT dumbass -e android.intent.extra.TEXT dumbass

Put the first string

Put the second string

Improper Platform Usage





OWASP Mobile top 10 Vulnerability

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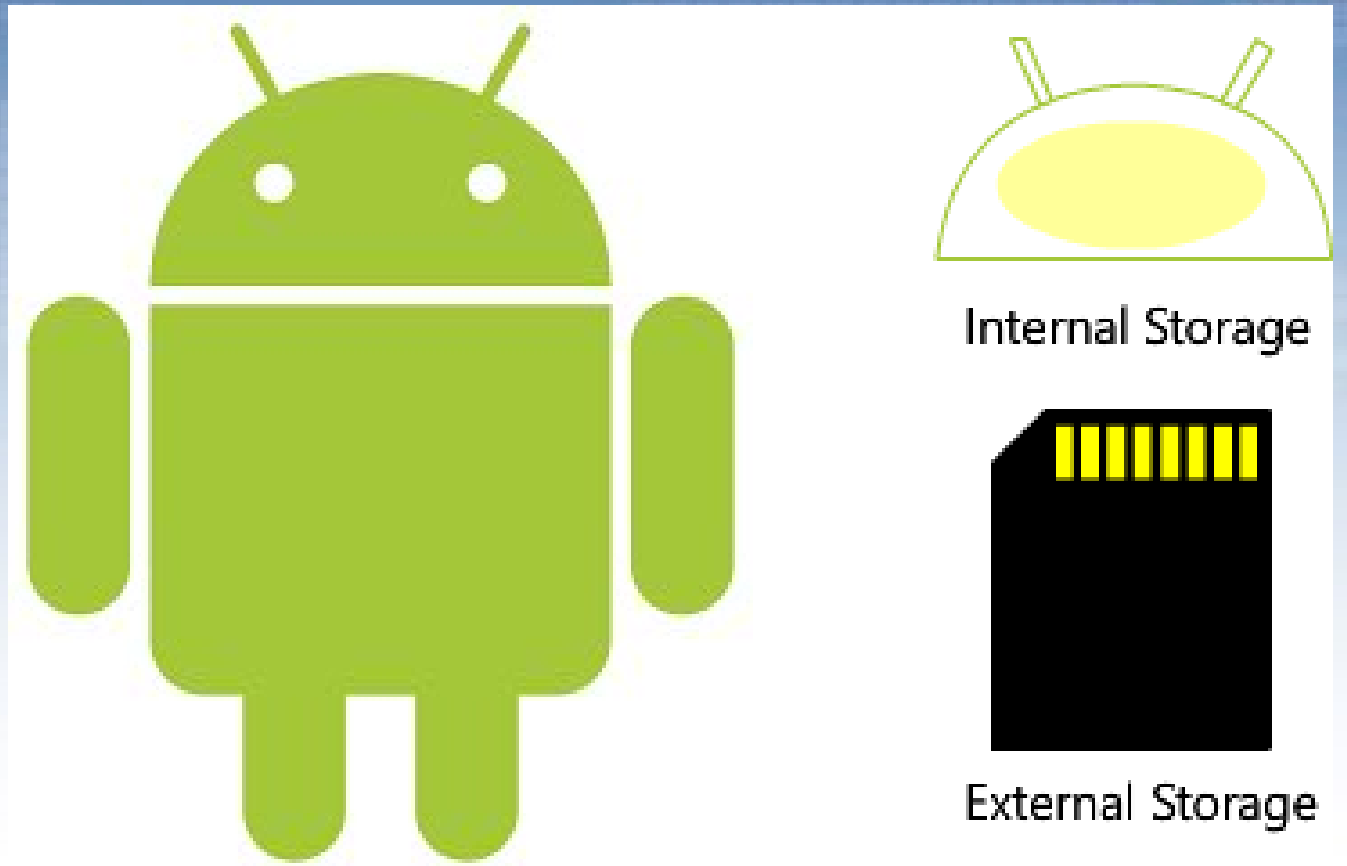
Insecure Data Storage



Target:

Basketball Shoot APK

6

4.4/5 (3 Discussions)

Author:	Latest Version:	Publish Date:
MiniCard	1.19.34	2017-09-15

Download APK (8.5 MB)

Insecure Data Storage

OWASP
Open Web Application Security Project

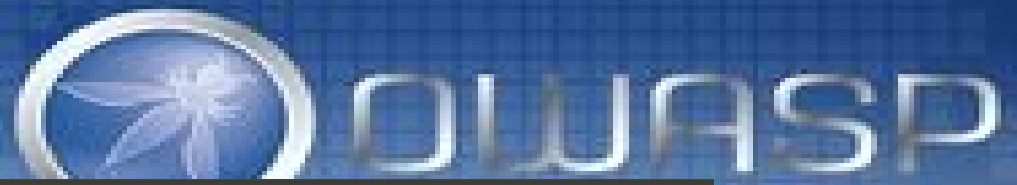
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Documents/android_pentest_tools/apk

```
root@android:/data/data/com.game.basketballshoot # ls
cache
code_cache
databases
files
lib
no_backup
shared_prefs
root@android:/data/data/com.game.basketballshoot #
```

Insecure Data Storage


```
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Documents/android_pentest_tools/apk
root@android:/data/data/com.game.basketballshoot/shared_prefs # ls
FBAdPrefs.xml
FLURRY_SHARED_PREFERENCES.xml
SDKIDFA.xml
admob.xml
appsflyer-data.xml
com.facebook.ads.FEATURE_CONFIG.xml
com.facebook.internal.preferences.APP_SETTINGS.xml
com.google.android.gms.appid.xml
com.google.android.gms.measurement.prefs.xml
config.xml
game_cfg.xml
multidex.version.xml
sql.xml
root@android:/data/data/com.game.basketballshoot/shared_prefs #
```

Insecure Data Storage



Open Save

```
<int name="pr21" value="0" />
<int name="mi15" value="0" />
<int name="local4" value="0" />
<int name="pr20" value="0" />
<int name="mi16" value="0" />
<int name="local9" value="0" />
<int name="pr27" value="0" />
<int name="pr26" value="0" />
<int name="local7" value="0" />
<int name="pr25" value="0" />
<int name="pr0" value="2" />
<int name="mi19" value="0" />
<int name="local8" value="0" />
<int name="pr24" value="0" />
<int name="pr1" value="0" />
<int name="pr29" value="0" />
<int name="pr28" value="0" />
<int name="local1" value="0" />
<int name="local2" value="0" />
<int name="local0" value="15051" />
<int name="mi12" value="0" />
<int name="mi11" value="0" />
<int name="mi14" value="0" />
<int name="mi13" value="0" />
<int name="ver" value="2" />
<int name="mi10" value="0" />
<int name="pr14" value="0" />
<int name="pr13" value="0" />
<int name="pr16" value="0" />
<int name="pr15" value="0" />
<int name="pr10" value="0" />
<int name="pr12" value="0" />
<int name="pr11" value="0" />
<int name="ghtip" value="0" />
<int name="pr18" value="0" />
<int name="pr17" value="0" />
<int name="pr19" value="0" />
<int name="lbc" value="0" />
<int name="cbc" value="4" />
</map>
```

XML Tab Width: 8 Ln 58, Col 28 INS

Insecure Data Storage

Open Save

```
<int name="pr21" value="0" />
<int name="mi15" value="0" />
<int name="local4" value="0" />
<int name="pr20" value="0" />
<int name="mi16" value="0" />
<int name="local9" value="0" />
<int name="pr27" value="0" />
<int name="pr26" value="0" />
<int name="local7" value="0" />
<int name="pr25" value="0" />
<int name="pr0" value="2" />
<int name="mi19" value="0" />
<int name="local8" value="0" />
<int name="pr24" value="0" />
<int name="pr1" value="0" />
<int name="pr29" value="0" />
<int name="pr28" value="0" />
<int name="local1" value="500" />
<int name="local2" value="1251" />
<int name="local0" value="15051" />
<int name="mi12" value="0" />
<int name="mi11" value="0" />
<int name="mi14" value="0" />
<int name="mi13" value="0" />
<int name="ver" value="2" />
<int name="mi10" value="0" />
<int name="pr14" value="0" />
<int name="pr13" value="0" />
<int name="pr16" value="0" />
<int name="pr15" value="0" />
<int name="pr10" value="0" />
<int name="pr12" value="0" />
<int name="pr11" value="0" />
<int name="ghtip" value="0" />
<int name="pr18" value="0" />
<int name="pr17" value="0" />
<int name="pr19" value="0" />
<int name="lbc" value="0" />
<int name="cbc" value="4" />
</map>
```

Saving file '/home/williams/Documents/android_pentest_tools/apk_folder/config.xml'... XML Tab Width: 8 Ln 57, Col 30 INS

Insecure Data Storage

OWASP Mobile top 10 Vulnerability

Top 10 Mobile Risks - Final List 2016

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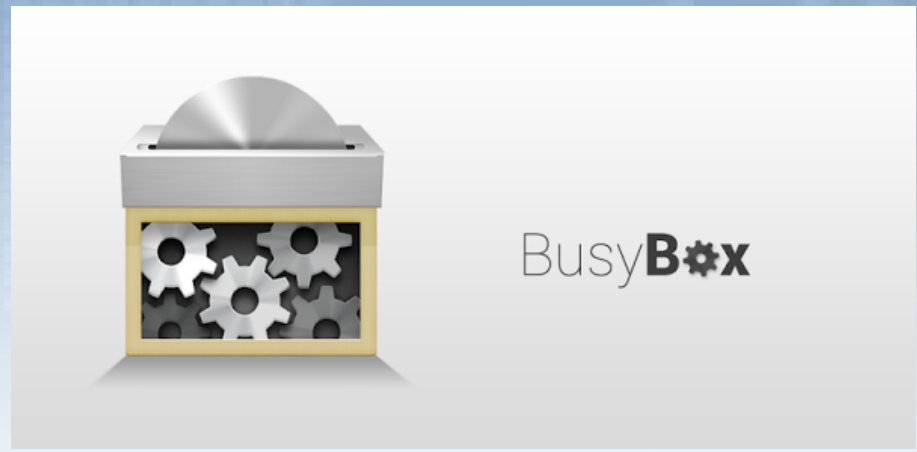
Insecure Communication



What do you need ?

Insecure Communication

williams@williams-HP-Pavilion-14-Notebook-PC: ~/Desktop/coursenet

```
root@android:/data/system # ls
batterystats.bin
busybox-armv6l
cache
called_pre_boots.dat
device_policies.xml
dropbox
entropy.dat
gesture.key
inputmethod
locksettings.db
locksettings.db-shm
locksettings.db-wal
netpolicy.xml
netstats
packages.list
packages.xml
profiles.xml
registered_services
shared_prefs
sync
tcpdump
throttle
uiderrors.txt
usagestats
users
root@android:/data/system #
```

Insecure Communication

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williams@williams-HP-Pavilion-14-Notebook-PC: ~/Desktop/coursenet

```
root@android:/data/system # ./busybox-armv6l
BusyBox v1.16.0 (2010-02-06 04:31:26 CST) multi-call binary.
Copyright (C) 1998-2009 Erik Andersen, Rob Landley, Denys Vlasenko
and others. Licensed under GPLv2.
See source distribution for full notice.

Usage: busybox [function] [arguments]...
   or: function [arguments]...

        BusyBox is a multi-call binary that combines many common Unix
        utilities into a single executable.  Most people will create a
        link to busybox for each function they wish to use and BusyBox
        will act like whatever it was invoked as.

Currently defined functions:
        [, [[, acpid, addgroup, adduser, adjtimex, arp, arping, ash, awk,
        basename, bbconfig, beep, blkid, brctl, bunzip2, bzcat, bzip2, cal,
        cat, catv, chat, chattr, chgrp, chmod, chown, chpasswd, chpst, chroot,
        chrt, chvt, cksum, clear, cmp, comm, cp, cpio, crond, crontab, cryptpw,
        cttyhack, cut, date, dc, dd, deallocvt, delgroup, deluser, depmod,
        devmem, df, dhcprelay, diff, dirname, dmesg, dnsd, dnsdomainname,
        dos2unix, dpkg, dpkg-deb, du, dumpkmap, dumpleases, echo, ed, egrep,
        eject, env, envdir, envuidgid, ether-wake, expand, expr, fakeidentd,
        false, fbset, fbsplash, fdflush, fdformat, fdisk, fgrep, find, findfs,
        flashcp, fold, free, freeramdisk, fsck, fsck.minix, fsync, ftpd,
        ftpget, ftpput, fuser, getopt, getty, grep, gunzip, gzip, halt, hd,
        hdparm, head, hexdump, hostid, hostname, httpd, hush, hwclock, id,
```

Insecure Communication

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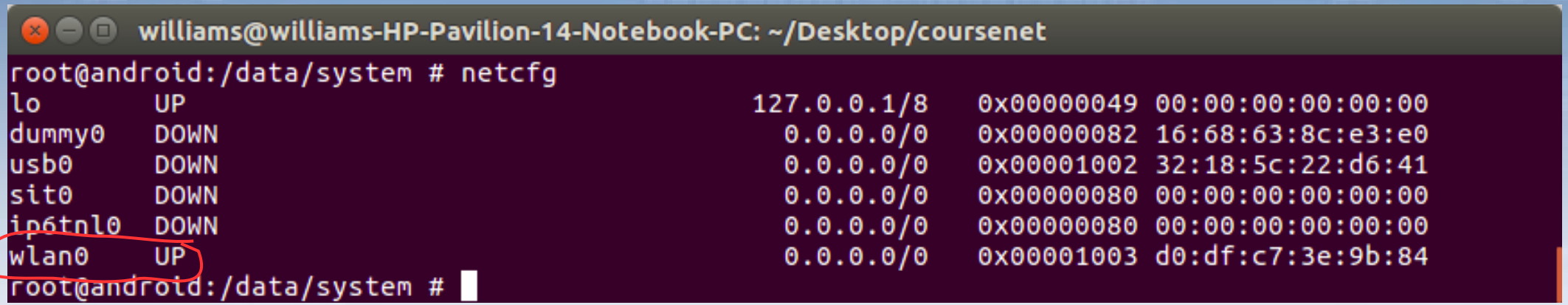
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Desktop/coursenet

```
root@android:/data/system # ./tcpdump -h
tcpdump version 4.9.2
libpcap version 1.8.1
Usage: tcpdump [-aAbdDefhHIJKlLnNOpqStuUvxX#] [ -B size ] [ -c count ]
                [ -C file_size ] [ -E algo:secret ] [ -F file ] [ -G seconds ]
                [ -i interface ] [ -j tstamptype ] [ -M secret ] [ --number ]
                [ -Q in|out|inout ]
                [ -r file ] [ -s snaplen ] [ --time-stamp-precision precision ]
                [ --immediate-mode ] [ -T type ] [ --version ] [ -V file ]
                [ -w file ] [ -W filecount ] [ -y datalinktype ] [ -z postrotate
-command ]
                [ -Z user ] [ expression ]
root@android:/data/system #
```

Insecure Communication



Insecure Communication


```
williams@williams-HP-Pavilion-14-Notebook-PC: ~/Desktop/coursenet
127|root@android:/data/system # netcfg
lo       UP                                   127.0.0.1/8   0x00000049 00:00:00:00:00:00
dummy0   DOWN                                   0.0.0.0/0   0x00000082 16:68:63:8c:e3:e0
usb0     DOWN                                   0.0.0.0/0   0x00001002 32:18:5c:22:d6:41
sit0     DOWN                                   0.0.0.0/0   0x00000080 00:00:00:00:00:00
ip6tnl0  DOWN                                   0.0.0.0/0   0x00000080 00:00:00:00:00:00
wlan0    UP                                 192.168.43.79/24  0x00001043 d0:df:c7:3e:9b:84
root@android:/data/system #./tcpdump -i wlan0 -v -w sniff.pcap
```

Insecure Communication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williams@williams-HP-Pavilion-14-Notebook-PC: ~/Desktop/coursenet
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usb0     DOWN                                   0.0.0.0/0   0x00001002 32:18:5c:22:d6:41
sit0     DOWN                                   0.0.0.0/0   0x00000080 00:00:00:00:00:00
ip6tnl0  DOWN                                   0.0.0.0/0   0x00000080 00:00:00:00:00:00
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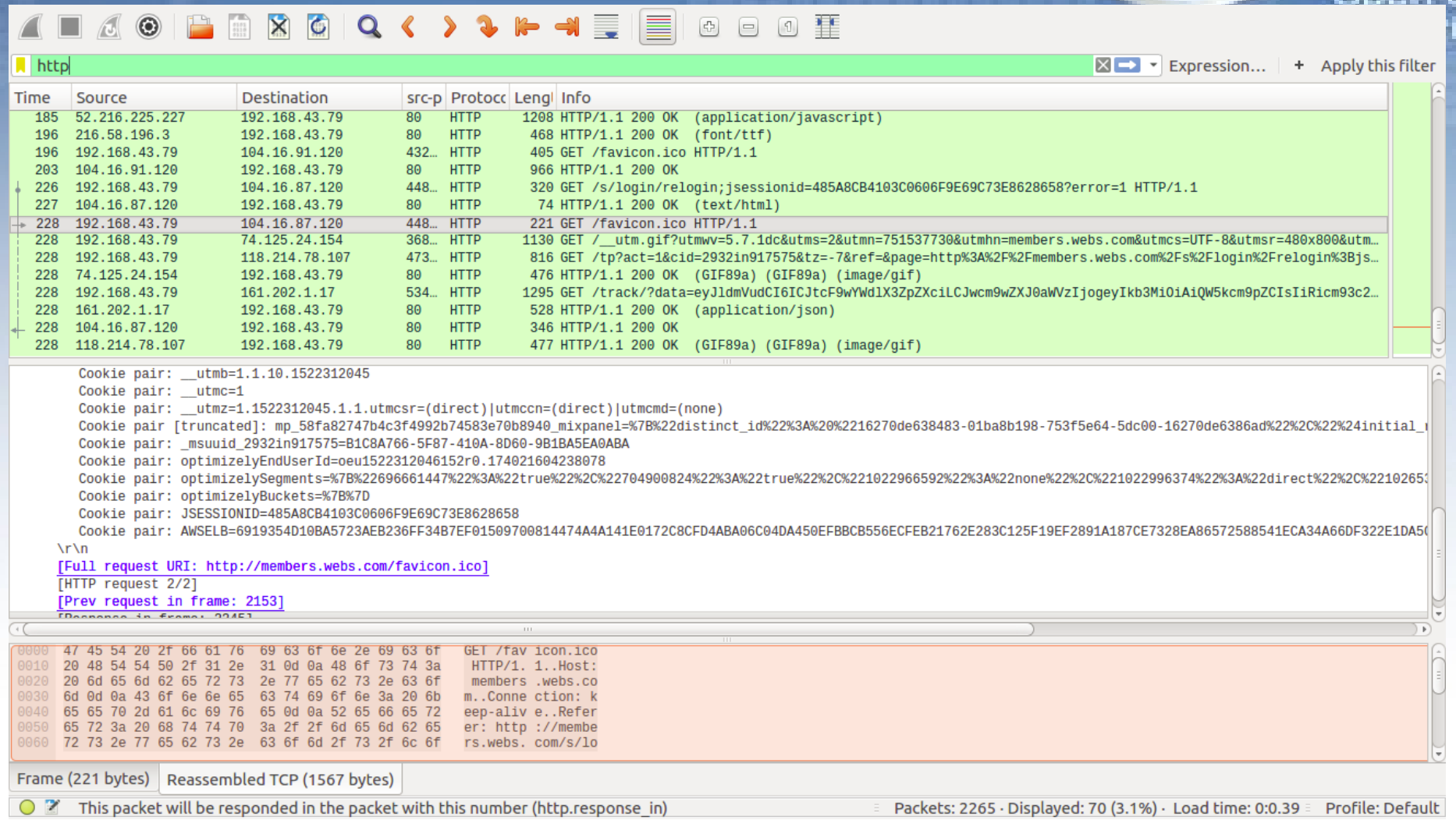
Insecure Communication



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Thank You