

L#3 Android Application

Structure

Android Program

- Program → APK
 - Android application package

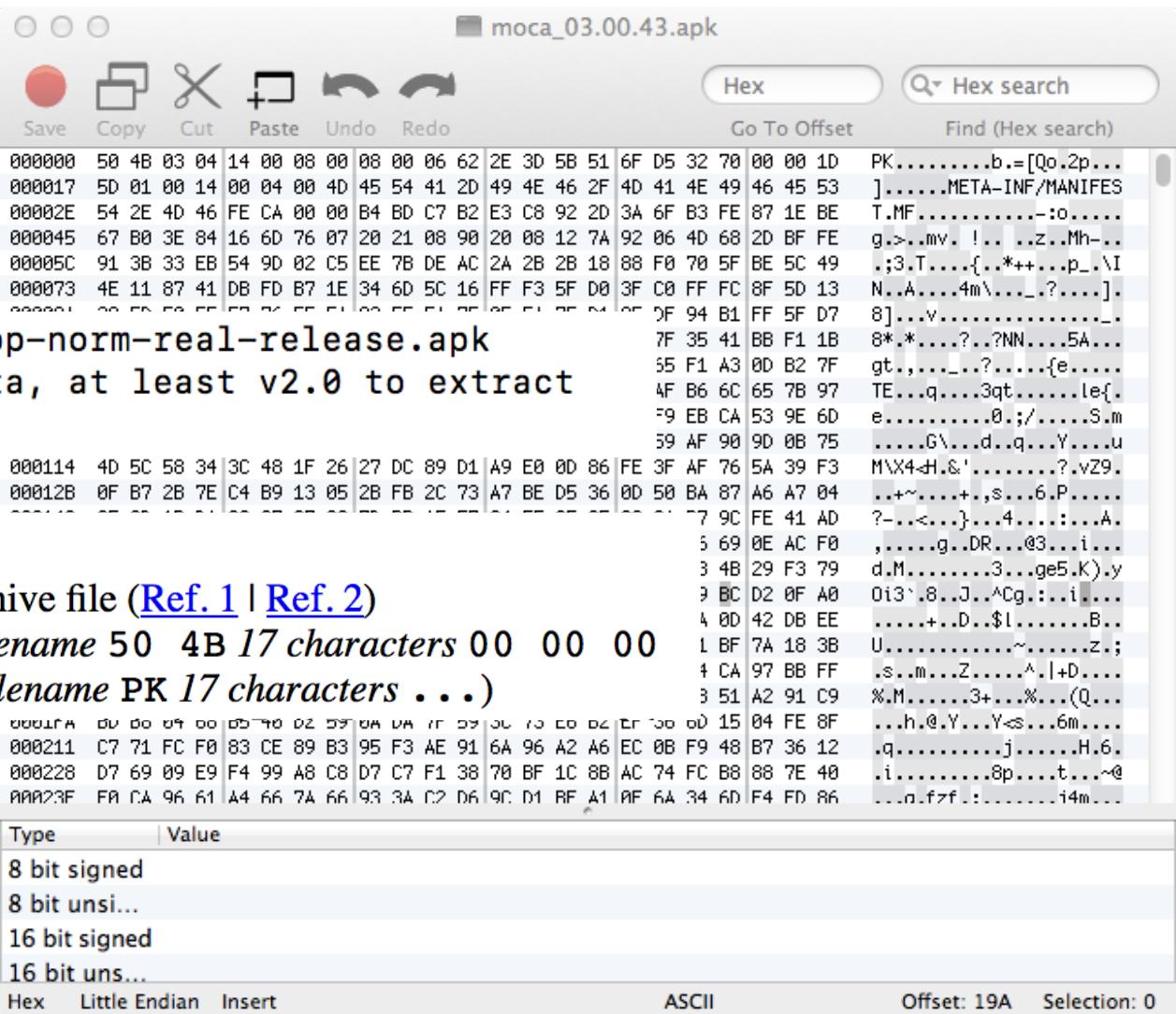
```
[v0nui-MacBook-Pro:Toss_Update v0n$ file toss-app-norm-real-release.apk
toss-app-norm-real-release.apk: Zip archive data, at least v2.0 to extract
v0nui-MacBook-Pro:Toss_Update v0n$ ]
```

50 4B 03 04

PK..
ZIP PKZIP archive file ([Ref. 1](#) | [Ref. 2](#))

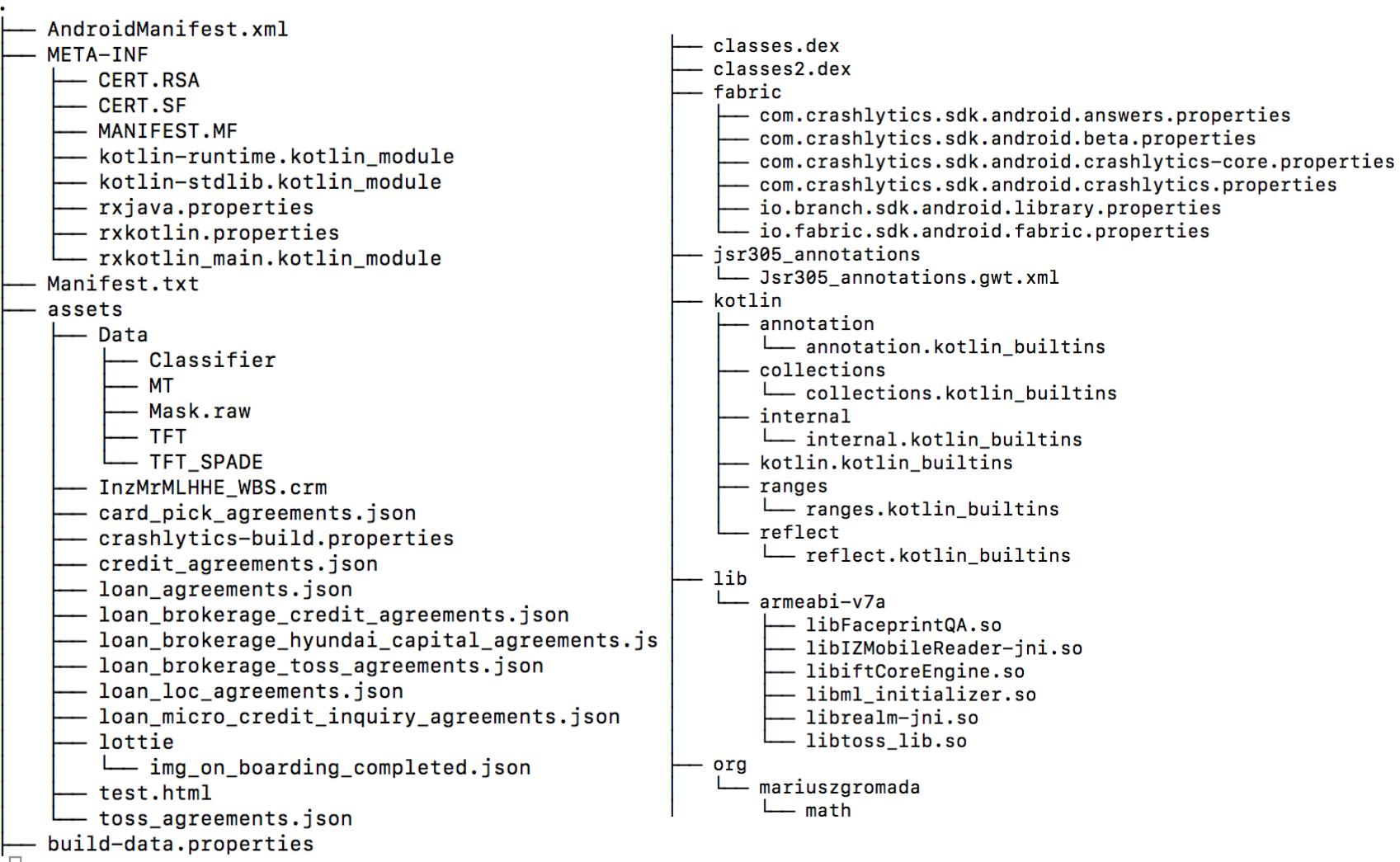
Trailer: *filename 50 4B 17 characters 00 00 00*

Trailer: *(filename PK 17 characters ...)*



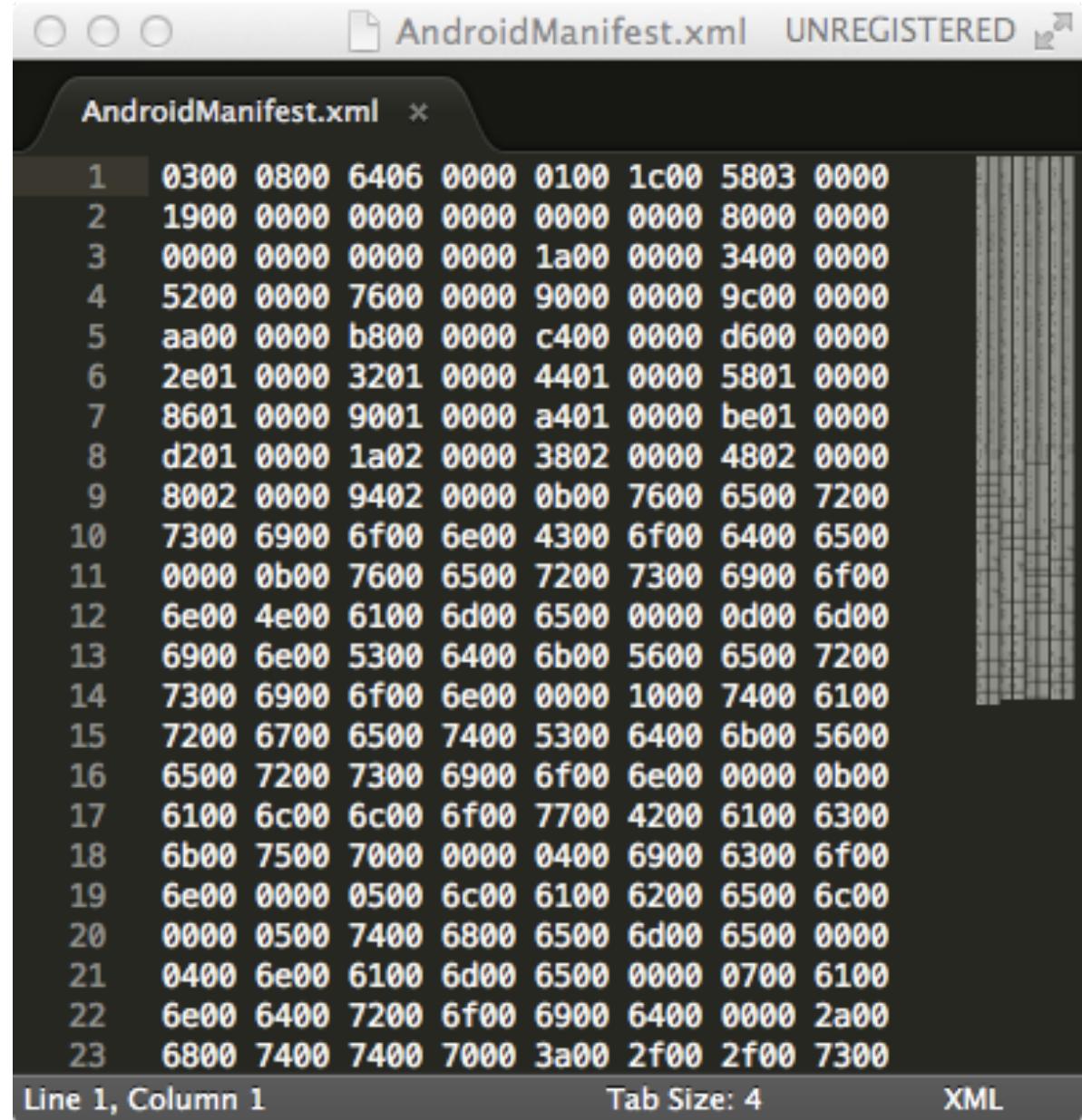
Android Program

- Program → APK
 - Structure



Android Program

- Program → APK
 - Structure : AndroidManifest.xml
 - Encoded XML file(MISSION)
 - Description
 - Package name
 - Permissions
 - SDK version
 - Intent



The screenshot shows a code editor window titled "AndroidManifest.xml" with the status bar indicating "Line 1, Column 1" and "Tab Size: 4". The file is described as "UNREGISTERED". The content of the file consists of 23 lines of binary data, each line starting with a line number (1-23) followed by a series of 12 hexadecimal digits. The data is highly compressed and non-human-readable.

Line	Content
1	0300 0800 6406 0000 0100 1c00 5803 0000
2	1900 0000 0000 0000 0000 0000 8000 0000
3	0000 0000 0000 0000 1a00 0000 3400 0000
4	5200 0000 7600 0000 9000 0000 9c00 0000
5	aa00 0000 b800 0000 c400 0000 d600 0000
6	2e01 0000 3201 0000 4401 0000 5801 0000
7	8601 0000 9001 0000 a401 0000 be01 0000
8	d201 0000 1a02 0000 3802 0000 4802 0000
9	8002 0000 9402 0000 0b00 7600 6500 7200
10	7300 6900 6f00 6e00 4300 6f00 6400 6500
11	0000 0b00 7600 6500 7200 7300 6900 6f00
12	6e00 4e00 6100 6d00 6500 0000 0d00 6d00
13	6900 6e00 5300 6400 6b00 5600 6500 7200
14	7300 6900 6f00 6e00 0000 1000 7400 6100
15	7200 6700 6500 7400 5300 6400 6b00 5600
16	6500 7200 7300 6900 6f00 6e00 0000 0b00
17	6100 6c00 6c00 6f00 7700 4200 6100 6300
18	6b00 7500 7000 0000 0400 6900 6300 6f00
19	6e00 0000 0500 6c00 6100 6200 6500 6c00
20	0000 0500 7400 6800 6500 6d00 6500 0000
21	0400 6e00 6100 6d00 6500 0000 0700 6100
22	6e00 6400 7200 6f00 6900 6400 0000 2a00
23	6800 7400 7400 7000 3a00 2f00 2f00 7300

Android Program

- Program → APK
 - Structure : AndroidManifest.xml
 - Unique identifier
 - Components definition : Activities, Services, Broadcast Receivers, Content Providers with Intent message
 - Permission application need
 - Minimum level of the Android API

Android Program

- Program → APK
 - Structure : AndroidManifest.xml
 - AndroidManifest.xml : <manifest> → <application>(Unique)
 - package : Unique identifier on the system

```
<?xml version="1.0" encoding="utf-8" standalone="no"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android" package="com.hanafn...
<uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
<uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE"/>
<uses-permission android:name="android.permission.ACCESS_NETWORK_STATE"/>
<uses-permission android:name="android.permission.INTERNET"/>
<uses-permission android:name="android.permission.GET_ACCOUNTS"/>
<uses-permission android:name="android.permission.WAKE_LOCK"/>
<permission android:name="com.hanafn.grouphub.permission.C2D_MESSAGE" anc <?xml version="1.0" encoding="utf-8" standalone="no"?>
<uses-permission android:name="com.hanafn.grouphub.permission.C2D_MESSAGE" <manifest xmlns:android="http://schemas.android.com/apk/res/android"
<uses-permission android:name="com.google.android.c2dm.permission.RECEIVE" package="com.hanafn.grouphub" platformBuildVersionCode="21"
<uses-permission android:name="android.permission.VIBRATE"/> platformBuildVersionName="5.0.1-1624448">
<uses-permission android:name="com.android.launcher.permission.INSTALL_SHORTCUT" />
<uses-permission android:name="com.android.launcher.permission.UNINSTALL_SHORTCUT"/>
<uses-permission android:name="android.permission.WRITE_CONTACTS"/>
<uses-permission android:name="android.permission.GET_TASKS"/>
<uses-permission android:name="android.permission.DISABLE_KEYGUARD"/>
<uses-permission android:name="android.permission.READ_PHONE_STATE"/>
<uses-permission android:name="android.permission.SYSTEM_ALERT_WINDOW"/>
<uses-permission android:name="android.permission.NFC"/>
<uses-feature android:name="android.hardware.nfc"/>
<application android:allowBackup="true" android:debuggable="false" android:icon="@dra
</manifest>
```

Android Program

- Program → APK
 - Structure : AndroidManifest.xml
 - AndroidManifest.xml : Under <manifest>
 - <application>
 - <uses-permission>
 - <use-sdk>
 - <permission>
 - <instrumentation>
 - <uses-configuration>
 - <uses-feature>

Android Program

- Program → APK
 - Structure : classes.dex
 - .dex(Dalvik Executable) is a compiled android application code file
 - Compiler(Java) = .dex
 - Have to understand the DEX structure

The screenshot shows a hex editor window titled "classes.dex". The interface includes standard file operations (Save, Copy, Cut, Paste, Undo, Redo), a search bar ("Hex search"), and navigation buttons ("Go To Offset", "Find (Hex search)"). The main pane displays the hex dump of the file, with each row containing a 4-digit offset, two bytes of hex data, and their ASCII representation. Below the hex dump is a table with columns for Type and Value, listing various data types such as 8-bit signed and 16-bit signed values. At the bottom, there are tabs for Hex, Little Endian, Insert, ASCII, and Selection, along with an offset counter set at 0.

Type	Value
8 bit signed	
8 bit unsi...	
16 bit signed	
16 bit unsi...	

Hex Little Endian Insert ASCII Offset: 0 Selection: 0

Android Program

- Program → APK
 - Structure : classes.dex

```
hkpco — root@ubuntu: ~/android_analysis/yonsei_seminar/HelloActivity — ssh — 114x28
019194: 28e1          |002a: goto 000b // -001f
019196: 1a02 c101      |002b: const-string v2, "FEEDBACK_AUDIBLE" // string@01c1
01919a: 6e20 320d 2000 |002d: invoke-virtual {v0, v2}, Ljava/lang/StringBuilder;.append:(L
java/lang/String;)Ljava/lang/StringBuilder; // method@0d32
0191a0: 28db          |0030: goto 000b // -0025
0191a2: 1a02 c301      |0031: const-string v2, "FEEDBACK_HAPTIC" // string@01c3
0191a6: 6e20 320d 2000 |0033: invoke-virtual {v0, v2}, Ljava/lang/StringBuilder;.append:(L
java/lang/String;)Ljava/lang/StringBuilder; // method@0d32
0191ac: 28d5          |0036: goto 000b // -002b
0191ae: 1a02 c201      |0037: const-string v2, "FEEDBACK_GENERIC" // string@01c2
0191b2: 6e20 320d 2000 |0039: invoke-virtual {v0, v2}, Ljava/lang/StringBuilder;.append:(L
java/lang/String;)Ljava/lang/StringBuilder; // method@0d32
0191b8: 28cf          |003c: goto 000b // -0031
0191ba: 1a02 c501      |003d: const-string v2, "FEEDBACK_VISUAL" // string@01c5
0191be: 6e20 320d 2000 |003f: invoke-virtual {v0, v2}, Ljava/lang/StringBuilder;.append:(L
java/lang/String;)Ljava/lang/StringBuilder; // method@0d32
0191c4: 28c9          |0042: goto 000b // -0037
0191c6: 1a02 6706      |0043: const-string v2, "]" // string@0667
0191ca: 6e20 320d 2000 |0045: invoke-virtual {v0, v2}, Ljava/lang/StringBuilder;.append:(L
java/lang/String;)Ljava/lang/StringBuilder; // method@0d32
0191d0: 6e10 360d 0000 |0048: invoke-virtual {v0}, Ljava/lang/StringBuilder;.toString():()Lj
ava/lang/String; // method@0d36
0191d6: 0c02          |004b: move-result-object v2
0191d8: 1102          |004c: return-object v2
0191da: 0000          |004d: nop // spacer
0191dc: 0002 0500 0100 0000 0200 0000 0400 ... |004e: sparse-switch-data (22 units)
      catches      : (none)
root@ubuntu:~/android_analysis/yonsei_seminar/HelloActivity# dexdump -d classes.dex | more
```

Android Program

- Program → APK
 - Structure : resources.arsc
 - Compiled resources file
 - aapt dump --values resources HelloActivity.apk

The screenshot shows a hex editor window titled "resources.arsc". The interface includes standard file operations (Save, Copy, Cut, Paste, Undo, Redo) and search functions (Hex search, Find (Hex search), Go To Offset). The main pane displays the binary data of the resources file in a grid format, where each row represents a memory location (e.g., 000, 018, 030, etc.) followed by a sequence of bytes. Below the main pane is a legend table:

Type	Value
8 bit signed	
8 bit unsi...	
16 bit signed	
16 bit uns...	

At the bottom of the editor, there are tabs for Hex, Little Endian, Insert, ASCII, and Selection, along with an Offset indicator set to 0.

Android Program

- Program → APK
 - Structure : resources.arsc

```
root@ubuntu:~/android_analysis/yonsei_seminar# cat HelloActivity_Resource.txt
Package Groups (1)
Package Group 0 id=127 packageCount=1 name=com.v0n.helloactivity
    Package 0 id=127 name=com.v0n.helloactivity typeCount=7
        type 0 configCount=0 entryCount=0
        type 1 configCount=4 entryCount=1
            spec resource 0x7f020000 com.v0n.helloactivity:drawable/ic_launcher: flags=0x00000100
            config 0 density=120 sdk=4
                resource 0x7f020000 com.v0n.helloactivity:drawable/ic_launcher: t=0x03 d=0x00000002 (s=0x0008 r=0x00)
                    (string8) "res/drawable-ldpi/ic_launcher.png"
            config 1 density=160 sdk=4
                resource 0x7f020000 com.v0n.helloactivity:drawable/ic_launcher: t=0x03 d=0x00000003 (s=0x0008 r=0x00)
                    (string8) "res/drawable-mdpi/ic_launcher.png"
            config 2 density=240 sdk=4
                resource 0x7f020000 com.v0n.helloactivity:drawable/ic_launcher: t=0x03 d=0x00000004 (s=0x0008 r=0x00)
                    (string8) "res/drawable-hdpi/ic_launcher.png"
            config 3 density=320 sdk=4
                resource 0x7f020000 com.v0n.helloactivity:drawable/ic_launcher: t=0x03 d=0x00000005 (s=0x0008 r=0x00)
                    (string8) "res/drawable-xhdpi/ic_launcher.png"
        type 2 configCount=1 entryCount=1
            spec resource 0x7f030000 com.v0n.helloactivity:layout/activity_main: flags=0x00000000
            config 0
                resource 0x7f030000 com.v0n.helloactivity:layout/activity_main: t=0x03 d=0x00000001 (s=0x0008 r=0x00)
                    (string8) "res/layout/activity_main.xml"
        type 3 configCount=1 entryCount=3
            spec resource 0x7f040000 com.v0n.helloactivity:string/app_name: flags=0x00000000
            spec resource 0x7f040001 com.v0n.helloactivity:string/hello_world: flags=0x00000000
            spec resource 0x7f040002 com.v0n.helloactivity:string/menu_settings: flags=0x00000000
```

Android Program

- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF

```
[v0nui-MacBook-Pro:META-INF v0n$ ls
CERT.RSA                           kotlin-runtime.kotlin_module
CERT.SF                            kotlin-stdlib.kotlin_module
MANIFEST.MF                         rxjava.properties
[v0nui-MacBook-Pro:META-INF v0n$ file CERT*
CERT.RSA: data
CERT.SF:  ASCII text, with CRLF line terminators
v0nui-MacBook-Pro:META-INF v0n$ ]
```

```
Signature-Version: 1.0
SHA1-Digest-Manifest-Main-Attributes: X+cWFyD3gUX010JyZftxyp/ySIg=
r) SHA1-Digest-Manifest: 76yJBaPM6luIbnfftrp7wpZzGZ0=
r) Created-By: 1.8.0_131 (Oracle Corporation)

Name: res/color/selector_color_caution_red.xml
SHA1-Digest: DHMXTxfEvwBu0dD3sBpHsPk21/E=

Name: res/menu/menu_bank_account_detail.xml
SHA1-Digest: ko/uAbFTITAehHzXKuXN/4G3shY=

Name: res/menu/menu_secure_account.xml
SHA1-Digest: vBs+WCgvNYrIiDLAGkjvbIEkkwQ=>

Name: res/drawable/shape_gray_round_border.xml
SHA1-Digest: LRNbkcwvlKJIaGmu/I1LLH1QCYM=>

Name: res/drawable/btn_white_disabled.xml
SHA1-Digest: 2k3hw8po5phZ0TsL7G7gGwwU2jM=>

Name: res/drawable-xxxhdpi-v4/bg_number_edit_text.9.png
SHA1-Digest: 0dsErgx8vlXBQ3ojzB9y3L23QLA=>

Name: res/drawable-xxhdpi-v4/icon_send_white.png
SHA1-Digest: mqpCTwQcwrCvUNH6ZexPq7Jnz14=
```

Android Program

- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF
 - Android self-signing process
 - Based on the RSA
 - Signature ↔ Verification

Android Program

- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF

```
v0nui-MacBook-Pro:METADATA v0n$ cat CERT.RSA | more
0<82>^Cr^F *<86>H<86><F7>^M^A^G^B<A0><82>^Cc0<82>^C_`^B^A^A1^K0 ^F^E+^N^C^B^Z^E^@0^K^F *<86>H<86>
<F7>^M^A^G^A<A0><82>^B10<82>^B_0<82>^A<96><A0><C^B^A^B^B^D\N^A<8D><AB>0^M^F *<86>H<86><F7>^M^A^A^E^@0[1^N
0^L^F^CU^D^G^S^ESeoul1^W0^U^F^CU^D
^S^Nviva Republica1^X0^V^F^CU^D^K^S^0Developing unit1^V0^T^F^CU^D^C^S^MSeung Gun Lee0^^^W^M110622063731Z^W^M4
10614063731Z0[1^N0^L^F^CU^D^G^S^ESeoul1^W0^U^F^CU^D
^S^Nviva Republica1^X0^V^F^CU^D^K^S^0Developing unit1^V0^T^F^CU^D^C^S^MSeung Gun Lee0<81><9F>0^M^F *<86>
H<86><F7>^M^A^A^A^E^@^C<81><8D>^@0<81><89>^B<81><81>^@<BD>sM<EE><F8><D7><F7><B5>x<95>^02<CF>^\"<F8>:Δ" <CB>>wM
<D8>"<95>-`L~^_f^W^G<E8>
C<C4>mz<EF><D6>_NAF<EA>!V<F3><9E>f<B6>L<CC><DA>;<A1>:^Z@I<82><C4>*<F8>XR^0<E5>r<F8>U<F5><A9><E3>^L<C6>Qy<C7>|
<9B>E<EB>T<ED>`<E3>^M{`<CC>n" <BC><CC>Z0<A5>w<E0><EC>? ֿ&<A8><BF>E<EA>^^<F1><CA><C8>4I<E8><9F>^B^C^A^@^A0
^M^F *<86>H<86><F7>^M^A^A^E^@^C<81><81>^@hF^Z<AA><8D><BA>9<85><B7><C9>`<A6>`^D<A4><CB>^G<AE><A3><CB>9<DB>
^@^A)~<84>J^G`^T<C0>^C1<F6><F5>&<FC><92><E3>^0<E3>L<A8>~a{f<B4><D4>N<AA><D0>5<9F>g7<DC><F4>'WTK.<85><-Mt^QG
<B3><F5>g<F3><F0><D4><FD><95><A8><9B><DF><C3>^]<FF><C5><ED><83><E4>^YB21<E2><AD><D6>
<86><F9>\<E6>n<96>^A, a<92><E3>^<E1>^0a&<A0><92>q:LY" ^R!<B9>A<BE>^T<FD>1<82>^A 0<82>^A^E^B^A^A0c0[1^N0^L^F^C
U^D^G^S^ESeoul1^W0^U^F^CU^D
^S^Nviva Republica1^X0^V^F^CU^D^K^S^0Developing unit1^V0^T^F^CU^D^C^S^MSeung Gun Lee^B^D\N^A<8D><AB>0 ^F^E+
^N^C^B^Z^E^@0^M^F *<86>H<86><F7>^M^A^A^A^E^@^D<81><80><A8><BF>^B<FF>^L<B3 o ^B<EB><D4><ED`- <FE i= ^ ^Z<FE
E<8F>z<E6>I{M^P
<E4><C3><EB>) <D9>&<9D>T^LH<A4>^LT<B1><F1><A4><E0><U+05FC>k<9F><D8>}<A1><8D><C2>'V<BC>^]6<D9><DA>v^LW<A6>^N
<E7>x.<AC>A<BD><99><F0>MB<F2><U+2B7B6><87>^Vδ - |<F2>^Kv^O$^C^C<BE><B0><FB>{x}~<C9><F8><CC><F7>^Q<A7><C0><A2>
<9C><B0>sz<D1><C0>^V<DC>6m#2
v0nui-MacBook-Pro:METADATA v0n$
```

Android Program

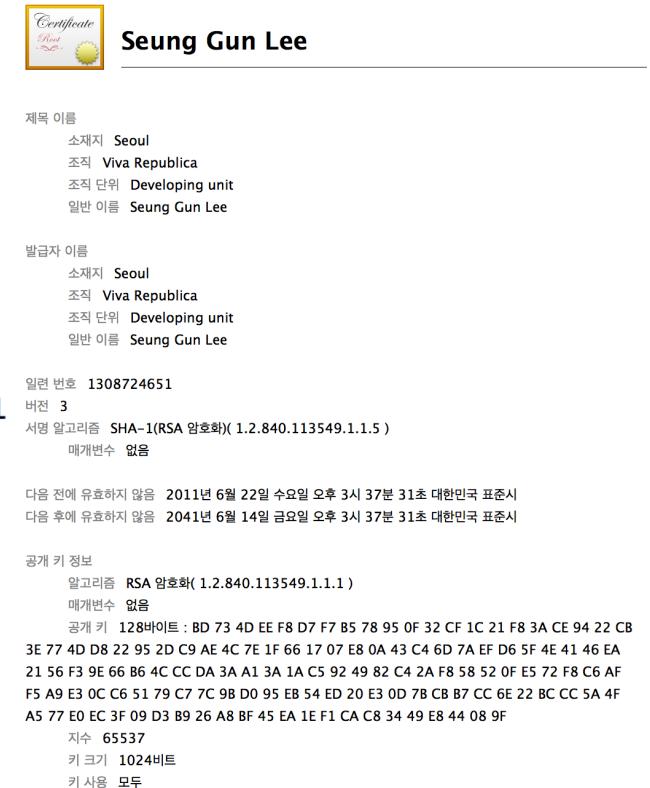
- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF

```
v0nui-MacBook-Pro:META-INF v0n$ openssl pkcs7 -in CERT.RSA -inform DER -print_certs -out cert.pem
v0nui-MacBook-Pro:META-INF v0n$ ls -al
total 856
drwxr-xr-x  11 v0n  staff      374  9 12 12:59 .
drwxr-xr-x  16 v0n  staff      544  9 12 12:32 ..
-rw-r--r--  1 v0n  staff     886  9  4 12:12 CERT.RSA
-rw-r--r--  1 v0n  staff  204032  9  4 12:12 CERT.SF
-rw-r--r--  1 v0n  staff  203911  9  4 12:12 MANIFEST.MF
-rw-r--r--  1 v0n  staff     954  9 12 13:02 cert.pem
-rw-r--r--  1 v0n  staff     246  9  4 12:11 kotlin-runtime.kotlin_module
-rw-r--r--  1 v0n  staff    2090  9  4 12:11 kotlin-stdlib.kotlin_module
-rw-r--r--  1 v0n  staff     651  9  4 12:11 rxjava.properties
-rw-r--r--  1 v0n  staff     657  9  4 12:11 rxkotlin.properties
-rw-r--r--  1 v0n  staff     118  9  4 12:11 rxkotlin_main.kotlin_module
v0nui-MacBook-Pro:META-INF v0n$ openssl x509 -in cert.pem -pubkey -noout
-----BEGIN PUBLIC KEY-----
MIGfMA0GCSqGSIb3DQEBAQUAA4GNADCBiQKBgQC9c03u+Nf3tXiVDzLPHCH40s6U
Iss+d03YIpUtya5Mfh9mFwf0CkPEbXrv1l90QUbqIVbznma2TMzaOqE6GsWSSYLE
KvhYUg/lcvjGr/Wp4wzGUXnHfJvQletU7SDjDXvLt8xuIrzMWk+ld+DsPwnTuSao
v0XqHvHKyDRJ6EQInwIDAQAB
-----END PUBLIC KEY-----
v0nui-MacBook-Pro:META-INF v0n$ □
```

Android Program

- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF

```
[v0nui-MacBook-Pro:META-INF v0n$ keytool -printcert -file CERT.RSA
소유자 : CN=Seung Gun Lee, OU=Developing unit, O=Viva Republica, L=Seoul
발행자 : CN=Seung Gun Lee, OU=Developing unit, O=Viva Republica, L=Seoul
일련 번호 : 4e018dab
적합한 시작 날짜 : Wed Jun 22 15:37:31 KST 2011, 종료 날짜 : Fri Jun 14 15:37:31 KST 2041
인증서 지문 :
    MD5: 92:EE:20:E8:64:9D:BB:96:89:B1:E9:0E:64:11:C6:F2
    SHA1: 8C:CD:21:7E:C9:25:5E:B7:09:39:B3:6A:83:ED:0B:82:C0:6D:A6:83
    SHA256: 45:DB:EC:B9:90:A1:37:45:58:D8:0A:6C:65:A9:DE:46:5F:96:0F:09:7D:F9:D1:2E:F9:1
:5C
    서명 알고리즘 이름 : SHA1withRSA
    버전 : 3
v0nui-MacBook-Pro:META-INF v0n$ ]
```



Android Program

- Program → APK
 - Structure : META-INF/CERT.RSA, CERT.SF, MANIFEST.MF

```
v0nui-MacBook-Pro:Toss_Update v0n$ jarsigner -verify -certs -verbose toss-app-norm-real-release.apk | grep -A 10 -B 10 classes.dex
X.509, CN=Seung Gun Lee, OU=Developing unit, O=Viva Republica, L=Seoul
[certificate is valid from 6/22/11 3:37 PM to 6/14/41 3:37 PM]
[CertPath not validated: Path does not chain with any of the trust anchors]

sm 1422036 Tue Jan 01 09:00:00 KST 1980 resources.arsc

X.509, CN=Seung Gun Lee, OU=Developing unit, O=Viva Republica, L=Seoul
[certificate is valid from 6/22/11 3:37 PM to 6/14/41 3:37 PM]
[CertPath not validated: Path does not chain with any of the trust anchors]

sm 8766956 Mon Sep 04 12:11:56 KST 2017 classes.dex

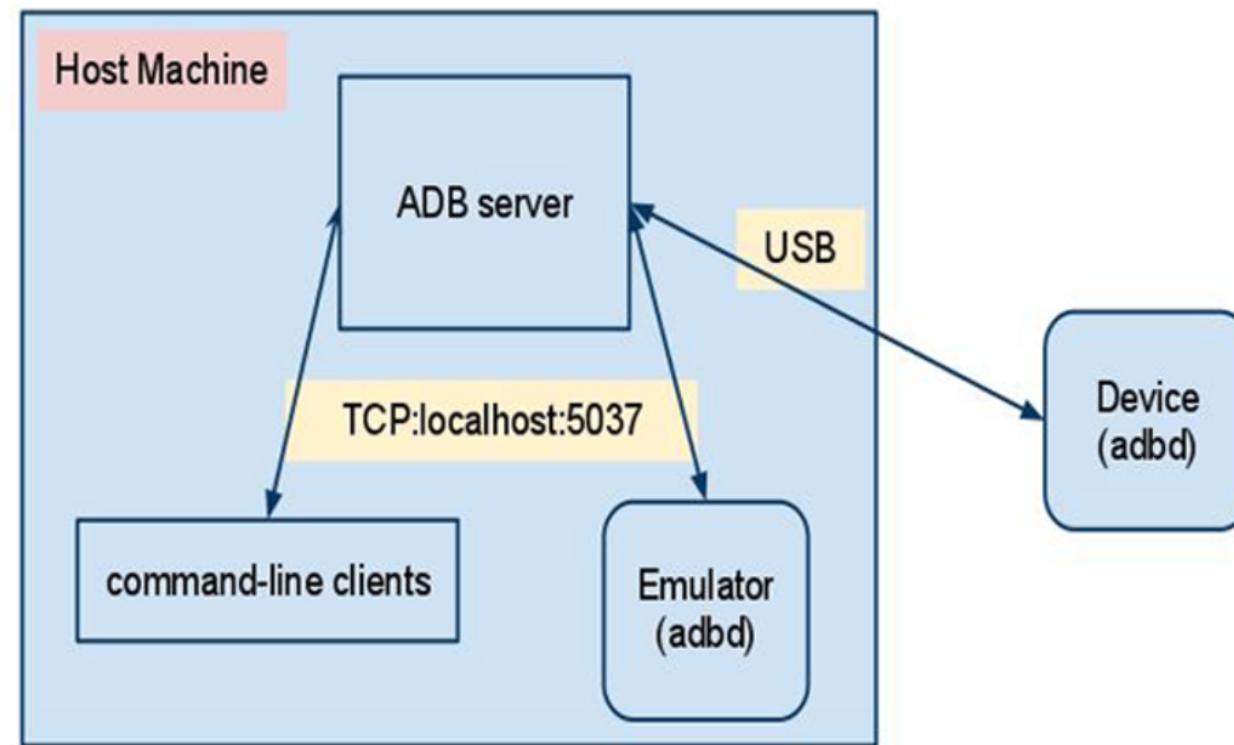
X.509, CN=Seung Gur      s = signature was verified
                           m = entry is listed in manifest
[certificate is va]      k = at least one certificate was found in keystore
[CertPath not vali]      i = at least one certificate was found in identity scope

sm 7900848 Mon Sep 04 - Signed by "CN=Seung Gun Lee, OU=Developing unit, O=Viva Republica, L=Seoul"
X.509, CN=Seung Gur      Digest algorithm: SHA1
                           Signature algorithm: SHA1withRSA, 1024-bit key
[certificate is va]      [CertPath not vali] jar verified.

v0nui-MacBook-Pro:Toss_U
Warning:
This jar contains entries whose certificate chain is not validated.
This jar contains signatures that does not include a timestamp. Without a timestamp, users may not be able to validate this jar afte
r the signer certificate's expiration date (2041-06-14) or after any future revocation date.
```

Android Program Information

- ADB(Android Debug Bridge)
 - Server : 5037



Android Program Information

- ADB Command
 - devices, start-server, kill-server
 - shell
 - install/uninstall
 - logcat
 - bugreport : dumpsys, dumpstate, logcat
 - jdwp
 - push/pull
 - forward
 - am
 - pm
 - get-serialno, get-state, wait-for-device

Android Program Information

- ADB Command
 - devices(start-server, kill-server)

```
v0n — -bash — 80x24
tcpip PORT          restart adb server listening on TCP on PORT

internal debugging:
  start-server      ensure that there is a server running
  kill-server       kill the server if it is running
  reconnect         kick connection from host side to force reconnect
  reconnect device  kick connection from device side to force reconnect

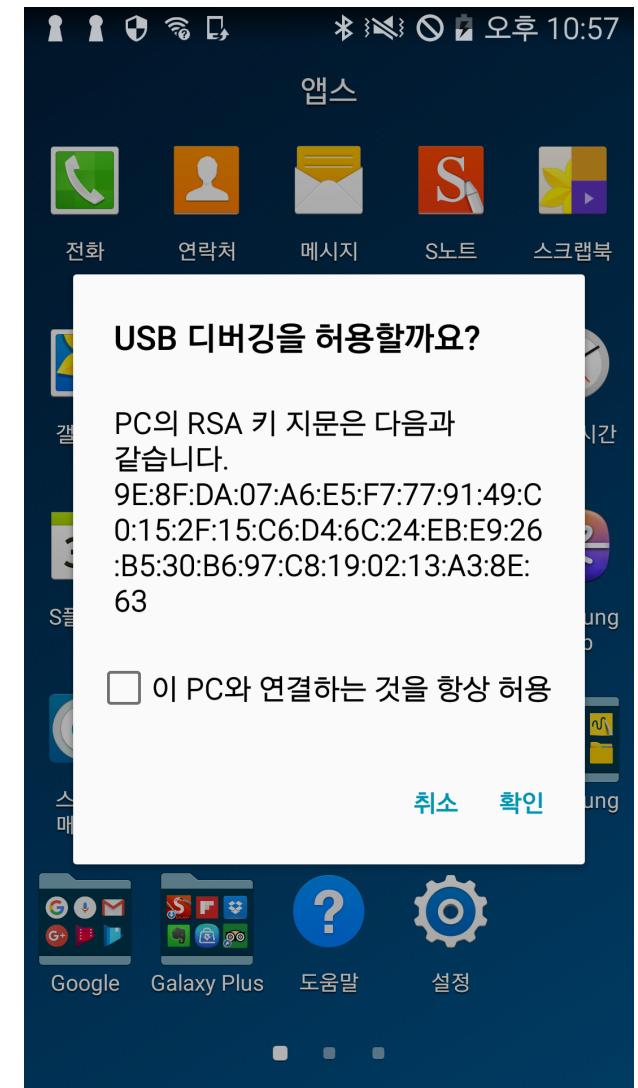
environment variables:
  $ADB_TRACE        comma-separated list of debug info to log:
                    all,adb,sockets,packets,rwx,usb,sync,sysdeps,transport,jdwp
  $ADB_VENDOR_KEYS   colon-separated list of keys (files or directories)
  $ANDROID_SERIAL    serial number to connect to (see -s)
  $ANDROID_LOG_TAGS   tags to be used by logcat (see logcat --help)

[v0nui-MacBook-Pro:~ v0n$ adb devices
List of devices attached
a9745d71      unauthorized

[v0nui-MacBook-Pro:~ v0n$ adb devices
List of devices attached
a9745d71      device

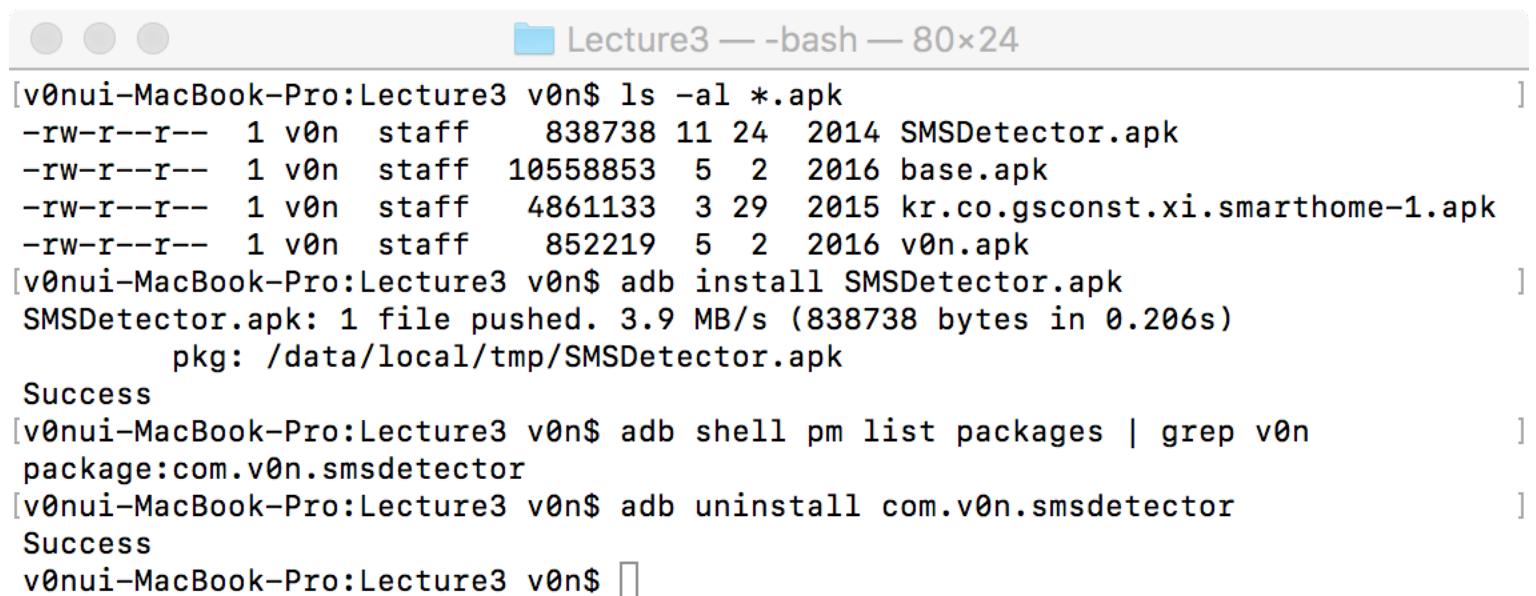
v0nui-MacBook-Pro:~ v0n$ ]
```

*List of devices attached
serial_number state*



Android Program Information

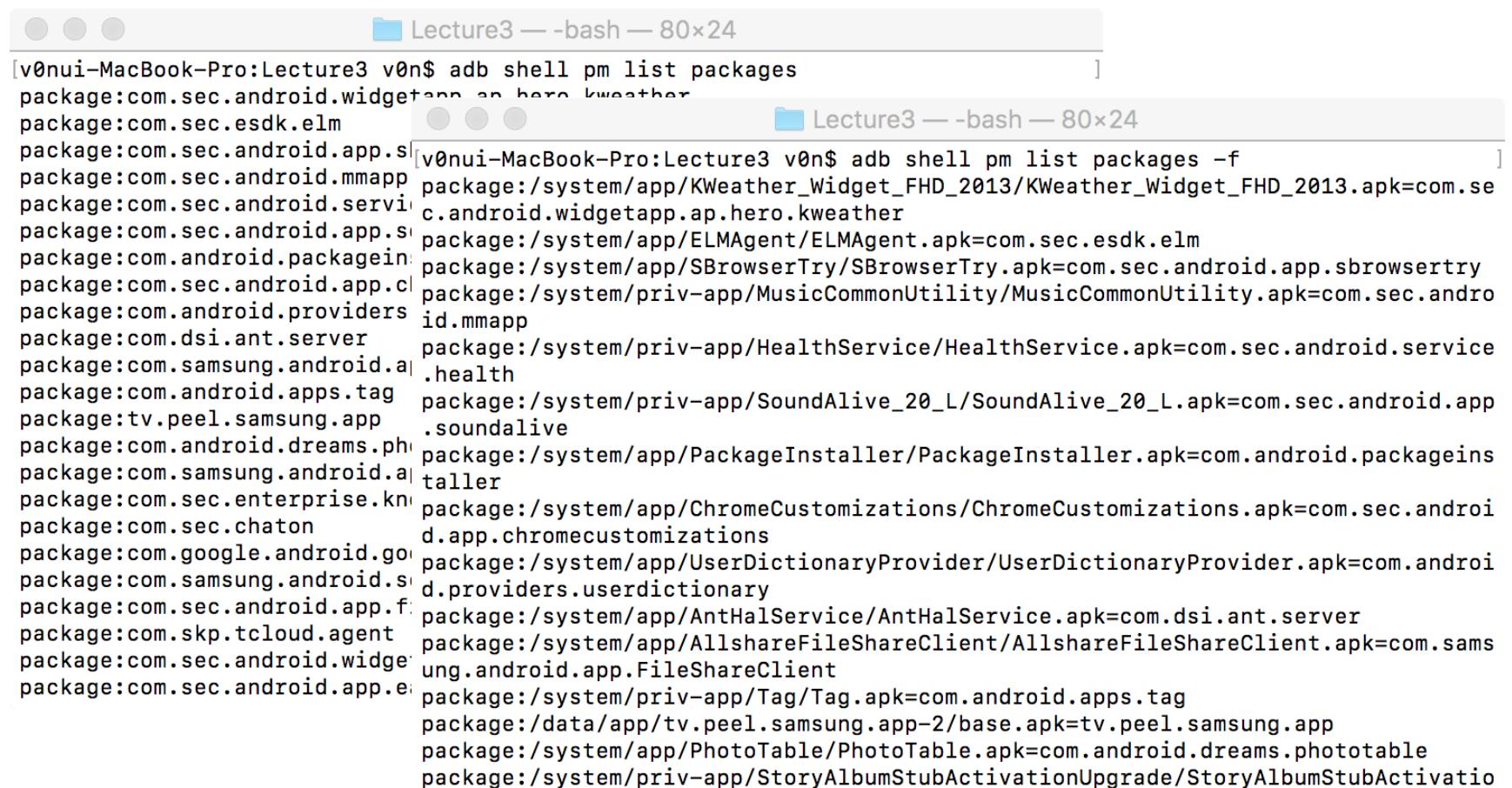
- ADB Command
 - install/uninstall [package name]
 - shell [command]
 - jdwp



```
[v0nui-MacBook-Pro:Lecture3 v0n$ ls -al *.apk
-rw-r--r-- 1 v0n  staff  838738 11 24  2014 SMSDetector.apk
-rw-r--r-- 1 v0n  staff  10558853 5  2  2016 base.apk
-rw-r--r-- 1 v0n  staff  4861133 3 29  2015 kr.co.gsconst.xi.smarthome-1.apk
-rw-r--r-- 1 v0n  staff   852219 5  2  2016 v0n.apk
[v0nui-MacBook-Pro:Lecture3 v0n$ adb install SMSDetector.apk
SMSDetector.apk: 1 file pushed. 3.9 MB/s (838738 bytes in 0.206s)
pkg: /data/local/tmp/SMSDetector.apk
Success
[v0nui-MacBook-Pro:Lecture3 v0n$ adb shell pm list packages | grep v0n
package:com.v0n.smsdetector
[v0nui-MacBook-Pro:Lecture3 v0n$ adb uninstall com.v0n.smsdetector
Success
v0nui-MacBook-Pro:Lecture3 v0n$ ]
```

Android Program Information

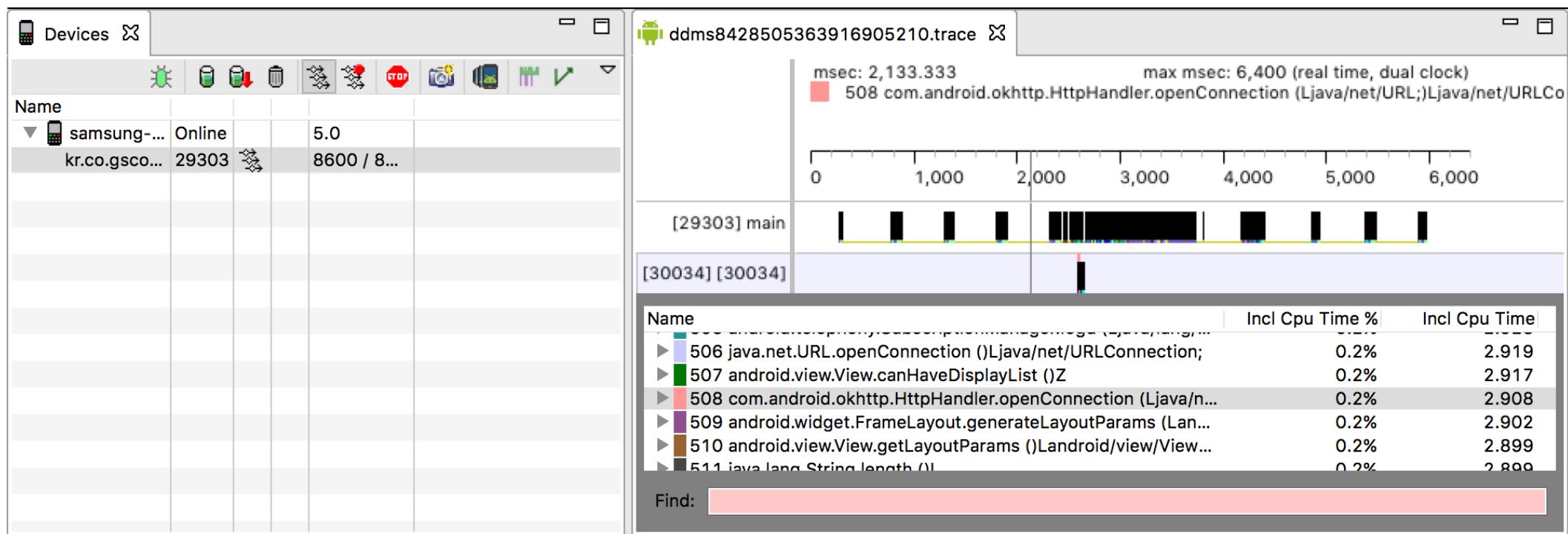
- ADB Command
 - pm list/path



```
[v0nui-MacBook-Pro:Lecture3 v0n$ adb shell pm list packages
package:com.sec.android.widgetapp.ap.hero.kweather
package:com.sec.esdk.elm
package:com.sec.android.app.s
[v0nui-MacBook-Pro:Lecture3 v0n$ adb shell pm list packages -f
package:com.sec.android.mmapp package:/system/app/KWeather_Widget_FHD_2013/KWeather_Widget_FHD_2013.apk=com.se
package:com.sec.android.servi
package:com.sec.android.app.s
package:com.android.packagein
package:com.sec.android.app.cl
package:com.android.providers
package:com.dsi.ant.server
package:com.samsung.android.a
package:com.android.apps.tag
package:tv.peel.samsung.app
package:com.android.dreams.ph
package:com.samsung.android.ai
package:com.sec.enterprise.kn
package:com.sec.chaton
package:com.google.android.go
package:com.samsung.android.s
package:com.sec.android.app.f
package:com.skp.tcloud.agent
package:com.sec.android.widge
package:com.sec.android.app.e
[v0nui-MacBook-Pro:Lecture3 v0n$ adb shell pm list packages -f
package:/system/app/ELMAgent.apk=com.sec.esdk.elm
package:/system/app/SBrowserTry/SBrowserTry.apk=com.sec.android.app.sbrowsertry
package:/system/priv-app/MusicCommonUtility/MusicCommonUtility.apk=com.sec.andro
id.mmapp
package:/system/priv-app/HealthService/HealthService.apk=com.sec.android.service
.package/.health
package:/system/priv-app/SoundAlive_20_L/SoundAlive_20_L.apk=com.sec.android.app
.soundalive
package:/system/app/PackageInstaller/PackageInstaller.apk=com.android.packageins
taller
package:/system/app/ChromeCustomizations/ChromeCustomizations.apk=com.sec.androi
d.app.chromecustomizations
package:/system/app/UserDictionaryProvider/UserDictionaryProvider.apk=com.androi
d.providers.userdictionary
package:/system/app/AntHalService/AntHalService.apk=com.dsi.ant.server
package:/system/app/AllshareFileShareClient/AllshareFileShareClient.apk=com.sams
ung.android.app.FileShareClient
package:/system/priv-app/Tag/Tag.apk=com.android.apps.tag
package:/data/app/tv.peel.samsung.app-2/base.apk=tv.peel.samsung.app
package:/system/app/PhotoTable/PhotoTable.apk=com.android.dreams.photatable
package:/system/priv-app/StoryAlbumStubActivationUpgrade/StoryAlbumStubActivatio
```

Android Program Information

- ADB Command
 - am profile [PID] start/stop [PATH]
 - Check the method call like DDMS



Android Program Information

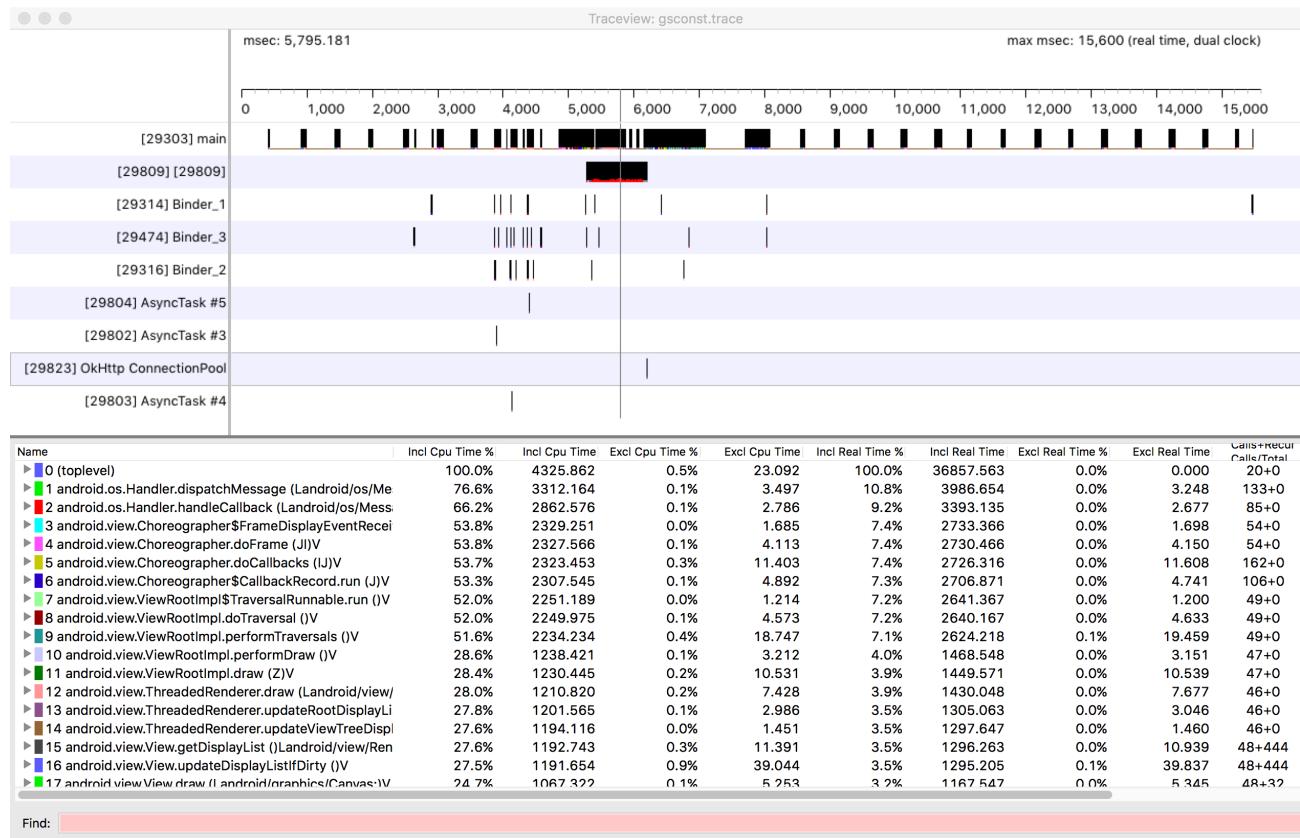
- ADB Command
 - am profile [PID] start/stop [PATH]
 - With "Android Device Monitor"... Make trace file with am command
 - And traceview...

```
[v0nui-MacBook-Pro:Tmp v0n$ adb shell am profile 29303 start /sdcard/gsconst.trace]
[v0nui-MacBook-Pro:Tmp v0n$ adb shell am profile 29303 stop /sdcard/gsconst.trace]

[v0nui-MacBook-Pro:Tmp v0n$ adb pull /sdcard/gsconst.trace . ]
[sdcard/gsconst.trace: 1 file pulled. 4.6 MB/s (8382500 bytes in 1.738s) ]
[v0nui-MacBook-Pro:Tmp v0n$ traceview gsconst.trace ]
The standalone version of traceview is deprecated.
Please use Android Device Monitor (tools/monitor) instead.
Error Loading DDMS Preferences
java.lang.NullPointerException
    at org.eclipse.swt.widgets.Control.internal_new_GC(Unknown Source)
    at org.eclipse.swt.graphics.GC.cocoa_new(Unknown Source)
    at org.eclipse.swt.widgets.Tree.sendMeasureItem(Unknown Source)
    at org.eclipse.swt.widgets.Tree.cellSize(Unknown Source)
    at org.eclipse.swt.widgets.Display.windowProc(Unknown Source)
    at org.eclipse.swt.internal.cocoa.OS.objc_msgSendSuper_stret(Native Method)
    at org.eclipse.swt.widgets.Widget.expansionFrameWithFrame_inView(Unknown Sourc
e)
    at org.eclipse.swt.widgets.Tree.expansionFrameWithFrame_inView(Unknown Source)
    at org.eclipse.swt.widgets.Display.windowProc(Unknown Source)
    at org.eclipse.swt.internal.cocoa.OS.objc_msgSend_bool(Native Method)
    at org.eclipse.swt.internal.cocoa.NSRunLoop.runMode(Unknown Source)
    at org.eclipse.swt.widgets.Display.sleep(Unknown Source)
```

Android Program Information

- ADB Command
 - am profile [PID] start/stop [PATH]



Android Program Information

- ADB Command
 - am start -a [INTENT] -n [COMPONENT]
 - adb shell am start -a android.intent.action.MAIN -n [PACKAGE/ACTIVITY]

```
rm -rf v0n.apk
adb uninstall [REDACTED]
apktool b -f base_smali -o v0n.apk
[REDACTED]
adb install v0n.apk
adb shell am start -a android.intent.action.MAIN -n
[REDACTED] SplashActivity
adb logcat -c | adb logcat | grep v0n
```

```
[v0nui-MacBook-Pro:Tmp v0n$ adb shell am start -a android.intent.action.MAIN -n kr.co.gsconst.xi.smarthome/kr.co.ezville.hn.main.HNIntroActivity
Starting: Intent { act=android.intent.action.MAIN cmp=kr.co.gsconst.xi.smarthome
/kr.co.ezville.hn.main.HNIntroActivity }
v0nui-MacBook-Pro:Tmp v0n$ ]
```

Android Program Information

- ADB Command
 - am dumpheap [PROCESSID] [FILE]
 - adb shell am dumpheap 9105 /sdcard/gsconst.dumpheap

```
● ● ● Tmp — bash — 80x24
[v0nui-MacBook-Pro:Tmp v0n$ adb shell ps | grep gsconst]
u0_a274 9105 310 1936516 129956 ffffffff 00000000 S kr.co.gsconst.xi.smarthome
[v0nui-MacBook-Pro:Tmp v0n$ adb shell am dumpheap 9105 /sdcard/gsconst.dumpheap]
[v0nui-MacBook-Pro:Tmp v0n$ adb pull /sdcard/gsconst.dumpheap]
/sdcard/gsconst.dumpheap: 1 file pulled. 4.4 MB/s (75447899 bytes in 16.194s)
[v0nui-MacBook-Pro:Tmp v0n$ xxd gsconst.dumpheap | grep "f.u.c.k" -A 5 -B 5]
00472b00: 0000 0000 0000 0000 0000 0000 0000 ..... .
00472b10: 2232 db0c 4000 0000 0000 0000 0470 8ee1 "2..@.....p..
00472b20: 0832 d923 f032 d3cc 6032 c0b7 a032 d77e .2.#.2..`2...2.~
00472b30: c022 32d9 2e00 0000 0000 0000 0001 708f ."2.....p..
00472b40: 04a0 32c8 b3c0 2332 db14 9000 0000 0000 ..2...#2.....
00472b50: 0000 1205 0066 0075 0063 006b 0069 006c .....f.u.c.k.i.l
00472b60: 006c 006c 006c 0069 006e 0067 0000 0000 .l.l.l.i.n.g....
00472b70: 0000 0000 0000 2232 d92e 1000 0000 ....."2.....
00472b80: 0000 0000 0170 8f04 a032 c8b3 c022 32d9 .....p...2.."2.
00472b90: 2e20 0000 0000 0000 0001 708f 04a0 32c8 .....p...2.
00472ba0: b3c0 2232 d92e 3000 0000 0000 0000 0170 .."2..0.....p.

-- 
-- 
00556fe0: 0000 000a 0000 0000 0000 0000 2332 e857 .....#2.W
00556ff0: 6000 0000 0000 0000 0a05 0076 0030 006e `.....v.0.n
00557000: 0073 0063 0068 0033 006c 006c 0069 2232 .s.c.h.3.1.l.i"2
00557010: e857 8000 0000 0000 0000 0270 8ee9 2032 .W.....p.. 2
```

Android Program Information

- ADB Command
 - am dumpheap [PROCESSID] [FILE]
 - Like HPROF file from Android Device Monitor

The screenshot shows the Android Device Monitor interface on the left and a terminal window on the right.

Android Device Monitor (Left):

- Devices:** Shows a list of connected devices, with one device listed as "Online".
- Threads:** Tab selected, showing a list of threads.
- Heap:** Tab selected, showing heap statistics for the selected device. It includes a table for memory usage and a histogram for allocation count per size.
- Allocation Tracker:** Shows a timeline of allocations.
- Network Statistics:** Shows network traffic details.
- File Explorer:** Shows file system navigation.
- Emulator Control:** Shows emulator status.

Terminal Window (Right):

```
v0nui-MacBook-Pro:Tmp v0n$ xxd gsconst.hprof | grep "f.u.c.k" -A 5 -B 5
00472940: 0000 0000 0000 0000 0000 0000 2232 db0c ....."2..
00472950: 4000 0000 0000 0000 0470 8ee1 0832 d923 @.....p..2.#
00472960: f032 d3cc 6032 c0b7 a032 d77e c022 32d9 .2..`2..2.~."2.
00472970: 2e00 0000 0000 0000 0001 708f 04a0 32c8 .....p..2.
00472980: b3c0 2332 db14 9000 0000 0000 0000 1205 ..#2.....
00472990: 0066 0075 0063 006b 0069 006c 006c 006c .f.u.c.k.i.l.1.1
004729a0: 006c 0069 006e 0067 0000 0000 0000 0000 .l.i.n.g.....
004729b0: 0000 0000 2232 d92e 1000 0000 0000 0000 ...."2.....
004729c0: 0170 8f04 a032 c8b3 c022 32d9 2e20 0000 .p..2..`2...
004729d0: 0000 0000 0001 708f 04a0 32c8 b3c0 2232 .....p..2.."2
004729e0: d92e 3000 0000 0000 0000 0170 8f04 a032 ..0.....p..2
-- 
005b8350: 0000 0000 0000 0000 0000 0000 0000 0021 .....!
005b8360: 32d3 04e0 0000 0000 70dd 50f0 0000 0004 2.....p.P....
005b8370: 32d6 1080 2132 eec6 8000 0000 0070 dd43 2...!2.....p.C
005b8380: 1000 0000 1032 eec6 6000 0000 0032 d304 .....2..`2..
005b8390: e000 0000 a023 32ee c6a0 0000 0000 0000 .....#2.....
005b83a0: 0005 0500 6600 7500 6300 6b00 6921 32ee ....f.u.c.k.i!2.
005b83b0: c6c0 0000 0000 6f53 49c8 0000 0010 32ee .....oSI....2.
005b83c0: c6a0 0000 0005 05d4 0dd2 0000 0000 2332 .....#2
005b83d0: eec6 e000 0000 0000 0000 0405 0066 0075 .....f.u
005b83e0: 0063 006b 2132 eec7 0000 0000 006f 5349 .c.k!2.....oSI
```

Q&A