Android 逆向工程筆記

工具簡介

基本工具

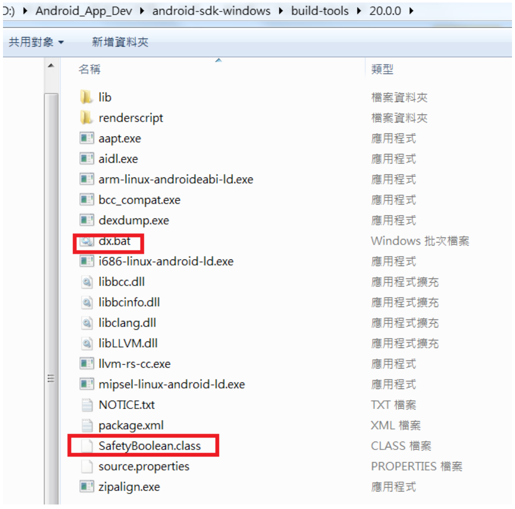
1. apktool: https://ibotpeaches.github.io/Apktool/
2. jd-gui: http://java-decompiler.github.io/
3. dex2jar: https://sourceforge.net/projects/dex2jar/
4. dedexer: http://dedexer.sourceforge.net/

SDK 工具

1. dx: <sdk-path>\build-tools\<sdk-version>
2. aapt: <sdk-path>\build-tools\<sdk-version>
3. dexdump: <sdk-path>\build-tools\<sdk-version>

範例

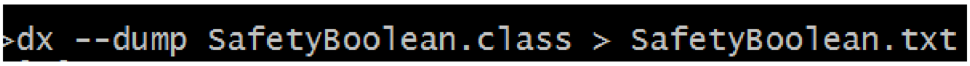
1. Dump class file



D:) ▸ Android_App_Dev ▸ android-sdk-windows ▸ build-tools ▸ 20.0.0 ▸

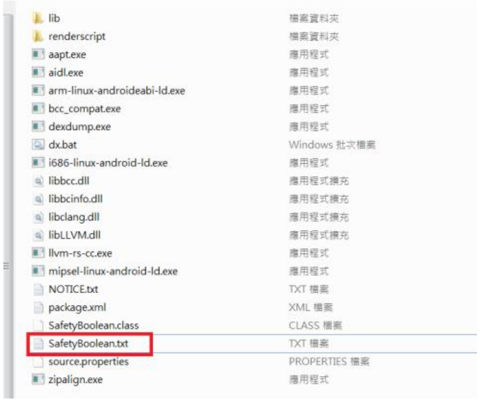
名稱	類型
lib	檔案資料夾
renderscript	檔案資料夾
aapt.exe	應用程式
aidl.exe	應用程式
arm-linux-androideabi-ld.exe	應用程式
bcc_compat.exe	應用程式
dexdump.exe	應用程式
dx.bat	Windows 批次檔案
i686-linux-android-ld.exe	應用程式
libbcc.dll	應用程式擴充
libbcinfo.dll	應用程式擴充
libclang.dll	應用程式擴充
libLLVM.dll	應用程式擴充
llvm-rs-cc.exe	應用程式
mipsel-linux-android-ld.exe	應用程式
NOTICE.txt	TXT 檔案
package.xml	XML 檔案
SafetyBoolean.class	CLASS 檔案
source.properties	PROPERTIES 檔案
zipalign.exe	應用程式

打開 cmd 並且下以下指令



```
>dx --dump SafetyBoolean.class > SafetyBoolean.txt
```

之後就會產生一個 dump file



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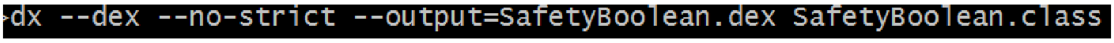
2. Dump dex to file

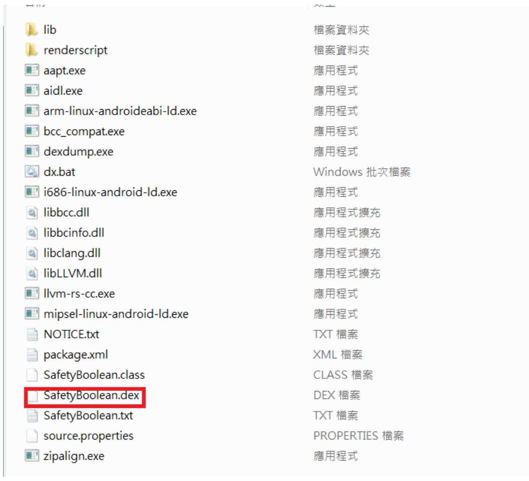
Class to dex file

打開 cmd 並且下以下指令



```
>dx --dex --no-strict --output=SafetyBoolean.dex SafetyBoolean.class
```

之後就會產生一個 DEX file



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i686-linux-android-ld.exe	應用程式
libbcc.dll	應用程式擴充
libbcinfo.dll	應用程式擴充
libclang.dll	應用程式擴充
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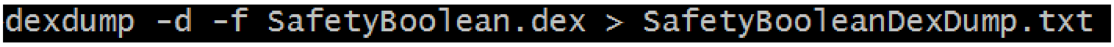
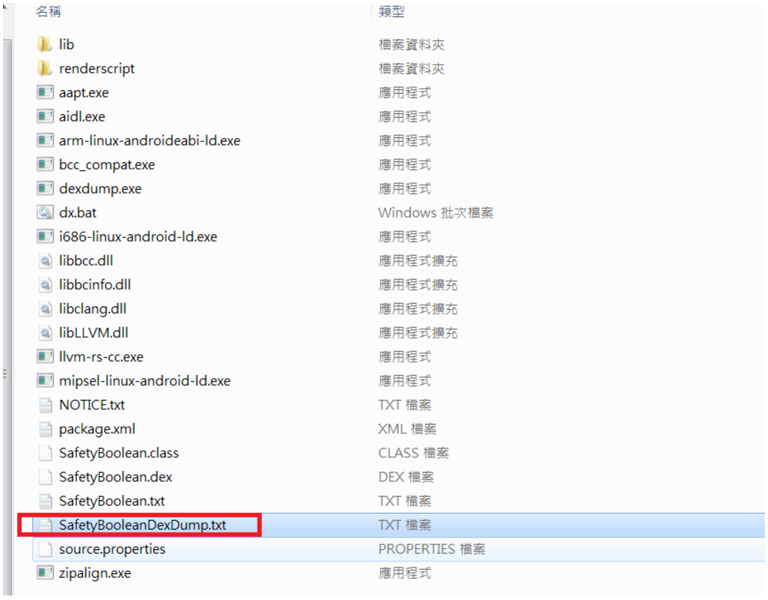
package.xml	XML 檔案
SafetyBoolean.class	CLASS 檔案
SafetyBoolean.dex	DEX 檔案
SafetyBoolean.txt	TXT 檔案
source.properties	PROPERTIES 檔案
zipalign.exe	應用程式

Dex to file



```
dexdump -d -f SafetyBoolean.dex > SafetyBooleanDexDump.txt
```

之後就會產生一個 DEX dump file



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SafetyBoolean.txt	TXT 檔案
SafetyBooleanDexDump.txt	TXT 檔案
source.properties	PROPERTIES 檔案
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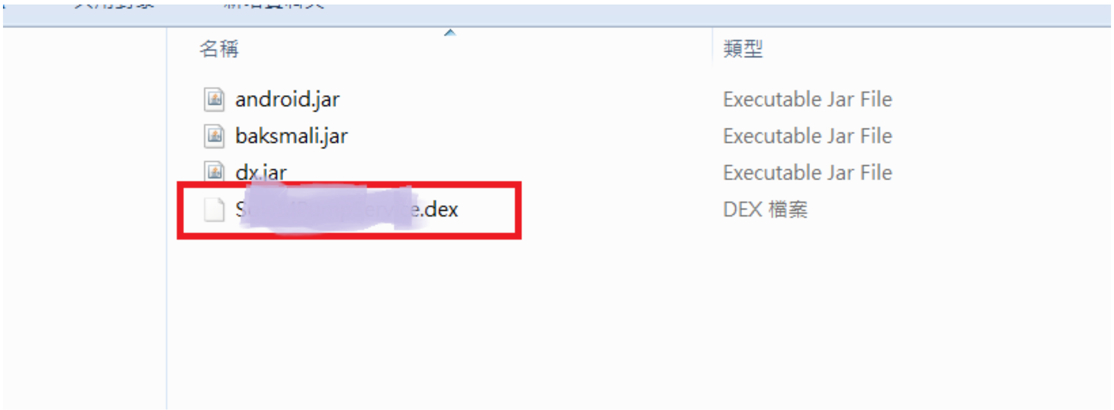
3. Java convert to smali file

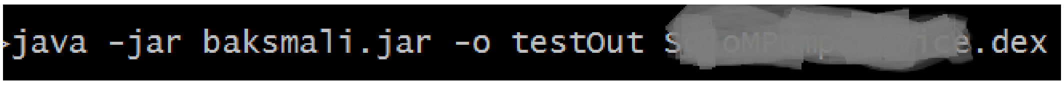
把 dex file 放到 AndroidDumpTool\lib



名稱	類型
android.jar	Executable Jar File
baksmali.jar	Executable Jar File
dx.jar	Executable Jar File
S[redacted]e.dex	DEX 檔案

打開 cmd 並且下以下指令

java -jar baksmali.jar -o 資料夾名稱 dex file



```
java -jar baksmali.jar -o testOut S[redacted]ce.dex
```

產生 smali file

Ps: baksmali 可以下載 https://github.com/fourbrother/java2smali

附件

AndroidDumpTool.rar

參考網站

http://pallergabor.uw.hu/androidblog/dalvik_opcodes.html
http://huli.logdown.com/posts/661513-android-apk-decompile
https://codertw.com/android-%E9%96%8B%E7%99%BC/354008/
http://pallergabor.uw.hu/androidblog/dalvik_opcodes.html
https://docs.oracle.com/javase/specs/jvms/se7/html/jvms-6.html#jvms-6.5
https://github.com/fourbrother/java2smali
https://r8.googlesource.com/?format=HTML
http://pallergabor.uw.hu/androidblog/dalvik_opcodes.html

Adb 指令

1. 在沒有 root 手機的情況下讀取 Data 目錄下的檔

After android 8.0

使用 adb 命令時的錯誤

如果直接使用 adb 命令會產生以下錯誤:

```
127|shell@android:/ $ cd /data
cd /data
shell@android:/data $ ls
ls
opendir failed, Permission denied
```

你是沒有許可權的。

正確使用 adb 讀取 data 目錄下的檔方式

```
shell@android:/data $ run-as com.your.package
run-as com.your.package
shell@android:/data/data/com.your.package $ cd /data/data/com.your.package
cd /data/data/com.your.package
shell@android:/data/data/com.your.package $ ls
ls
cache
databases
lib
```

```
shared_prefs
shell@android:/data/data/com.your.package $ cd databases
cd databases
shell@android:/data/data/com.your.package/databases $ ls
yourpackagename.db
$ cat preferences.db > /mnt/sdcard/yourpackagename.db
```

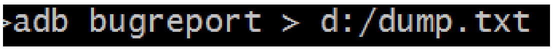
將你要訪問的 package 目錄下的 db 檔拷貝到 sdcard 中，這樣就可以正常訪問了！

作者：Snowball
來源：CSDN
原文：https://blog.csdn.net/yangzl2008/article/details/8498196
版權聲明：本文為博主原創文章，轉載請附上博文連結！

2. Android adb bugreport 工具分析和使用

Before android 8.0

adb bugreport > [file path] ps: Suggestion use the sdk version before android 8.0

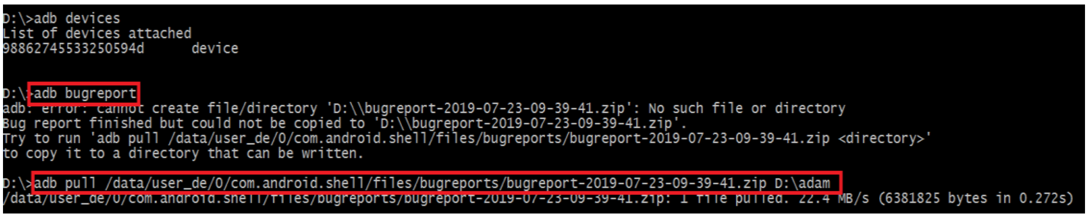


```
>adb bugreport > d:/dump.txt
```

After android 8.0

adb bugreport

adb pull [bug report zip file] [dest_file_path]



```
D:\>adb devices
List of devices attached
988627455332505594d      device


D:\>adb bugreport
adb: error: cannot create file/directory 'D:\\bugreport-2019-07-23-09-39-41.zip': No such file or directory
Bug report finished but could not be copied to 'D:\\bugreport-2019-07-23-09-39-41.zip'.
Try to run 'adb pull /data/user_de/0/com.android.shell/files/bugreports/bugreport-2019-07-23-09-39-41.zip <directory>'
to copy it to a directory that can be written.

D:\>adb pull /data/user_de/0/com.android.shell/files/bugreports/bugreport-2019-07-23-09-39-41.zip D:\adam
/data/user_de/0/com.android.shell/files/bugreports/bugreport-2019-07-23-09-39-41.zip: 1 file pulled. 22.4 MB/s (6381825 bytes in 0.272s)
```

異常 1

這裡我出現一個異常：當前 SDK 最新版本為 7.0(25)，而我的手機系統版本為 5.0，所以使用命令列：**adb bugreport > report.txt** 時出現了如下異常：

Failed to get bugreportz version, which is only available on devices running Android 7.0 or later.

這是由於 SDK 版本太新了，既然手機系統不能升級，那就只好把 SDK 降級，其實這裡只是使用了 plantform 下的 adb 命令，所以從新下載 **platform-tools** 即可。我下載和手機系統版本一致的 platform-tools，然後解壓。使用新下載的 platform-tools 的 adb 命令執行 adb bugreport > out.txt 時提示沒有設備。

異常 2

又使用 **adb devices** 查看列表仍然沒有。重啟 adb 也沒用效果。
因為我的是 Mac 設備，所以命令列執行 system_profiler SPUSBDataType 時會顯示一系列外接設備資訊，找到你的 Android 設備，複製 Vendor ID。
進入你下載的低版本 **platform-tools** 資料夾下，修改或創建 **adb_usb.ini** 檔，把剛才複製的 Vendor ID 粘貼到這裡。再次執行 **adb devices** 就可以查看到設備清單了。然後再次執行 adb bugreport > out.txt 就會產生一個設備耗能統計資訊檔。

注意

匯出電量統計資料是一個持續輸出的過程，就是說如果你不手動停止，那會一直統計。所以看到檔中已經寫入內容後就可以 CTRL+C 了。

Bugreport 分析

Reference: https://blog.csdn.net/createchance/article/details/51954142

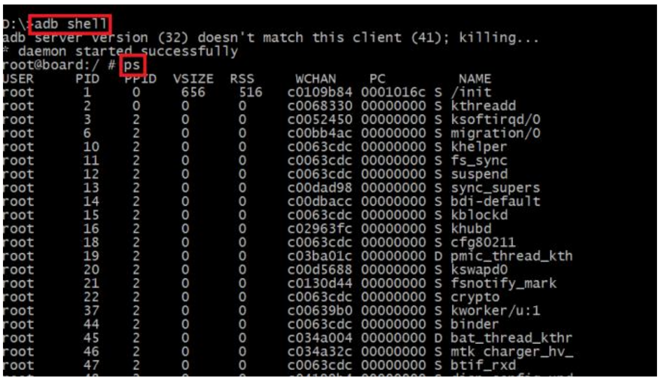
3. 利用 adb shell 來觀看 device 中的 process 和 thread

Before android 8.0

Open the command line and check adb connection status by adb devices

Process

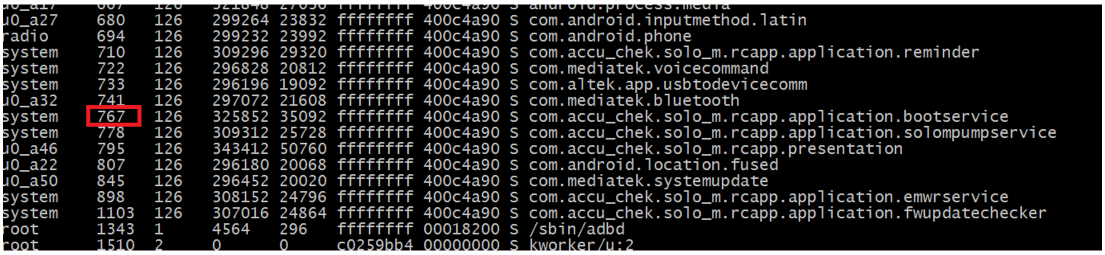
- adb shell
- ps



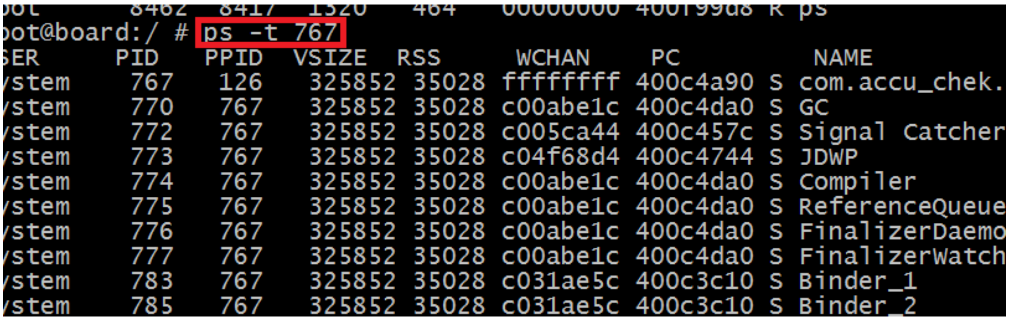
```
D:\>adb shell
adb server version (32) doesn't match this client (41); killing...
* daemon started successfully
root@board:/ # ps
USER     PID   PPID  VSIZE  RSS     WCHAN    PC         NAME
root      1     0     656    516   c0109b84 0001016c S /init
root      2     0     0      0     c0068330 00000000 S kthreadd
root      3     2     0      0     c0052450 00000000 S ksoftirqd/0
root      6     2     0      0     c00bb4ac 00000000 S migration/0
root      10    2     0      0     c0063cdc 00000000 S khelper
root      11    2     0      0     c0063cdc 00000000 S fs_sync
root      12    2     0      0     c0063cdc 00000000 S suspend
root      13    2     0      0     c00dad98 00000000 S sync_supers
root      14    2     0      0     c00dbacc 00000000 S bdi-default
root      15    2     0      0     c0063cdc 00000000 S kblockd
root      16    2     0      0     c02963fc 00000000 S khubd
root      18    2     0      0     c0063cdc 00000000 S cfg80211
root      19    2     0      0     c03ba01c 00000000 D pmic_thread_kth
root      20    2     0      0     c00d5688 00000000 S kswapd0
root      21    2     0      0     c0130d44 00000000 S fsnotify_mark
root      22    2     0      0     c0063cdc 00000000 S crypto
root      37    2     0      0     c00639b0 00000000 S kworker/u:1
root      44    2     0      0     c0063cdc 00000000 S binder
root      45    2     0      0     c034a004 00000000 D bat_thread_kthr
root      46    2     0      0     c034a32c 00000000 S mtk charger_hv_
root      47    2     0      0     c0063cdc 00000000 S btif_rxd
```

Thread

- Get the specified pid by ps command
- Ps －t [pid]



```
u0_a27    680   126   299264 23832 ffffffff 400c4a90 S com.android.inputmethod.latin
radio     694   126   299232 23992 ffffffff 400c4a90 S com.android.phone
system    710   126   309296 29320 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.application.reminder
system    722   126   296828 20812 ffffffff 400c4a90 S com.mediatek.voicecommand
system    733   126   296196 19092 ffffffff 400c4a90 S com.altek.app.usbtodevicecomm
u0_a32    741   126   297072 21608 ffffffff 400c4a90 S com.mediatek.bluetooth
system    767   126   325852 35092 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.application.bootservice
system    778   126   309312 25728 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.application.solompumpservice
u0_a46    795   126   343412 50760 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.presentation
u0_a22    807   126   296180 20068 ffffffff 400c4a90 S com.android.location.fused
u0_a50    845   126   296452 20020 ffffffff 400c4a90 S com.mediatek.systemupdate
system    898   126   308152 24796 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.application.emwrservice
system    1103  126   307016 24864 ffffffff 400c4a90 S com.accu_chek.solo_m.rcapp.application.fwupdatechecker
root      1343  1     4564   296   ffffffff 00018200 S /sbin/adbd
root      1510  2     0      0     c0259bb4 00000000 S kworker/u:2
```



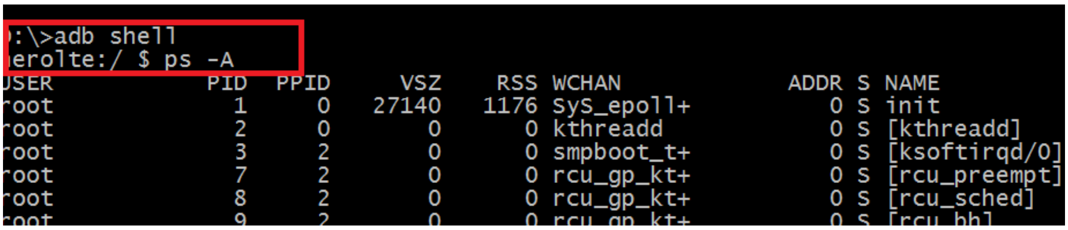
```
oot       8462  8417  1520   464   00000000 400f99d8 R ps
oot@board:/ # ps -t 767
SER      PID   PPID  VSIZE  RSS     WCHAN    PC         NAME
ystem     767   126   325852 35028 ffffffff 400c4a90 S com.accu_chek.
ystem     770   767   325852 35028 c00abe1c 400c4da0 S GC
ystem     772   767   325852 35028 c005ca44 400c457c S Signal Catcher
ystem     773   767   325852 35028 c04f68d4 400c4744 S JDWP
ystem     774   767   325852 35028 c00abe1c 400c4da0 S Compiler
ystem     775   767   325852 35028 c00abe1c 400c4da0 S ReferenceQueue
ystem     776   767   325852 35028 c00abe1c 400c4da0 S FinalizerDaemo
ystem     777   767   325852 35028 c00abe1c 400c4da0 S FinalizerWatch
ystem     783   767   325852 35028 c031ae5c 400c3c10 S Binder_1
ystem     785   767   325852 35028 c031ae5c 400c3c10 S Binder_2
```

After android 8.0

Open the command line and check adb connection status by adb devices

Process

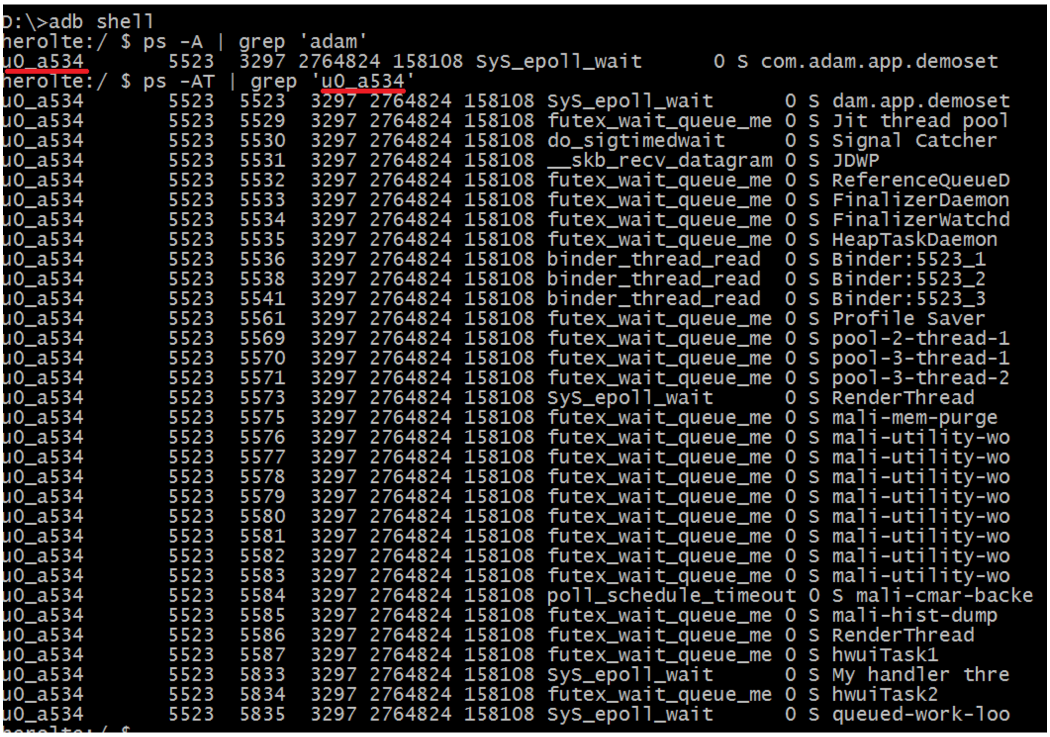
- adb shell
- ps -A



```
D:\>adb shell
erolte:/ $ ps -A
USER            PID   PPID     VSZ    RSS WCHAN            ADDR S NAME
root              1      0   27140   1176 SyS_epoll+          0 S init
root              2      0       0      0 kthreadd            0 S [kthreadd]
root              3      2       0      0 smpboot_t+          0 S [ksoftirqd/0]
root              7      2       0      0 rcu_gp_kt+          0 S [rcu_preempt]
root              8      2       0      0 rcu_gp_kt+          0 S [rcu_sched]
root              9      2       0      0 rcu_gp_kt+          0 S [rcu_bh]
```

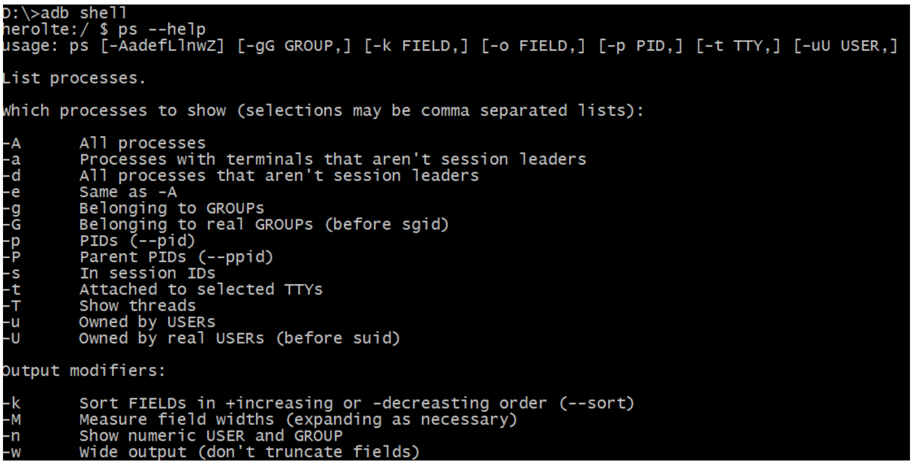
Thread

- adb shell
- ps -A
- get user name from process list
- ps -AT | grep [user name]



```
D:\>adb shell
herolte:/ $ ps -A | grep 'adam'
u0_a534         5523  3297 2764824 158108 SyS_epoll_wait      0 S com.adam.app.demoset
herolte:/ $ ps -AT | grep 'u0_a534'
u0_a534         5523  5523  3297 2764824 158108 SyS_epoll_wait      0 S dam.app.demoset
u0_a534         5523  5529  3297 2764824 158108 futex_wait_queue_me 0 S Jit thread pool
u0_a534         5523  5530  3297 2764824 158108 do_sigtimedwait     0 S Signal Catcher
u0_a534         5523  5531  3297 2764824 158108 __skb_recv_datagram 0 S JDWP
u0_a534         5523  5532  3297 2764824 158108 futex_wait_queue_me 0 S ReferenceQueueD
u0_a534         5523  5533  3297 2764824 158108 futex_wait_queue_me 0 S FinalizerDaemon
u0_a534         5523  5534  3297 2764824 158108 futex_wait_queue_me 0 S FinalizerWatchd
u0_a534         5523  5535  3297 2764824 158108 futex_wait_queue_me 0 S HeapTaskDaemon
u0_a534         5523  5536  3297 2764824 158108 binder_thread_read  0 S Binder:5523_1
u0_a534         5523  5538  3297 2764824 158108 binder_thread_read  0 S Binder:5523_2
u0_a534         5523  5541  3297 2764824 158108 binder_thread_read  0 S Binder:5523_3
u0_a534         5523  5561  3297 2764824 158108 futex_wait_queue_me 0 S Profile Saver
u0_a534         5523  5569  3297 2764824 158108 futex_wait_queue_me 0 S pool-2-thread-1
u0_a534         5523  5570  3297 2764824 158108 futex_wait_queue_me 0 S pool-3-thread-1
u0_a534         5523  5571  3297 2764824 158108 futex_wait_queue_me 0 S pool-3-thread-2
u0_a534         5523  5573  3297 2764824 158108 SyS_epoll_wait      0 S RenderThread
u0_a534         5523  5575  3297 2764824 158108 futex_wait_queue_me 0 S mali-mem-purge
u0_a534         5523  5576  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5577  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5578  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5579  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5580  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5581  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5582  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5583  3297 2764824 158108 futex_wait_queue_me 0 S mali-utility-wo
u0_a534         5523  5584  3297 2764824 158108 poll_schedule_timeout 0 S mali-cmar-backe
u0_a534         5523  5585  3297 2764824 158108 futex_wait_queue_me 0 S mali-hist-dump
u0_a534         5523  5586  3297 2764824 158108 futex_wait_queue_me 0 S RenderThread
u0_a534         5523  5587  3297 2764824 158108 futex_wait_queue_me 0 S hwuiTask1
u0_a534         5523  5833  3297 2764824 158108 SyS_epoll_wait      0 S My handler thre
u0_a534         5523  5834  3297 2764824 158108 futex_wait_queue_me 0 S hwuiTask2
u0_a534         5523  5835  3297 2764824 158108 SyS_epoll_wait      0 S queued-work-loo
herolte:/ $
```

Type the commend ps – help



```
D:\>adb shell
herolte:/ $ ps --help
usage: ps [-AadefLlnwZ] [-gG GROUP,] [-k FIELD,] [-o FIELD,] [-p PID,] [-t TTY,] [-uU USER,]

List processes.

Which processes to show (selections may be comma separated lists):

-A      All processes
-a      Processes with terminals that aren't session leaders
-d      All processes that aren't session leaders
-e      Same as -A
-g      Belonging to GROUPs
-G      Belonging to real GROUPs (before sgid)
-p      PIDs (--pid)
-P      Parent PIDs (--ppid)
-s      In session IDs
-t      Attached to selected TTYs
-T      Show threads
-u      Owned by USERs
-U      Owned by real USERs (before suid)

Output modifiers:

-k      Sort FIELDs in +increasing or -decreasting order (--sort)
-M      Measure field widths (expanding as necessary)
-n      Show numeric USER and GROUP
-w      Wide output (don't truncate fields)
```

Reference: https://blog.csdn.net/RadianceBlau/article/details/77855149