实验四——移动应用自动化测试

一、实验目的

①学会java和android环境搭建（主要是后者）

②熟练掌握adb命令

③熟练掌握安卓自动化测试（monkey测试）

④学会使用aapt获取报名

二、实验环境搭建

1. JAVA环境在之前的课程中已经搭建完成

2. Android SDK 环境搭建以及搭建过程中遇到问题的解决

①在D:\Android下建立SDK文件夹，依据实验要求指导首先解压android-sdk-windows文件，将其中内容copy到刚才建立的SDK文件夹下，将其中存放待测app的文件夹apk放在D:\Android\apk以便于后续使用。**

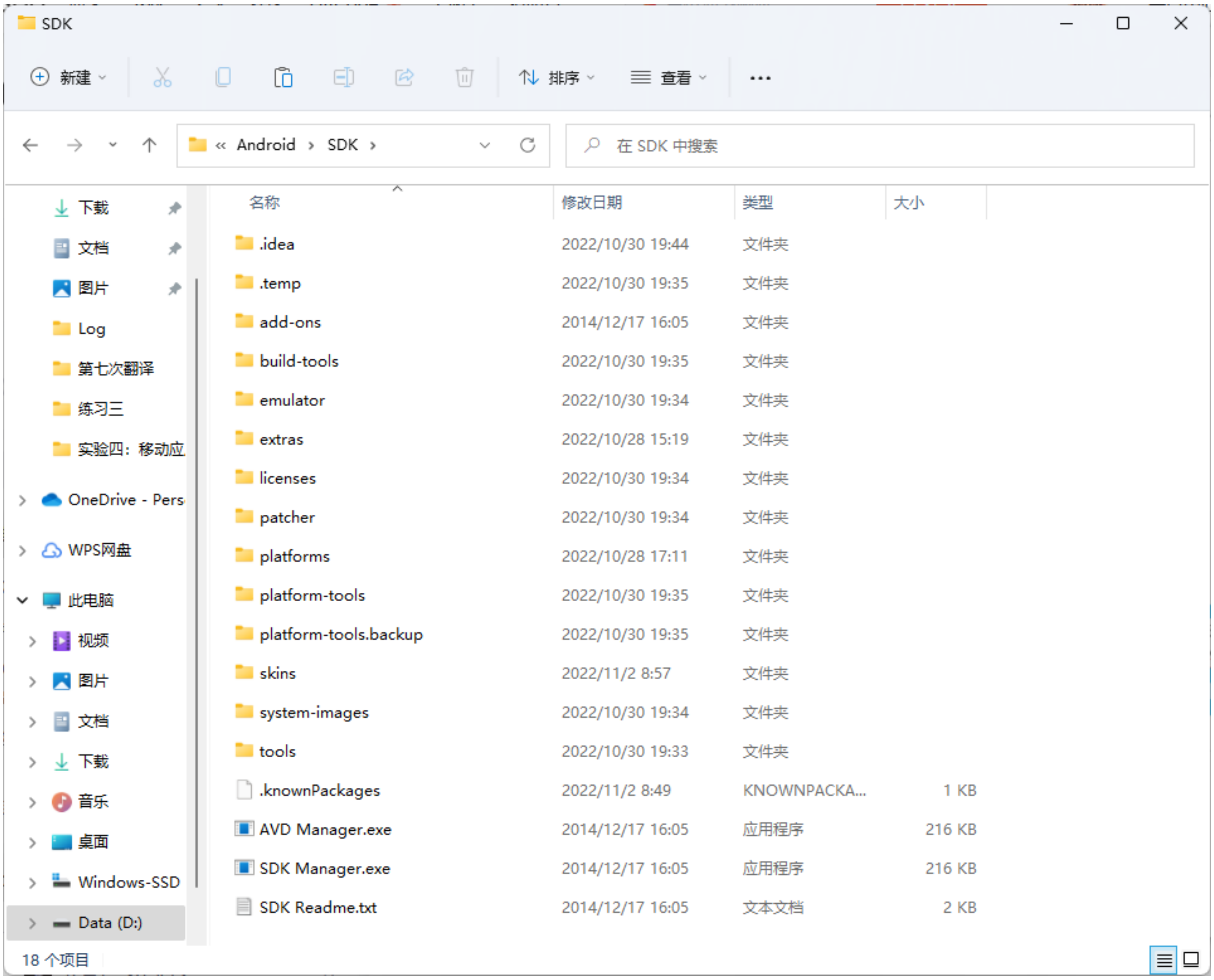
②解压extras.zip ***（在这里遇到第一个问题，应该把extras.zip解压后文件夹中的extras文件夹放在SDK下，不能把解压后的文件夹直接放在SDK下，因为其中还有另一个_MACOSX文件夹，会让SDK Manager找不到正确的路径）***放到SDK文件夹下；**

③解压system-images.zip直接放到SDK文件夹下**（因为之前在win11设置过文件解压偏好，因此我在这次多解压出了一层无用的文件夹，将system-images直接放在SDK下即可）**；**

④将platform-tools_r22-windows.zip直接解压到SDK目录下；**

⑤在SDK目录下建立，build-tools文件夹, 并将21.1.2.rar解压到build-tools文件夹下；**

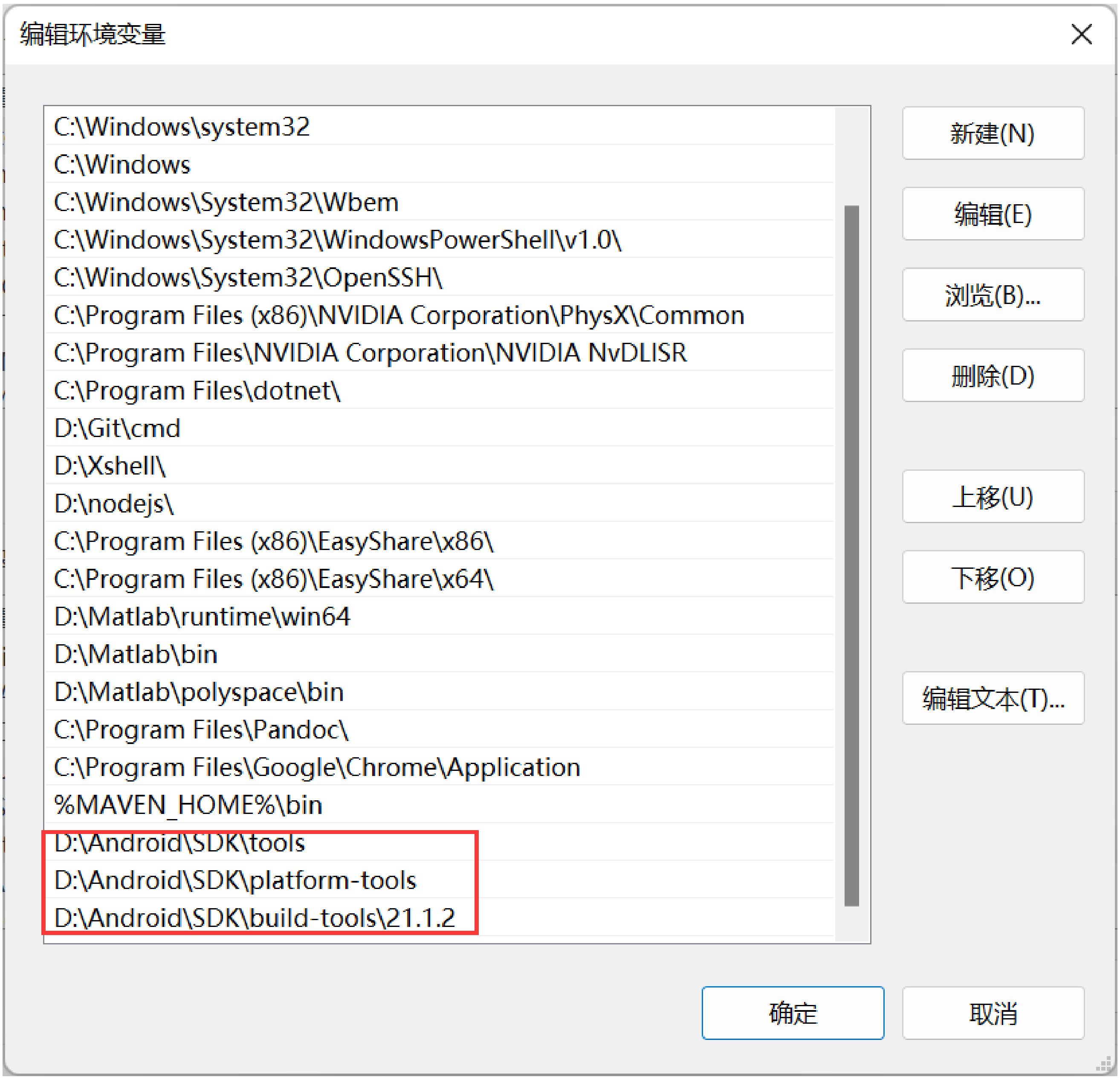
⑥将android-21.rar解压到SDK目录下的platforms文件夹下**（⑤⑥这里也遇到了与system-images相同的问题，删除多余的一层文件夹即可）



名称	修改日期	类型	大小
.idea	2022/10/30 19:44	文件夹	
.temp	2022/10/30 19:35	文件夹	
add-ons	2014/12/17 16:05	文件夹	
build-tools	2022/10/30 19:35	文件夹	
emulator	2022/10/30 19:34	文件夹	
extras	2022/10/28 15:19	文件夹	
licenses	2022/10/30 19:34	文件夹	
patcher	2022/10/30 19:34	文件夹	
platforms	2022/10/28 17:11	文件夹	
platform-tools	2022/10/30 19:35	文件夹	
platform-tools.backup	2022/10/30 19:35	文件夹	
skins	2022/11/2 8:57	文件夹	
system-images	2022/10/30 19:34	文件夹	
tools	2022/10/30 19:33	文件夹	
.knownPackages	2022/11/2 8:49	KNOWNPACKA...	1 KB
AVD Manager.exe	2014/12/17 16:05	应用程序	216 KB
SDK Manager.exe	2014/12/17 16:05	应用程序	216 KB
SDK Readme.txt	2014/12/17 16:05	文本文档	2 KB

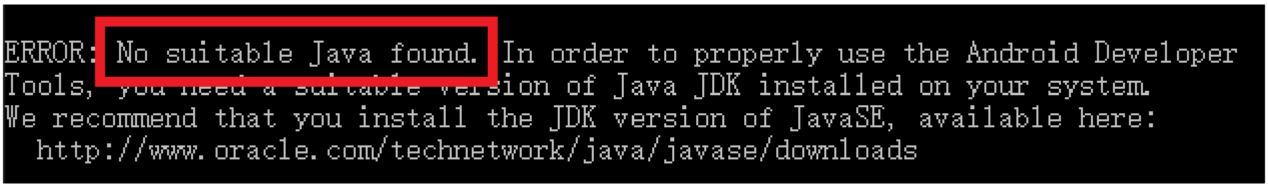
配置如上图，其中还包括了后续使用Android Studio安装Google USB Driver以及测试虚拟机后自动生成的文件

⑦配置环境变量



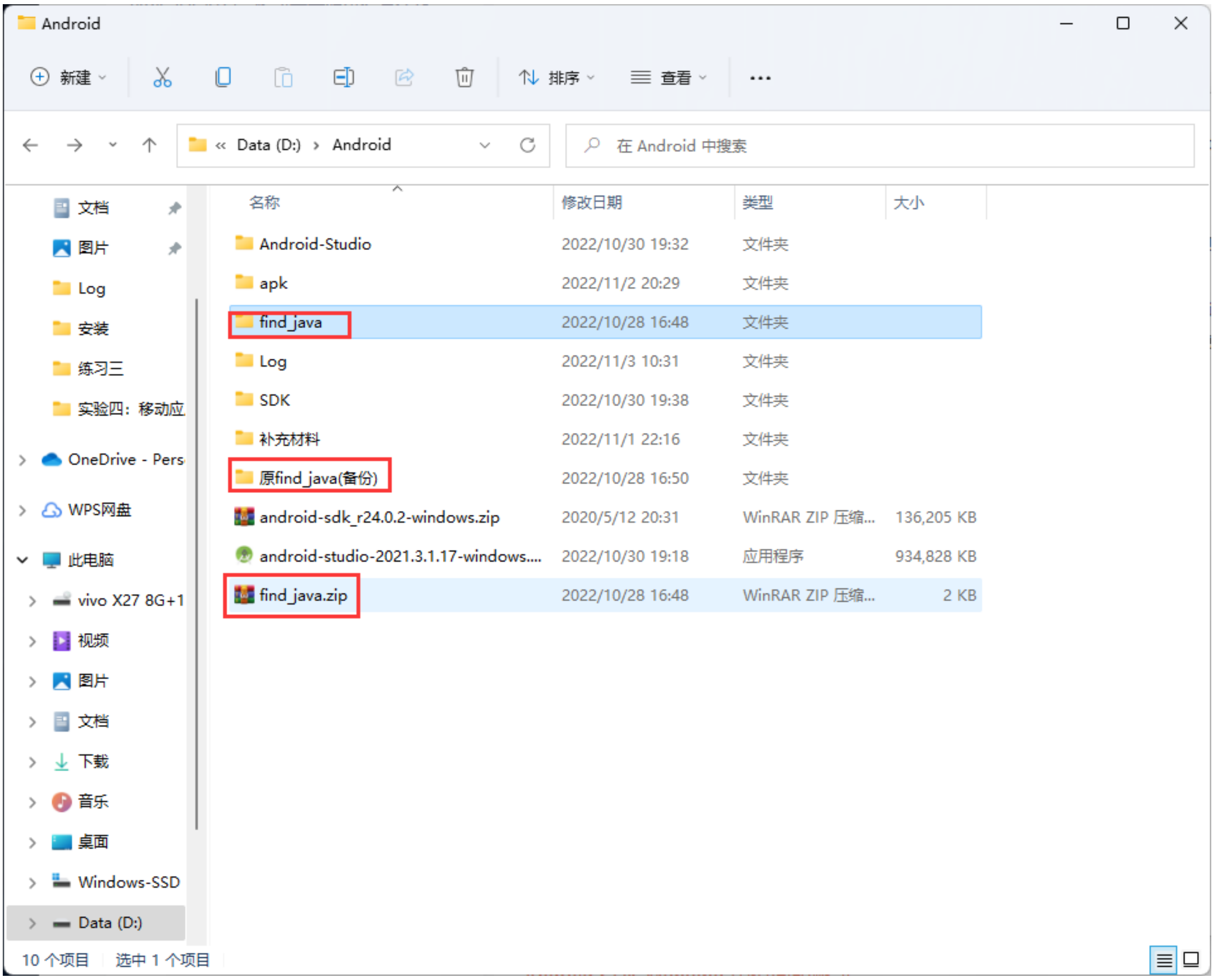
```
C:\Windows\system32
C:\Windows
C:\Windows\System32\Wbem
C:\Windows\System32\WindowsPowerShell\v1.0\
C:\Windows\System32\OpenSSH\
C:\Program Files (x86)\NVIDIA Corporation\PhysX\Common
C:\Program Files\NVIDIA Corporation\NVIDIA NvDLISR
C:\Program Files\dotnet\
D:\Git\cmd
D:\Xshell\
D:\nodejs\
C:\Program Files (x86)\EasyShare\x86\
C:\Program Files (x86)\EasyShare\x64\
D:\Matlab\runtime\win64
D:\Matlab\bin
D:\Matlab\polyspace\bin
C:\Program Files\Pandoc\
C:\Program Files\Google\Chrome\Application
%MAVEN_HOME%\bin
D:\Android\SDK\tools
D:\Android\SDK\platform-tools
D:\Android\SDK\build-tools\21.1.2
```

⑧经过以上步骤后，发现SDK Manager无法正常运行（闪退），搜索得知是因为find_java.bat文件版本的问题。



```
ERROR: No suitable Java found. In order to properly use the Android Developer
Tools, you need a suitable version of Java JDK installed on your system.
We recommend that you install the JDK version of JavaSE, available here:
  http://www.oracle.com/technetwork/java/javase/downloads
```

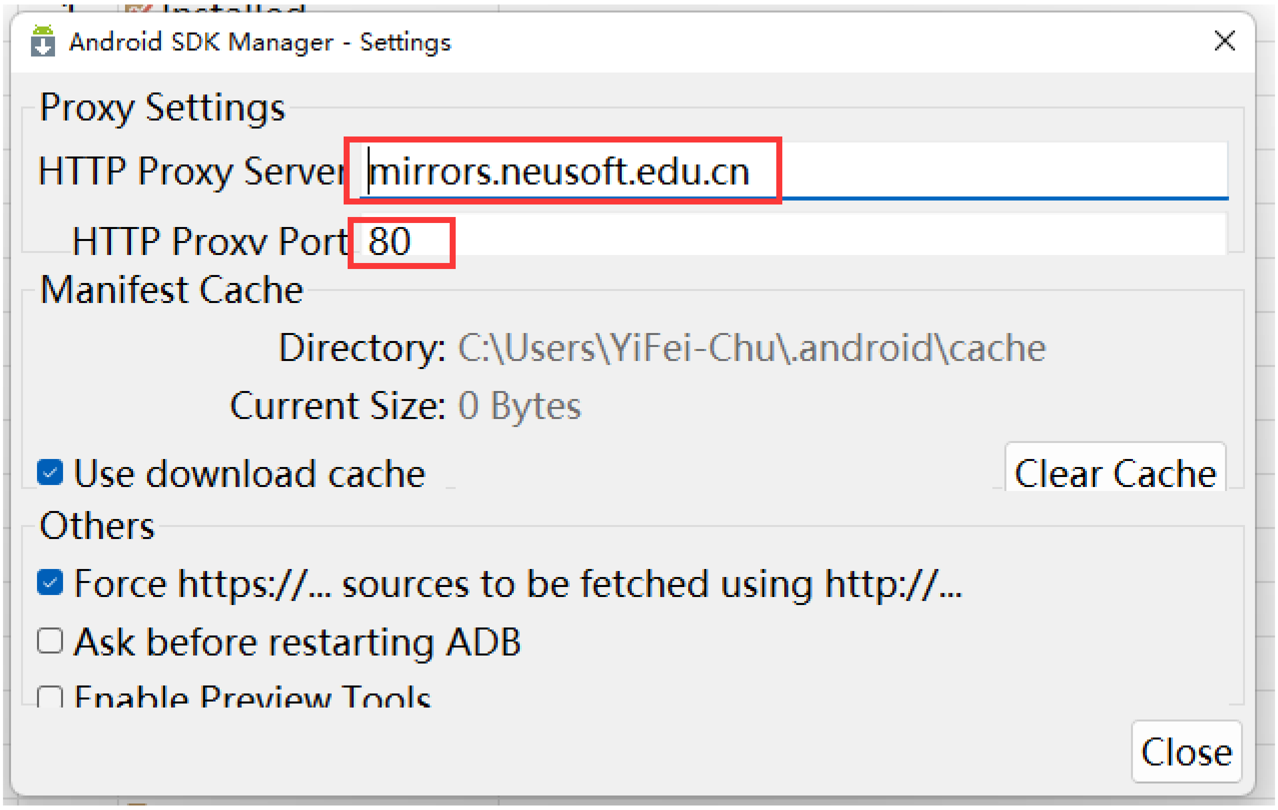
根据网络中的解决方案重新下载了合适版本的find_java.bat文件备份并替换了原文件



名称	修改日期	类型	大小
Android-Studio	2022/10/30 19:32	文件夹	
apk	2022/11/2 20:29	文件夹	
find_java	2022/10/28 16:48	文件夹	
Log	2022/11/3 10:31	文件夹	
SDK	2022/10/30 19:38	文件夹	
补充材料	2022/11/1 22:16	文件夹	
原find_java(备份)	2022/10/28 16:50	文件夹	
android-sdk_r24.0.2-windows.zip	2020/5/12 20:31	WinRAR ZIP 压缩...	136,205 KB
android-studio-2021.3.1.17-windows....	2022/10/30 19:18	应用程序	934,828 KB
find_java.zip	2022/10/28 16:48	WinRAR ZIP 压缩...	2 KB

⑨运行SDK Manager

首先在Tools->options中换源，加速下载安装



Android SDK Manager - Settings

Proxy Settings

HTTP Proxy Server: mirrors.neusoft.edu.cn

HTTP Proxy Port: 80

Manifest Cache

Directory: C:\Users\YiFei-Chu\.android\cache

Current Size: 0 Bytes

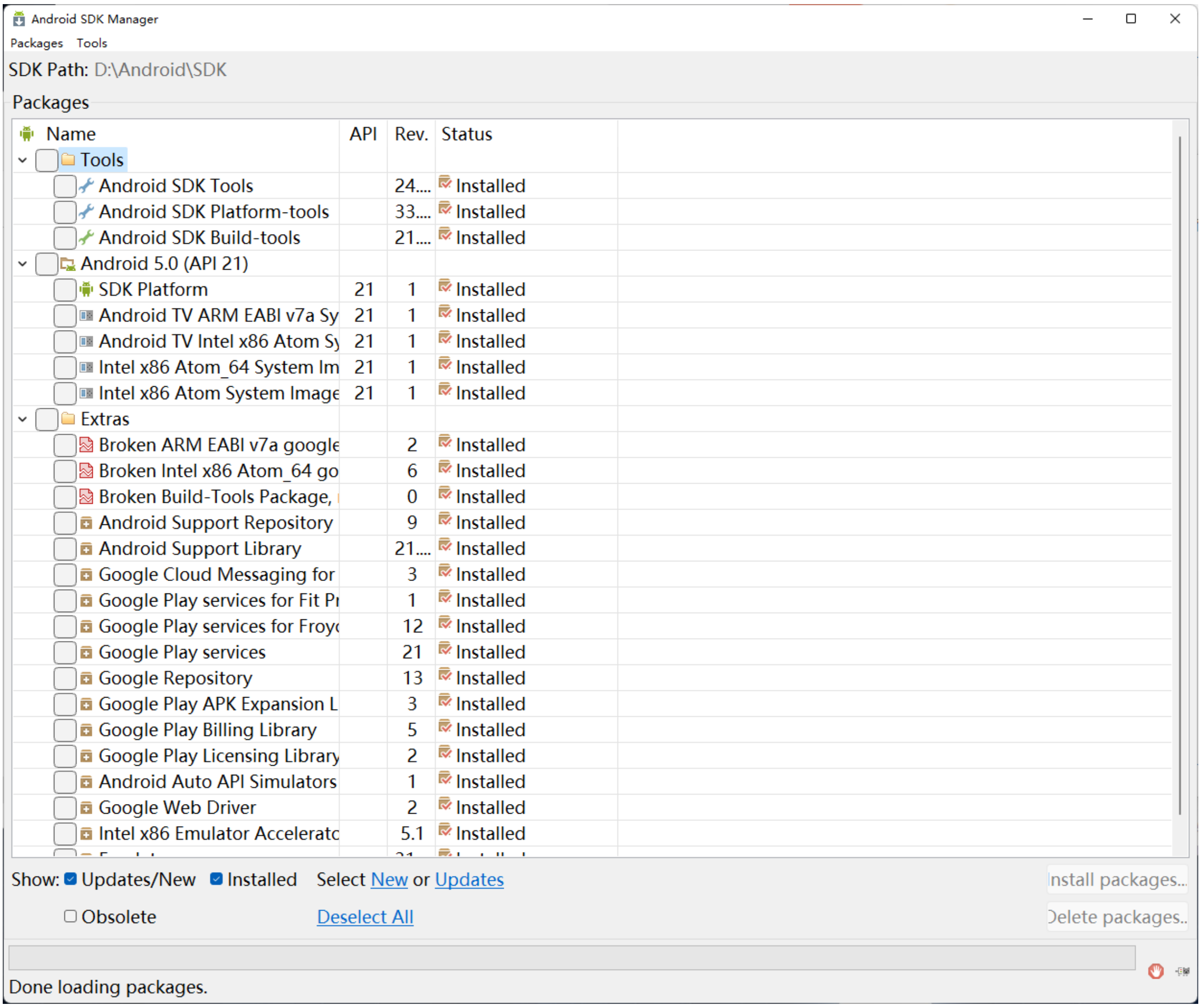
☑ Use download cache

Others

☑ Force https://... sources to be fetched using http://...

☐ Ask before restarting ADB

☐ Enable Preview Tools



Android SDK Manager

Packages Tools

SDK Path: D:\Android\SDK

Packages

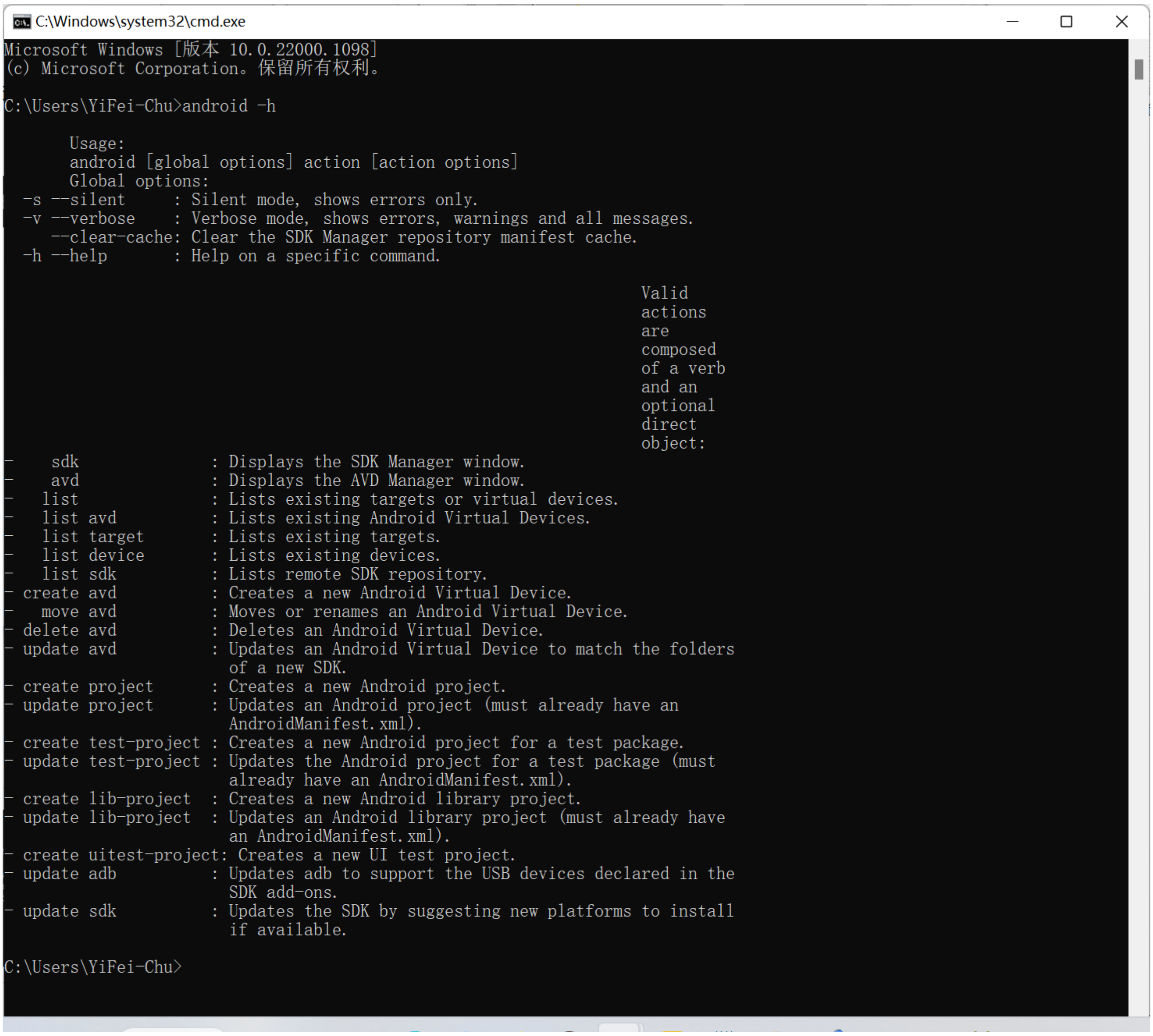
Name	API	Rev.	Status
☐ Tools			
☐ Android SDK Tools		24....	Installed
☐ Android SDK Platform-tools		33....	Installed
☐ Android SDK Build-tools		21....	Installed
☐ Android 5.0 (API 21)			
☐ SDK Platform	21	1	Installed
☐ Android TV ARM EABI v7a Sy	21	1	Installed
☐ Android TV Intel x86 Atom Sy	21	1	Installed
☐ Intel x86 Atom_64 System Im	21	1	Installed
☐ Intel x86 Atom System Image	21	1	Installed
☐ Extras			
☐ Broken ARM EABI v7a google		2	Installed
☐ Broken Intel x86 Atom_64 go		6	Installed
☐ Broken Build-Tools Package,		0	Installed
☐ Android Support Repository		9	Installed
☐ Android Support Library		21....	Installed
☐ Google Cloud Messaging for		3	Installed
☐ Google Play services for Fit Pr		1	Installed
☐ Google Play services for Froy		12	Installed
☐ Google Play services		21	Installed
☐ Google Repository		13	Installed
☐ Google Play APK Expansion L		3	Installed
☐ Google Play Billing Library		5	Installed
☐ Google Play Licensing Library		2	Installed
☐ Android Auto API Simulators		1	Installed
☐ Google Web Driver		2	Installed
☐ Intel x86 Emulator Acceleratc		5.1	Installed

Show: ☑ Updates/New ☑ Installed Select New or Updates

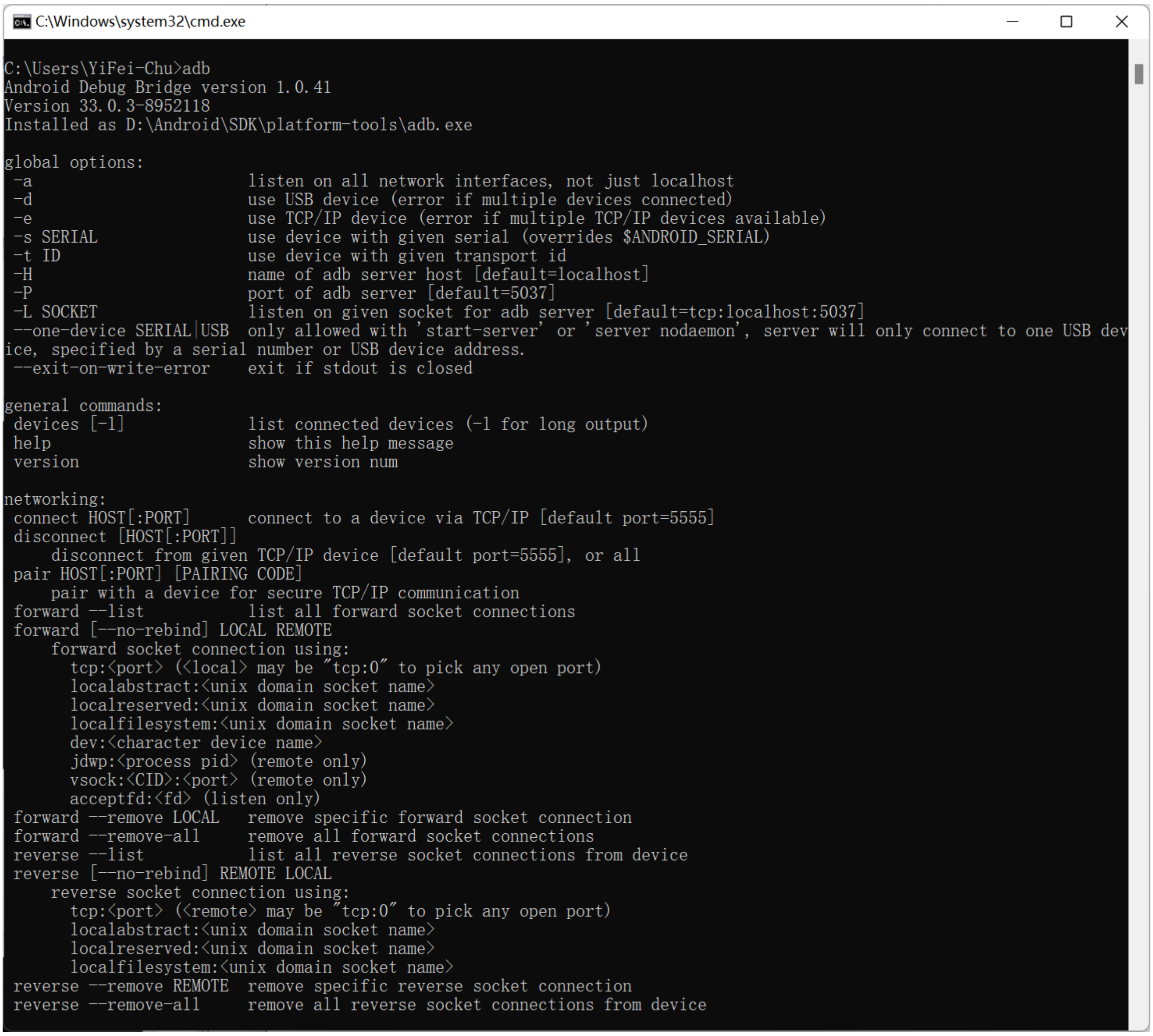
☐ Obsolete Deselect All

Done loading packages.

⑩终端命令测试 android -h 与 adb 如下两图所示



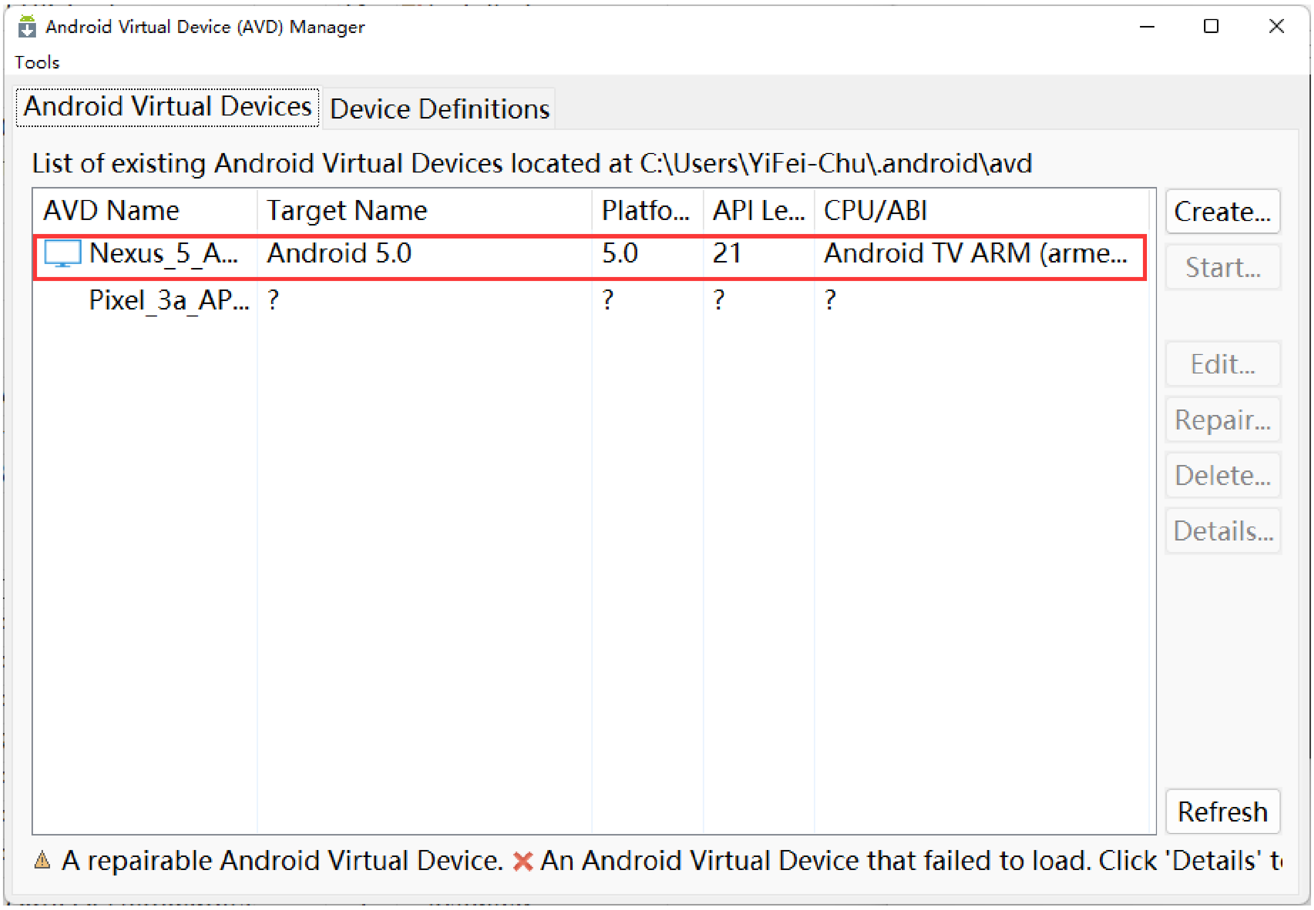
```
Microsoft Windows [版本 10.0.22000.1098]
(c) Microsoft Corporation。保留所有权利。

C:\Users\YiFei-Chu>android -h

       Usage:
       android [global options] action [action options]
       Global options:
  -s --silent     : Silent mode, shows errors only.
  -v --verbose    : Verbose mode, shows errors, warnings and all messages.
     --clear-cache: Clear the SDK Manager repository manifest cache.
  -h --help       : Help on a specific command.

                                                                    Valid
                                                                    actions
                                                                    are
                                                                    composed
                                                                    of a verb
                                                                    and an
                                                                    optional
                                                                    direct
                                                                    object:
-    sdk              : Displays the SDK Manager window.
-    avd              : Displays the AVD Manager window.
-   list              : Lists existing targets or virtual devices.
-   list avd          : Lists existing Android Virtual Devices.
-   list target       : Lists existing targets.
-   list device       : Lists existing devices.
-   list sdk          : Lists remote SDK repository.
- create avd          : Creates a new Android Virtual Device.
-   move avd          : Moves or renames an Android Virtual Device.
- delete avd          : Deletes an Android Virtual Device.
- update avd          : Updates an Android Virtual Device to match the folders
                        of a new SDK.
- create project      : Creates a new Android project.
- update project      : Updates an Android project (must already have an
                        AndroidManifest.xml).
- create test-project : Creates a new Android project for a test package.
- update test-project : Updates the Android project for a test package (must
                        already have an AndroidManifest.xml).
- create lib-project  : Creates a new Android library project.
- update lib-project  : Updates an Android library project (must already have
                        an AndroidManifest.xml).
- create uitest-project: Creates a new UI test project.
- update adb          : Updates adb to support the USB devices declared in the
                        SDK add-ons.
- update sdk          : Updates the SDK by suggesting new platforms to install
                        if available.

C:\Users\YiFei-Chu>
```



```
C:\Users\YiFei-Chu>adb
Android Debug Bridge version 1.0.41
Version 33.0.3-8952118
Installed as D:\Android\SDK\platform-tools\adb.exe

global options:
 -a                       listen on all network interfaces, not just localhost
 -d                       use USB device (error if multiple devices connected)
 -e                       use TCP/IP device (error if multiple TCP/IP devices available)
 -s SERIAL                use device with given serial (overrides $ANDROID_SERIAL)
 -t ID                    use device with given transport id
 -H                       name of adb server host [default=localhost]
 -P                       port of adb server [default=5037]
 -L SOCKET                listen on given socket for adb server [default=tcp:localhost:5037]
 --one-device SERIAL|USB  only allowed with 'start-server' or 'server nodaemon', server will only connect to one USB dev
ice, specified by a serial number or USB device address.
 --exit-on-write-error    exit if stdout is closed

general commands:
 devices [-l]             list connected devices (-l for long output)
 help                     show this help message
 version                  show version num

networking:
 connect HOST[:PORT]      connect to a device via TCP/IP [default port=5555]
 disconnect [HOST[:PORT]]
     disconnect from given TCP/IP device [default port=5555], or all
 pair HOST[:PORT] [PAIRING CODE]
     pair with a device for secure TCP/IP communication
 forward --list           list all forward socket connections
 forward [--no-rebind] LOCAL REMOTE
     forward socket connection using:
       tcp:<port> (<local> may be "tcp:0" to pick any open port)
       localabstract:<unix domain socket name>
       localreserved:<unix domain socket name>
       localfilesystem:<unix domain socket name>
       dev:<character device name>
       jdwp:<process pid> (remote only)
       vsock:<CID>:<port> (remote only)
       acceptfd:<fd> (listen only)
 forward --remove LOCAL   remove specific forward socket connection
 forward --remove-all     remove all forward socket connections
 reverse --list           list all reverse socket connections from device
 reverse [--no-rebind] REMOTE LOCAL
     reverse socket connection using:
       tcp:<port> (<remote> may be "tcp:0" to pick any open port)
       localabstract:<unix domain socket name>
       localreserved:<unix domain socket name>
       localfilesystem:<unix domain socket name>
 reverse --remove REMOTE  remove specific reverse socket connection
 reverse --remove-all     remove all reverse socket connections from device
```

三、安卓自动化测试

1.创建安卓虚拟机，使用android avd命令

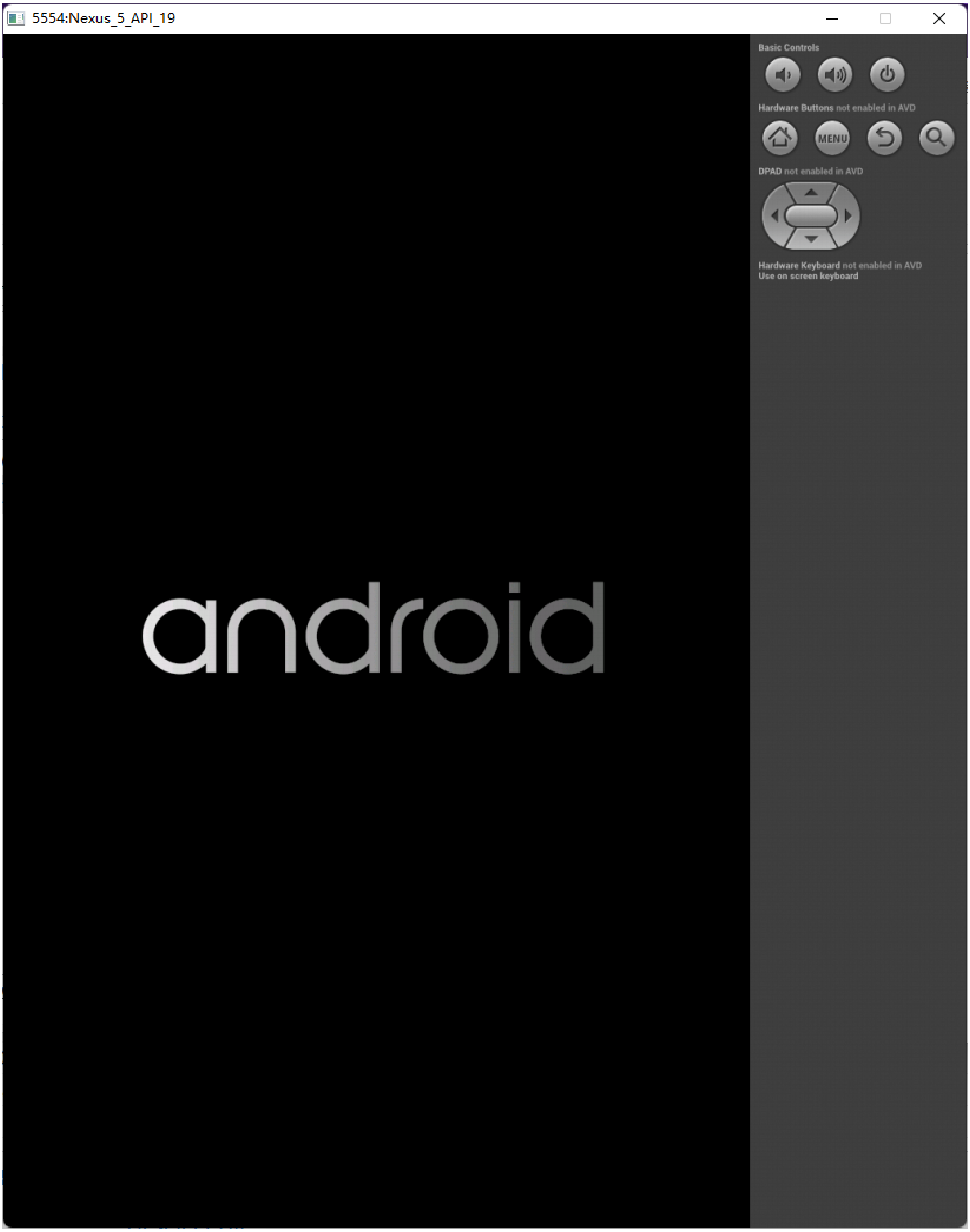


List of existing Android Virtual Devices located at C:\Users\YiFei-Chu\.android\avd

AVD Name	Target Name	Platfo...	API Le...	CPU/ABI
Nexus_5_A...	Android 5.0	5.0	21	Android TV ARM (arme...
Pixel_3a_AP...	?	?	?	?

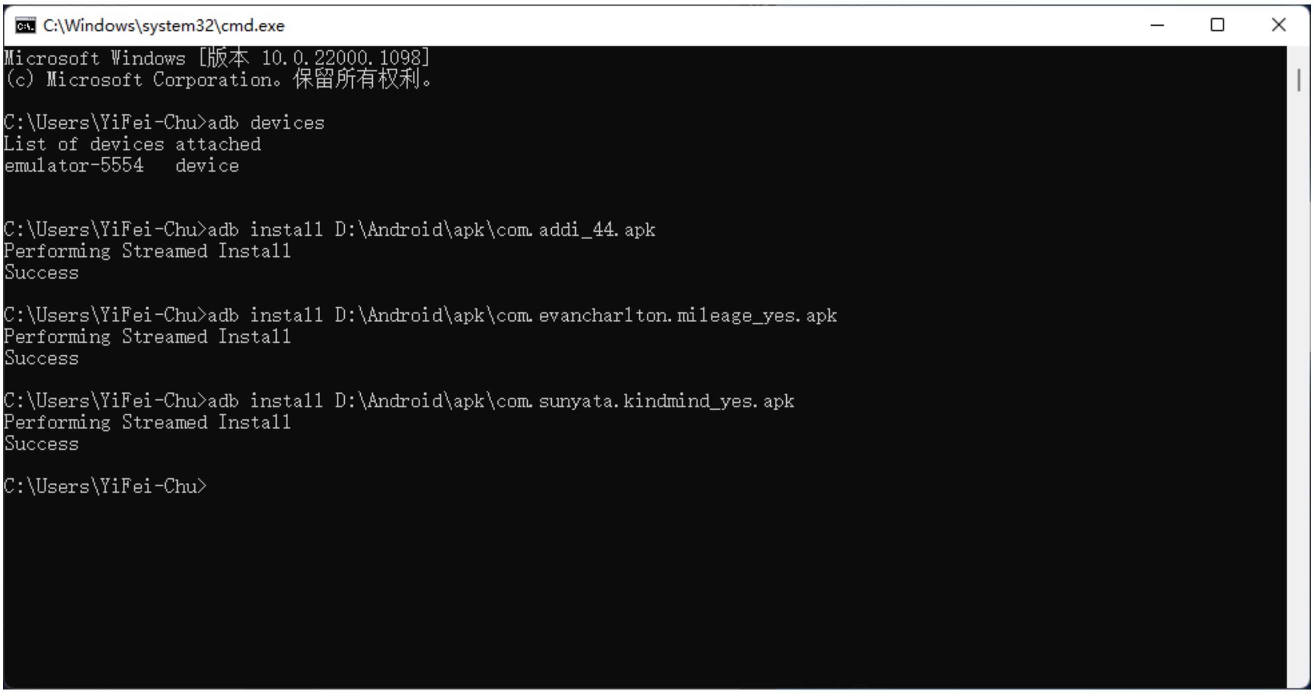
⚠ A repairable Android Virtual Device. ✖ An Android Virtual Device that failed to load. Click 'Details' t

第一个是使用终端命令创建的虚拟机器，第二行虚拟机是Android Studio创建的虚拟机



但是这种方法创建的虚拟机十分卡顿，虽然经过多次尝试已经给其分配了很大的空间以保证其顺利运行，但是打开速度和反应速度都较慢，因此我又使用了其他模拟器

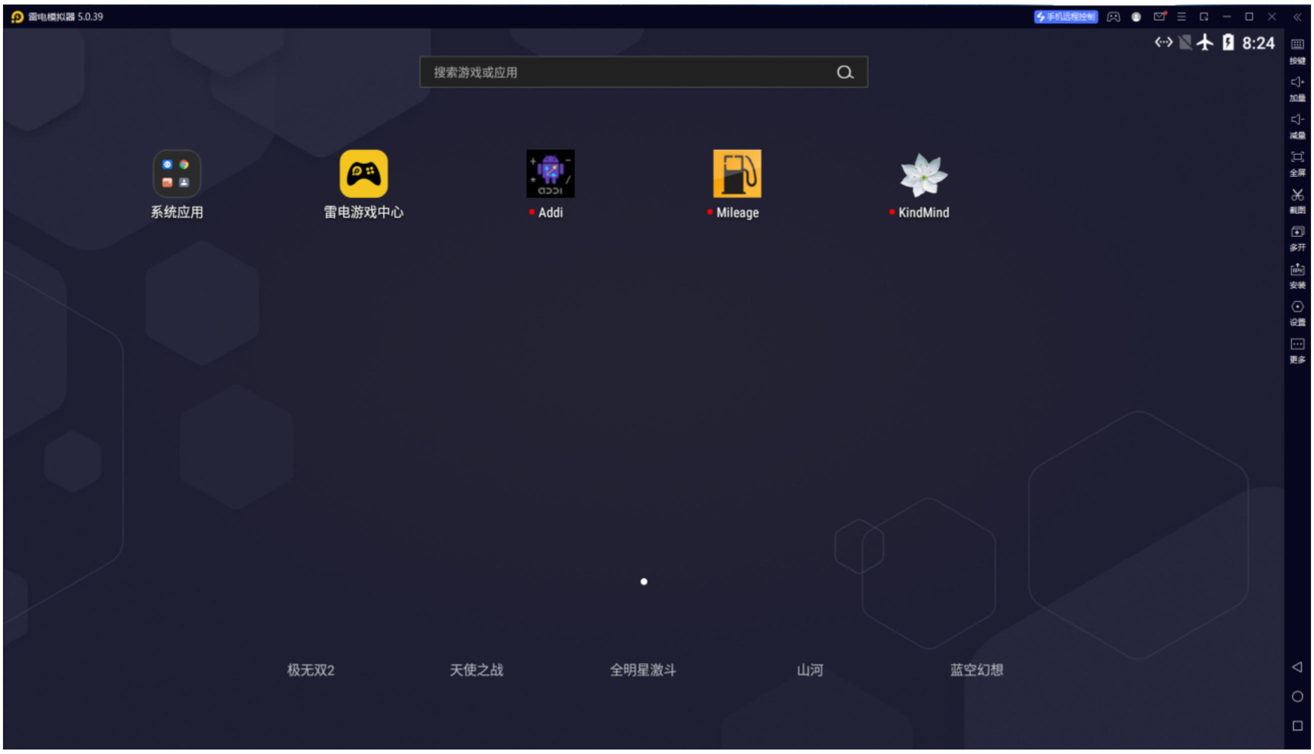
2.使用雷电模拟器和adb命令安装三个之前放在D:\Android\apk下的应用



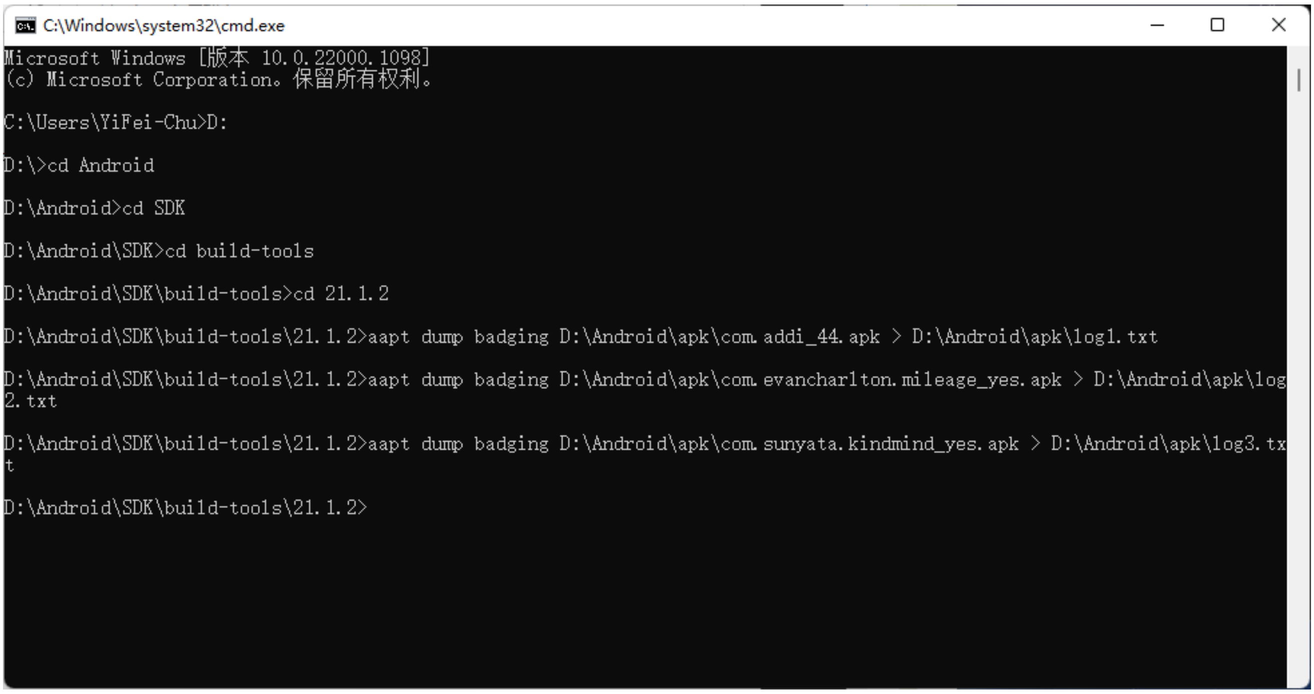
```
Microsoft Windows [版本 10.0.22000.1098]
(c) Microsoft Corporation。保留所有权利。

C:\Users\YiFei-Chu>adb devices
List of devices attached
emulator-5554   device


C:\Users\YiFei-Chu>adb install D:\Android\apk\com.addi_44.apk
Performing Streamed Install
Success

C:\Users\YiFei-Chu>adb install D:\Android\apk\com.evancharlton.mileage_yes.apk
Performing Streamed Install
Success

C:\Users\YiFei-Chu>adb install D:\Android\apk\com.sunyata.kindmind_yes.apk
Performing Streamed Install
Success

C:\Users\YiFei-Chu>
```

雷电模拟器启动后可以自动检测连接，只需使用adb devices查看一下是否连接成功，连接未成功时也可以用adb connect 127.0.0.1：port连接

安装情况如下：

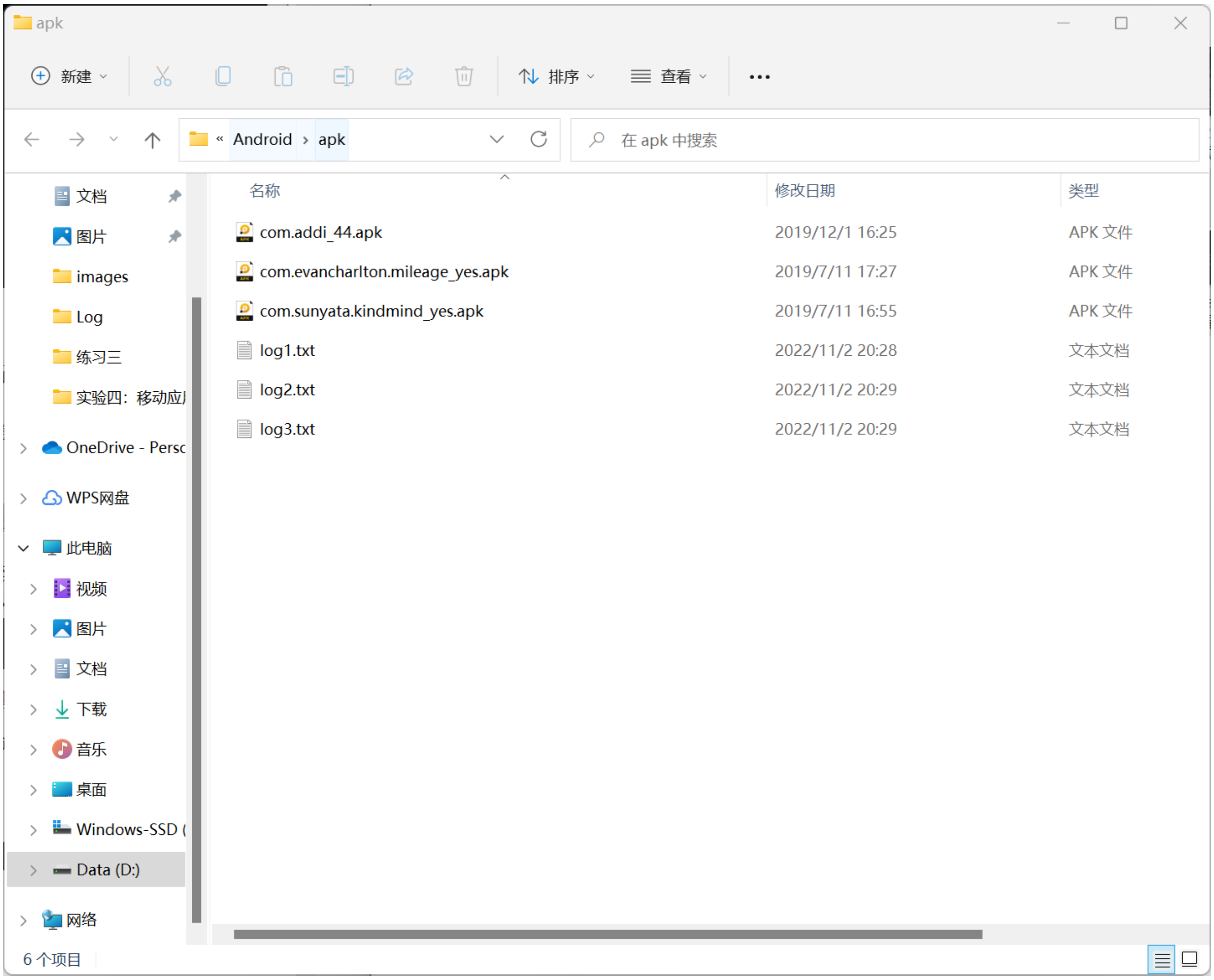


3.使用aapt命令保存相应的包名、activity、版本等信息

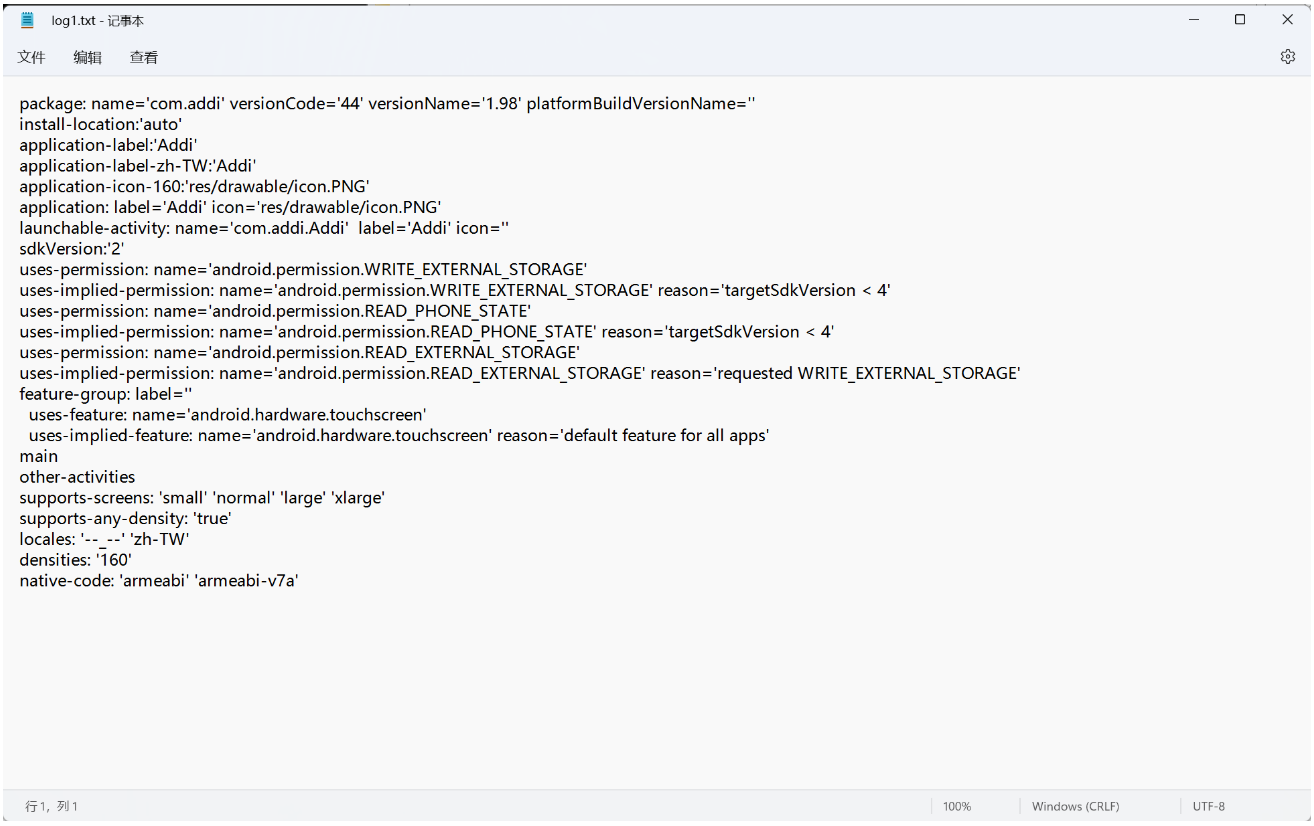


```
Microsoft Windows [版本 10.0.22000.1098]
(c) Microsoft Corporation。保留所有权利。

C:\Users\YiFei-Chu>D:

D:\>cd Android

D:\Android>cd SDK

D:\Android\SDK>cd build-tools

D:\Android\SDK\build-tools>cd 21.1.2

D:\Android\SDK\build-tools\21.1.2>aapt dump badging D:\Android\apk\com.addi_44.apk > D:\Android\apk\log1.txt

D:\Android\SDK\build-tools\21.1.2>aapt dump badging D:\Android\apk\com.evancharlton.mileage_yes.apk > D:\Android\apk\log
2.txt

D:\Android\SDK\build-tools\21.1.2>aapt dump badging D:\Android\apk\com.sunyata.kindmind_yes.apk > D:\Android\apk\log3.tx
t

D:\Android\SDK\build-tools\21.1.2>
```

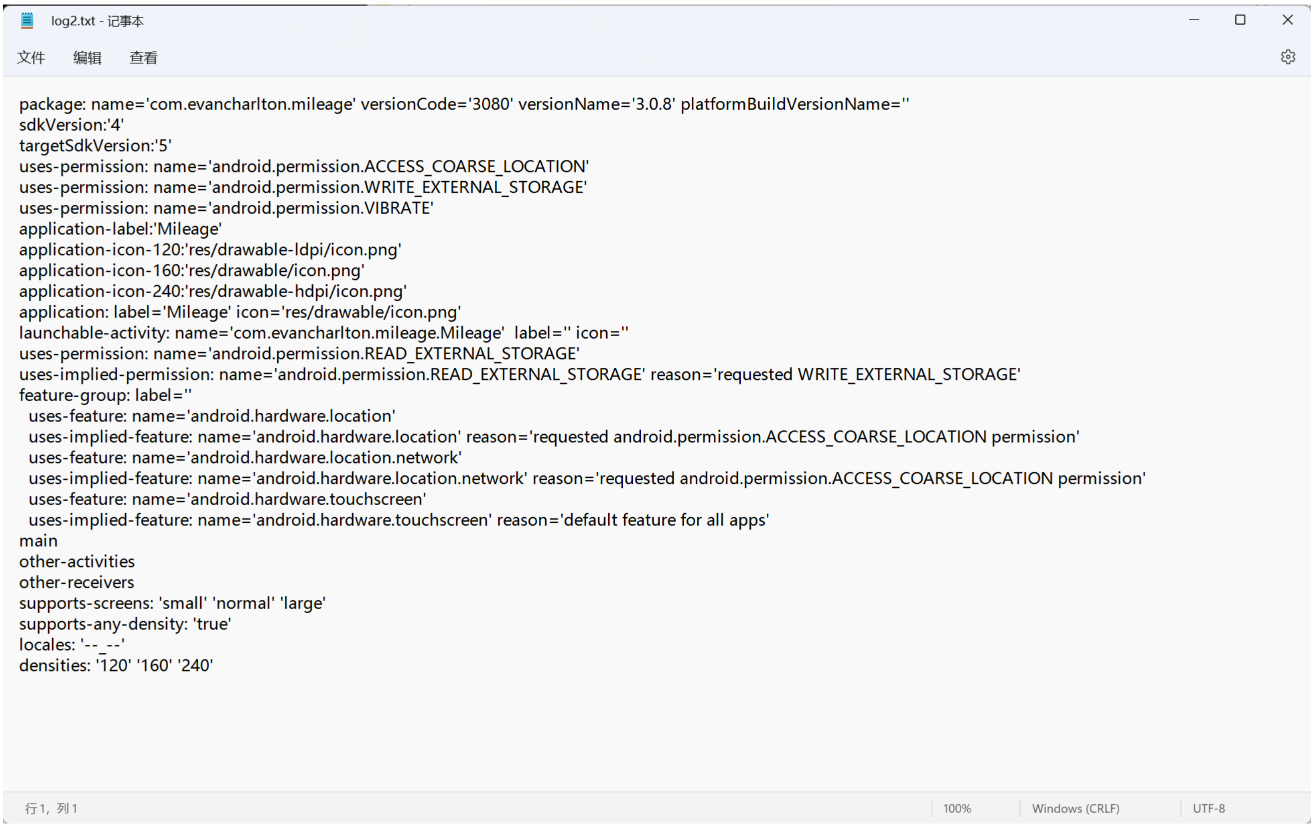
保存的三个文本文件如下几图所示（第三个apk文件对应的信息太多不便全部展示）：



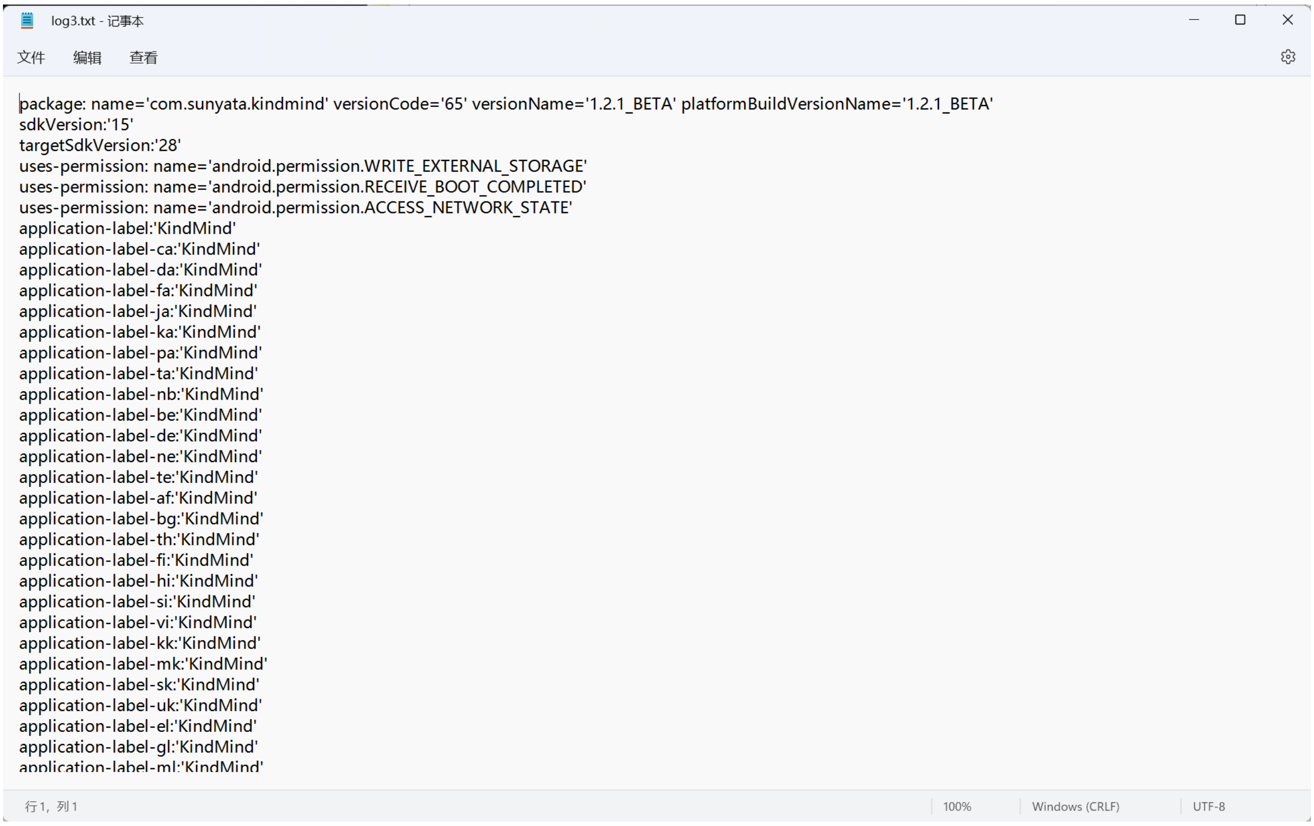
名称	修改日期	类型
com.addi_44.apk	2019/12/1 16:25	APK 文件
com.evancharlton.mileage_yes.apk	2019/7/11 17:27	APK 文件
com.sunyata.kindmind_yes.apk	2019/7/11 16:55	APK 文件
log1.txt	2022/11/2 20:28	文本文档
log2.txt	2022/11/2 20:29	文本文档
log3.txt	2022/11/2 20:29	文本文档



```
package: name='com.addi' versionCode='44' versionName='1.98' platformBuildVersionName=''
install-location:'auto'
application-label:'Addi'
application-label-zh-TW:'Addi'
application-icon-160:'res/drawable/icon.PNG'
application: label='Addi' icon='res/drawable/icon.PNG'
launchable-activity: name='com.addi.Addi'  label='Addi' icon=''
sdkVersion:'2'
uses-permission: name='android.permission.WRITE_EXTERNAL_STORAGE'
uses-implied-permission: name='android.permission.WRITE_EXTERNAL_STORAGE' reason='targetSdkVersion < 4'
uses-permission: name='android.permission.READ_PHONE_STATE'
uses-implied-permission: name='android.permission.READ_PHONE_STATE' reason='targetSdkVersion < 4'
uses-permission: name='android.permission.READ_EXTERNAL_STORAGE'
uses-implied-permission: name='android.permission.READ_EXTERNAL_STORAGE' reason='requested WRITE_EXTERNAL_STORAGE'
feature-group: label=''
  uses-feature: name='android.hardware.touchscreen'
  uses-implied-feature: name='android.hardware.touchscreen' reason='default feature for all apps'
main
other-activities
supports-screens: 'small' 'normal' 'large' 'xlarge'
supports-any-density: 'true'
locales: '--_--' 'zh-TW'
densities: '160'
native-code: 'armeabi' 'armeabi-v7a'
```

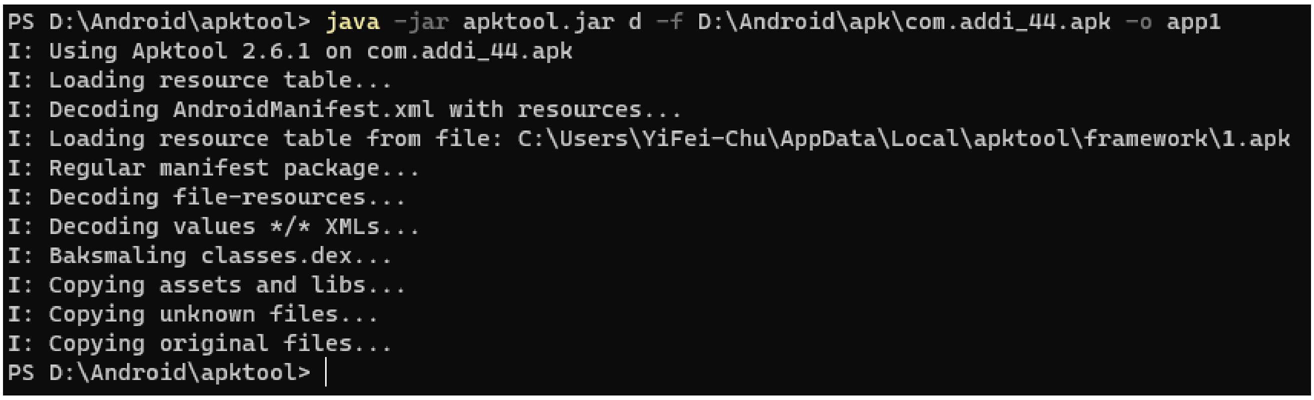


```
package: name='com.evancharlton.mileage' versionCode='3080' versionName='3.0.8' platformBuildVersionName=''
sdkVersion:'4'
targetSdkVersion:'5'
uses-permission: name='android.permission.ACCESS_COARSE_LOCATION'
uses-permission: name='android.permission.WRITE_EXTERNAL_STORAGE'
uses-permission: name='android.permission.VIBRATE'
application-label:'Mileage'
application-icon-120:'res/drawable-ldpi/icon.png'
application-icon-160:'res/drawable/icon.png'
application-icon-240:'res/drawable-hdpi/icon.png'
application: label='Mileage' icon='res/drawable/icon.png'
launchable-activity: name='com.evancharlton.mileage.Mileage'  label='' icon=''
uses-permission: name='android.permission.READ_EXTERNAL_STORAGE'
uses-implied-permission: name='android.permission.READ_EXTERNAL_STORAGE' reason='requested WRITE_EXTERNAL_STORAGE'
feature-group: label=''
  uses-feature: name='android.hardware.location'
  uses-implied-feature: name='android.hardware.location' reason='requested android.permission.ACCESS_COARSE_LOCATION permission'
  uses-feature: name='android.hardware.location.network'
  uses-implied-feature: name='android.hardware.location.network' reason='requested android.permission.ACCESS_COARSE_LOCATION permission'
  uses-feature: name='android.hardware.touchscreen'
  uses-implied-feature: name='android.hardware.touchscreen' reason='default feature for all apps'
main
other-activities
other-receivers
supports-screens: 'small' 'normal' 'large'
supports-any-density: 'true'
locales: '--_--'
densities: '120' '160' '240'
```

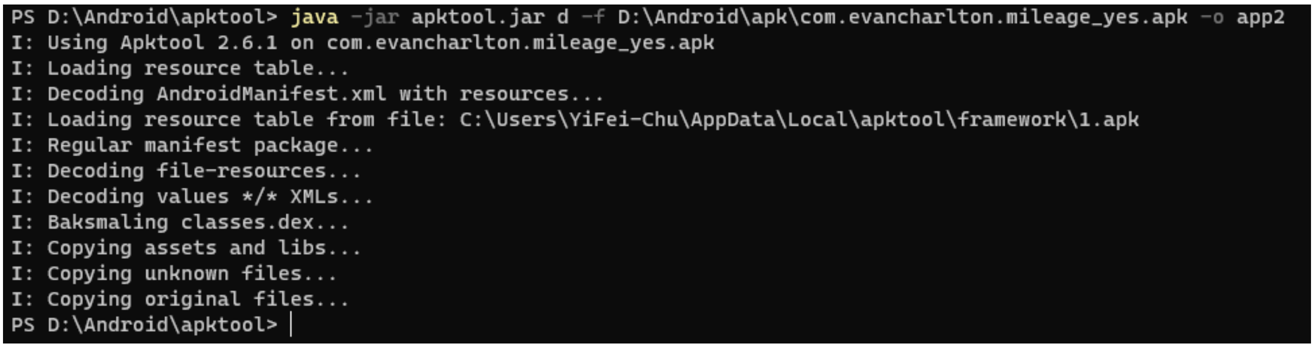


```
package: name='com.sunyata.kindmind' versionCode='65' versionName='1.2.1_BETA' platformBuildVersionName='1.2.1_BETA'
sdkVersion:'15'
targetSdkVersion:'28'
uses-permission: name='android.permission.WRITE_EXTERNAL_STORAGE'
uses-permission: name='android.permission.RECEIVE_BOOT_COMPLETED'
uses-permission: name='android.permission.ACCESS_NETWORK_STATE'
application-label:'KindMind'
application-label-ca:'KindMind'
application-label-da:'KindMind'
application-label-fa:'KindMind'
application-label-ja:'KindMind'
application-label-ka:'KindMind'
application-label-pa:'KindMind'
application-label-ta:'KindMind'
application-label-nb:'KindMind'
application-label-be:'KindMind'
application-label-de:'KindMind'
application-label-ne:'KindMind'
application-label-te:'KindMind'
application-label-af:'KindMind'
application-label-bg:'KindMind'
application-label-th:'KindMind'
application-label-fi:'KindMind'
application-label-hi:'KindMind'
application-label-si:'KindMind'
application-label-vi:'KindMind'
application-label-kk:'KindMind'
application-label-mk:'KindMind'
application-label-sk:'KindMind'
application-label-uk:'KindMind'
application-label-el:'KindMind'
application-label-gl:'KindMind'
application-label-ml:'KindMind'
```

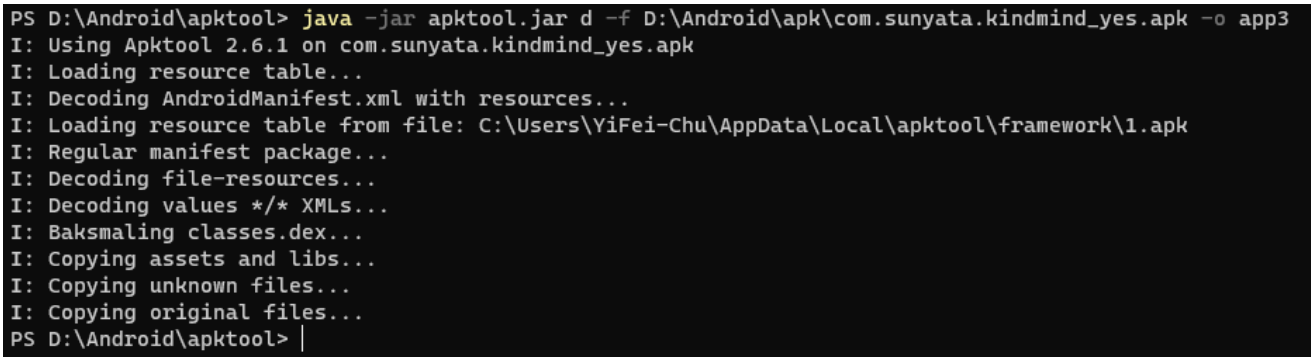
安装并使用apktool反编译



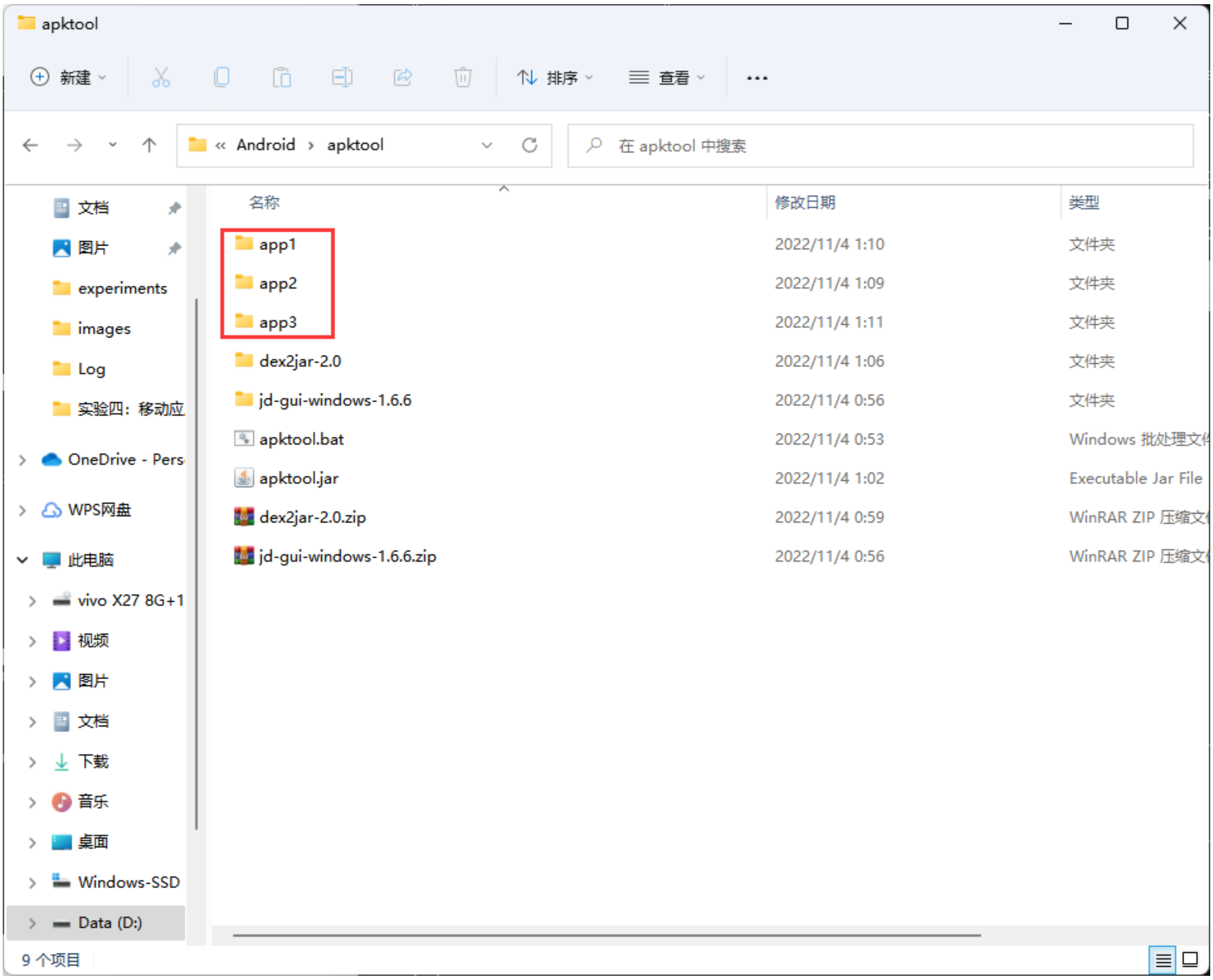
```
PS D:\Android\apktool> java -jar apktool.jar d -f D:\Android\apk\com.addi_44.apk -o app1
I: Using Apktool 2.6.1 on com.addi_44.apk
I: Loading resource table...
I: Decoding AndroidManifest.xml with resources...
I: Loading resource table from file: C:\Users\YiFei-Chu\AppData\Local\apktool\framework\1.apk
I: Regular manifest package...
I: Decoding file-resources...
I: Decoding values */* XMLs...
I: Baksmaling classes.dex...
I: Copying assets and libs...
I: Copying unknown files...
I: Copying original files...
PS D:\Android\apktool>
```



```
PS D:\Android\apktool> java -jar apktool.jar d -f D:\Android\apk\com.evancharlton.mileage_yes.apk -o app2
I: Using Apktool 2.6.1 on com.evancharlton.mileage_yes.apk
I: Loading resource table...
I: Decoding AndroidManifest.xml with resources...
I: Loading resource table from file: C:\Users\YiFei-Chu\AppData\Local\apktool\framework\1.apk
I: Regular manifest package...
I: Decoding file-resources...
I: Decoding values */* XMLs...
I: Baksmaling classes.dex...
I: Copying assets and libs...
I: Copying unknown files...
I: Copying original files...
PS D:\Android\apktool>
```

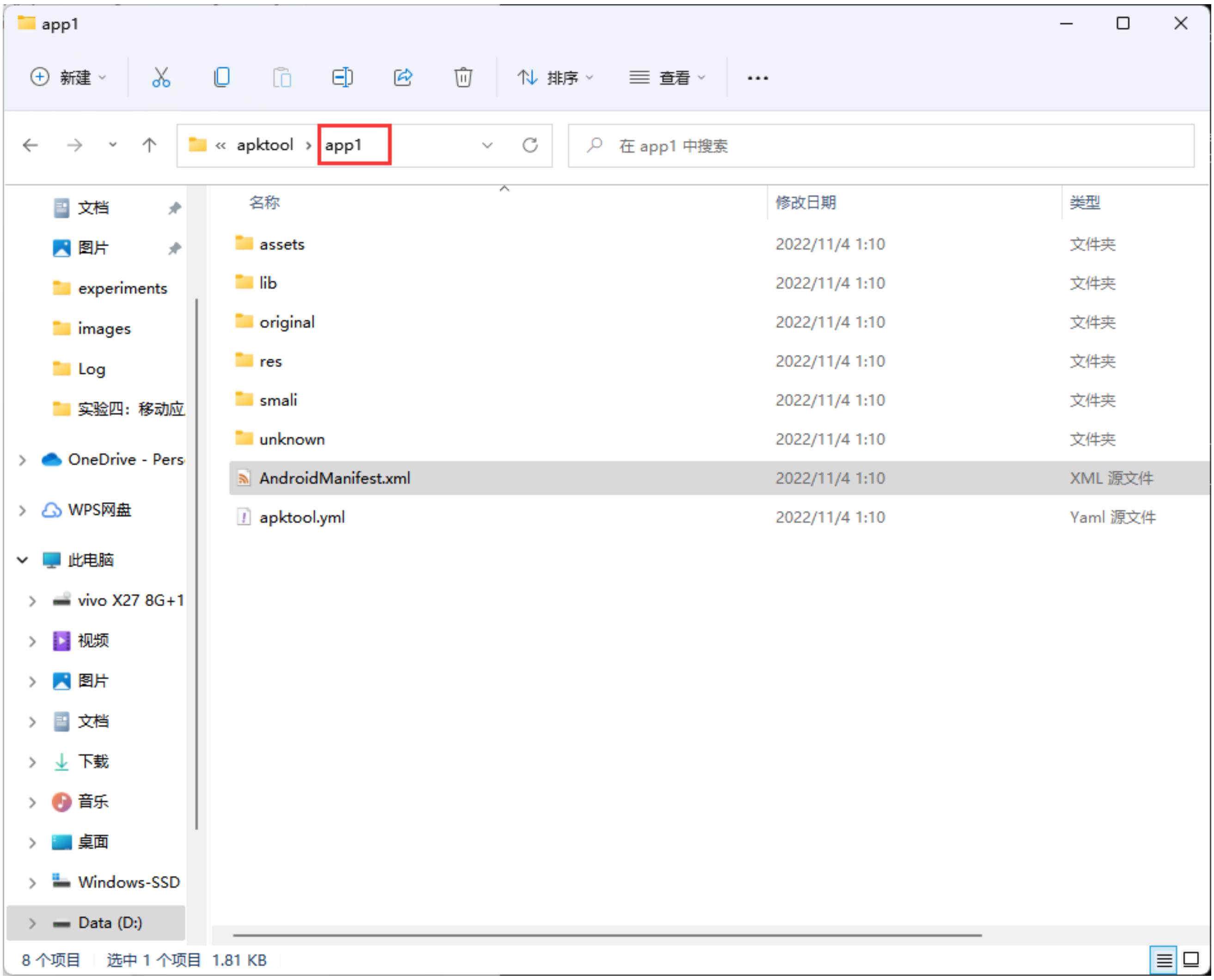


```
PS D:\Android\apktool> java -jar apktool.jar d -f D:\Android\apk\com.sunyata.kindmind_yes.apk -o app3
I: Using Apktool 2.6.1 on com.sunyata.kindmind_yes.apk
I: Loading resource table...
I: Decoding AndroidManifest.xml with resources...
I: Loading resource table from file: C:\Users\YiFei-Chu\AppData\Local\apktool\framework\1.apk
I: Regular manifest package...
I: Decoding file-resources...
I: Decoding values */* XMLs...
I: Baksmaling classes.dex...
I: Copying assets and libs...
I: Copying unknown files...
I: Copying original files...
PS D:\Android\apktool>
```



名称	修改日期	类型
app1	2022/11/4 1:10	文件夹
app2	2022/11/4 1:09	文件夹
app3	2022/11/4 1:11	文件夹
dex2jar-2.0	2022/11/4 1:06	文件夹
jd-gui-windows-1.6.6	2022/11/4 0:56	文件夹
apktool.bat	2022/11/4 0:53	Windows 批处理文件
apktool.jar	2022/11/4 1:02	Executable Jar File
dex2jar-2.0.zip	2022/11/4 0:59	WinRAR ZIP 压缩文件
jd-gui-windows-1.6.6.zip	2022/11/4 0:56	WinRAR ZIP 压缩文件

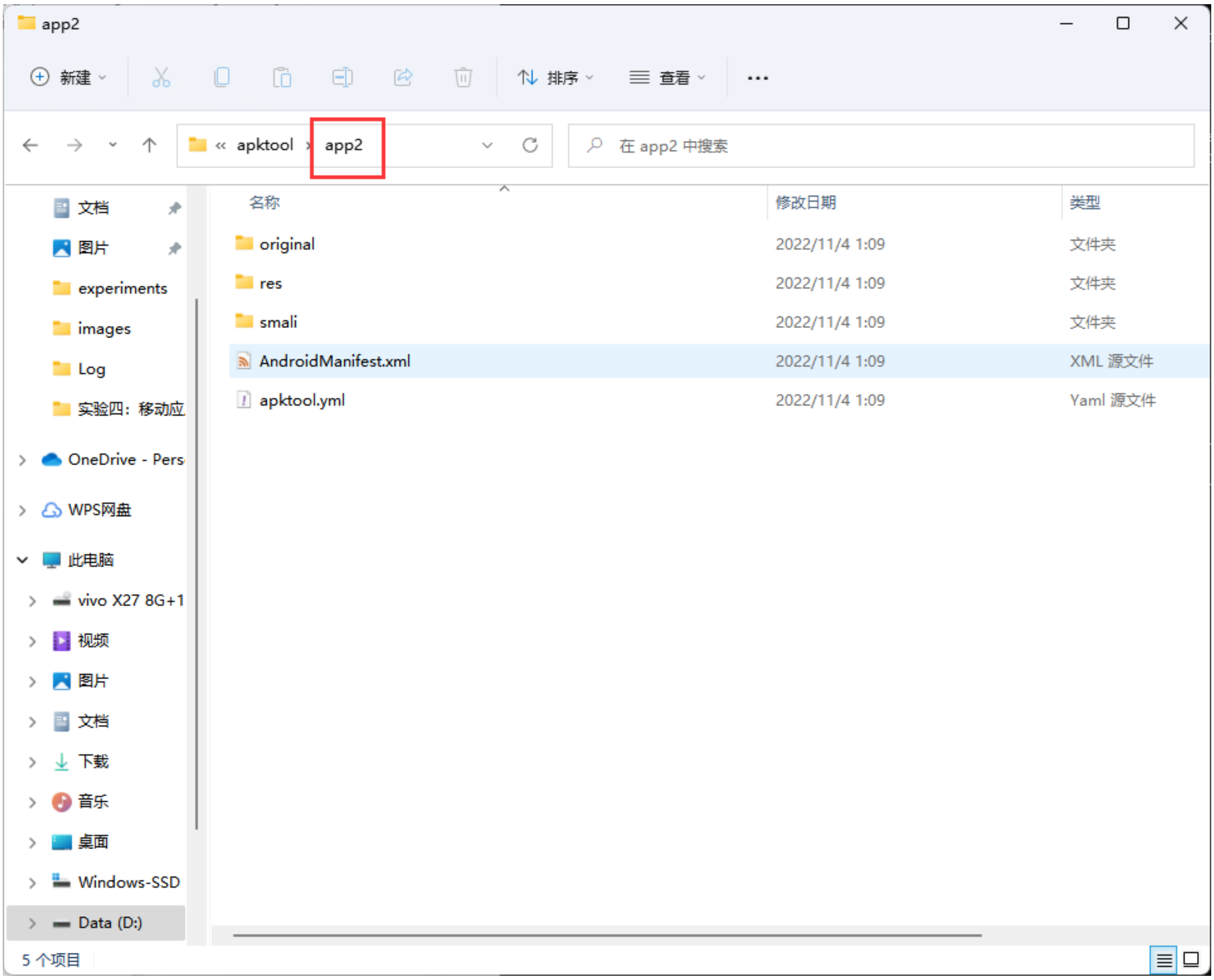
9 个项目



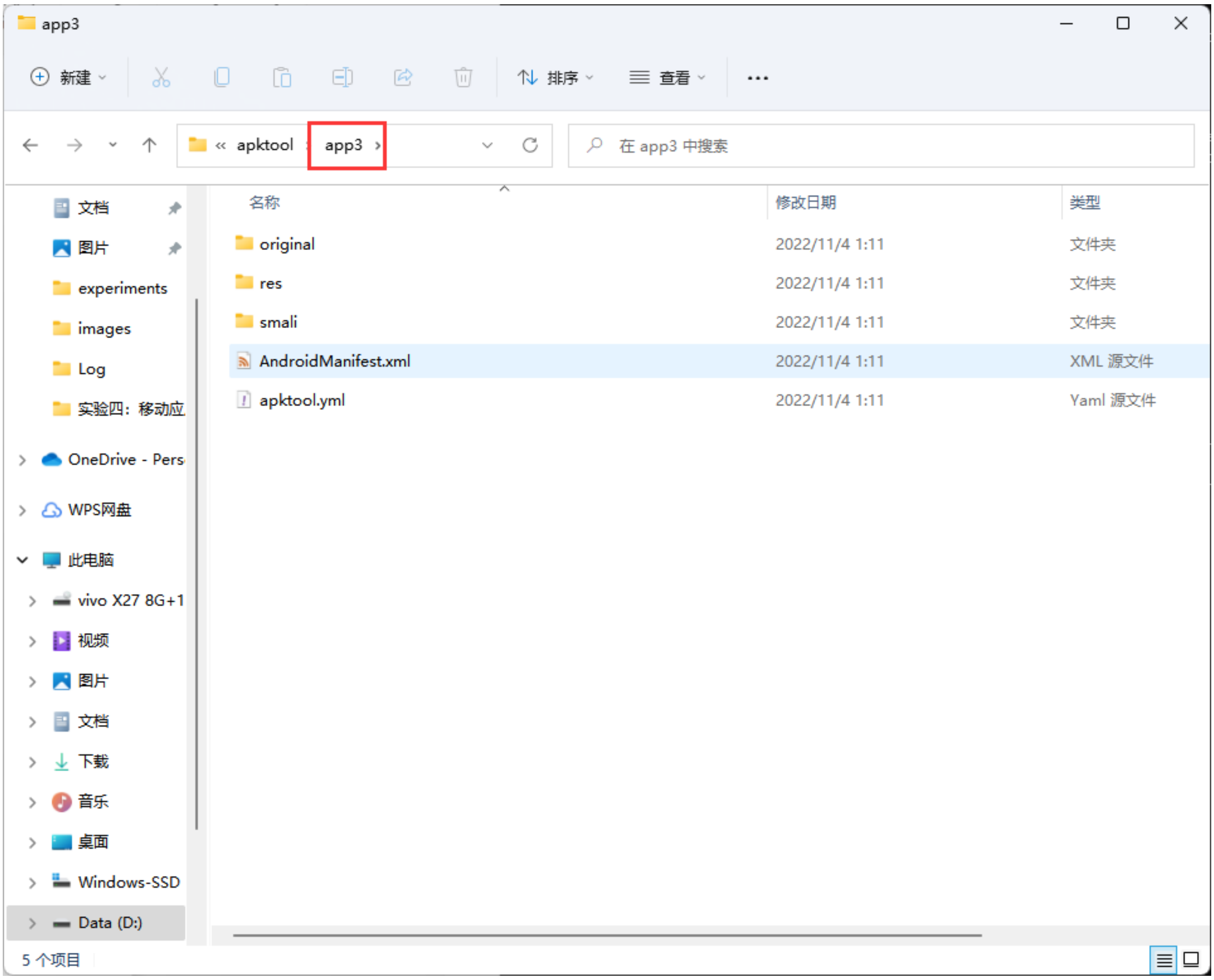
« apktool › app1

名称	修改日期	类型
assets	2022/11/4 1:10	文件夹
lib	2022/11/4 1:10	文件夹
original	2022/11/4 1:10	文件夹
res	2022/11/4 1:10	文件夹
smali	2022/11/4 1:10	文件夹
unknown	2022/11/4 1:10	文件夹
AndroidManifest.xml	2022/11/4 1:10	XML 源文件
apktool.yml	2022/11/4 1:10	Yaml 源文件

8 个项目　选中 1 个项目　1.81 KB

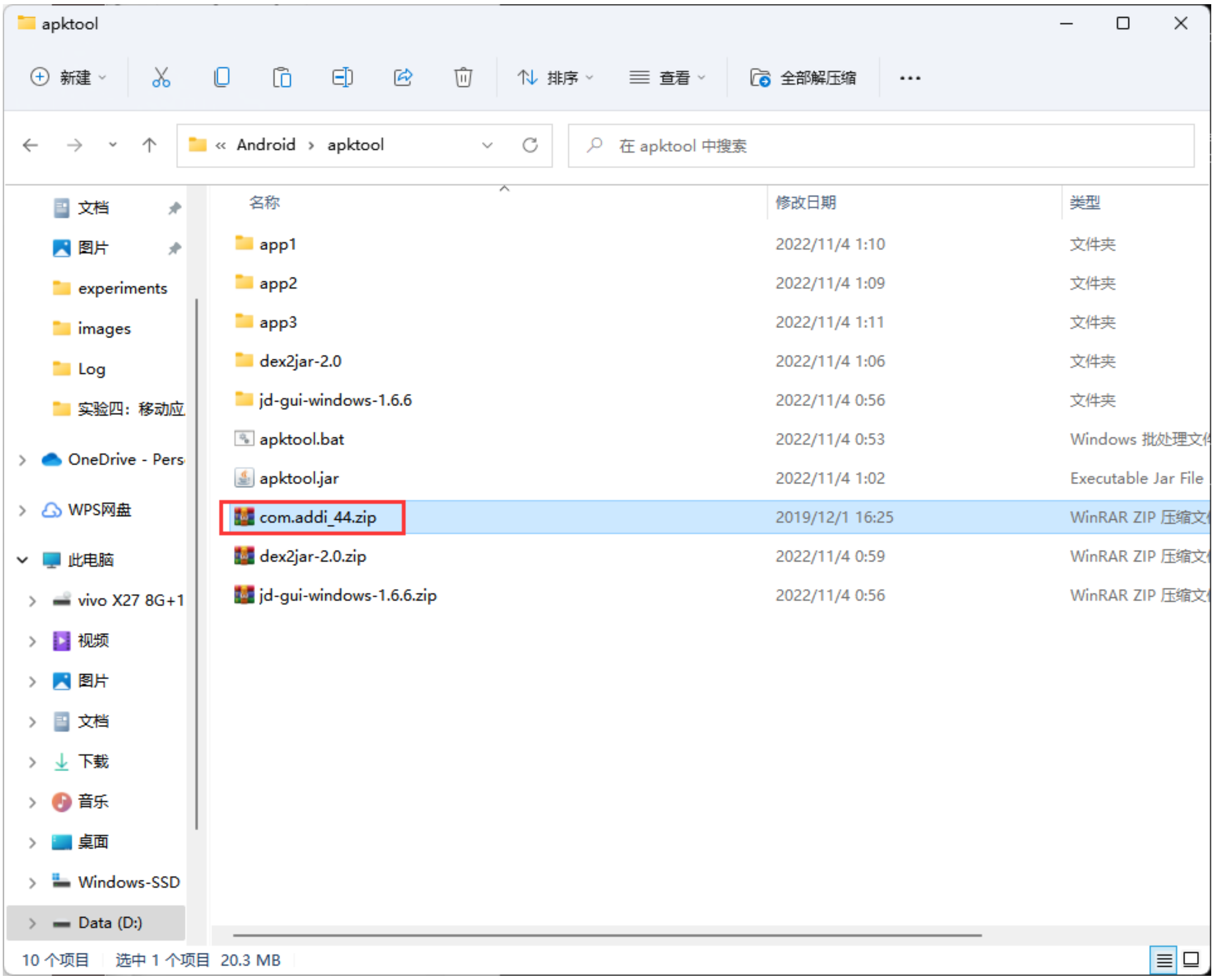


名称	修改日期	类型
original	2022/11/4 1:09	文件夹
res	2022/11/4 1:09	文件夹
smali	2022/11/4 1:09	文件夹
AndroidManifest.xml	2022/11/4 1:09	XML 源文件
apktool.yml	2022/11/4 1:09	Yaml 源文件



名称	修改日期	类型
original	2022/11/4 1:11	文件夹
res	2022/11/4 1:11	文件夹
smali	2022/11/4 1:11	文件夹
AndroidManifest.xml	2022/11/4 1:11	XML 源文件
apktool.yml	2022/11/4 1:11	Yaml 源文件

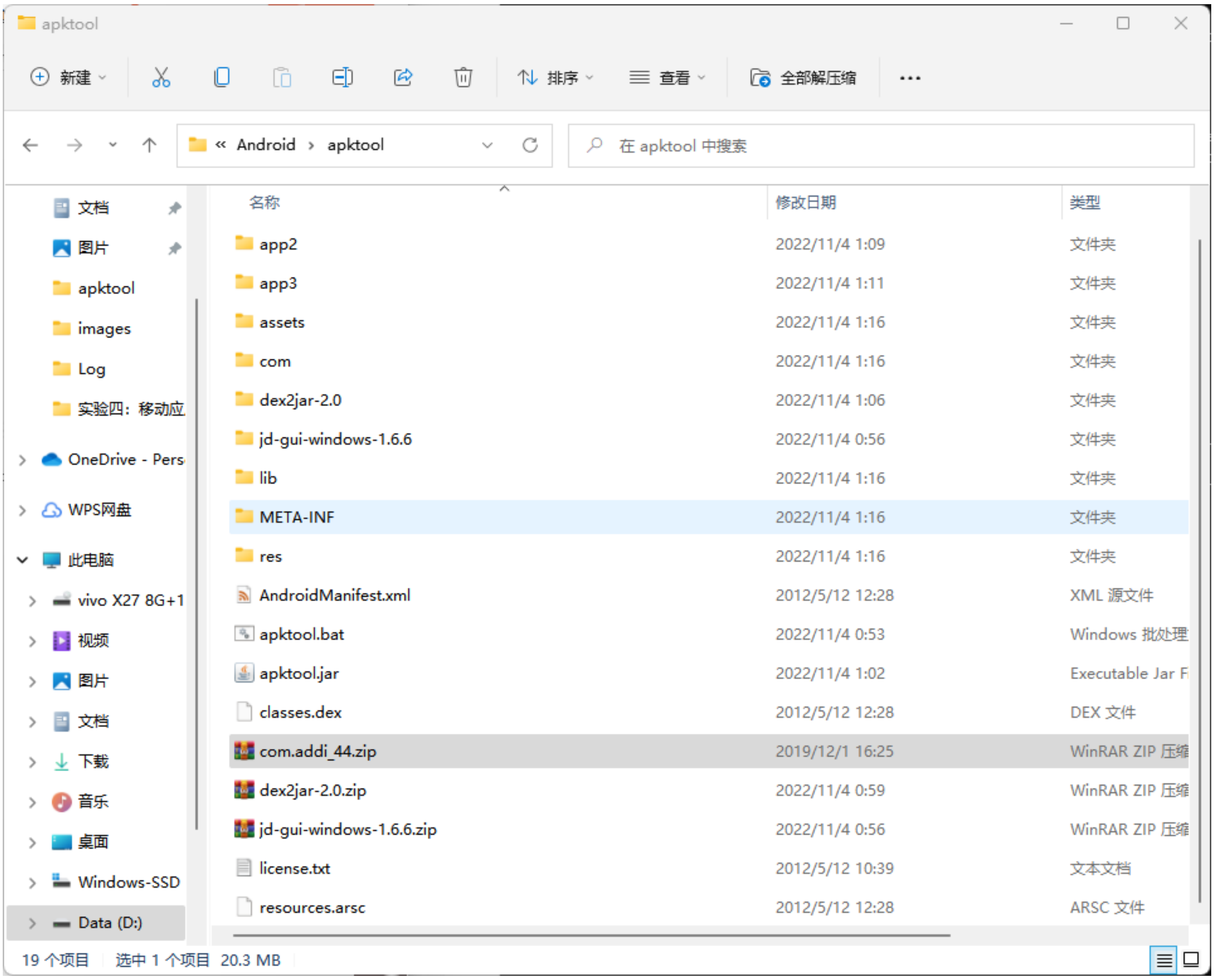
以上是文件目录，下面以第一个apk为例查看java源码



名称	修改日期	类型
app1	2022/11/4 1:10	文件夹
app2	2022/11/4 1:09	文件夹
app3	2022/11/4 1:11	文件夹
dex2jar-2.0	2022/11/4 1:06	文件夹
jd-gui-windows-1.6.6	2022/11/4 0:56	文件夹
apktool.bat	2022/11/4 0:53	Windows 批处理文件
apktool.jar	2022/11/4 1:02	Executable Jar File
com.addi_44.zip	2019/12/1 16:25	WinRAR ZIP 压缩文
dex2jar-2.0.zip	2022/11/4 0:59	WinRAR ZIP 压缩文
jd-gui-windows-1.6.6.zip	2022/11/4 0:56	WinRAR ZIP 压缩文

10 个项目　选中 1 个项目　20.3 MB

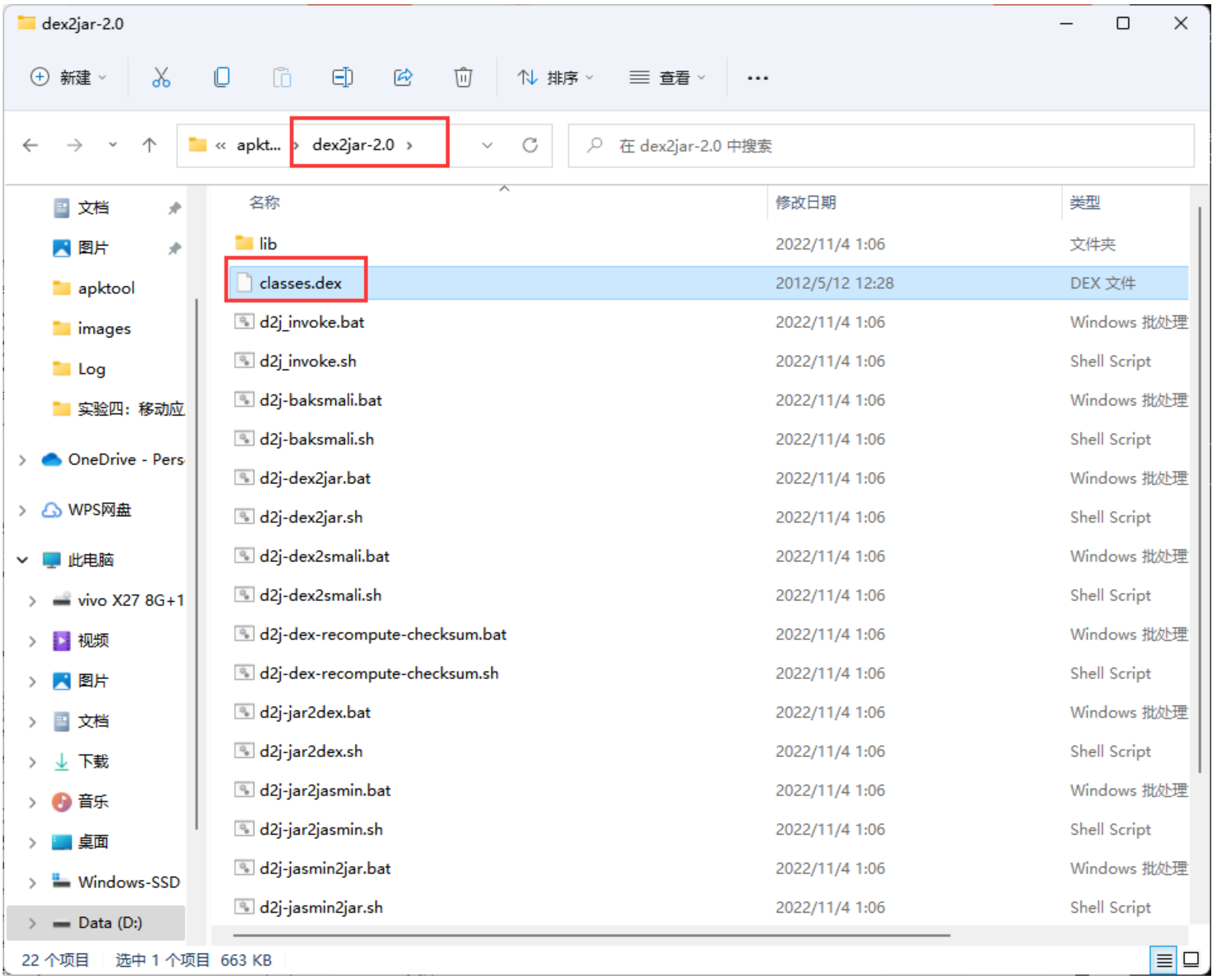
拷贝一份com.addi_44.apk，更改其后缀名为zip



名称	修改日期	类型
app2	2022/11/4 1:09	文件夹
app3	2022/11/4 1:11	文件夹
assets	2022/11/4 1:16	文件夹
com	2022/11/4 1:16	文件夹
dex2jar-2.0	2022/11/4 1:06	文件夹
jd-gui-windows-1.6.6	2022/11/4 0:56	文件夹
lib	2022/11/4 1:16	文件夹
META-INF	2022/11/4 1:16	文件夹
res	2022/11/4 1:16	文件夹
AndroidManifest.xml	2012/5/12 12:28	XML 源文件
apktool.bat	2022/11/4 0:53	Windows 批处理
apktool.jar	2022/11/4 1:02	Executable Jar F
classes.dex	2012/5/12 12:28	DEX 文件
com.addi_44.zip	2019/12/1 16:25	WinRAR ZIP 压缩
dex2jar-2.0.zip	2022/11/4 0:59	WinRAR ZIP 压缩
jd-gui-windows-1.6.6.zip	2022/11/4 0:56	WinRAR ZIP 压缩
license.txt	2012/5/12 10:39	文本文档
resources.arsc	2012/5/12 12:28	ARSC 文件

19 个项目　选中 1 个项目　20.3 MB

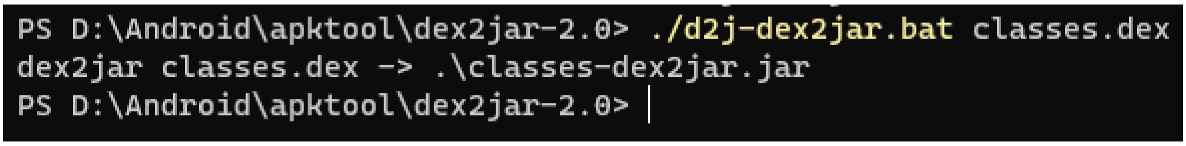
直接解压到当前文件夹



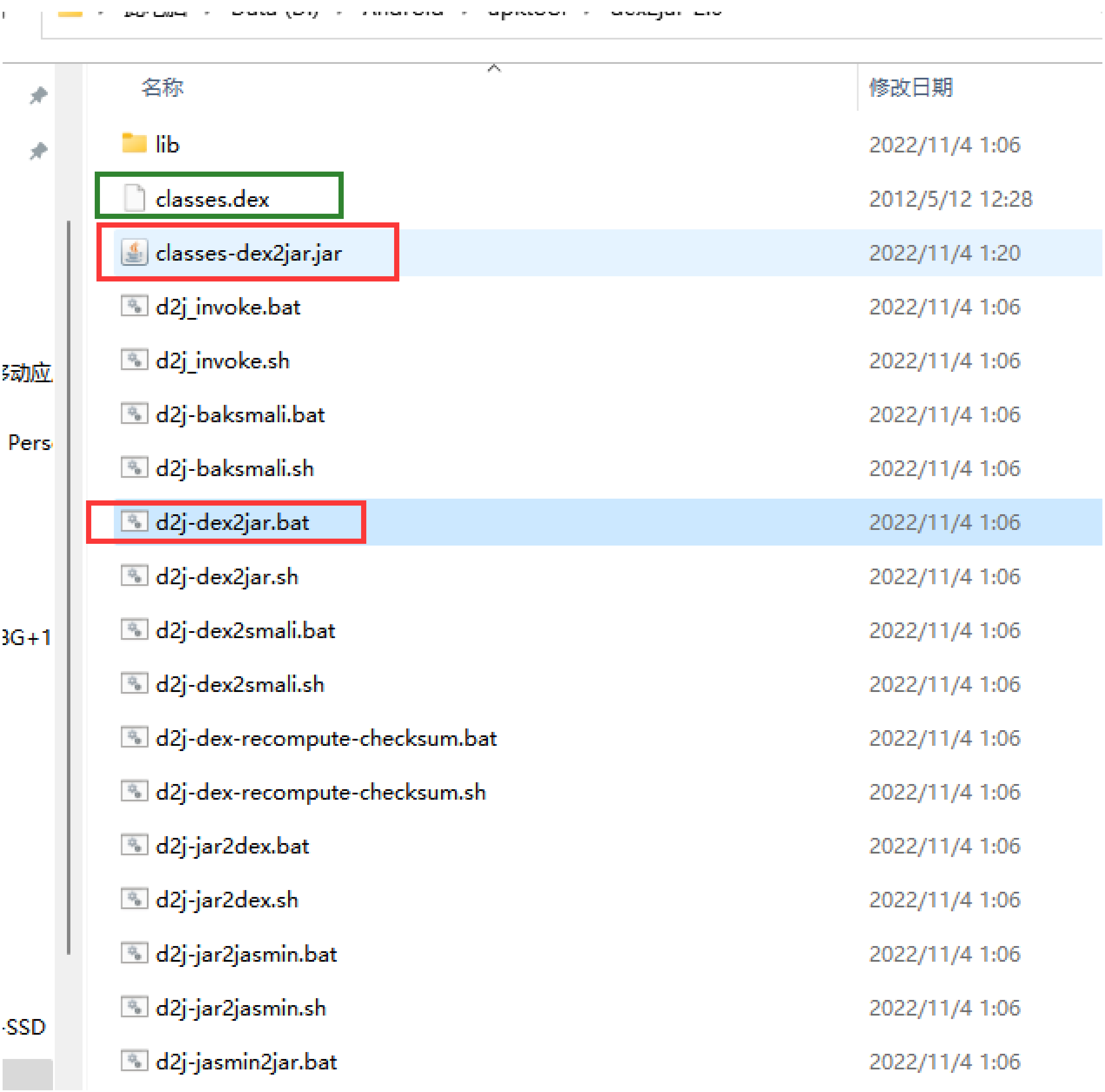
名称	修改日期	类型
lib	2022/11/4 1:06	文件夹
classes.dex	2012/5/12 12:28	DEX 文件
d2j_invoke.bat	2022/11/4 1:06	Windows 批处理
d2j_invoke.sh	2022/11/4 1:06	Shell Script
d2j-baksmali.bat	2022/11/4 1:06	Windows 批处理
d2j-baksmali.sh	2022/11/4 1:06	Shell Script
d2j-dex2jar.bat	2022/11/4 1:06	Windows 批处理
d2j-dex2jar.sh	2022/11/4 1:06	Shell Script
d2j-dex2smali.bat	2022/11/4 1:06	Windows 批处理
d2j-dex2smali.sh	2022/11/4 1:06	Shell Script
d2j-dex-recompute-checksum.bat	2022/11/4 1:06	Windows 批处理
d2j-dex-recompute-checksum.sh	2022/11/4 1:06	Shell Script
d2j-jar2dex.bat	2022/11/4 1:06	Windows 批处理
d2j-jar2dex.sh	2022/11/4 1:06	Shell Script
d2j-jar2jasmin.bat	2022/11/4 1:06	Windows 批处理
d2j-jar2jasmin.sh	2022/11/4 1:06	Shell Script
d2j-jasmin2jar.bat	2022/11/4 1:06	Windows 批处理
d2j-jasmin2jar.sh	2022/11/4 1:06	Shell Script

22 个项目　选中 1 个项目 663 KB

将得到的clssses.dex放到之前的dex2jar-2.0文件夹内

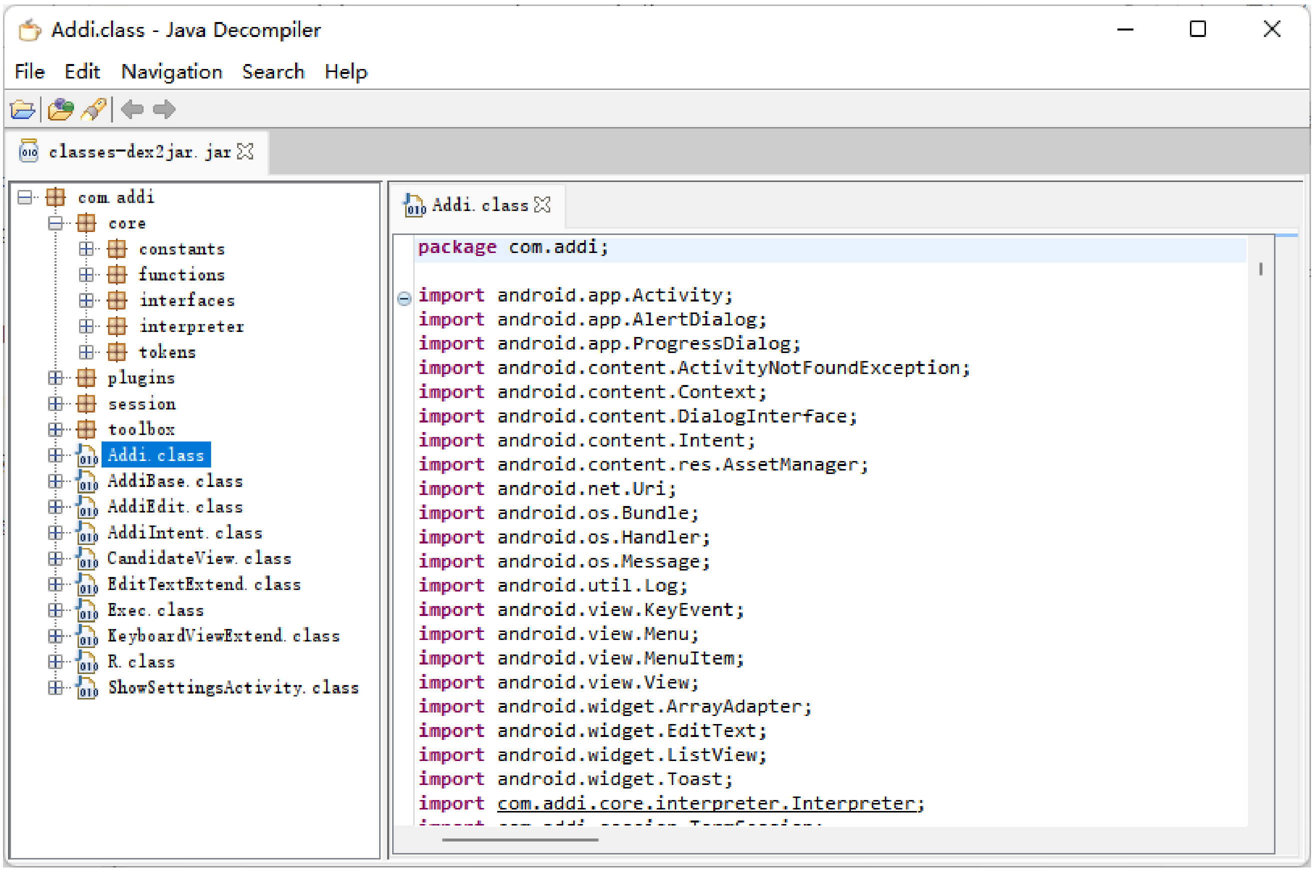


```
PS D:\Android\apktool\dex2jar-2.0> ./d2j-dex2jar.bat classes.dex
dex2jar classes.dex -> .\classes-dex2jar.jar
PS D:\Android\apktool\dex2jar-2.0> |
```



名称	修改日期
lib	2022/11/4 1:06
classes.dex	2012/5/12 12:28
classes-dex2jar.jar	2022/11/4 1:20
d2j_invoke.bat	2022/11/4 1:06
d2j_invoke.sh	2022/11/4 1:06
d2j-baksmali.bat	2022/11/4 1:06
d2j-baksmali.sh	2022/11/4 1:06
d2j-dex2jar.bat	2022/11/4 1:06
d2j-dex2jar.sh	2022/11/4 1:06
d2j-dex2smali.bat	2022/11/4 1:06
d2j-dex2smali.sh	2022/11/4 1:06
d2j-dex-recompute-checksum.bat	2022/11/4 1:06
d2j-dex-recompute-checksum.sh	2022/11/4 1:06
d2j-jar2dex.bat	2022/11/4 1:06
d2j-jar2dex.sh	2022/11/4 1:06
d2j-jar2jasmin.bat	2022/11/4 1:06
d2j-jar2jasmin.sh	2022/11/4 1:06
d2j-jasmin2jar.bat	2022/11/4 1:06

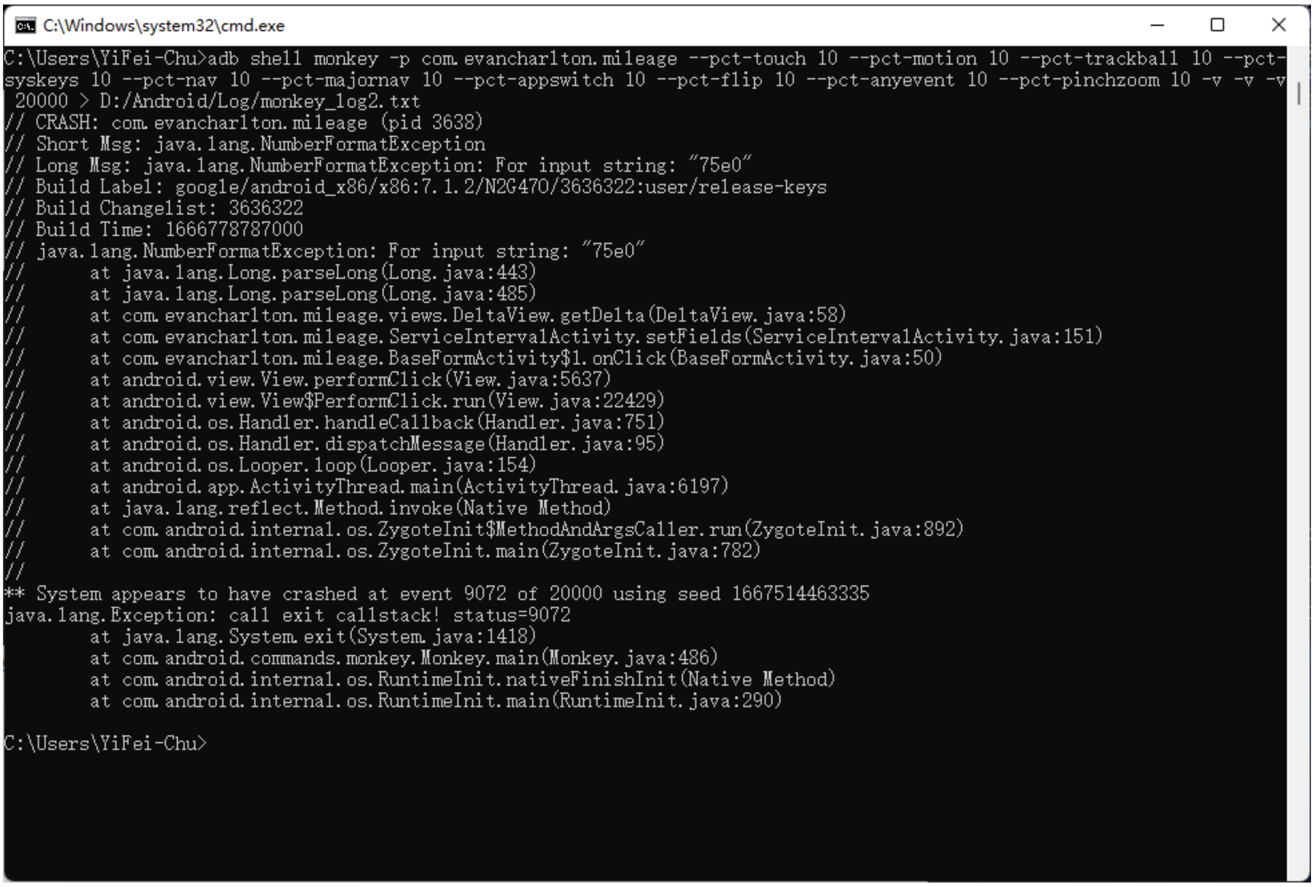
在dex2jar-2.0文件夹运行以上命令获得jar



```
package com.addi;

import android.app.Activity;
import android.app.AlertDialog;
import android.app.ProgressDialog;
import android.content.ActivityNotFoundException;
import android.content.Context;
import android.content.DialogInterface;
import android.content.Intent;
import android.content.res.AssetManager;
import android.net.Uri;
import android.os.Bundle;
import android.os.Handler;
import android.os.Message;
import android.util.Log;
import android.view.KeyEvent;
import android.view.Menu;
import android.view.MenuItem;
import android.view.View;
import android.widget.ArrayAdapter;
import android.widget.EditText;
import android.widget.ListView;
import android.widget.Toast;
import com.addi.core.interpreter.Interpreter;
```

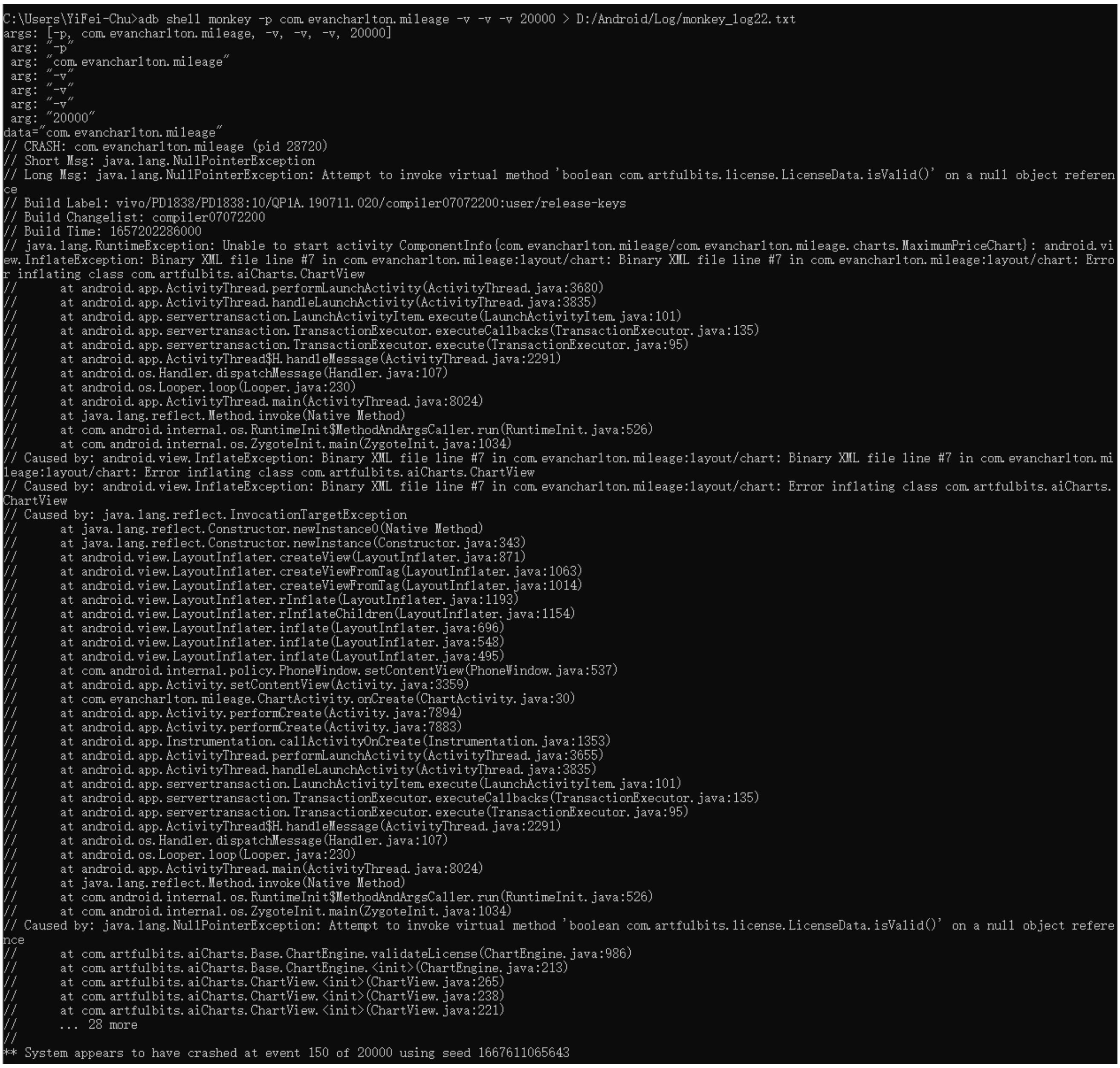
使用jd-gui-windows打开即可查看源码

4.使用monkey命令测试安装好的第二个app

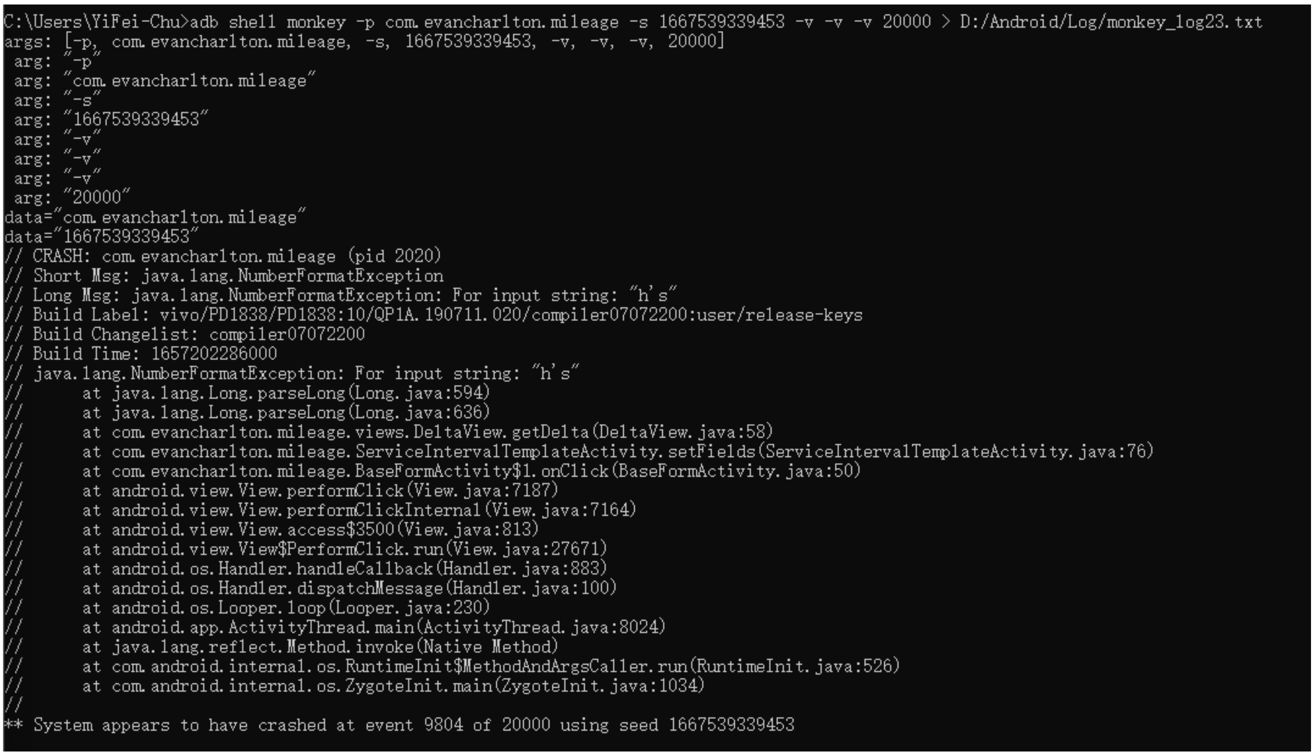


```
C:\Users\YiFei-Chu>adb shell monkey -p com.evancharlton.mileage --pct-touch 10 --pct-motion 10 --pct-trackball 10 --pct-
syskeys 10 --pct-nav 10 --pct-majornav 10 --pct-appswitch 10 --pct-flip 10 --pct-anyevent 10 --pct-pinchzoom 10 -v -v -v
 20000 > D:/Android/Log/monkey_log2.txt
// CRASH: com.evancharlton.mileage (pid 3638)
// Short Msg: java.lang.NumberFormatException
// Long Msg: java.lang.NumberFormatException: For input string: "75e0"
// Build Label: google/android_x86/x86:7.1.2/N2G470/3636322:user/release-keys
// Build Changelist: 3636322
// Build Time: 1666778787000
// java.lang.NumberFormatException: For input string: "75e0"
//        at java.lang.Long.parseLong(Long.java:443)
//        at java.lang.Long.parseLong(Long.java:485)
//        at com.evancharlton.mileage.views.DeltaView.getDelta(DeltaView.java:58)
//        at com.evancharlton.mileage.ServiceIntervalActivity.setFields(ServiceIntervalActivity.java:151)
//        at com.evancharlton.mileage.BaseFormActivity$1.onClick(BaseFormActivity.java:50)
//        at android.view.View.performClick(View.java:5637)
//        at android.view.View$PerformClick.run(View.java:22429)
//        at android.os.Handler.handleCallback(Handler.java:751)
//        at android.os.Handler.dispatchMessage(Handler.java:95)
//        at android.os.Looper.loop(Looper.java:154)
//        at android.app.ActivityThread.main(ActivityThread.java:6197)
//        at java.lang.reflect.Method.invoke(Native Method)
//        at com.android.internal.os.ZygoteInit$MethodAndArgsCaller.run(ZygoteInit.java:892)
//        at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:782)
//
** System appears to have crashed at event 9072 of 20000 using seed 1667514463335
java.lang.Exception: call exit callstack! status=9072
        at java.lang.System.exit(System.java:1418)
        at com.android.commands.monkey.Monkey.main(Monkey.java:486)
        at com.android.internal.os.RuntimeInit.nativeFinishInit(Native Method)
        at com.android.internal.os.RuntimeInit.main(RuntimeInit.java:290)

C:\Users\YiFei-Chu>
```

为了方便演示，以下两个测试使用真机并录制视频



```
C:\Users\YiFei-Chu>adb shell monkey -p com.evancharlton.mileage -v -v -v 20000 > D:/Android/Log/monkey_log22.txt
args: [-p, com.evancharlton.mileage, -v, -v, -v, 20000]
 arg: "-p"
 arg: "com.evancharlton.mileage"
 arg: "-v"
 arg: "-v"
 arg: "-v"
 arg: "20000"
data="com.evancharlton.mileage"
// CRASH: com.evancharlton.mileage (pid 28720)
// Short Msg: java.lang.NullPointerException
// Long Msg: java.lang.NullPointerException: Attempt to invoke virtual method 'boolean com.artfulbits.license.LicenseData.isValid()' on a null object referen
ce
// Build Label: vivo/PD1838/PD1838:10/QP1A.190711.020/compiler07072200:user/release-keys
// Build Changelist: compiler07072200
// Build Time: 1657202286000
// java.lang.RuntimeException: Unable to start activity ComponentInfo{com.evancharlton.mileage/com.evancharlton.mileage.charts.MaximumPriceChart}: android.vi
ew.InflateException: Binary XML file line #7 in com.evancharlton.mileage:layout/chart: Binary XML file line #7 in com.evancharlton.mileage:layout/chart: Erro
r inflating class com.artfulbits.aiCharts.ChartView
//      at android.app.ActivityThread.performLaunchActivity(ActivityThread.java:3680)
//      at android.app.ActivityThread.handleLaunchActivity(ActivityThread.java:3835)
//      at android.app.servertransaction.LaunchActivityItem.execute(LaunchActivityItem.java:101)
//      at android.app.servertransaction.TransactionExecutor.executeCallbacks(TransactionExecutor.java:135)
//      at android.app.servertransaction.TransactionExecutor.execute(TransactionExecutor.java:95)
//      at android.app.ActivityThread$H.handleMessage(ActivityThread.java:2291)
//      at android.os.Handler.dispatchMessage(Handler.java:107)
//      at android.os.Looper.loop(Looper.java:230)
//      at android.app.ActivityThread.main(ActivityThread.java:8024)
//      at java.lang.reflect.Method.invoke(Native Method)
//      at com.android.internal.os.RuntimeInit$MethodAndArgsCaller.run(RuntimeInit.java:526)
//      at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:1034)
// Caused by: android.view.InflateException: Binary XML file line #7 in com.evancharlton.mileage:layout/chart: Binary XML file line #7 in com.evancharlton.mi
leage:layout/chart: Error inflating class com.artfulbits.aiCharts.ChartView
// Caused by: android.view.InflateException: Binary XML file line #7 in com.evancharlton.mileage:layout/chart: Error inflating class com.artfulbits.aiCharts.
ChartView
// Caused by: java.lang.reflect.InvocationTargetException
//      at java.lang.reflect.Constructor.newInstance0(Native Method)
//      at java.lang.reflect.Constructor.newInstance(Constructor.java:343)
//      at android.view.LayoutInflater.createView(LayoutInflater.java:871)
//      at android.view.LayoutInflater.createViewFromTag(LayoutInflater.java:1063)
//      at android.view.LayoutInflater.createViewFromTag(LayoutInflater.java:1014)
//      at android.view.LayoutInflater.rInflate(LayoutInflater.java:1193)
//      at android.view.LayoutInflater.rInflateChildren(LayoutInflater.java:1154)
//      at android.view.LayoutInflater.inflate(LayoutInflater.java:696)
//      at android.view.LayoutInflater.inflate(LayoutInflater.java:548)
//      at android.view.LayoutInflater.inflate(LayoutInflater.java:495)
//      at com.android.internal.policy.PhoneWindow.setContentView(PhoneWindow.java:537)
//      at android.app.Activity.setContentView(Activity.java:3359)
//      at com.evancharlton.mileage.ChartActivity.onCreate(ChartActivity.java:30)
//      at android.app.Activity.performCreate(Activity.java:7894)
//      at android.app.Activity.performCreate(Activity.java:7883)
//      at android.app.Instrumentation.callActivityOnCreate(Instrumentation.java:1353)
//      at android.app.ActivityThread.performLaunchActivity(ActivityThread.java:3655)
//      at android.app.ActivityThread.handleLaunchActivity(ActivityThread.java:3835)
//      at android.app.servertransaction.LaunchActivityItem.execute(LaunchActivityItem.java:101)
//      at android.app.servertransaction.TransactionExecutor.executeCallbacks(TransactionExecutor.java:135)
//      at android.app.servertransaction.TransactionExecutor.execute(TransactionExecutor.java:95)
//      at android.app.ActivityThread$H.handleMessage(ActivityThread.java:2291)
//      at android.os.Handler.dispatchMessage(Handler.java:107)
//      at android.os.Looper.loop(Looper.java:230)
//      at android.app.ActivityThread.main(ActivityThread.java:8024)
//      at java.lang.reflect.Method.invoke(Native Method)
//      at com.android.internal.os.RuntimeInit$MethodAndArgsCaller.run(RuntimeInit.java:526)
//      at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:1034)
// Caused by: java.lang.NullPointerException: Attempt to invoke virtual method 'boolean com.artfulbits.license.LicenseData.isValid()' on a null object refere
nce
//      at com.artfulbits.aiCharts.Base.ChartEngine.validateLicense(ChartEngine.java:986)
//      at com.artfulbits.aiCharts.Base.ChartEngine.<init>(ChartEngine.java:213)
//      at com.artfulbits.aiCharts.ChartView.<init>(ChartView.java:265)
//      at com.artfulbits.aiCharts.ChartView.<init>(ChartView.java:238)
//      at com.artfulbits.aiCharts.ChartView.<init>(ChartView.java:221)
//      ... 28 more
//
** System appears to have crashed at event 150 of 20000 using seed 1667611065643
```



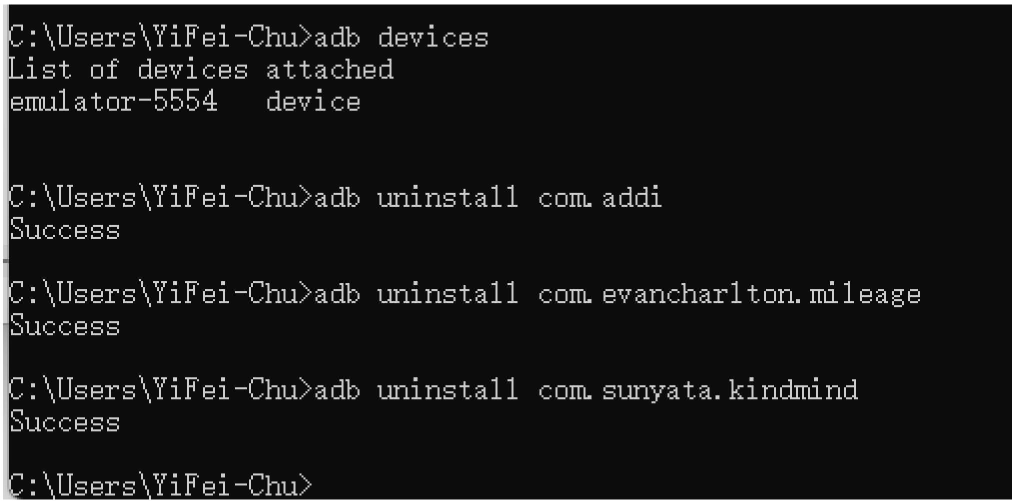
```
C:\Users\YiFei-Chu>adb shell monkey -p com.evancharlton.mileage -s 1667539339453 -v -v -v 20000 > D:/Android/Log/monkey_log23.txt
args: [-p, com.evancharlton.mileage, -s, 1667539339453, -v, -v, -v, 20000]
 arg: "-p"
 arg: "com.evancharlton.mileage"
 arg: "-s"
 arg: "1667539339453"
 arg: "-v"
 arg: "-v"
 arg: "-v"
 arg: "20000"
data="com.evancharlton.mileage"
data="1667539339453"
// CRASH: com.evancharlton.mileage (pid 2020)
// Short Msg: java.lang.NumberFormatException
// Long Msg: java.lang.NumberFormatException: For input string: "h's"
// Build Label: vivo/PD1838/PD1838:10/QP1A.190711.020/compiler07072200:user/release-keys
// Build Changelist: compiler07072200
// Build Time: 1657202286000
// java.lang.NumberFormatException: For input string: "h's"
//      at java.lang.Long.parseLong(Long.java:594)
//      at java.lang.Long.parseLong(Long.java:636)
//      at com.evancharlton.mileage.views.DeltaView.getDelta(DeltaView.java:58)
//      at com.evancharlton.mileage.ServiceIntervalTemplateActivity.setFields(ServiceIntervalTemplateActivity.java:76)
//      at com.evancharlton.mileage.BaseFormActivity$1.onClick(BaseFormActivity.java:50)
//      at android.view.View.performClick(View.java:7187)
//      at android.view.View.performClickInternal(View.java:7164)
//      at android.view.View.access$3500(View.java:813)
//      at android.view.View$PerformClick.run(View.java:27671)
//      at android.os.Handler.handleCallback(Handler.java:883)
//      at android.os.Handler.dispatchMessage(Handler.java:100)
//      at android.os.Looper.loop(Looper.java:230)
//      at android.app.ActivityThread.main(ActivityThread.java:8024)
//      at java.lang.reflect.Method.invoke(Native Method)
//      at com.android.internal.os.RuntimeInit$MethodAndArgsCaller.run(RuntimeInit.java:526)
//      at com.android.internal.os.ZygoteInit.main(ZygoteInit.java:1034)
//
** System appears to have crashed at event 9804 of 20000 using seed 1667539339453
```

第一个和第三个都是Format错误，第二个是空指针错误，具体可见视频

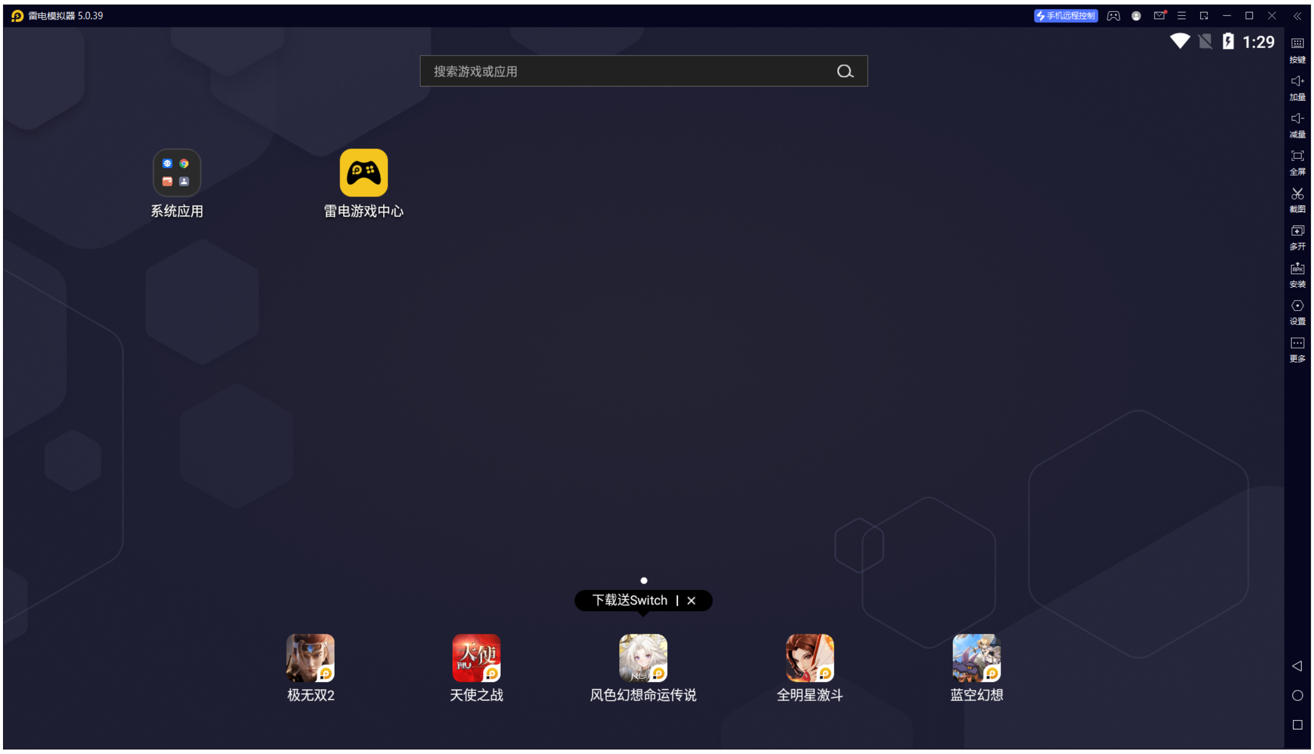
monkey部分参数使用如下：

--throttle	*事件执行的间隔时间*
-s	*代表seed指定随机种子数*
--ignore-crashes	*忽略崩溃*
--ignore-timeouts	*忽略超时（由于未响应 anr）*
--ignore-security-exceptions	*忽略安全异常*
--monitor-native-crashes	*监控本地崩溃代码*
--ignore-native-crashes	*忽略本地崩溃*
--pct-touch	*触摸、点击屏幕*
--pct-motion	*滑动（一般是直线滑动，途径若干个坐标点）*
--pct-trackball	*无规则的轨迹球滑动（曲线滑动）也叫跟踪球*
--pct-syskeys	*系统级事件、系统按键 比如：Home键、Menu菜单键、Back回退、音量键等*
--pct-nav	*方向导航事件，比如光标上移*
--pct-majornav	*主要导航事件 比如：应用中的菜单选项，返回按钮（虚拟键操作）*
--pct-appswitch	*App切换窗口 比如：应用内部、应用之间的窗口切换*
--pct-flip	*键盘事件，比如键盘弹起、收回*
--pct-anyevent	*其它事件*
--pct-pinchzoom	*缩放事件，比如多指触控 放大、缩小*

5.使用adb卸载安装的软件



```
C:\Users\YiFei-Chu>adb devices
List of devices attached
emulator-5554   device


C:\Users\YiFei-Chu>adb uninstall com.addi
Success

C:\Users\YiFei-Chu>adb uninstall com.evancharlton.mileage
Success

C:\Users\YiFei-Chu>adb uninstall com.sunyata.kindmind
Success

C:\Users\YiFei-Chu>
```



可以看到已经成功卸载

四、实验分析与总结

由于之前没有使用过android移动应用开发或者测试的软件，因此实验伊始遇到的很多问题。不过在网上广泛搜集资料以后顺利地解决了（详见二、环境搭建和三、安卓自动化测试）。

其实Android SDK环境的搭建还是比较复杂的（个人感觉不管是相比于anaconda还是一些之前用过的模型，比如Alphapose），可能是因为压缩包较为零散的原因，直接使用Android Studio会方便很多，不过在学校里的基础课程中这是非常有意义的，是对搭建环境能力的一种较为全面的锻炼了，不管是添加环境变量（或者系统变量），每个文件夹具体的位置，换源，最后用常用基础命令测试环境是否搭建成功等等，以后要搭建的环境只会更多更复杂。

实验中，我学习到了如何使用adb的常用命令、如何使用aapt查看包名以及版本等相关信息、还有monkey测试的指令格式。monkey自动化测试在用户指令的要求下生成一些相关的操作，但是实际看来这些操作之间没有什么联系，是完全随机的，因此能测出的Bug是非常有限的，最初我运行的几次monkey测试一直到两万条测试都完成都没有遇到Crash或者Exception等错误。此外，我一开始对Bug进行复现时只是设置的相同的seed值，但是没有保证他们的初始页面和初始条件相同（比如某些信息框里的文字），所以没有成功复现。最后，在真机上的测试比电脑上更加容易，但是要注意断开网络，关闭声音（虽然大概率还会被自动调大）等等，最好别用自己的主力机。