Thread Visualization Tool – Manual

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1. Introduction

Android applications need to be very efficient and run very fast. On the other hand, Android developers tend to open a lot of threads of execution, sometimes unknowingly.

There are almost no tools that can help a developer understand where the bottlenecks in a multi-threaded application in Android are.

The Thread Visualization Tool will be installed as a plugin for Android Studio, and will provide a coherent picture of the threads' state for each action performed in the application.

This tool was developed with the goal of helping create much more efficient applications with the aid of a friendly UI visualization tool.

This plugin will be supported by both Mac and PC.

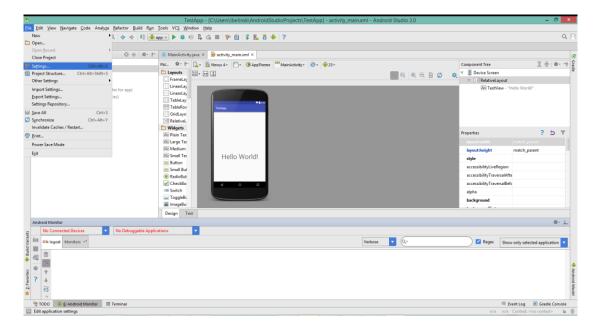
2. Plugin installation

Download the plugin from GitHub:

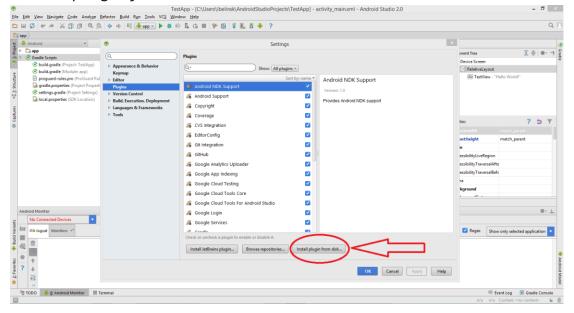
https://github.com/SandroGolis/VisualisationToolPlugin

You should download the file VisualizationToolPlugin.zip.

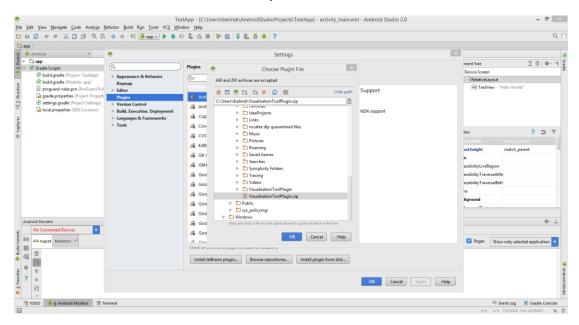
Enter Android Studio and click on File->Settings



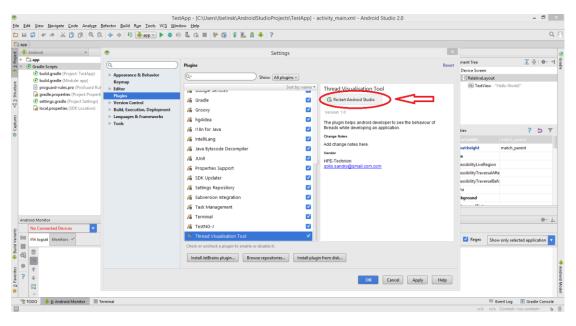
Now click on the *Plugins* tab and click on *Install plugin from disk...*



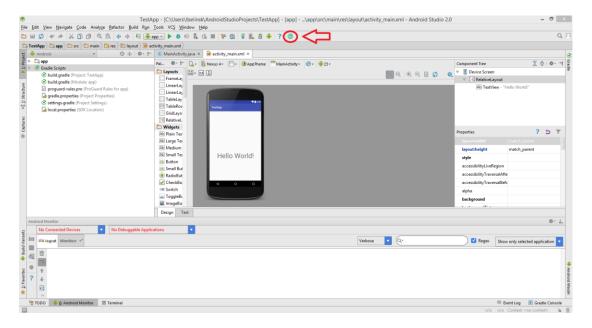
Find the *VisualizationToolPlugin.zip* file you have just downloaded. Press *OK* Once you have found it.



Now restart Android Studio so the changes can be updated.



Once Android Studio is back and running, you should see the Visualization Tool plugin icon at the right hand side of the main toolbar.



Congratulations, the plugin is now installed!

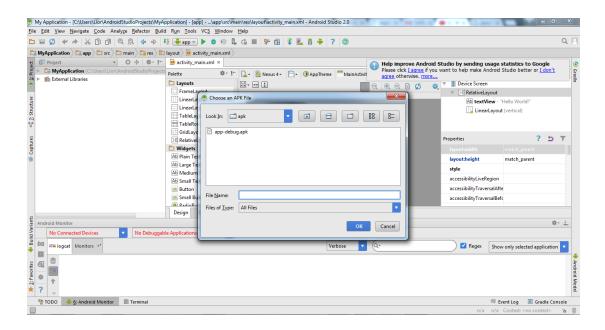
3. Receive the threads information

The first thing we must do is to create an Instrumented APK file from the original APK file.

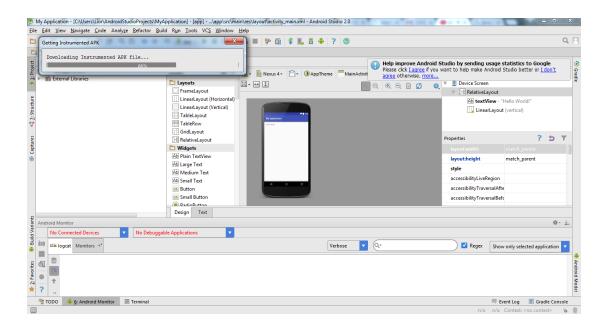
This can be achieved in 2 ways – **manually** or **automatically**. The latter is obviously more convenient, but both options will be explained comprehensively.

<u>Create an Instrumented APK Automatically:</u>

Go to *Tools->Get Instrumented APK* (or click *Ctrl + Shift + I*) and then a dialog window will pop-up. Please choose your APK file and press *OK*.



At this moment the creation process of the Instrumented APK file will be running in the background. You should see the dialog progress window which will update you with informative messages regarding the phase of which the background process is currently on. If you wish to cancel this process, you are welcome to close the dialog window, and it will terminate this process.



Once the download is finished, this file will be transferred to your device, but only if it's connected with an usb cable.

Create an Instrumented APK Manually:

Go to http://52.1.231.128:8282/easywrapper/ Choose your APK file and click on *Upload*.

When the file will be fully uploaded, you should click on 'download *instrumented apk'* in order to initiate the downloading operation.

After a few moments your Instrumented APK will be downloaded.

Transfer this instrumented APK file to your Device, go to the directory which contains the Instrumented APK file, inside your Device, and run it.

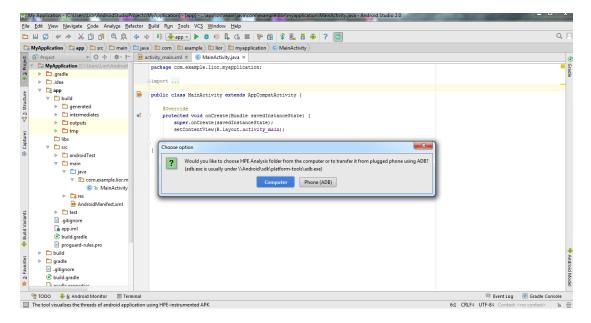
This operation will launch the installation of your app on the Device.

Enter your app and perform the desired actions. A new directory will be created in the Device under the name /sdcard/HPActionAnalysis.

At the time you finished performing the desired actions, transfer the directory /sdcard/HPActionAnalysis from your Device to the PC/Mac.

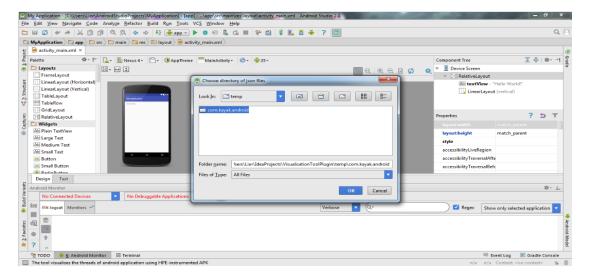
Now, after you have created the Instrumented APK file in your favorite way, press on the Thread Visualization Icon, or Use the keyboard shortcut Ctrl + Shift + V + T.

You will then be suggested with 2 options:

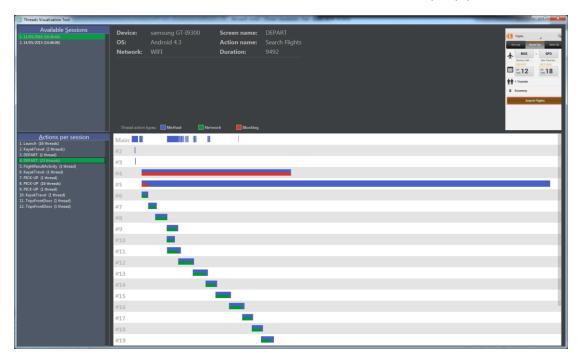


- 1. Choose the Directory which contains the Json files from your own computer.
- 2. Choose the Directory from your device, using ADB. The relevant directory will be copied from the device to a temporary directory on your computer, and then you will be asked to choose the specific directory you wish to visualize.

In both cases, you should navigate to the relevant directory.



Click OK and the visualization window will finally appear.



All the actions described in this section must be repeatedly performed every time some new information regarding the threads behavior is required.

4. Understanding the visualization window

The window consists of 3 fundamental parts:

Part 1 – Available sessions.

This part shows all the launched sessions. Each session contains all the actions which were performed by the app's user (developer). The session ends when the app is terminated. The sessions appear in descending order, from the newest to the oldest.

Part 2 – Actions per session

This part presents all the actions of each selected session. The actions appear in ascending order, from the oldest to the newest.

Part 3 – The main information

For each selected action in a certain session, a visualization of the threads' state during the performance of the chosen action will be presented. Moreover, if a screenshot of the action was taken, it will be presented on the right hand side of the screen. In the upper section there is some basic information, and in the lower section there is a graphic presentation of each thread used to perform the action in relation to the time line. The actions are subjected to 3 types—Method, Network or Blocking.

Each thread could be partitioned into alien segments of tasks.

It is possible to click on a specific segment in order to get additional information regarding that specific operation. This information will be presented above the threads chart.

5. Some Useful Keyboard Shortcuts

1. Ctrl + Shift + V + T

This will lunch the Visualization Tool Window.

2. **Alt + S**

When the Visualization Tool Window is opened, after performing this keyboard shortcut, you will be able to navigate between sessions, using only the keyboard's Up and Down controllers.

3. **Alt + A**

Similar to the previous shortcut, only it will allow you to navigate between the actions instead of the sessions.

4. Ctrl + Shift + I

Start the Creation of an Instrumented APK file, just as explained in chapter 3.