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CSEC 467-01
9/1/21

Lab 1

Repository Link

Critical Thinking Questions

1.) This lab assignment involved building a basic Android application that included two "activities" and functionality to share text in between those activities. It also involved extracting the apk file for the application from an AVD with and without Google Play services enabled.

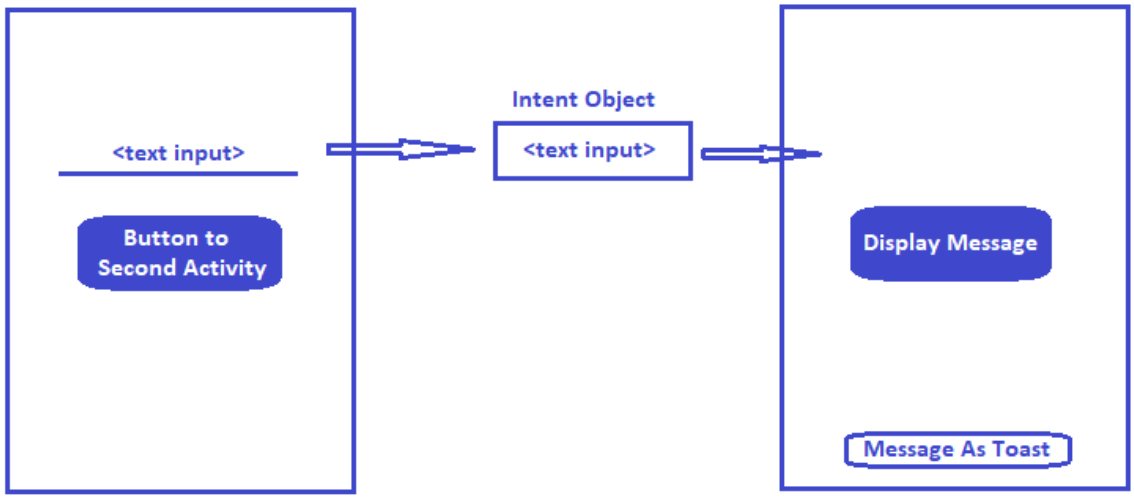
2.) To solve this problem I used an "*Intent*" object. The first activity includes a *Button* and *EditText* object. The button is configured so that, on click, an *Intent* object is created and given the second activity. The user input, if any, is assigned to the *Intent* object using the *putExtra()* function; this stores the string in a dictionary within the *Intent*. Finally, a new activity is started and given the *Intent* object.

When the second activity starts, it displays one button. That button is configured so that, on click, it queries the intent for the activity using the *getIntent()* function, converts it to a string, and then displays that string using Android's "Toast" object.

For retrieving the apk file, I started by running a Pixel 5 API 29 AVD with no Google Play services. Using adb, I opened a shell on the device, used *su* to elevate to root, and navigated to the */data/app* directory to find the name of my application (com.example.lab1-JHv41vIkqmWSRdc9dcmYFw==). After getting the name, I could run *adb pull /data/app/com.example.lab1-JHv41vIkqmWSRdc9dcmYFw==* to pull the apk out of the VM.

When Google Play is enabled on the device, it is not possible to extract the apk file using the same method. There are several online services that claim to be able to extract any apk, but they are likely using cracked versions of Android that circumvent Google Play protections.

3.)



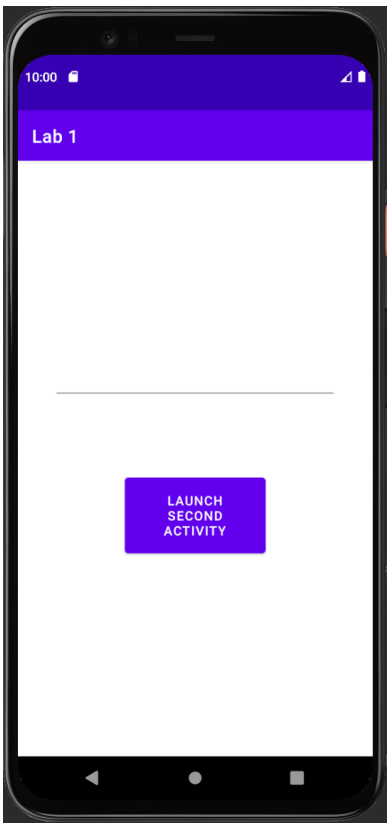
4.) The apk was found at: */data/app/com.example.lab1-JHv41vIkqmWSRdc9dcmYFw==* .

- */data*
  - Used for storing files relating to installed applications, users, the Android system, etc.
- */data/app*
  - Used for storing specifically the apk's of installed applications.
- */data/app/com.example.lab1-JHv41vIkqmWSRdc9dcmYFw==*
  - Used to store the lab1 application apk and any libraries that the application needs to run.

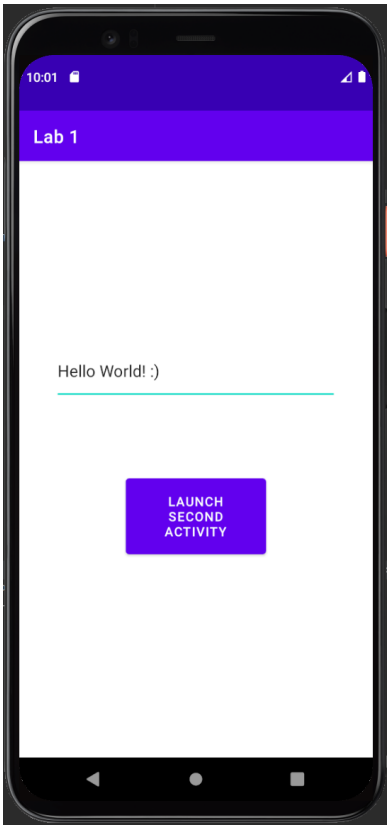
5.) On the AVD with Google Play services enabled, it was not possible to extract the apk. Unlike before, Android won't allow a shell to elevate to root privileges (*su* is not installed), and thus it is not possible to list the contents of */data/app/* (*Permission Denied*).

6.) Reasons Google may restrict root on devices that have Google Play:
   a.) Allowing access to the root user could introduce severe security risks if a malicious application happens to be installed on the device. Applications are safer when isolated and given only the required permissions.
   b.) Restricting root on Google Play devices may help protect against the reverse-engineering of applications found on the Google Play store.
   c.) Restricting root on Google Play devices may help protect against the reverse engineering of proprietary Google binaries or Google Play binaries.

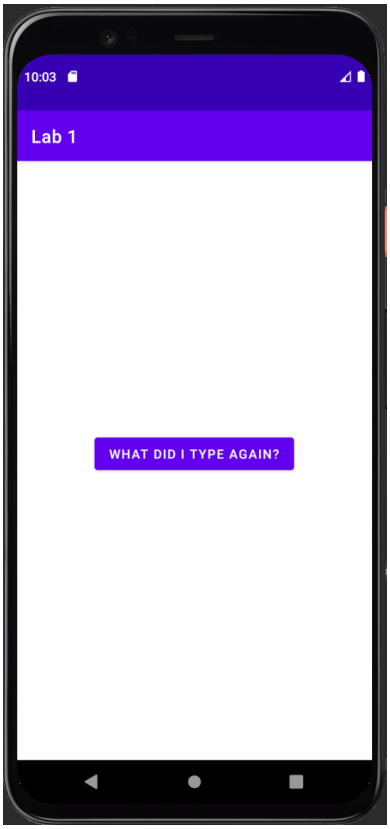
Screenshots



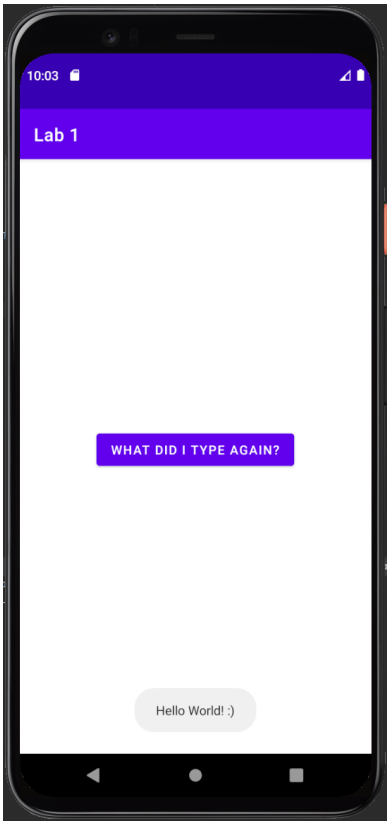
1A



1B



1C



1D

```
B.setOnClickListener(new View.OnClickListener() {
    @Override
    public void onClick(View view) {
        Intent intent = new Intent(view.getContext(), MainActivity2.class);
        String message = text.getText().toString();
        intent.putExtra(MESSAGE, message);
        startActivity(intent);
    }
});
```

2A

```
Intent intent = getIntent();
String message = intent.getStringExtra(MainActivity.MESSAGE);
```

2B

```
generic_x86:/data/app # ls
com.example.lab1-Qaxp-5huePqfr9XSLRPbWg==
```

3A

```
C:\Users\Connor Jackson\Downloads\platform-tools_r31.0.3-windows\platform-tools>adb.exe pull /data/app/com.example.lab1-
Qaxp-5huePqfr9XSLRPbWg==
/data/app/com.example.lab1-Qaxp-5huePqfr9XSLRPbWg==/: 1 file pulled, 0 skipped. 220.6 MB/s (3326706 bytes in 0.014s)

C:\Users\Connor Jackson\Downloads\platform-tools_r31.0.3-windows\platform-tools>dir "com.example.lab1-Qaxp-5huePqfr9XSLR
PbWg=="
 Volume in drive C has no label.
 Volume Serial Number is 4CE1-EE00

 Directory of C:\Users\Connor Jackson\Downloads\platform-tools_r31.0.3-windows\platform-tools\com.example.lab1-Qaxp-5hue
Pqfr9XSLRPbWg==

08/31/2021  10:17 PM    <DIR>          .
08/31/2021  10:17 PM    <DIR>          ..
08/31/2021  10:17 PM         3,326,706 base.apk
08/31/2021  10:15 PM    <DIR>          lib
               1 File(s)      3,326,706 bytes
               3 Dir(s)  61,898,366,976 bytes free
```

4A

```
generic_x86_arm:/ $ su
/system/bin/sh: su: inaccessible or not found
127|generic_x86_arm:/ $ ls /data/app/
ls: /data/app/: Permission denied
```

5A