CS475/575

Permissions

Manifest

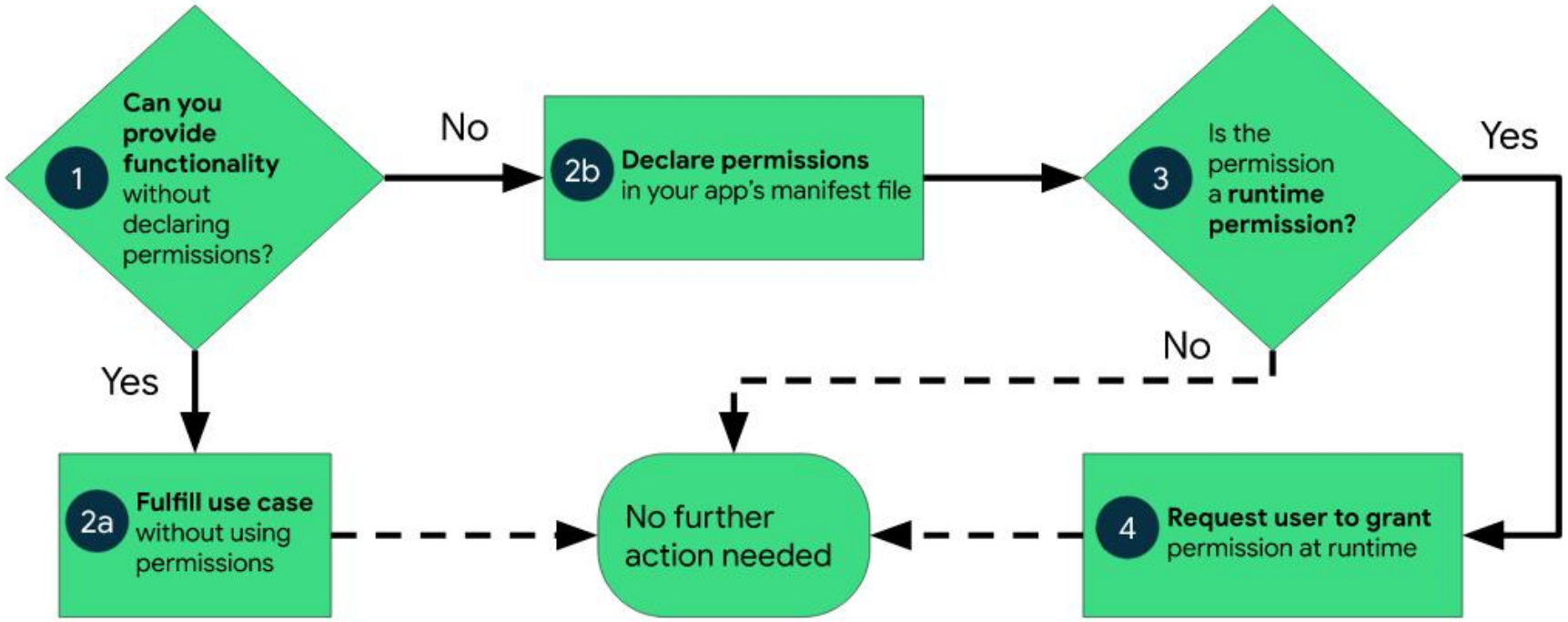
Outline

- Introduction
- Where defined (Manifest)
- Details
- Difference between normal and runtime (or dangerous) permissions
- Behavior based on API (23 and above are harder)
- Demos

Introduction

- Apps isolated (sandboxed), cannot access hardware or software by default
- Must explicitly request permissions in manifest

Workflow for app permissions



from https://developer.android.com/guide/topics/permissions/overview#normal-dangerous

Requesting permissions for an App

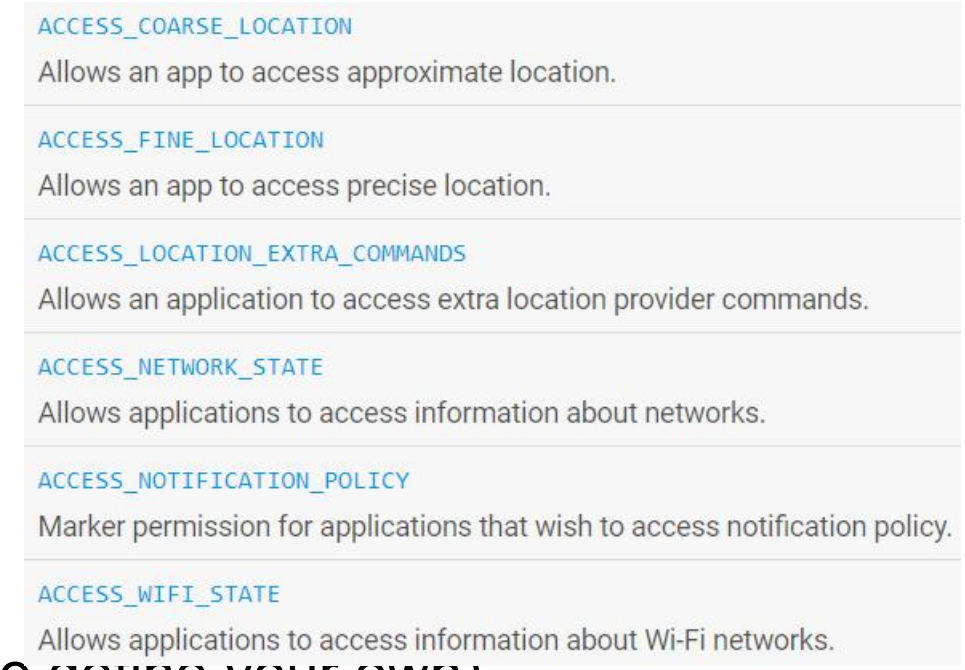
- Declared in manifest

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.example.solution_color"
    android:versionCode="1"
    android:versionName="1.0" >
    <uses-permission android:name="android.permission.CAMERA" />
    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE" />
    <uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE" />
```

Where can I find a comprehensive list?

- You can find a list of Android permissions here:

https://developer.android.com/reference/android/Manifest.permission.html



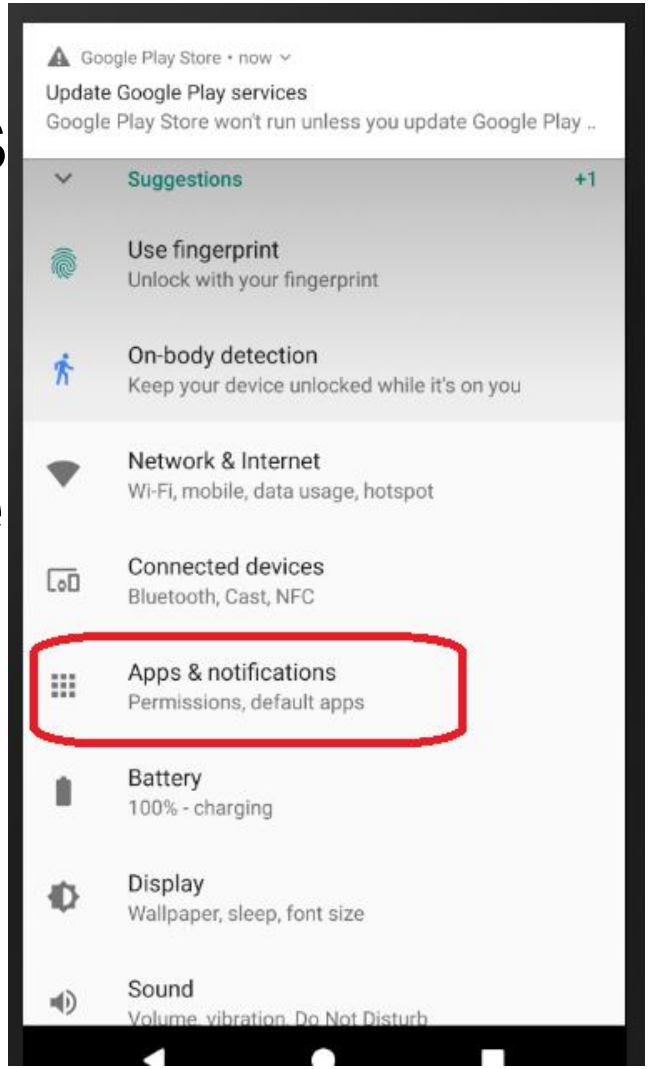
(You can also define your own)

Is this done in secret?

- Are your customers told that they have granted these permissions?
  - Adb install or apk email – maybe, depends on the handset API and the SDK app was compiled with
  - Google Playstore – yes, at install time

How to view permissions

- You can see permissions an app has via Settings -Apps & notifications
- You can also en/disable them
- Useful for when you deny a permission at runtime then change your mind.



Where are permissions checked?

- Permissions granted dependent on API
  - If targetSDKversion <23 or target Device running <23 then
    - At install (manifest)
  - If targetSDKversion >=23 and target Device running >=23 then
    - Normal permissions – granted at install (like above)
    - MUCH HARDER - Runtime permissions – must ask user at runtime, user can revoke permissions

Where is targetSDKversion?

- In build.gradle (app)

```
apply plugin: 'com.android.application'

android {
    compileSdkVersion 23
    buildToolsVersion "23.0.2"

    defaultConfig {
        applicationId "com.example.solution_color"
        minSdkVersion 15
        targetSdkVersion 23
    }
```

List of Normal Permissions

https://developer.android.com/reference/android/Manifest.permission

Normal permissions

Normal permissions cover areas where your app needs to access data or resources outside the app's sandbox, but where there's very little risk to the user's privacy or the operation of other apps. For example, permission to set the time zone is a normal permission.

If an app declares in its manifest that it needs a normal permission, the system automatically grants the app that permission at install time. The system does not prompt the user to grant normal permissions, and users cannot revoke these permissions.

As of API level 26, the following permissions are classified as `PROTECTION_NORMAL`:

- `ACCESS_LOCATION_EXTRA_COMMANDS`
- `ACCESS_NETWORK_STATE`
- `ACCESS_NOTIFICATION_POLICY`
- `ACCESS_WIFI_STATE`
- `BLUETOOTH`
- `BLUETOOTH_ADMIN`

The list goes on, as of API 26 there are about 40 of these

List of Dangerous Permissions

https://developer.android.com/reference/android/Manifest.permission

Dangerous permissions

Dangerous permissions cover areas where the app wants data or resources that involve the user's private information, or could potentially affect the user's stored data or the operation of other apps. For example, the ability to read the user's contacts is a dangerous permission. If an app declares that it needs a dangerous permission, the user has to explicitly grant the permission to the app.

To use a dangerous permission, your app must prompt the user to grant permission at runtime. For more details about how the user is prompted, see Request prompt for dangerous permission.

Permission Group	Permissions
CALENDAR	• READ_CALENDAR • WRITE_CALENDAR
CAMERA	• CAMERA
CONTACTS	• READ_CONTACTS • WRITE_CONTACTS • GET_ACCOUNTS
LOCATION	• ACCESS_FINE_LOCATION • ACCESS_COARSE_LOCATION

The list goes on, as of API 26 there are about 30 of these

What do I have to do for normal permissions?

- Define permission in manifest
- It works!

What do I have to do for runtime (dangerous) permissions?

- Define permission in manifest
- If API <23 or targetSDKVersion <23
  - It Works!

What do I have to do for runtime (dangerous) permissions?

- Define permission in manifest
- If API >23 and targetSDKVersion >23
- Check if permission already granted at runtime
- If so call your API
- If not ask the user for permission
- Define callback for users choice
- In callback, if yes use permission
  if no you don't have it, notify user
  (maybe give another chance?)

Cant I just do it one way for all APIs?

- Yep, the runtime (dangerous) permissions way works for both
- Asks user when running on API 23 and above
- Silently grants access for below API 23

Permissions Demo

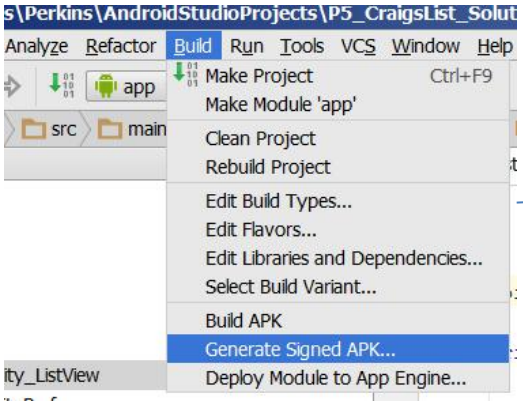
- Install Android_RuntimePermissionsBasic
- On API 22 device
  - Asks at install only
- On API 30 device
  - Asks at install for permissions and then periodically thereafter

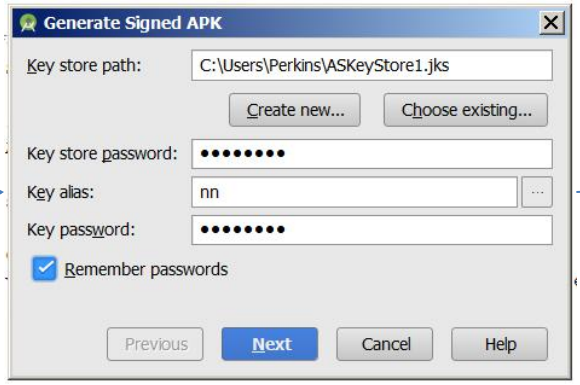
Do I have to do this?

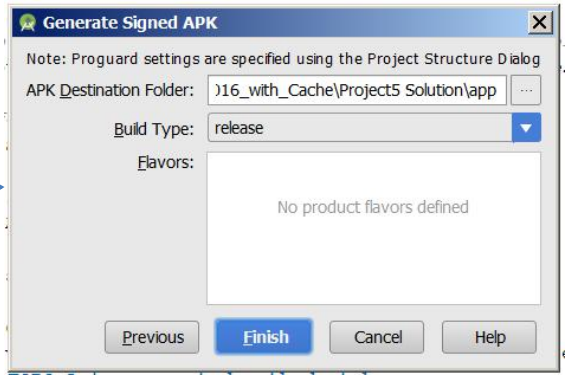
- Yep… with a very few exceptions
- For instance, can you use an implicit intent to ask Android to find another app to do what you want?
- If so the app it finds will run with its own permissions.
- ie. Ask Android to find a camera app for you verses using the camera itself.

Done

Signing an apk







- Uses a self signed digital certificate (ie no 3rd party vouching)
- Developer generates public/private key pair
- Developer makes a hash of the apk and sign(encrypt) the hash using the private key, then attaches to apk
- User of apk verifies that app unmodified by:
  - Making a hash of apk
  - Uses Developer public key to unwrap(decrypt) attached hash
  - Compares 2 hashes if == then owner of priv key generated the hash, if not its been modified
- Signing used by Google play, authors need to have same key to update app on play