CMSC436: Programming Handheld Systems

Fall 2017

Permissions

Today’s Topics

Android permissions

Defining and using permissions

Component permissions and permissions-related APIs

Permissions

Permissions protects resources and data

For instance, they limit access to:

- User information – e.g, contacts
- Cost-sensitive API’s – e.g., SMS/MMS
- System resources – e.g., Camera

Permissions

Permissions are represented as strings

Apps describe relevant permissions in AndroidManifest.xml, including

- Permissions they use
- Permissions required of components that want to interact with them

Using Permissions

Applications specify permissions they use through a <uses-permission> tag

Users must accept these permissions before access is granted

Apps must check at runtime that all required permissions have been granted

Using Permissions

<manifest … >
…
<uses-permission android:name="android.permission.CAMERA”/>
<uses-permission android:name="android.permission.INTERNET”/>
<uses-permission
android:name=“android.permission.ACCESS_FINE_LOCATION”/>
…
</manifest >

See: https://developer.android.com/training/permissions/index.html

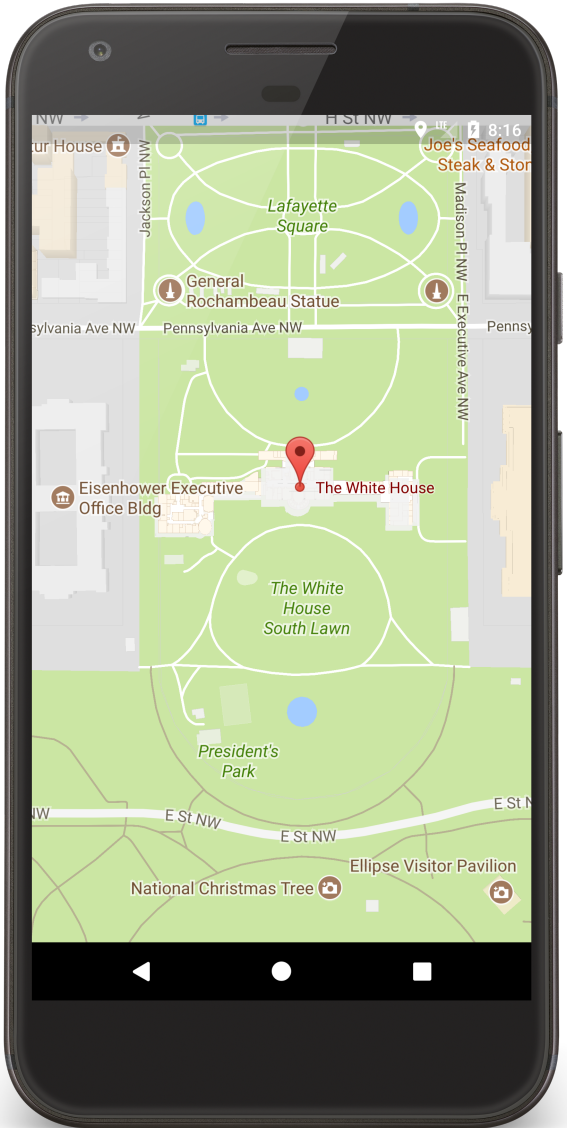
MapLocationFromContacts

Selects a contact from contacts database

Displays a map centered on selected contact’s address


8:15
MapLocationFromContacts
FIND ADDRESS


8:15
Choose a contact
M
MyDog Porter


8:16
Lafayette Square
General Rochambeau Statue
Pennsylvania Ave NW
Jackson Pl NW
Madison Pl NW
Executive Ave NW
Eisenhower Executive Office Bldg
The White House
The White House South Lawn
President's Park
E St NW
Ellipse Visitor Pavilion
National Christmas Tree

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
   package="course.examples.maplocationfromcontacts"
   …" >

   <uses-permission android:name="android.permission.READ_CONTACTS" />

   <application
      android:allowBackup="false"
      android:icon="@mipmap/ic_launcher"
      android:label="MapLocationFromContacts"
      android:theme="@style/MaterialTheme">
      <activity
         android:name="MapLocationFromContactsActivity"
         android:label="MapLocationFromContacts" >
         …
      </activity>
   </application>
</manifest>
```

```
private void getContact() {
   // Step 1: Ensure permissions
   if (needsRuntimePermission(Manifest.permission.READ_CONTACTS)) {
      requestPermissions(new String[]{Manifest.permission.READ_CONTACTS},
                                       PERMISSIONS_PICK_CONTACT_REQUEST);
   } else {
     // App has permissions. Get the contact from the Contacts app
      startContactsApp();
   }
}

private boolean needsRuntimePermission(String permission) {
   // Check the SDK version and whether the permission is already granted.
   return (Build.VERSION.SDK_INT >= Build.VERSION_CODES.M &&
                checkSelfPermission(permission) != PackageManager.PERMISSION_GRANTED);
}
```

```
// Callback after user has been asked to grant a permission
@Override
public void onRequestPermissionsResult(int requestCode,
                                       String[] permissions, int[] grantResults) {
   if (requestCode == PERMISSIONS_PICK_CONTACT_REQUEST) {
      if (grantResults[0] == PackageManager.PERMISSION_GRANTED) {
         // Permission is granted
         startContactsApp();
      } else {
         Toast.makeText(this, "This app requires access to your contact list",
                        Toast.LENGTH_SHORT).show();
      }
   }
}
```

Defining Permissions

Apps can also define and enforce their own permissions

Defining Permissions

Suppose your application performs a potentially dangerous operation

You might not want to allow just any application to invoke yours

So you can define & enforce your own permission

PermissionExampleBoom

Simple Application that performs a (pretend) dangerous action


10:10
PermissionExampleBoom
BOOM!

Define & Enforcing Permissions

You don’t want just anyone to run PermissionExampleBoom

Define & enforce an application-specific permission

```
<!-- Defines a custom permission -->
<permission
   android:name="course.examples.permissionexample.BOOM_PERM"
   android:description="@string/boom_perm_string"
   android:label="@string/boom_permission_label_string"
   android:protectionLevel="dangerous"/>

<!--  Enforces the BOOM_PERM permission on users of this application  -->
<application
   android:allowBackup="true"
   android:icon="@mipmap/ic_launcher"
   android:theme="@style/MaterialTheme"
   android:label="@string/app_name"
   android:permission="course.examples.permissionexample.BOOM_PERM" >
```

ProtectionLevel

Normal – Low risk

System automatically grants permission

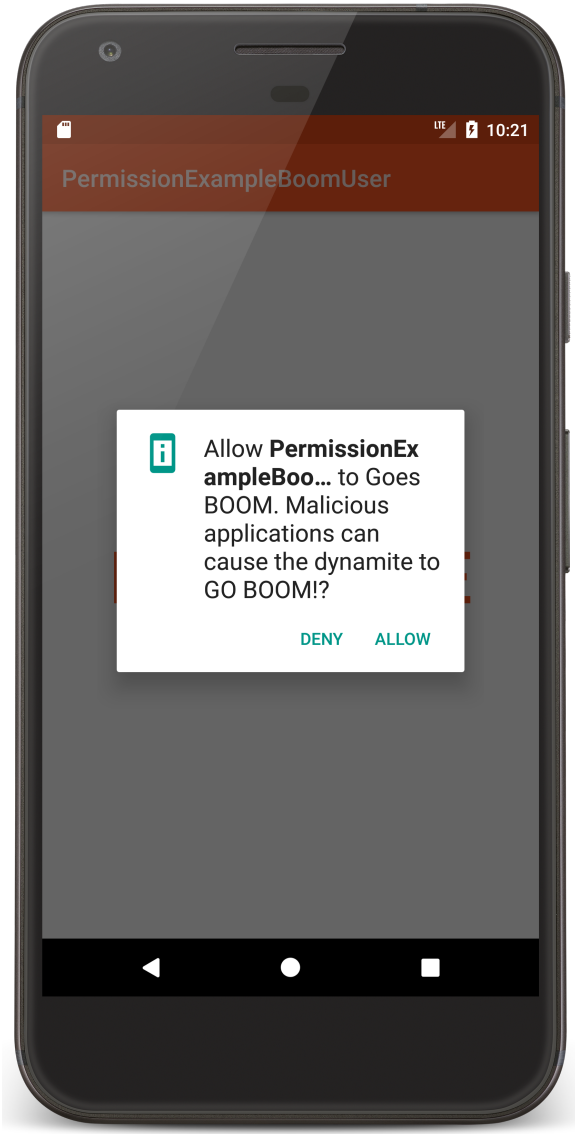
Dangerous– High risk

User must explicitly grant permission

Using the Permission

Apps that want to use PermissionExampleBoom must acquire the required permission


10:21
PermissionExampleBoomUser
DETONATE


10:21
PermissionExampleBoomUser
Allow PermissionExampleBoo... to Goes BOOM. Malicious applications can cause the dynamite to GO BOOM!?
DENY
ALLOW


10:21
PermissionExampleBoom
BOOM!

Uses-Permission

Applications declare the permissions required by the Applications it uses

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
   package="course.examples.permissionexample.boomuser"
   android:versionCode="1"
   android:versionName="1.0" >

   <!--  App needs the "...BOOM_PERM permission -->
   <uses-permission android:name="course.examples.permissionexample.BOOM_PERM" />
```

Component Permissions

Individual components can set their own permissions, restricting which other components can access them

Component permissions take precedence over application-level permissions

Activity Permissions

Restricts which components can start the associated Activity

Checked within execution of

- startActivity()
- startActivityForResult()

Throws SecurityException on permissions failure

Service Permissions

Restricts which components can start or bind to the associated service

Checked within execution of

- Context.startService()
- Context.stopService()
- Context.bindService()

Throws SecurityException on permissions failure

BroadcastReceiver Permissions

Restricts which components can send & receive broadcasts

Permissions checked in multiple places

More on this when we discuss BroadcastReceivers

ContentProvider Permissions

Restrict which components can read & write the data in a ContentProvider

More on this when we discuss ContentProviders

Next

The Fragment Class