Location and Maps

Upon completion of this module, a student will be able to

- setup google play services
- request “dangerous” permissions
- get GPS location coordinates
- convert coordinates to street address
- create a map activity
- manipulate the map view
- add markers the map view

Assignment

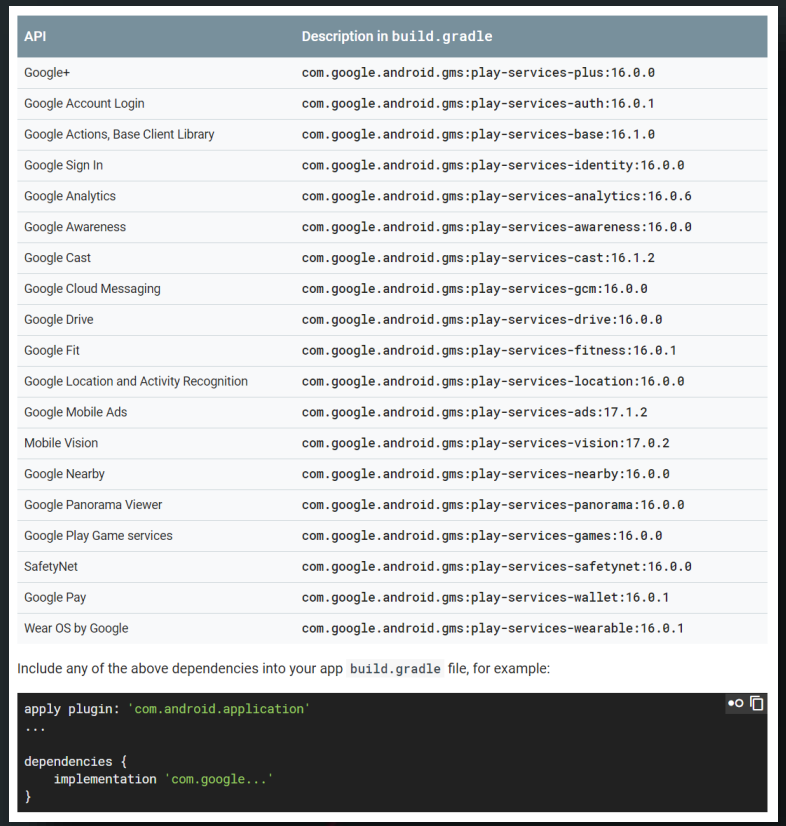
- Task
  - Build an app which allows users to place tags on a map and track their current location.
- Repo
  - https://github.com/LambdaSchool/Android_LocationServices_MapMarker
- Submission
  - Fork on github and submit pull request

A Student Can

setup google play services

Google Play Services

- Add google play services sdk
- com.google.android.gms:play-services-location



API	Description in `build.gradle`
Google+	`com.google.android.gms:play-services-plus:16.0.0`
Google Account Login	`com.google.android.gms:play-services-auth:16.0.1`
Google Actions, Base Client Library	`com.google.android.gms:play-services-base:16.1.0`
Google Sign In	`com.google.android.gms:play-services-identity:16.0.0`
Google Analytics	`com.google.android.gms:play-services-analytics:16.0.6`
Google Awareness	`com.google.android.gms:play-services-awareness:16.0.0`
Google Cast	`com.google.android.gms:play-services-cast:16.1.2`
Google Cloud Messaging	`com.google.android.gms:play-services-gcm:16.0.0`
Google Drive	`com.google.android.gms:play-services-drive:16.0.0`
Google Fit	`com.google.android.gms:play-services-fitness:16.0.1`
Google Location and Activity Recognition	`com.google.android.gms:play-services-location:16.0.0`
Google Mobile Ads	`com.google.android.gms:play-services-ads:17.1.2`
Mobile Vision	`com.google.android.gms:play-services-vision:17.0.2`
Google Nearby	`com.google.android.gms:play-services-nearby:16.0.0`
Google Panorama Viewer	`com.google.android.gms:play-services-panorama:16.0.0`
Google Play Game services	`com.google.android.gms:play-services-games:16.0.0`
SafetyNet	`com.google.android.gms:play-services-safetynet:16.0.0`
Google Pay	`com.google.android.gms:play-services-wallet:16.0.1`
Wear OS by Google	`com.google.android.gms:play-services-wearable:16.0.1`

Include any of the above dependencies into your app `build.gradle` file, for example:

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

dependencies {
    implementation 'com.google...'
}
```

https://developers.google.com/android/guides/setup

A Student Can

request “dangerous” permissions

Dangerous Permissions

- Check for Permission
- If not granted, ask for it
  - Wait for result
- Check again before each use

```
// check for permission
if (ContextCompat.checkSelfPermission(context, Manifest.permission.ACCESS_FINE_LOCATION)
    != PackageManager.PERMISSION_GRANTED) {
    // not already granted, request it from user
    ActivityCompat.requestPermissions(activity,
                                      new String[]{Manifest.permission.ACCESS_FINE_LOCATION},
                                      PERMISSIONS_REQUEST_LOCATION);
} else {
    getLocation();
}
...

@Override
public void onRequestPermissionsResult(
        int requestCode,
        @NonNull String[] permissions,
        @NonNull int[] grantResults) {
    // process request result from user
    if(requestCode == PERMISSIONS_REQUEST_LOCATION) {
        if(permissions[0].equals(Manifest.permission.ACCESS_FINE_LOCATION) &&
           grantResults[0] == PackageManager.PERMISSION_GRANTED) {
            getLocation();
        } else {
            // permission denied
        }
    }
}

private void getLocation() {
    // check again before using permission
    if (Build.VERSION.SDK_INT >= Build.VERSION_CODES.M) {
        if (checkSelfPermission(
                Manifest.permission.ACCESS_FINE_LOCATION) !=
                    PackageManager.PERMISSION_GRANTED) {
            return;
        }
...
}
```

https://developer.android.com/training/permissions/requesting#perm-request

A Student Can

get GPS location coordinates

Location Provider

- FusedLocationProviderClient
  - LocationServices.getFusedLocationProviderClient(this);
- mFusedLocationClient.getLastLocation().addOnSuccessListener

```
mFusedLocationClient.getLastLocation().addOnSuccessListener(
        this, new OnSuccessListener<Location>() {
            @Override
            public void onSuccess(Location location) {
                // check we got a valid location
                if (location != null) {
                    // Handle location object
                    ...
                }
            }
        });
```

https://developers.google.com/android/reference/com/google/android/gms/location/FusedLocationProviderClient

A Student Can

convert coordinates to street address

- Geocoder
  - Get address
- Fine location

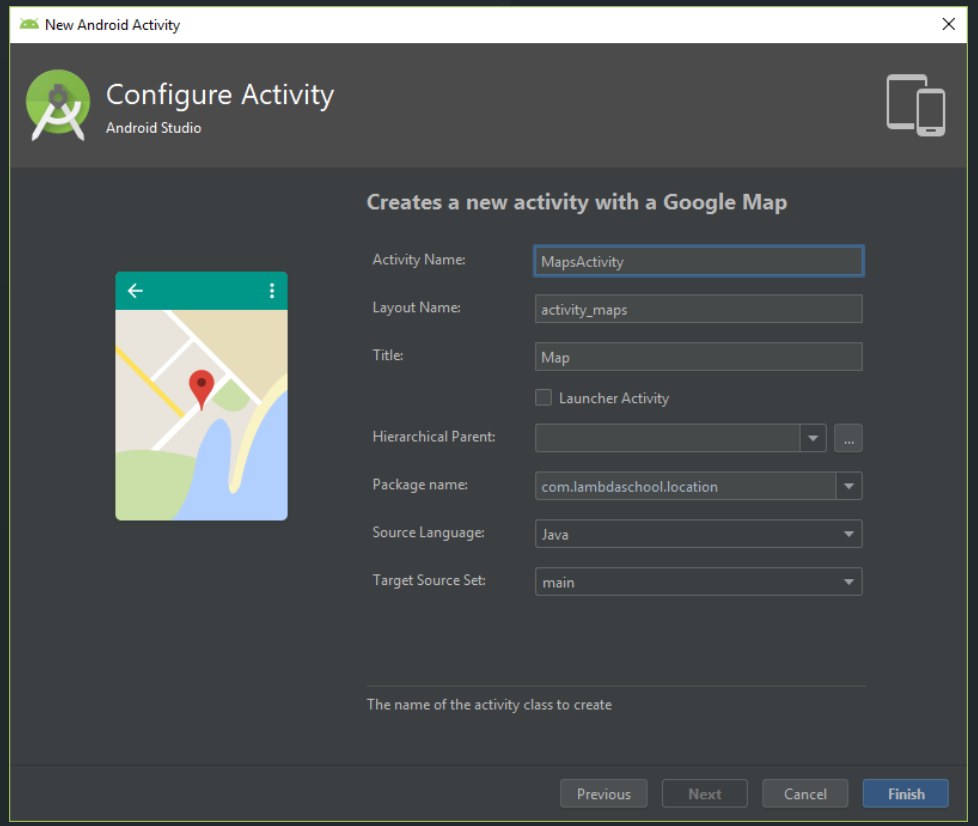
```
@Override
public void onSuccess(Location location) {
    // check we got a valid location
    if (location != null) {
        // Handle location object
        Geocoder      geocoder  = new Geocoder(context);
        List<Address> addresses = null;
        try {
            addresses = geocoder.getFromLocation(
                    location.getLatitude(),
                    location.getLongitude(),
                    MAX_LOCATION_DECODE_RESULTS);
        } catch (IOException e) {
            e.printStackTrace();
        }
        if (addresses != null) {
            final String addressLine;
            addressLine = addresses.get(0).getAddressLine(0);
            runOnUiThread(new Runnable() {
                @Override
                public void run() {
                    TextView textView = findViewById(R.id.text_output);
                    textView.setText(addressLine);
                }
            });
        }
    }
}
```

https://developer.android.com/reference/android/location/Geocoder

A Student Can

create a map activity

Map Activity



- New Map activity

API Key

- google_maps_api.xml
- console.developers.google.com …
- Fill out form

```
<resources>
    <!--
    TODO: Before you run your application, you need a Google Maps API key.

    To get one, follow this link, follow the directions and press "Create" at the end:

    https://console.developers.google.com/flows/enableapi?apiid=maps_android_backend&keyType...

    You can also add your credentials to an existing key, using these values:

    Package name:
    ...

    SHA-1 certificate fingerprint:
    ...

    Alternatively, follow the directions here:
    https://developers.google.com/maps/documentation/android/start#get-key

    Once you have your key (it starts with "AIza"), replace the "google_maps_key"
    string in this file.
    -->
    <string name="google_maps_key" templateMergeStrategy="preserve" translatable="false">YOUR_KEY_HERE</string>
</resources>
```

Check Manifest

- Location Permission
- API key meta file
- ADD LIBRARY: `org.apache.http.legacy`

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.lambdaschool.googlemapsstarteractivity">

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

    <application
        ...
        <meta-data
            android:name="com.google.android.geo.API_KEY"
            android:value="@string/google_maps_key" />
        <uses-library android:name="org.apache.http.legacy" android:required="false" />
        <activity
            ...
        </activity>
    </application>

</manifest>
```

A Student Can

manipulate the map view

GoogleMap Object

- moveCamera(CameraUpdate)
- CameraUpdateFactory.newLatLng()

```
LatLng tempMarker = new LatLng(location.getLatitude(), location.getLongitude());
mMap.animateCamera(CameraUpdateFactory.newLatLng(tempMarker));
```

https://developers.google.com/android/reference/com/google/android/gms/maps/GoogleMap

A Student Can

add markers the map view

Marker Options

- addMarker(MarkerOptions)

```
MarkerOptions current_position_temp_marker =
        new MarkerOptions()
                .position(latLng)
                .alpha(0.5f)
                .title("Current Position Temp Marker");
mMap.addMarker(current_position_temp_marker);
```

https://developers.google.com/android/reference/com/google/android/gms/maps/model/MarkerOptions

Custom Icon

- BitmapDescriptorFactory
  - fromResource
  - *Resource must be a bitmap, not vector*

```
final BitmapDescriptor customIcon = BitmapDescriptorFactory.fromResource(
        R.drawable.ic_my_location_black_24dp);
MarkerOptions current_position_temp_marker =
        new MarkerOptions()
                ...
                .icon(customIcon);
```

https://developers.google.com/android/reference/com/google/android/gms/maps/model/BitmapDescriptorFactory

Marker Listener

- Perform action based on marker selection

```
mMap.setOnMarkerClickListener(new GoogleMap.OnMarkerClickListener() {
    @Override
    public boolean onMarkerClick(Marker marker) {
        // handle marker click
        return true;
    }
});
```

https://developers.google.com/android/reference/com/google/android/gms/maps/model/Marker