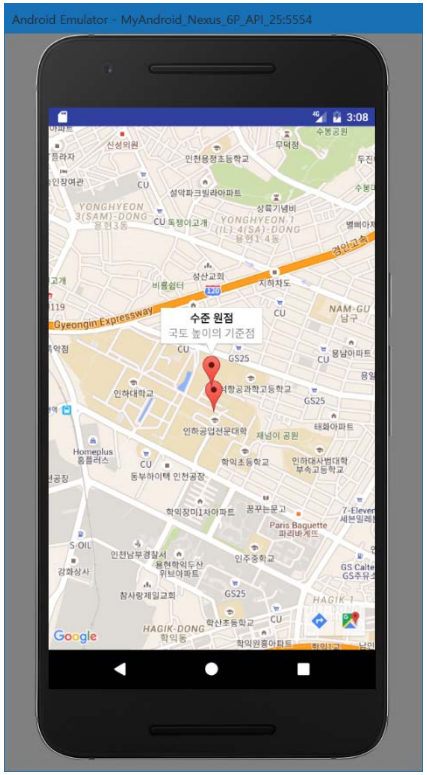
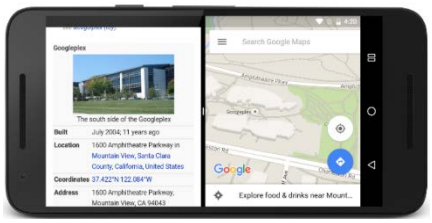
android

Google Map 구현



학습 목표

교육 목표

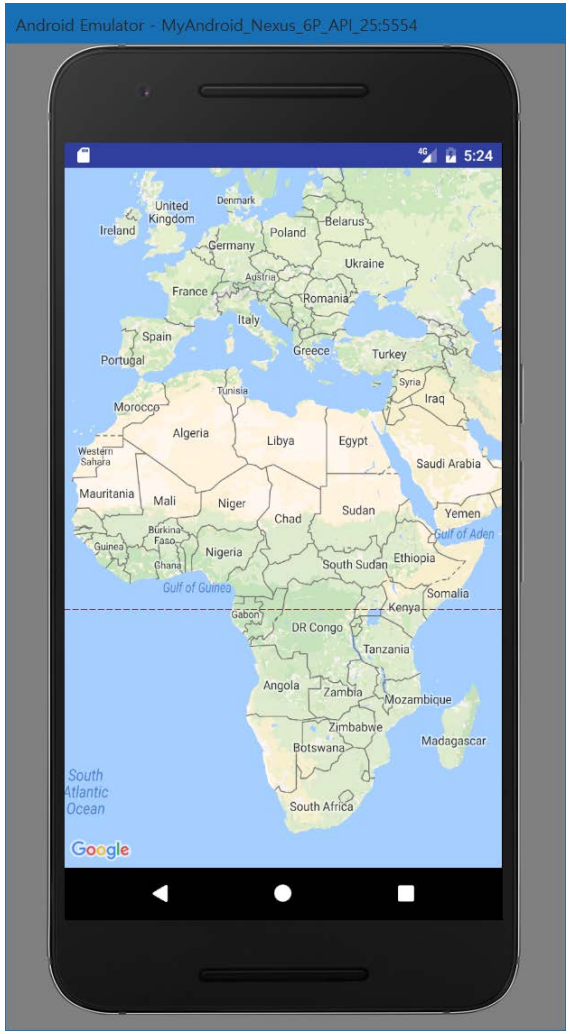


- Google Map
- Google Map View
- Install Google Play Services
- Google Map 구현
- Google Map API Key
- Practice
  - 실습 I: Google Map Type 구현
  - 실습 II: Latitude/Longitude 구현
  - 실습 III: Multi-Marker 구현
  - 실습 IV: Current Position 구현

Google Map 구현 (1)

Google Map 구현

- Google Maps Android API v1
  - MapView ^l용
  - MD5 ^l용
- Google Maps Android API v2
  - Fragment ^l용
  - SHA1 ^l용
  - google-play-services

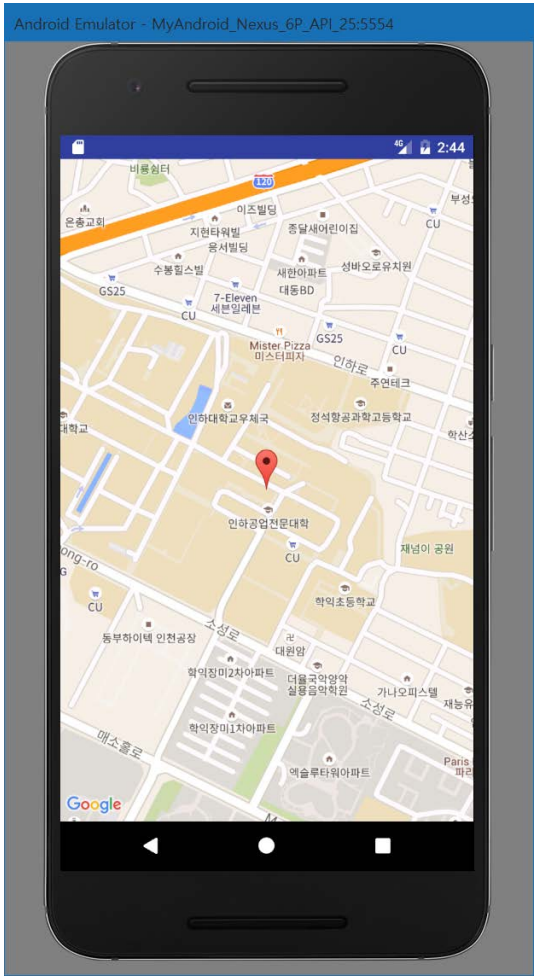


Google Map 구현 (2)

Google Map View

❖ 기능

- ◆ Google Map을 보여 주는 기능 제공
- ◆ Google Maps Android API v1 지원



Google Map 구현 (3)

MapView 클래스의 Method

Method	설 명
setStreetView(boolean)	도로 보기
setTraffic(boolean)	교통 보기
setSatellite(boolean)	위성 사진 모드

위성 사진 모드

Google Map 구현 (4)

Map View 클래스

❖ Map 제어 기능

Method	설 명
getController()	MapController 클래스 반환

Map Controller 클래스

❖ Map 제어 기능

Method	설 명
animateTo()	Map 이동 기능
setZoom(boolean)	Zoom In 기능

Google Map 구현 (5)

Google Maps Android API v2 구현

❶ Install Google Play Services

❷ Create Project GoogleMap_Source

❸ Create Google Map API Key

❹ Paste Google Map API Key To google_maps_api.xml

❺ Add Uses Permission To Androidmanifest.xml

- ACCESS_FINE_LOCATION

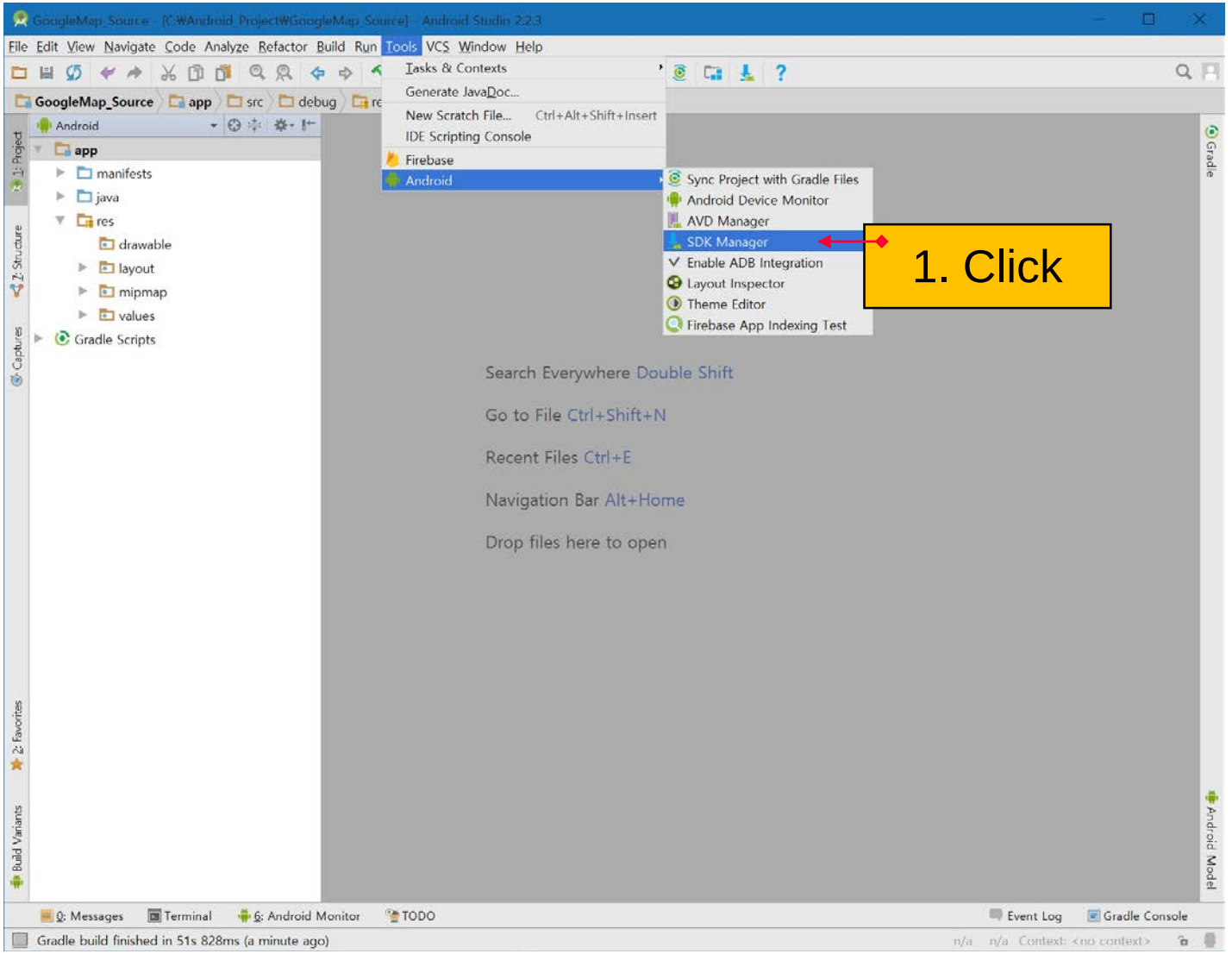
❻ Update build.gradle (Module app)

- `compile 'com.google.android.gms:play-services:9.6.0'`

❼ Coding MapsActivity.java

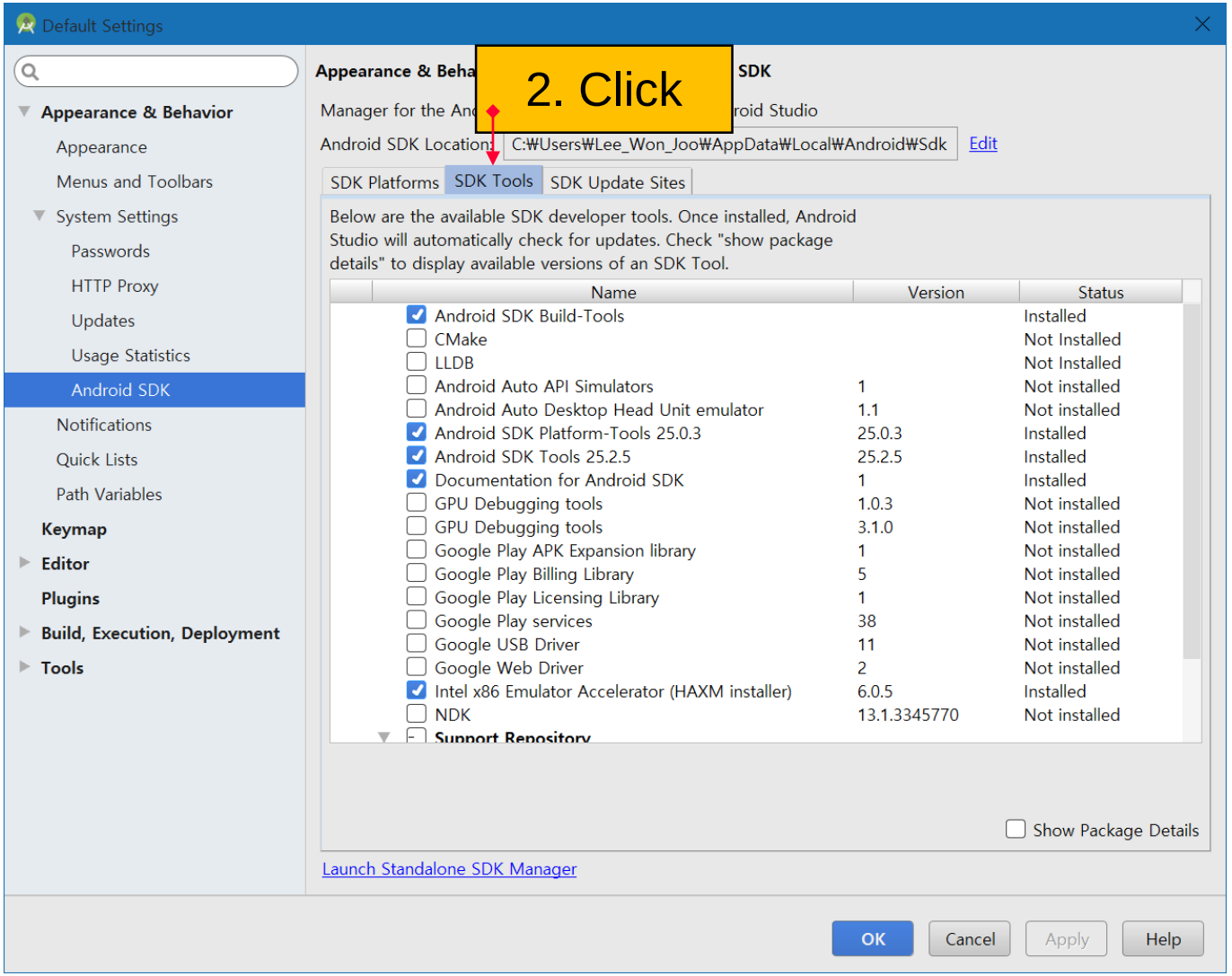
Install Google Play Services (1)

- [Tools > Android > SDK Manager]



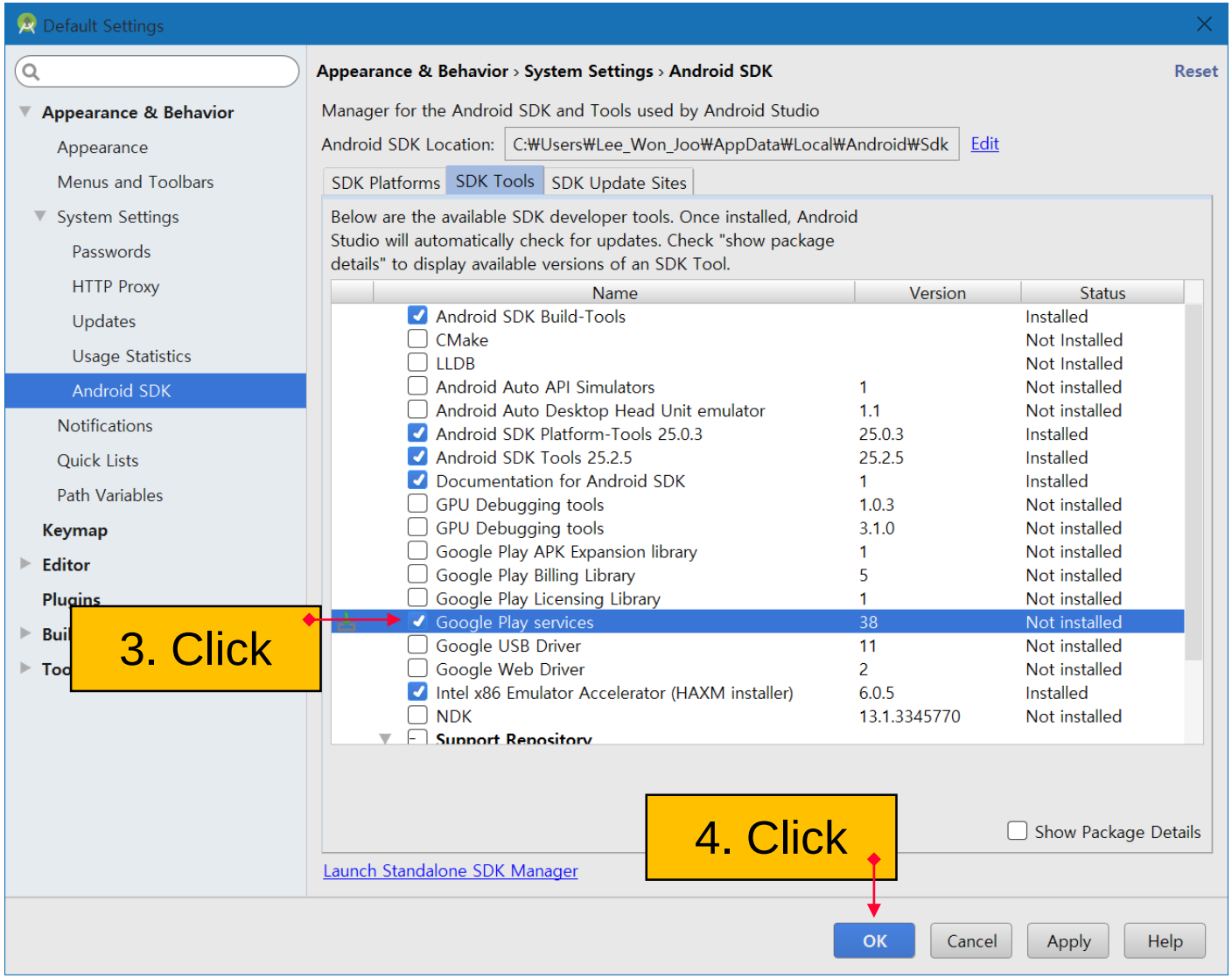
Install Google Play Services (2)

- Select [SDK Tools] Tab



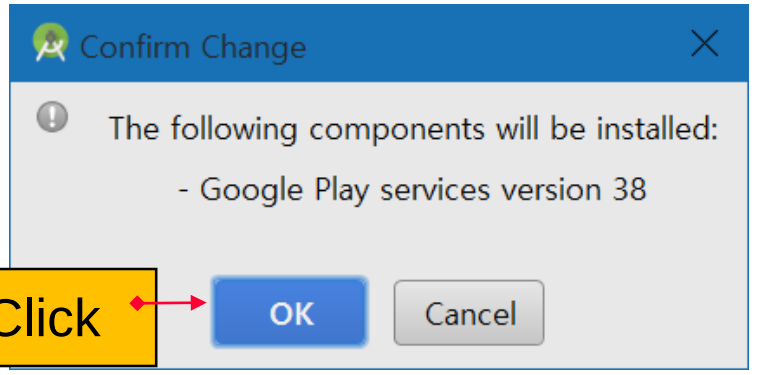
Install Google Play Services (3)

- Select [Google Play Services]

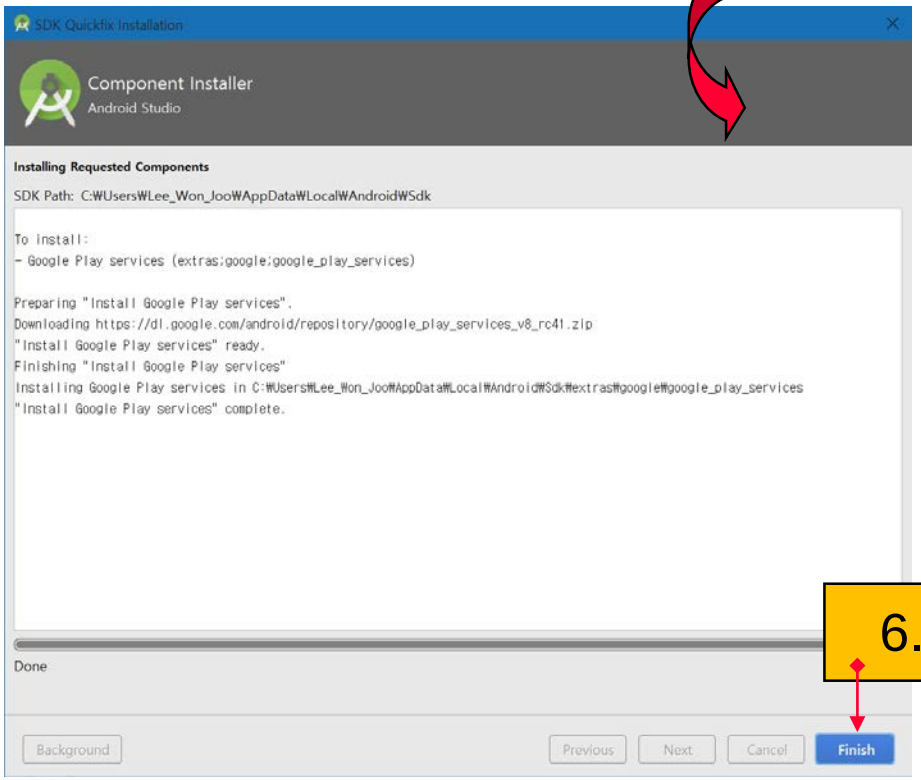


Install Google Play Services (4)

- Install [Google Play Services]



5. Click

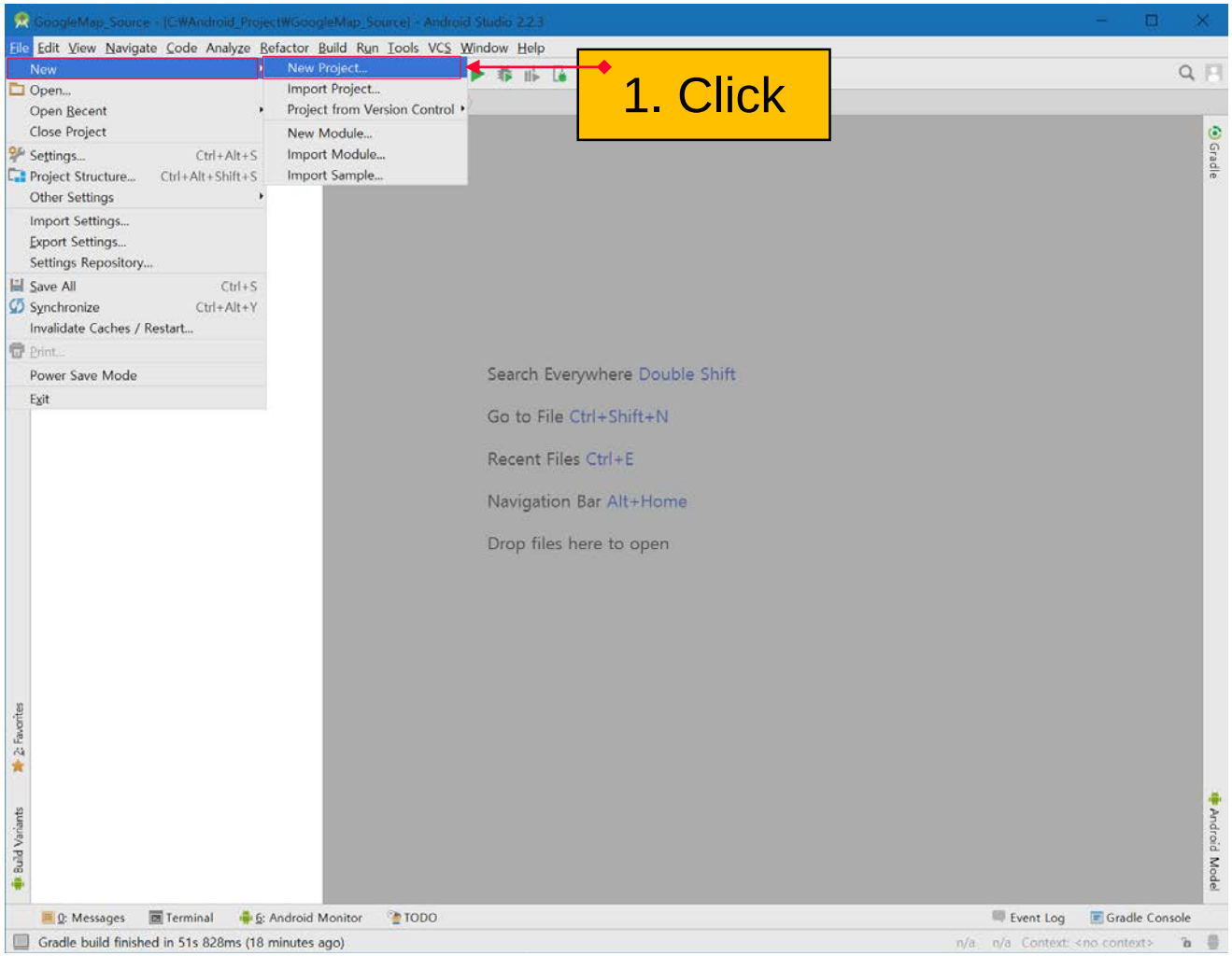


6. Click

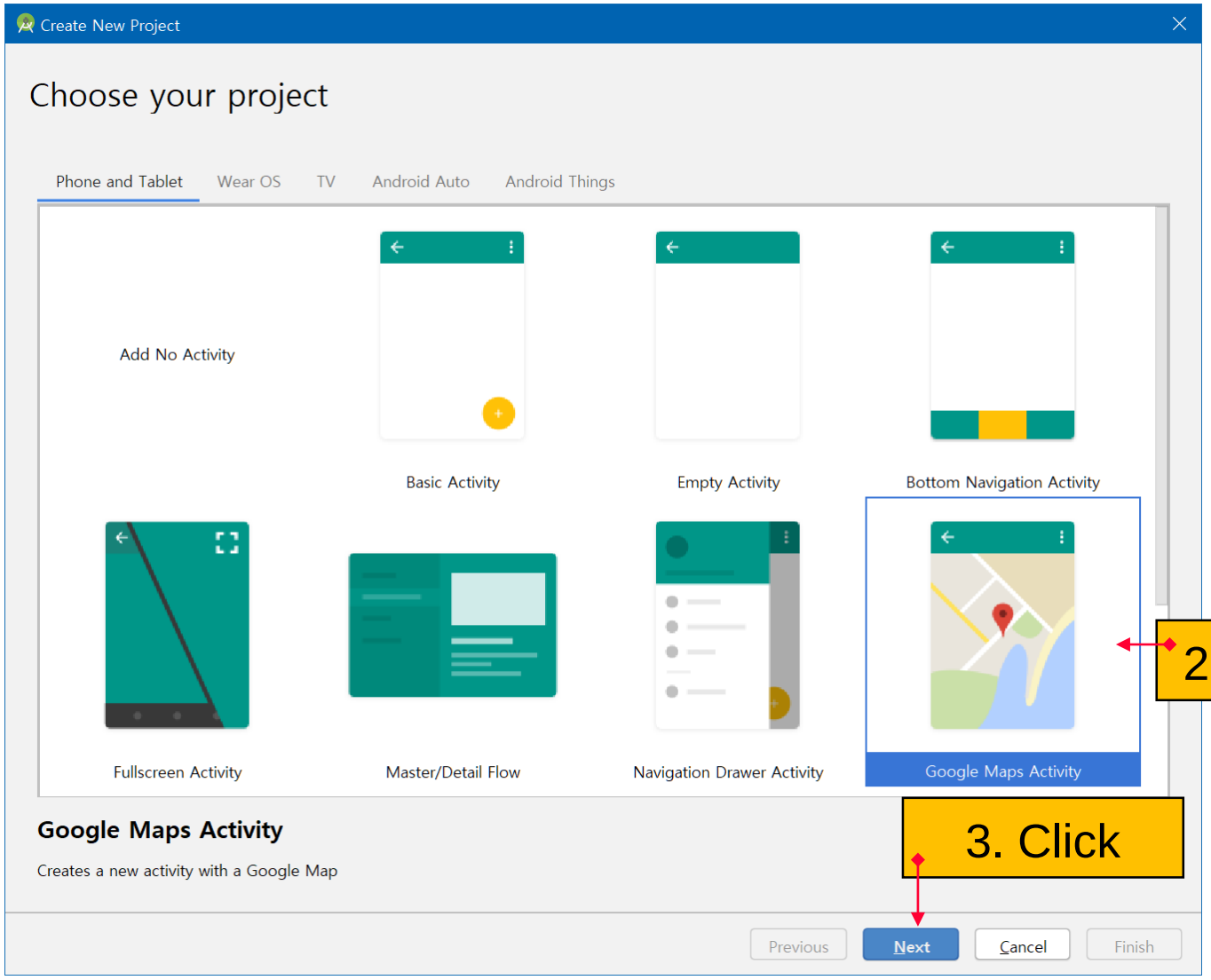
Google Map 구현 (1)

Android 프로젝트 생성

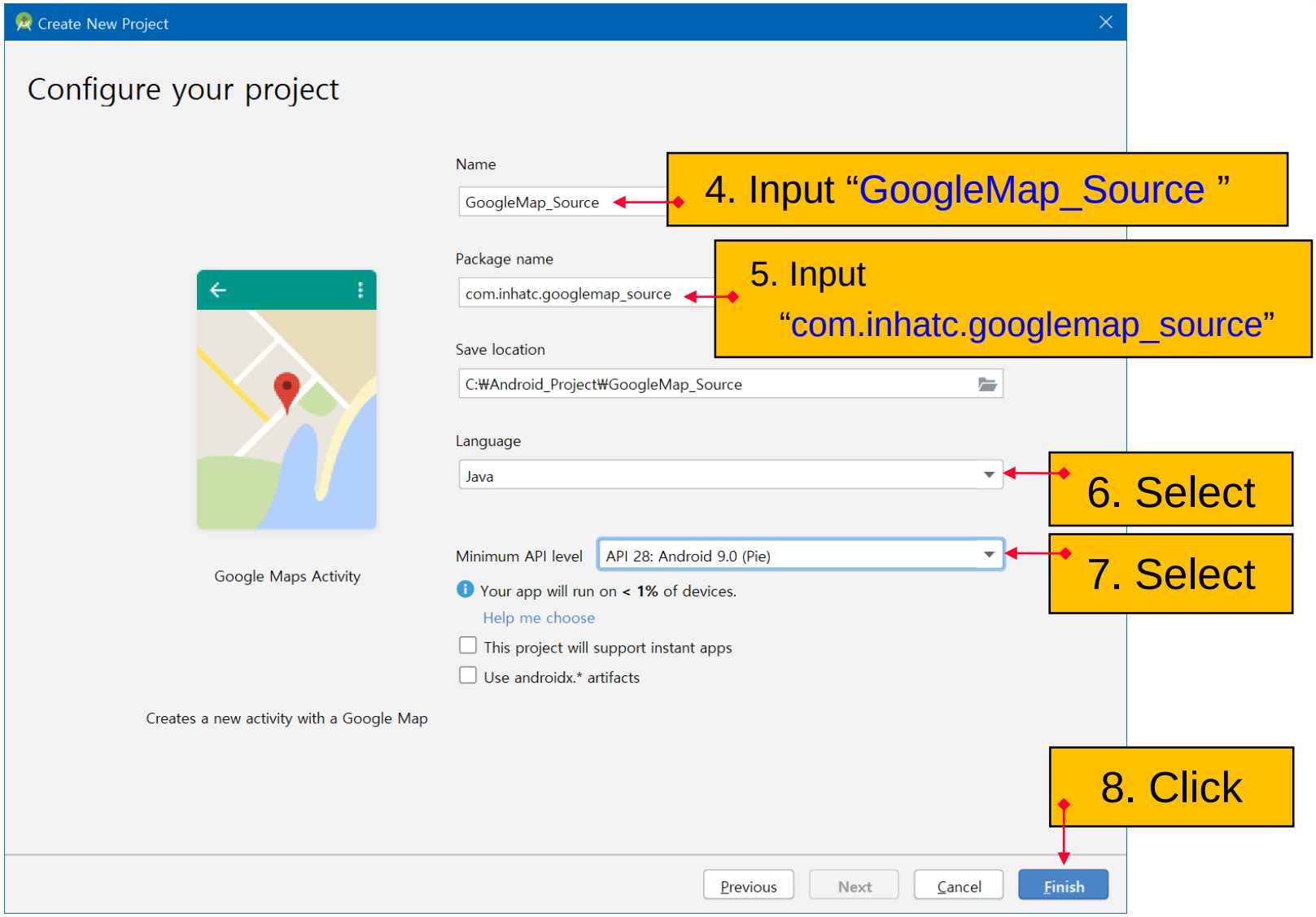
- 프로젝트 명 : GoogleMap_Source



Google Map 구현 (2)

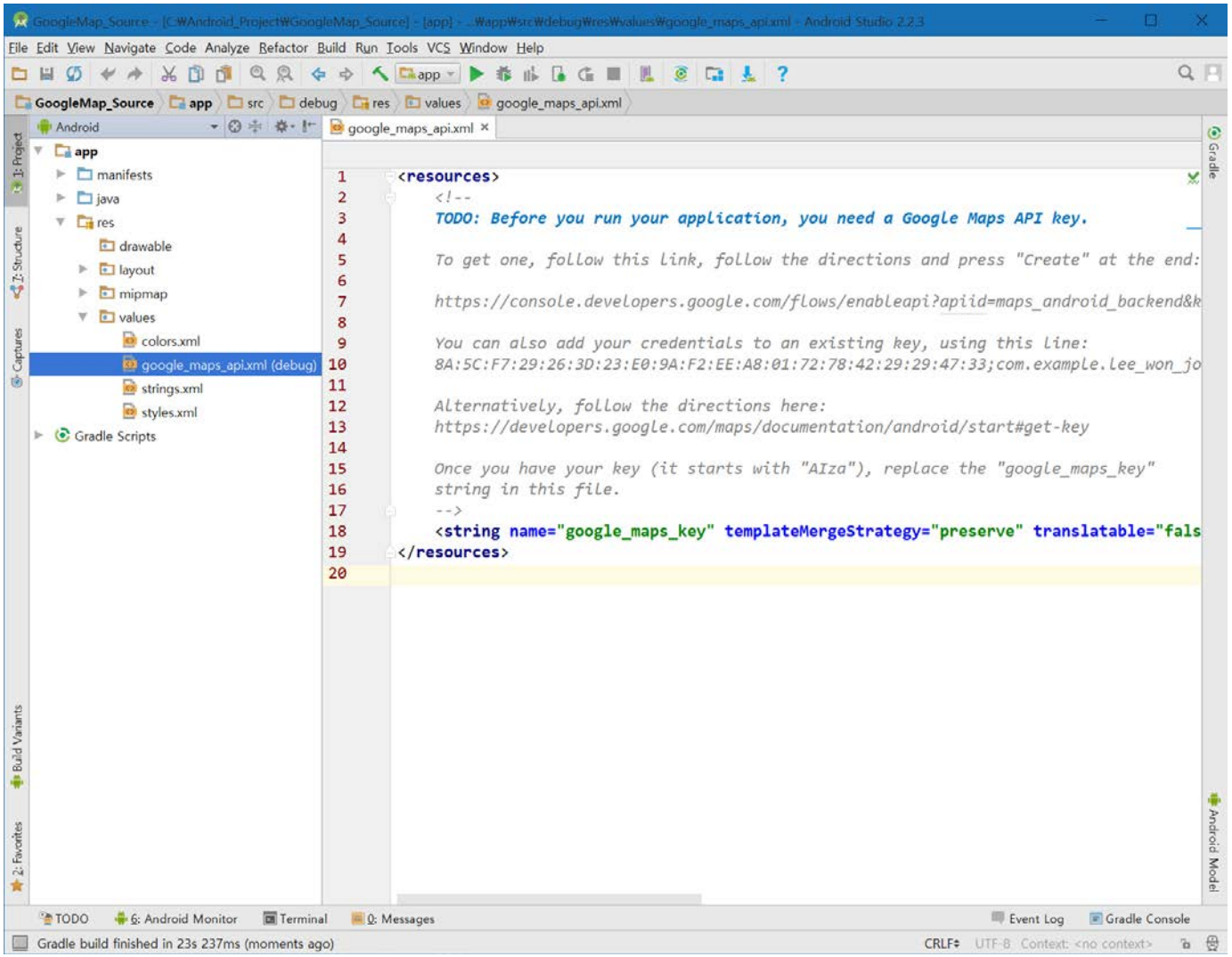


Google Map 구현 (3)



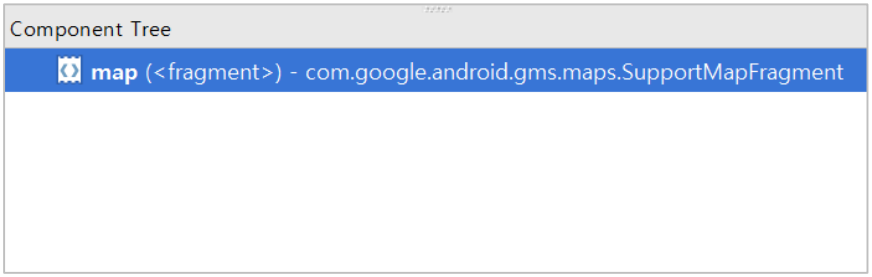
Google Map 구현 (4)

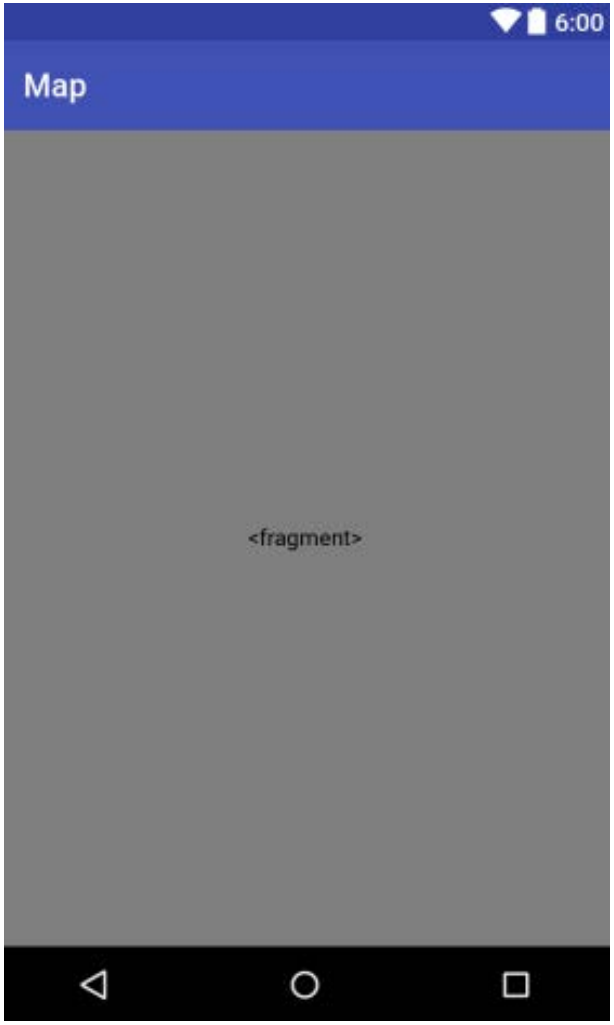
- Android 프로젝트 GoogleMap_Source 생성 완료



Google Map 구현 (5)

UI 설계





Google Map 구현 (6)

Fragment 추가

- activity_maps.xml 수정

activity_maps.xml

```
1  <fragment xmlns:android="http://schemas.android.com/apk/res/android"
2      xmlns:map="http://schemas.android.com/apk/res-auto"
3      xmlns:tools="http://schemas.android.com/tools"
4      android:id="@+id/map"
5      android:name="com.google.android.gms.maps.SupportMapFragment"
6      android:layout_width="match_parent"
7      android:layout_height="match_parent"
8      tools:context="com.example.lee_won_joo.googlemap_source.MapsActivity" />
9
10
```

Design Text

9. XML code 확인

Google Map 구현 (7)

AndroidManifest.xml

AndroidManifest.xml

```
1  <?xml version="1.0" encoding="utf-8"?>
2  <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3      package="com.example.lee_won_joo.googlemap_source">
4
5      <!--...-->
10     <uses-permission android:name="android.permission.ACCESS_FINE_LOCATION" />
11
12     <application
13         android:allowBackup="true"
14         android:icon="@mipmap/ic_launcher"
15         android:label="GoogleMap_Source"
16         android:supportsRtl="true"
17         android:theme="@style/AppTheme">
18
19         <!--...-->
27         <meta-data
28             android:name="com.google.android.geo.API_KEY"
29             android:value="YOUR_KEY_HERE" />
30
31         <activity
32             android:name=".MapsActivity"
33             android:label="Map">
34             <intent-filter>
35                 <action android:name="android.intent.action.MAIN" />
36
37                 <category android:name="android.intent.category.LAUNCHER" />
38             </intent-filter>
39         </activity>
40     </application>
41
42 </manifest>
```

Text | Merged Manifest

10. Uses Permission확인

Google Map 구현 (8)

AndroidManifest.xml

❖ <uses-permission> Tag

- ◆ 애플리케이션이 device data에 접근 허가를 얻기 위한 tag

❖ Format

- ◆ <uses-permission android:name="*android.permission.INTERNET*" />

Field		설명
android.permission.	**INTERNET**	인터넷 접속
	RECEIVE_SMS	SMS 메시지
	ACCESS_COARSE_LOCATION	위치정보(Cell-ID, WiFi)
	ACCESS_FINE_LOCATION	위치정보(GPS)

Google Map 구현 (9)

Source

❖ MapsActivity.java

MapsActivity.java

```
1  package com.example.lee_won_joo.googlemap_source;
2
3  import android.support.v4.app.FragmentActivity;
4  import android.os.Bundle;
5
6  import com.google.android.gms.maps.CameraUpdateFactory;
7  import com.google.android.gms.maps.GoogleMap;
8  import com.google.android.gms.maps.OnMapReadyCallback;
9  import com.google.android.gms.maps.SupportMapFragment;
10 import com.google.android.gms.maps.model.LatLng;
11 import com.google.android.gms.maps.model.MarkerOptions;
12
13 public class MapsActivity extends FragmentActivity implements OnMapReadyCallback {
14
15     private GoogleMap mMap;     //Google Map object
16
17     @Override
18     protected void onCreate(Bundle savedInstanceState) {
19         super.onCreate(savedInstanceState);
20         setContentView(R.layout.activity_maps);
21
22         // Obtain the SupportMapFragment and get notified when the map is ready to be used.
23         SupportMapFragment mapFragment = (SupportMapFragment) getSupportFragmentManager()
24                                                               .findFragmentById(R.id.map);
25         mapFragment.getMapAsync(this);
26     }
27
```

11. Source code 확인

Google Map 구현 (10)

Source 분석

❖ SupportMapFragment Class

◆ A Map component in an app. This fragment is the simplest way to place a map in an application.

static SupportMapFragment	newInstance(GoogleMapOptions options) Creates a map fragment with the given options.
static SupportMapFragment	newInstance() Creates a map fragment, using default options.

activity_maps.xml

```
<fragment xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:map="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:id="@+id/map"
    android:name="com.google.android.gms.maps.SupportMapFragment"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context="com.example.lee_won_joo.googlemap_source.MapsActivity" />
```

Design Text

❖ mapFragment.getMapAsync(this);

Google Map 구현 (11)

- mapFragment.getMapAsync(this);

public void **getMapAsync** (OnMapReadyCallback callback)

Sets a callback object which will be triggered when the `GoogleMap` instance is ready to be used.

Note that:

- This method must be called from the main thread.
- The callback will be executed in the main thread.
- In the case where Google Play services is not installed on the user's device, the callback will not be triggered until the user installs it.
- In the rare case where the GoogleMap is destroyed immediately after creation, the callback is not triggered.
- The `GoogleMap` object provided by the callback is non-null.

Parameters

callback	The callback object that will be triggered when the map is ready to be used.

Google Map 구현 (12)

❖ MapsActivity.java

MapsActivity.java

```
27
28
29      /**
30       * Manipulates the map once available.
31       * This callback is triggered when the map is ready to be used.
32       * This is where we can add markers or lines, add listeners or move the camera. In this case,
33       * we just add a marker near Sydney, Australia.
34       * If Google Play services is not installed on the device, the user will be prompted to install
35       * it inside the SupportMapFragment. This method will only be triggered once the user has
36       * installed Google Play services and returned to the app.
37       */
38      @Override
39      public void onMapReady(GoogleMap googleMap) {
40          mMap = googleMap;
41
42          // Add a marker in Sydney and move the camera
43          LatLng sydney = new LatLng(-34, 151);
44          mMap.addMarker(new MarkerOptions().position(sydney).title("Marker in Sydney"));
45          mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney));
46      }
47  }
48
```

12. Source code 확인

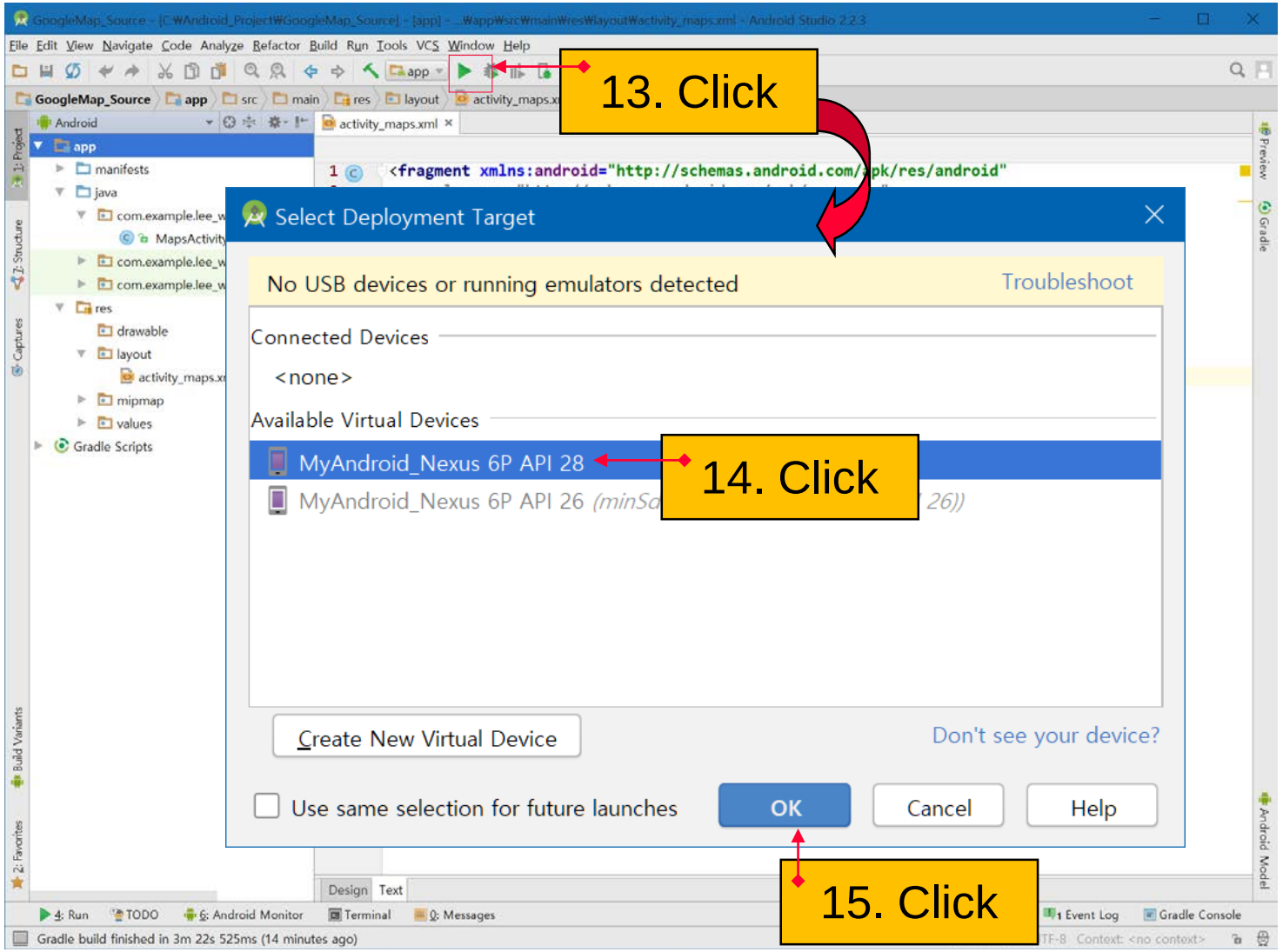
Google Map 구현 (13)

❖ GoogleMap Method()

final Marker	addMarker(MarkerOptions options) Adds a marker to this map.
final CameraPosition	getCameraPosition() Gets the current position of the camera.
IndoorBuilding	getFocusedBuilding() Gets the currently focused building.
final int	getMapType() Gets the type of map that's currently displayed.
final float	getMaxZoomLevel() Returns the maximum zoom level for the current camera position.
final float	getMinZoomLevel() Returns the minimum zoom level.
final Location	getMyLocation() *This method was deprecated. use com.google.android.gms.location.FusedLocationProviderApi instead. FusedLocationProviderApi provides improved location finding and power usage and is used by the "My Location" blue dot. See the MyLocationDemoActivity in the sample applications folder for example example code, or the Location Developer Guide.*
final void	moveCamera(CameraUpdate update) Repositions the camera according to the instructions defined in the update.

Google Map 구현 (14)

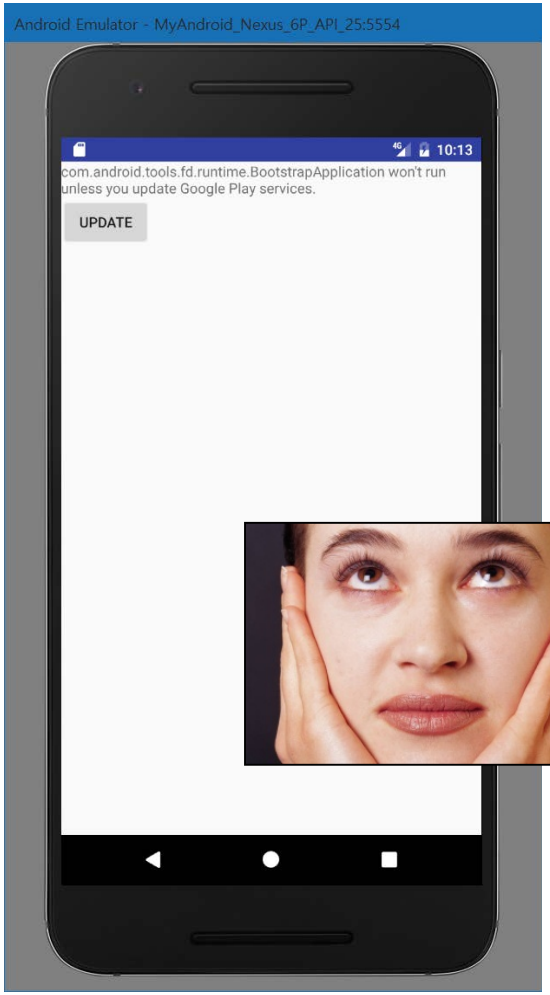
❖ Android 프로젝트 실행



Google Map 구현 (15)

❖ 실행 결과

◆ Emulator



Google Map API Key (1)

- Map API Key 획득 과정
  - ❶ google_maps_api.xml 에서 URL 복사
  - ❷ Chrome/Explorer Edge 에 URL 붙여넣기
  - ❸ Google APIs site에서 License 동의
  - ❹ API Key 생성
  - ❺ API Key 복사
  - ❻ google_maps_api.xml 파일에 API Key 등록

Google Map API Key (2)

- Google Map API Key
  - ❖ Google Map 서비스를 App에서 사용할 수 있도록 지원
- SHA1 fingerprint
  - ❖ google_maps_api.xml

google_maps_api.xml

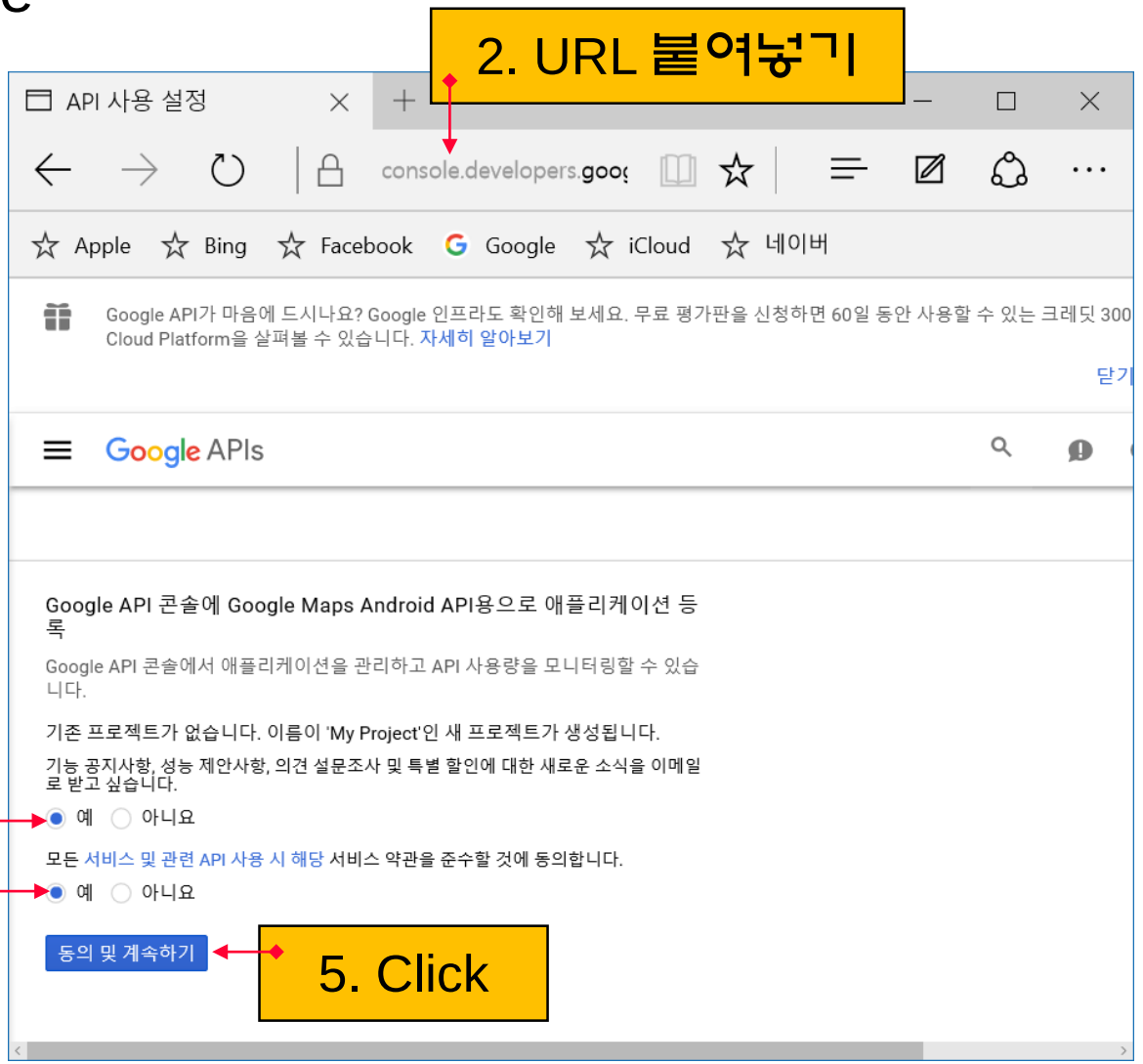
```
1  <resources>
2      <!--
3      TODO: Before you run your application, you need a Google Maps API key.
4
5      To get one, follow this link, follow the directions and press "Create" at the end:
6
7      https://console.developers.google.com/flows/enableapi?apiid=maps_android_backend&keyType=CLIENT_SIDE_ANDROID&
8
9      You can also add your credentials to an existing key, using this line:
10     8A:5C:F7:                                9:29:47:33;com.example.lee_won_joo.googlemap_source
11
12     Alternatively, follow the directions here:
13     https://developers.google.com/maps/documentation/android/start#get-key
14
15     Once you have your key (it starts with "AIza"), replace the "google_maps_key"
16     string in this file.
17     -->
18     <string name="google_maps_key" templateMergeStrategy="preserve" translatable="false">YOUR_KEY_HERE</string>
19 </resources>
20
```

1. URL 복사

SHA1 fingerprint

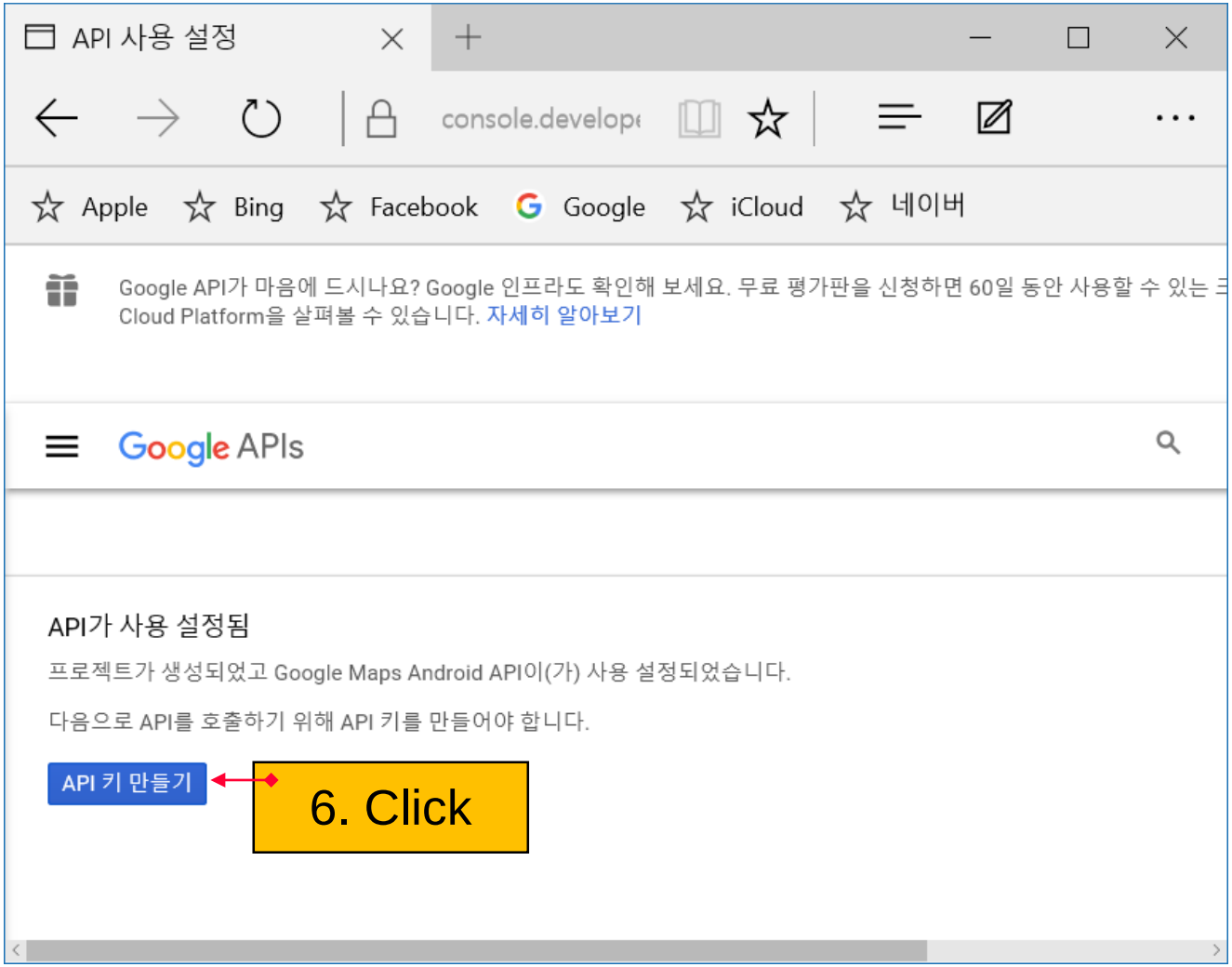
Google Map API Key (3)

- Explorer Edge



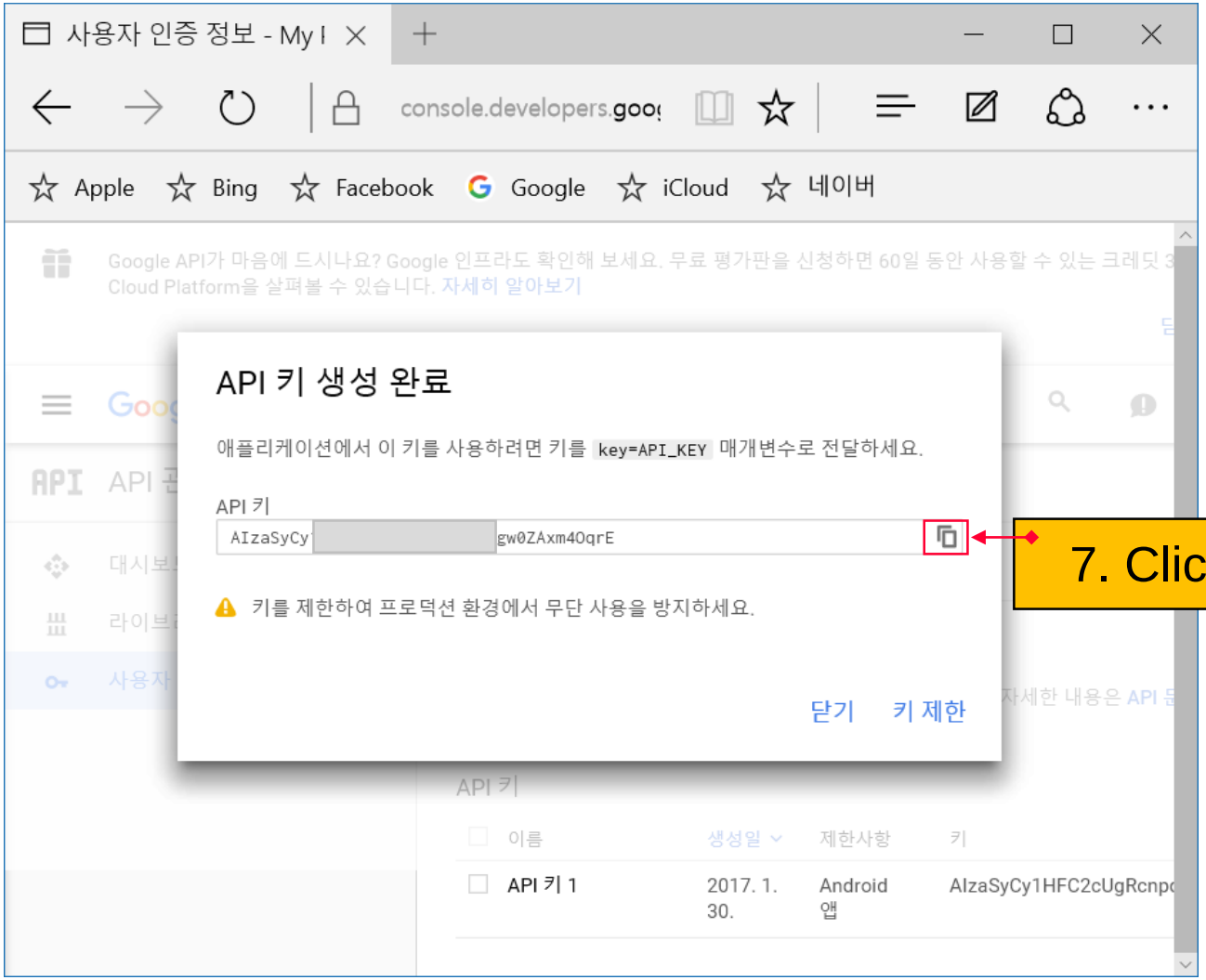
Google Map API Key (4)

❖ Create API Key



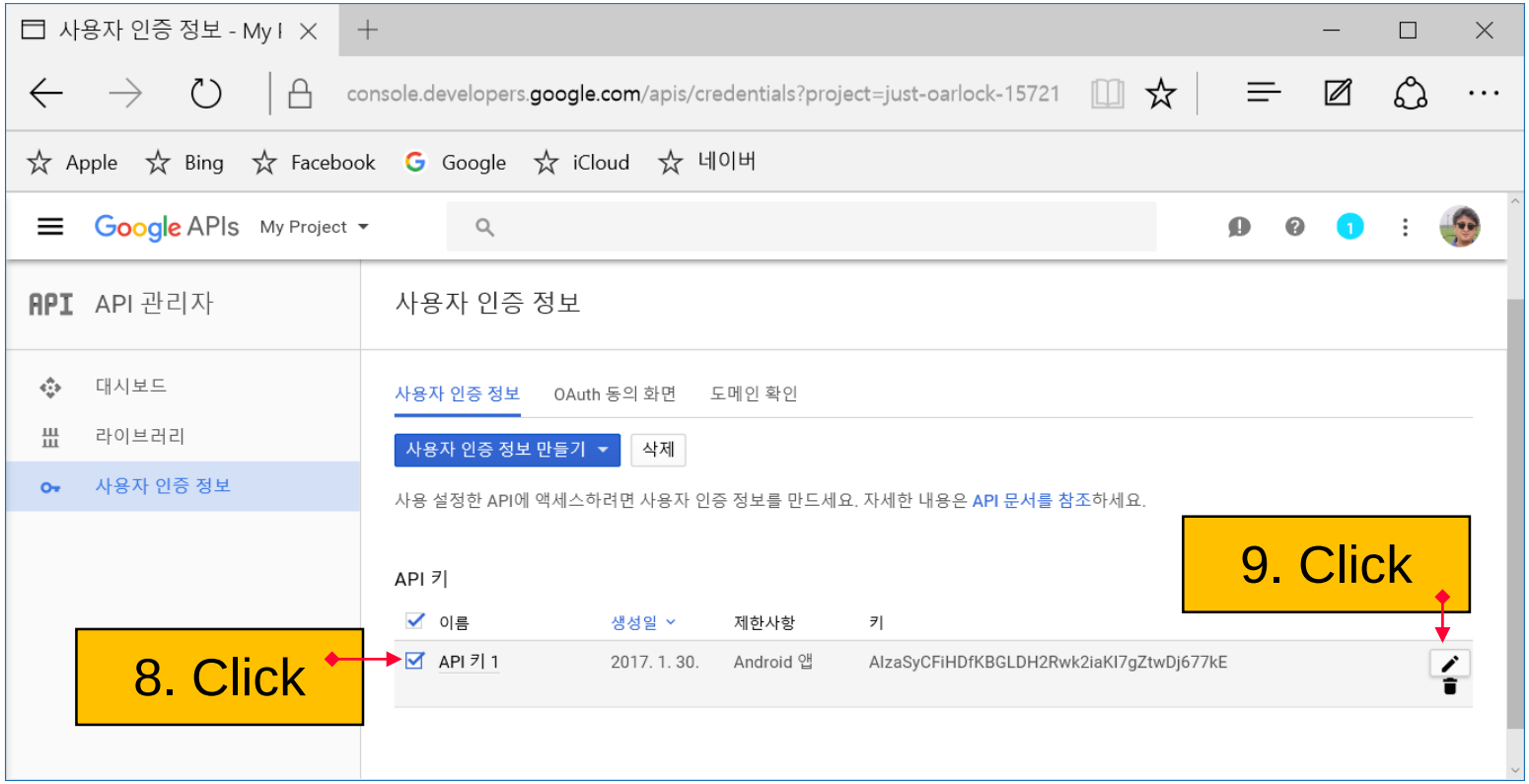
Google Map API Key (5)

❖ Copy API Key

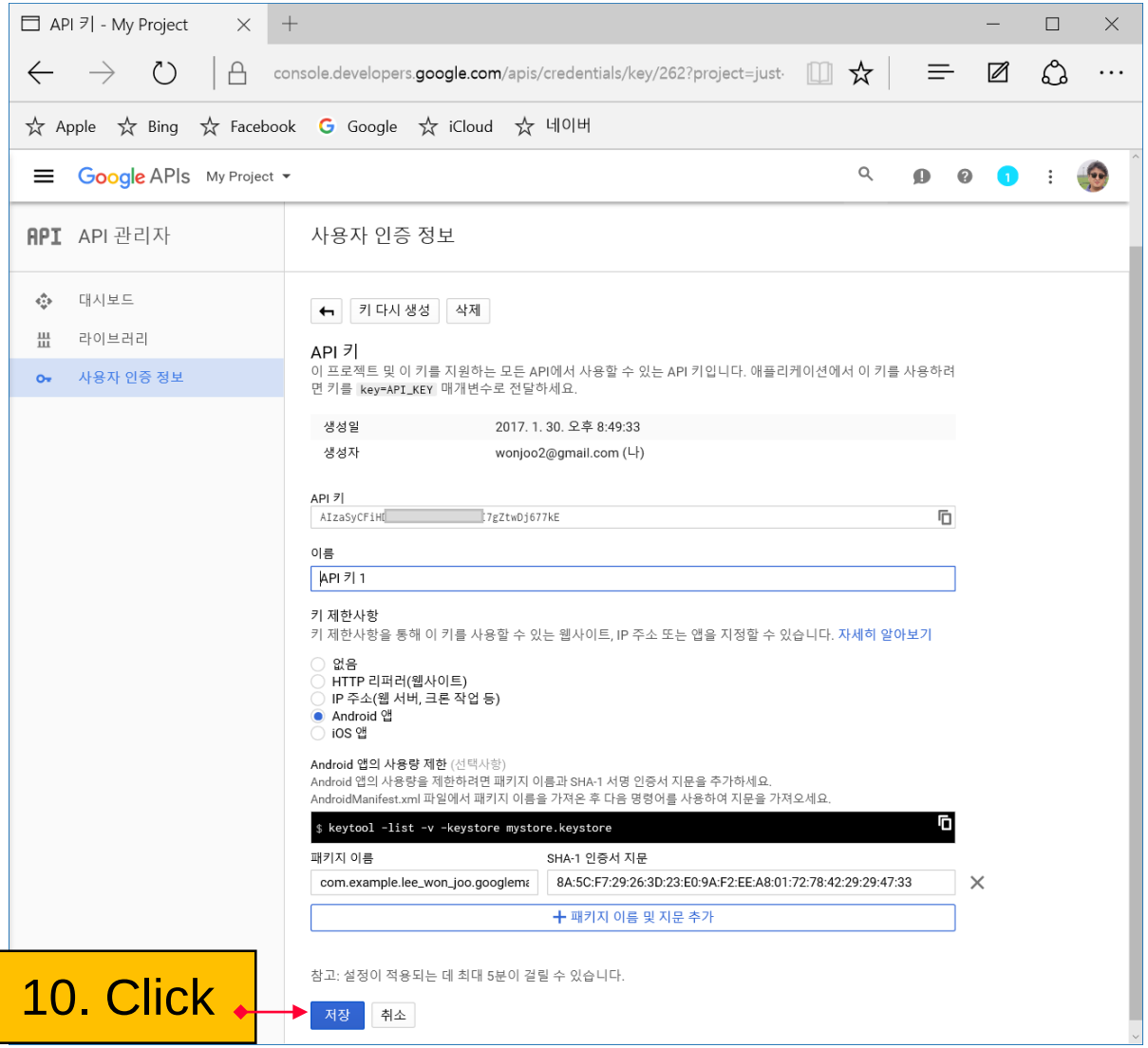


Google Map API Key (6)

❖ 사용자 인증 정보 만들기



Google Map API Key (7)



10. Click

Google Map API Key (10)

- Copy API Key to google_maps_api.xml

google_maps_api.xml

```
1   <resources>
2       <!--...-->
18      <string name="google_maps_key" templateMergeStrategy="preserve"
19          translatable="false">YOUR_KEY_HERE</string>
20  </resources>
21
```

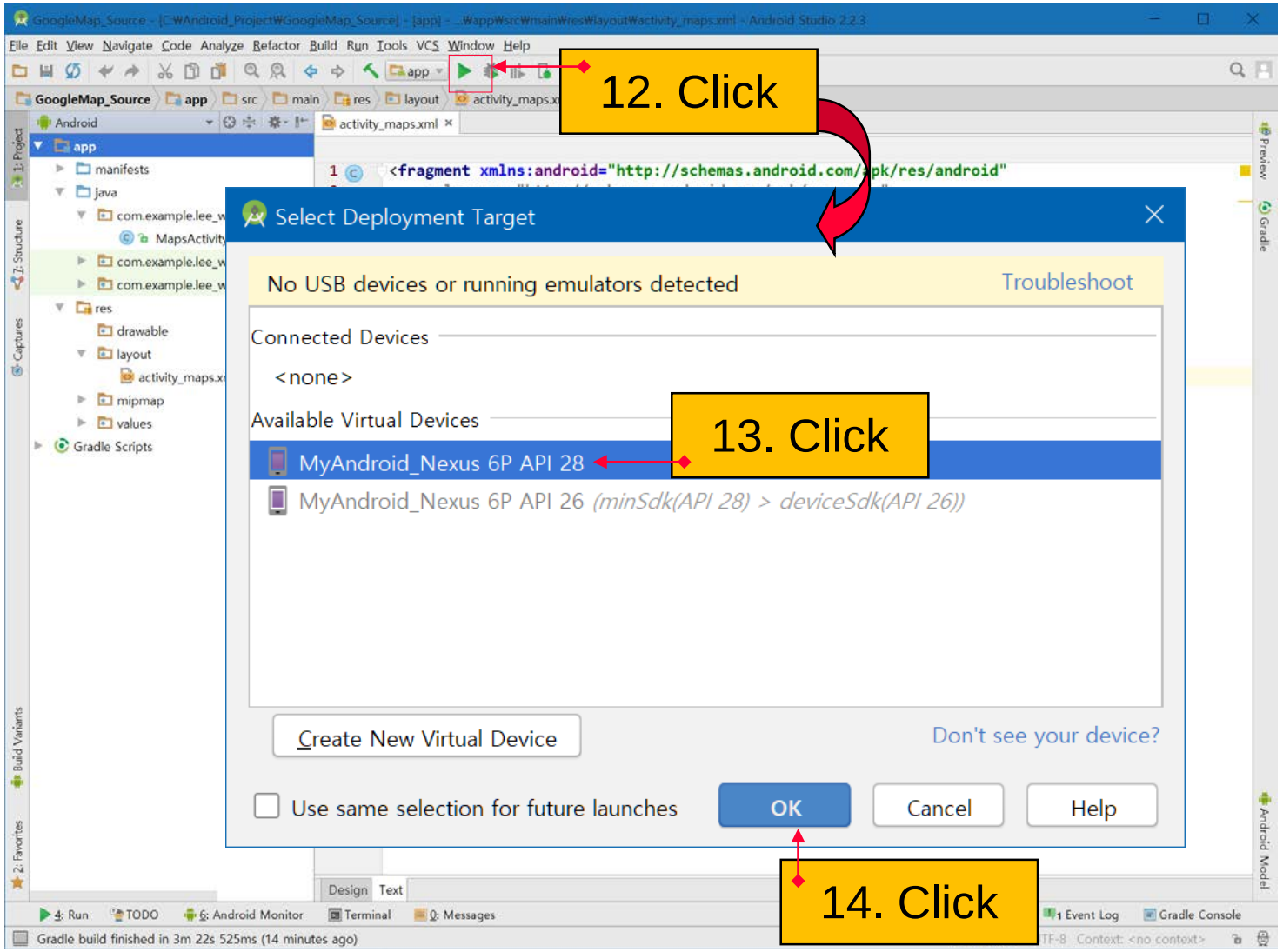
11. Paste

google_maps_api.xml

```
1   <resources>
2       <!--...-->
18      <string name="google_maps_key" templateMergeStrategy="preserve"
19          translatable="false">AIzaSyC                    ZAxm4OqrE</string>
20  </resources>
21
```

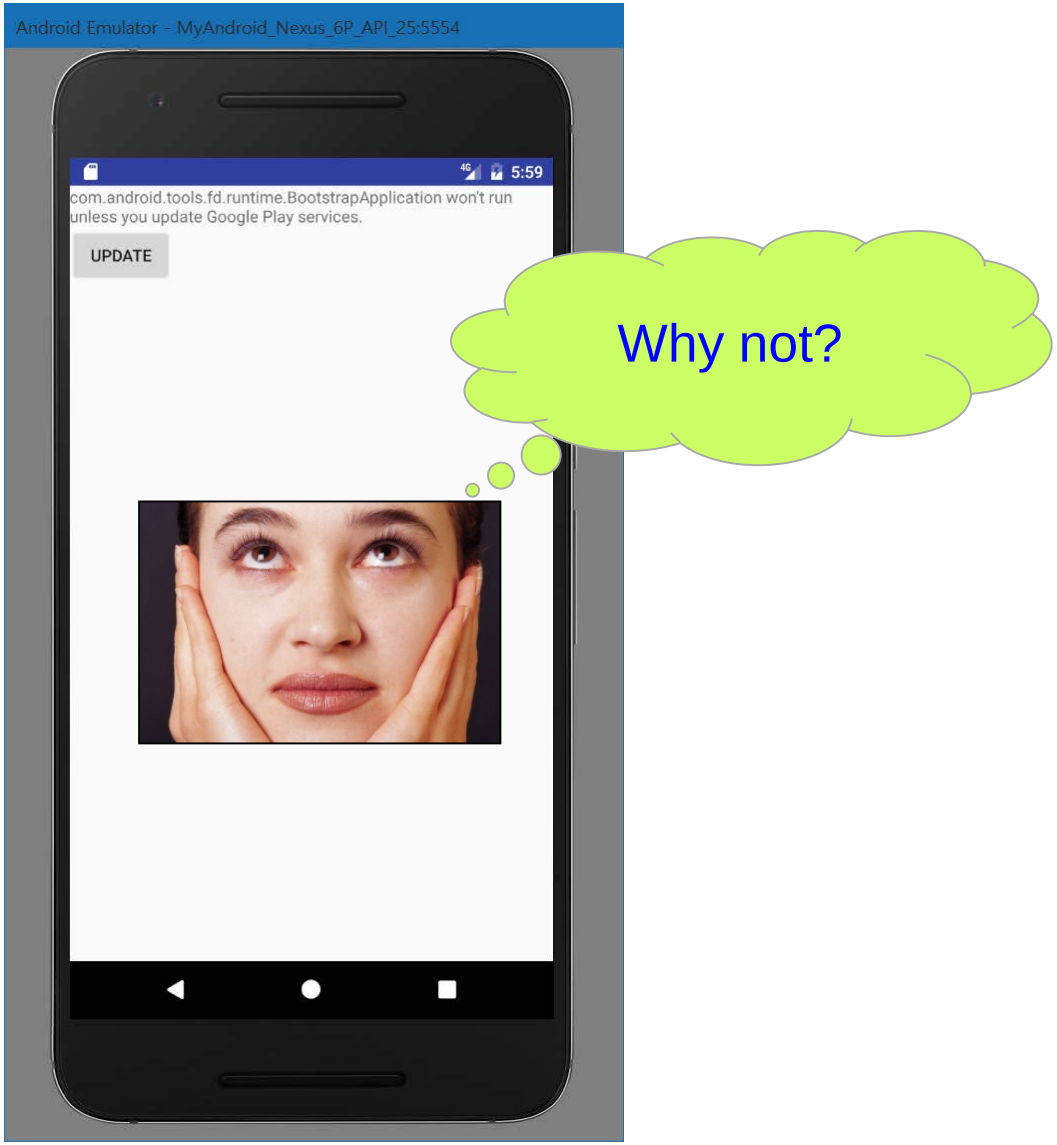
Google Map API Key (11)

❖ Android 프로젝트 실행



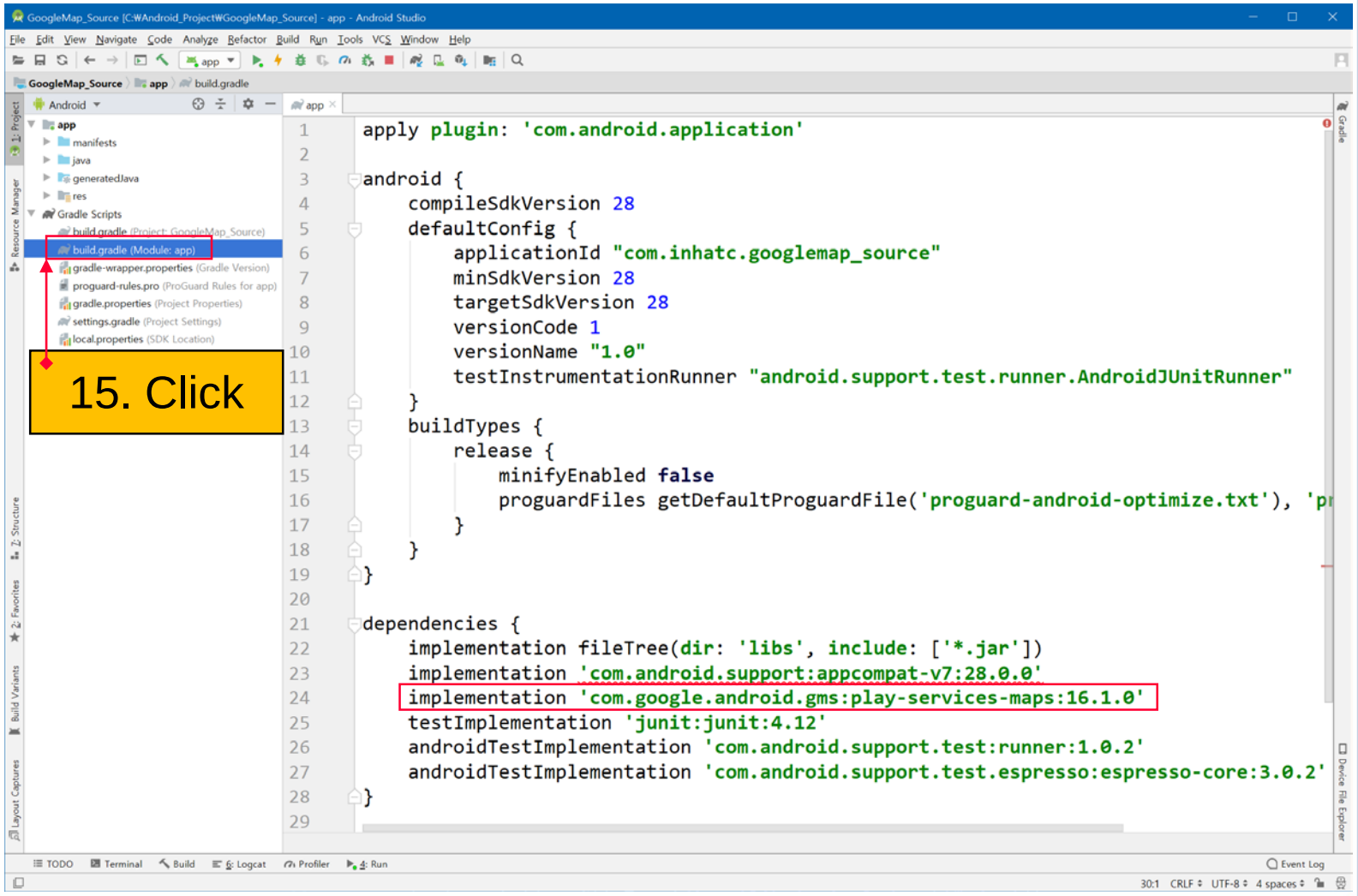
Google Map API Key (12)

❖ 실행 결과



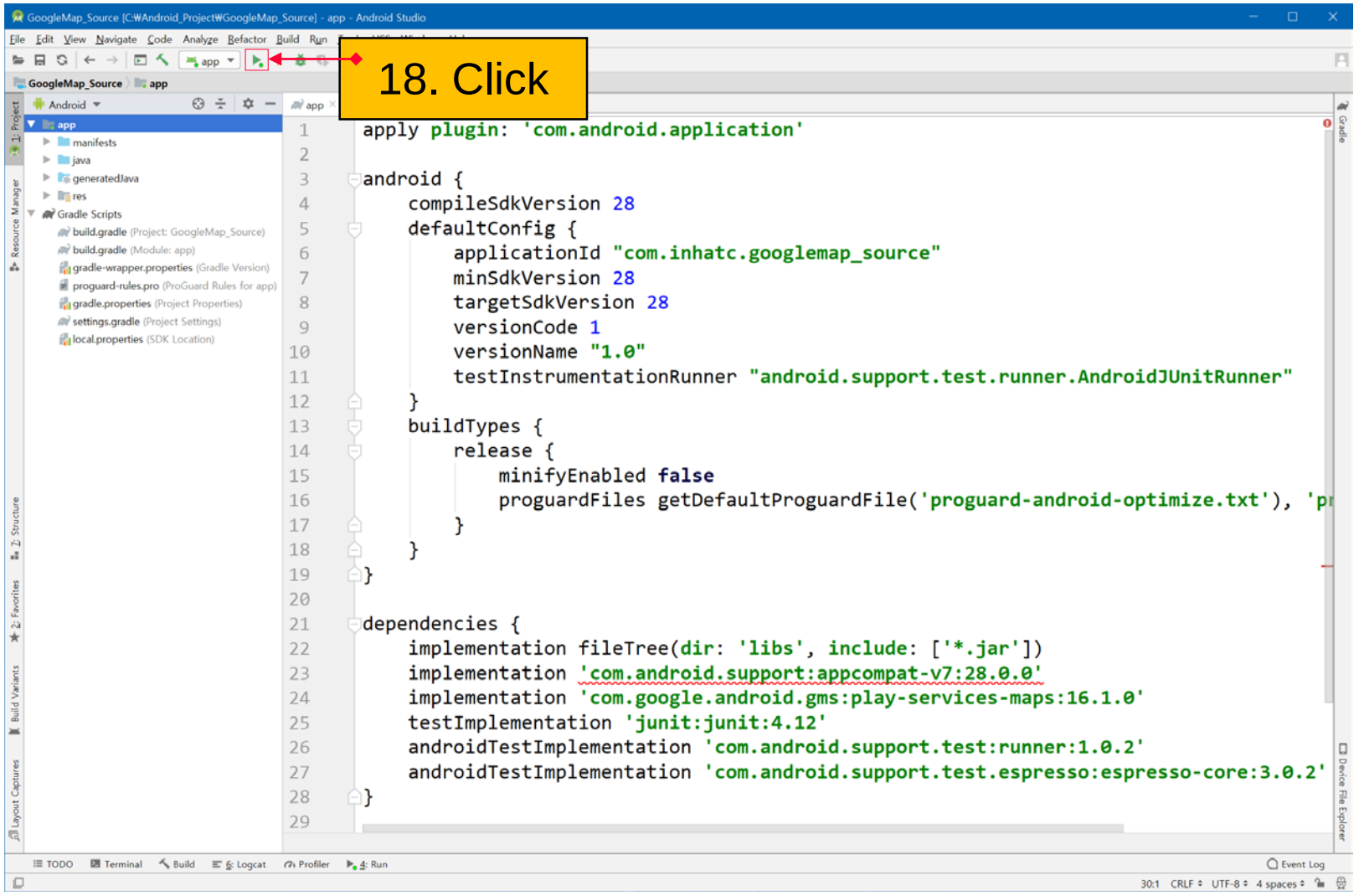
Google Map API Key (13)

- Update build.gradle (Module app)



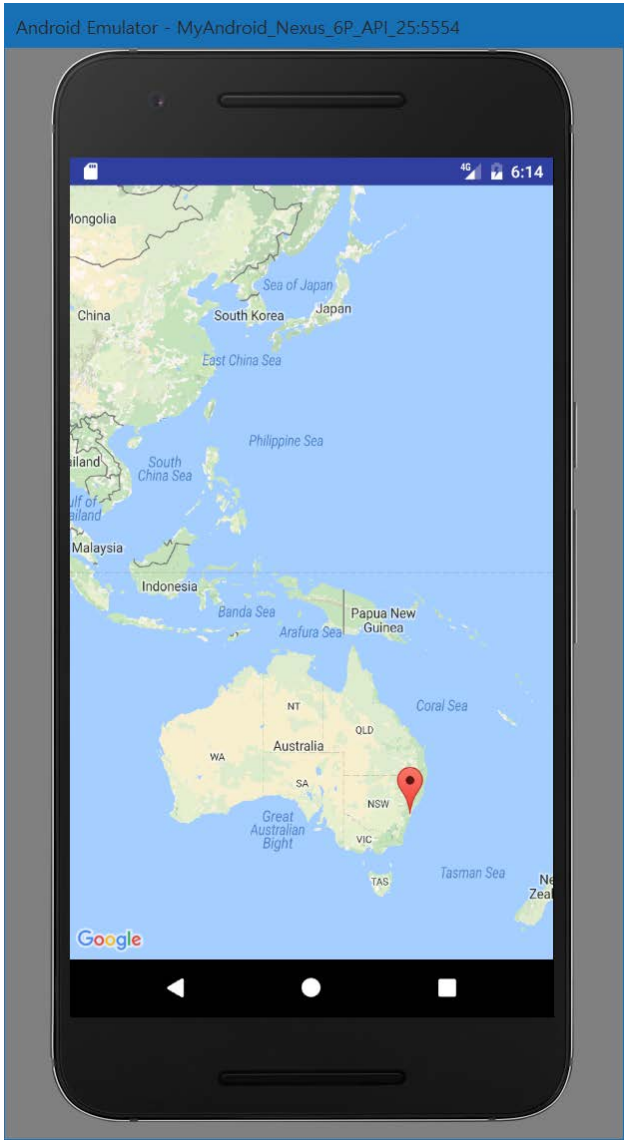
Google Map API Key (14)

❖ Android 프로젝트 실행



Google Map API Key (15)

❖ 실행 결과

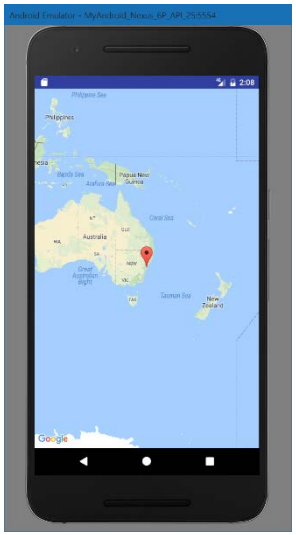


실습 I : Google Map Type 구현

Map Type (실습 시간 : 30분)

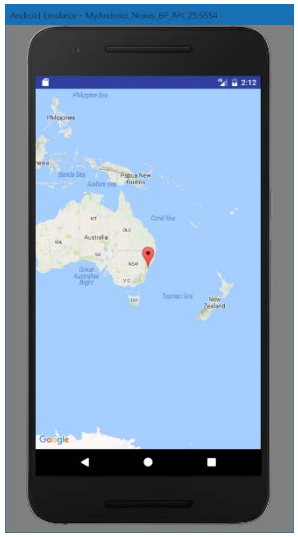
- Project Name : GoogleMap_Source
- Implementation
  - 아래 그림과 같이 Map Type을 출력하도록 구현하시오.

MAP_TYPE_HYBRID

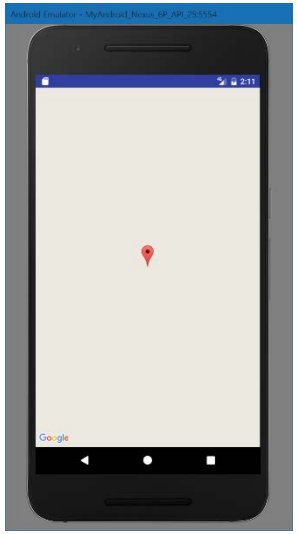


MAP_TYPE_NORMAL

MAP_TYPE_SATELLITE



MAP_TYPE_TERRAIN

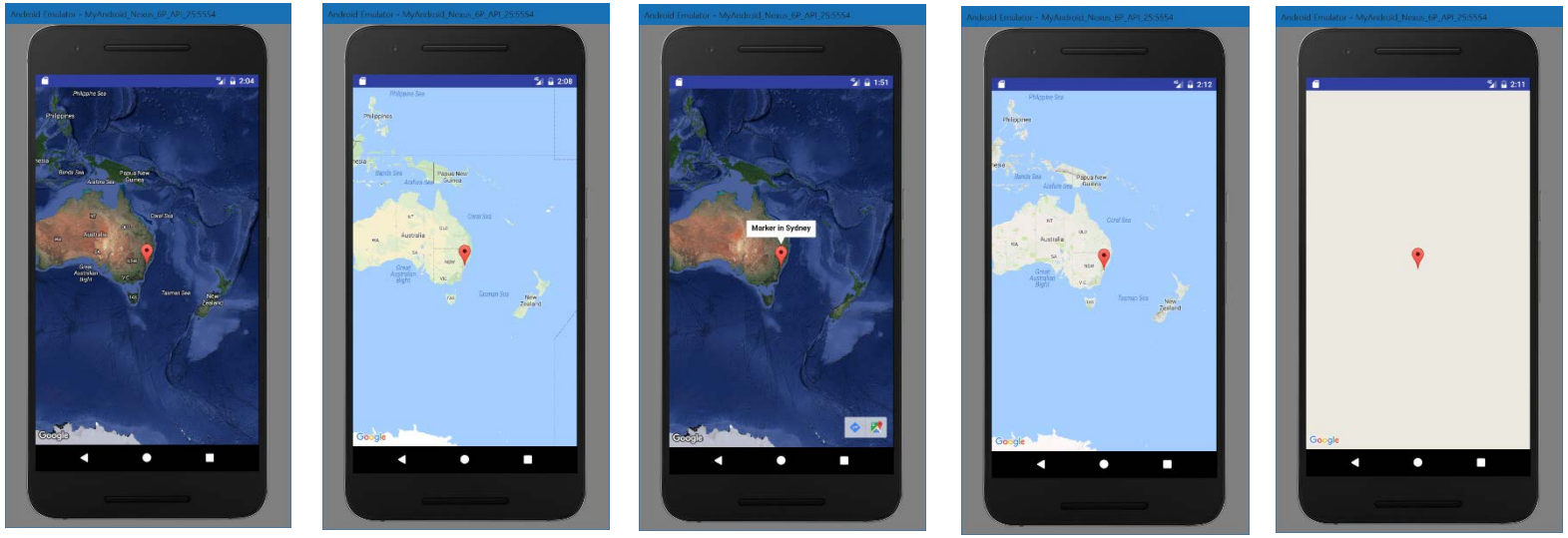


MAP_TYPE_NONE

실습 I : Google Map Type 구현 (1)

Map Type

Method	Comment
MAP_TYPE_HYBRID	하이브리드 지도: 위성사진 데이터와 지형지물 라벨 표시
MAP_TYPE_NORMAL	일반지도: 로드맵, 도로, 강 위에 지형지물 표시
MAP_TYPE_SATELLITE	위성사진 지도: 위성사진 데이터 표시, 지형지물 라벨 표시 않됨
MAP_TYPE_TERRAIN	지형지도: 지형 데이터, 지도색, 등고선 라벨 표시
MAP_TYPE_NONE	지도 표시되지 않음



실습 I : Google Map Type 구현 (2)

❖ MapsActivity.java

MapsActivity.java

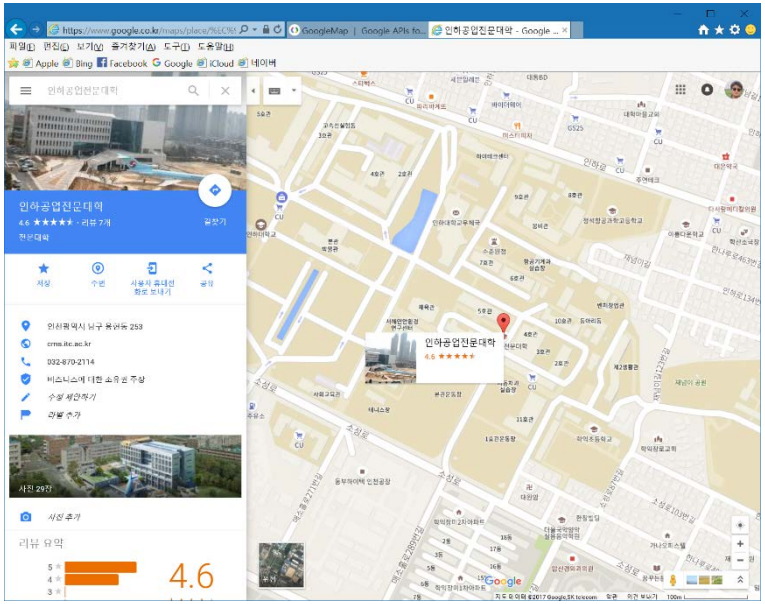
```
28
29      /**...*/
38      @Override
39      public void onMapReady(GoogleMap googleMap) {
40          mMap = googleMap;
41
42          // Add a marker in Sydney and move the camera
43          LatLng sydney = new LatLng(-34, 151);
44          mMap.addMarker(new MarkerOptions().position(sydney).title("Marker in Sydney"));
45          mMap.moveCamera(CameraUpdateFactory.newLatLng(sydney));
46
47          //Set Satellite Map
48          mMap.setMapType(GoogleMap.MAP_TYPE_SATELLITE);
49      }
50  }
51
```

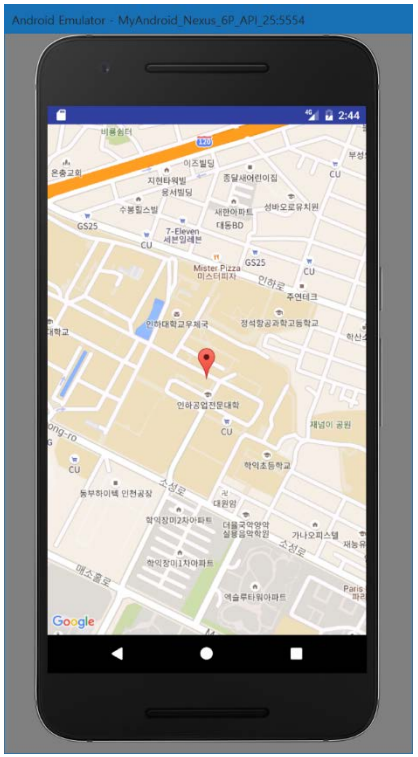
Coding

실습 II : Latitude/Longitude 구현

Latitude/Longitude (실습 시간 : 30분)

- Project Name : GoogleMap_Source
- Implementation
  - 아래 그림과 같이 "인하공업전문대학"을 출력하도록 구현하시오.
    - **Latitude: 37.448344**
    - **Longitude: 126.657474**





실습 II : Latitude/Longitude 구현

❖ MapsActivity.java

MapsActivity.java

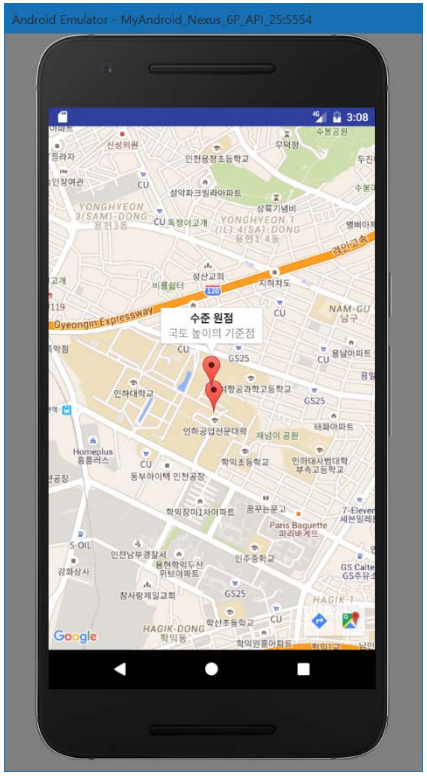
```
29
30      /**...*/
39      @Override
40      public void onMapReady(GoogleMap googleMap) {
41          mMap = googleMap;
42
43          double latitude = 37.448344;
44          double longitude = 126.657474;
45          LatLng objLocation;
46
47          objLocation = new LatLng(latitude, longitude);
48
49          // Add a marker in Inha Technical College and move the camera
50          mMap.addMarker(new MarkerOptions().position(objLocation).title("Inha Technical College"));
51          mMap.moveCamera(CameraUpdateFactory.newLatLng(objLocation));
52          mMap.moveCamera(CameraUpdateFactory.zoomTo(16));
53
54          //Set Satellite Map
55          mMap.setMapType(GoogleMap.MAP_TYPE_NORMAL);
56      }
57  }
58
```

Coding

실습 III : Multi-Marker 구현

Multi-Marker (실습 시간 : 30분)

- Project Name : GoogleMap_Source
- Implementation
  - 아래 그림과 같이 "인하공업전문대학" 과 "수준 원점"을 Multi-Marker로 출력하도록 구현하시오.
    - **Latitude: 37.449402**
    - **Longitude: 126.657348**



실습 III : Multi-Marker 구현

❖ MapsActivity.java

MapsActivity.java

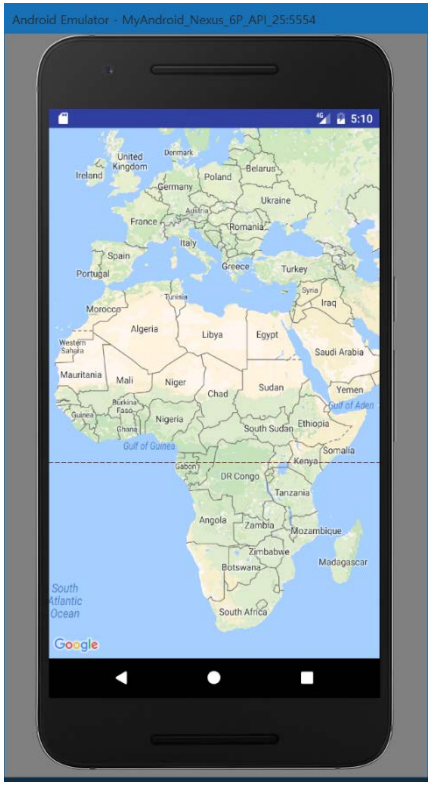
```
29
30      /**...*/
39      @Override
40      public void onMapReady(GoogleMap googleMap) {
41          mMap = googleMap;
42
43          double latitude = 37.448344;
44          double longitude = 126.657474;
45          LatLng objLocation;
46
47          objLocation = new LatLng(latitude, longitude);
48
49          // Add a marker in Inha Technical College and move the camera
50          Marker objMK1 = mMap.addMarker(new MarkerOptions()
51                                  .position(objLocation)
52                                  .title("Inha Technical College")
53                                  .snippet("INHATC"));
54
55          latitude = 37.449402;
56          longitude = 126.657348;
57          objLocation = new LatLng(latitude, longitude);
58
59          // Add a marker in Inha Technical College and move the camera
60          Marker objMK2 = mMap.addMarker(new MarkerOptions()
61                  .position(objLocation)
62                  .title("수준 원점")
63                  .snippet("국토 높이의 기준점"));
64
65          objMK2.showInfoWindow();
66          mMap.moveCamera(CameraUpdateFactory.newLatLng(objLocation));
67          mMap.moveCamera(CameraUpdateFactory.zoomTo(15));
68
69          //Set Satellite Map
70          mMap.setMapType(GoogleMap.MAP_TYPE_NORMAL);
71      }
72  }
73
```

Coding

실습 IV : Current Position 구현

Current Position (실습 시간 : 60분)

- Project Name : GoogleMap_Source
- Implementation
  - 아래 그림과 같이 현재 위치를 실시간으로 출력하도록 구현하시오.



실습 IV : Current Position 구현 (1)

❖ MapsActivity.java

MapsActivity.java

```
1  package com.example.lee_won_joo.googlemap_source;
2
3  import ...
22
23 public class MapsActivity extends FragmentActivity implements OnMapReadyCallback {
24
25     private GoogleMap mMap;     //Google Map object
26
27     @Override
28     protected void onCreate(Bundle savedInstanceState) {
29         super.onCreate(savedInstanceState);
30         setContentView(R.layout.activity_maps);
31
32         // Obtain the SupportMapFragment and get notified when the map is ready to be used.
33         SupportMapFragment mapFragment = (SupportMapFragment) getSupportFragmentManager()
34                 .findFragmentById(R.id.map);
35         mapFragment.getMapAsync(this);
36
37     }
38
```

1. Coding

실습 IV : Current Position 구현 (2)

MapsActivity.java

```
49  public void onMapReady(GoogleMap googleMap) {
50      mMap = googleMap;
51      long minTime = 1000;
52      float minDistance = 1;
53
54      mMap.setMapType(googleMap.MAP_TYPE_NORMAL);
55
56      LocationManager locationManager = (LocationManager) this.
57              getSystemService(Context.LOCATION_SERVICE);
58
59      //Event Handler
60      LocationListener locationListener = new LocationListener() {
61          //Automatically calling when current position changed
62          public void onLocationChanged(Location location) {
63              updateMap(location);
64          }
65          //Automatically calling when provider status changed
66          public void onStatusChanged(String provider, int status, Bundle extras) {
67              alertStatus(provider);
68          }
69          //Automatically calling when provider enable status
70          public void onProviderEnabled(String provider) {
71              alertProvider(provider);
72          }
73          //Automatically calling when provider disable status
74          public void onProviderDisabled(String provider) {
75              checkProvider(provider);
76          }
77      };
78
79      String strLocationProvider = LocationManager.NETWORK_PROVIDER;
80      if (ActivityCompat.checkSelfPermission(this,
81              android.Manifest.permission.ACCESS_COARSE_LOCATION) !=
82              PackageManager.PERMISSION_GRANTED) {
83          return;
84      }
85      locationManager.requestLocationUpdates(strLocationProvider,
86                                             minTime, minDistance, locationListener);
87  }
88
```

2. Coding

실습 IV : Current Position 구현 (3)

3. Coding

MapsActivity.java

```
88
89      public void updateMap(Location location) {
90          double latitude = location.getLatitude();
91          double longitude = location.getLongitude();
92          final LatLng objLocation = new LatLng(latitude, longitude);
93
94          mMap.animateCamera(CameraUpdateFactory.newLatLngZoom(objLocation, 15));
95          Marker objMK = mMap.addMarker(new MarkerOptions()
96                  .position(objLocation)
97                  .title("Current Position"));
98          objMK.showInfoWindow();
99      }
100
101     public void checkProvider(String strProvider) {
102         Toast.makeText(this, strProvider + "에 의한 turn off position service. " +
103                 "Please Turn on position service...", Toast.LENGTH_SHORT).show();
104         //Create Intent to setting provider
105         Intent objIntent = new Intent(android.provider.Settings.ACTION_LOCATION_SOURCE_SETTINGS);
106         startActivity(objIntent);
107     }
108
109     public void alertProvider(String strProvider) {
110         Toast.makeText(this, strProvider + "Starting Position service !",
111                         Toast.LENGTH_LONG).show();
112     }
113
114     public void alertStatus(String strProvider) {
115         Toast.makeText(this, "Changing position service : " + strProvider,
116                 Toast.LENGTH_LONG).show();
117     }
118 }
119
```

학습 요약

- Google Map
- Google Map View
- Install Google Play Services
- Google Map 구현
- Google Map API Key
- Practice
  - 실습 I: Google Map Type 구현
  - 실습 II: Latitude/Longitude 구현
  - 실습 III: Multi-Marker 구현
  - 실습 IV: Current Position 구현