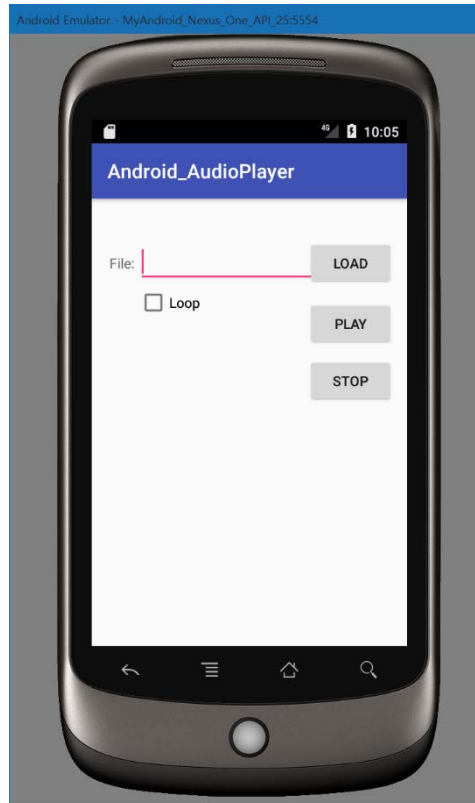




android



Multimedia

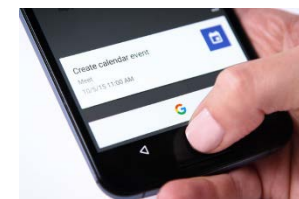
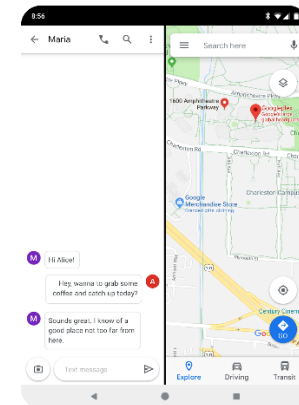
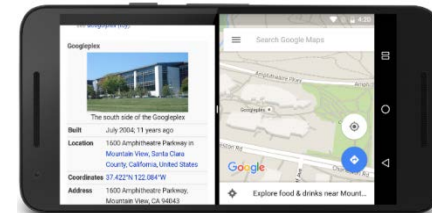




학습 목표

교육 목표

- ❖ Android Multimedia
- ❖ Android Audio 재생 구현
 - ◆ Service 이용
- ❖ 실습 I : Audio Player 구현
 - ◆ MediaPlayer 이용
- ❖ Emulator : SD card 설정





Android Multimedia (1)

■ Android 지원 Audio 형식

- ❖ WAV (PCM 압축되지 않음)

- ❖ AAC (iPod 포맷, 보호 안됨)

- ❖ MP3 (MPEG-3)

 - ◆ 음성은 모노, 음악은 스테레오

- ❖ WMA (Windows Media Audio)

- ❖ AMR (음성 코덱)

- ❖ OGG (Ogg Vorbis)

 - ◆ 게임 음향 효과와 같은 짧은 클립에 적합

- ❖ MIDI (악기)

- ❖ 대부분의 에뮬레이터에서 제대로 동작하는 포맷

 - ◆ OGG, WAV, MP3 포맷

- ❖ 기본 오디오 포맷은 44.1 KHZ, 16 비트 스테레오 오디오





Android Multimedia (2)

■ MediaPlayer 객체 사용 과정

① `import android.media.MediaPlayer;`

② MediaPlayer 객체 생성

`MP = new MediaPlayer();` // MediaPlayer 객체 생성

③ `setDataSource()`를 사용하여 audio 파일 Load

`MP.setDataSource(File_Path);`

④ `prepare()` 메소드를 이용하여 사용할 준비

`MP.prepare();` // Audio File 준비

⑤ `start()` 메소드로 재생

`MP.start();`

⑥ MediaPlayer의 각종 메소드로 재생 컨트롤

`MP.pause();` // Pause

⑦ MediaPlayer 객체 소멸 (Garbage collection)

`MP.release();` // MediaPlayer 객체 Release





Android Multimedia (3)

■ Android 지원 Video 형식

- ❖ MP4 (MPEG-4 낮은 비트 속도)
- ❖ H.263
- ❖ H.264 (AVC)
- ❖ 윈도우 SDK 상에서는 MP4 만이 안정적으로 동작





Android Multimedia (4)

■ SD card

❖ 경로 얻기

◆ `android.os.Environment.getExternalStorageDirectory().getAbsolutePath();`

```
명령 프롬프트 - adb shell

C:\Users\Lee_Won_Joo>cd c:\Android\SDK\platform-tools

c:\Android\SDK\platform-tools>adb shell
# ls
ls
acct
cache
config
d
data
default.prop
dev
etc
init
init.goldfish.rc
init.rc
mnt
proc
root
sbin
sdcard
sys
system
ueventd.goldfish.rc
ueventd.rc
vendor
#
```

1. platform-tools 디렉토리 이동
`cd c:\Android\SDK\platform-tools`

2. adb shell 실행

3. ls 실행

4. data 폴더 확인

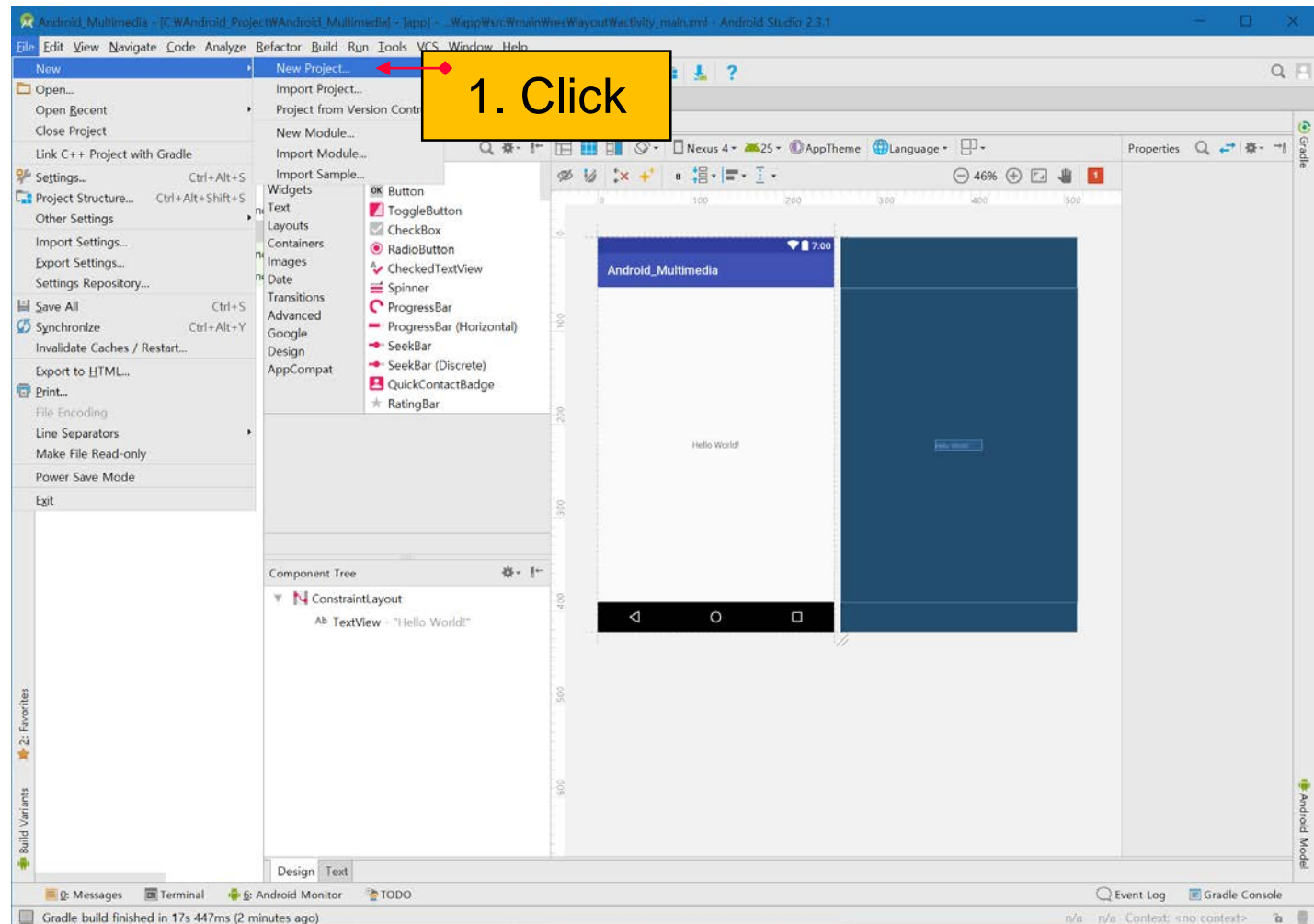




Android Audio 재생 구현 (1)

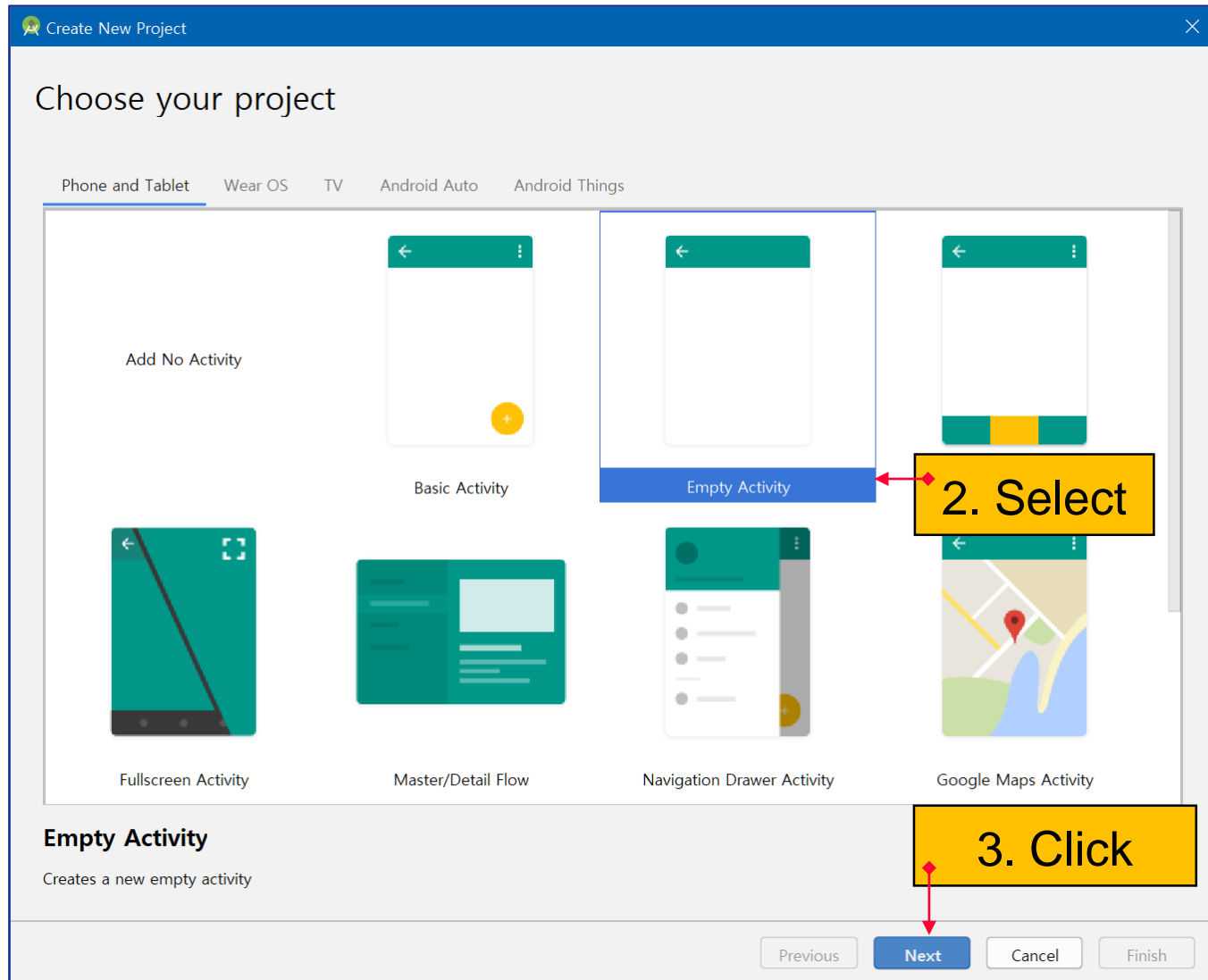
■ Android 프로젝트 생성

❖ 프로젝트 명 : Android_Multimedia





Android Audio 재생 구현 (2)





Android Audio 재생 구현 (3)

Create New Project

Configure your project

Name
Android_Multimedia

Package name
com.inhatec.android_multimedia

Save location
C:\Android_Project\Android_Multimedia

Language
Java

Minimum API level
API 26: Android 8.0 (Oreo)

☐ This project will support instant apps

☐ Use AndroidX artifacts

Empty Activity

Creates a new empty activity

Previous Next Cancel Finish

4. Input "Android_Multimedia"

5. Input
"com.inhatec.android_multimedia"

6. Select

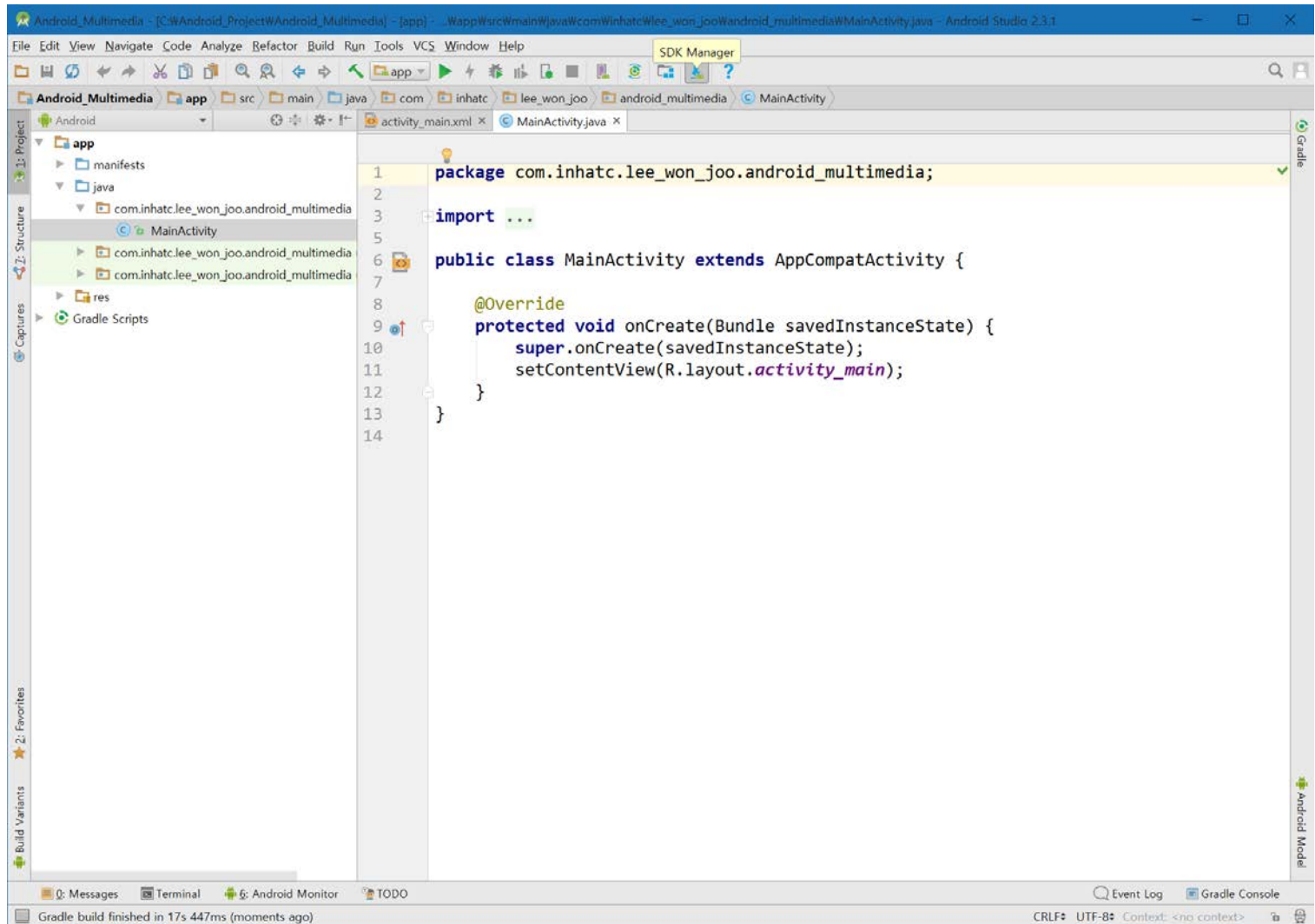
7. Select

8. Click



Android Audio 재생 구현 (4)

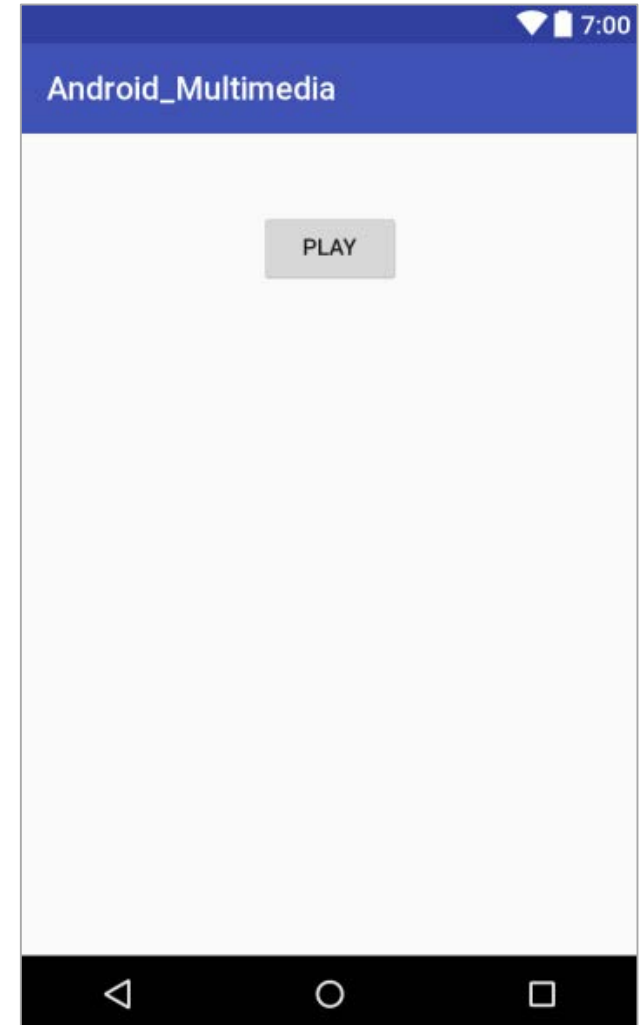
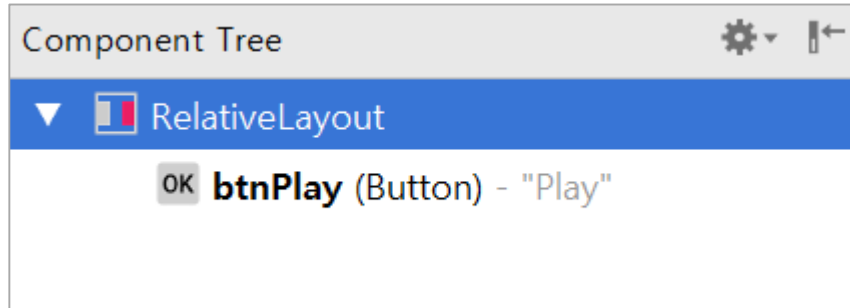
❖ Android 프로젝트 생성 완료





Android Audio 재생 구현 (5)

■ UI 설계





Android Audio 재생 구현 (6)

❖ TextView 삭제

Android Multimedia - [C:\Android\Project\Android_Multimedia] - [app] - _app\src\main\res\layout\activity_main.xml - Android Studio 2.3.1

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Android Multimedia app src main res layout activity_main.xml

Project

- Android
 - app
 - manifests
 - java
 - com.inhatec.lee_won_joo.android
 - MainActivity
 - res
 - Gradle Scripts

Palette

- All
 - TextView
 - Button
 - ToggleButton
 - CheckBox
 - RadioButton
 - CheckedTextView
 - Spinner
 - ProgressBar

Component Tree

- ConstraintLayout
 - TextView - "Hello World!"

Design

Properties

TextView

text tello World!

contentDe...

textApp... /material.Small

Favorite Attributes

accessibilit... none

visibility none

9. 마우스 오른쪽 버튼 Click

10. Click

Ctrl+X

Ctrl+C

Ctrl+V

Delete

Delete

Select

Morphing

Save Screenshot...

Refactor

Go To Declaration

Ctrl+B

View all properties

Event Log

Gradle Console

1:1 n/a n/a Context: <no context>



Android Audio 재생 구현 (7)

❖ Button 1 속성 지정

컨트롤	속성 지정
Button1	<ul style="list-style-type: none">• android:id="@+id/btnPlay"• android:layout_width="wrap_content"• android:layout_height="wrap_content"• android:minWidth="100dp"• android:text="Play"





Android Audio 재생 구현 (8)

Activity_main.xml 수정

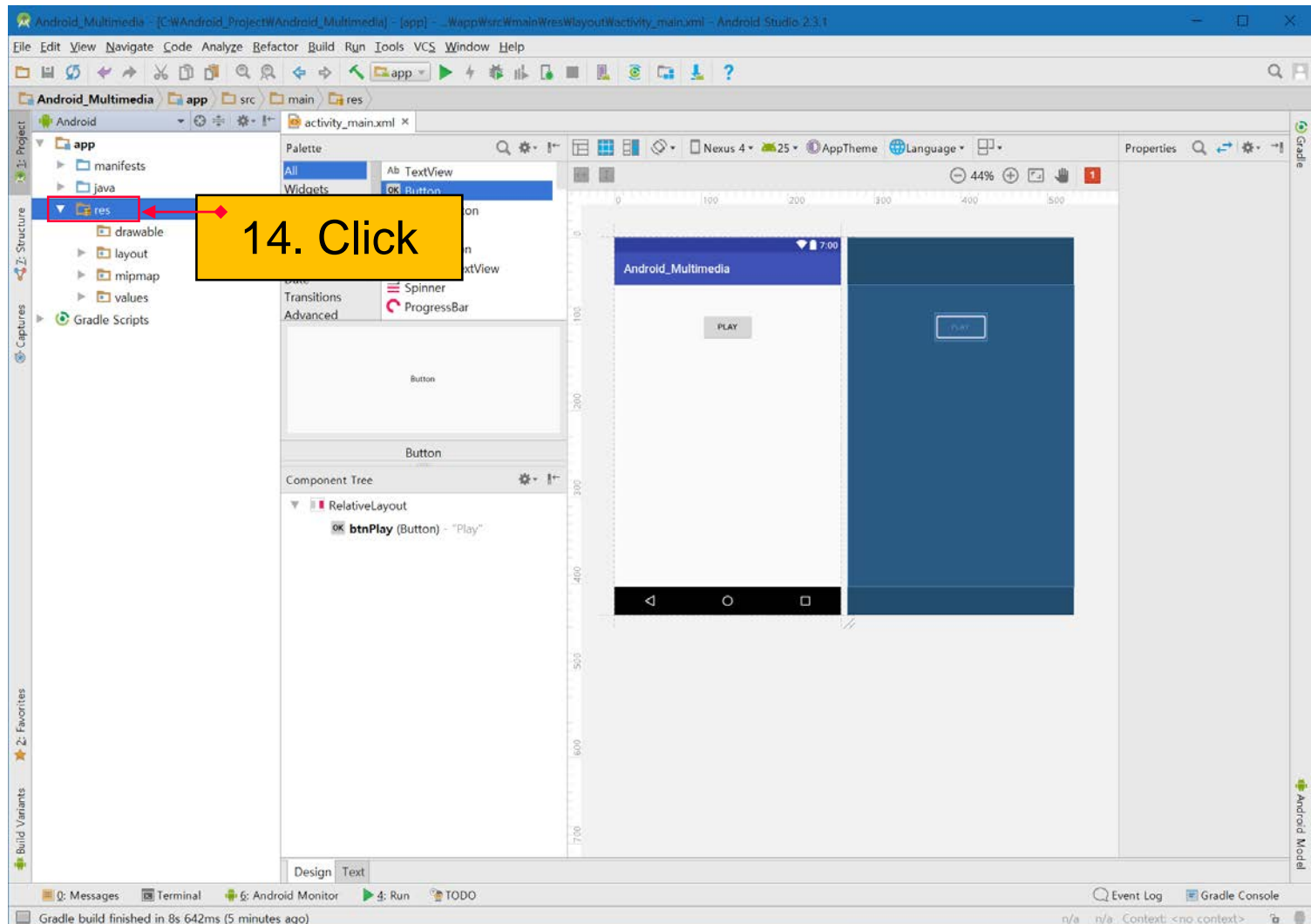
```
activity_main.xml x
1  <?xml version="1.0" encoding="utf-8"?>
2  <RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
3      xmlns:app="http://schemas.android.com/apk/res-auto"
4      xmlns:tools="http://schemas.android.com/tools"
5      android:layout_width="match_parent"
6      android:layout_height="match_parent"
7      tools:context="com.inhatc.lee_won_joo.android_multimedia.MainActivity">
8
9      <Button
10         android:id="@+id/btnPlay"
11         android:layout_width="wrap_content"
12         android:layout_height="wrap_content"
13         android:layout_alignParentTop="true"
14         android:layout_centerHorizontal="true"
15         android:layout_marginTop="47dp"
16         android:text="Play"
17         tools:layout_editor_absoluteX="157dp"
18         tools:layout_editor_absoluteY="68dp" />
19  </RelativeLayout>
20
```

13. XML code 수정 확인



Android Audio 재생 구현 (9)

Create raw folder





Android Audio 재생 구현 (10)

15. Click

16. Select "raw"

17. Click

Android Multimedia - [C:\Android_Project\Android_Multimedia] - [app] - Wapp\src\main\res\layout\Wactivity_main.xml - Android Studio 2.3.2

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

New Project...
Import Project...
Project from Version Control...
New Module...
Import Module...
Import Sample...
Android resource file
Android resource directory
File
Directory
C++ Class
C/C++ Source File
C/C++ Header File
Image Asset
Vector Asset
Singleton
Edit File Templates...
AIDL
Activity
Android Auto
Folder
Fragment
Google
Other
Service
UI Component
Wear
Widget
XML
Resource Bundle

Activity.java x activity_main.xml x

Ab TextView
OK Button

rs
ns
d

en
Re

Country Code
Network Code
Locale
Layout Direction
Smallest Screen Width
Screen Width
Screen Height

Chosen qualifiers:
Nothing to show

OK Cancel Help

Event Log
Gradle Console

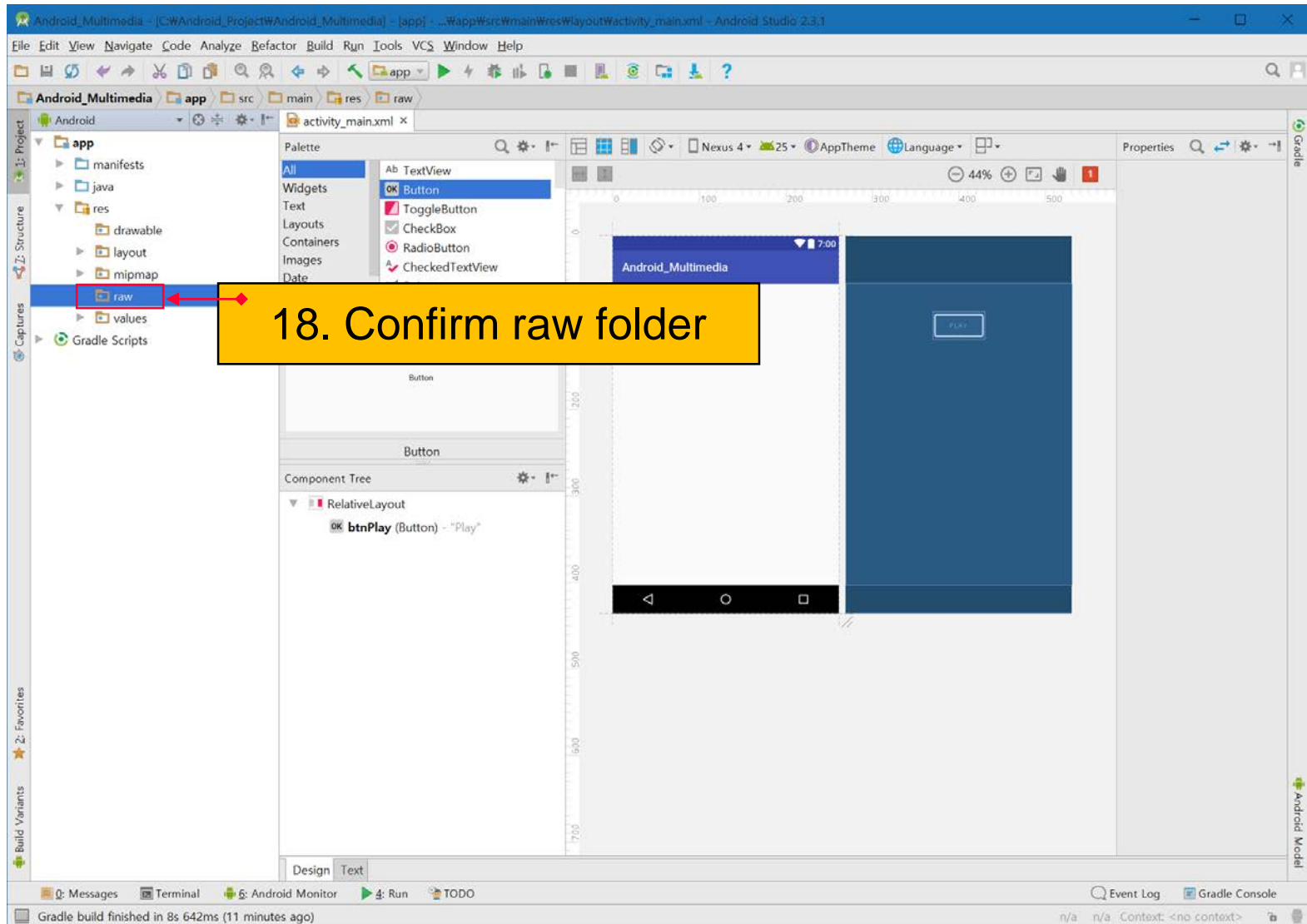
n/a n/a Context: <no context>

Create new resource file



Android Audio 재생 구현 (11)

❖ raw folder

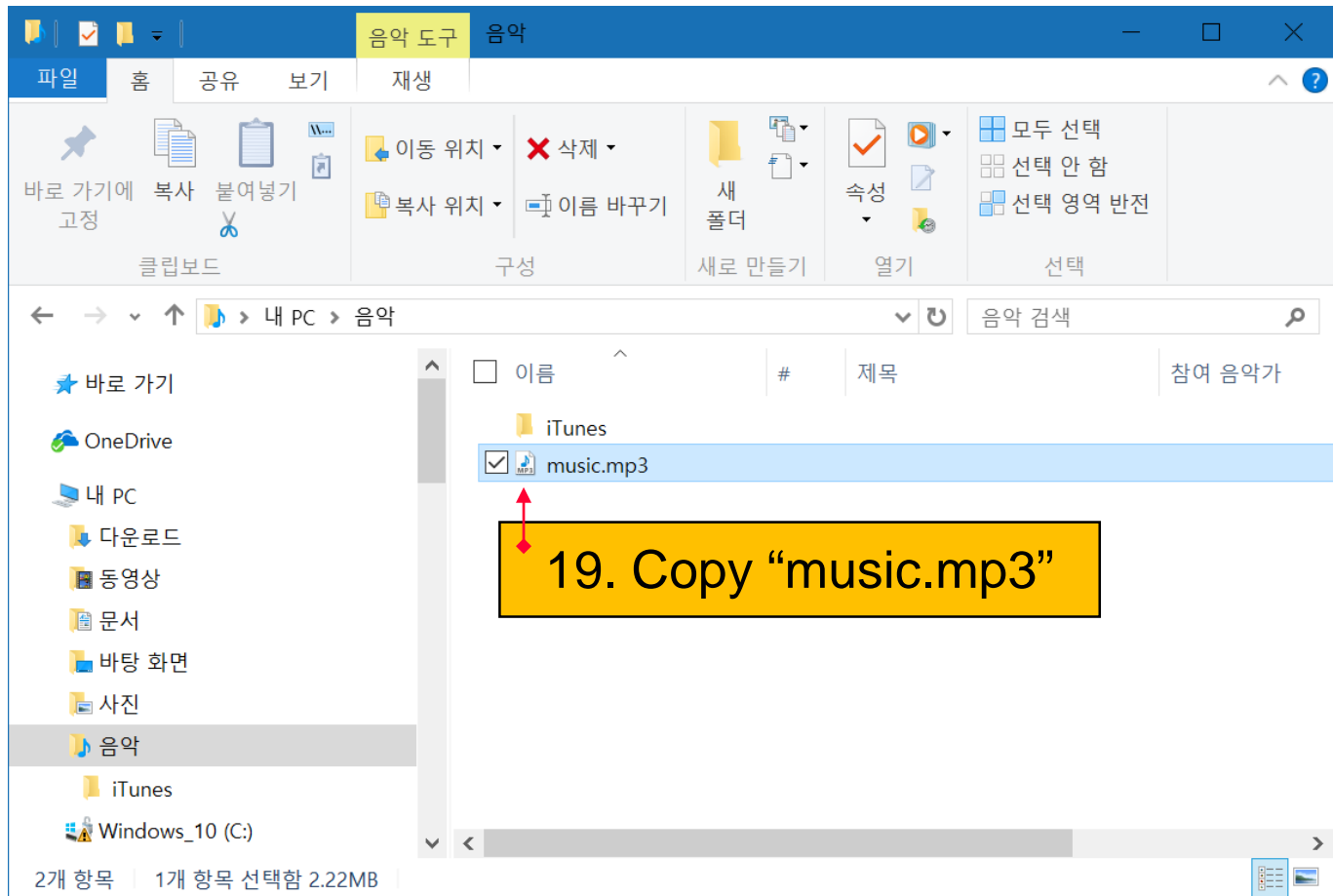




Android Audio 재생 구현 (12)

❖ Import mp3 file

◆ music.mp3





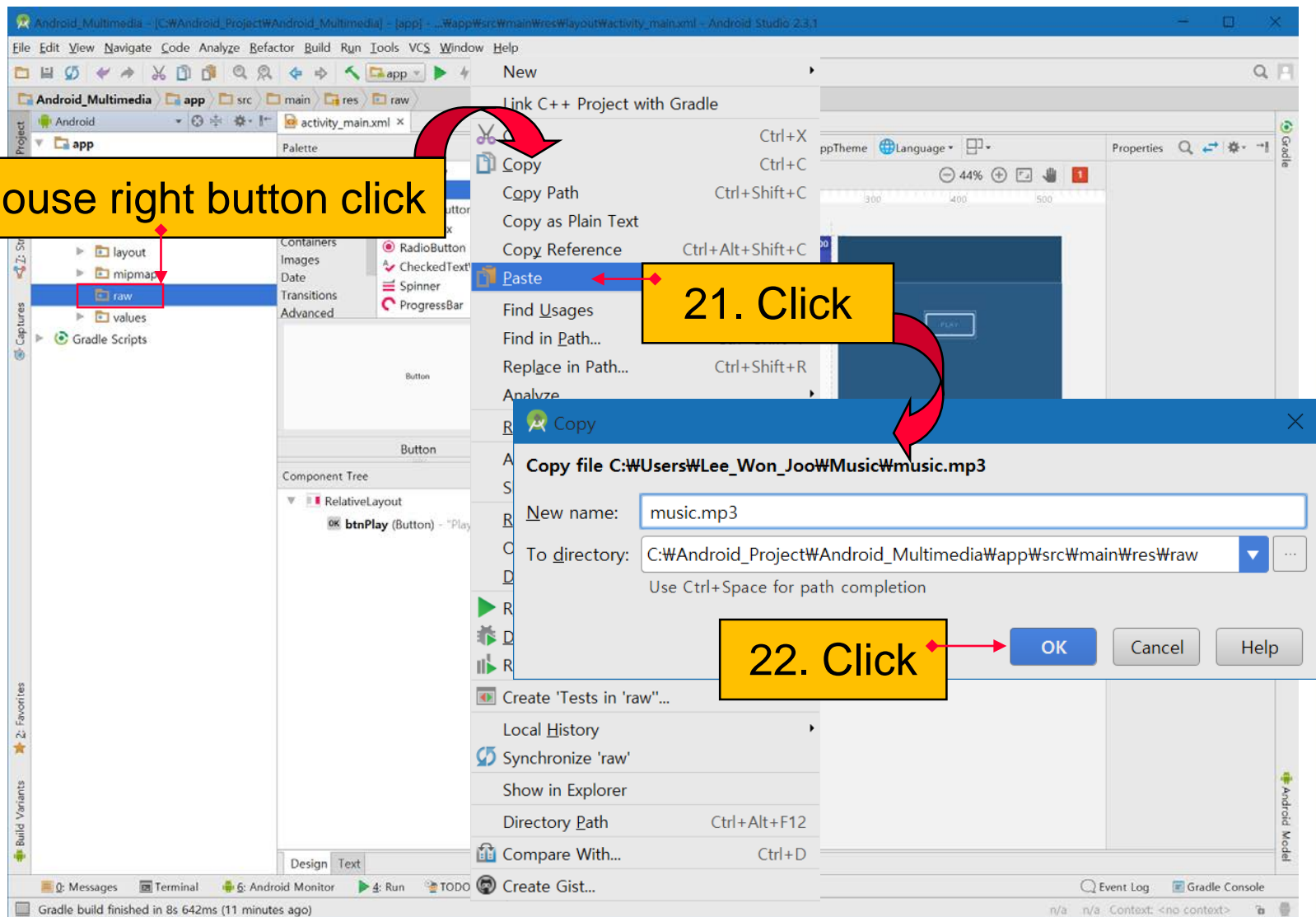
Android Audio 재생 구현 (13)

❖ Import mp3 file

20. Mouse right button click

21. Click

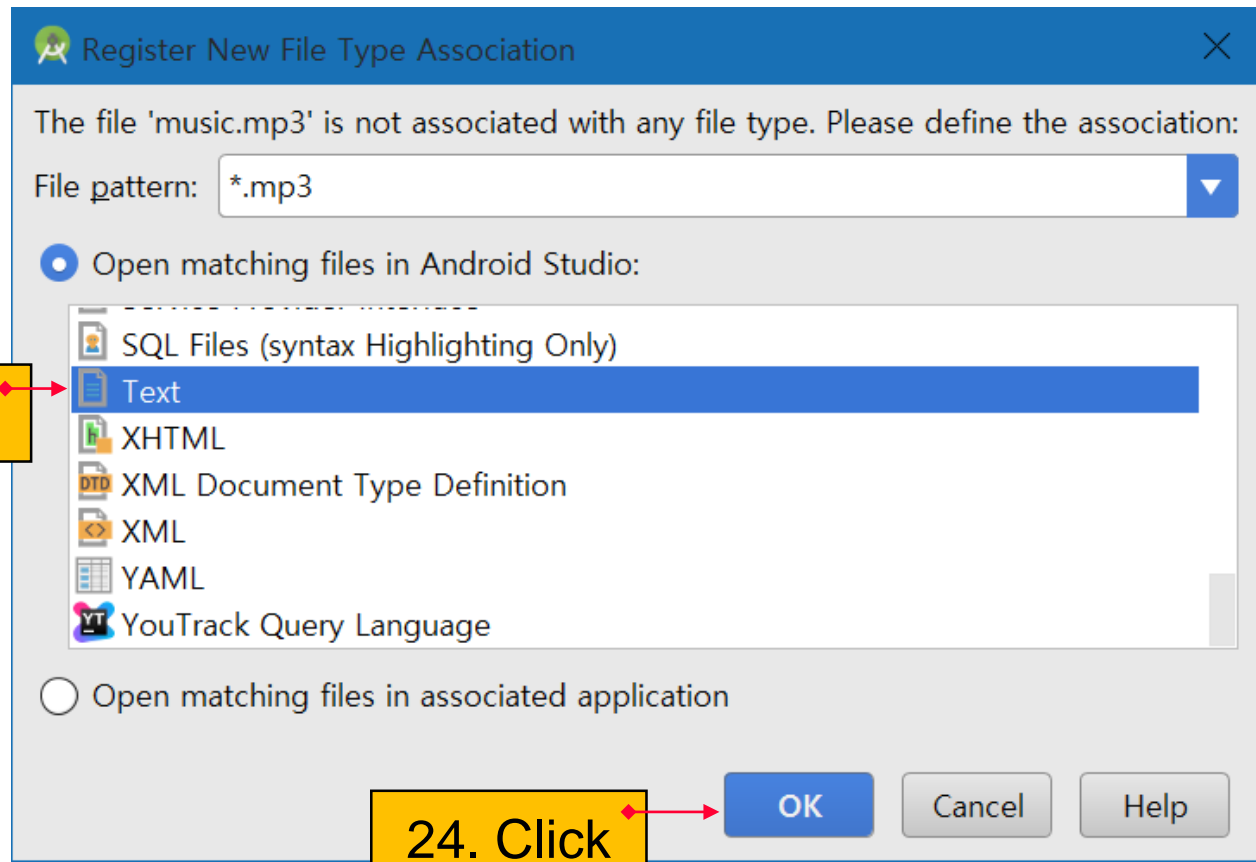
22. Click





Android Audio 재생 구현 (14)

❖ Setting file type



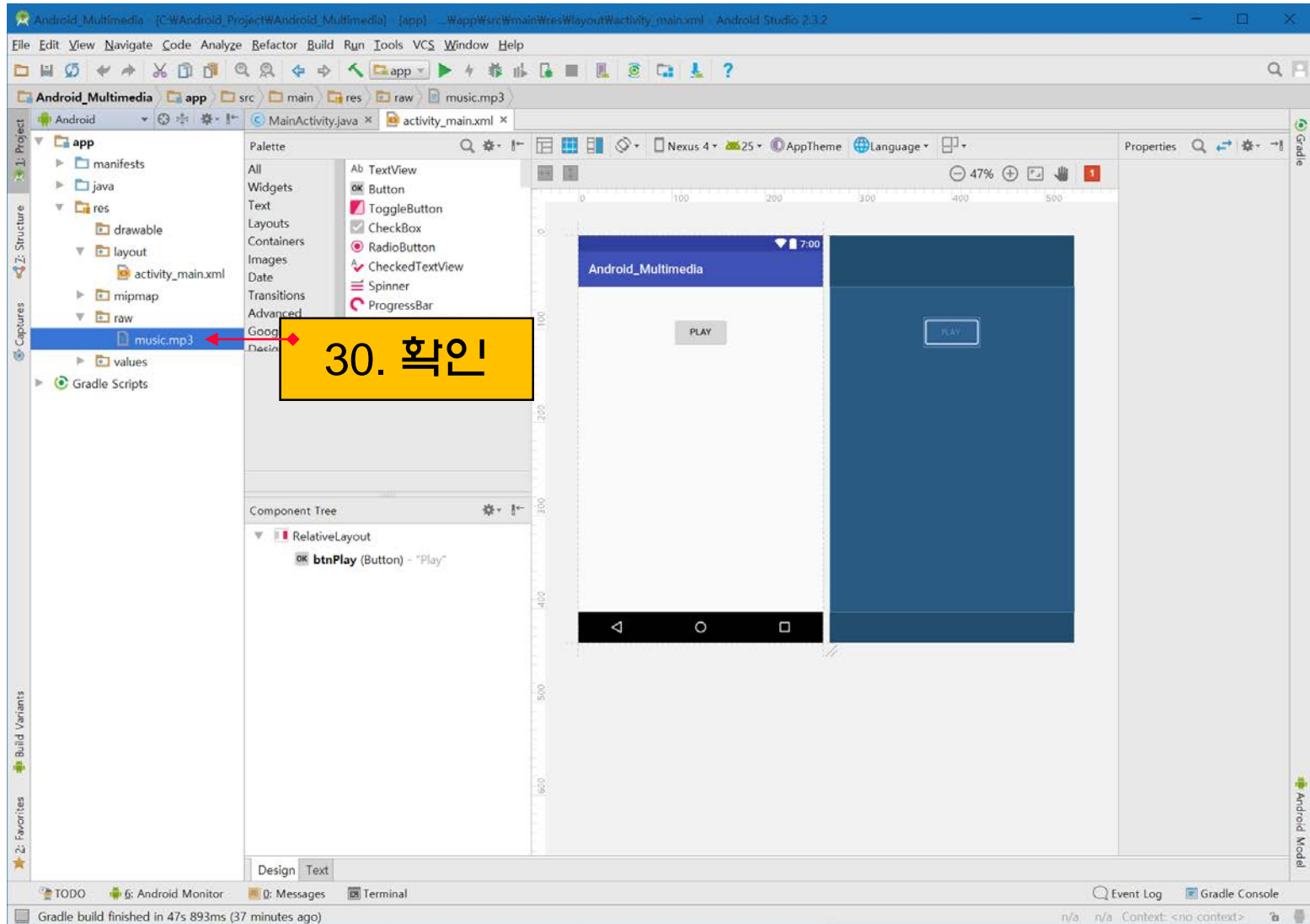
23. Click

24. Click



Android Audio 재생 구현 (15)

❖ MP3 파일 import 결과 확인





Android Audio 재생 구현 (16)

MainActivity.java

```
MainActivity.java x
1  package com.inhatc.lee_won_joo.android_multimedia;
2
3  import android.media.MediaPlayer;
4  import android.support.v7.app.AppCompatActivity;
5  import android.os.Bundle;
6  import android.view.View;
7  import android.widget.Button;
8
9  public class MainActivity extends AppCompatActivity
10         implements View.OnClickListener {
11
12     private MediaPlayer objMP;    //MediaPlayer object
13     private Button btnPlay;      //Button object
14
15     @Override
16     protected void onCreate(Bundle savedInstanceState) {
17         super.onCreate(savedInstanceState);
18         setContentView(R.layout.activity_main);
19
20         btnPlay = (Button) this.findViewById(R.id.btnPlay);
21         btnPlay.setOnClickListener(this);
22
23         objMP = MediaPlayer.create(this, R.raw.music); //Create Media Player
24     }
25
```

44. Coding





Android Audio 재생 구현 (17)

❖ Button Event Handler

45. Coding

```
26  @Override
27  public void onClick(View v) {
28      if (objMP != null){
29          Music_Player();
30      } else {
31          objMP = MediaPlayer.create(MainActivity.this, R.raw.music);
32          Music_Player();
33      }
34  }
35
36  private void Music_Player(){
37      if (!objMP.isPlaying()){
38          objMP.start();
39          btnPlay.setText("Stop");
40
41      }else{
42          btnPlay.setText("Play");
43          objMP.stop();
44          objMP.release();
45          objMP = null;
46      }
47  }
48  }
49  }
```




Android Audio 재생 구현 (18)

❖ Android 프로젝트 실행

The screenshot shows the Android Studio interface with the 'Run' menu open. A red arrow points to the 'Run' option, which is highlighted by a yellow box labeled '16. Click'. Another red arrow points to the 'MyAndroid_Nexus One API 25' option in the 'Select Deployment Target' dialog, which is highlighted by a yellow box labeled '17. Click'. A third red arrow points to the 'OK' button in the same dialog, highlighted by a yellow box labeled '18. Click'.

16. Click

17. Click

18. Click

Android Multimedia - [C:\Android_Project\Android_Multimedia] - [app] - ...\app\src\main\java\com\winhate\Whee_won_joo\android_multimedia\MainActivity.java - Android Studio 2.3.2

File Edit View Navigate Code Analyze Refactor Build Run Tools VCS Window Help

Run 'app' (Alt+Shift+F10)

Debug 'app' (Alt+Shift+F9)

Run 'app' with Coverage

Run...

Debug...

Record Espresso Test

Edit Configurations...

Import Test Results

Apply Changes (Ctrl+F10)

Stop 'app' (Ctrl+F10)

Show Running List

Restart Activity

Step Over

Force Step Over

Step Into

Force Step Into

Smart Step Into

Step Out

Run to Cursor

Force Run to Cursor

Drop Frame

Pause Program

Resume Program

Evaluate Expression...

Quick Evaluate Expression

Show Execution Point

Toggle Line Breakpoint

Toggle Method Breakpoint

Toggle Temporary Line Breakpoint

Toggle Breakpoint Enabled

View Breakpoints...

Get thread dump

Attach debugger to Android process

Music_Player();

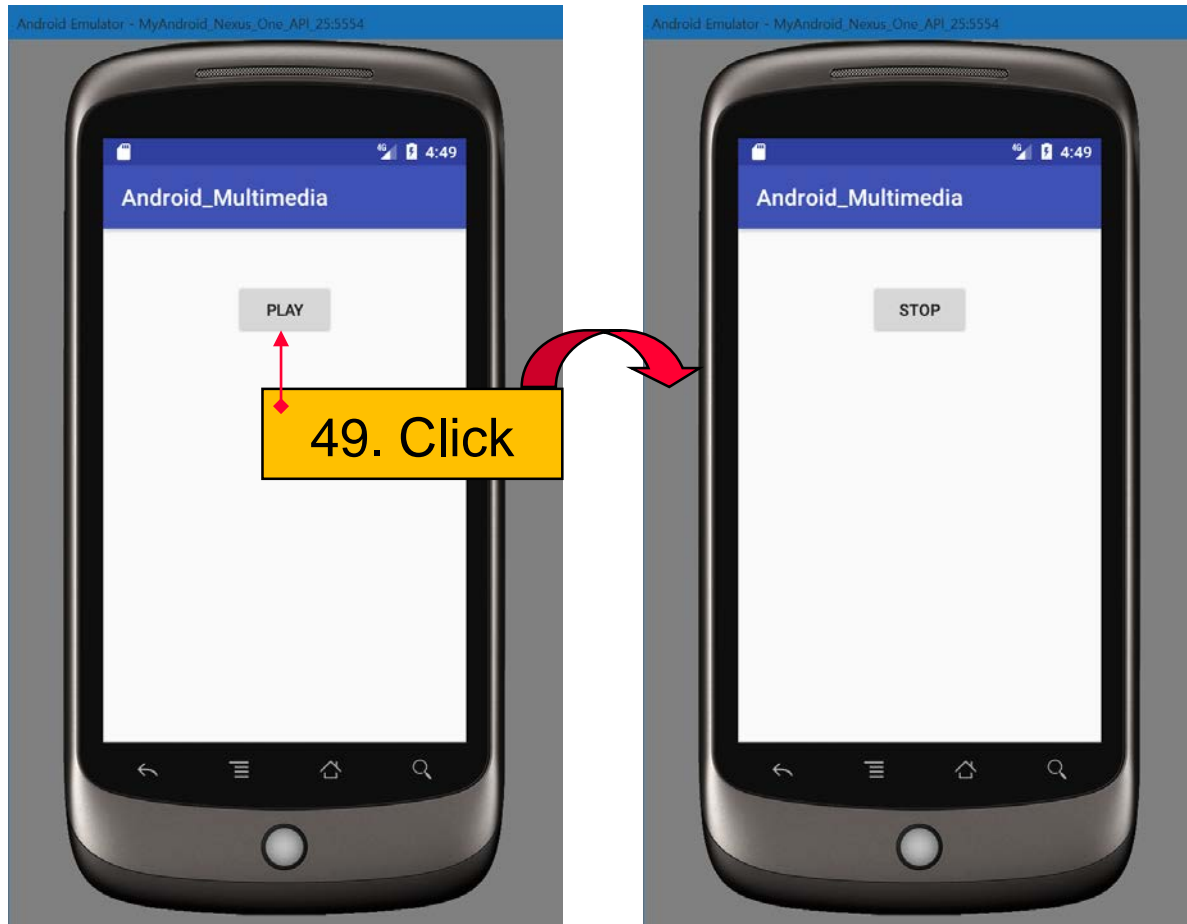
else {

objMP = MediaPlayer.create(MainActivity.this, R.raw.music);

Music_Player();

Android Audio 재생 구현 (19)

❖ 실행 결과



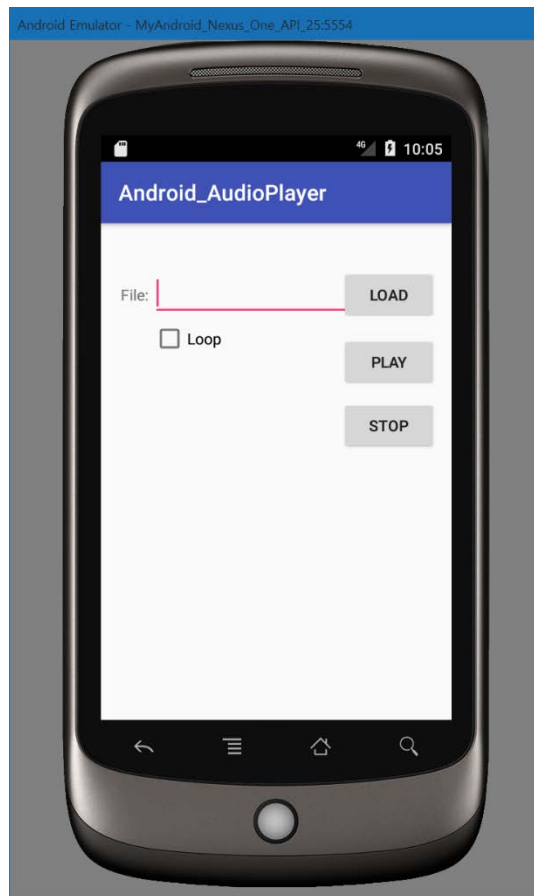


실습 I : Audio Player 구현

■ Android_AudioPlayer (실습 시간 : 30분)

❖ 아래 그림과 같이 AudioPlayer를 구현하시오.

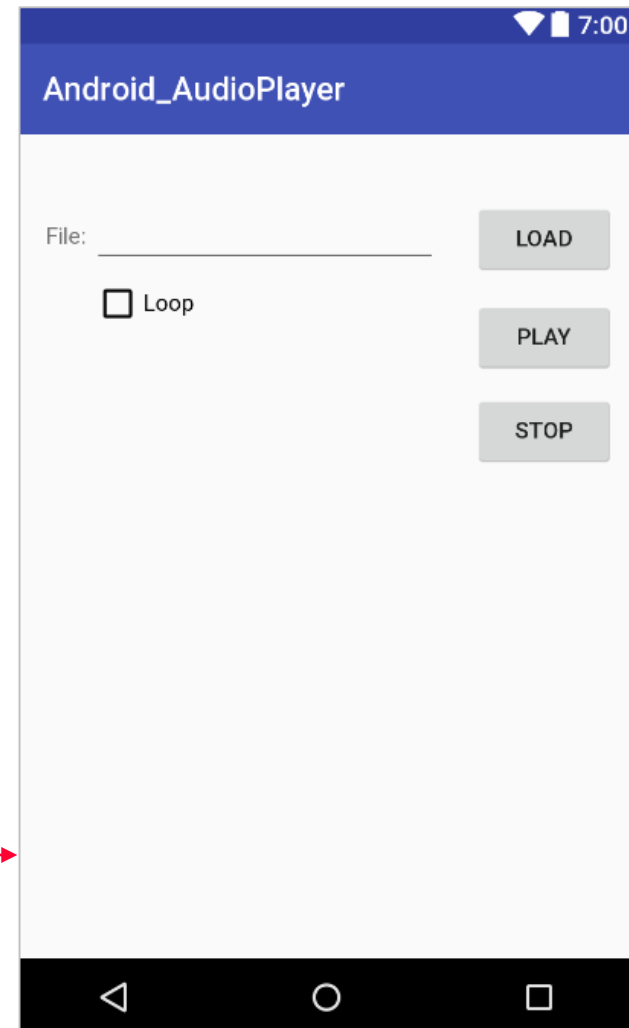
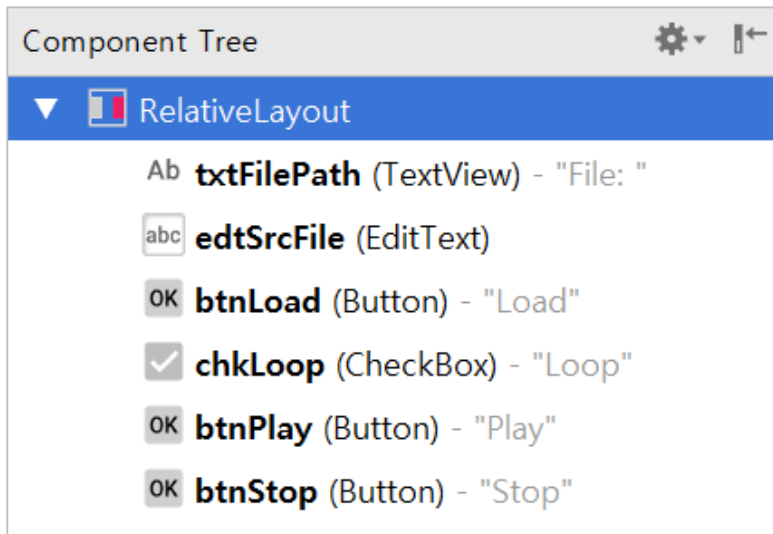
◆ Project Name : Android_AudioPlayer





실습 I : Audio Player 구현 (1)

■ UI 설계



1. UI 설계 및 속성 지정



실습 I : Audio Player 구현 (2)

❖ RelativeLayout, TextView1, EditText1, 속성 지정

```
activity_main.xml x
1  <?xml version="1.0" encoding="utf-8"?>
2  <RelativeLayout xmlns:android="http://schemas.android.com/apk/res/android"
3      xmlns:app="http://schemas.android.com/apk/res-auto"
4      xmlns:tools="http://schemas.android.com/tools"
5      android:layout_width="match_parent"
6      android:layout_height="match_parent"
7      tools:context="com.inhatec.lee_won_joo.android_audioplayer.MainActivity">
8
9      <TextView
10         android:id="@+id/txtFilePath"
11         android:layout_width="wrap_content"
12         android:layout_height="wrap_content"
13         android:text="File: "
14         app:layout_constraintBottom_toBottomOf="parent"
15         app:layout_constraintLeft_toLeftOf="parent"
16         app:layout_constraintRight_toRightOf="parent"
17         app:layout_constraintTop_toTopOf="parent"
18         android:layout_alignBaseline="@+id/edtSrcFile"
19         android:layout_alignBottom="@+id/edtSrcFile"
20         android:layout_alignParentStart="true"
21         android:layout_marginStart="18dp" />
22
```





실습 I : Audio Player 구현 (3)

❖ EditText1, Button 1, CheckBox 1 속성 지정

```
activity_main.xml x
23      <EditText
24          android:id="@+id/edtSrcFile"
25          android:layout_width="wrap_content"
26          android:layout_height="wrap_content"
27          android:layout_alignParentTop="true"
28          android:layout_marginTop="41dp"
29          android:layout_toEndOf="@+id/txtFilePath"
30          android:ems="10"
31          android:inputType="text" />
32
33      <Button
34          android:id="@+id/btnLoad"
35          android:layout_width="wrap_content"
36          android:layout_height="wrap_content"
37          android:layout_alignParentEnd="true"
38          android:layout_alignTop="@+id/edtSrcFile"
39          android:layout_marginEnd="13dp"
40          android:text="Load" />
41
42      <CheckBox
43          android:id="@+id/chkLoop"
44          android:layout_width="wrap_content"
45          android:layout_height="wrap_content"
46          android:layout_alignStart="@+id/edtSrcFile"
47          android:layout_below="@+id/btnLoad"
48          android:text="Loop" />
49
```





실습 I : Audio Player 구현 (4)

❖ Button 2, 3 속성 지정

```
activity_main.xml x
49
50     <Button
51         android:id="@+id/btnPlay"
52         android:layout_width="wrap_content"
53         android:layout_height="wrap_content"
54         android:layout_alignStart="@+id/btnLoad"
55         android:layout_below="@+id/btnLoad"
56         android:layout_marginTop="13dp"
57         android:text="Play" />
58
59     <Button
60         android:id="@+id/btnStop"
61         android:layout_width="wrap_content"
62         android:layout_height="wrap_content"
63         android:layout_alignStart="@+id/btnPlay"
64         android:layout_below="@+id/btnPlay"
65         android:layout_marginTop="10dp"
66         android:text="Stop" />
67
68 </RelativeLayout>
69
```





실습 I : Audio Player 구현 (5)

MainActivity.java

```
MainActivity.java x
1 package com.inhatc.lee_won_joo.android_audioplayer;
2
3 import ...
12
13 public class MainActivity extends AppCompatActivity
14     implements View.OnClickListener {
15
16     private MediaPlayer objMP;           // MediaPlayer object
17     private EditText audioSrcFile;       // EditText object
18     private CheckBox chkLoopCTRL;        // CheckBox object
19     private Button btnLoad, btnPlay, btnStop; // Button object
20
21     @Override
22     protected void onCreate(Bundle savedInstanceState) {
23         super.onCreate(savedInstanceState);
24         setContentView(R.layout.activity_main);
25
26         audioSrcFile = (EditText)findViewById(R.id.edtSrcFile);
27
28         chkLoopCTRL = (CheckBox)findViewById(R.id.chkLoop);
29         chkLoopCTRL.setOnClickListener(this);
30
31         btnLoad = (Button)findViewById(R.id.btnLoad);
32         btnLoad.setOnClickListener(this);
33
34         btnPlay = (Button)findViewById(R.id.btnPlay);
35         btnPlay.setOnClickListener(this);
36
37         btnStop = (Button)findViewById(R.id.btnStop);
38         btnStop.setOnClickListener(this);
39
40     }
41 }
```

2. Coding





실습 I : Audio Player 구현 (6)

❖ Load Button Event Handler 구현

```
MainActivity.java x
42  @Override
43  public void onClick(View v) {
44      if (v == btnLoad){ //Audio File Load
45          if(!LoadAudioFile(audioSrcFile.getText().toString())){
46              Toast.makeText(getApplicationContext(), "Audio File Load Fail !",
47                  Toast.LENGTH_LONG)
48                  .show();
49              return;
50          }
51
52          audioSrcFile.setEnabled(false); // EditText audioSrcFile disable
53          btnPlay.setEnabled(true);
54          btnStop.setEnabled(true);
55          chkLoopCTRL.setEnabled(true);
56          btnLoad.setEnabled(false);
57          Toast.makeText(getApplicationContext(), "File : " +
58              audioSrcFile.getText().toString() + " Load Success !",
59              Toast.LENGTH_LONG)
60              .show();
61          return;
62
63      } else if(v == btnPlay) {
```

3. Coding



실습 I : Audio Player 구현 (7)

❖ Loop CheckBox / [Play], [Stop] Button Event Handler 구현

```
MainActivity.java x
63 } else if(v == btnPlay) {
64     if(PlayPauseAudio() != true) { //MediaPlayer Play
65         btnPlay.setText("Pause"); //btnPaly.Text = "Pause"
66     }else{
67         btnPlay.setText("Play"); //btnPaly.Text = "Play"
68     }
69 } else if(v == btnStop) {
70     objMP.stop(); //MediaPlayer Stop
71     audioSrcFile.setEnabled(true); //audioSrcFile Active
72     btnPlay.setText("Play");
73     chkLoopCTRL.setChecked(false);
74     btnPlay.setEnabled(false);
75     btnStop.setEnabled(false);
76     chkLoopCTRL.setEnabled(false);
77     btnLoad.setEnabled(true);
78 } else if(v == chkLoopCTRL) {
79     if(chkLoopCTRL.isChecked()){ //chkLoopCTRL.Checked = true
80         objMP.setLooping(true); //Loop Set
81         Toast.makeText(getApplicationContext(), "Loop Set Status",
82             Toast.LENGTH_SHORT)
83             .show();
84     }else{
85         objMP.setLooping(false); //Loop Reset
86         Toast.makeText(getApplicationContext(), "Loop Reset Status",
87             Toast.LENGTH_SHORT)
88             .show();
89     }
90 }
91 }
92 }
```

4. Coding





실습 I : Audio Player 구현 (8)

❖ PlayPauseAudio() Method 구현

```
MainActivity.java x
93     private boolean PlayPauseAudio(){
94         if(!objMP.isPlaying()){
95             objMP.start();
96             Toast.makeText(getApplicationContext(), "Play",
97                 Toast.LENGTH_SHORT).show();
98             return false;
99         }else{ // in Play status
100             objMP.pause(); // Pause
101             Toast.makeText(getApplicationContext(), "Pause", Toast.LENGTH_SHORT).show();
102             return true;
103         }
104     }
105 }
```

5. Coding





실습 I : Audio Player 구현 (9)

❖ LoadAudioFile() / onDestroy() Method 구현

```
MainActivity.java x
105
106
107
108
109
110
111
112
113
114
115
116
117
118
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126

private boolean LoadAudioFile(String path){ //Audio File Load
    objMP = new MediaPlayer();                // Create MediaPlayer object
    try{
        objMP.setDataSource(path);
        objMP.prepare();                      // Audio File ready
        return true;
    }catch(Exception e){                     //Audio File Load Fail
        Toast.makeText(getApplicationContext(), e.getMessage(),
            Toast.LENGTH_SHORT).show();
        return false;
    }
}

public void onDestroy(){                    //Activity Destroy
    super.onDestroy();
    if(objMP != null) objMP.release();       // MediaPlayer object Release
    objMP = null;
}
```

6. Coding





실습 I : Audio Player 구현 (10)

❖ Android 프로젝트 실행

The screenshot shows the Android Studio 2.3.2 interface. The 'Run' menu is open, and the 'Run' option is highlighted. A yellow box labeled '7. Click' points to the 'Run' menu item. The 'Select Deployment Target' dialog is open, showing 'Connected Devices' and 'Available Virtual Devices'. The 'MyAndroid_Nexus One API 25' device is selected. A yellow box labeled '8. Click' points to this device. At the bottom of the dialog, the 'OK' button is highlighted with a yellow box labeled '9. Click'.

7. Click

8. Click

9. Click



실습 I : Audio Player 구현 (11)

❖ 실행 결과

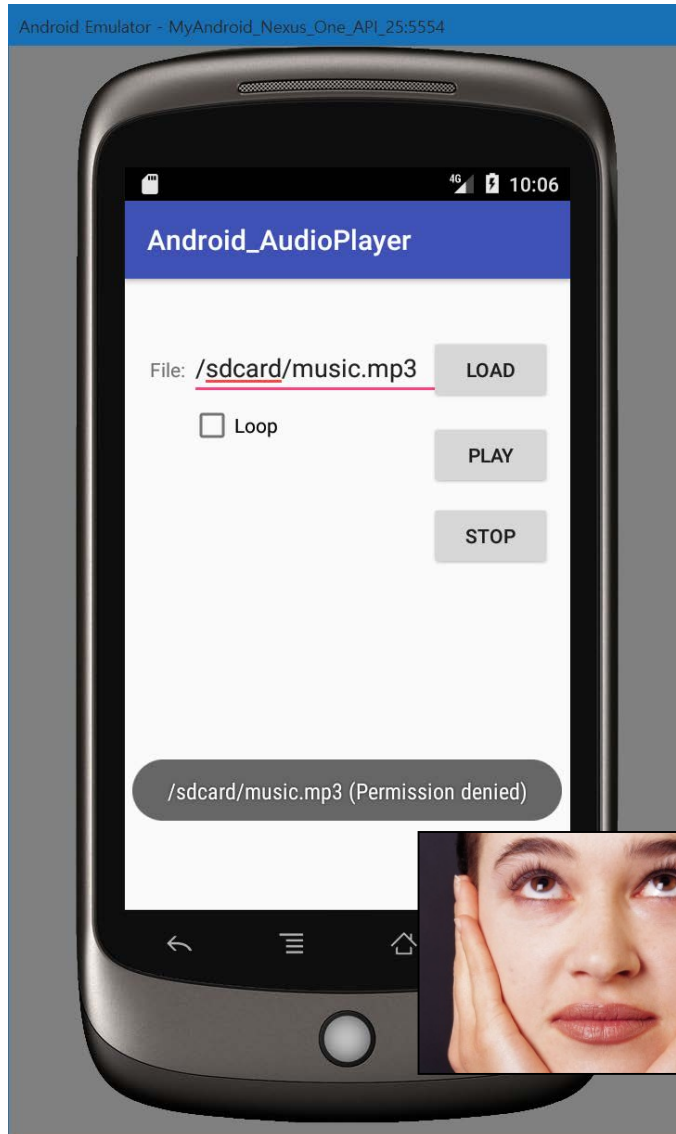


10. /sdcard/music.mp3 입력

11. Click



실습 I : Audio Player 구현 (12)





실습 I : Audio Player 구현 (13)

❖ AndroidManifest.xml

```
AndroidManifest.xml x
1  <?xml version="1.0" encoding="utf-8"?>
2  <manifest xmlns:android="http://schemas.android.com/apk/res/android"
3    package="com.inhatc.lee_won_joo.android_audioplayer">
4
5    <uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/>
6
7    <application
8      android:allowBackup="true"
9      android:icon="@mipmap/ic_launcher"
10     android:label="Android_AudioPlayer"
11     android:roundIcon="@mipmap/ic_launcher_round"
12     android:supportsRtl="true"
13     android:theme="@style/AppTheme">
14     <activity android:name=".MainActivity">
15       <intent-filter>
16         <action android:name="android.intent.action.MAIN" />
17
18         <category android:name="android.intent.category.LAUNCHER" />
19       </intent-filter>
20     </activity>
21   </application>
22
23 </manifest>
24
```

12. xml coding





실습 I : Audio Player 구현 (14)

❖ Android 프로젝트 실행

The screenshot shows the Android Studio interface with the 'Run' menu open. A yellow box labeled '13. Click' points to the 'Run' button in the menu. The 'Select Deployment Target' dialog is also open, showing 'Connected Devices' and 'Available Virtual Devices'. A yellow box labeled '14. Click' points to the 'MyAndroid_Nexus One API 25' device. Another yellow box labeled '15. Click' points to the 'OK' button in the dialog.

13. Click

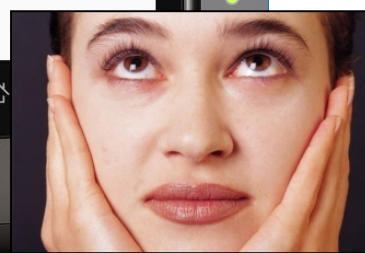
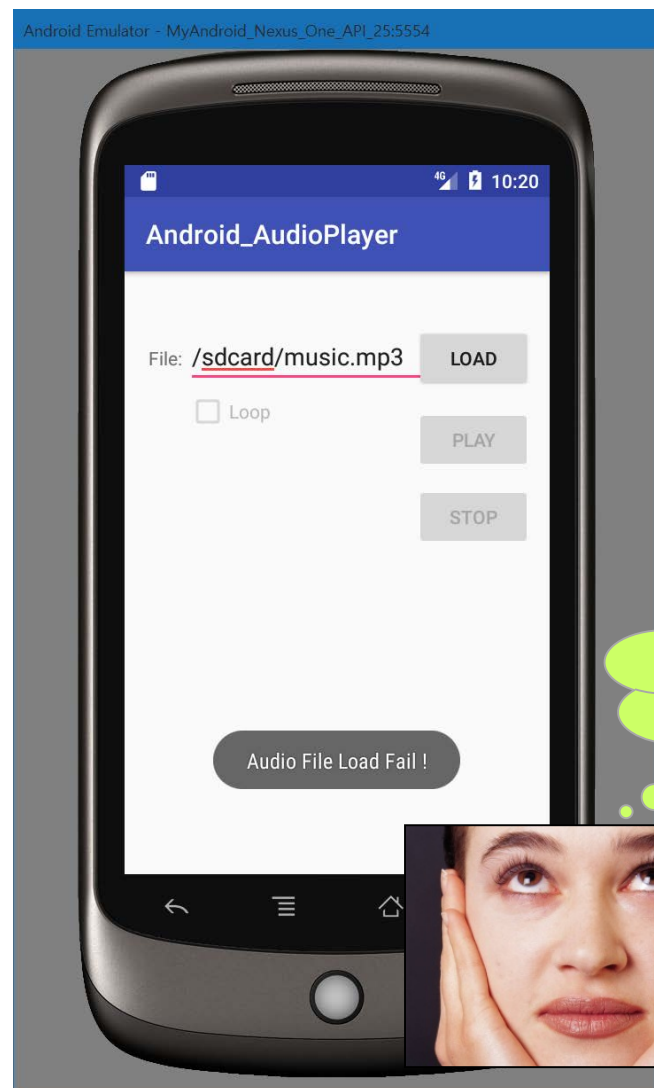
14. Click

15. Click



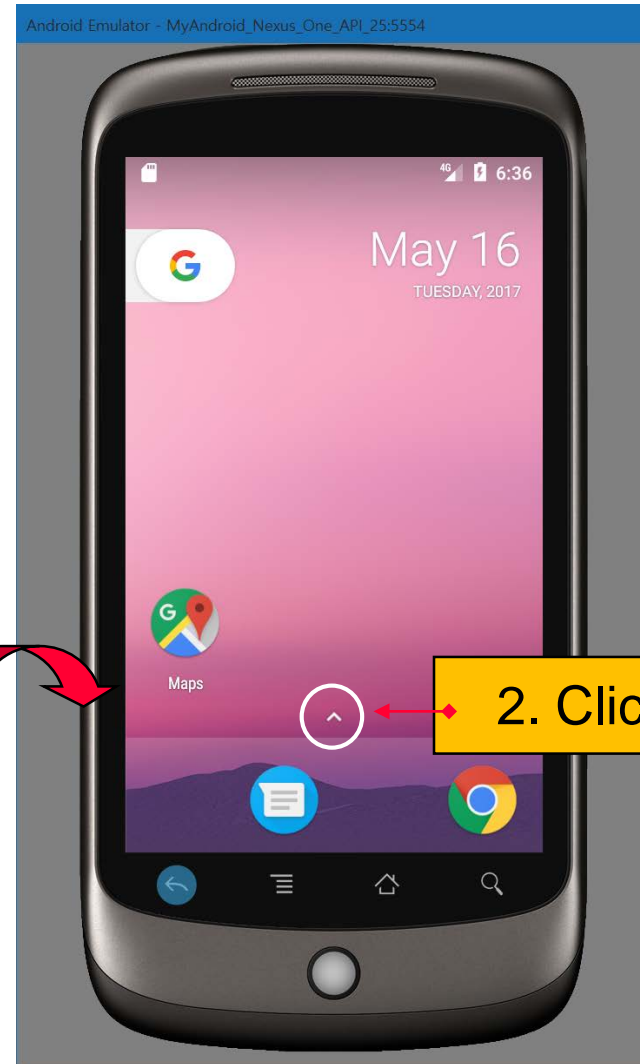
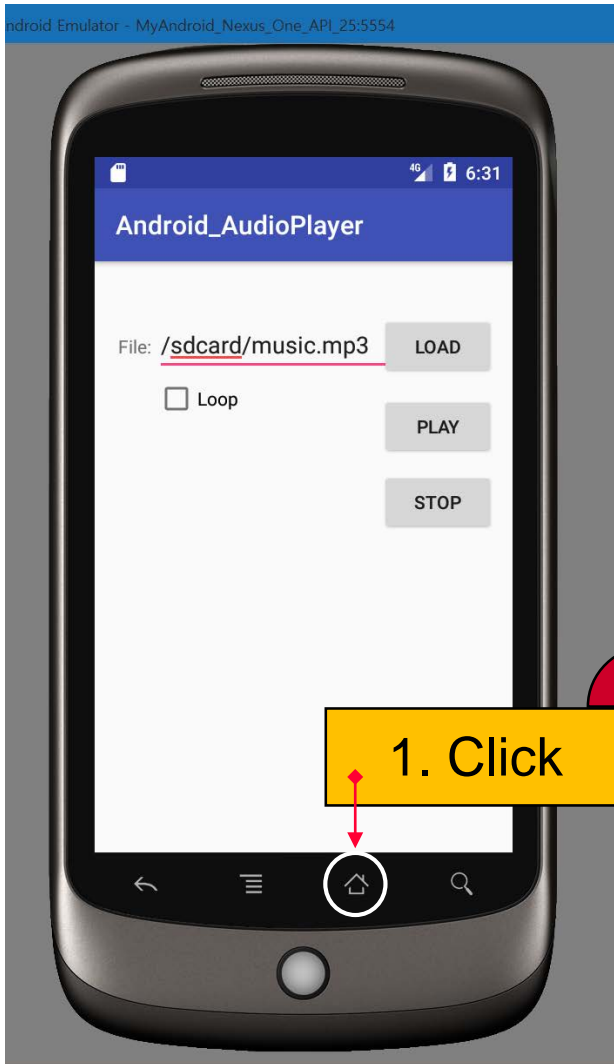
실습 I : Audio Player 구현 (15)

❖ 실행 결과



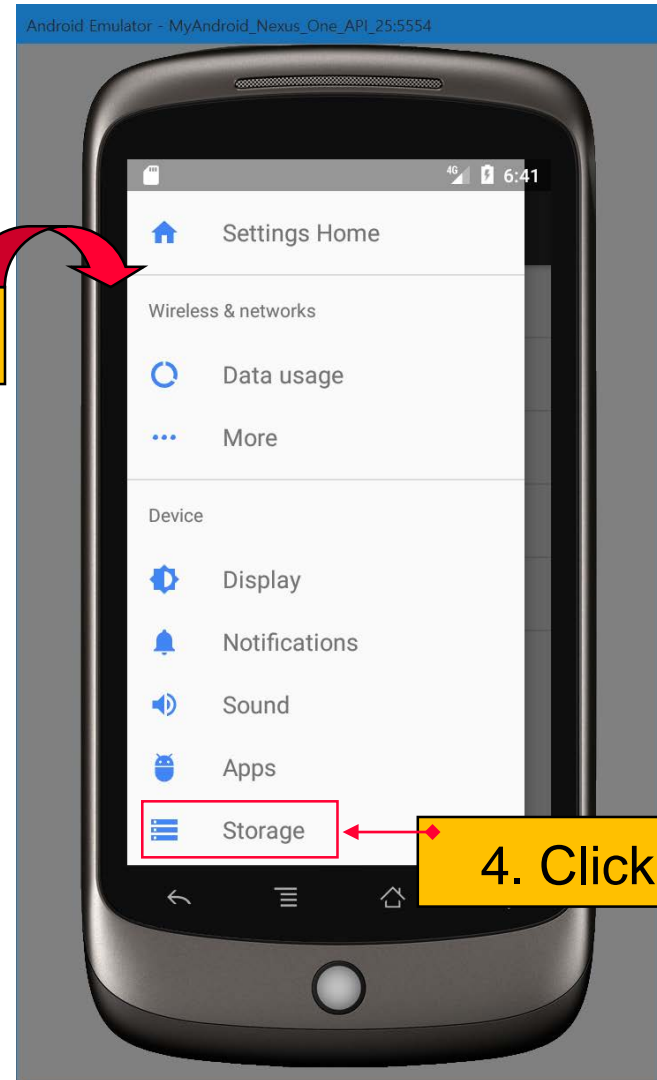
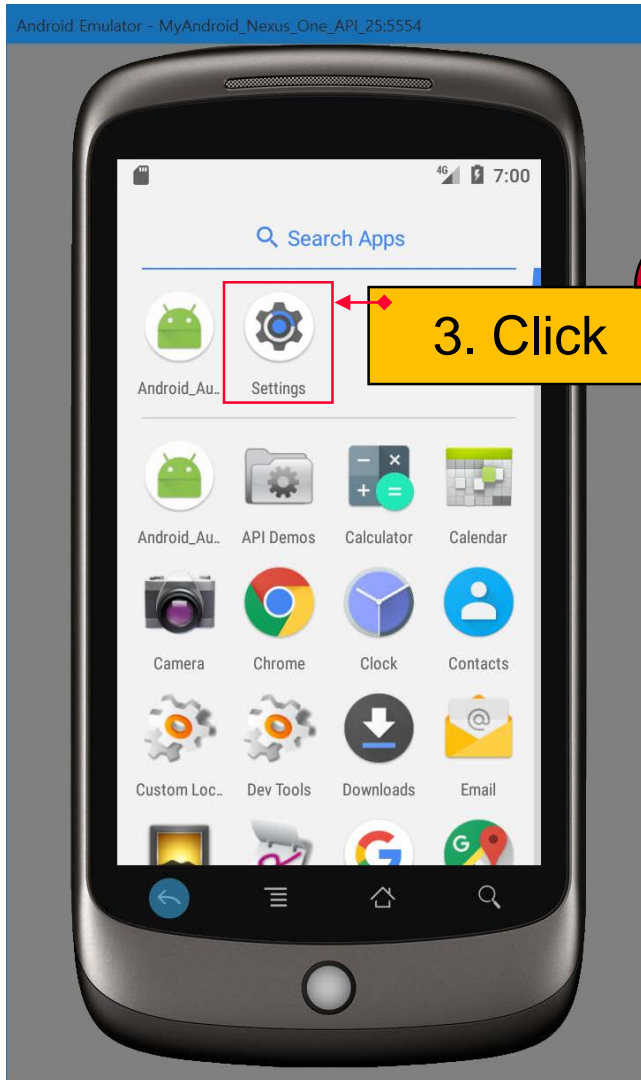
Emulator : SD card 설정 (1)

Emulator : SD card 설정 확인

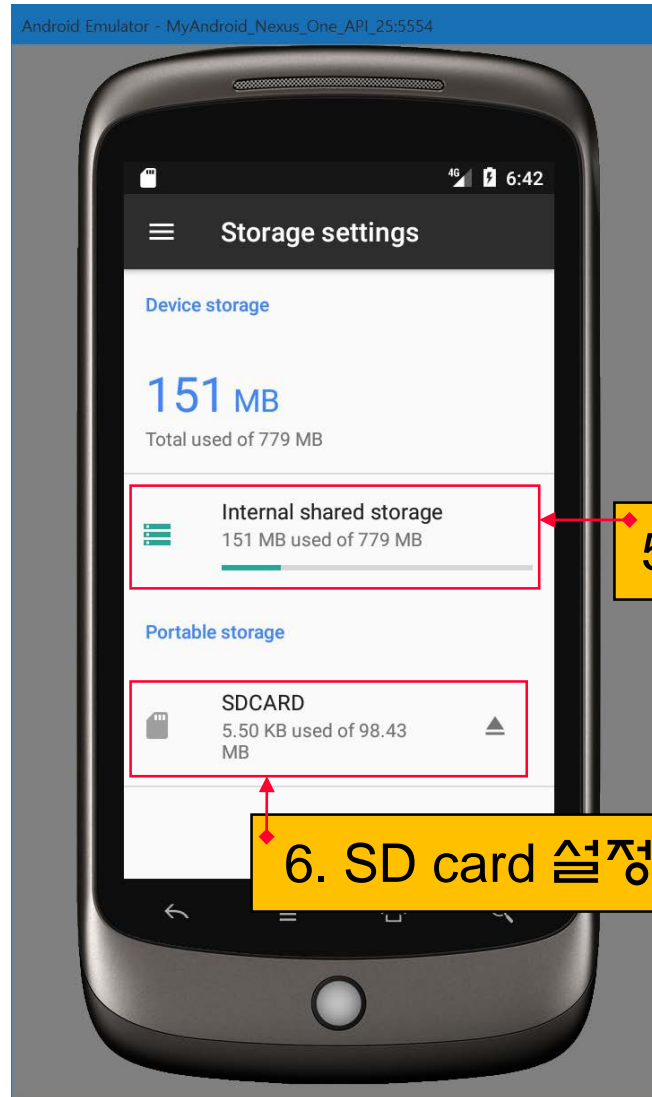


Emulator : SD card 설정 (2)

❖ Settings 지정



Emulator : SD card 설정 (3)



5. Available space

6. SD card 설정





Emulator : SD card 설정 (4)

SD card 설정

The screenshot shows the Android Studio 2.3.2 interface. The 'Tools' menu is open, and the 'AVD Manager' option is highlighted. A yellow box with the text '7. Click' points to the 'AVD Manager' option. The background shows the project structure and the MainActivity.java file.

```
22  
23  
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50  
51  
52  
53  
54
```

```
audioSrcFile = (EditTe  
chkLoopCTRL = (CheckBo  
chkLoopCTRL.setOnClick  
btnLoad = (Button)find  
btnLoad.setOnClickListener(  
btnPlay = (Button)findViewById(R.id.btnPlay);  
btnPlay.setOnClickListener(this);  
btnStop = (Button)findViewById(R.id.btnStop);  
btnStop.setOnClickListener(this);  
}  
@Override  
public void onClick(View v) {  
    if (v == btnLoad){  
        //Audio File Load  
        if(!LoadAudioFile(audioSrcFile.getText().toString())){  
            Toast.makeText(getApplicationContext(), "Audio File Load Fail !", Toast.LENGTH_LONG)  
                .show();  
            return;  
        }  
        audioSrcFile.setEnabled(false); // EditText audioSrcFile disable  
        btnPlay.setEnabled(true);  
        btnStop.setEnabled(true);  
        chkLoopCTRL.setEnabled(true);  
        btnLoad.setEnabled(false);
```



Emulator : SD card 설정 (5)

❖ 기존 AVD(Android Virtual Device)에 SD card 추가

Android Virtual Device Manager

Your Virtual Devices
Android Studio

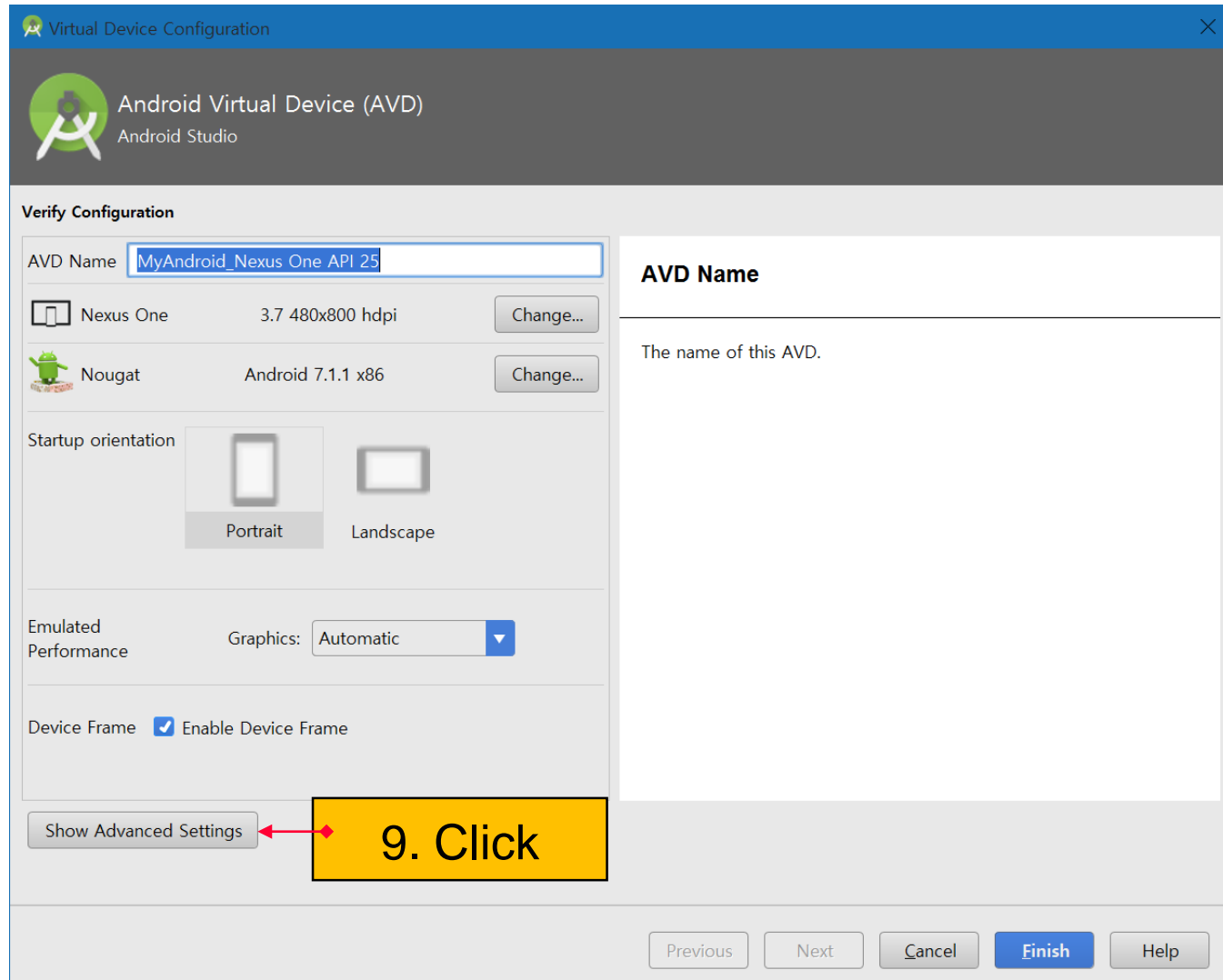
Type	Name	Play Store	Resolution	API	Target	CPU/ABI	Size on Disk	Actions
	MyAndroid_Nexus 6P API 25		1440 × 2560: 5...	25	Android 7.1.1 (Google APIs)	x86_64	1 GB	
	MyAndroid_Nexus One API 25		480 × 800: hdpi	25	Android 7.1.1 (Google APIs)	x86	1 GB	

+ Create Virtual Device...

8. Click



Emulator : SD card 설정 (6)





Emulator : SD card 설정 (7)

Virtual Device Configuration

Android Virtual Device (AVD)
Android Studio

Verify Configuration

Back: Emulated

Network Speed: Full
Latency: None

Emulated Performance
Graphics: Automatic
☒ Multi-Core CPU 2 (Experimental)

Memory and Storage
RAM: 512 MB
VM heap: 48 MB
Internal Storage: 800 MB
SD card: ☒ Studio-managed 512 MB
☐ External file

Device Frame ☒ Enable Device Frame
Custom skin definition nexus_one
[How do I create a custom hardware skin?](#)

Keyboard ☒ Enable keyboard input

[Hide Advanced Settings](#)

Built-in SD Card Size

The amount of removable space available to store data on the device. We recommend at least 100MB in order to use the camera in the emulator.

10. Input "512"

11. Click

Previous Next Cancel **Finish** Help



Emulator : SD card 설정 (8)

❖ Execute AVD(Android Virtual Device)

Android Virtual Device Manager

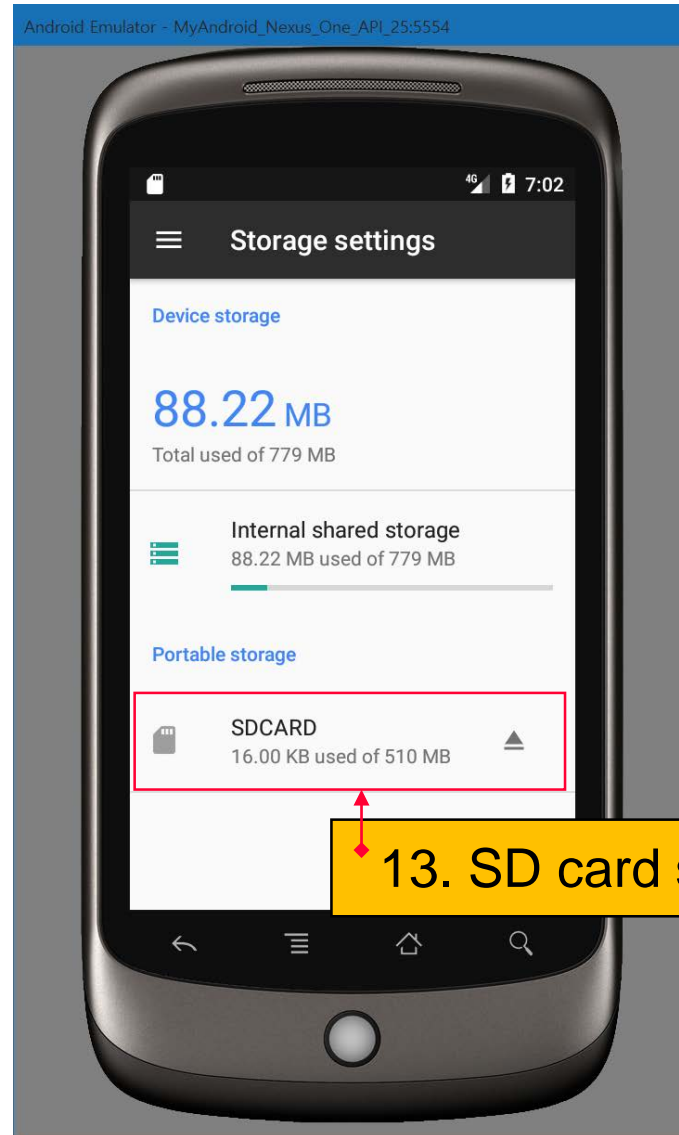
Your Virtual Devices
Android Studio

Type	Name	Play Store	Resolution	API	Target	CPU/ABI	Size on Disk	Actions
	MyAndroid_Nexus 6P API 25		1440 × 2560: 5...	25	Android 7.1.1 (Google APIs)	x86_64	1 GB	
	MyAndroid_Nexus One API 25		480 × 800: hdpi	25	Android 7.1.1 (Google APIs)	x86	1 GB	

+ Create Virtual Device...

12. Click

Emulator : SD card 설정 (9)



13. SD card setting Memory

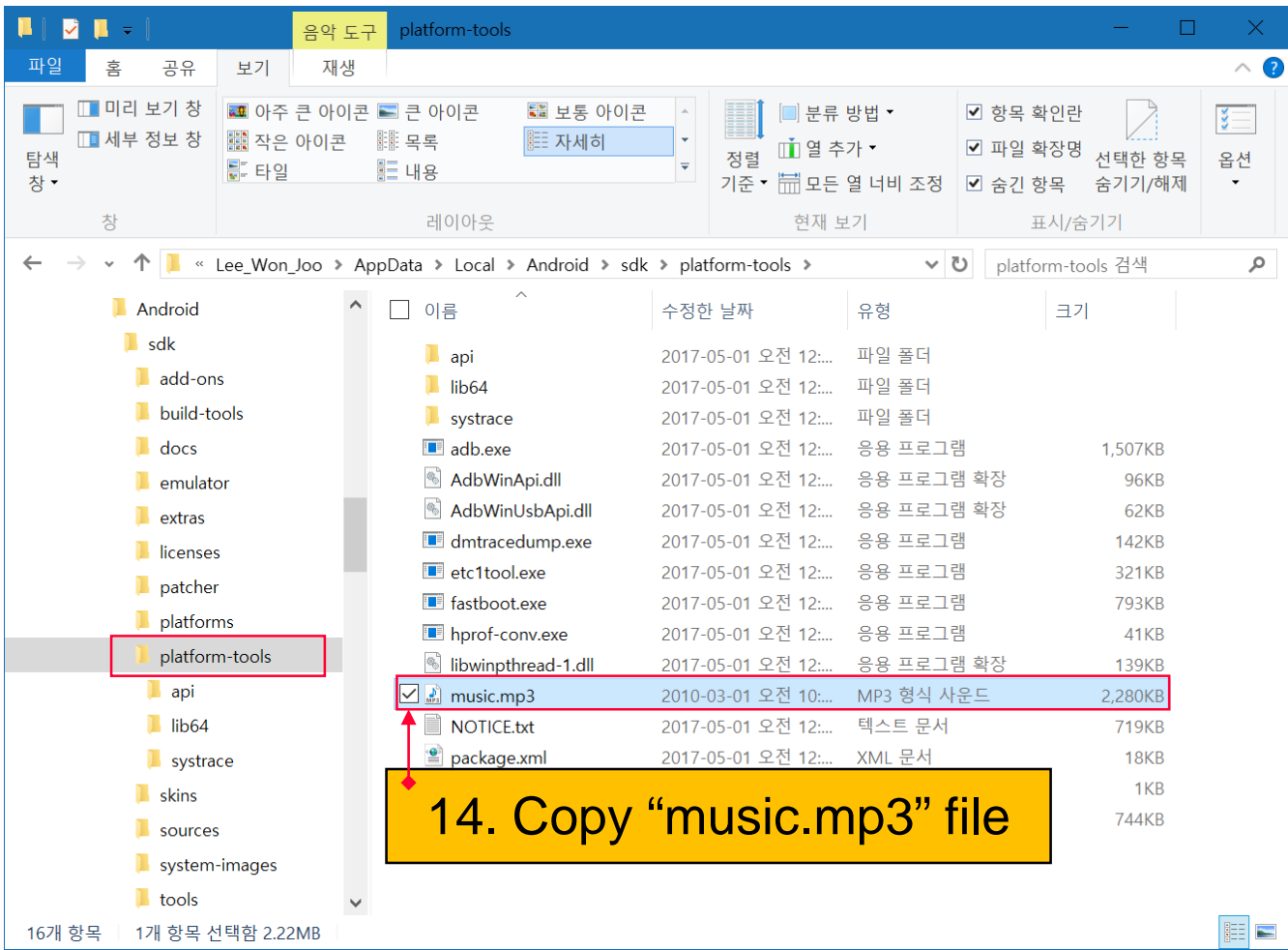




Emulator : SD card 설정 (10)

■ Copy audio file to SD card

❖ music.mp3 → C:\Android\SDK\platform-tools





Emulator : SD card 설정 (11)

■ Command Prompt 실행

❖ C:\Android\SDK\platform-tools

명령 프롬프트

Microsoft Windows [Version 10.0.10240]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Lee_Won_Joo>cd C:\Users\Lee_Won_Joo\AppData\Local\Android\sdk\platform-tools

C:\Users\Lee_Won_Joo\AppData\Local\Android\sdk\platform-tools>dir

15. 폴더 이동
cd c:\Android\sdk\platform-tools

16. dir 명령어

명령 프롬프트

C:\Users\Lee_Won_Joo\AppData\Local\Android\sdk\platform-tools 디렉터리

2017-05-16	오전 04:10	<DIR>	.
2017-05-16	오전 04:10	<DIR>	..
2017-05-01	오전 12:00		1,542,656 adb.exe
2017-05-01	오전 12:00		97,792 AdbWinApi.dll
2017-05-01	오전 12:00		62,976 AdbWinUsbApi.dll
2017-05-01	오전 12:00	<DIR>	api
2017-05-01	오전 12:00		145,408 dmtracedump.exe
2017-05-01	오전 12:00		328,704 etc1tool.exe
2017-05-01	오전 12:00		812,032 fastboot.exe
2017-05-01	오전 12:00		41,984 hprof-conv.exe
2017-05-01	오전 12:00	<DIR>	lib64
2017-05-01	오전 12:00		141,538 libwinpthread-1.dll
2010-03-01	오전 10:56		2,334,268 music.mp3
2017-05-01	오전 12:00		735,544 NOTICE.txt
2017-05-01	오전 12:00		17,443 package.xml
2017-05-01	오전 12:00		39 source.properties
2017-05-01	오전 12:00		761,344 sqlite3.exe
2017-05-01	오전 12:00	<DIR>	systrace
		13개 파일	7,021,728 바이트
		5개 디렉터리	85,695,574 바이트 남음

C:\Users\Lee_Won_Joo\AppData\Local\Android\sdk\platform-tools>

17. 파일 확인





Emulator : SD card 설정 (12)

■ music.mp3 → SD card

❖ adb.exe 명령어 사용

C:\Android\SDK\platform-tools> adb push music.mp3 /sdcard/music.mp3

```
명령 프롬프트
2017-05-16 오후 04:10 <DIR> .
2017-05-16 오후 04:10 <DIR> ..
2017-05-01 오후 12:00 1,542,656 adb.exe
2017-05-01 오후 12:00 97,792 AdbWinApi.dll
2017-05-01 오후 12:00 62,976 AdbWinUsbApi.dll
2017-05-01 오후 12:00 <DIR> api
2017-05-01 오후 12:00 145,408 dmtracedump.exe
2017-05-01 오후 12:00 328,704 etc1tool.exe
2017-05-01 오후 12:00 812,032 fastboot.exe
2017-05-01 오후 12:00 41,984 hprof-conv.exe
2017-05-01 오후 12:00 <DIR> lib64
2017-05-01 오후 12:00 141,538 libwinpthread-1.dll
2010-03-01 오후 10:56 2,334,268 music.mp3
2017-05-01 오후 12:00 735,544 NOTICE.txt
2017-05-01 오후 12:00 17,443 package.xml
2017-05-01 오후 12:00 39 source.properties
2017-05-01 오후 12:00 761,3
2017-05-01 오후 12:00 <DIR>
13개 파일 7,02
5개 디렉터리 85,695,574,016 바이트 남음

C:\Users\Lee_Won_Joo\AppData\Local\Android\SDK\platform-tools> adb push music.mp3 /sdcard/music.mp3
music.mp3: 1 file pushed. 57.1 MB/s (2334268 bytes in 0.039s)

C:\Users\Lee_Won_Joo\AppData\Local\Android\SDK\platform-tools>
```

18. Copy music.mp3 file to SD card

adb push music.mp3 /sdcard/music.mp3





Emulator : SD card 설정 (13)

❖ sdcard directory 확인

명령 프롬프트 - adb shell

19. adb shell 입력

C:\Users\Lee_Won_Joo\AppData\Local\Android\SDK\platform-tools>adb shell

generic_x86:/ \$

generic_x86:/ \$

generic_x86:/ \$

generic_x86:/ \$ su 20. su 실행(admin 권한 획득)

generic_x86:/ #

generic_x86:/ #

generic_x86:/ # ls 21. ls 입력

acct dev property_contexts storage

bugreports etc root sys

cache file_contexts.bin init.usb.configfs.rc sbin system

charger fstab.goldfish init.usb.rc sdcard ueventd.goldfish.rc

config fstab.ranchu init.zygote32.rc seapp_contexts ueventd.ranchu.rc

d init mnt

data init.environ.rc oem

default.prop init.goldfish.rc proc

generic_x86:/ #

22. "sdcard" directory 확인





Emulator : SD card 설정 (14)

❖ music.mp3 file 확인

```
명령 프롬프트 - adb shell

generic_x86:/ # ls
acct          dev           init.ranchu.rc  property_contexts  storage
bugreports    etc           init.rc         root               sys
cache         file_contexts.bin  init.usb.configfs.rc  sbin              system
charger       fstab.goldfish  init.usb.rc     sdcard             ueventd.goldfish.rc
config       fstab.ranchu    init.zygote32.rc  seapp_contexts    ueventd.ranchu.rc
d            init           mnt             selinux_version   ueventd.rc
data         init.environ.rc  oem            sepolicy          vendor
default.prop  init.goldfish.rc

generic_x86:/ # cd sdcard
generic_x86:/sdcard # ls
Alarms Android DCIM Download Movies Music Notifications Pictures Podcasts Ringtones music.mp3

generic_x86:/sdcard #
```

23. Input "cd sdcard"

24. Input "ls"

25. "music.mp3" 파일 저장 확인



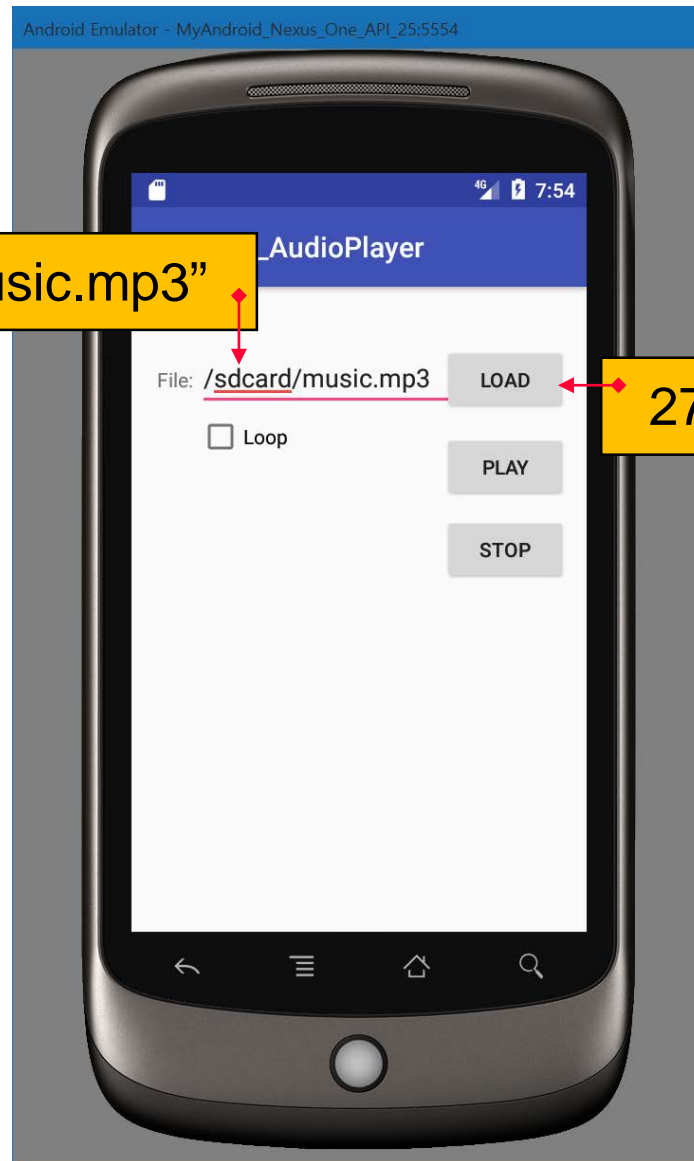


Emulator : SD card 설정 (15)

■ music.mp3 재생

26. Input “/sdcard/music.mp3”

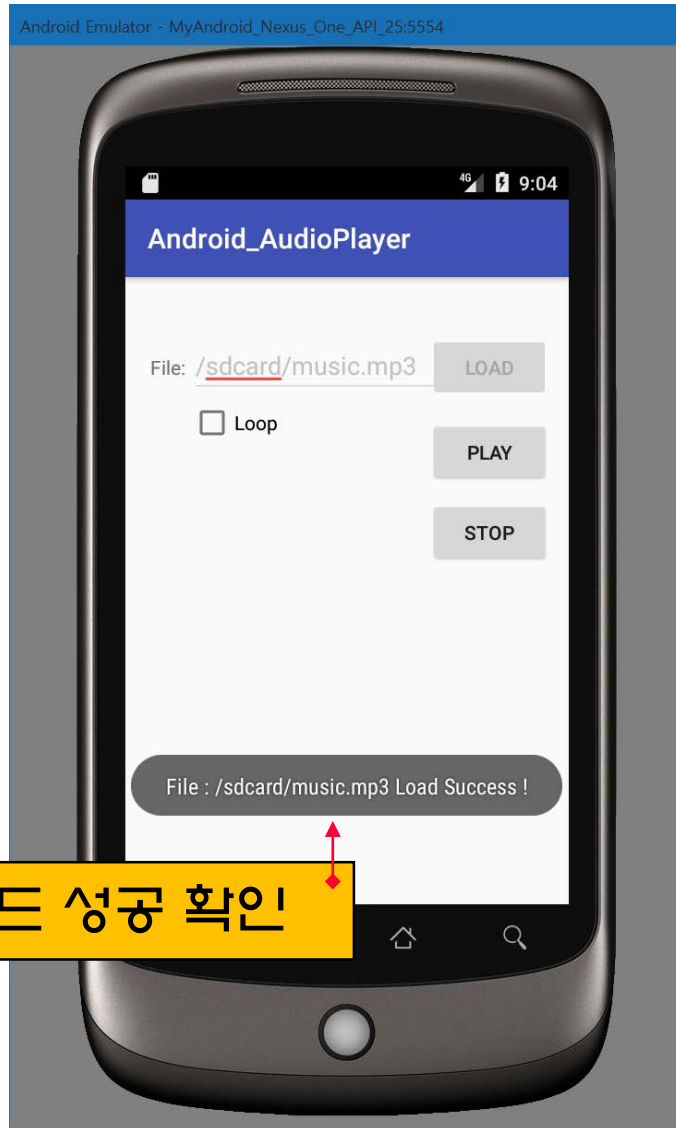
27. Click





Emulator : SD card 설정 (16)

❖ music.mp3 로드 성공

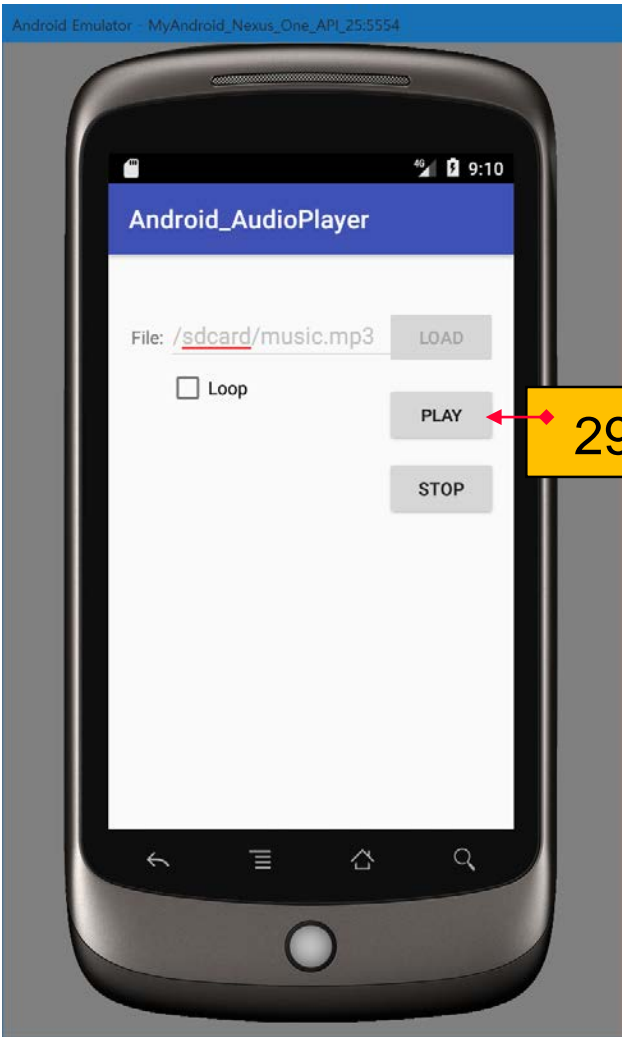


28. music.mp3 로드 성공 확인!

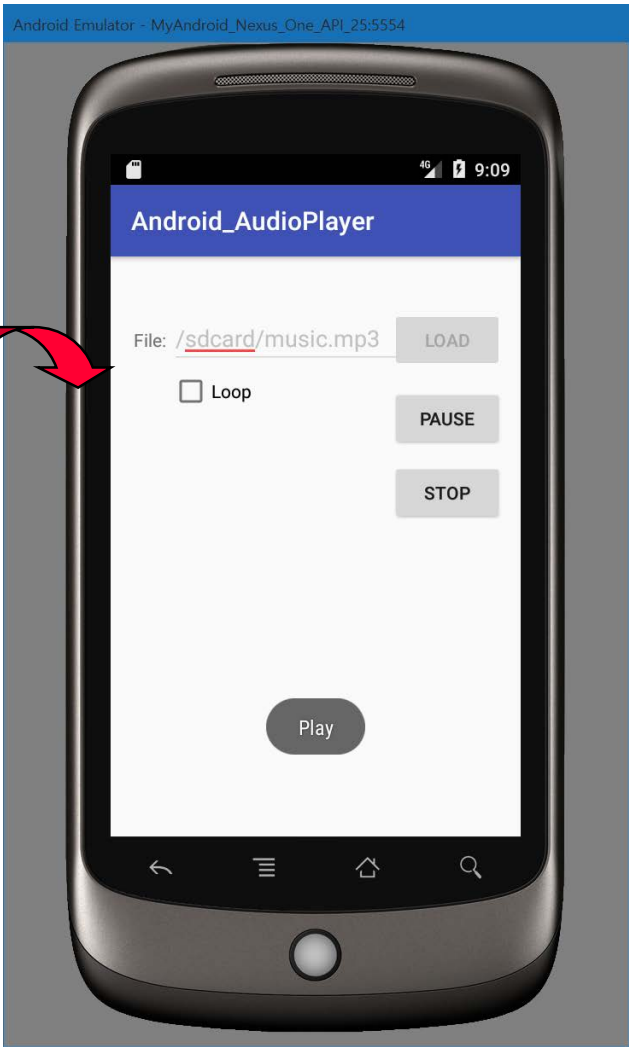


Emulator : SD card 설정 (17)

❖ music.mp3 로드 성공



29. Click





학습 요약

- MediaPlayer 객체 사용 방법

- Android Audio 재생 구현

 - ❖ Service 이용

- 실습 I : Audio Player 구현

 - ❖ MediaPlayer 이용

- Emulator : SD card 설정



open handset alliance