Embedded System Software

Java Examples
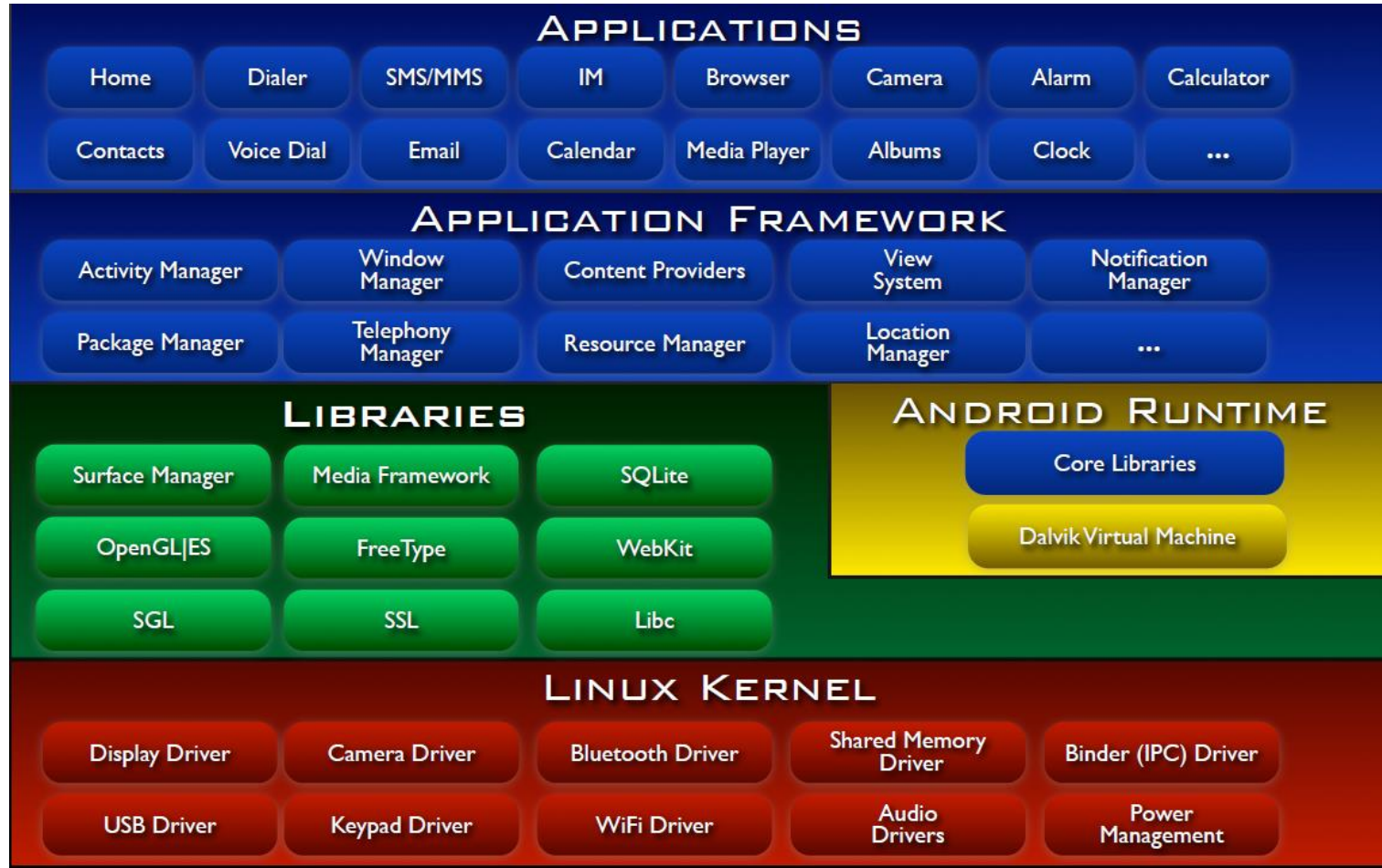
Dept. of Computer Science and Engineering

Sogang University, Seoul, KOREA
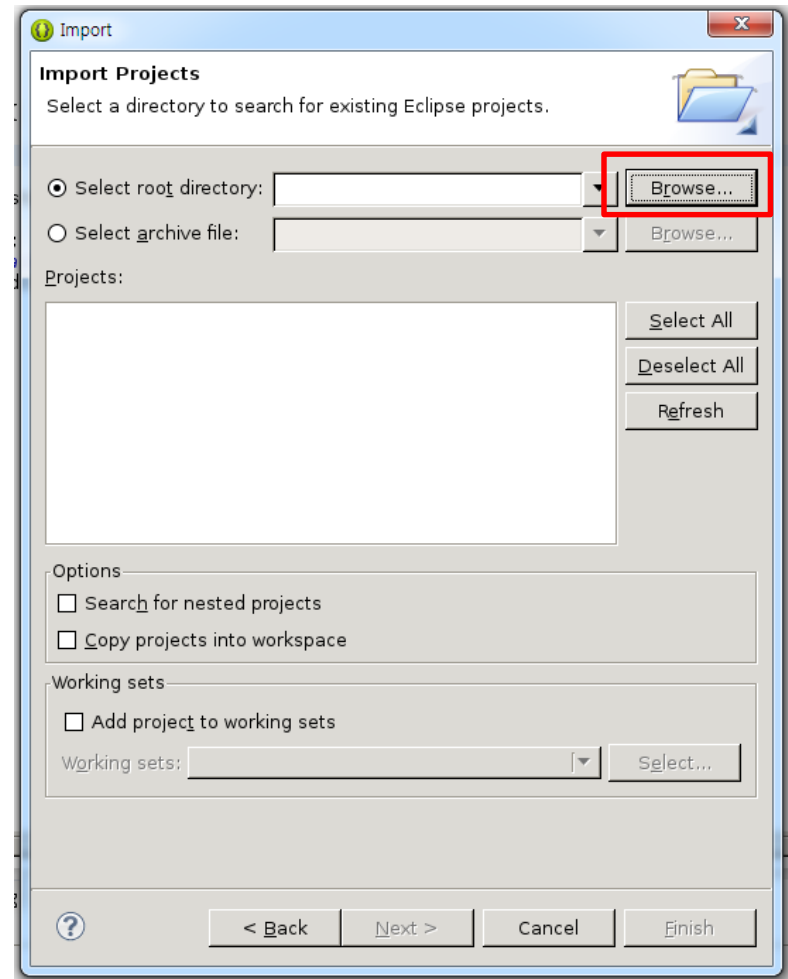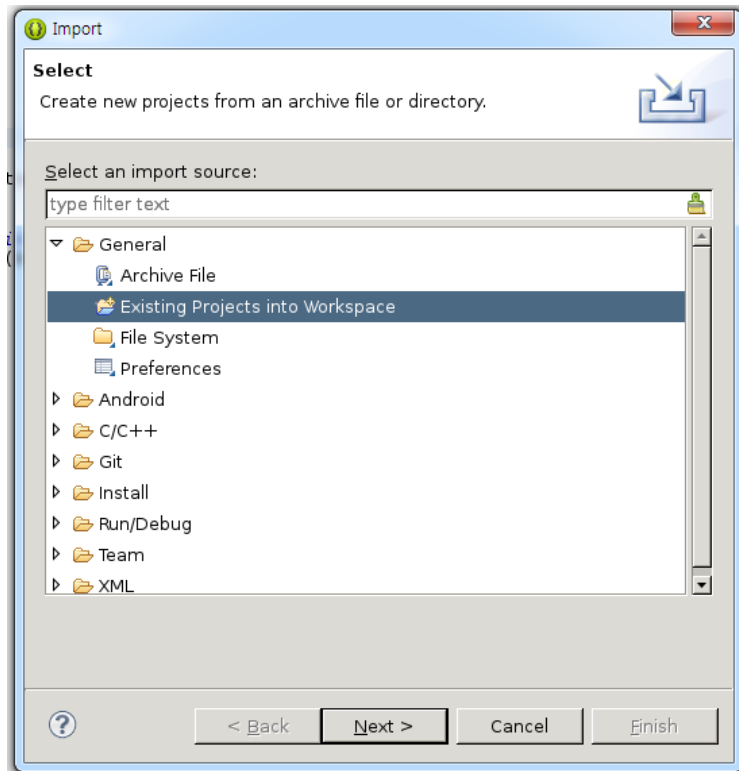
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Android Architecture

Java

C or C++

APPLICATIONS

| Home | Dialer | SMS/MMS | IM | Browser | Camera | Alarm | Calculator |
| Contacts | Voice Dial | Email | Calendar | Media Player | Albums | Clock | ... |

APPLICATION FRAMEWORK

| Activity Manager | Window Manager | Content Providers | View System | Notification Manager |
| Package Manager | Telephony Manager | Resource Manager | Location Manager | ... |

LIBRARIES

Surface Manager	Media Framework	SQLite
OpenGL|ES	FreeType	WebKit
SGL	SSL	Libc

ANDROID RUNTIME

Core Libraries

Dalvik Virtual Machine

LINUX KERNEL

| Display Driver | Camera Driver | Bluetooth Driver | Shared Memory Driver | Binder (IPC) Driver |
| USB Driver | Keypad Driver | WiFi Driver | Audio Drivers | Power Management |

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Import Project

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Import Project

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에러 발생시

- **Unable to resolve target 'android-??'` 에러 발생시**
  - **http://apphappy.tistory.com/123**
  - 해당 사이트 참조

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Intent

→ **An intent is an abstract description of an operation to be performed**

→ **한 액티비티에서 뷰들에 액션을 취해 다른 액티비티로 전환을 하게 되는 경우 사용됨.**

→ **Structure**

- ▪ **The primary pieces of information**
  - • Action
    - – The general action to be performed, such as ACTION_VIEW, ACTION_EDIT, ACTION_MAIN, etc.
  - • Data
    - – The data to operate on, such as a person record in the contacts database, expressed as a Uri.
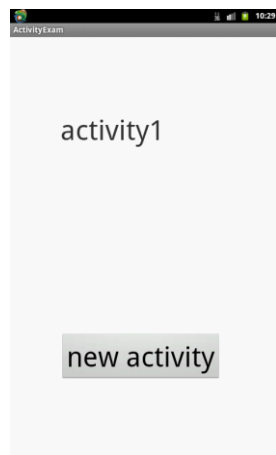
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Activity

- 안드로이드에서 '화면 하나'라고 이해하는 것이 가장 직관적
- **lifecycle**
  - **OnCreate()**
    - Called when the activity is first created
  - **OnStart()**
    - Called when the activity is becoming visible to the user
  - **OnResume ( )**
    - Called when the activity will start interacting with the user
  - **OnPause ( )**
    - Called when the system is about to start resuming a previous activity
  - **OnStop()**
    - Called when the activity is no longer visible to the user
  - **OnDestroy()**
    - The final call you receive before your activity is destroyed
- **public View findViewById (int id)**
  - **Finds a view that was identified by the id attribute from the XML**
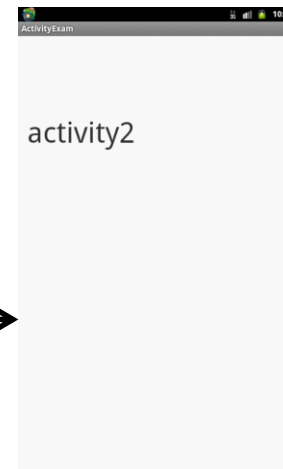 - **xml 레이아웃 내 선언된 각 뷰에 대한 인스턴스를 받기 위해 findViewById()를 사용**

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Activity

➜ Start activity

Intent intent = new Intent(this, A.class);
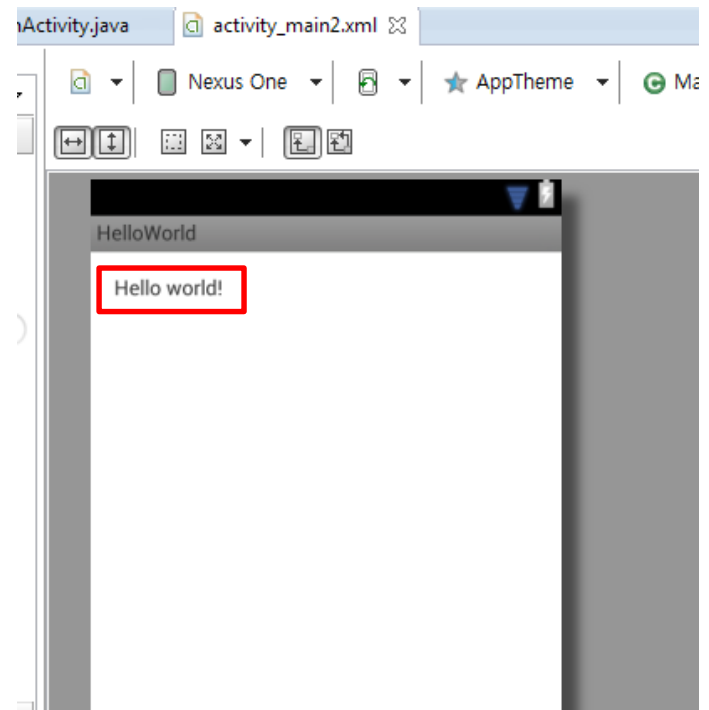startActivity(intent);
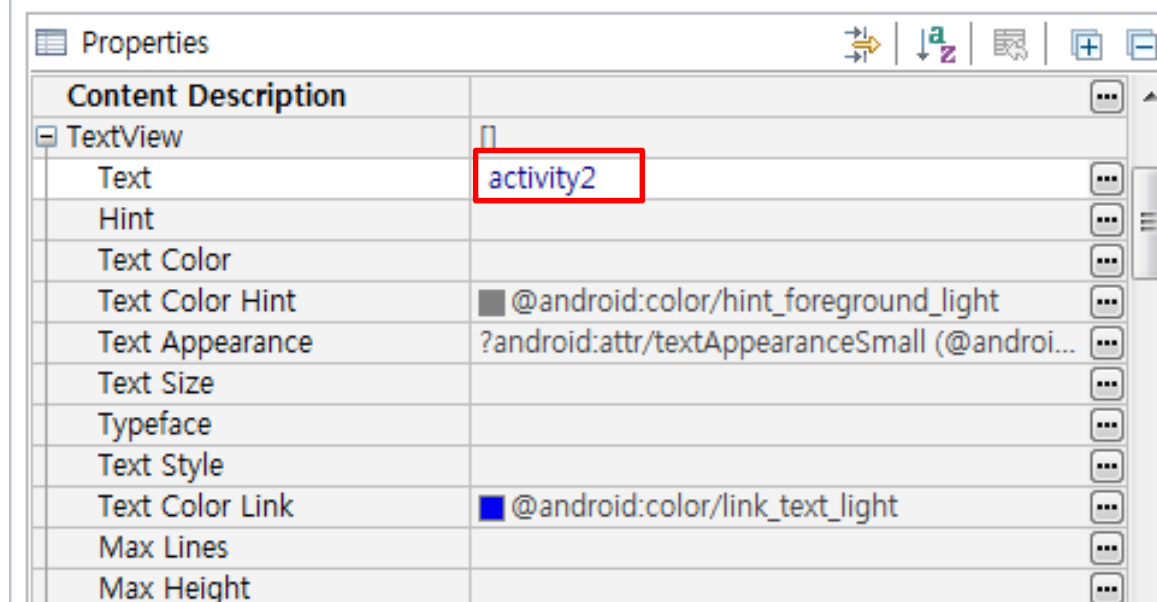

startActivity()

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Activity2개를 사용하는 예제

- res/layout/activity_main.xml을 res/layout/activity_main2.xml로 복사
- res/layout/activity_main2 더블클릭
- TextView를 클릭

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Activity2개를 사용하는 예제(Cont.)

- 'Properties' window
  - TextView / text
    - 'activity2'로 변경

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Activity2개를 사용하는 예제(Cont.)

➔ File / New / File
- src / com / example / androidex 선택
- File name : MainAcitivity2.java

➔ MainActivity2.java 작성

```
package com.example.androidex;

import android.app.Activity;

public class MainActivity2 extends Activity{
        protected void onCreate(Bundle savedInstanceState) {
                super.onCreate(savedInstanceState);

                setContentView(R.layout.activity_main2);
        }
}
```
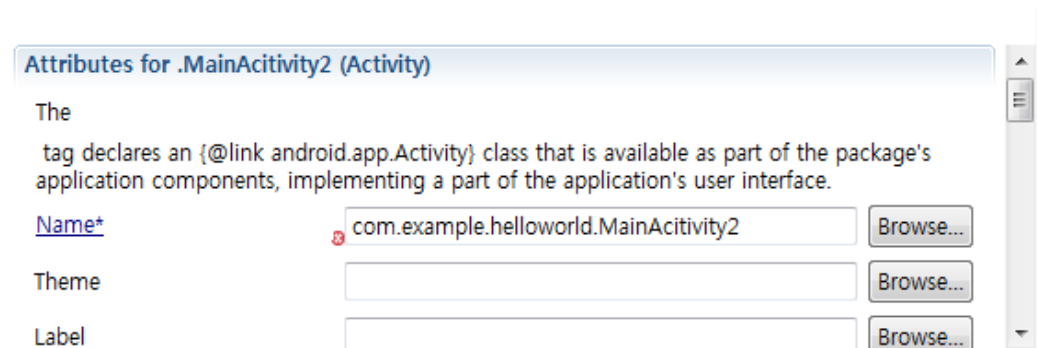
➔ Ctrl + Shift + o : 현재코드에서 import 필요하면 자동으로 해
줌.

Activity2개를 사용하는 예제(Cont.)

➔ AndroidManifest.xml 더블클릭
- Application 탭에서 Application Nodes / Add… /Activity
- Application 탭에서 Attributes for … / Name의 Browse / MainAcitivity2

Attributes for .MainAcitivity2 (Activity)

The

tag declares an {@link android.app.Activity} class that is available as part of the package's application components, implementing a part of the application's user interface.

Name*	com.example.helloworld.MainAcitivity2	Browse...
Theme		Browse...
Label		Browse...

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Activity2개를 사용하는 예제(Cont.)

→ res/layout/activity_main.xml 더블클릭
- Button 추가
- Button 클릭
- 'Properties' 윈도우
  - Id : @+id/newactivity

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Activity2개를 사용하는 예제(Cont.)
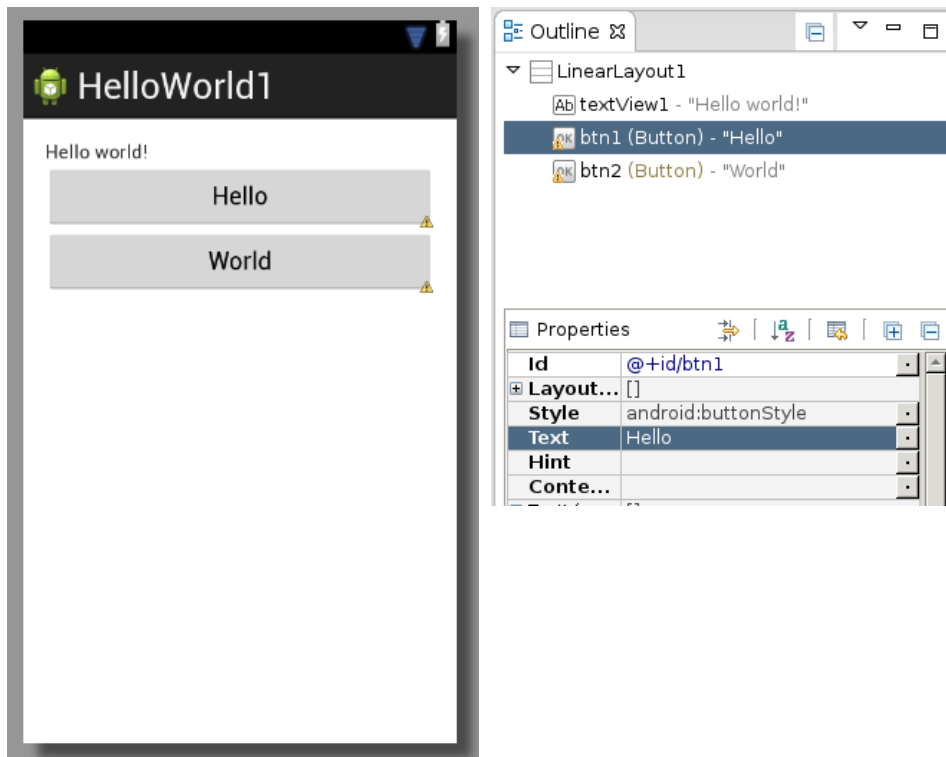
→ MainActivity.java 수정

```java
public class MainActivity extends Activity{

    LinearLayout linear;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        // TODO Auto-generated method stub
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        linear = (LinearLayout)findViewById(R.id.container);
        Button btn = (Button)findViewById(R.id.newactivity);
        OnClickListener listener = new OnClickListener() {
            @Override
            public void onClick(View v) {
                Intent intent = new Intent(MainActivity.this, MainActivity2.class);
                startActivity(intent);
            }
        };
        btn.setOnClickListener(listener);


    }

}
```

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Button

→ **activity_main.xml**

▪ **Add two buttons with id btn1 text hello, btn2 world**

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MediaPlayer

→ MainActivity에 MediaPlayer mp1, mp2 선언

→ Shift+ctrl+O

→ res/raw/ 폴더 생성 후 hello.mp3, world.mp3 복사

→ onCreate()에 MediaPlayer.create(this, R.raw.songName); 을 통해 MediaPlayer 생성

```java
MediaPlayer mp1, mp2;
Button btn, helloBtn, worldBtn;
OnClickListener ltn, ltn1, ltn2;
LinearLayout linear;
@Override
protected void onCreate(Bundle savedInstanceState) {
    // TODO Auto-generated method stub
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    linear = (LinearLayout)findViewById(R.id.container);


    btn = (Button)findViewById(R.id.newactivity);
    helloBtn = (Button)findViewById(R.id.hello);
    worldBtn = (Button)findViewById(R.id.world);

    mp1 = MediaPlayer.create(this, R.raw.hello);
    mp2 = MediaPlayer.create(this, R.raw.world);
```
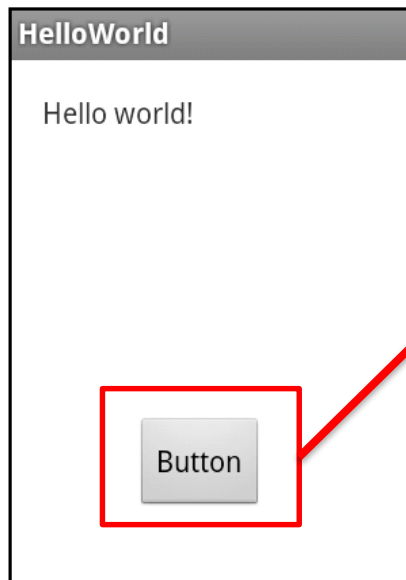
R.id.btn1
R.id.btn2

d
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Button.OnClickListener

```java
ltn1 = new OnClickListener() {
    @Override
    public void onClick(View v) {
        mp1.start();
    }
};
helloBtn.setOnClickListener(ltn1);

ltn2 = new OnClickListener() {
    @Override
    public void onClick(View v) {
        mp2.start();
    }
};
worldBtn.setOnClickListener(ltn2);
```

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TextView

- MainActivity에 TextView tv;
- tv = (TextView)findViewById(R.id.textView1);

- public final void setText (CharSequence text)
  - Sets the string value

- public CharSequence getText ()
  - Return the text the TextView is displaying.

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```
ltn1 = new OnClickListener() {
    @Override
    public void onClick(View v) {
        mp1.start();
        tv.setText("hello!\n");
    }
};
helloBtn.setOnClickListener(ltn1);

ltn2 = new OnClickListener() {
    @Override
    public void onClick(View v) {
        mp2.start();
        tv.setText("world!\n");
    }
};
worldBtn.setOnClickListener(ltn2);
```

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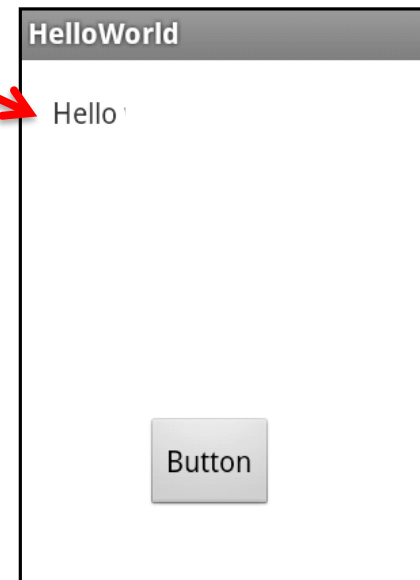
ScrollView

➜ **activity_main.xml**

```xml
<ScrollView
    android:id="@+id/scrollView1"
    android:layout_width="match_parent"
    android:layout_height="wrap_content" >

    <LinearLayout
        android:layout_width="match_parent"
        android:layout_height="match_parent"
        android:orientation="vertical" >

        <TextView
            android:id="@+id/textView2"
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:text="Hello World!" />
    </LinearLayout>
</ScrollView>
```

➜ **MainActivity.java**

```java
tv = (TextView)findViewById(R.id.textView1);
tv2 = (TextView)findViewById(R.id.textView2);

ltn2 = new OnClickListener() {
    @Override
    public void onClick(View v) {
        mp2.start();
        tv.setText("world!\n");
        tv2.setText("Hello\nHello\nHello\nHello\nHello\nHello\nHello\nHello\nHello\n");
    }
};
worldBtn.setOnClickListener(ltn2);
```

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Making Buttons Dynamically

```java
package com.example.androidexample;

import android.app.Activity;


public class MainActivity extends Activity{

    LinearLayout linear;
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        // TODO Auto-generated method stub
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
        linear = (LinearLayout)findViewById(R.id.container);
        linear.setOrientation(LinearLayout.VERTICAL);

        for(int i = 0; i < 3; i++){
            LinearLayout row = new LinearLayout(this);
            row.setLayoutParams(new LayoutParams(LayoutParams.FILL_PARENT, LayoutParams.WRAP_CONTENT));

            for(int j = 0; j < 4; j++){
                Button btnTag = new Button(this);
                btnTag.setLayoutParams(new LayoutParams(LayoutParams.WRAP_CONTENT, LayoutParams.WRAP_CONTENT));
                btnTag.setText("Button"+(j+1+(i*4)));
                row.addView(btnTag);

            }
            linear.addView(row);
        }
    }

}
```
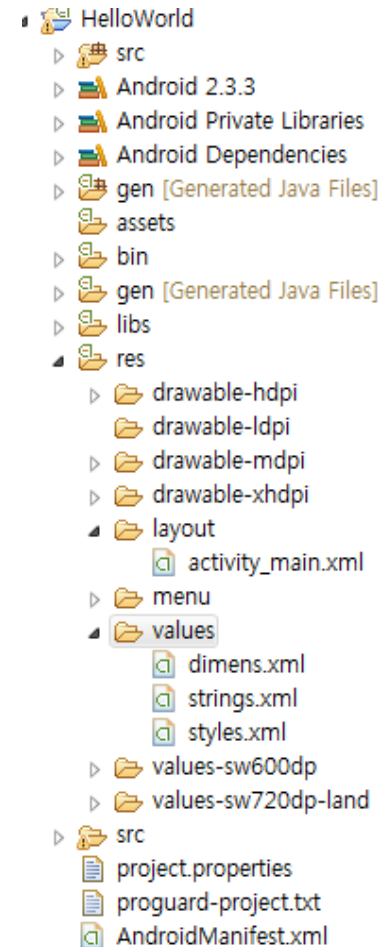
Application 파일구조

- ↳ res/drawable/ : image 파일
- ↳ res/layout/ : 화면 구성 xml 파일
- ↳ res/values/ : string 등
- ↳ src/ : source
- ↳ AndroidManifest.xml
  - Activity, Service를 정의하고
    그 메타데이터들을 제공

HelloWorld
- src
- Android 2.3.3
- Android Private Libraries
- Android Dependencies
- gen [Generated Java Files]
- assets
- bin
- gen [Generated Java Files]
- libs
- res
  - drawable-hdpi
  - drawable-ldpi
  - drawable-mdpi
  - drawable-xhdpi
  - layout
    - activity_main.xml
  - menu
  - values
    - dimens.xml
    - strings.xml
    - styles.xml
  - values-sw600dp
  - values-sw720dp-land
- src
- project.properties
- proguard-project.txt
- AndroidManifest.xml

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String

- An immutable sequence of characters/code units (chars)
- Methods
  - charAt(int index)
    - Returns the char value at the specified index.
  - equals(Object anObject)
    - Compares this string to the specified object.
  - contains(CharSequence s)
    - Returns true if and only if this string contains the specified sequence of char values
  - length()
    - Returns the length of this string.
  - substring(int beginIndex, int endIndex)
    - Returns a new string that is a substring of this string.
  - toCharArray()
    - Converts this string to a new character array.
  - static String valueOf(int i)
    - Returns the string representation of the int argument.
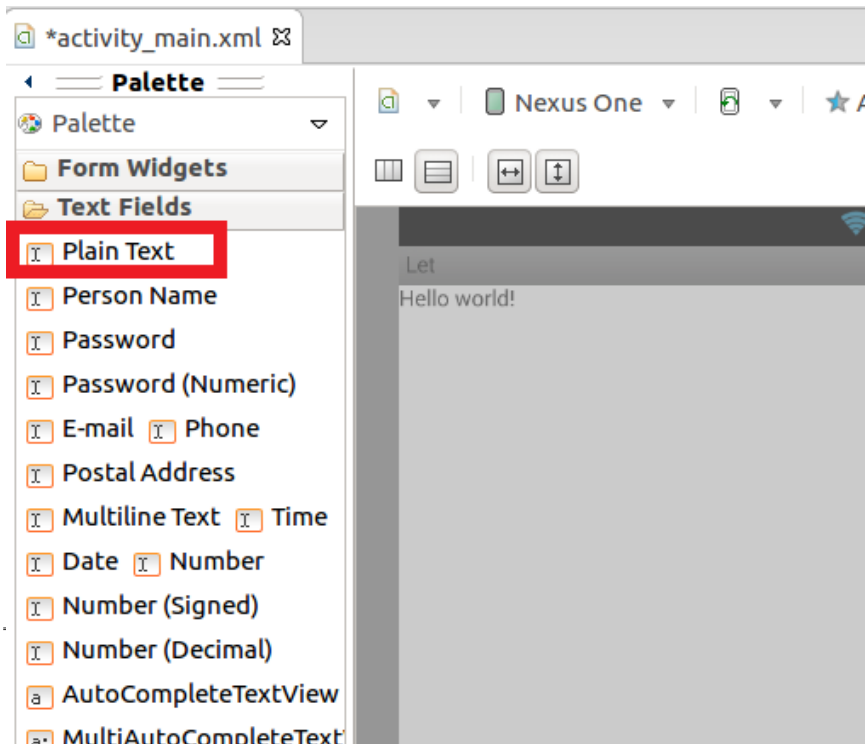
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String

```
String str = "abcdefg";

str.charAt(3);           // d
str.equals("abcdefg");   // true
str.contains("cde");     // true

str.length();            // 7
str.substring(2);        // cdefg
String.valueOf(1234);    // 1234
```

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Edit Text field

- 안드로이드 화면 통해 **text** 입력이 가능한 **field**
- **xml**에서 **Plain Text**를 사용하여 생성 가능, 해당 필드를 추가하면, 예상 화면을 보여주는 그래픽이 깨질 수 있으나, 실제로 프로그램 돌릴 시 정상적으로 수행됨

AndroidEx_edittext

➜ **user가 터치패드를 통해 값을 입력하고, button을 누르면, text field값이 입력한 값을 바꾸는 프로그램**

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FileReader

- **MainActivity.java**
- **FileReader fis 를 MainActivity에 추가**

```java
try {
    fis = new FileReader("/proc/modules");
    BufferedReader br = new BufferedReader(fis);

    String str = null;
    do {
        Log.e("ayoayo", "ayoayo " + str);
        tv.append(str);

    } while ((str = br.readLine()) != null);

} catch (FileNotFoundException e) {
    // TODO Auto-generated catch block
    e.printStackTrace();
} catch (IOException e) {
    // TODO Auto-generated catch block
    e.printStackTrace();
}
```

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