Advanced Widgets

Mobile Software
2019 Fall

What to do next?

- **ViewPager**
- Spinner
- ProgressBar
- SeekBar

Tabbed Interface

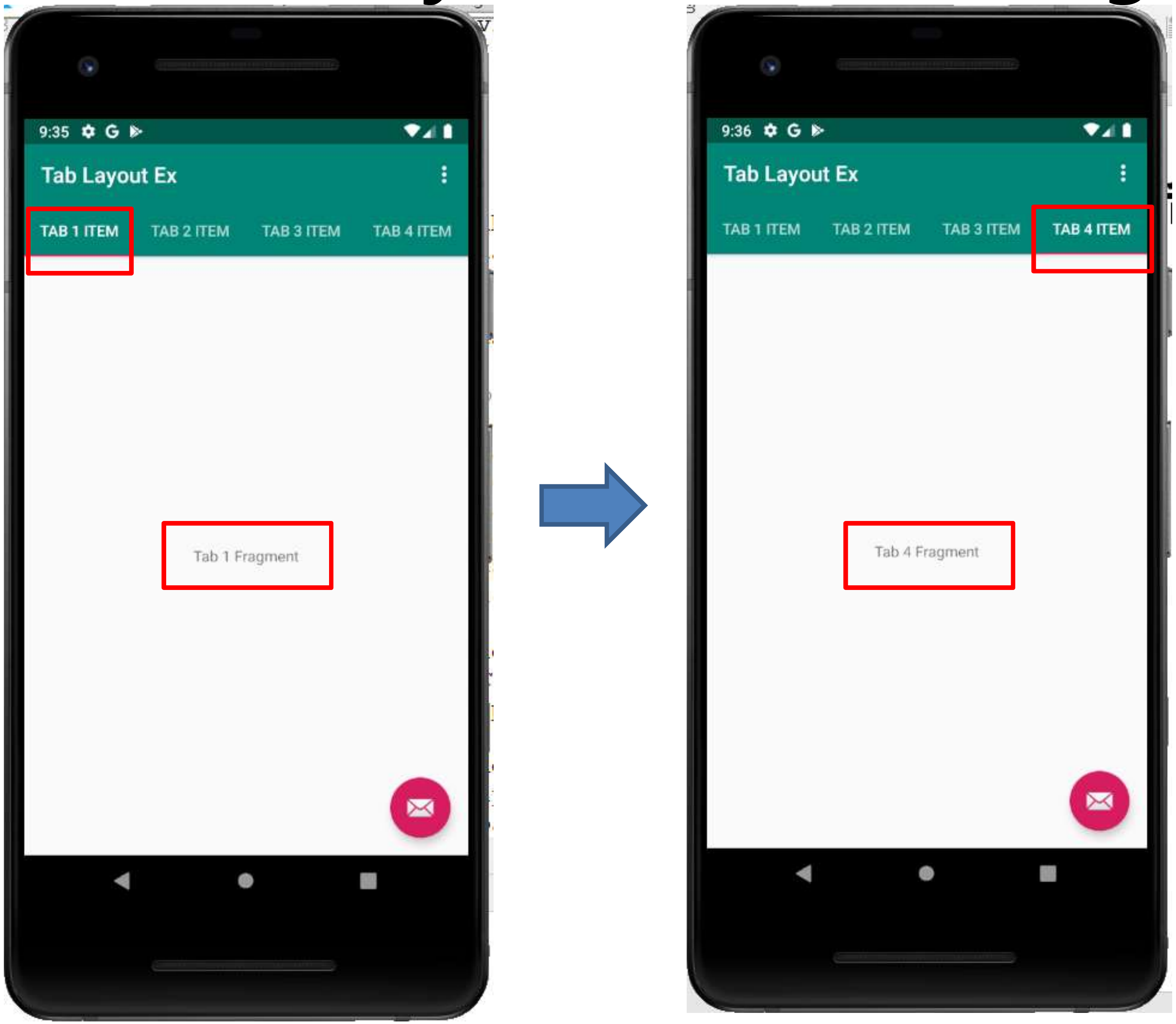
- **Tab based interface : TabLayout + ViewPager**
- **TabLayout** : present the user with a row of tabs
  - The tabs can be *fixed* or *scrollable*
- **ViewPager**
  - Allow the user to *flip* through different pages of information
  - Each page is represented by a *layout fragment*
  - ViewPager의 fragment는 **FragmentPagerAdapter** 객체가 관리
  - 아래 2개 method를 반드시 구현
    - **getCount** : return the number of page fragments available to be displayed to the user
    - **getItem** : passed a page number and must return the corresponding fragment object ready to be presented to the user

실습 준비

- 새 프로젝트 생성
  - **Activity** : **Basic Activity**
  - **Application name** : **TabLayoutEx**
  - **Minimum API level : API 26** (Oreo)
  - **Activity name** : **MainActivity.kt** (자동 생성)
  - **Layout name**
    - **activity_main.xml, content_main.xml** (자동 생성)

- 자동 생성된 레이아웃 XML 파일은 2개
  - **activity_main.xml** 의 root layout은 **CoordinatorLayout**
  - **content_main.xml** 의 root layout은 **ConstraintLayout**
    - **content_main.xml** 에서 TextView 는 삭제

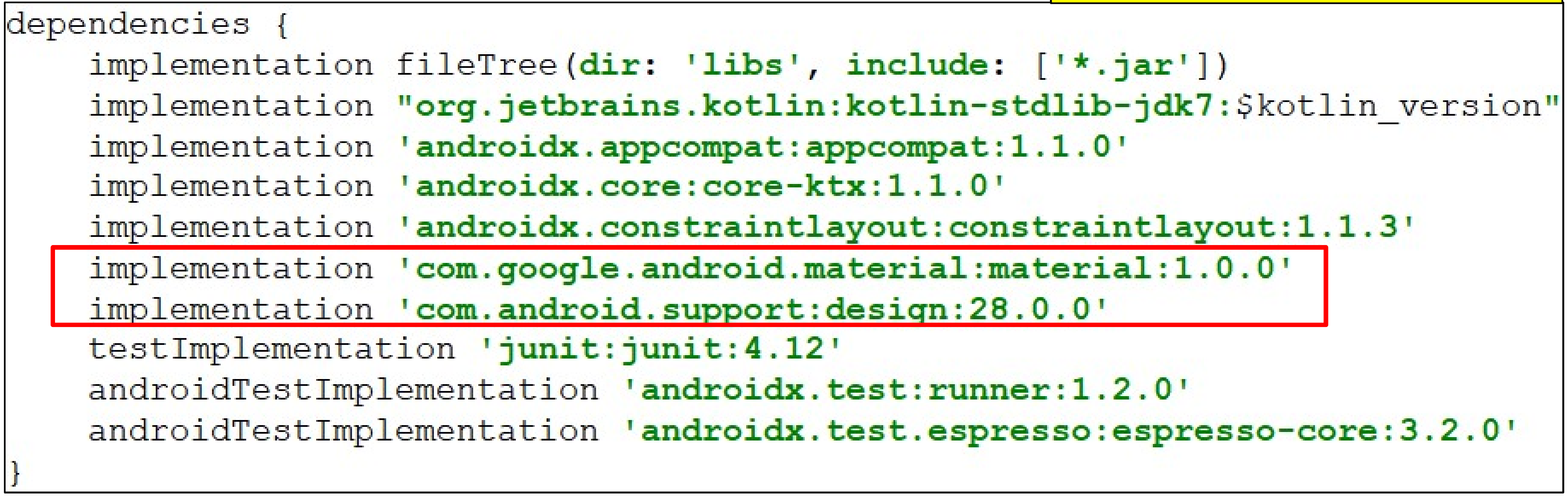
실습 1: Tab Layout with ViewPager



Dependency 추가

ViewPager와 TabLayout을 사용하기 위해
2개의 implementation 추가 → Sync Now 클릭

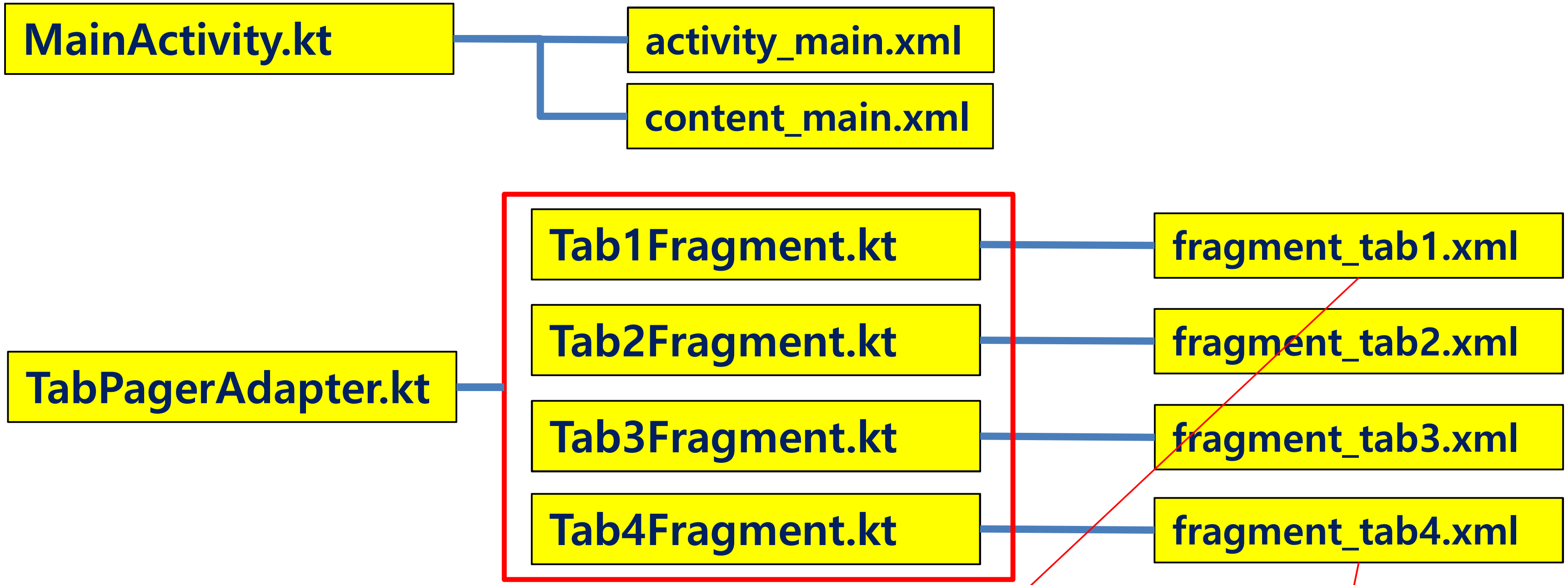
build.gradle(Module : app)



```
dependencies {
    implementation fileTree(dir: 'libs', include: ['*.jar'])
    implementation "org.jetbrains.kotlin:kotlin-stdlib-jdk7:$kotlin_version"
    implementation 'androidx.appcompat:appcompat:1.1.0'
    implementation 'androidx.core:core-ktx:1.1.0'
    implementation 'androidx.constraintlayout:constraintlayout:1.1.3'
    implementation 'com.google.android.material:material:1.0.0'
    implementation 'com.android.support:design:28.0.0'
    testImplementation 'junit:junit:4.12'
    androidTestImplementation 'androidx.test:runner:1.2.0'
    androidTestImplementation 'androidx.test.espresso:espresso-core:3.2.0'
}
```

소스코드 – 1쪽

실습 1: 파일 구성



MainActivity.kt

activity_main.xml

content_main.xml

TabPagerAdapter.kt

Tab1Fragment.kt

Tab2Fragment.kt

Tab3Fragment.kt

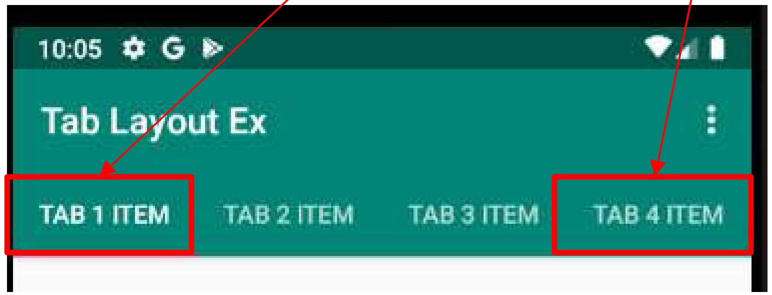
Tab4Fragment.kt

fragment_tab1.xml

fragment_tab2.xml

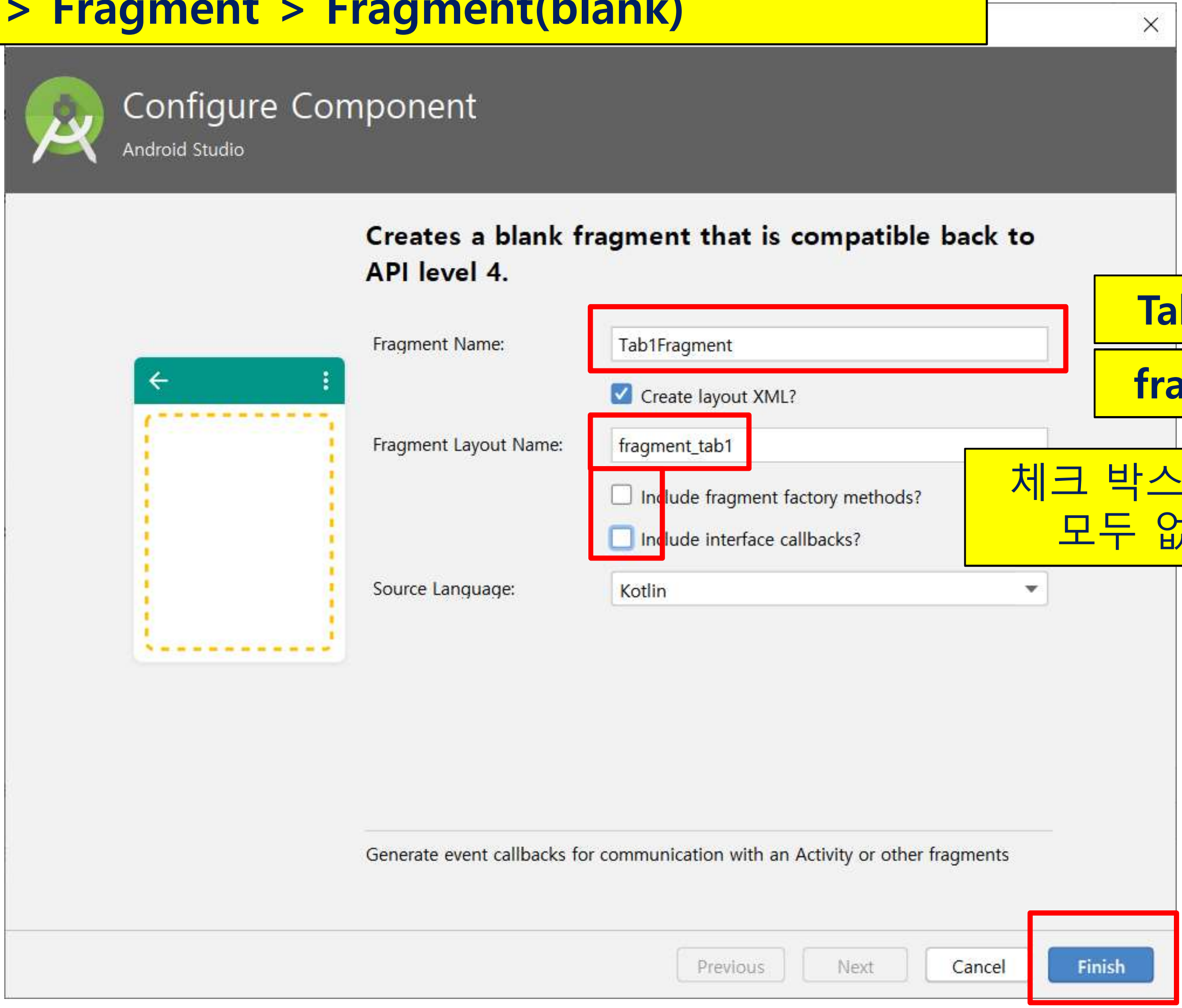
fragment_tab3.xml

fragment_tab4.xml



실습 1: Fragment - Tabxfragment.kt

edu.Incheon.tablayoutex 클릭 > 오른쪽 버튼 클릭 >
➢ New > Fragment > Fragment(blank)



Creates a blank fragment that is compatible back to API level 4.

Fragment Name: Tab1Fragment

☑ Create layout XML?

Fragment Layout Name: fragment_tab1

□ Include fragment factory methods?

□ Include interface callbacks?

Source Language: Kotlin

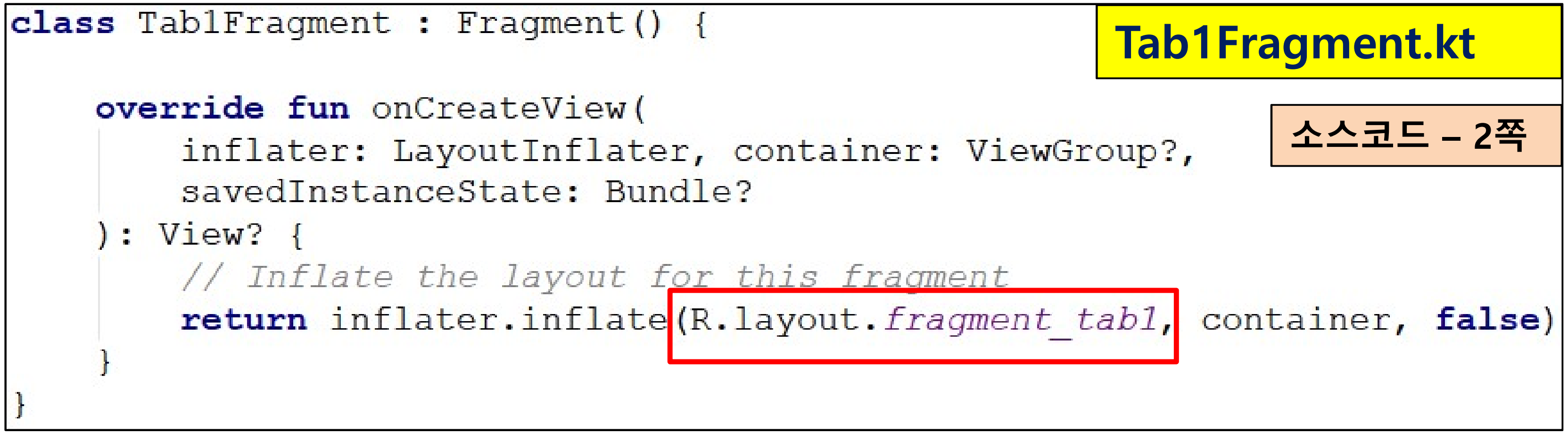
Generate event callbacks for communication with an Activity or other fragments

Tab1Fragment

fragment_tab1

체크 박스 표시
모두 없앰

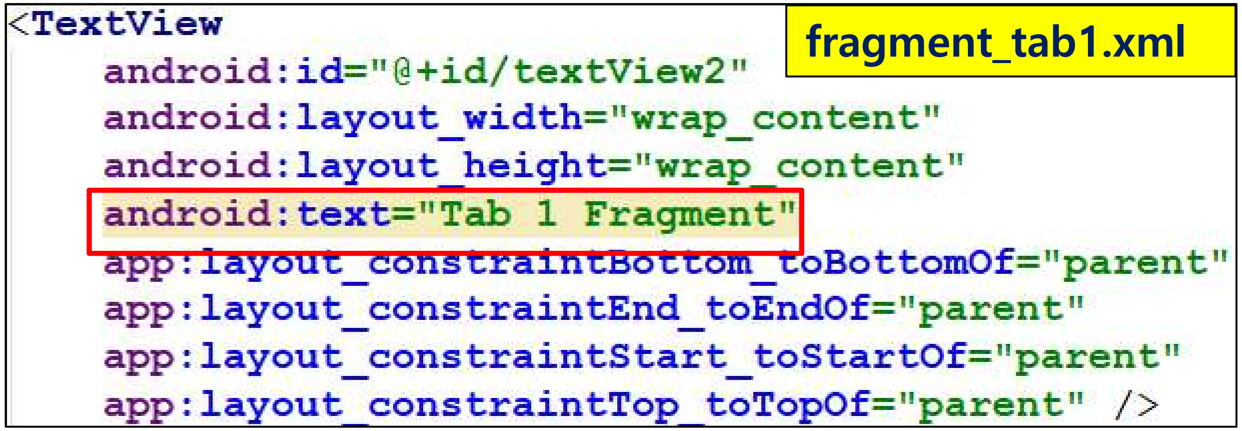
실습 1: Fragment - Tabxfragment.kt



Tab1Fragment.kt

소스코드 – 2쪽

```
class Tab1Fragment : Fragment() {

    override fun onCreateView(
        inflater: LayoutInflater, container: ViewGroup?,
        savedInstanceState: Bundle?
    ): View? {
        // Inflate the layout for this fragment
        return inflater.inflate(R.layout.fragment_tab1, container, false)
    }
}
```



fragment_tab1.xml

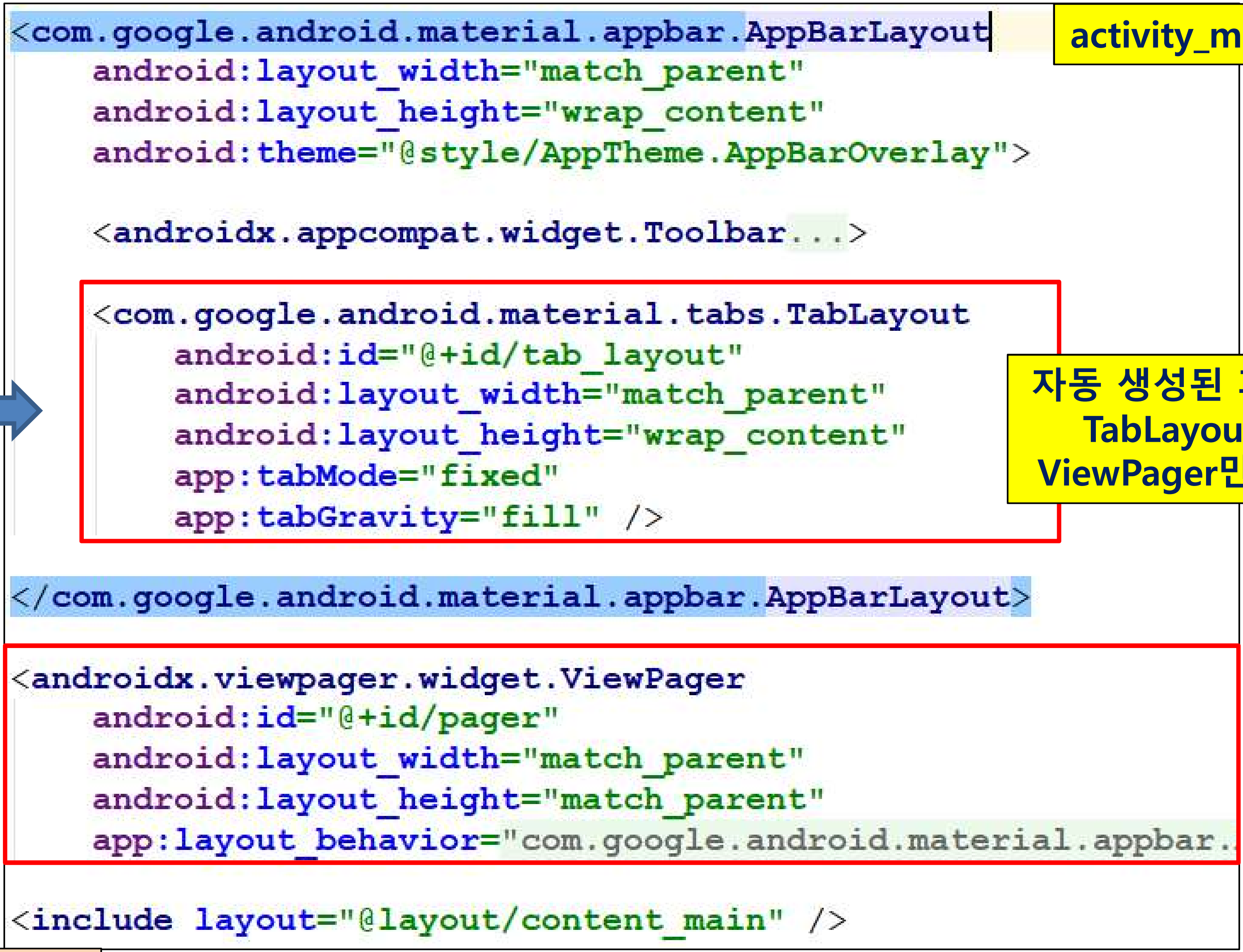
```
<TextView
    android:id="@+id/textView2"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:text="Tab 1 Fragment"
    app:layout_constraintBottom_toBottomOf="parent"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />
```

다른 3개의 kt
파일과
XML 레이아웃
파일도 함께 생성

소스코드 – 1쪽

실습 1: Layout

activity_main.xml

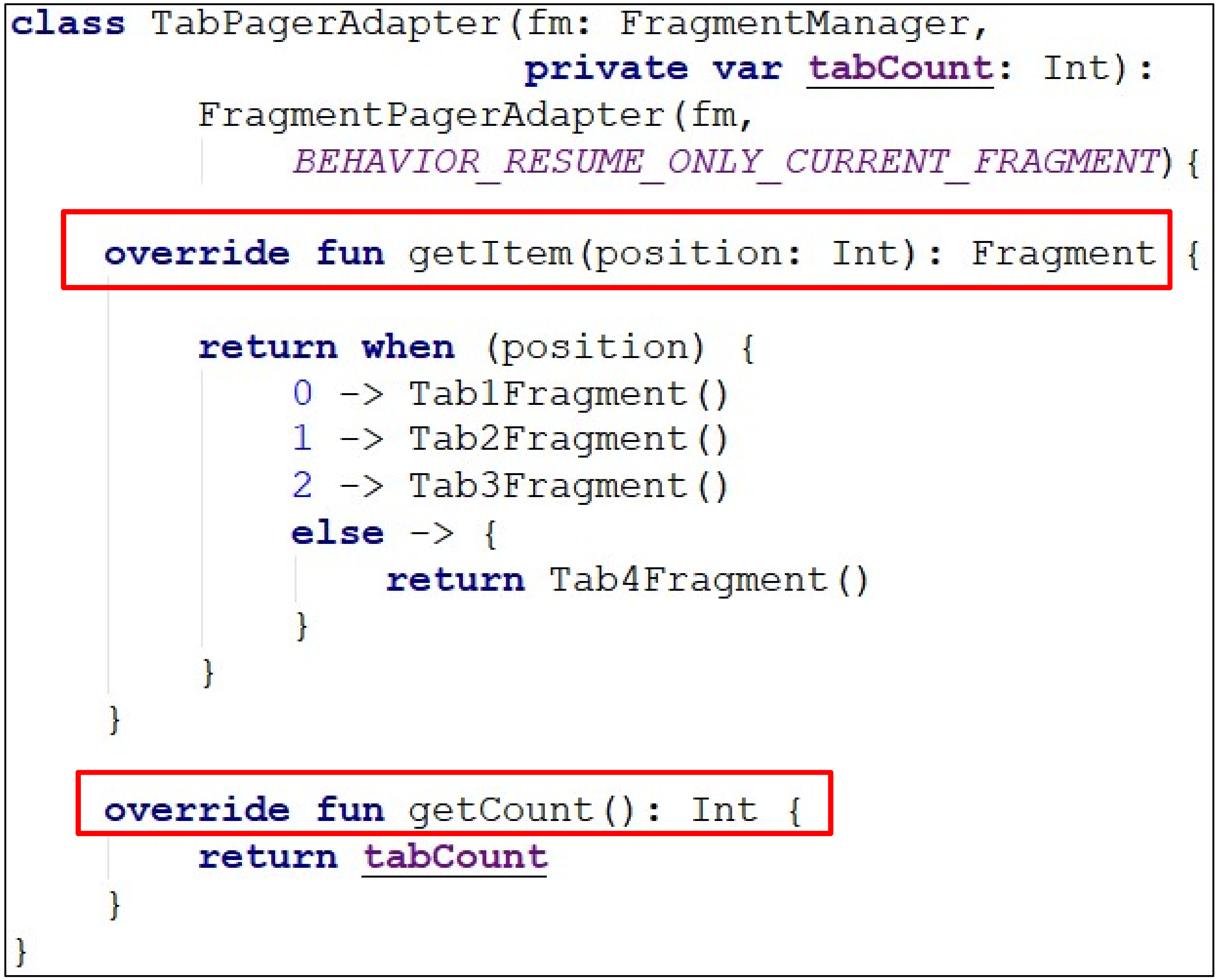


```
<com.google.android.material.appbar.AppBarLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    android:theme="@style/AppTheme.AppBarOverlay">

    <androidx.appcompat.widget.Toolbar...>

    <com.google.android.material.tabs.TabLayout
        android:id="@+id/tab_layout"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        app:tabMode="fixed"
        app:tabGravity="fill" />

</com.google.android.material.appbar.AppBarLayout>

<androidx.viewpager.widget.ViewPager
    android:id="@+id/pager"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    app:layout_behavior="com.google.android.material.appbar..

<include layout="@layout/content_main" />
```

자동 생성된 파일에
TabLayout과
ViewPager만 추가

소스코드 – 3쪽

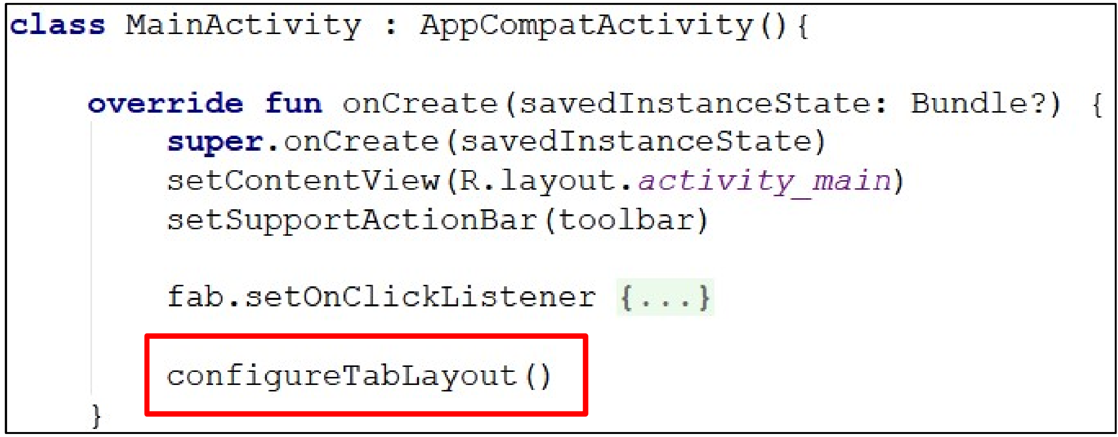
실습 1: ViewPager Adapter



```
class TabPagerAdapter(fm: FragmentManager,
                      private var tabCount: Int):
        FragmentPagerAdapter(fm,
            BEHAVIOR_RESUME_ONLY_CURRENT_FRAGMENT){

    override fun getItem(position: Int): Fragment {

        return when (position) {
            0 -> Tab1Fragment()
            1 -> Tab2Fragment()
            2 -> Tab3Fragment()
            else -> {
                return Tab4Fragment()
            }
        }
    }

    override fun getCount(): Int {
        return tabCount
    }
}
```

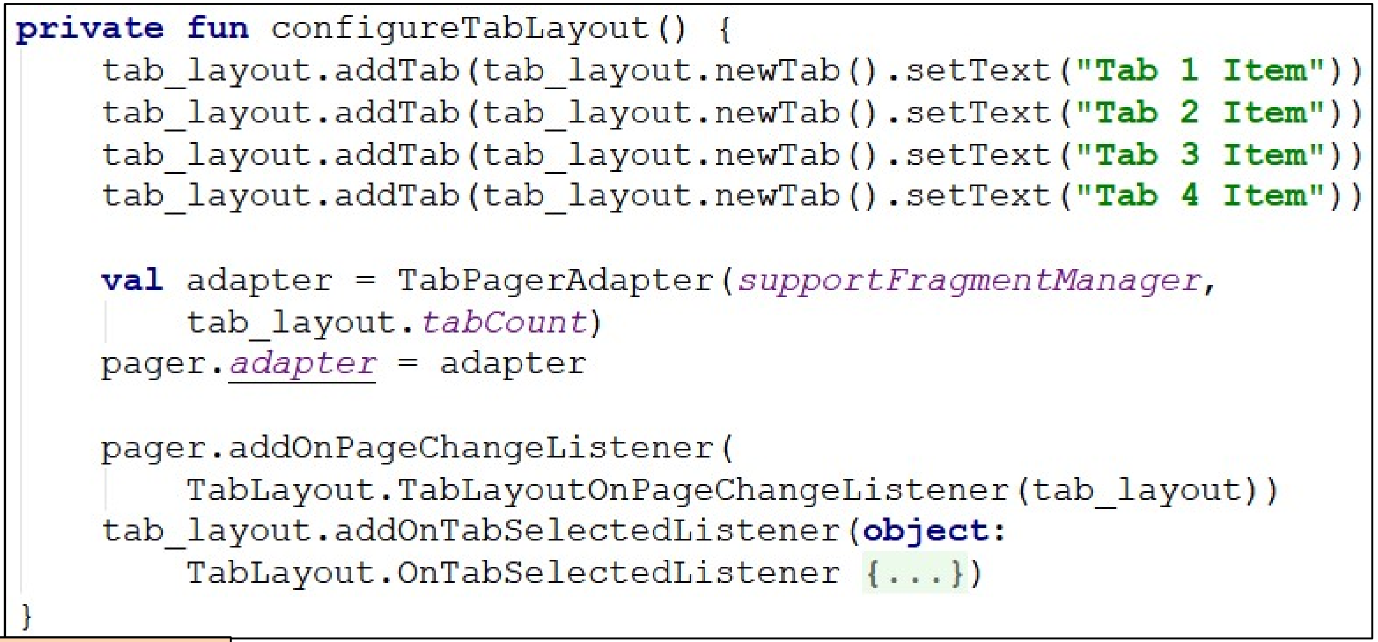
소스코드 – 4쪽

실습 1: Activity (1/2)



```
class MainActivity : AppCompatActivity(){

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)
        setSupportActionBar(toolbar)

        fab.setOnClickListener {...}

        configureTabLayout()
    }
```

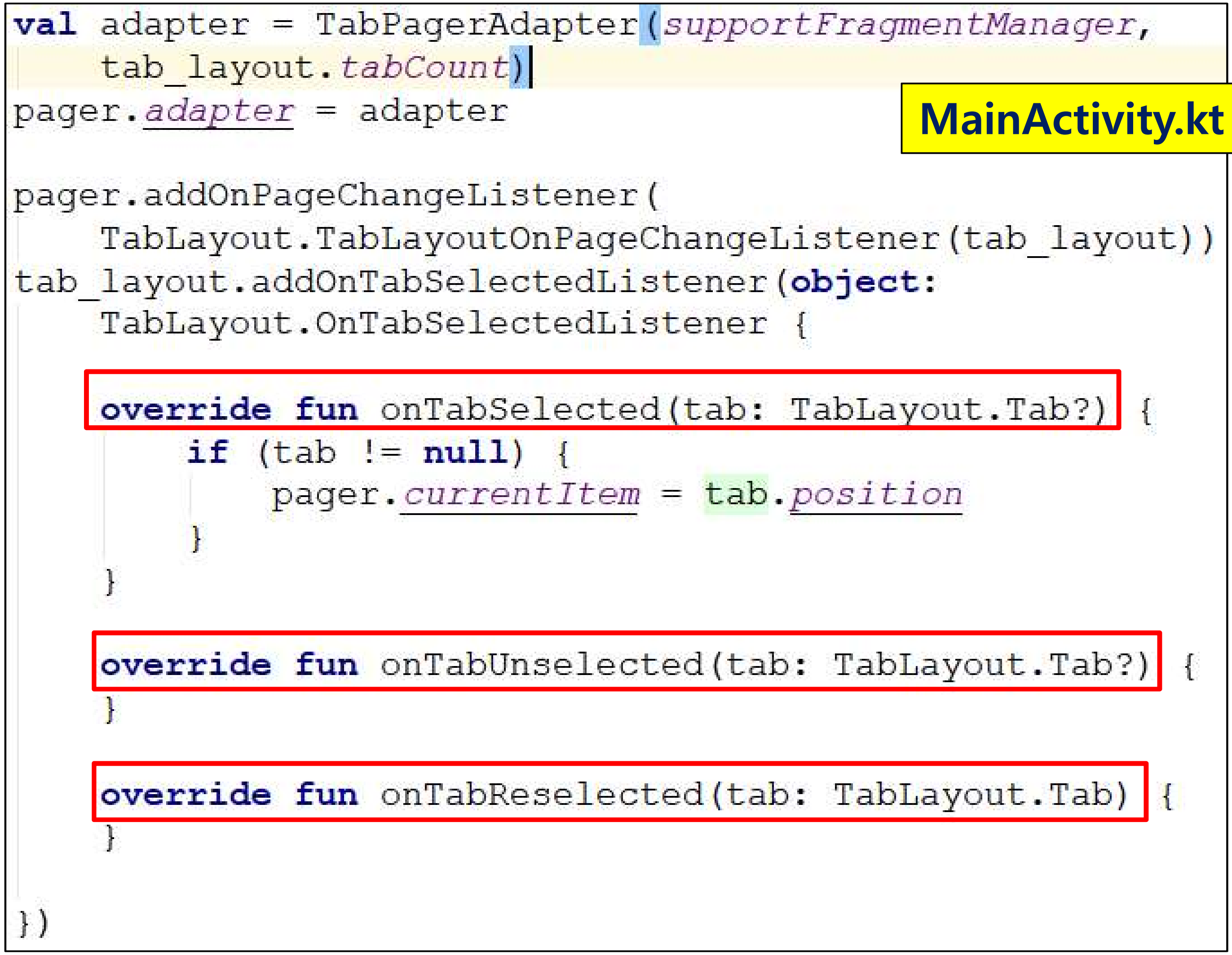
MainActivity.kt



```
private fun configureTabLayout() {
    tab_layout.addTab(tab_layout.newTab().setText("Tab 1 Item"))
    tab_layout.addTab(tab_layout.newTab().setText("Tab 2 Item"))
    tab_layout.addTab(tab_layout.newTab().setText("Tab 3 Item"))
    tab_layout.addTab(tab_layout.newTab().setText("Tab 4 Item"))

    val adapter = TabPagerAdapter(supportFragmentManager,
        tab_layout.tabCount)
    pager.adapter = adapter

    pager.addOnPageChangeListener(
        TabLayout.TabLayoutOnPageChangeListener(tab_layout))
    tab_layout.addOnTabSelectedListener(object:
        TabLayout.OnTabSelectedListener {...})
}
```

소스코드 – 4~5쪽

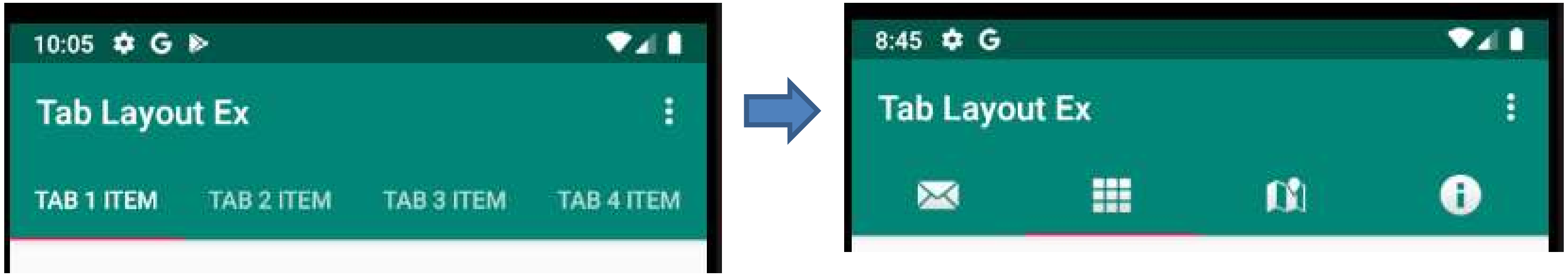
실습 1: Activity (2/2)



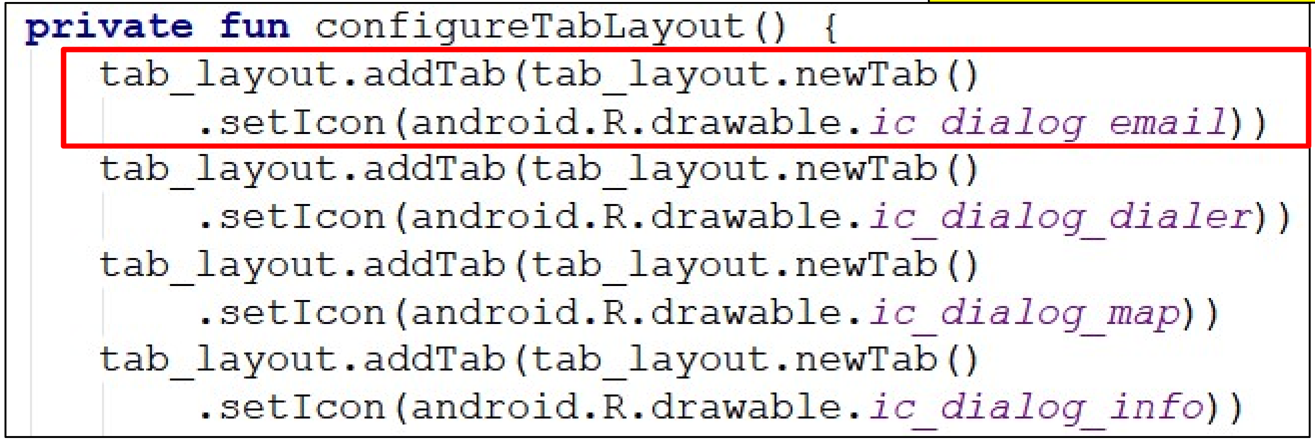
```
val adapter = TabPagerAdapter(supportFragmentManager,
    tab_layout.tabCount)
pager.adapter = adapter

pager.addOnPageChangeListener(
    TabLayout.TabLayoutOnPageChangeListener(tab_layout))
tab_layout.addOnTabSelectedListener(object:
    TabLayout.OnTabSelectedListener {

    override fun onTabSelected(tab: TabLayout.Tab?) {
        if (tab != null) {
            pager.currentItem = tab.position
        }
    }

    override fun onTabUnselected(tab: TabLayout.Tab?) {
    }

    override fun onTabReselected(tab: TabLayout.Tab) {
    }

})
```

MainActivity.kt

실습 1(b): Tab item으로 icon 설정



MainActivity.kt



```
private fun configureTabLayout() {
    tab_layout.addTab(tab_layout.newTab()
        .setIcon(android.R.drawable.ic dialog email))
    tab_layout.addTab(tab_layout.newTab()
        .setIcon(android.R.drawable.ic_dialog_dialer))
    tab_layout.addTab(tab_layout.newTab()
        .setIcon(android.R.drawable.ic_dialog_map))
    tab_layout.addTab(tab_layout.newTab()
        .setIcon(android.R.drawable.ic_dialog_info))
```

소스코드 – 6쪽

실습 준비

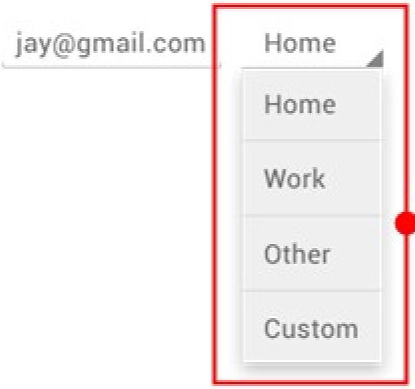
- 새 프로젝트 생성
  - **Activity** : **Empty Activity**
  - **Application name** : **Ch9Project**
  - **Minimum API level : API 26** (Oreo)
  - **Activity name** : **MainActivity.kt** (자동 생성)
  - **Layout name**
    - **activity_main.xml**

- 자동 생성된 XML 레이아웃 파일은 1개
  - **activity_main.xml** 의 root layout은 **ConstraintLayout**
    - **activity_main.xml** 에서 TextView 는 삭제

What to do next?

- ViewPager
- **Spinner**
- ProgressBar
- SeekBar

Spin Control(1/2)

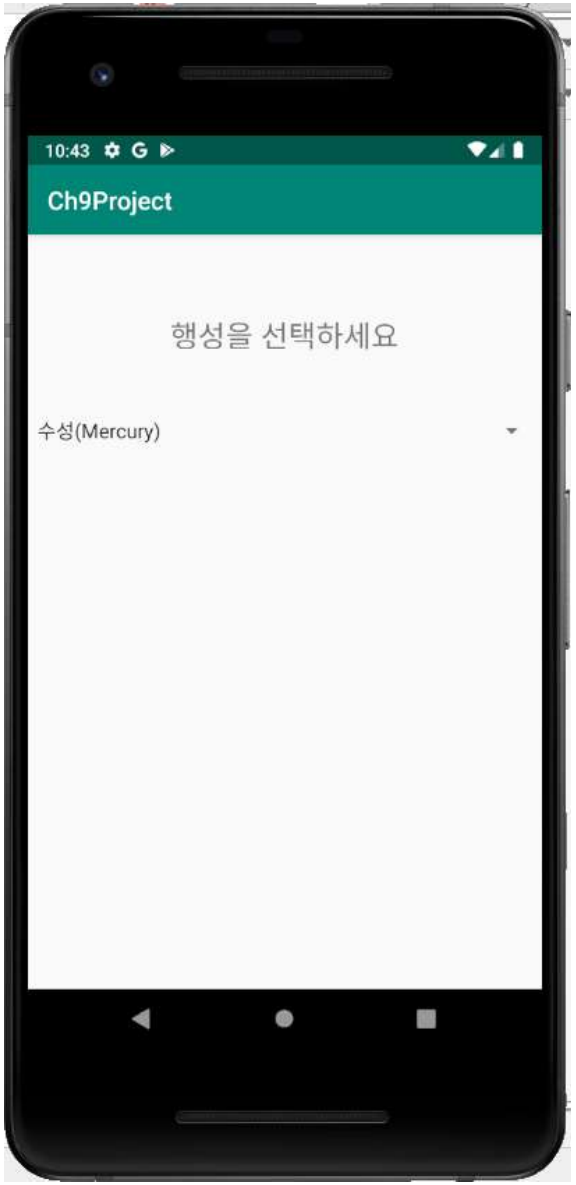


스피너

Spin Control(2/2)

- **Spinner** is the equivalent of the drop-down selector.
- Spinners have the *same functionality of a **ListView*** but **take less space**.
- As with **ListView**, you provide the adapter for data and child views via **setAdapter( )** and hook in a listener object for selections with **OnItemSelectedListener( ).**
- Use the **setDropDownViewResource (int resource)** method
  - **to supply the resource ID** of the view to use.

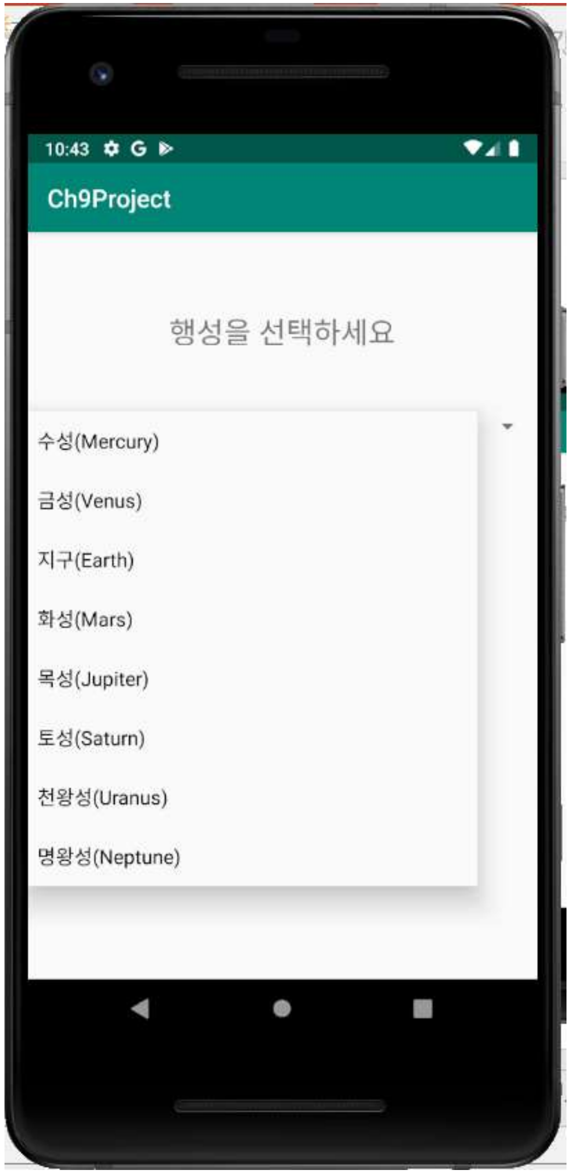
실습 2: Spinner



Ch9Project

행성을 선택하세요

수성(Mercury)



Ch9Project

행성을 선택하세요

수성(Mercury)

금성(Venus)

지구(Earth)

화성(Mars)

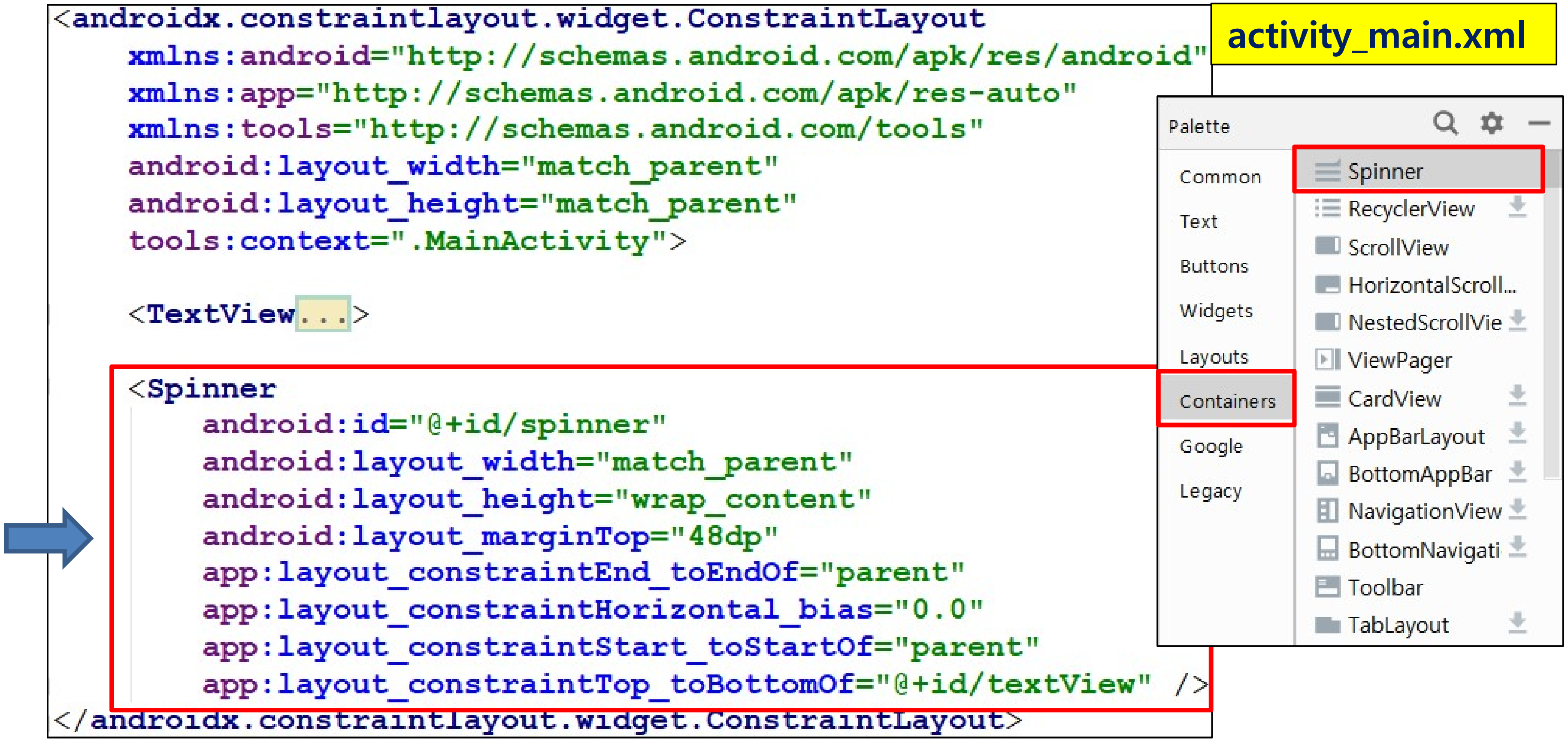
목성(Jupiter)

토성(Saturn)

천왕성(Uranus)

명왕성(Neptune)

실습 2: Spinner - Layout



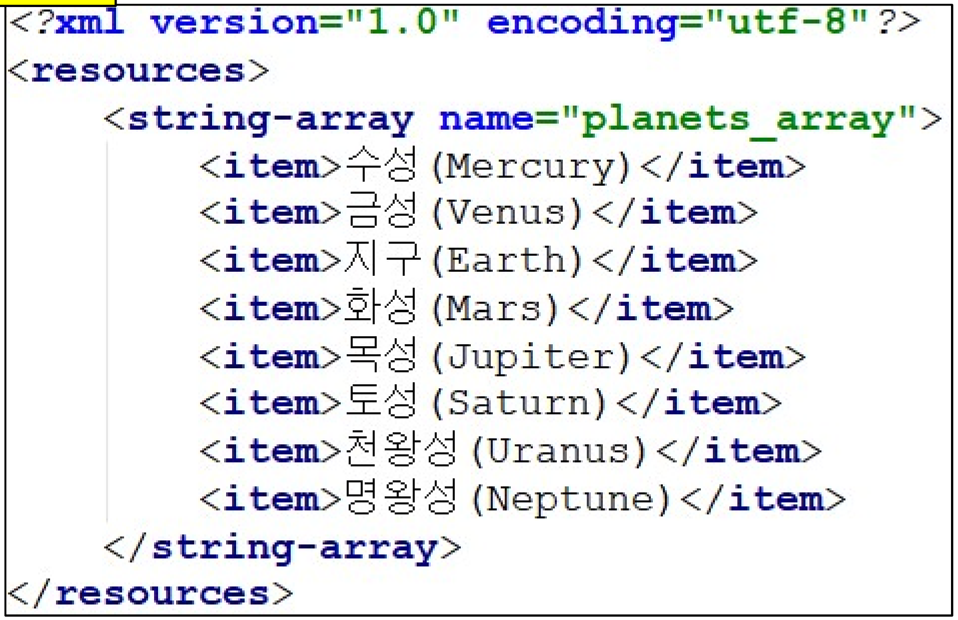
activity_main.xml

```
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">

    <TextView...>

    <Spinner
        android:id="@+id/spinner"
        android:layout_width="match_parent"
        android:layout_height="wrap_content"
        android:layout_marginTop="48dp"
        app:layout_constraintEnd_toEndOf="parent"
        app:layout_constraintHorizontal_bias="0.0"
        app:layout_constraintStart_toStartOf="parent"
        app:layout_constraintTop_toBottomOf="@+id/textView" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

소스코드 – 7쪽

실습 2: Spinner – string-array

res/arrays.xml

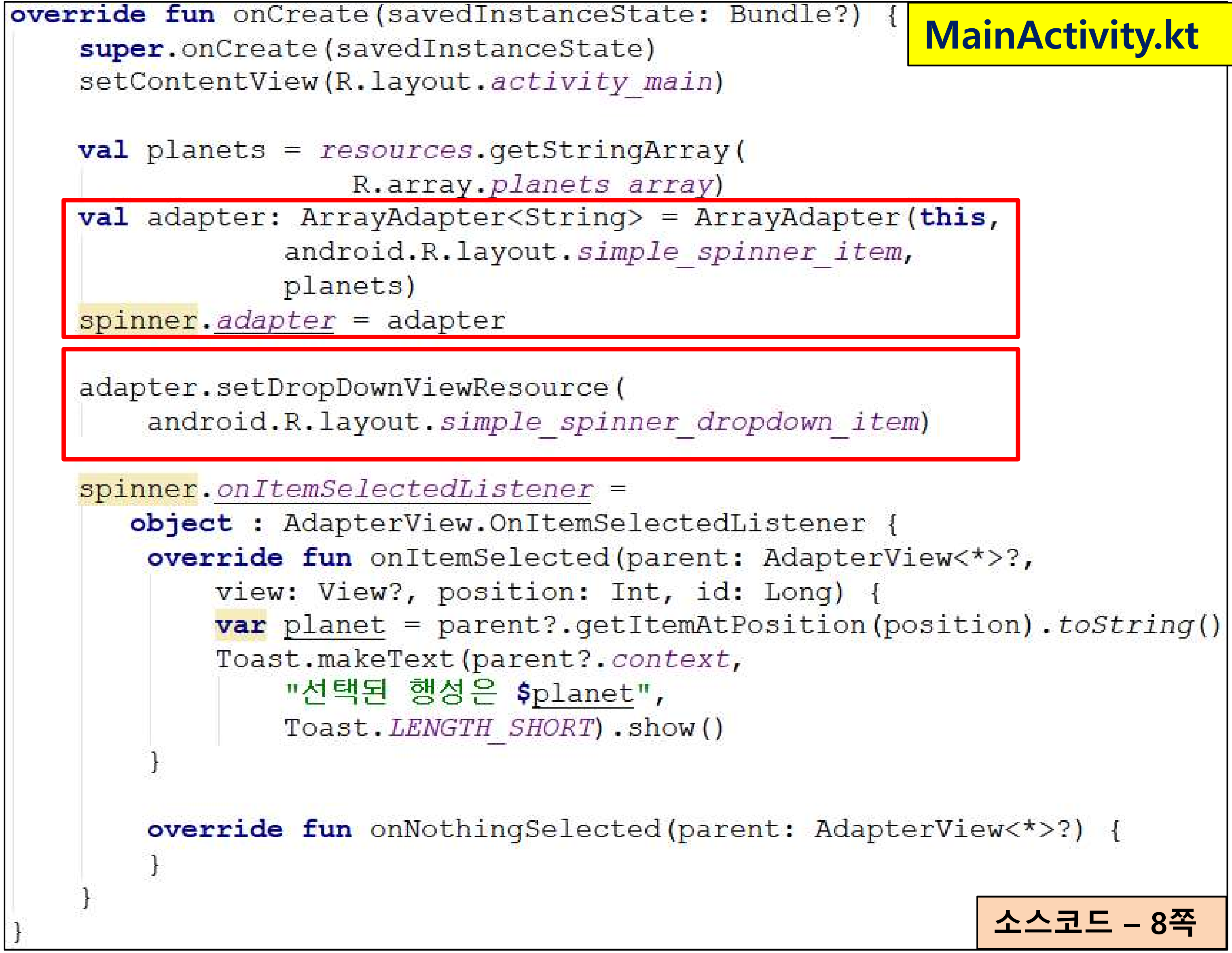


```xml
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <string-array name="planets_array">
        <item>수성(Mercury)</item>
        <item>금성(Venus)</item>
        <item>지구(Earth)</item>
        <item>화성(Mars)</item>
        <item>목성(Jupiter)</item>
        <item>토성(Saturn)</item>
        <item>천왕성(Uranus)</item>
        <item>명왕성(Neptune)</item>
    </string-array>
</resources>
```

소스코드 – 7쪽

실습 2: Spinner - Activity

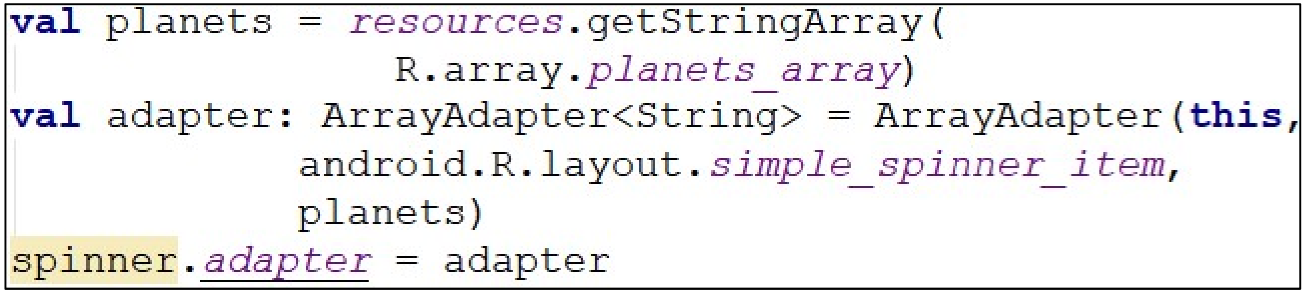
MainActivity.kt



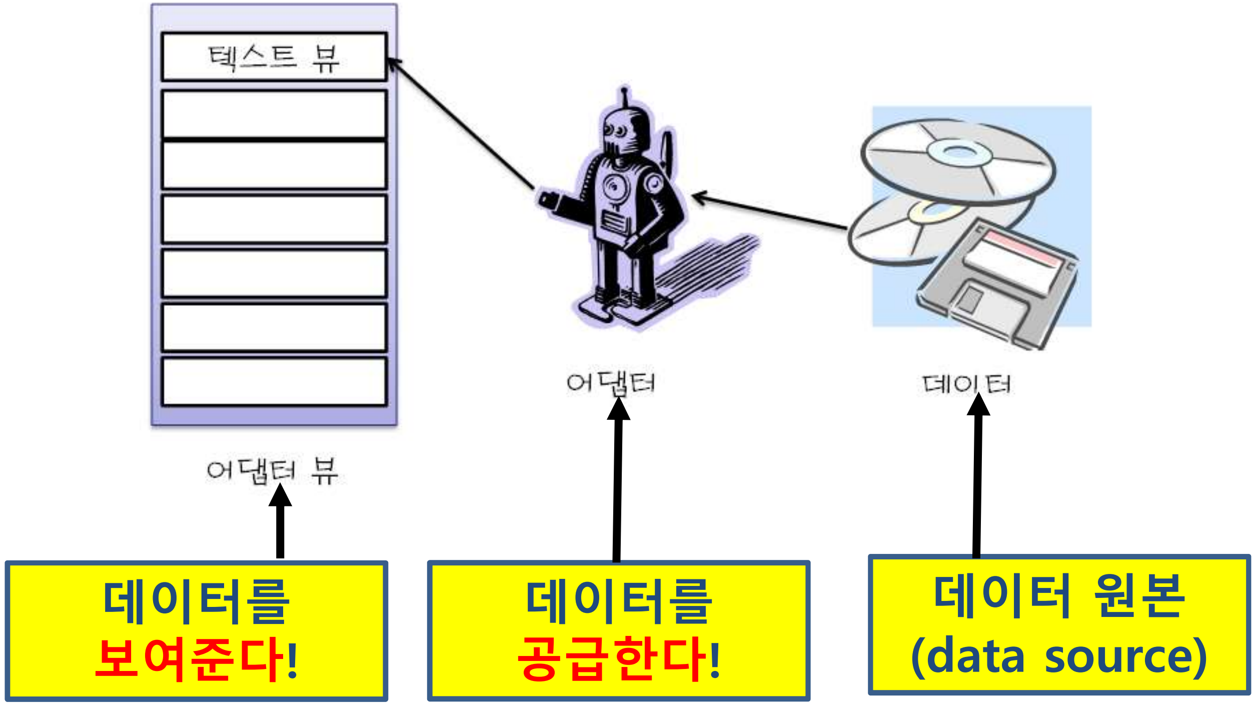
```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)

    val planets = resources.getStringArray(
                    R.array.planets_array)
    val adapter: ArrayAdapter<String> = ArrayAdapter(this,
                android.R.layout.simple_spinner_item,
                planets)
    spinner.adapter = adapter

    adapter.setDropDownViewResource(
        android.R.layout.simple_spinner_dropdown_item)

    spinner.onItemSelectedListener =
       object : AdapterView.OnItemSelectedListener {
        override fun onItemSelected(parent: AdapterView<*>?,
            view: View?, position: Int, id: Long) {
            var planet = parent?.getItemAtPosition(position).toString()
            Toast.makeText(parent?.context,
                "선택된 행성은 $planet",
                Toast.LENGTH_SHORT).show()
        }

        override fun onNothingSelected(parent: AdapterView<*>?) {
        }
    }
}
```

소스코드 – 8쪽

AdapterView 와 Adapter



```
val planets = resources.getStringArray(
                R.array.planets_array)
val adapter: ArrayAdapter<String> = ArrayAdapter(this,
            android.R.layout.simple_spinner_item,
            planets)
spinner.adapter = adapter
```

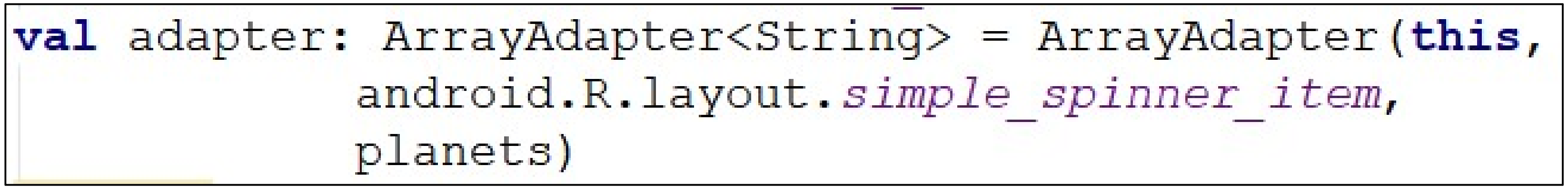


데이터를
보여준다!

데이터를
공급한다!

데이터 원본
(data source)

Using ArrayAdapter

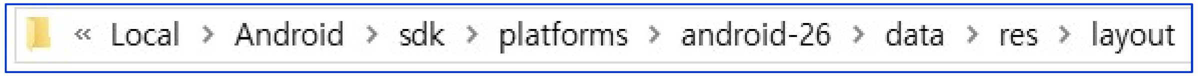


```
val adapter: ArrayAdapter<String> = ArrayAdapter(this,
            android.R.layout.simple_spinner_item,
            planets)
```

- The **ArrayAdapter** constructor takes *three parameters*:
  - The **Context** to use
    - 어디에 보여 줄 것인가? → UI를 갖고 있는 activity 객체
  - The **resource ID** of a view to use
    - item의 layout style
    - **`android.R.layout.simple_list_item_1`**
  - The **actual (source)** array or list of items to show

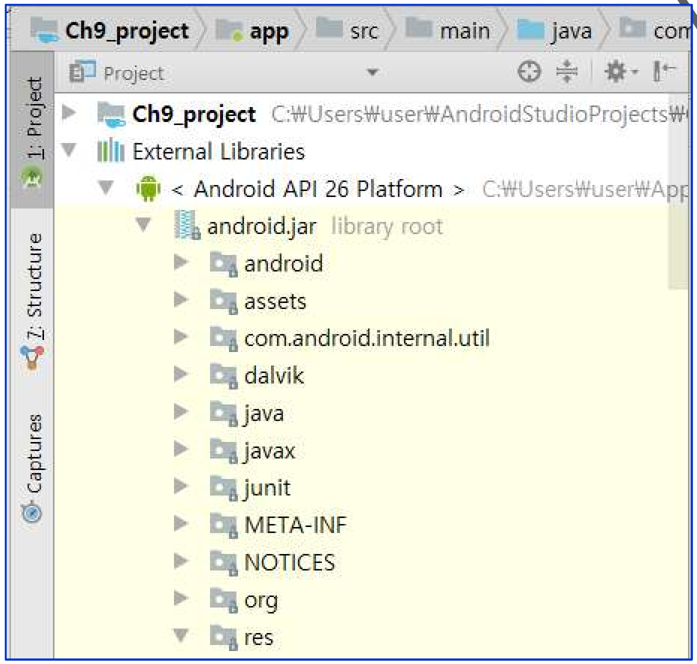
잠깐! android.R.layout.simple_list_item1

1. Android SDK 설치 폴더



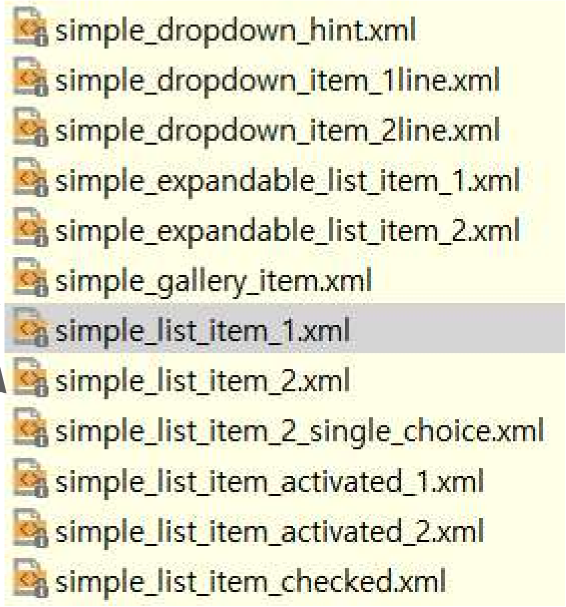
« Local › Android › sdk › platforms › android-26 › data › res › layout

2. Android Studio > Project 모드



Ch9_project › app › src › main › java › com

- Ch9_project C:₩Users₩user₩AndroidStudioProjects₩
- External Libraries
  - < Android API 26 Platform > C:₩Users₩user₩App
    - android.jar library root
      - android
      - assets
      - com.android.internal.util
      - dalvik
      - java
      - javax
      - junit
      - META-INF
      - NOTICES
      - org
      - res



simple_dropdown_hint.xml
simple_dropdown_item_1line.xml
simple_dropdown_item_2line.xml
simple_expandable_list_item_1.xml
simple_expandable_list_item_2.xml
simple_gallery_item.xml
simple_list_item_1.xml
simple_list_item_2.xml
simple_list_item_2_single_choice.xml
simple_list_item_activated_1.xml
simple_list_item_activated_2.xml
simple_list_item_checked.xml

External Libraries
> API Platform > android.jar
> res > layout

잠깐! ArrayAdapter<String>

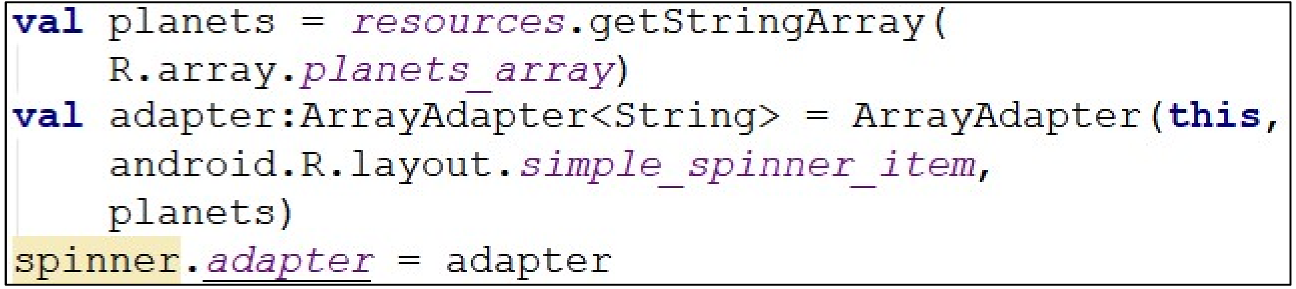
- **Generic class**(범용 클래스)는 **Collection**에서 주로 사용
  - Collection이란?
    - (여러 개의 항목들을 관리하기 위한) 자료 구조
    - **ArrayList, LinkedList, HashSet, TreeSet**

- Generic class인 **ArrayAdapter** 객체를 생성할 때 *type parameter* **T**를 **String**으로 지정
  - 배열에 속한 항목들의 type을 **String**으로 지정
    - *Type parameter* **T**는 대문자를 사용

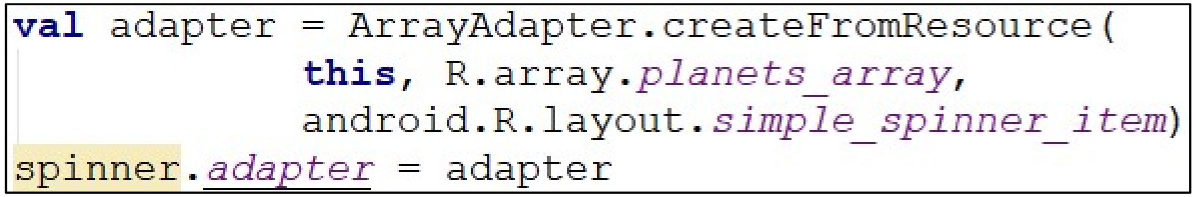
- 어떤 type의 객체도 저장할 수 있지만,
  - 엉뚱한 type의 객체가 저장되는 걸 막기 위해
  - 저장할 객체의 type을 미리 지정

실습 2(b): 리소스를 직접 가져오기

MainActivity.kt



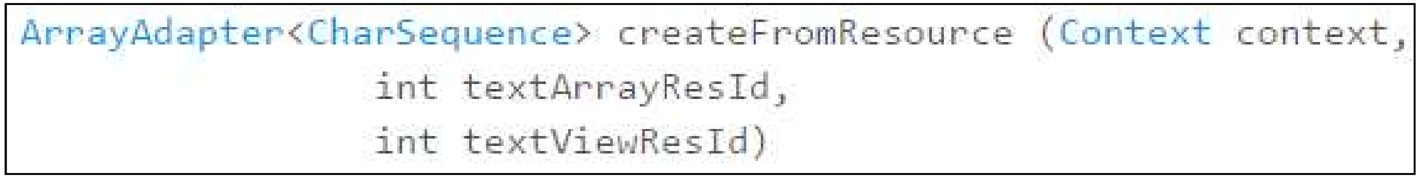
```
val planets = resources.getStringArray(
    R.array.planets_array)
val adapter:ArrayAdapter<String> = ArrayAdapter(this,
    android.R.layout.simple_spinner_item,
    planets)
spinner.adapter = adapter
```



```
val adapter = ArrayAdapter.createFromResource(
            this, R.array.planets_array,
            android.R.layout.simple_spinner_item)
spinner.adapter = adapter
```

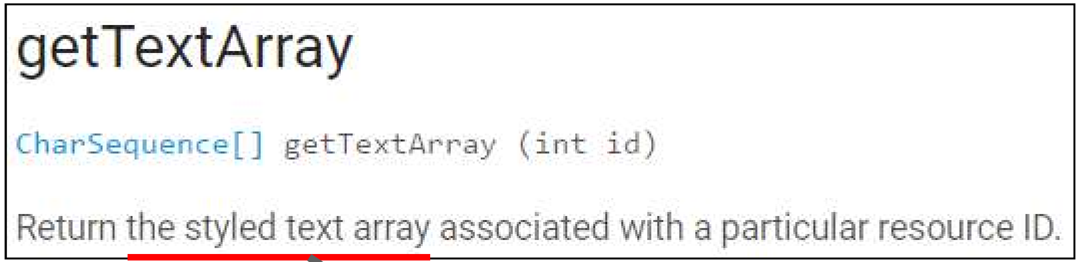
소스코드 – 8쪽

잠깐! createFromResource



```
ArrayAdapter<CharSequence> createFromResource (Context context,
                int textArrayResId,
                int textViewResId)
```

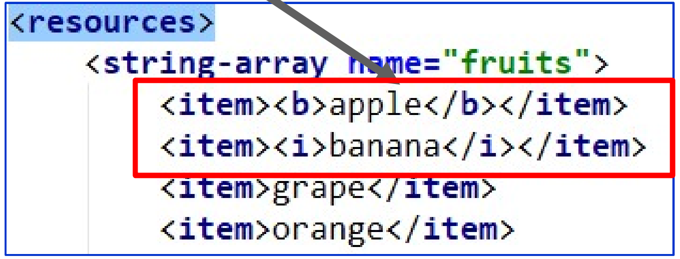
Creates a new ArrayAdapter from external resources.
The **content of the array** is obtained through **getTextArray** (int).



getTextArray

```
CharSequence[] getTextArray (int id)
```

Return the styled text array associated with a particular resource ID.



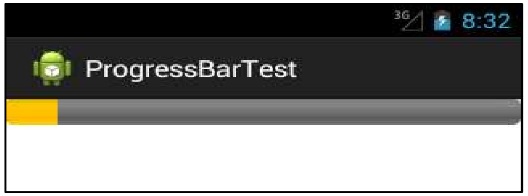
```
<resources>
    <string-array name="fruits">
        <item><b>apple</b></item>
        <item><i>banana</i></item>
        <item>grape</item>
        <item>orange</item>
```

What to do next?

- ViewPager
- Spinner
- **ProgressBar**
- SeekBar

ProgressBar

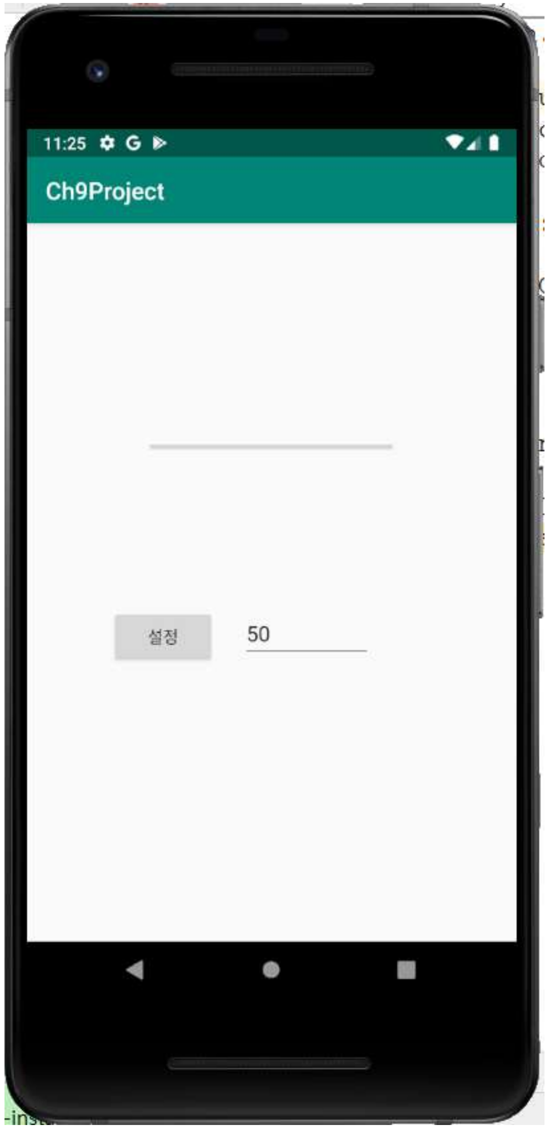
- 작업의 진행 정도를 표시하는 widget

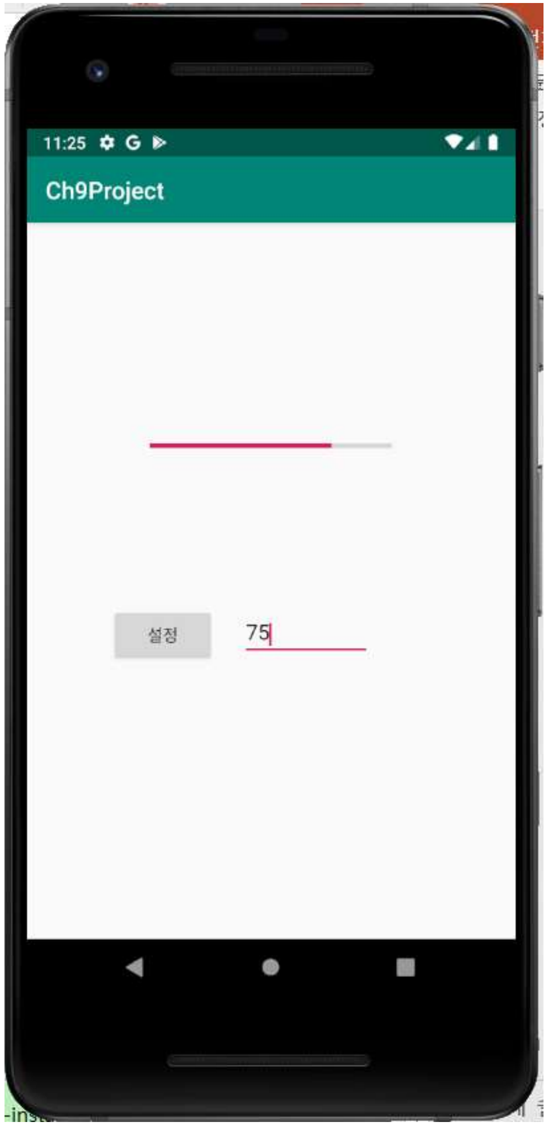


  - **setProgressStyle** : 직선 또는 원
    - STYLE_HORIZONTAL 또는 STYLE_SPINNER
  - **setMax**, **setProgress**

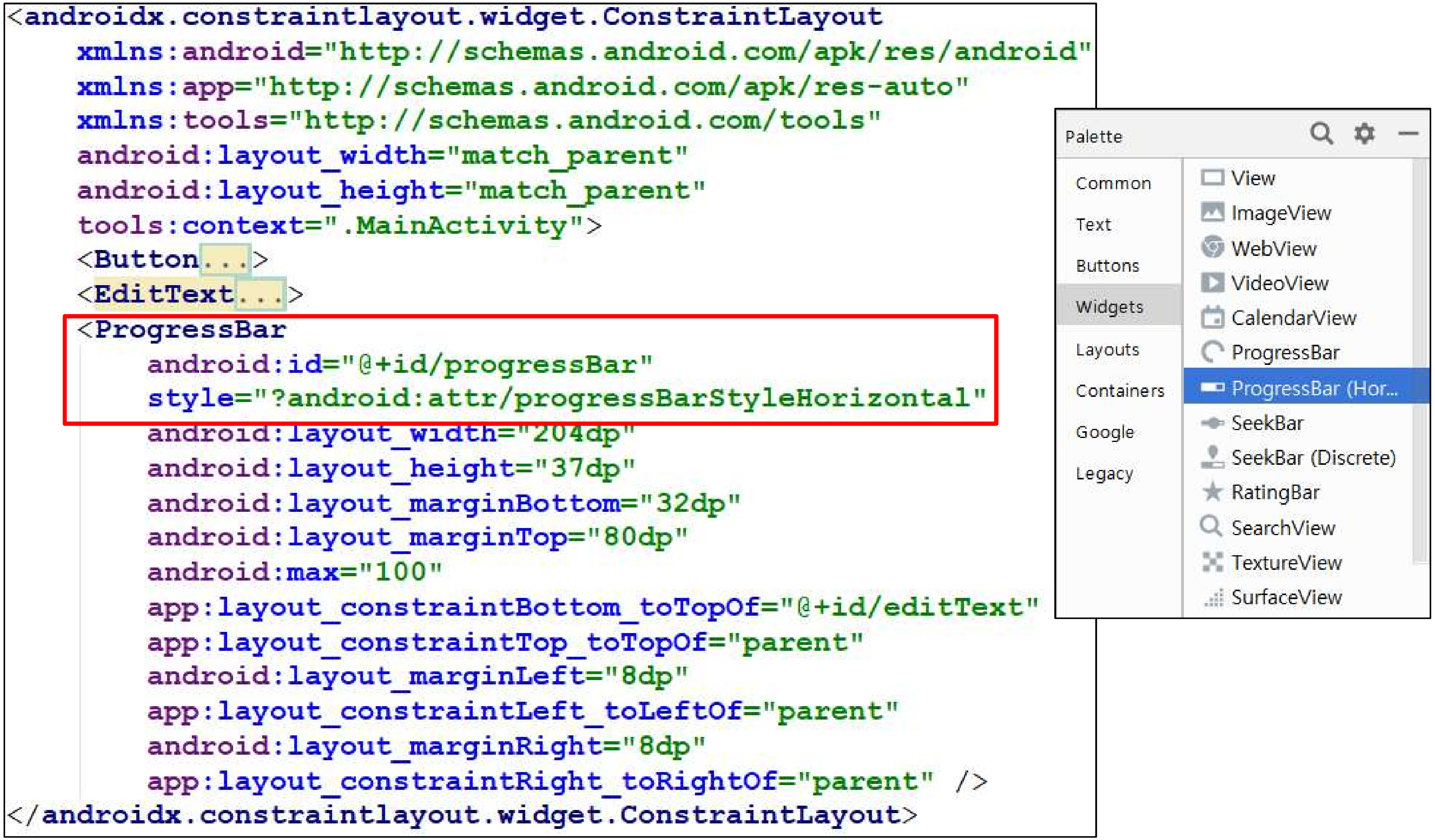
- Widget 대신 dialog로 나타낼 수 있음.
  - dialog. **show**()
  - dialog. **dismiss**()

실습 3: ProgressBar





실습 3: ProgressBar – Layout

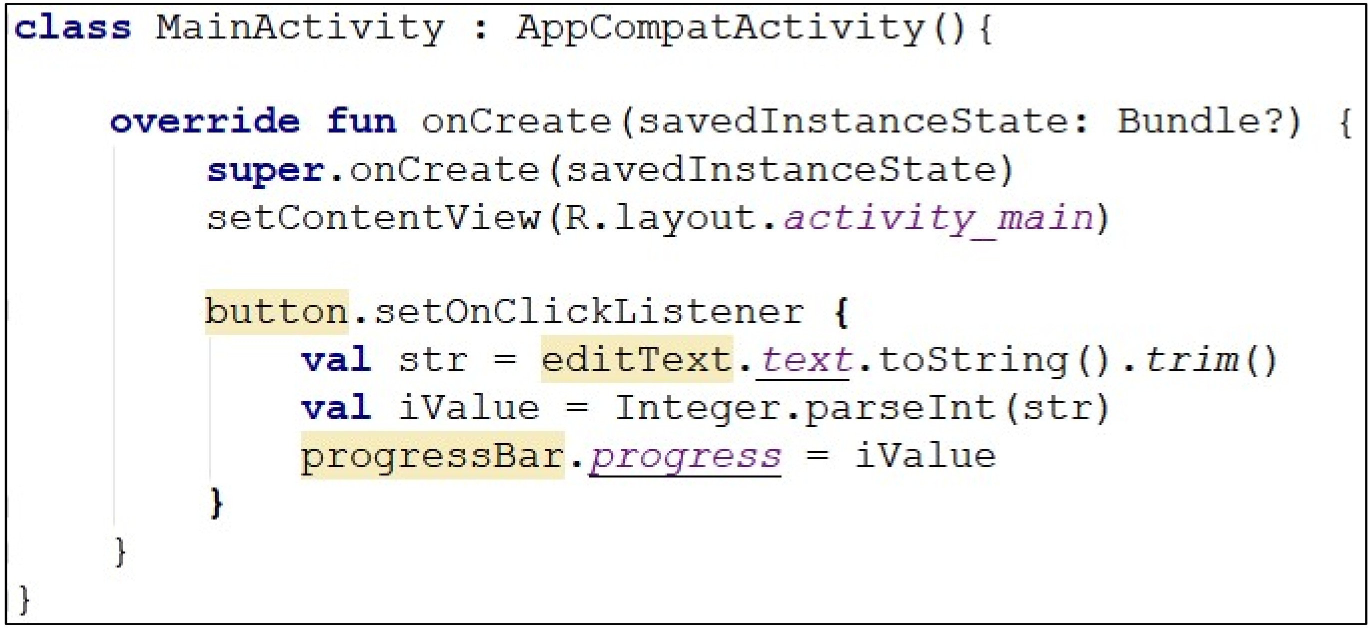


```
<androidx.constraintlayout.widget.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
    xmlns:app="http://schemas.android.com/apk/res-auto"
    xmlns:tools="http://schemas.android.com/tools"
    android:layout_width="match_parent"
    android:layout_height="match_parent"
    tools:context=".MainActivity">
    <Button...>
    <EditText...>
    <ProgressBar
        android:id="@+id/progressBar"
        style="?android:attr/progressBarStyleHorizontal"
        android:layout_width="204dp"
        android:layout_height="37dp"
        android:layout_marginBottom="32dp"
        android:layout_marginTop="80dp"
        android:max="100"
        app:layout_constraintBottom_toTopOf="@+id/editText"
        app:layout_constraintTop_toTopOf="parent"
        android:layout_marginLeft="8dp"
        app:layout_constraintLeft_toLeftOf="parent"
        android:layout_marginRight="8dp"
        app:layout_constraintRight_toRightOf="parent" />
</androidx.constraintlayout.widget.ConstraintLayout>
```

소스코드 – 9쪽

실습 3: ProgressBar – Activity

MainActivity.kt



```kotlin
class MainActivity : AppCompatActivity(){

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        button.setOnClickListener {
            val str = editText.text.toString().trim()
            val iValue = Integer.parseInt(str)
            progressBar.progress = iValue
        }
    }
}
```

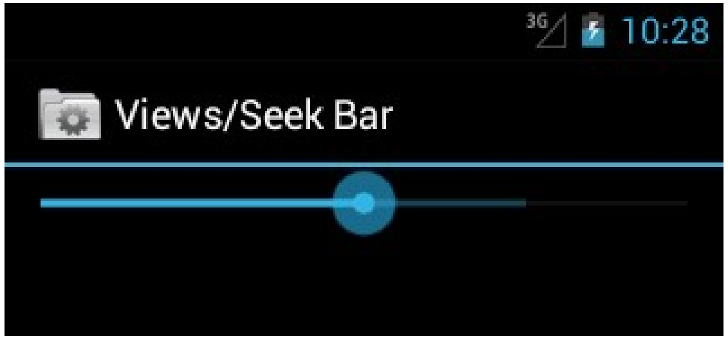
소스코드 – 10쪽

What to do next?

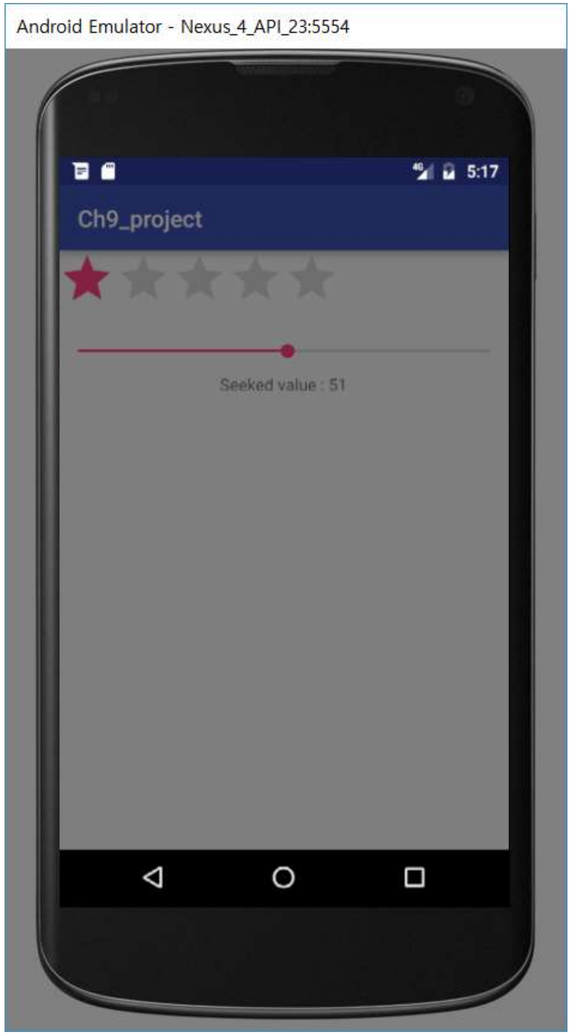
- ViewPager
- Spinner
- ProgressBar
- **SeekBar**

SeekBar

- **SeekBar**는 ProgressBar의 확장
- 사용자가 드래그할 수 있는 thumb이 추가됨

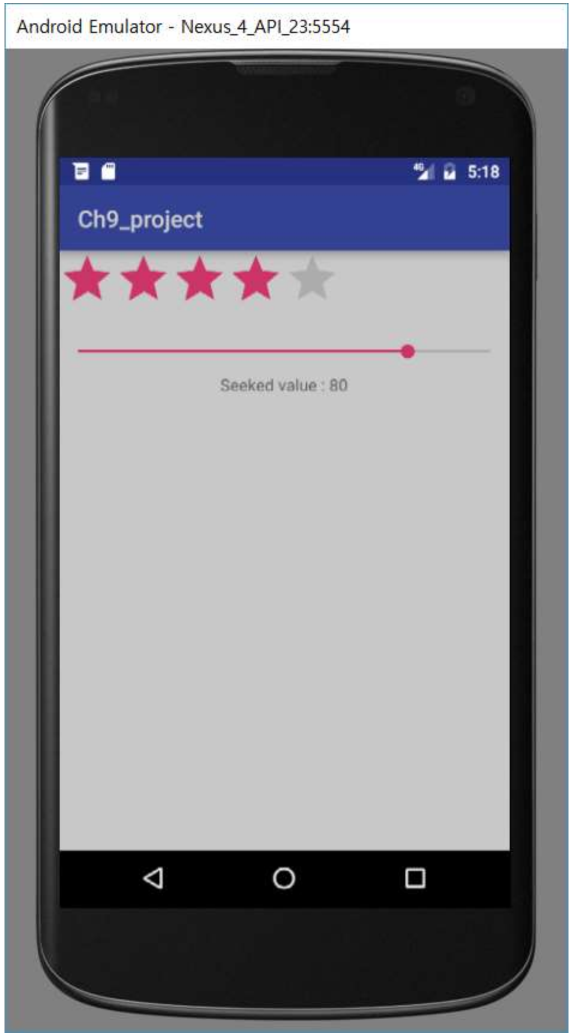


실습 4: SeekBar



Android Emulator - Nexus_4_API_23:5554

Seeked value : 51



Android Emulator - Nexus_4_API_23:5554

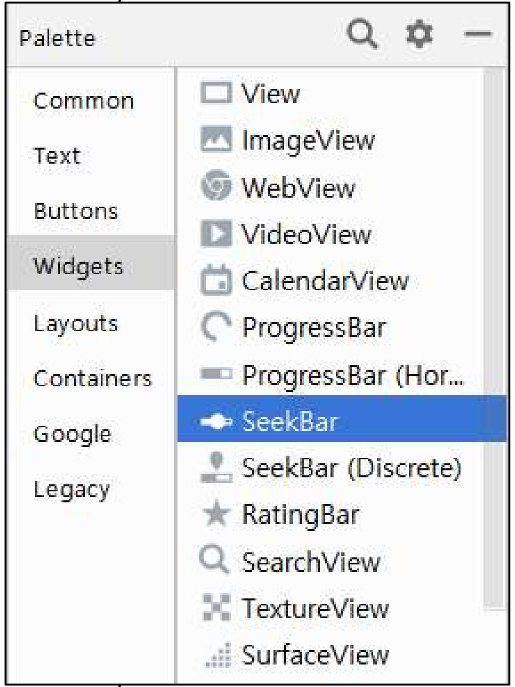
Seeked value : 80

소스코드 부분 인용: http://kd3302.tistory.com/69

실습 4: SeekBar - Layout

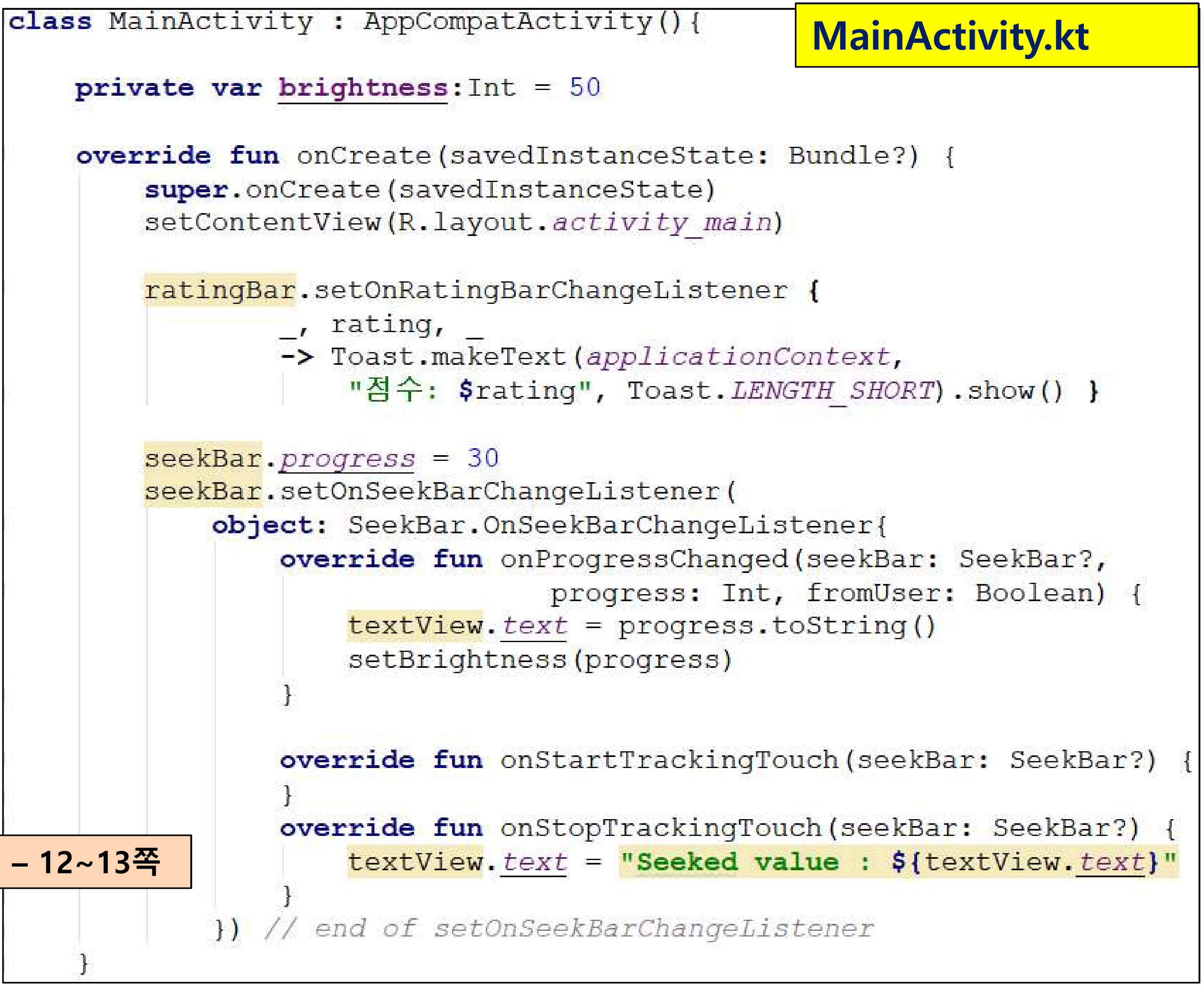
activity_main.xml

```
<RatingBar
    android:id="@+id/ratingBar"
    android:layout_width="wrap_content"
    android:layout_height="wrap_content"
    android:layout_marginTop="64dp"
    android:numStars="5"
    android:rating="3"
    android:stepSize="0.5"
    app:layout_constraintBottom_toTopOf="@+id/seekBar"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintHorizontal_bias="0.5"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toTopOf="parent" />

<SeekBar
    android:id="@+id/seekBar"
    android:layout_width="0dp"
    android:layout_height="wrap_content"
    app:layout_constraintBottom_toTopOf="@+id/textView"
    app:layout_constraintEnd_toEndOf="parent"
    app:layout_constraintStart_toStartOf="parent"
    app:layout_constraintTop_toBottomOf="@+id/ratingBar" />
```



소스코드 – 11쪽

실습 4: SeekBar – Activity(1/2)

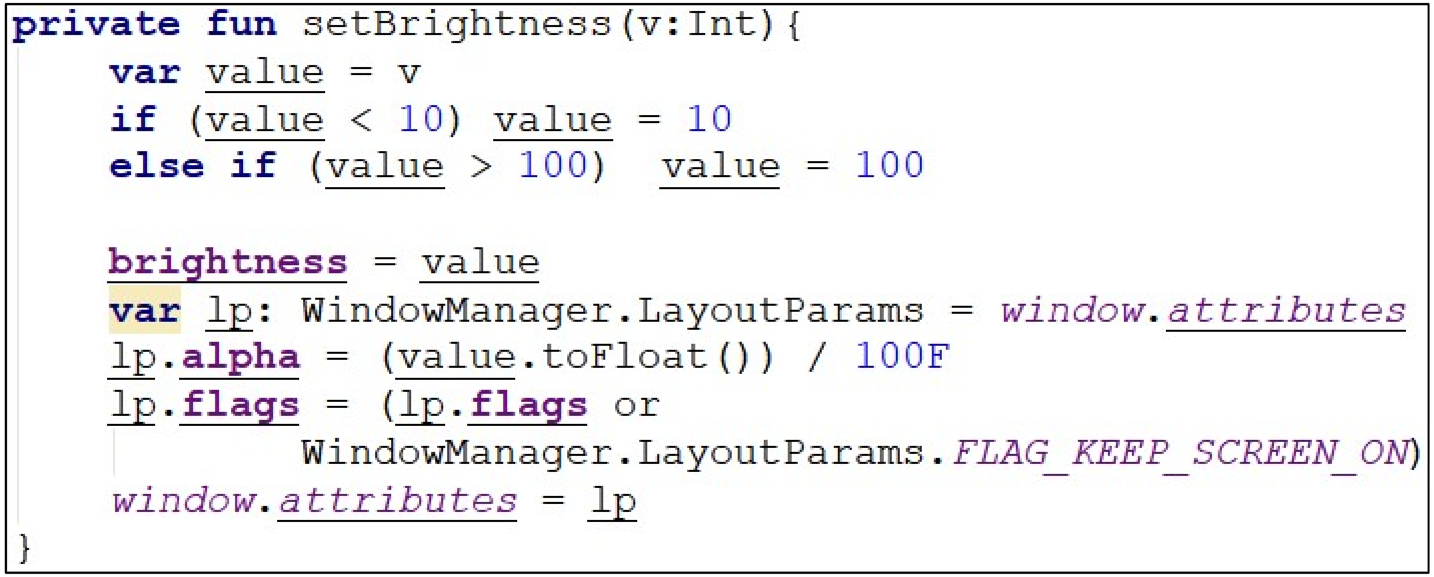


MainActivity.kt

```kotlin
class MainActivity : AppCompatActivity(){

    private var brightness:Int = 50

    override fun onCreate(savedInstanceState: Bundle?) {
        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        ratingBar.setOnRatingBarChangeListener {
                _, rating, _
                -> Toast.makeText(applicationContext,
                    "점수: $rating", Toast.LENGTH_SHORT).show() }

        seekBar.progress = 30
        seekBar.setOnSeekBarChangeListener(
            object: SeekBar.OnSeekBarChangeListener{
                override fun onProgressChanged(seekBar: SeekBar?,
                                    progress: Int, fromUser: Boolean) {
                    textView.text = progress.toString()
                    setBrightness(progress)
                }

                override fun onStartTrackingTouch(seekBar: SeekBar?) {
                }
                override fun onStopTrackingTouch(seekBar: SeekBar?) {
                    textView.text = "Seeked value : ${textView.text}"
                }
            }) // end of setOnSeekBarChangeListener
    }
```

소스코드 – 12~13쪽

실습 4: SeekBar – Activity(2/2)



```
private fun setBrightness(v:Int){
    var value = v
    if (value < 10) value = 10
    else if (value > 100)  value = 100

    brightness = value
    var lp: WindowManager.LayoutParams = window.attributes
    lp.alpha = (value.toFloat()) / 100F
    lp.flags = (lp.flags or
            WindowManager.LayoutParams.FLAG_KEEP_SCREEN_ON)
    window.attributes = lp
}
```