AS Projekt
(štruktúra projektu)

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MS-Teams: 2sf3ph4, List, github

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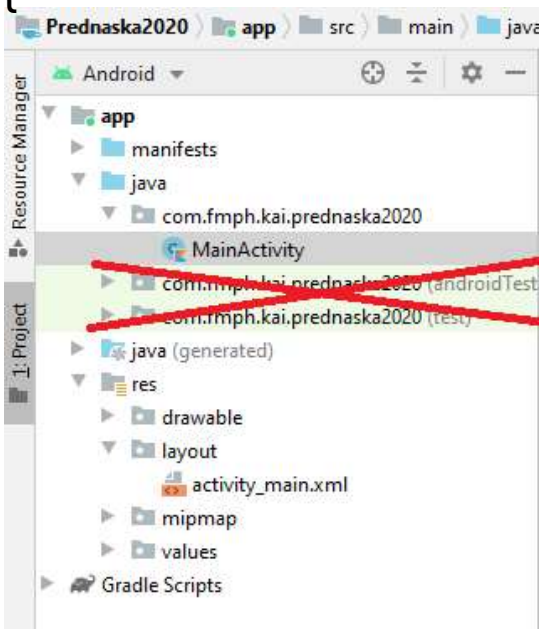
Čo dostaneme zadarmo

(pokračujeme v minulej prednáške)

```
package com.fmph.kai.prednaska2020

import android.os.Bundle
import androidx.appcompat.app.AppCompatActivity

class MainActivity : AppCompatActivity() {    // entry point pre App/Activity

    override fun onCreate(savedInstanceState: Bundle?) {

        super.onCreate(savedInstanceState)
        setContentView(R.layout.activity_main)

        // sem sme minule písali náš prvý kotlin kód

    }
}
```

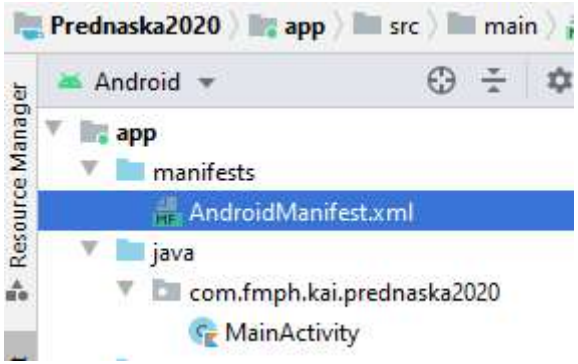


- MainActivity je inštancia triedy AppCompatActivity
- metóda onCreate() sa volá *niekde* v procese jej zobrazovania
- setContentView zobrazí layout podľa xml popisu v R.layout.*activity_main*
- argument **savedInstanceState:Bundle?** zatiaľ neriešte
- package androidTest a test môžete vymazať, pre prehľadnosť

Project: MyFirstApp2.zip

AndroidManifest.xml

(automaticky vygenerovaný súbor aplikácie)



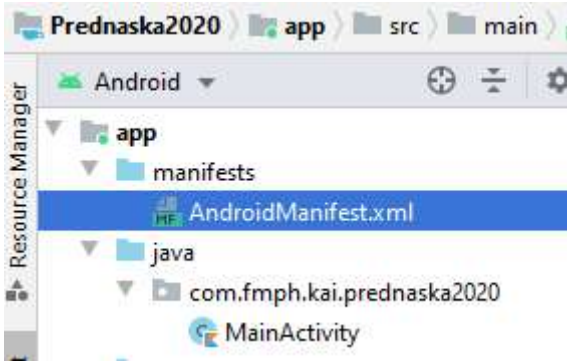

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="com.fmph.kai.prednaska2020">

    <application
        android:allowBackup="true"
        android:icon="@mipmap/ic_launcher"
        android:label="@string/app_name"
        android:roundIcon="@mipmap/ic_launcher_round"
        android:supportsRtl="true"
        android:theme="@style/AppTheme">
        <activity android:name=".MainActivity">
            <intent-filter>
                <action android:name="android.intent.action.MAIN" />

                <category android:name="android.intent.category.LAUNCHER" />
            </intent-filter>
        </activity>
    </application>

</manifest>
```

referencia na ikonu apky

referencia meno apky

Project: MyFirstApp2.zip

AndroidManifest.xml



Najhlavnejšie tagy:

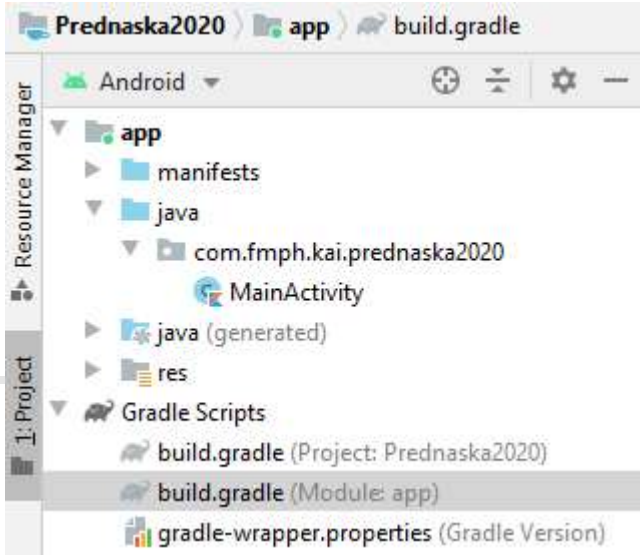
- **<application** je jediný a popisuje ikony, logo, meno, štýl aplikácie
- **<activity** môže ich byť viac a popisujú package definujúci aktivitu (Screen v MITI), intent aktivity, filtre pre aktivitu, …
- **<service** popisujú aplikácie bežiace na pozadí, tzv. servisy
- **<provider** popisuje Content Provider, napr. lokálnu databázu LiteSQL
- **<receiver** popisuje Broadcast Receiver prijímajúci nejaké intenty

AS-manifest ochudobnel, mnohé veci sa presunuli do build.gradle:

- **<uses-configuration** a **<uses-feature**
  popisujú HW predpoklady na spustenie apky, display, klávesnicu, senzory
- **<uses-supportScreens** popisuje rozliško HVGA, QVGA, QVGA, WQVGA
- **<uses-sdk** popisuje min./max. SDK a cieľovú verziu SDK
  http://developer.android.com/guide/topics/manifest/uses-sdk-element.html#ApiLevels
- **<uses-permissions** popisuje práva, ktoré apka musí mať schválené
- **<uses-library** popisuje externé knižnice, napr. Google Maps, ...
  viac na: http://developer.android.com/guide/topics/manifest/manifest-intro.html

build.gradle

(konfiguračný súbor pre gradle)

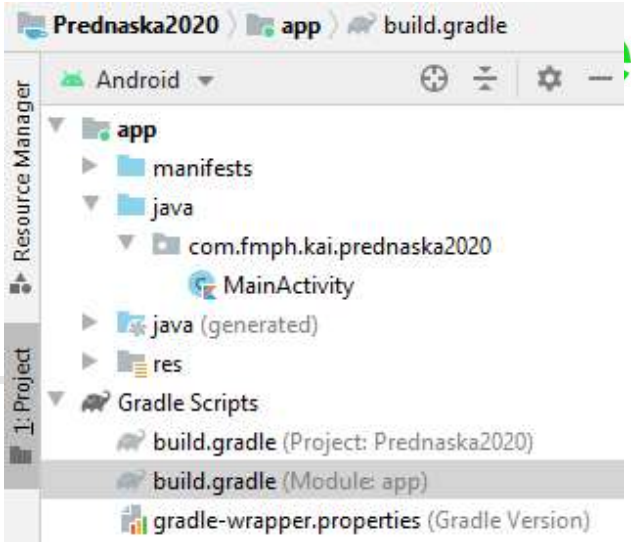


Gradle je build tool, podobne ako make, maven

```
apply plugin: 'com.android.application'
apply plugin: 'kotlin-android'
apply plugin: 'kotlin-android-extensions'
android {
    compileSdkVersion 29
    defaultConfig {
        applicationId "com.fmph.kai.prednaska2020"
        minSdkVersion 19
        targetSdkVersion 29
        versionCode 1
        versionName "1.0"
        testInstrumentationRunner "androidx.test.runner.AndroidJUnitRunner"
    }
    ...
}
dependencies {
    implementation fileTree(dir: 'libs', include: ['*.jar'])
    implementation"org.jetbrains.kotlin:kotlin-stdlib-jdk7:$kotlin_version"
    implementation 'androidx.appcompat:appcompat:1.0.2'
    ...
}
```

Project: MyFirstApp2.zip

Gradle



- je plugin-based project-build/management system v AS založený na jazyku Groovy
- už existuje Kotlin Gradle Plugin pre Gradle 6+

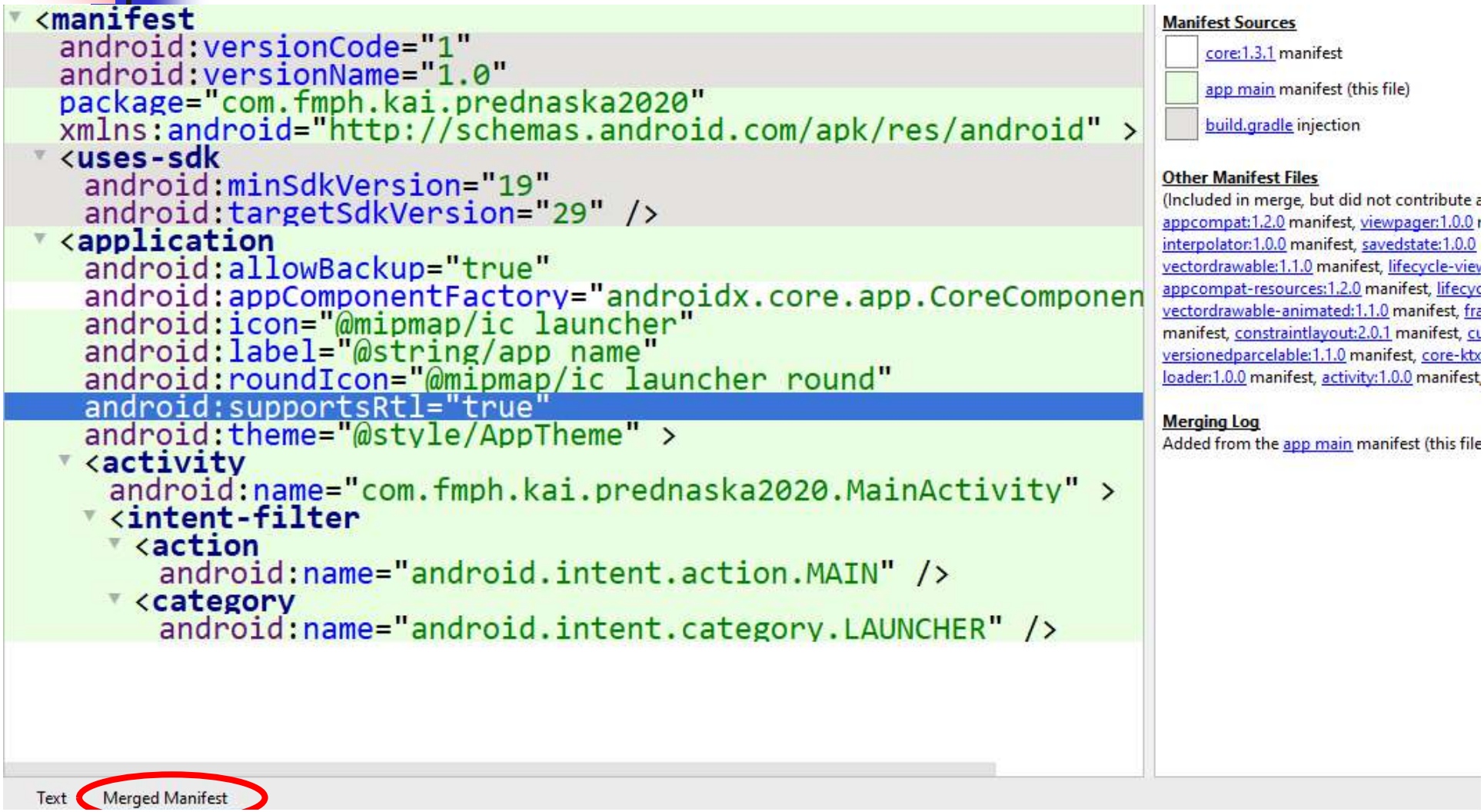
```
build.gradle.kts
dependencies {
    implementation("fileTree(dir: 'libs', include: ['*.jar'])")
    implementation("org.jetbrains.kotlin:kotlin-stdlib-jdk7:$kotlin_version"
    implementation("androidx.appcompat:appcompat:1.0.2")
    ...
}
```

```
dependencies {
    implementation fileTree(dir: 'libs', include: ['*.jar'])
    implementation"org.jetbrains.kotlin:kotlin-stdlib-jdk7:$kotlin_version"
    implementation 'androidx.appcompat:appcompat:1.0.2'
    ...
}
```

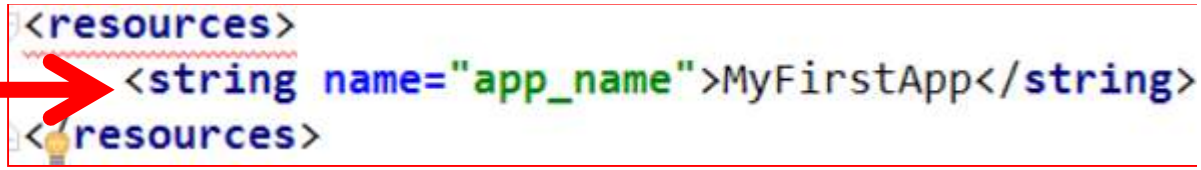
Project: MyFirstApp2.zip

MergedManifest

(spája AndroidManifest a build.gradle)



referencia meno apky



```xml
<resources>
    <string name="app_name">MyFirstApp</string>
</resources>
```

Resources/Values

- drawables - obrázky v rôznych rozlíšeniach (ldpi, mdpi, hdpi, xhdpi, xxhdpi)
- layouts – rozloženia komponentov na aktivitách (bude dnes, na budúce)
- menus – pre aktivity (bude neskôr)
- values – pomenované konštanty (strings.xml, colors.xml, styles.xml …)

```xml
<?xml version="1.0" encoding="utf-8"?>
<resources>
    <color name="colorPrimary">#3F51B5</color>
    <color name="colorPrimaryDark">#303F9F</color>
    <color name="colorAccent">#FF4081</color>
```

```xml
<resources>
    <!-- Base application theme. -->
    <style name="AppTheme" parent="Theme.AppCompat.Light.DarkActionBar">
        <!-- Customize your theme here. -->
        <item name="colorPrimary">@color/colorPrimary</item>
        <item name="colorPrimaryDark">@color/colorPrimaryDark</item>
        <item name="colorAccent">@color/colorAccent</item>
    </style>
</resources>
```

Project: MyFirstApp2.zip

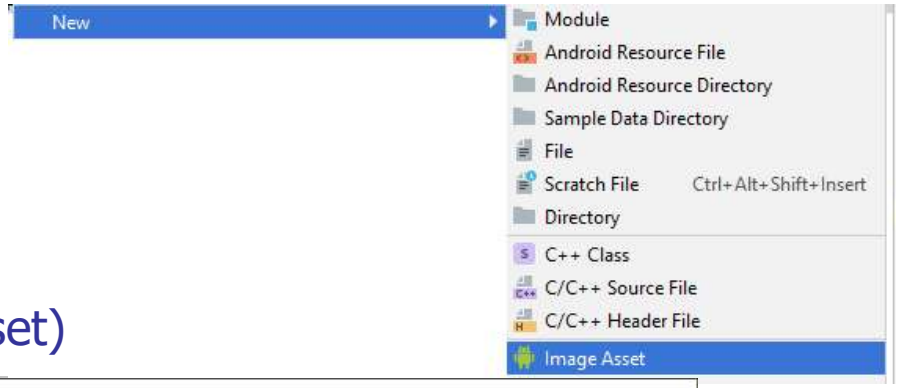
Buď kreatívny

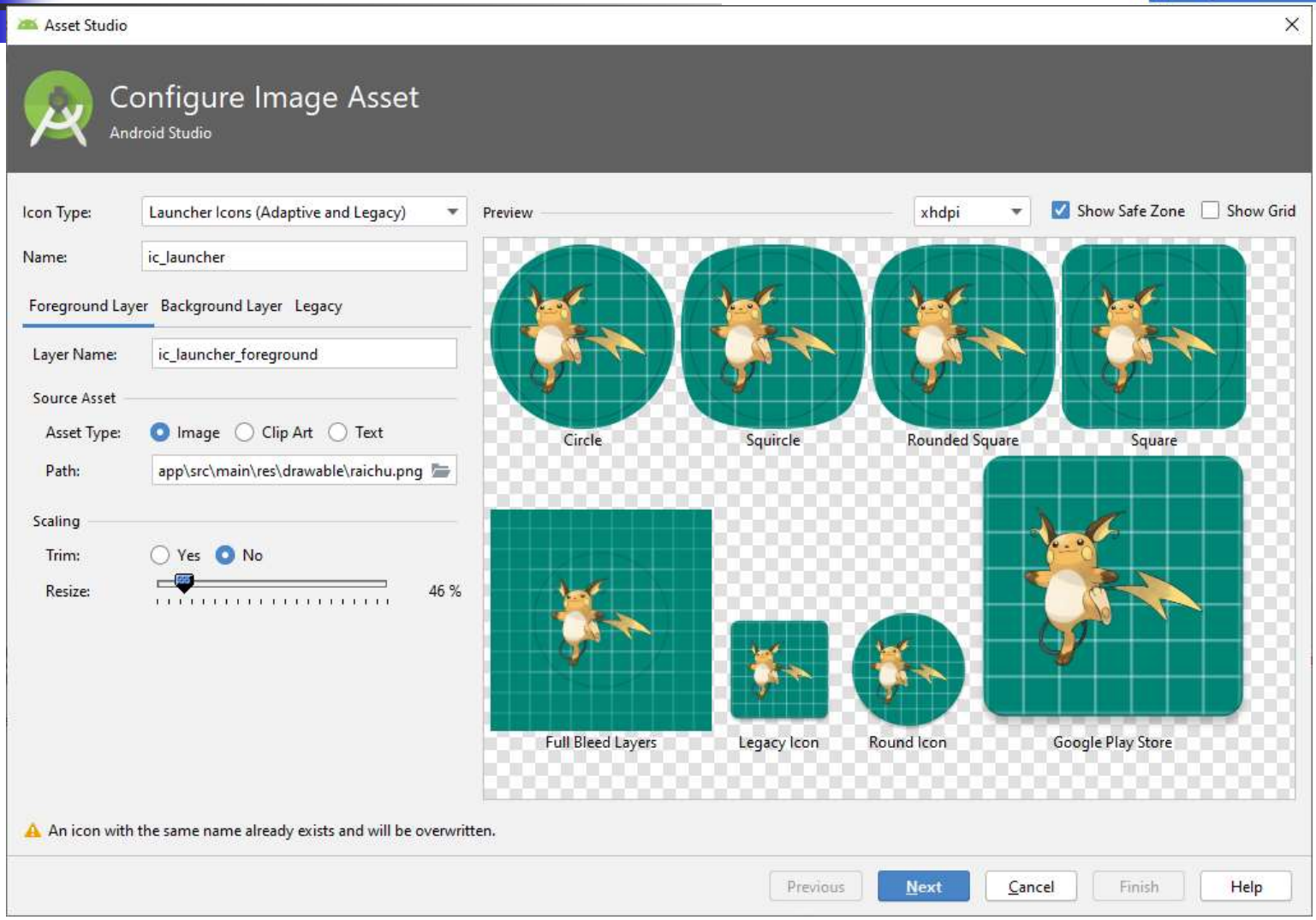
(aspoň pri ic_launcher ikone)

Je hrozné pri opravovaní mať v tablete/mobile viacero študentských riešení s generickými/neosobnými ikonami. Preto ak sa dá, tak sa zosobnite v posielanom riešení už v ikone vašej aplikácie.

Buď kreatívny

(a použi Asset Studio - New/ImageAsset)





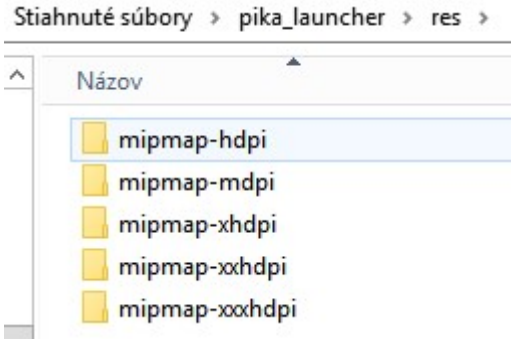
Android Asset Studio

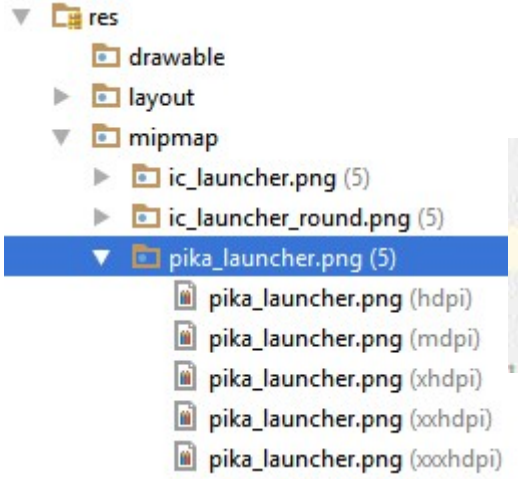
Icon generator

výsledok priamo nakopírujeme do podadresára res

Ikony/obrázky sa

sa objavia v projekte





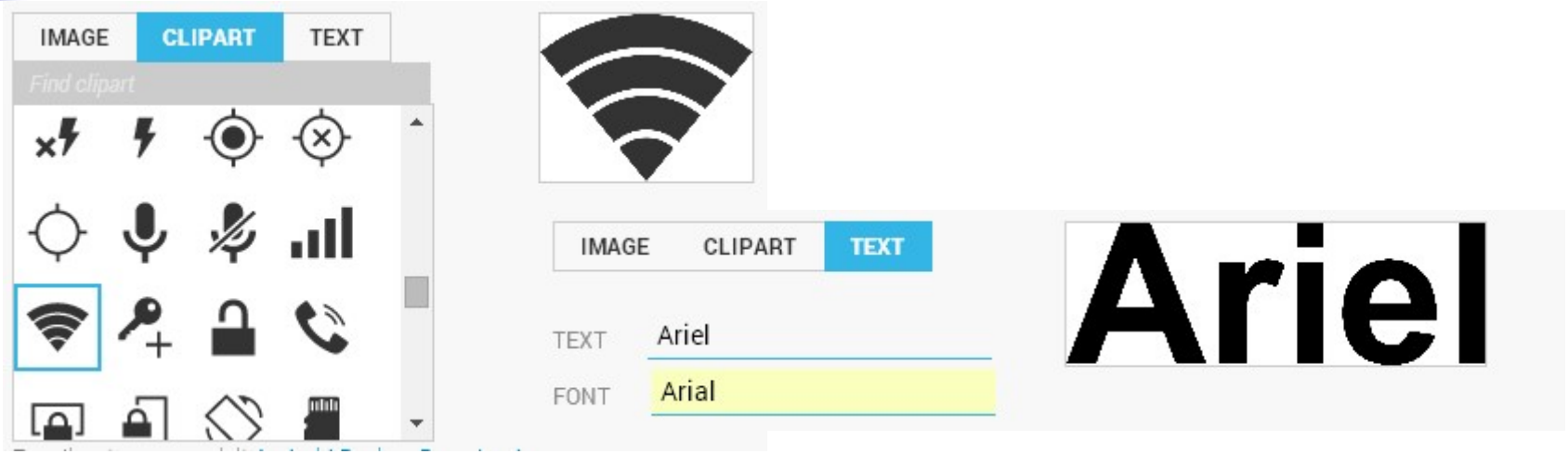

```
5
6
7
8
9
<application
    android:allowBackup="true"
    android:icon="@mipmap/pika_"
    android:label @mipmap/pika_launcher
    android:roundIcon="@mipmap/ic_launcher_round"
```

Project:Pikas.zip, Pikas2.zip

Android Asset Studio

(jedna z alternatív)

https://romannurik.github.io/AndroidAssetStudio/



- .png,. jpg, .bmp, ...
- cliparty
- texty

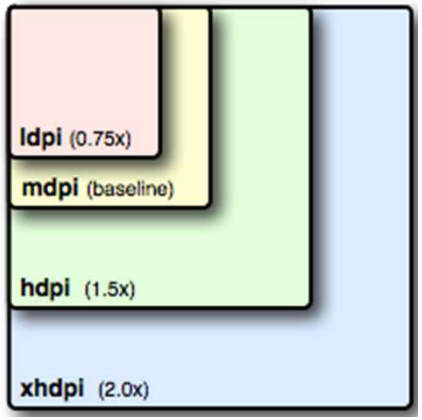
Resources/Drawables/Mipmap

(ikona - viacero rozlíšení)

http://developer.android.com/guide/practices/screens_support.html

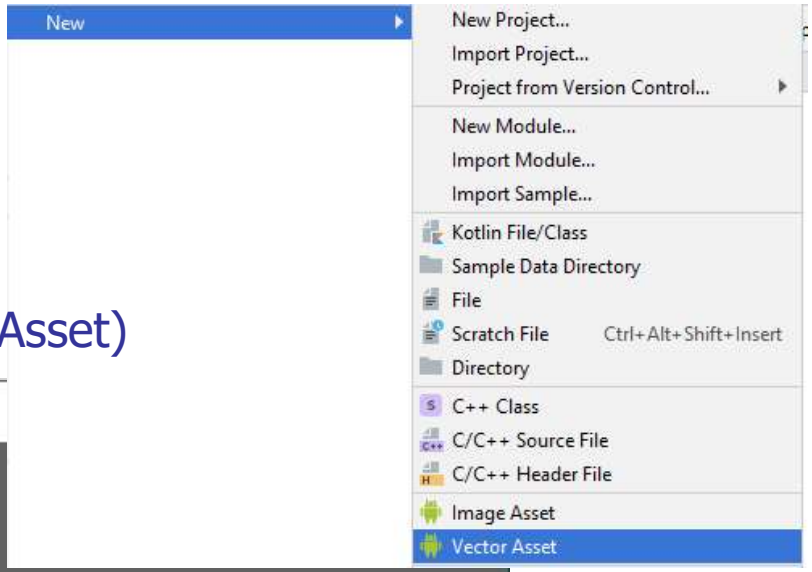
pomer l/m/h/xh/x²h/x³h-dpi 3:4:6:8:12:16 - geom.postupnosť s koef. Sqrt(2) $\sqrt{2}$

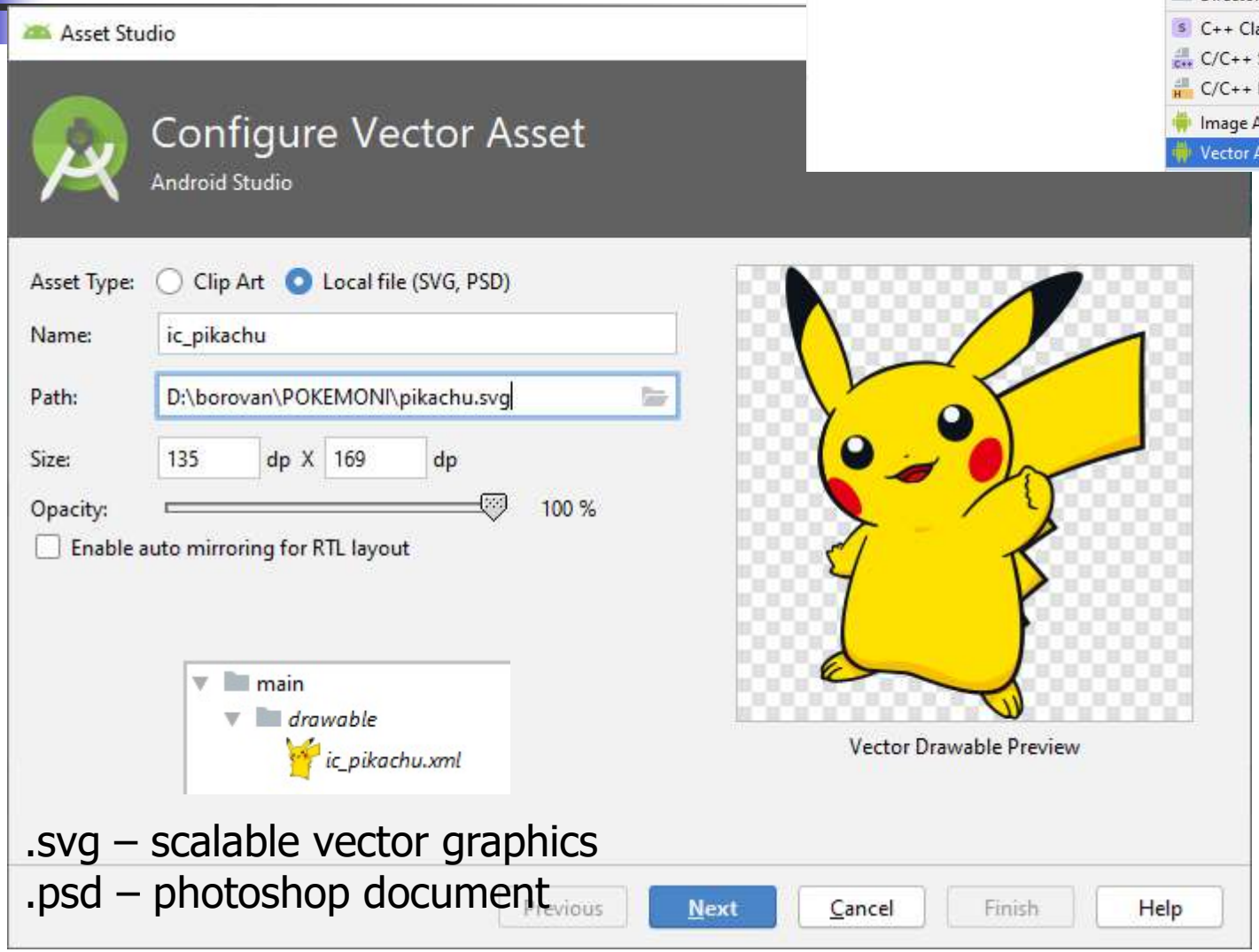
- 36x36 for low-density (LDPI = ~ 120 dpi)
- 48x48 for medium-density (MDPI = ~ 160 dpi)
- 72x72 for high-density (HDPI = ~ 240 dpi)
- 96x96 for extra high-density (XHDPI = ~ 320 dpi)
- 144x144 for extra² high-density (XXHDPI = ~ 480 dpi)
- 192x192 for extra³ high-density (XXXHDPI = ~ 640 dpi)



Pre .svg a .psd

(a použi Vector Asset Studio - New/VectorAsset)





.svg – scalable vector graphics

.psd – photoshop document

Resources/Values

- string

```
<string name="app_name">YourFirstHello</string>
```

- color

```
<color name="transparent_green">#7700FF00</color>
```

- dimentions

```
<dimen name="absolutLarge">144dp</dimen>
```

- style

```
<style name="myStyle">
      <item name="android:textSize">12sp</item>
      <item name="android:textColor">#FF00FF</item>
</style>
```

px = Pixels
in = Inches
mm = Millimeters
pt = Points, 1/72 of an inch
sp = Scale - Independent Pixels – používame pre veľkosť fontu
dp = Density - Independent Pixels – používame pre všetko ostatné

Resources/Values

- array-string/integer

```
<string-array name="poker">
    <item >full-hand</item>
    <item >postupka</item>
    <item >royal</item>
</string-array>
```

```
<integer-array name="coins">
        <item>1</item>
        <item>2</item>
        <item>5</item>
        <item>10</item>
        <item>20</item>
</integer-array>
```

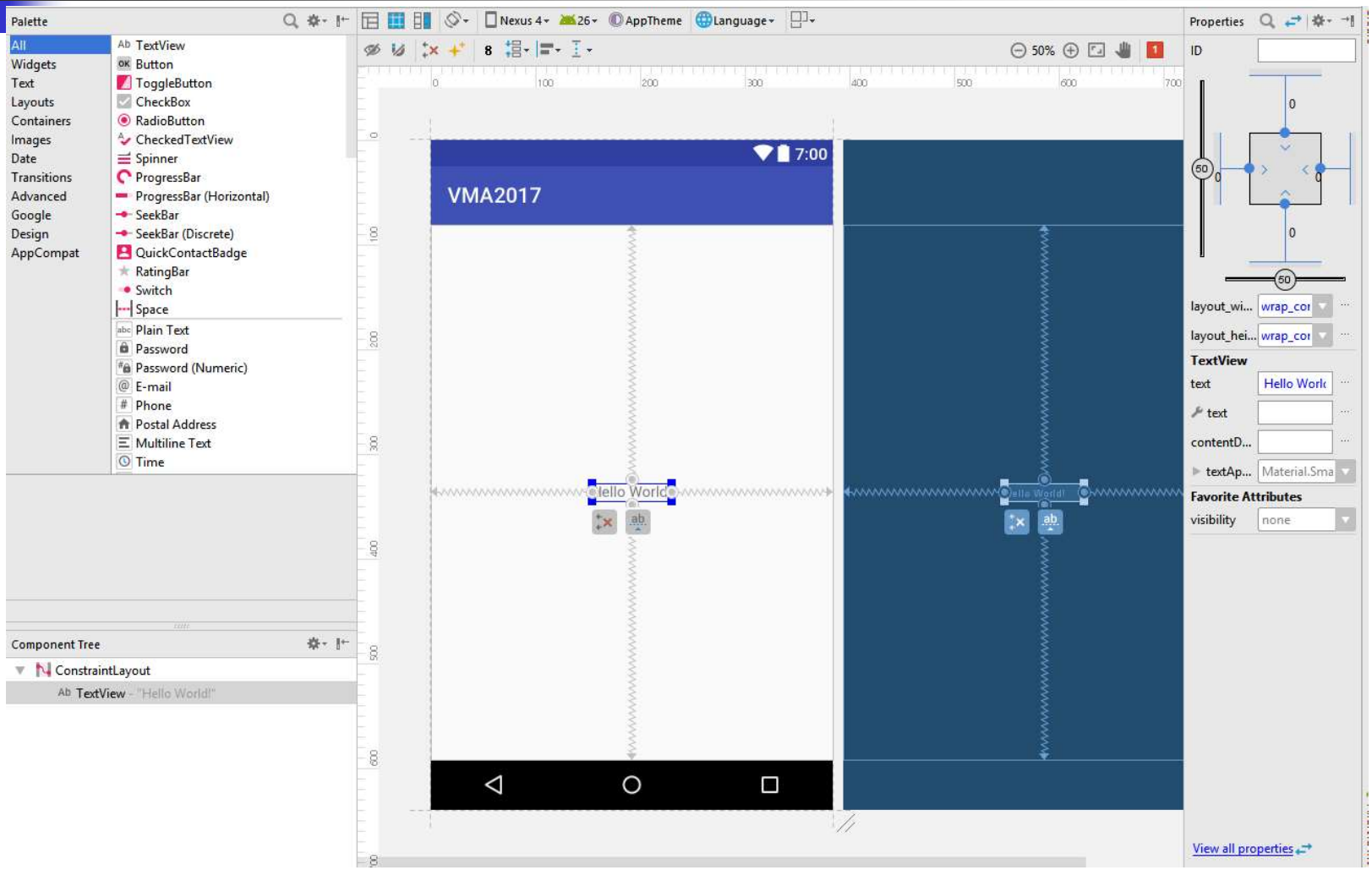
- plurals (quantity strings)

```
<plurals name="man">
    <item quantity="one">man</item>
    <item quantity="many">men</item>
    <item quantity="zero">paradis</item>
</plurals>
```

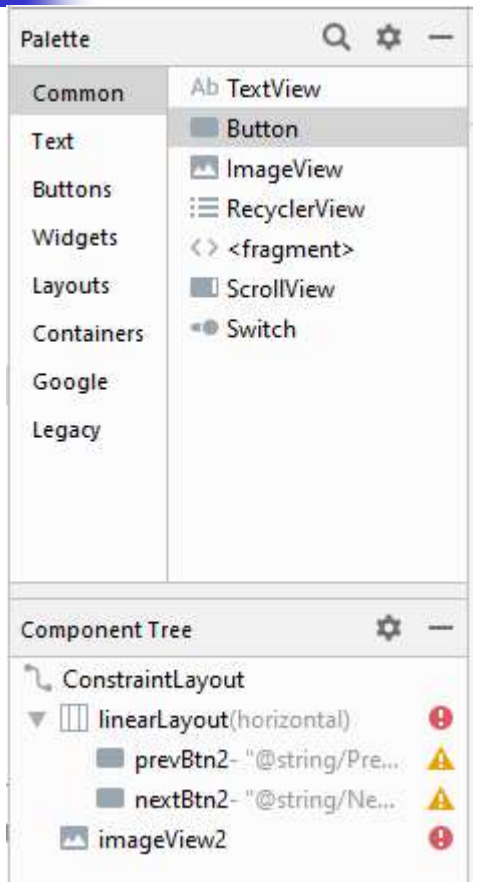
Resources/Layout

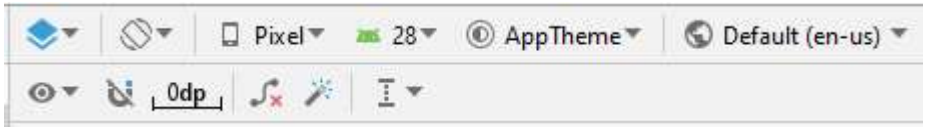
(Design View)

Konvencia:
XyzActivity[.kt/]
má layout
activity_xyz.xml



Layout Manager





Design/Blueprint/Design+Blueprint

Layout: Landscape/Portrait/…

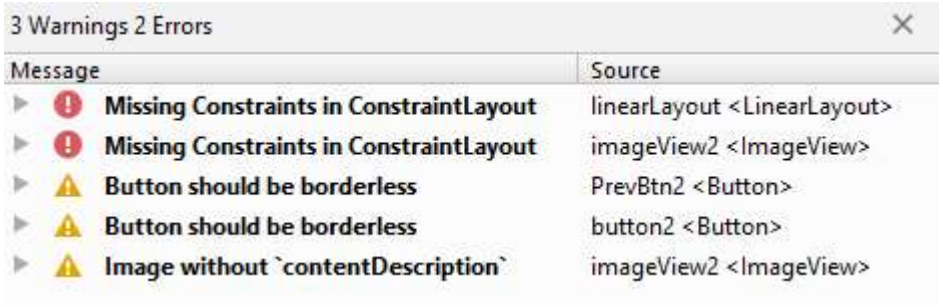
Pixel: AVD/Pixel2/Pixel#

API Level: 26/27/28/…

AppTheme :

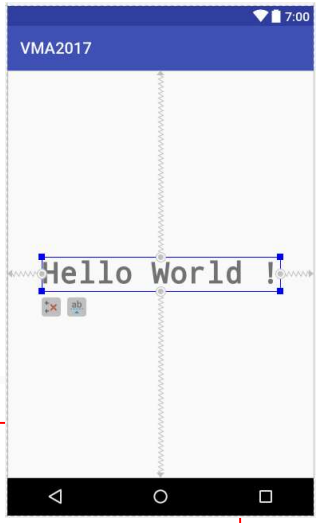
Default (en-us) : lokalizácie do rôznych jazykov

: warnings, errors



Resources/Layout

(Text View)



wrap_content
fill_parent=
match_parent

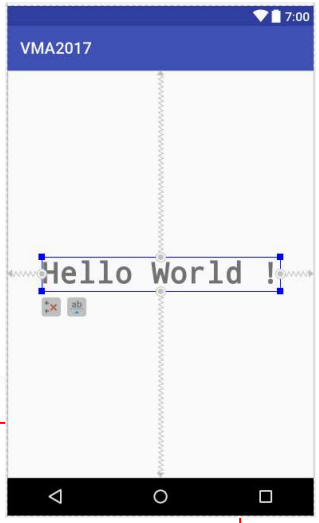
```
<android.support.constraint.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
       xmlns:app="http://schemas.android.com/apk/res-auto"
        xmlns:tools="http://schemas.android.com/tools"
         android:layout_width="match_parent"
         android:layout_height="match_parent"
         tools:context="pokus.example.com.vma2017.MainActivity">

        <TextView
            android:layout_width="wrap_content"
            android:layout_height="wrap_content"
            android:fontFamily="monospace"

            android:text="Hello World!"
            android:textSize="36sp"
            android:textStyle="bold"
            app:layout_constraintBottom_toBottomOf="parent"
            app:layout_constraintLeft_toLeftOf="parent"
            app:layout_constraintRight_toRightOf="parent"
            app:layout_constraintTop_toTopOf="parent" />
</android.support.constraint.ConstraintLayout>
```

ConstraintLayout
Ab res "Hello World 1"
Hardcoded string "Hello World 1", should use `@string` resource

Bad style

Resources/Layout

(Text View)



wrap_content
fill_parent=
match_parent

```
<android.support.constraint.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="pokus.example.com.vma2017.MainActivity">

      <TextView
          android:layout_width="wrap_content"
          android:layout_height="wrap_content"
          android:fontFamily="monospace"
          android:text="@string/IntroString"
          android:textSize="@dimen/reallyBigFont"
          android:textStyle="bold"
          app:layout_constraintBottom_toBottomOf="parent"
          app:layout_constraintLeft_toLeftOf="parent"
          app:layout_constraintRight_toRightOf="parent"
          app:layout_constraintTop_toTopOf="parent" />
</android.support.constraint.ConstraintLayout>
```

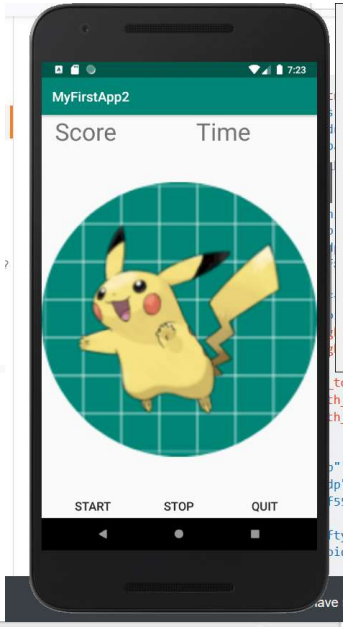
```
<resources>
    <string name="app_name">VMA2017</st
    <string name="IntroString">Hello Wo
</resources>
```

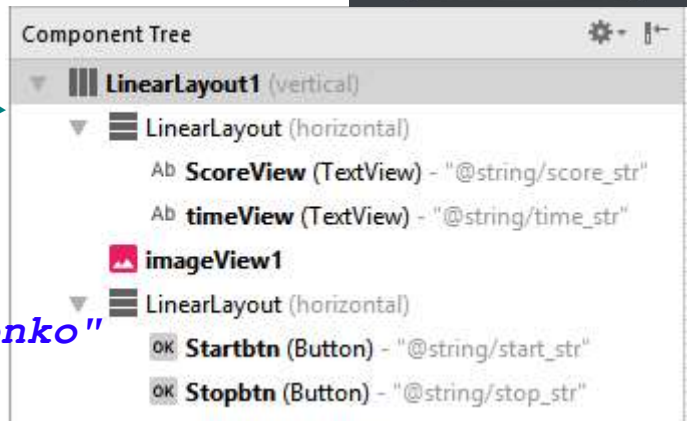
```
<resources>
    <dimen name="reallyBigFont">30
</reso
```

Ako by to malo vyzerať

```
<LinearLayout
    <TextView
        android:id="@+id/ScoreView"
        android:text="@string/score_str"/>
    <TextView
        android:id="@+id/timeView"
        android:text="@string/time_str" />
</LinearLayout>
<ImageView
    android:id="@+id/imageView1"
    android:contentDescription="@string/dronko"
    android:src="@drawable/ic_launcher" />
<LinearLayout
    <Button
        android:id="@+id/Startbtn"
        android:text="@string/start_str" />
    <Button
        android:id="@+id/Stopbtn"
        android:text="@string/stop_str" />
</LinearLayout>
```

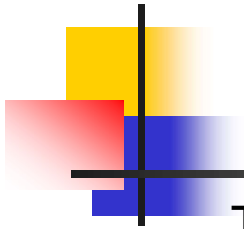
Žiadne warnings





zjednodušené pre účely slajdu

Project: MyFirstApp22.zip



Logovanie

Tri najbežnejšie spôsoby:

- Log
- Toast
- Snackbar – to chce pridať závislosť do build.gradle

```
dependencies {
    implementation 'com.android.support:design:28.0.0'
```

```
import com.google.android.material.snackbar.Snackbar
```

```
prevBtn2.setOnClickListener({
    Toast.makeText(this, "prev...", Toast.LENGTH_SHORT).show()

    Log.d(TAG, "prev...")

    Snackbar.make(it, "prev...",
        Snackbar.LENGTH_SHORT).setAction("Action", null).show()
    ...
    if (--i < 0) i += imgs.size
    imageView2.setImageDrawable(imgs[i])
})
```

Project:Pikas2.zip

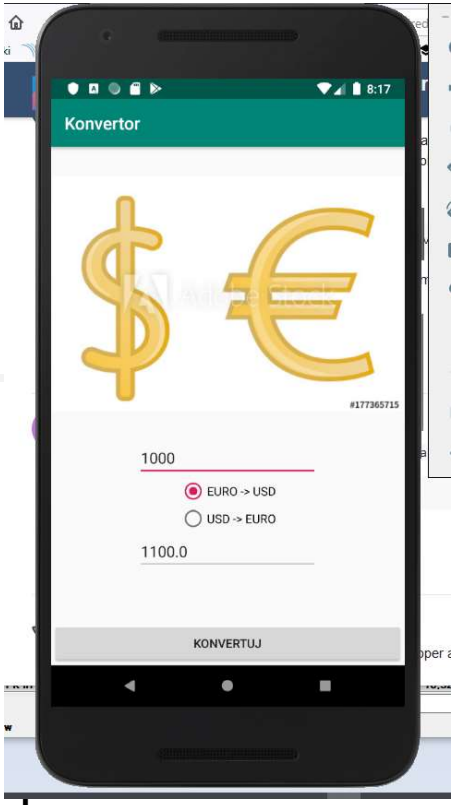
Pikas


```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    var i = 0
    var imgs = arrayOf(
      ContextCompat.getDrawable(applicationContext,
                                R.drawable.butterfree),
      ...          )
      imageView2.setImageDrawable(imgs[i])
      prevBtn2.setOnClickListener({
         Toast.makeText(this, "prev...", Toast.LENGTH_SHORT).show()
         if (--i < 0) i += imgs.size
         imageView2.setImageDrawable(imgs[i])
      })
      nextBtn2.setOnClickListener({
         Toast.makeText(this, "next...", Toast.LENGTH_LONG).show()
         i = (++i)%imgs.size
         imageView2.setImageDrawable(imgs[i])
     })
}
```

Project:Pikas2.zip

Konvertor EURO USD

(logika)



Jednoduchá aplikácia na konverziu kurzov USD EURO

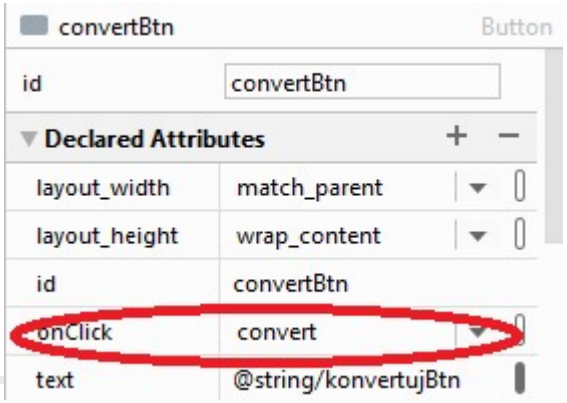
- s modifikovateľným TextView pre zadanie sumy, reálneho čísla
- RadioButtonom pre výber smeru konverzie
- s nemodifikovateľným poľom pre výsledok
- Button Konvertuj pre vykonanie akcie

```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    convertBtn.setOnClickListener({
        Toast.makeText(this, "convert",Toast.LENGTH_SHORT).show();
        if (inputText.text.isNotEmpty()) {
            val input = inputText.text.toString().toFloat();// get
            var output = input
            if (eur2usd.isChecked) output = 1.1F * output
            if (usd2eur.isChecked) output = output / 1.1F
            outputText.setText("$output")                    // set
        }}
```

Klik na Konvertuj

Konvertor EURO USD

(setOnClickListener)




```
// very old fashion
   val cBtn = findViewById<Button>(R.id.convertBtn)
   cBtn.setOnClickListener( { v -> convert(v) } )
   cBtn.setOnClickListener { convert(it) }

// old fashion
   convertBtn.setOnClickListener { v -> convert(v) }
   convertBtn.setOnClickListener { convert(it) }
```

```
fun convert(v: View) {
    Toast.makeText(this, "convert", Toast.LENGTH_SHORT).show()
    if (inputText.text.isNotEmpty()) {
        val input = inputText.text.toString().toFloat();
        var output = input
        if (eur2usd.isChecked) output = 1.1F * output
        if (usd2eur.isChecked) output = output / 1.1F
       outputText.setText("${output.format(2)}")     }}
fun Float.format(digits: Int) =
    java.lang.String.format("%.${digits}f", this)
```

metóda Float

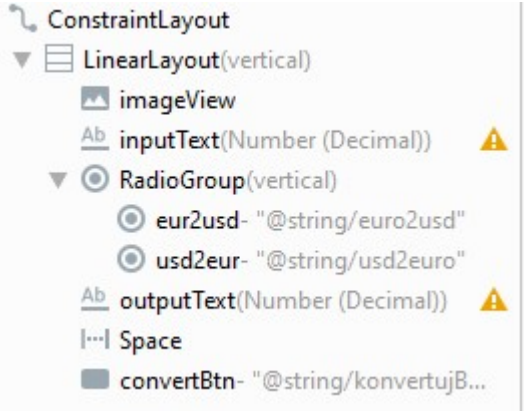
Project:Konvertor.zip

a

Konvertor EURO USD

(layout)

```
<LinearLayout
    <ImageView …/>
    <EditText …/>
    <RadioGroup
        <RadioButton …/>
        <RadioButton …/>
    </RadioGroup>
    <EditText …/>
    <Space …/>
    <Button …/>
</LinearLayout>
```



Project:Konvertor.zip

Príklad jednoduchej aplikácie

(ktorú sme si vyklikali minule)

Ilustrovali sme:

- príklad návrhu (vyklikania) jednoduchého GUI (single activity app)
- logovanie udalostí ako efektívny prostriedok ladenia pomocou
  - Log.d(…)
  - Toast.make(…)
  - Snackbar.make(…)
- používanie Image/Vector Asset (drawable/mipmap)
- používanie resource editora (pri definovaní strings.xml)
- používanie layout editora pri tvorbe rozhrania (ešte bude)
- eventhandler (**`.setOnClickListener`**) previazané cez
  - **`findViewById<Button>(R.id.quitBtn)`**
  - **`prevBtn.setOnClickListener({ })`**
  - property `android:onClick="nextOnClickListener"`

Project:Pikas2.zip

Nestihli sme:

- aktivitu a jej životný cyklus

Logovanie
(rekapitulácia)

Tri najbežnejšie spôsoby:

- Log – loguje do okna Logcat, filtrujte podľa `TAGu` metódy `Log.d(TAG,`
- Toast – potrebuje `Context` (zjednodušene aktivita, v ktorej sa toastuje)
- Snackbar – to chce pridať závislosť do build.gradle a import snackbaru

```
dependencies {
    implementation 'com.android.support:design:28.0.0'}
import com.google.android.material.snackbar.Snackbar

prevBtn2.setOnClickListener({
    Toast.makeText(this, "prev...", Toast.LENGTH_SHORT).show()

    Log.d(TAG, "prev...")

    Snackbar.make(it, "next...",
        Snackbar.LENGTH_SHORT).setAction("Action", null).show()
    alebo .setAction(R.string.action,
         View.OnClickListener { nextOnClickListener(it) }).show()
...
})
```

Project:Pikas2.zip

Pikas

(rekapitulácia)

activity entry point

```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    var i = 0
    var imgs = arrayOf(
      ContextCompat.getDrawable(applicationContext,
                                R.drawable.butterfree),
      ...          )
    imageView2.setImageDrawable(imgs[i])
    prevBtn2.setOnClickListener({
        Toast.makeText(this, "prev...", Toast.LENGTH_SHORT).show()
        if (--i < 0) i += imgs.size
        imageView2.setImageDrawable(imgs[i])
    })
    nextBtn2.setOnClickListener({
        Toast.makeText(this, "next...", Toast.LENGTH_LONG).show()
        i = (++i)%imgs.size
        imageView2.setImageDrawable(imgs[i])
    })
}
```

View(s)

logovanie

Project:Pikas2.zip

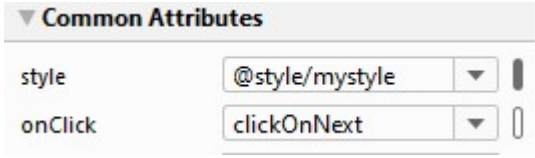
Pikas

(stav sa mieša s views a logikou – riešenie príde)

const
final

State

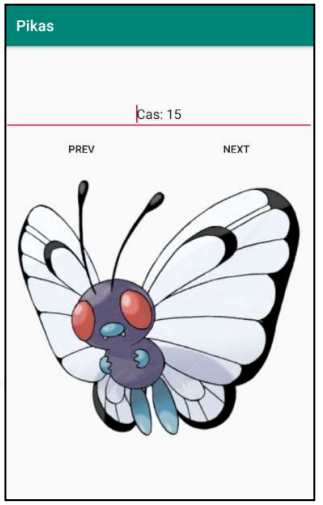
```
val TAG = "PIKAS"
var i = 0
var imgs = arrayOf<Drawable?>()
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    imgs = arrayOf(ContextCompat.getDrawable(applicationContext,
                                             R.drawable.butterfree), … )
    imageView2.setImageDrawable(imgs[i])
    prevBtn2.setOnClickListener {          // it:View -> { ... }
        if (--i < 0) i += imgs.size
        imageView2.setImageDrawable(imgs[i])
    }
}
// prepojene cez property android:onClick="nextOnClickListener"
fun nextOnClickListener(v: View) {
    i = (++i) % imgs.size
    imageView2.setImageDrawable(imgs[i])
}
```



Project:Pikas2.zip

Pikas

(asynchrónnosť - timer)



pomocou **java.util.Timer**

```
Timer("tik-tak").schedule(1000,1000) { // delay, period
    Log.d(TAG, "onTICK")
    cas++
    runOnUiThread { time.setText("Cas: $cas ") }
}.run()
```

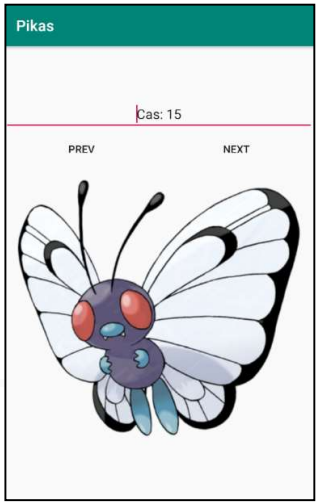
- nezabudnite na .run()
- runOnUiThread
  - má argument java.lang.Runnable, ktorý vykoná v hlavnom GUI vlákne

```
zabitie timera:
override fun onPause() {
    super.onPause()
    timer.cancel()
}
```

Project:Pikas2.zip

Pikas

(asynchrónnosť – count down)



pomocou **android.os.CountDownTimer**

```
object:CountDownTimer(20000, 1000) { // 20sek, tik po 1sek
                                     // how long, period
    override fun onTick(millisUntilFinished: Long) {
        Log.d(TAG, "onTICK")
        runOnUiThread {
            time.setText("Cas: ${millisUntilFinished/1000}") }
    }

    override fun onFinish() {
        Log.d(TAG, "onFinish")
        exitProcess(-1)
    }
}.start()
```

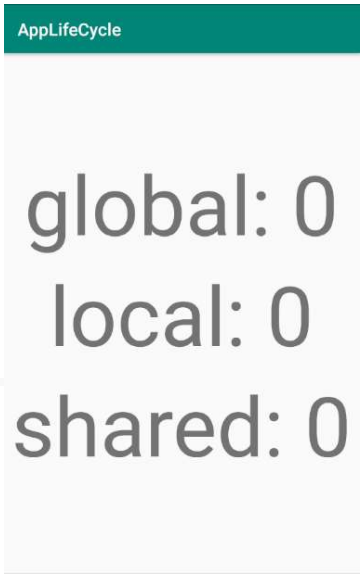
tik

game over

ukončenie appky

Project:Pikas2.zip

Životný cyklus apky
(prvý – zjednodušený nástrel)



- Alt-Insert = Generate Override Implemented Methods:
  - `protected void onDestroy()`
  - `protected void onPause()`
  - `protected void onRestart()`
  - `protected void onRestoreInstanceState(Bundle savedInstanceState)`
  - `protected void onResume()`
  - `protected void onSaveInstanceState(Bundle outState)`
  - `protected void onStart()`
  - `protected void onStop()`
- do každej metódy dáme kontrolný výpis, aby sme pochopili životný cyklus

```
@Override
public void onCreate(Bundle savedInstanceState) {
    super.onCreate(savedInstanceState);
    setContentView(R.layout.activity_main);
    Log.d("CYKLUS","onCreate"); // LOGUJTE, LOGUJTE, LOGUJTE
}
```

tag vhodný na filtrovanie

Project:AppLifeCycle.zip

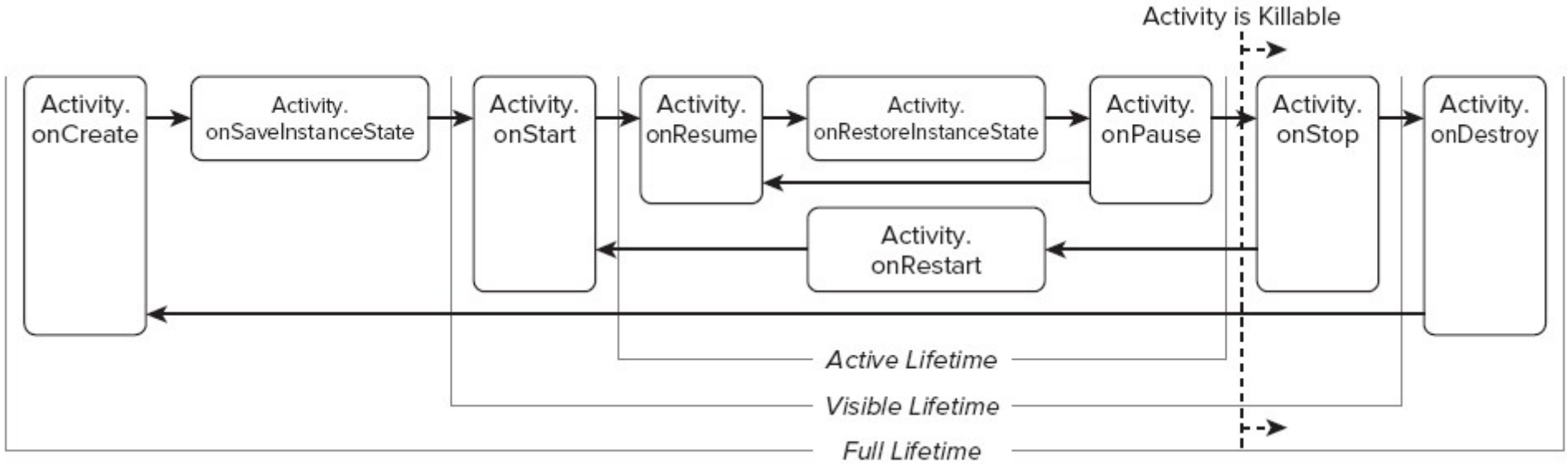
LogCat

(Filtrovanie logov)

- 10-13 12:55:41.091: D/Hello(405): onCreate
- 10-13 12:55:41.091: D/Hello(405): onStart
- 10-13 12:55:41.100: D/Hello(405): onResume

kill

- 10-13 12:56:45.061: D/Hello(405): onPause
- 10-13 12:56:45.681: D/Hello(405): onStop
- 10-13 12:56:45.681: D/Hello(405): onDestroy



zdroj: Reto Meier: PA2AD

Project:AppLifeCycle.zip