AS Projekt
(anatómia projektu)

Peter Borovanský
KAI, I-18

MS-Teams: 2sf3ph4, List, github

borovan 'at' ii.fmph.uniba.sk

Dnes bude

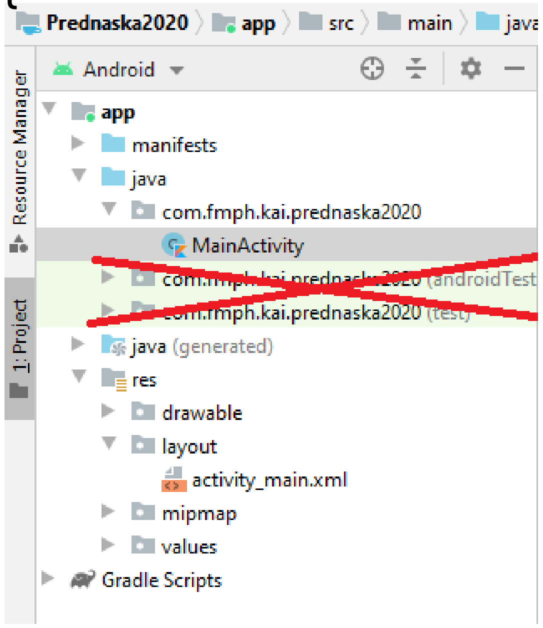
- základné časti AS projektu
  - AndroidManifest, build.gradle, resources, layout, obrázky a ikony, ...
- Design View
  - Design/Blueprint
- LinearLayout, TextView, Button, ...
- väzba medzi objektami z layout a kódom
  - findViewByID, plugin kotlin-android-extensions
- dobré zvyky pri návrhu layout
  - ako na warnings a errors

- Kotlin – nullables
  - operátory s tým spojené – tzv. Elvis operátor

- Cvičenie
  - vpisujete kódy do už pripravených templates (idea: Pexeso, Kalkulačka, Milionár)
  - online: Piškvorky

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

   }
}
```



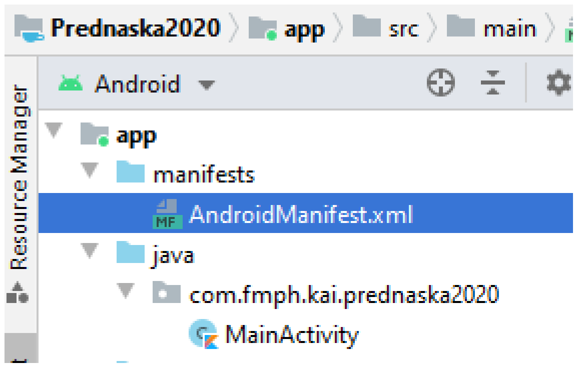
Prednaska2020 › app › src › main › java
Resource Manager
1: Project
Android
app
manifests
java
com.fmph.kai.prednaska2020
MainActivity
~~com.fmph.kai.prednaska2020 (androidTest)~~
~~com.fmph.kai.prednaska2020 (test)~~
java (generated)
res
drawable
layout
activity_main.xml
mipmap
values
Gradle Scripts

- 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

EmptyApp2021.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>
```

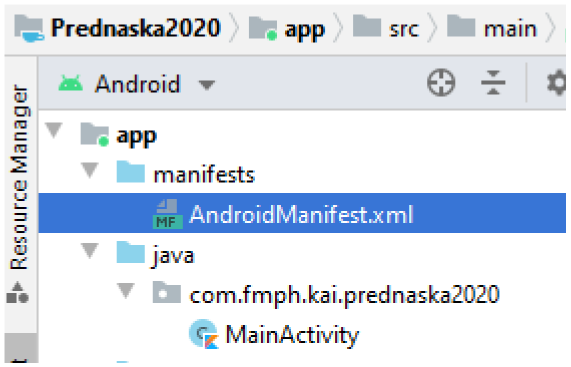
Alt-Enter

referencia na ikonu apky

referencia meno apky

EmptyApp2021.zip

AndroidManifest.xml



Hlavné tagy:

- **`<application`** je jediný a popisuje ikony, logo, meno, štýl aplikácie
- **`<activity`** može ich byť viac a popisujú package definujúci aktivitu (analógia 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

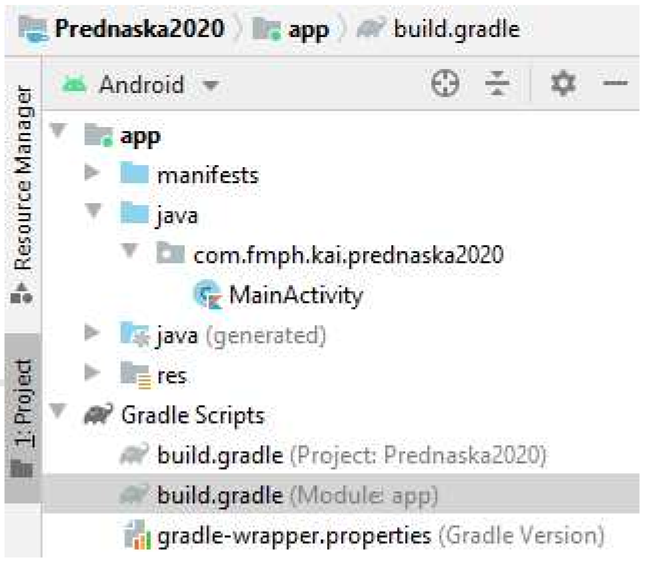
AS-manifest rokmi schudobnel, mnohé veci sa presunuli do build.gradle:

- **`<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)

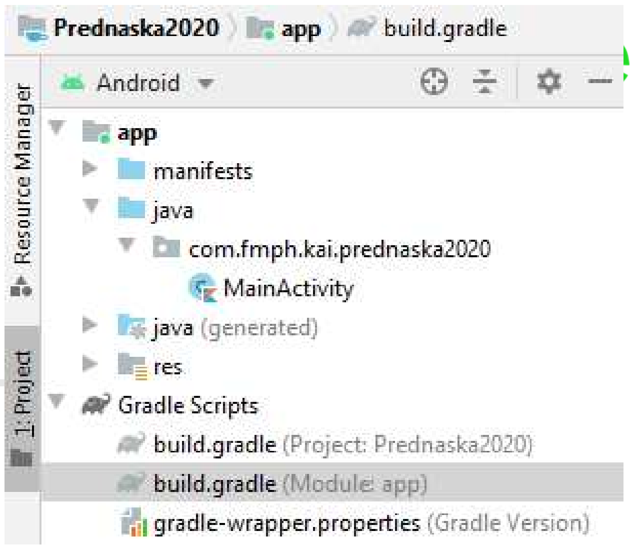

Prednaska2020
app
build.gradle
Android
Resource Manager
1: Project
app
manifests
java
com.fmph.kai.prednaska2020
MainActivity
java (generated)
res
Gradle Scripts
build.gradle (Project: Prednaska2020)
build.gradle (Module: app)
gradle-wrapper.properties (Gradle Version)

Gradle je build tool, podobne ako make, maven

```
plugins { id 'com.android.application`
          id 'kotlin-android`
          id 'kotlin-android-extensions'  }
android {
    compileSdk 30
    defaultConfig {
        applicationId "com.example.emptyapp2021"
        minSdk 23
        targetSdk 30
        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`
    ...
}
```

EmptyApp2021.zip

Gradle


Prednaska2020 › app › build.gradle

Android

- app
  - manifests
  - java
    - com.fmph.kai.prednaska2020
      - MainActivity
  - java (generated)
  - res
- Gradle Scripts
  - build.gradle (Project: Prednaska2020)
  - build.gradle (Module: app)
  - gradle-wrapper.properties (Gradle Version)

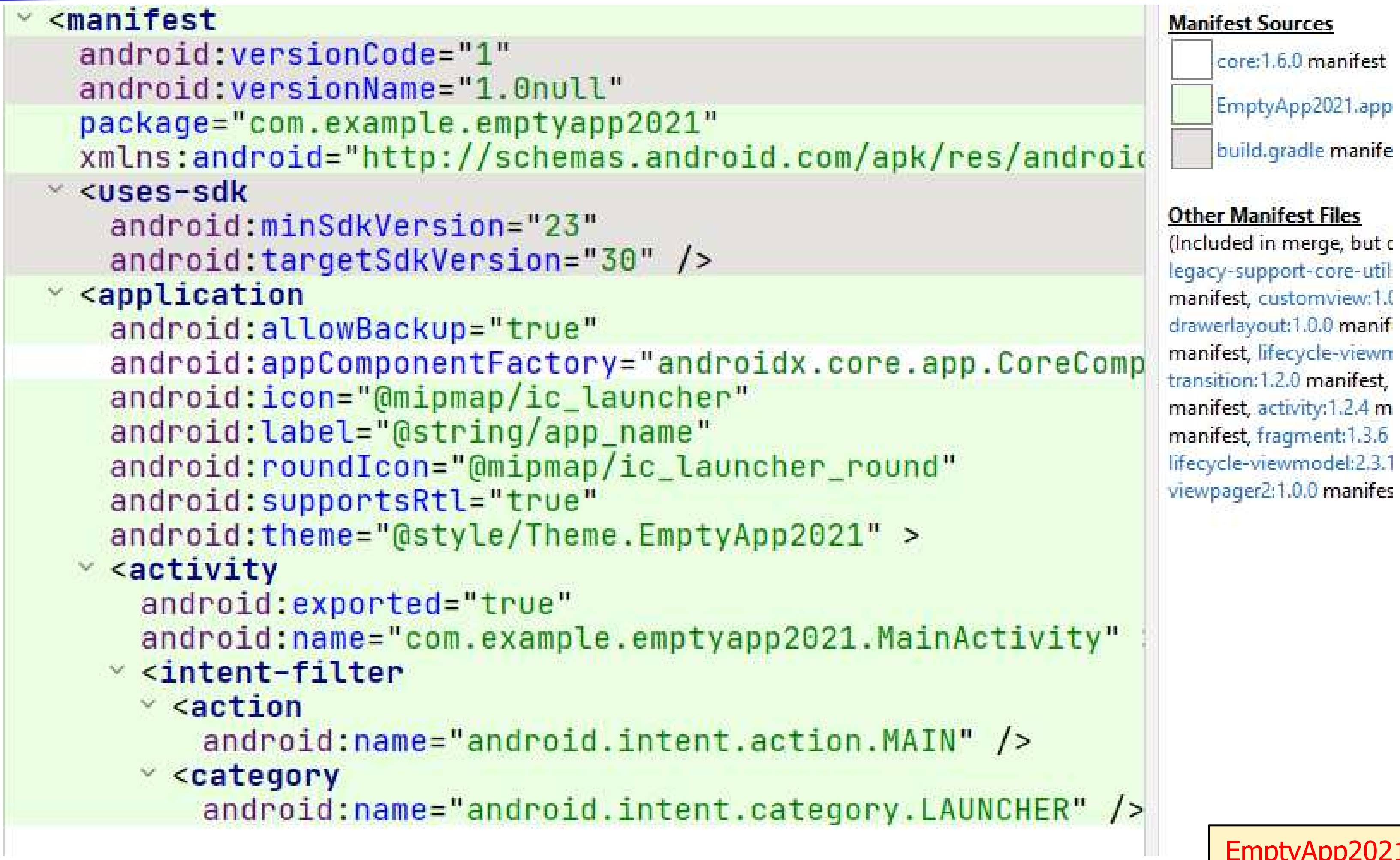
- je plugin-based project-build/management system v AS založený na jazyku Groovy
- už existuje Kotlin Gradle Plugin pre Gradle 6+

```
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`
    ...
}
```

EmptyApp2021.zip

MergedManifest
(spája AndroidManifest a build.gradle)



```
<manifest
  android:versionCode="1"
  android:versionName="1.0null"
  package="com.example.emptyapp2021"
  xmlns:android="http://schemas.android.com/apk/res/androic
  <uses-sdk
    android:minSdkVersion="23"
    android:targetSdkVersion="30" />
  <application
    android:allowBackup="true"
    android:appComponentFactory="androidx.core.app.CoreComp
    android:icon="@mipmap/ic_launcher"
    android:label="@string/app_name"
    android:roundIcon="@mipmap/ic_launcher_round"
    android:supportsRtl="true"
    android:theme="@style/Theme.EmptyApp2021" >
    <activity
      android:exported="true"
      android:name="com.example.emptyapp2021.MainActivity"
      <intent-filter
        <action
          android:name="android.intent.action.MAIN" />
        <category
          android:name="android.intent.category.LAUNCHER" />
```

Manifest Sources

⬜ core:1.6.0 manifest

🟩 EmptyApp2021.app

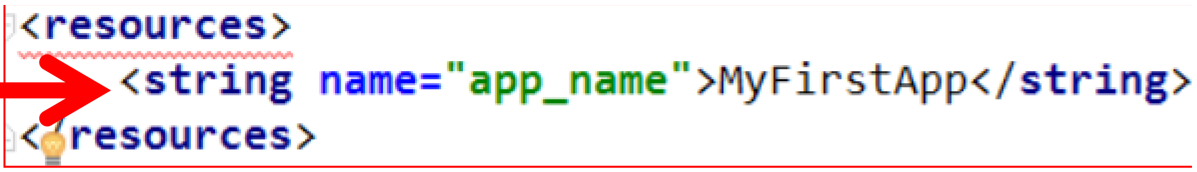
▨ build.gradle manife

Other Manifest Files

(Included in merge, but c
legacy-support-core-util
manifest, customview:1.(
drawerlayout:1.0.0 manif
manifest, lifecycle-viewn
transition:1.2.0 manifest,
manifest, activity:1.2.4 m
manifest, fragment:1.3.6
lifecycle-viewmodel:2.3.1
viewpager2:1.0.0 manifes

EmptyApp2021.zip

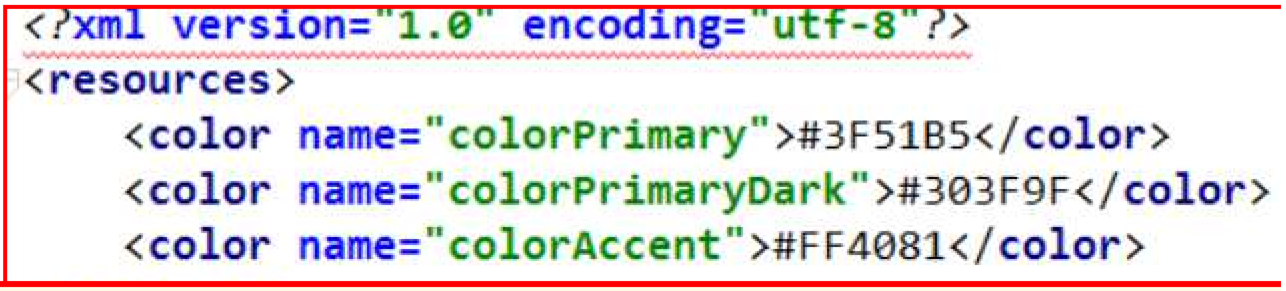
referencia meno apky



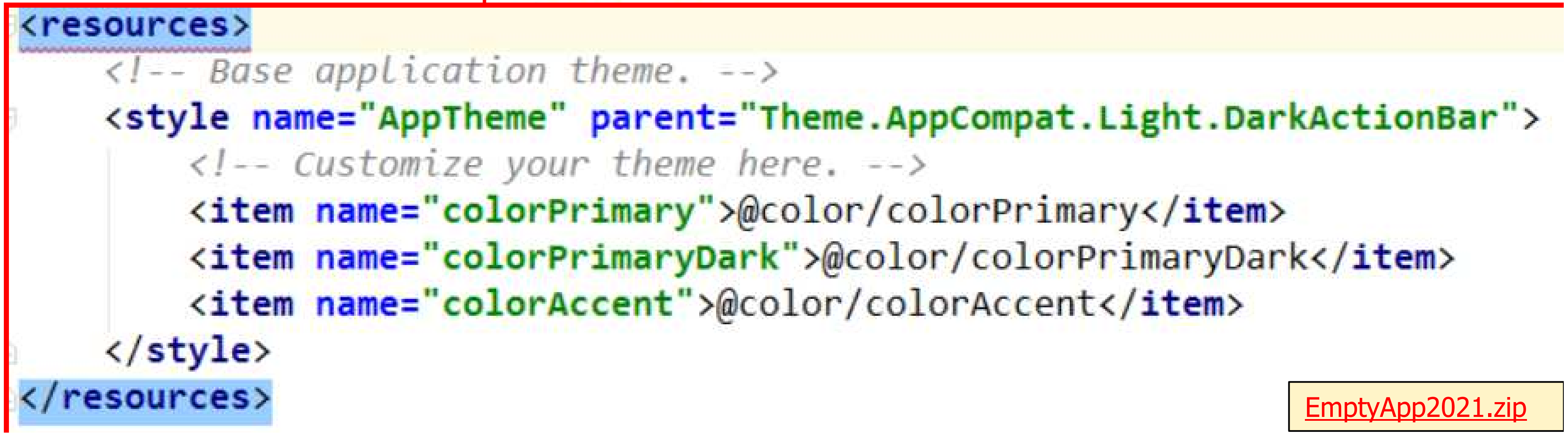
```
<resources>
    <string name="app_name">MyFirstApp</string>
</resources>
```

Resources/Values

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



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



```
<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>
```

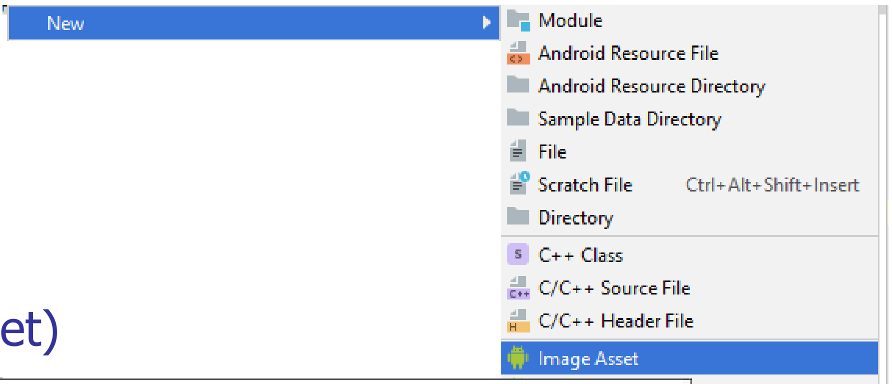
EmptyApp2021.zip

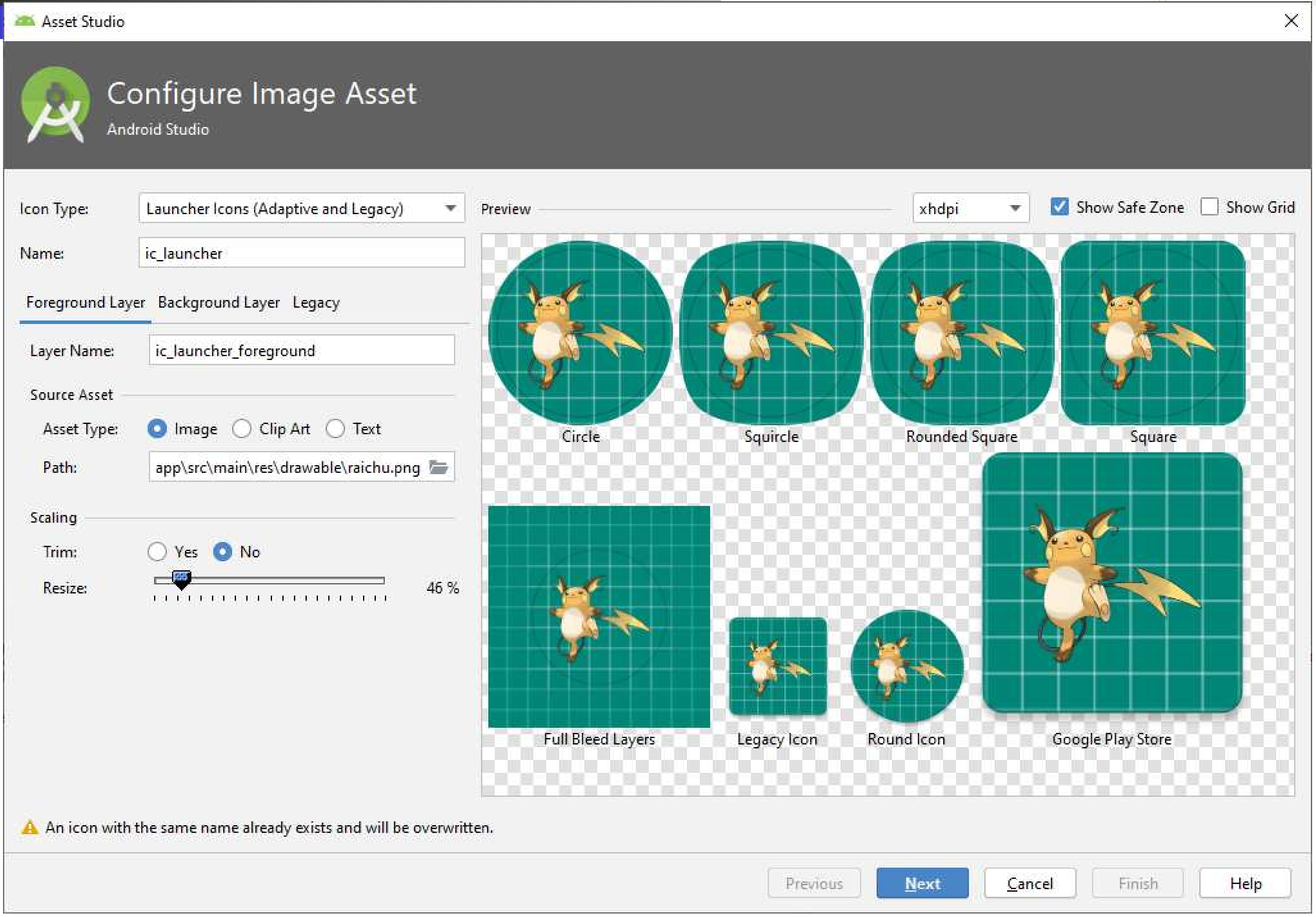
Buď kreatívny
(aspoň pri ic_launcher ikone)

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)





Icon Type: Launcher Icons (Adaptive and Legacy)

Name: ic_launcher

Foreground Layer | Background Layer | Legacy

Layer Name: ic_launcher_foreground

Source Asset

Asset Type: [✓ Image] Clip Art Text

Path: app\src\main\res\drawable\raichu.png

Scaling

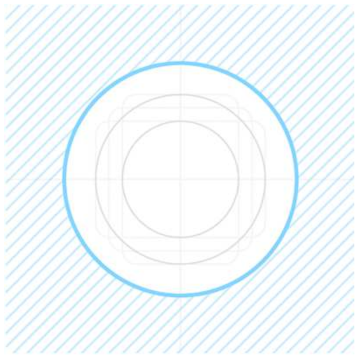
Trim: Yes [✓ No]

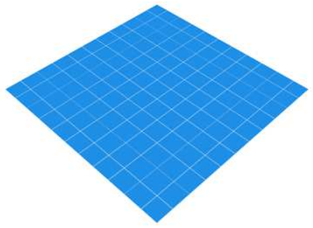
Resize: 46 %

xhdpi [✓ Show Safe Zone] Show Grid

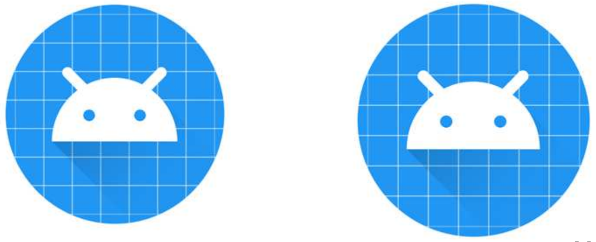
An icon with the same name already exists and will be overwritten.

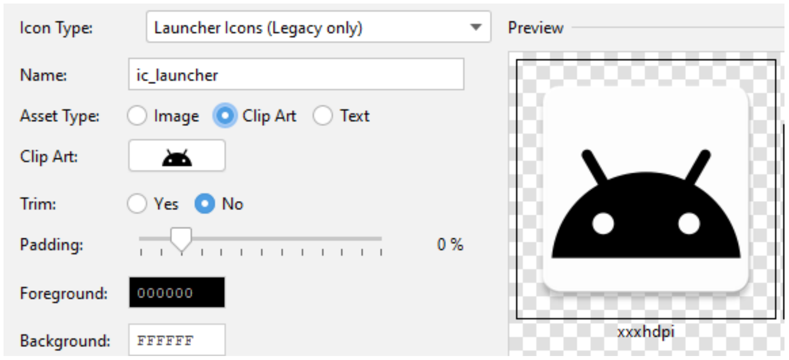
Adaptive icon





- funguje od Android-Oreo, API 26
- umožňuje zariadeniu vhodne škálovať ikonu podľa
  - zvoleného rozlíšenia 108dp, 66dp, ...
  - zvoleného orámovania
- adaptívna ikona má pozadie a popredie
-
```
<adaptive-icon
xmlns:android="http://schemas.android.com/apk/res/android">
  <background android:drawable="@drawable/ic_launcher_background" />
  <foreground android:drawable="@drawable/ic_launcher_foreground" />
</adaptive-icon>
```
- adaptívna ikona umožňuje zariadeniu robiť efekty pri zobrazovaní





Icon Type: Launcher Icons (Legacy only)

Name: ic_launcher

Asset Type: Image [✓ Clip Art] Text

Clip Art:

Trim: Yes [✓ No]

Padding: 0 %

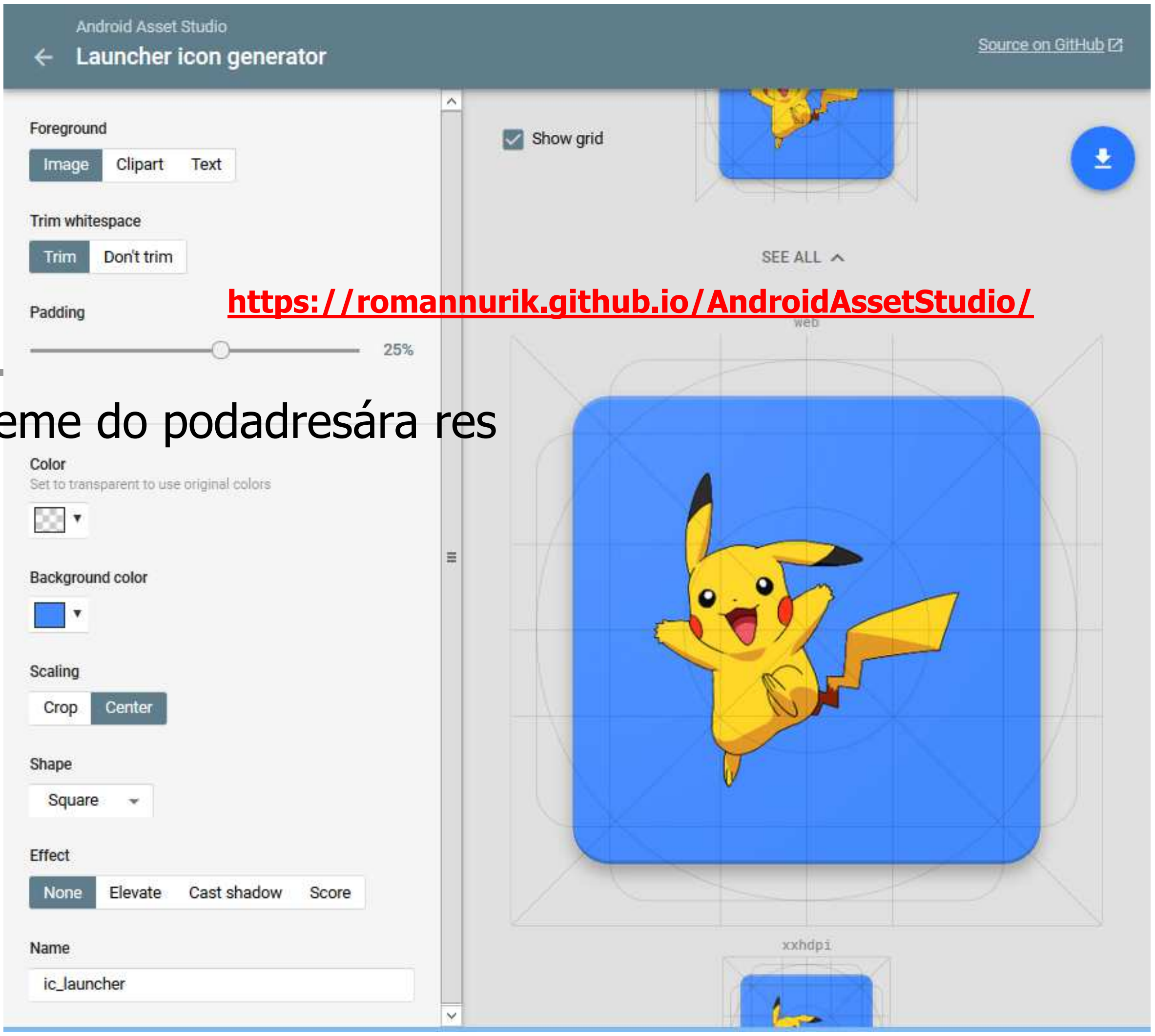
Foreground: 000000

Background: FFFFFF

- legacy ikona je jednoduchšia

https://developer.android.com/guide/practices/ui_guidelines/icon_design_adaptive?hl=de

Android Asset Studio
Icon generator



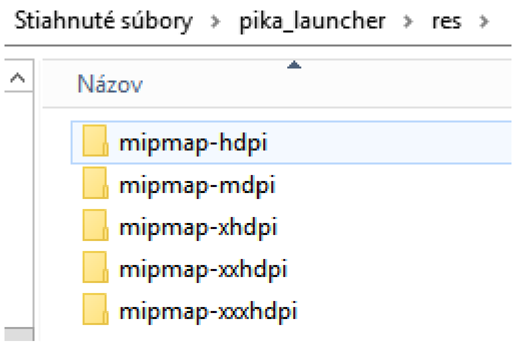
Foreground: Image [✓ Image] Clipart Text
Trim whitespace: [✓ Trim] Don't trim
Padding: 25%
Color: Set to transparent to use original colors
Background color
Scaling: Crop [✓ Center]
Shape: Square
Effect: [✓ None] Elevate Cast shadow Score
Name: ic_launcher

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

výsledok priamo nakopírujeme do podadresára res

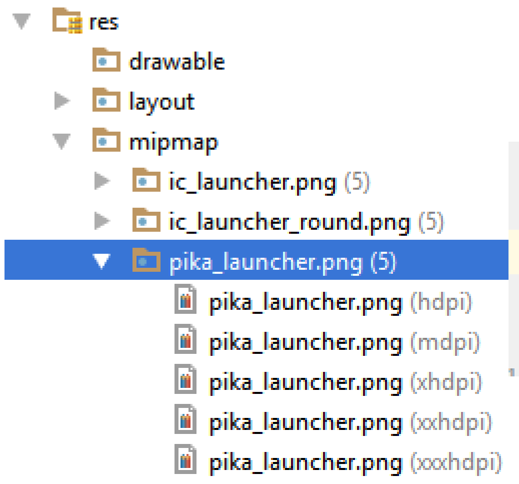
Ikony/obrázky sa

sa objavia v projekte

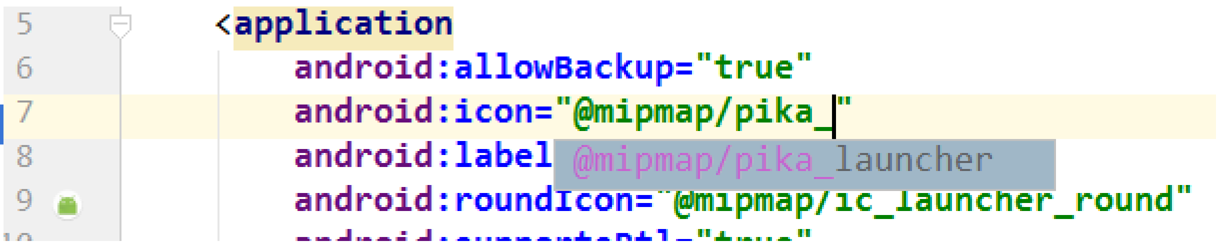


Stiahnuté súbory › pika_launcher › res ›

Názov
- mipmap-hdpi
- mipmap-mdpi
- mipmap-xhdpi
- mipmap-xxhdpi
- mipmap-xxxhdpi



```
res
  drawable
  layout
  mipmap
    ic_launcher.png (5)
    ic_launcher_round.png (5)
    pika_launcher.png (5)
      pika_launcher.png (hdpi)
      pika_launcher.png (mdpi)
      pika_launcher.png (xhdpi)
      pika_launcher.png (xxhdpi)
      pika_launcher.png (xxxhdpi)
```



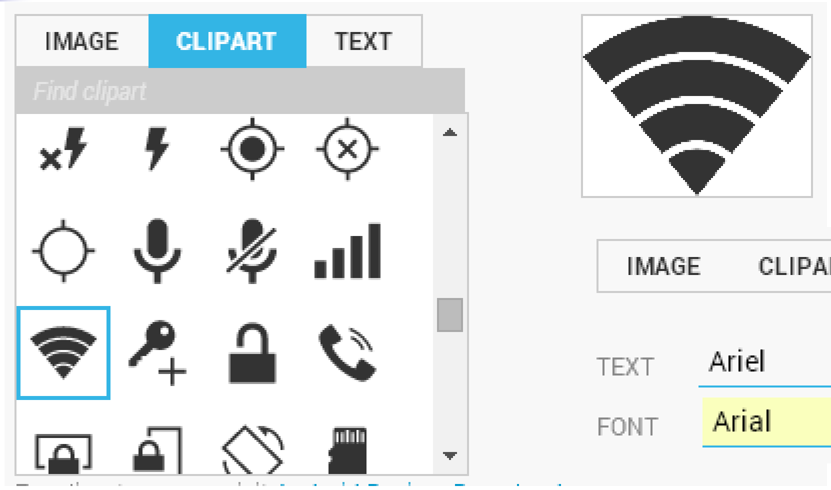
```
<application
    android:allowBackup="true"
    android:icon="@mipmap/pika_"
    android:label @mipmap/pika_launcher
    android:roundIcon="@mipmap/ic_launcher_round"
    android:supportsRtl="true"
```

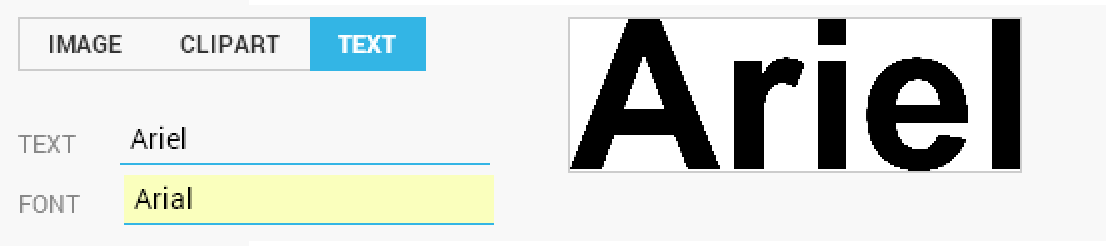
EmptyApp2021.zip

Android Asset Studio

(jedna z alternatív)

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

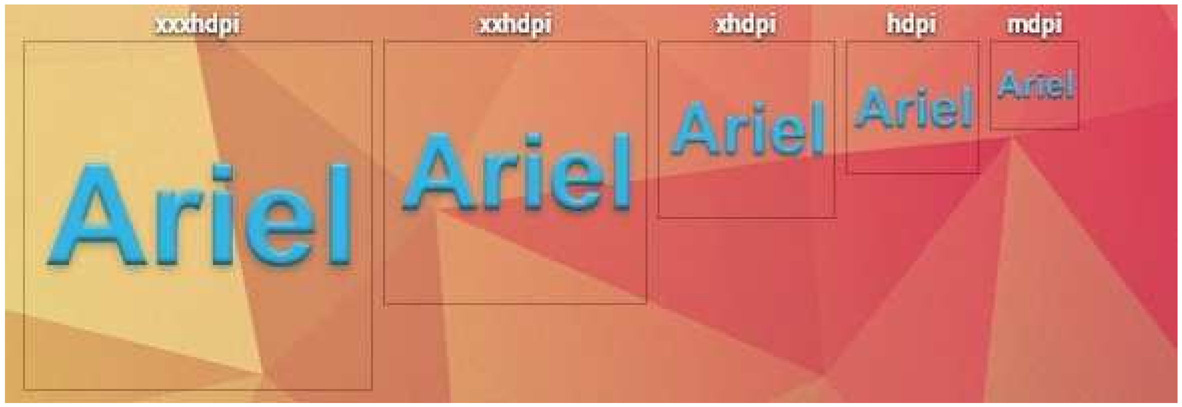




TEXT Ariel

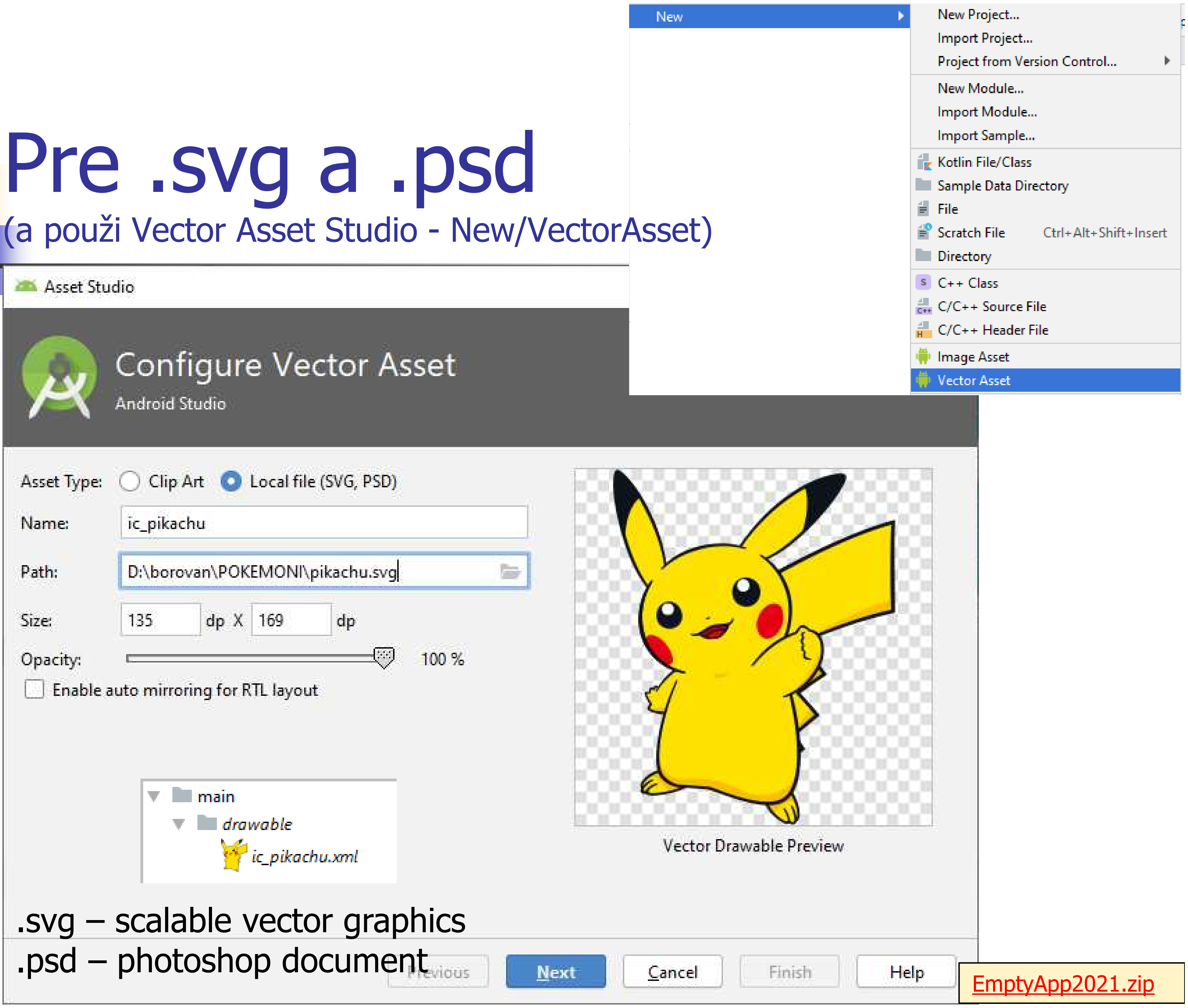
FONT Arial

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



Pre .svg a .psd

(a použi Vector Asset Studio - New/VectorAsset)



Asset Type: Clip Art [✓ Local file (SVG, PSD)]

Name: ic_pikachu

Path: D:\borovan\POKEMONI\pikachu.svg

Size: 135 dp X 169 dp

Opacity: 100 %

☐ Enable auto mirroring for RTL layout

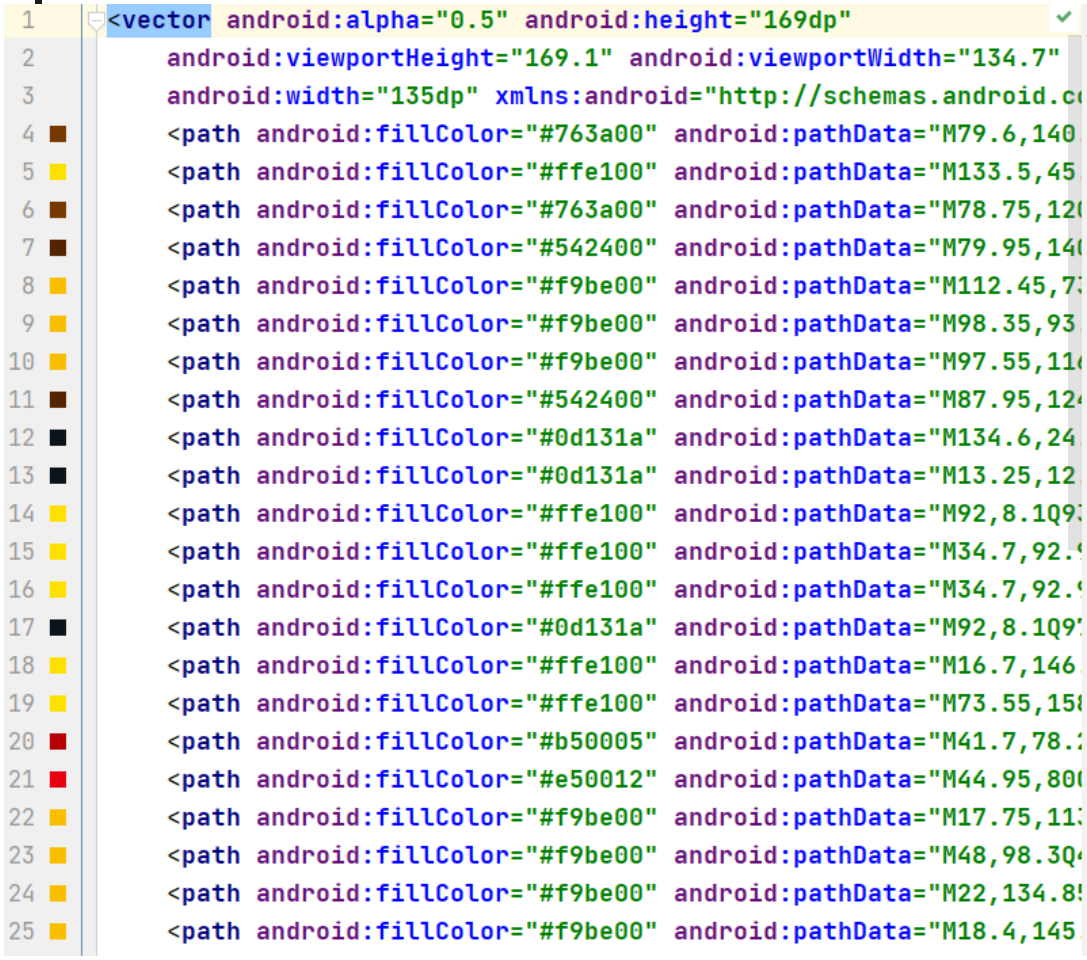
main
drawable
ic_pikachu.xml

.svg – scalable vector graphics

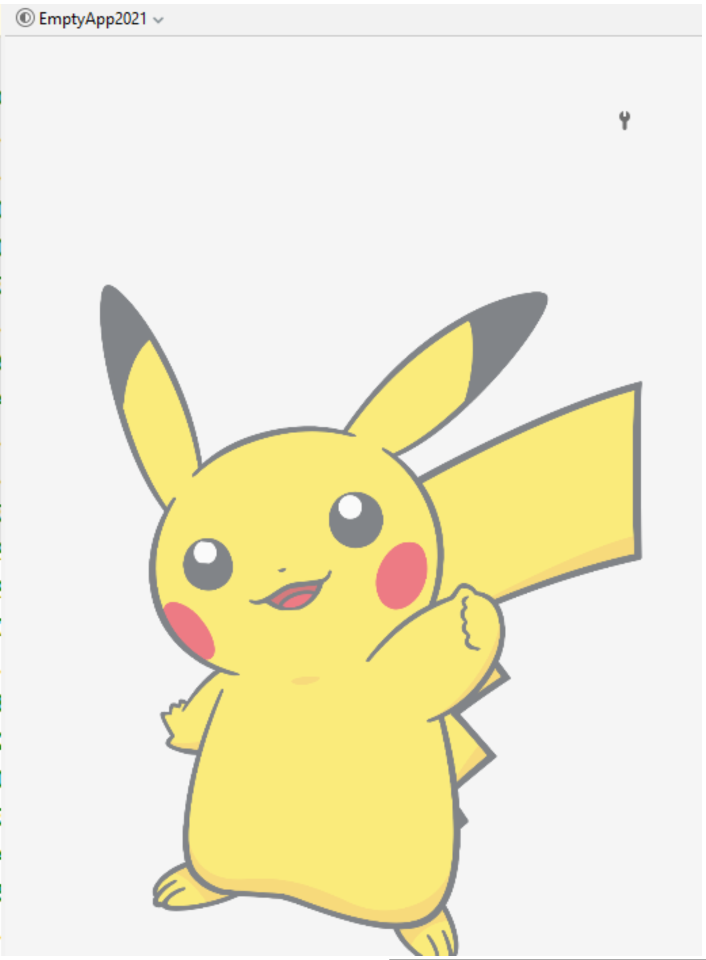
.psd – photoshop document

EmptyApp2021.zip

Vektorový pikachu



```
<vector android:alpha="0.5" android:height="169dp"
    android:viewportHeight="169.1" android:viewportWidth="134.7"
    android:width="135dp" xmlns:android="http://schemas.android.c
    <path android:fillColor="#763a00" android:pathData="M79.6,140
    <path android:fillColor="#ffe100" android:pathData="M133.5,45
    <path android:fillColor="#763a00" android:pathData="M78.75,12
    <path android:fillColor="#542400" android:pathData="M79.95,14
    <path android:fillColor="#f9be00" android:pathData="M112.45,7
    <path android:fillColor="#f9be00" android:pathData="M98.35,93
    <path android:fillColor="#f9be00" android:pathData="M97.55,11
    <path android:fillColor="#542400" android:pathData="M87.95,12
    <path android:fillColor="#0d131a" android:pathData="M134.6,24
    <path android:fillColor="#0d131a" android:pathData="M13.25,12
    <path android:fillColor="#ffe100" android:pathData="M92,8.1Q9
    <path android:fillColor="#ffe100" android:pathData="M34.7,92.
    <path android:fillColor="#ffe100" android:pathData="M34.7,92.
    <path android:fillColor="#0d131a" android:pathData="M92,8.1Q9
    <path android:fillColor="#ffe100" android:pathData="M16.7,146
    <path android:fillColor="#ffe100" android:pathData="M73.55,15
    <path android:fillColor="#b50005" android:pathData="M41.7,78.
    <path android:fillColor="#e50012" android:pathData="M44.95,80
    <path android:fillColor="#f9be00" android:pathData="M17.75,11
    <path android:fillColor="#f9be00" android:pathData="M48,98.3Q
    <path android:fillColor="#f9be00" android:pathData="M22,134.8
    <path android:fillColor="#f9be00" android:pathData="M18.4,145
```

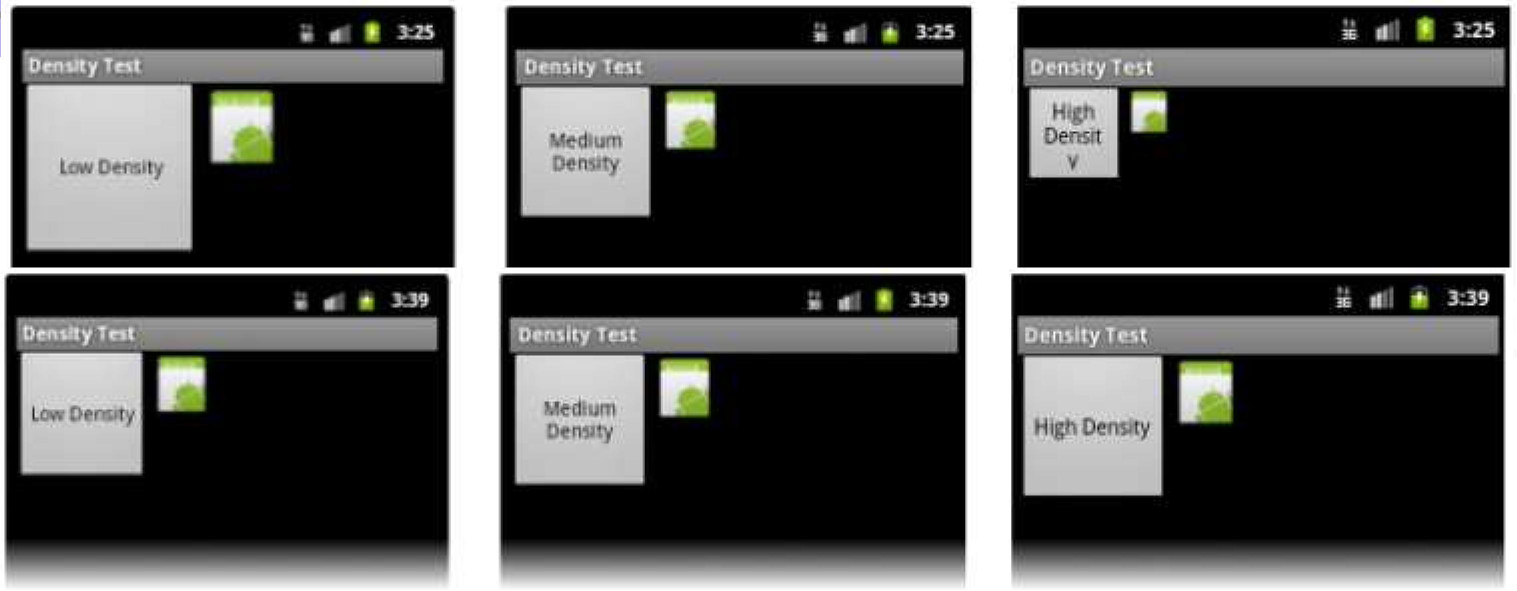


EmptyApp2021.zip

Resources/Drawables/Mipmap

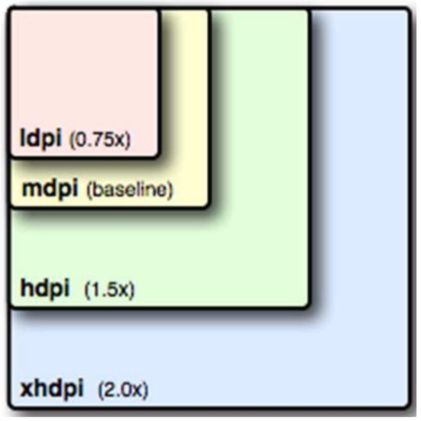
(ikona - viacero rozlíšení)

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) $\sqrt{2}$

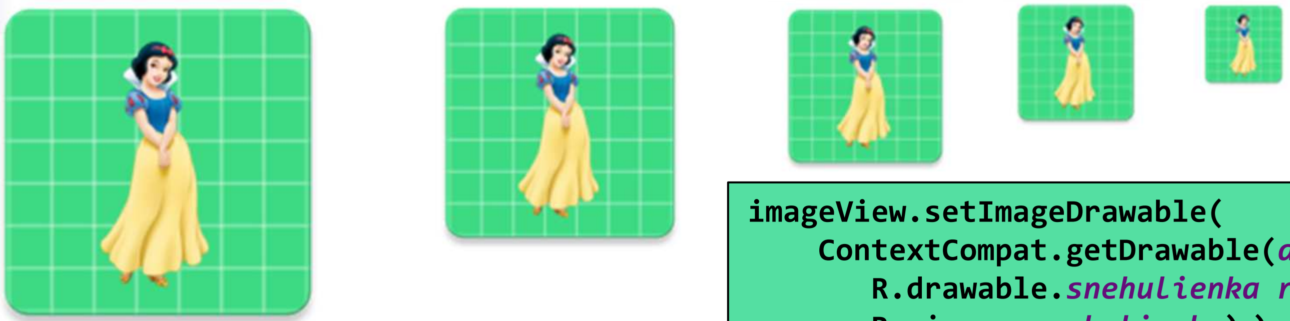
- 36x36 for low-density (LDPI = ~ 120 dpi)
- 48x48 for medium-density (MDPI = ~ 160 dpi)
- 72x72 for high-density (HDPI = ~ 240 dpi)
- 96x96 for extra high-density (XHDPI = ~ 320 dpi)
- 144x144 for extra² high-density (XXHDPI = ~ 480 dpi)
- 192x192 for extra³ high-density (XXXHDPI = ~ 640 dpi)



Snehulienka

(v geometrickom rade s quocientom sqrt(2))

$\sqrt{2}$



```
imageView.setImageDrawable(
    ContextCompat.getDrawable(applicationContext,
       R.drawable.snehulienka resp.
       R.mipmap.snehulienka) )
```

192x192 for extra^3 high-density (XXXHDPI = ~ 640 dpi)

144x144 for extra^2 high-density (XXHDPI = ~ 480 dpi)

96x96 for extra high-density (XHDPI = ~ 320 dpi)

72x72 for high-density (HDPI = ~ 240 dpi)

48x48 for medium-density (MDPI = ~ 160 dpi)

Resources/Values

- string – reťazce separované z kódu, lokalizácia

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

```
resources.getString(R.string.app_name)
```

- color - accessibility

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

```
resources.getColor(R.color.transparent_green)
```

- dimentions

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

```
resources.getDimension(R.dimen.absolutLarge)
```

- style – množina nastavení

```
<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

zložitejšie hodnoty

- 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>
```

```
resources.getStringArray(R.array.otazky) :Array<String>
```

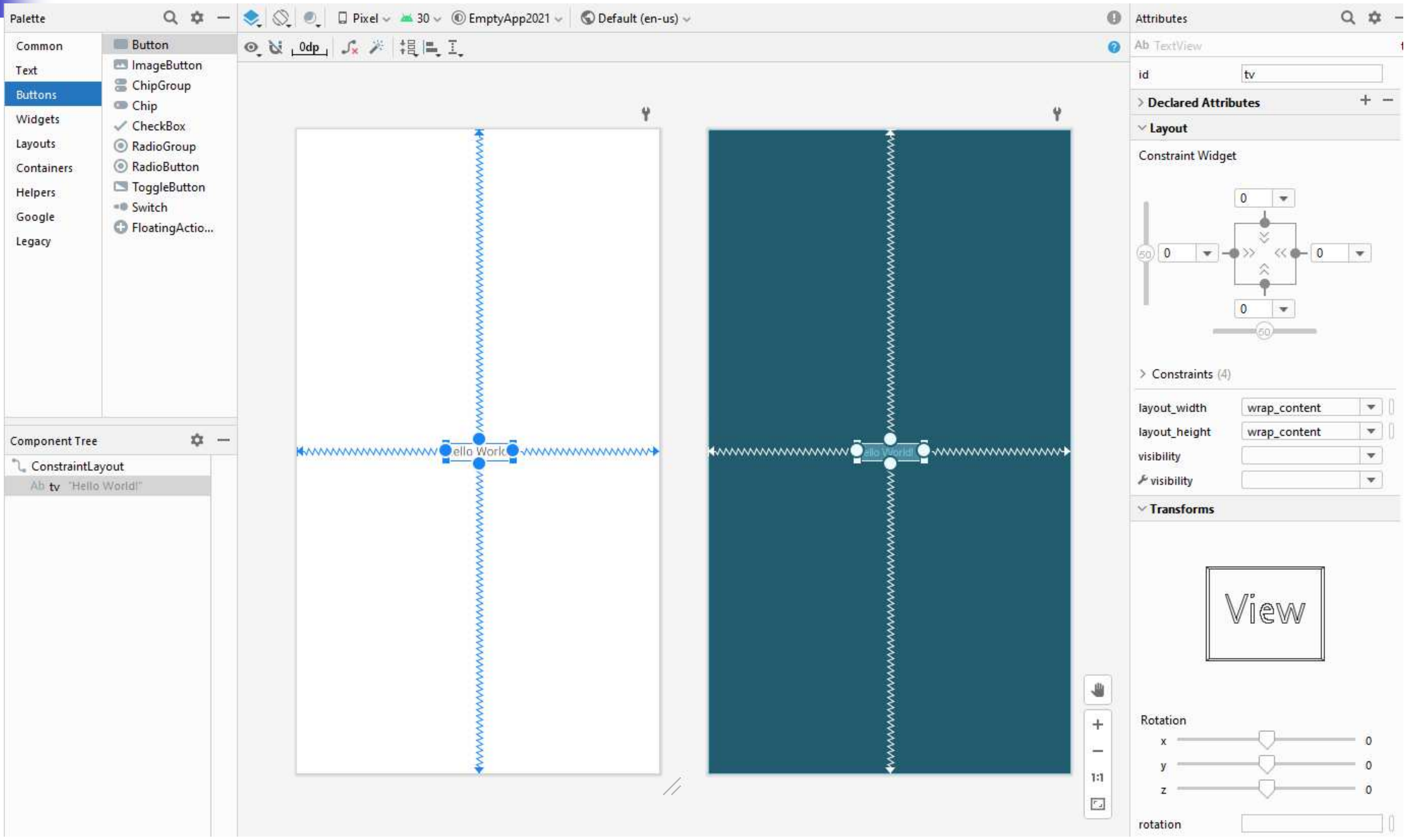
- plurals (quantity strings)

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

Resources/Layout

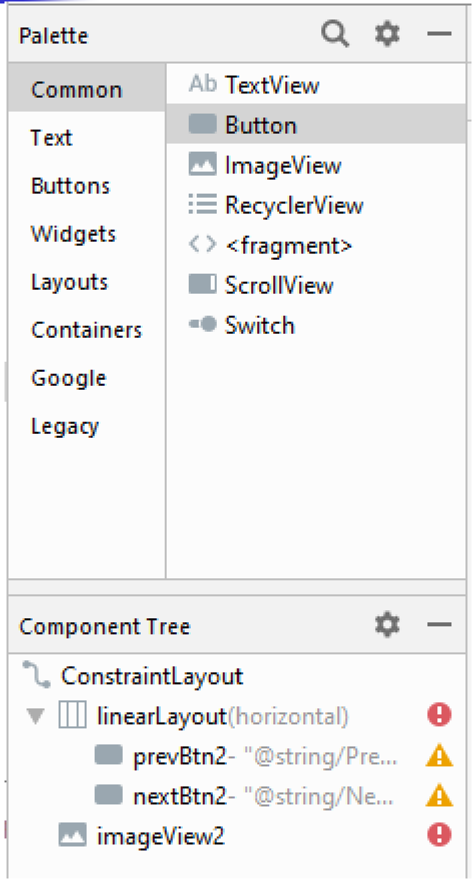
(Design View)

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



id: tv
layout_width: wrap_content
layout_height: wrap_content
visibility:
visibility:
Rotation x: 0, y: 0, z: 0
rotation:

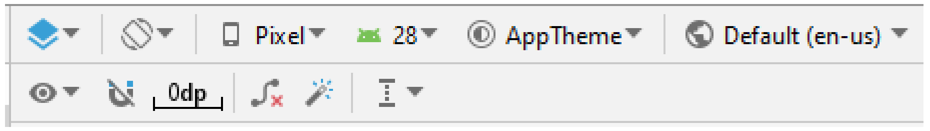
Layout Manager


Palette

Common	Ab TextView
Text	Button
Buttons	ImageView
Widgets	RecyclerView
Layouts	<fragment>
Containers	ScrollView
Google	Switch
Legacy	

Component Tree

- ConstraintLayout
  - linearLayout(horizontal)
    - prevBtn2- "@string/Pre...
    - nextBtn2- "@string/Ne...
  - imageView2



Design/Blueprint/Design+Blueprint

Layout: Landscape/Portrait/…

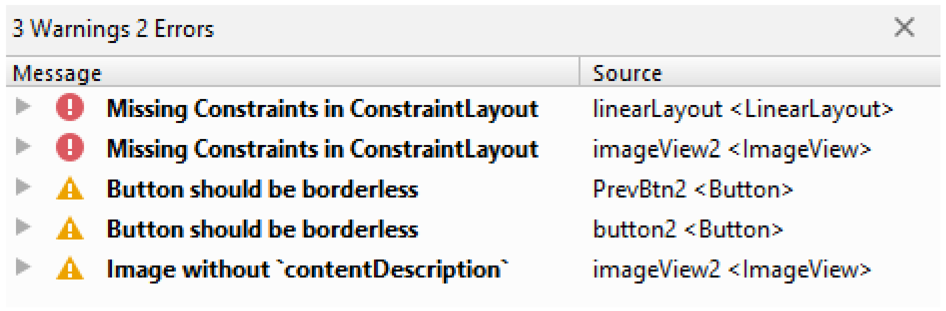
Pixel ▾ Pixel: AVD/Pixel2/Pixel#

28 ▾ API Level: 26/27/28/…

AppTheme ▾ :

Default (en-us) ▾ : lokalizácie do rôznych jazykov

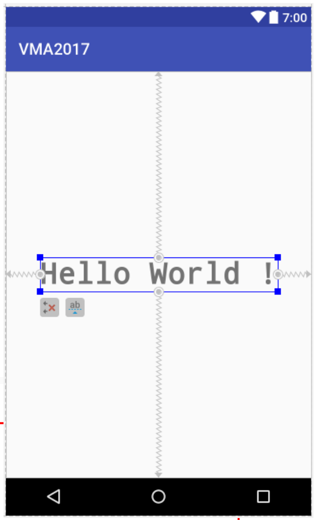
: warnings, errors


3 Warnings 2 Errors

Message	Source
Missing Constraints in ConstraintLayout	linearLayout <LinearLayout>
Missing Constraints in ConstraintLayout	imageView2 <ImageView>
Button should be borderless	PrevBtn2 <Button>
Button should be borderless	button2 <Button>
Image without `contentDescription`	imageView2 <ImageView>

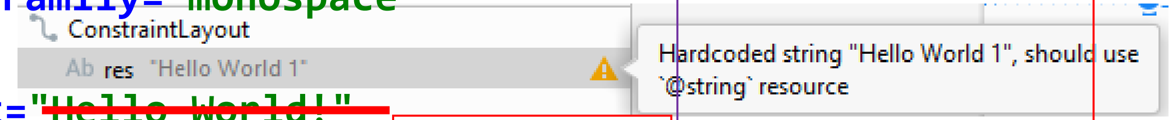
Resources/Layout

(Text View)



```
<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>
```

wrap_content
fill_parent=
match_parent

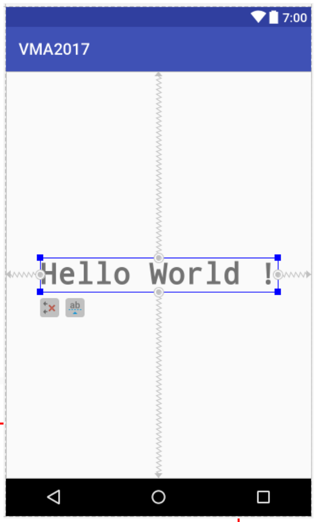


Hardcoded string "Hello World 1", should use `@string` resource

Bad style

Resources/Layout

(Text View)



```
<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>
```

wrap_content
fill_parent=
match_parent

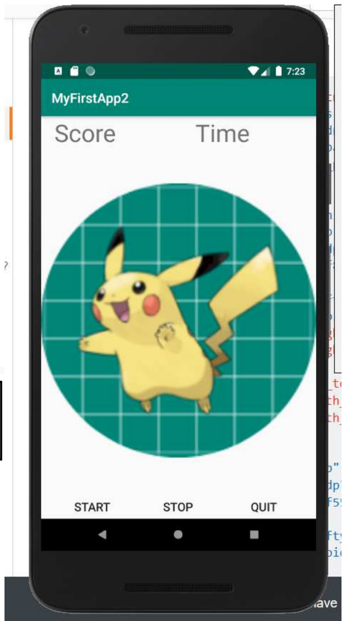
```
<resources>
    <string name="app_name">VMA2017</st
    <string name="IntroString">Hello Wo
</resources>
```

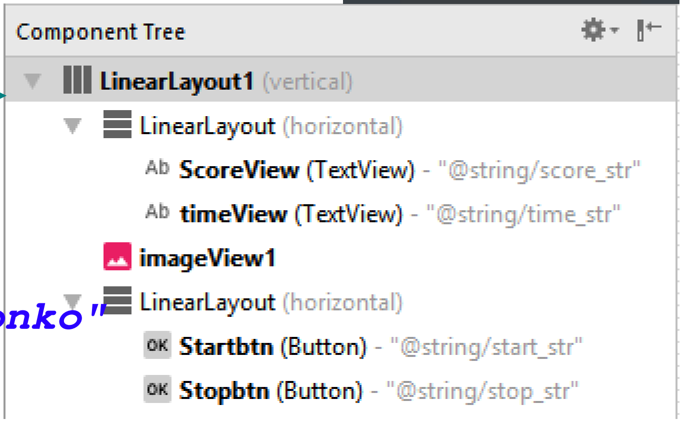
```
<resources>
    <dimen name="reallyBigFont">3
</reso
```

Ako by to malo vyzerať

Žiadne warnings

```
<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>
```





```
Component Tree
▼ LinearLayout1 (vertical)
   ▼ LinearLayout (horizontal)
        Ab ScoreView (TextView) - "@string/score_str"
        Ab timeView (TextView) - "@string/time_str"
      imageView1
   ▼ LinearLayout (horizontal)
        OK Startbtn (Button) - "@string/start_str"
        OK Stopbtn (Button) - "@string/stop_str"
```

zjednodušené pre účely slajdu

MyFirstApp22.zip

Väzba komponentov v kóde

- `val btn = findViewById<Button>(R.id.button)`
- `val iv = findViewById<ImageView>(R.id.imageView1)`

- plugin kotlin-android-extensions

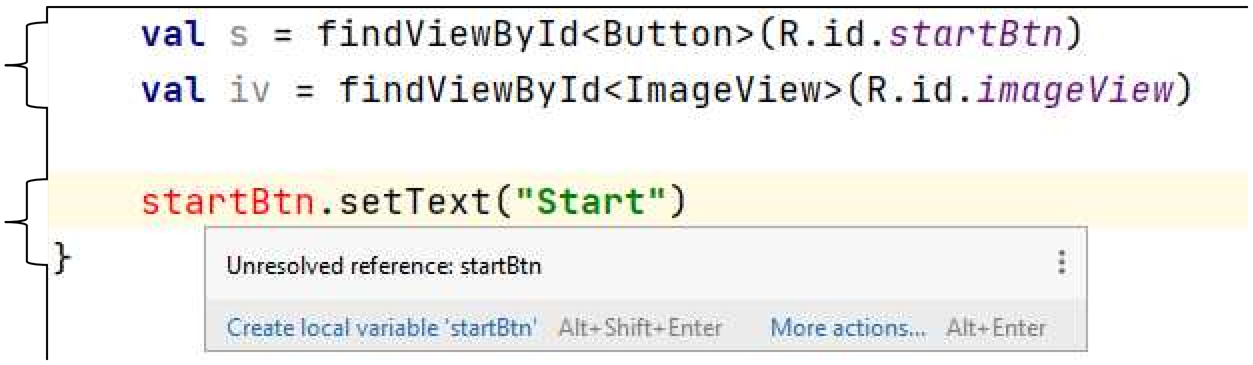
```
plugins {
     id 'com.android.application'
     id 'kotlin-android'
     id 'kotlin-android-extensions'
}
```

- import syntetic pomocou Alt-Enter
- `import kotlinx.android.synthetic.main.activity_main.*`

Old school, java style

Deprecated 2017-2020

@Parcelize od 2020



```
    val s = findViewById<Button>(R.id.startBtn)
    val iv = findViewById<ImageView>(R.id.imageView)

    startBtn.setText("Start")
}
```

Unresolved reference: startBtn

Create local variable 'startBtn' Alt+Shift+Enter   More actions... Alt+Enter

Logovanie

Tri najbežnejšie spôsoby ako (logovať, debugovať):

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

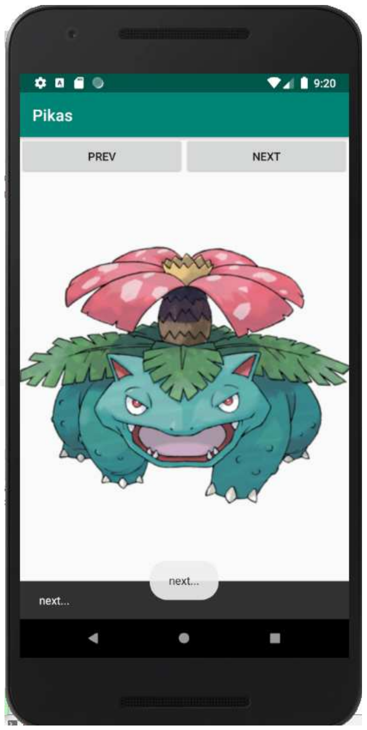
```
dependencies {
    implementation 'com.android.support:design:28.0.0'
import com.google.android.material.snackbar.Snackbar
```

```
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])
})
```

Pikas2.zip

Pikas

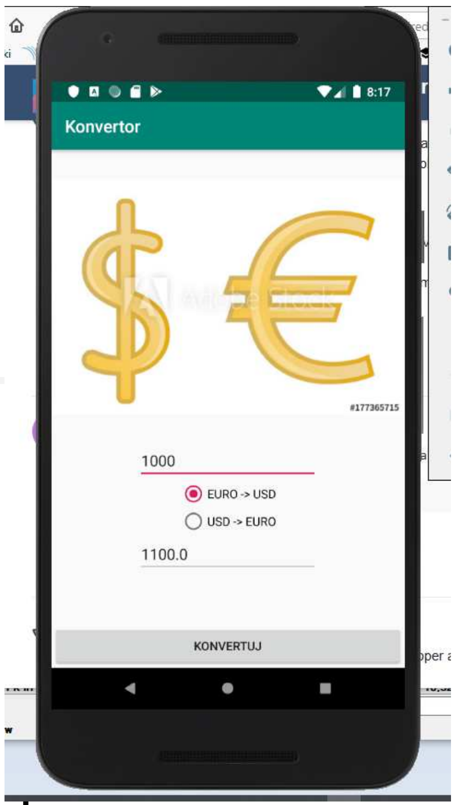
```
override fun onCreate(savedInstanceState: Bundle?) {
   super.onCreate(savedInstanceState)
   setContentView(R.layout.activity_main)
   var i = 0
   var imgs = arrayOf(
     ContextCompat.getDrawable(applicationContext,
                                    R.drawable.butterfree),
                                   ..., ..., ...     )
     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])
    })
}
```



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

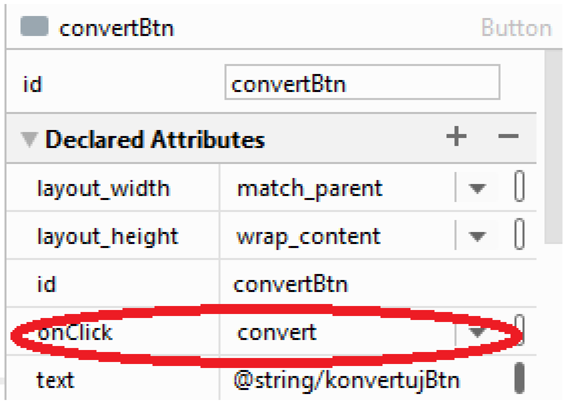
```
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    convertBtn.setOnClickListener({
        Toast.makeText(this, "convert",Toast.LENGTH_SHORT).show();
        if (inputText.text.isNotEmpty()) {
            val input = inputText.text.toString().toFloat();
            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.zip

Konvertor EURO USD

(setOnClickListener)



convertBtn	Button
id	convertBtn
Declared Attributes	
layout_width	match_parent
layout_height	wrap_content
id	convertBtn
onClick	convert
text	@string/konvertujBtn

```
// 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)
```

extension metóda Float

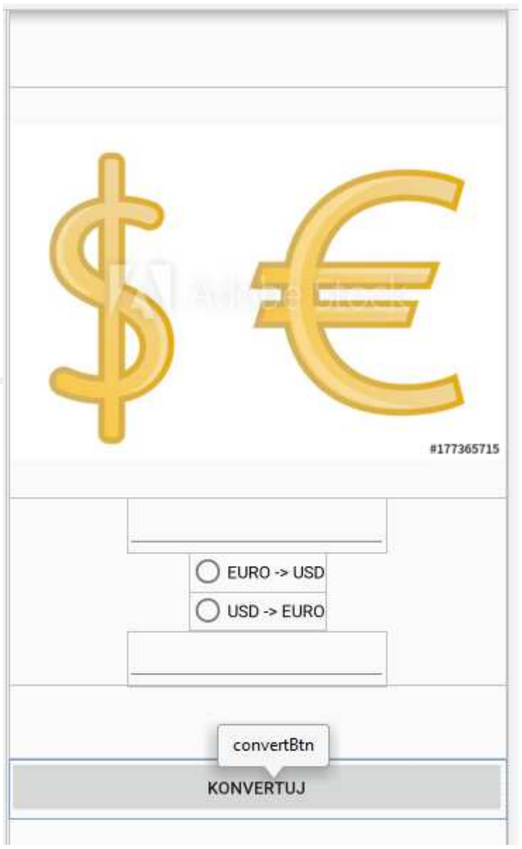
Konvertor.zip

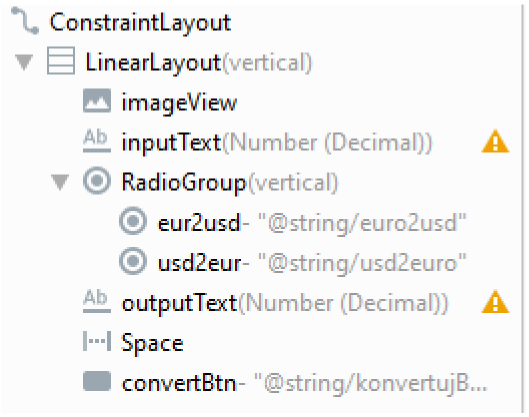
a

Konvertor EURO USD

(layout)

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





```
ConstraintLayout
▼ LinearLayout(vertical)
    imageView
    inputText(Number (Decimal))
  ▼ RadioGroup(vertical)
      eur2usd- "@string/euro2usd"
      usd2eur- "@string/usd2euro"
    outputText(Number (Decimal))
    Space
    convertBtn- "@string/konvertujB...
```

Konvertor.zip

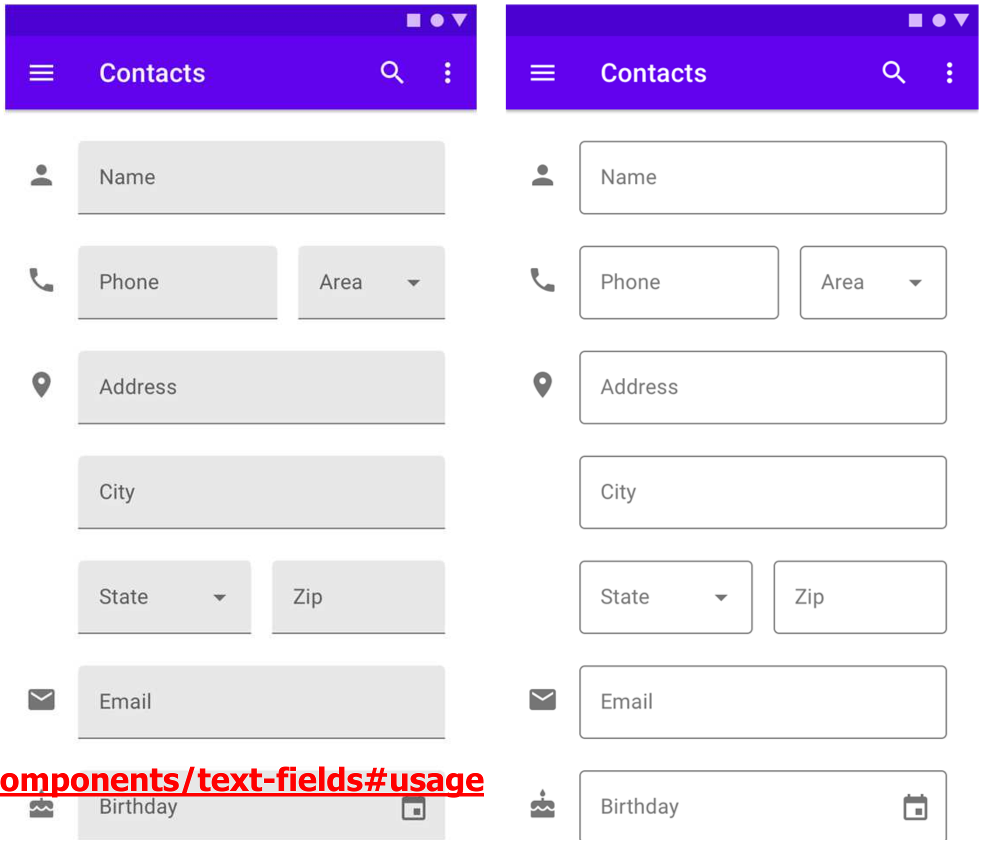
Text Fields

prvý dotyk s Material Design

Material Design je Google knižnica GUI komponentov unifikovaná pre Android, iOS, Flutter, web, ...

```
dependencies {
implementation 'com.google.android.material:material:1.4.0`
```

- zahŕňa Button, Text fields, SnackBars, Sliders, a mnoho ďalších vizuálnych komponentov Views

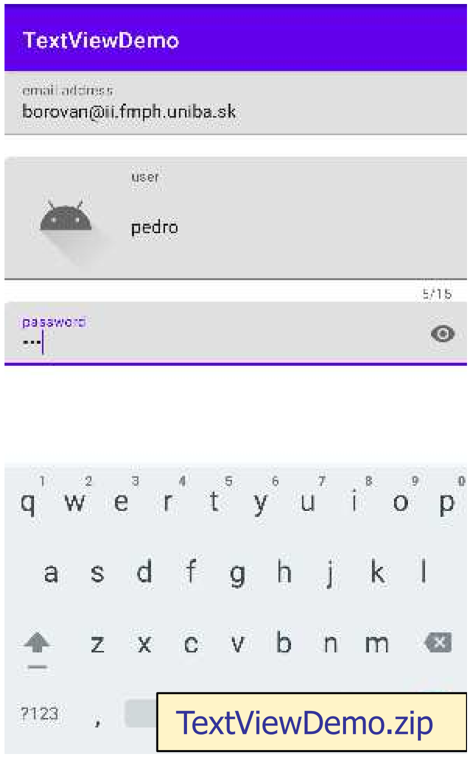


https://material.io/components/text-fields#usage

TextViewDemo.zip

TextInput[Layout/EditText]

```
<com.google.android.material.textfield.TextInputLayout
    android:layout_width="match_parent"
    android:layout_height="wrap_content"
    app:startIconDrawable="@drawable/ic_launcher_foreground"
    app:startIconContentDescription="@string/iconDescription"
    app:startIconCheckable="true"
    app:endIconMode="clear_text"
    app:counterEnabled="true"
    app:counterMaxLength="15"
    app:errorEnabled="true">
  <com.google.android.material.textfield.TextInputEditText
      android:id="@+id/userTV"
      android:layout_width="match_parent"
      android:layout_height="wrap_content"
      android:hint="@string/userHint"
      android:maxLength="15"
      android:inputType="textPersonName" />
</com.google.android.material.textfield.TextInputLayout>
```



https://material.io/components/text-fields#usage

TextViewDemo.zip

TextWatcher

```
val textWatcher = object : TextWatcher {      // singleton
    override fun beforeTextChanged(s: CharSequence, ...) { }
    override fun afterTextChanged(s: Editable?) { }
    override fun onTextChanged(s: CharSequence?, ...) {
        button.isEnabled =
                  emailTV.text?.isNotEmpty()?:false &&
                  userTV.text?.isNotEmpty()?:false &&
                  passwordTV.text?.isNotEmpty()?:false
        button.isEnabled =
            if (emailTV.text != null && userTV.text != null &&
                passwordTV.text != null)
              emailTV.text!!.isNotEmpty() &&
              userTV.text!!.isNotEmpty() &&
              passwordTV.text!!.isNotEmpty()
            else
                false
}    }
emailTV.addTextChangedListener(textWatcher)
userTV.addTextChangedListener(textWatcher)
passwordTV.addTextChangedListener(textWatcher)
```

TextViewDemo.zip

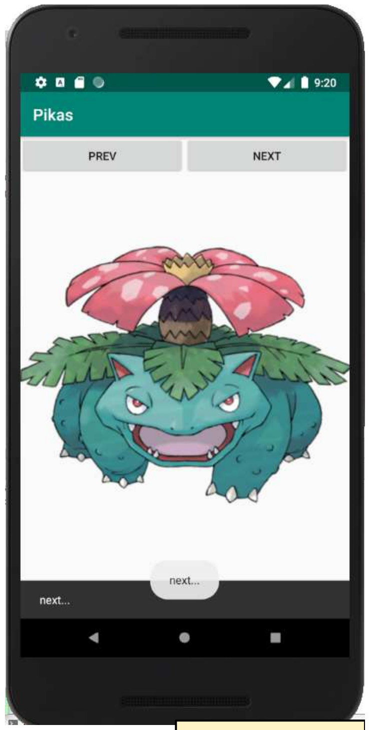
Príklad jednoduchej aplikácie
(ktorú sme si vyklikali minule)

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"`

Nestihli sme:

- aktivitu a jej životný cyklus



Pikas2.zip

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

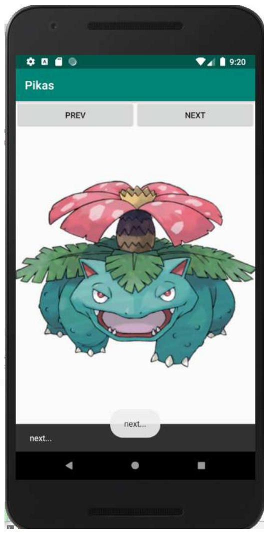
Pikas
(rekapitulácia)

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])
     })
}
```

logovanie

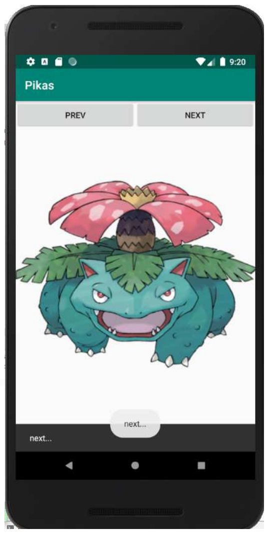
View(s)



Pikas2.zip

Pikas

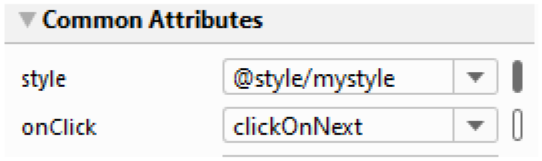
(stav sa mieša s views a logikou – riešenie príde)



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])
}
```



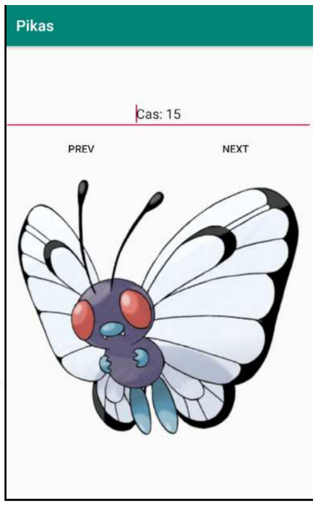
Common Attributes

style	@style/mystyle
onClick	clickOnNext

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()
```

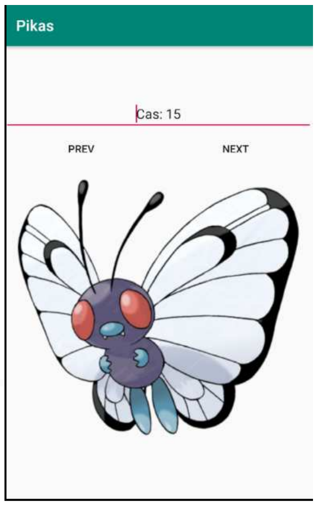
- nezabudnite na .run()
- runOnUiThread
  - má argument java.lang.Runnable, ktorý vykoná v hlavnom GUI vlákne

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

Pikas2.zip

Pikas

(asynchrónnosť – count down)



pomocou **android.os.CountDownTimer**

tik

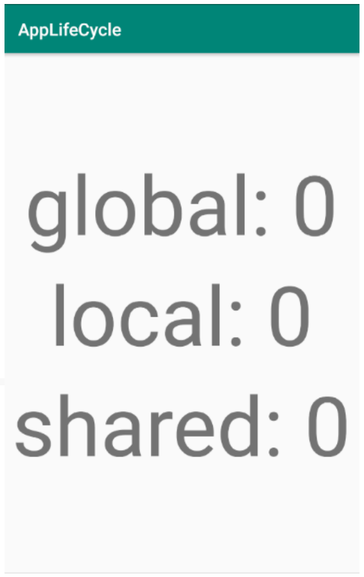
game over

ukončenie appky

```
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()
```

Pikas2.zip

Životný cyklus apky
(prvý – zjednodušený nástrel)



AppLifeCycle

global: 0
local: 0
shared: 0

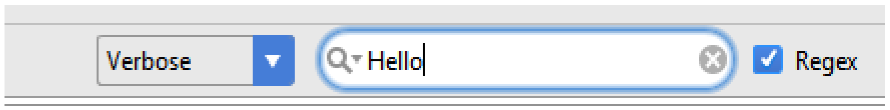
- Alt-Insert = Generate Override Implemented Methods:
  - `override fun onDestroy()`
  - `override fun onPause()`
  - `override fun onRestart()`
  - `override fun onRestoreInstanceState(Bundle savedInstanceState)`
  - `override fun onResume()`
  - `override fun onSaveInstanceState(Bundle outState)`
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

```
override fun onCreate(Bundle savedInstanceState?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    Log.d("CYKLUS","onCreate") // LOGUJTE, LOGUJTE, LOGUJTE
}
```

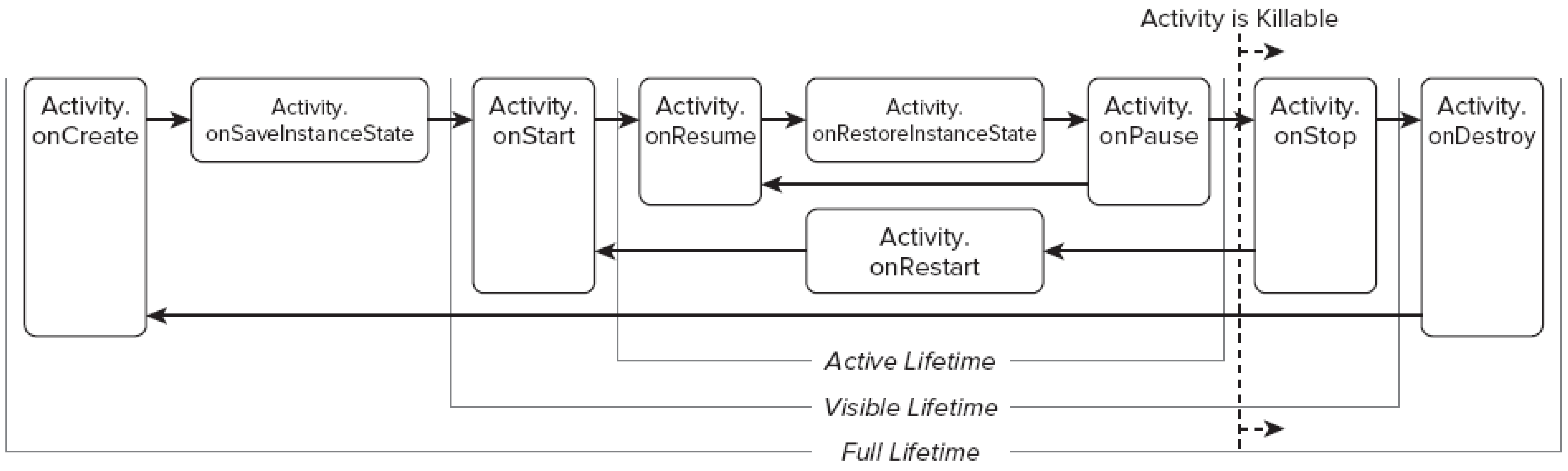
$\underbrace{\text{"CYKLUS"}}_{}$ tag vhodný na filtrovanie

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
```

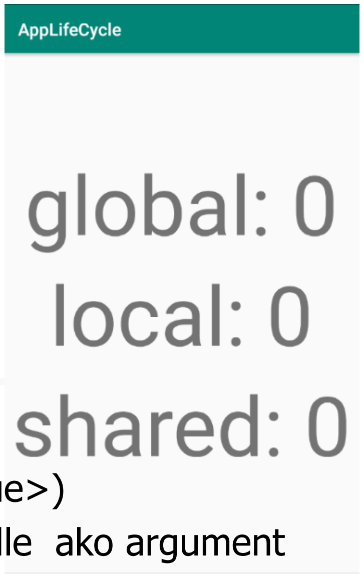


zdroj: Reto Meier: PA2AD

AppLifeCycle.zip

Persistencia

(prvý dotyk)



AppLifeCycle

global: 0

local: 0

shared: 0

- **`globalCounter`** je premenná, ktorá sa
  - pri **`onSaveInstanceState`** uloží do Bundle (HashMap<String, Value>)
  - pri **`onCreate(savedInstanceState: Bundle?)`** príde táto Bundle ako argument
- **`localCounter`** je bežná lokálna triedna premená v MainActivity
- **`sharedCounter`** je premenná, ktorá sa ukladá
  - pri **`onPause`** sa uloží do **`SharedPreferences`** (HashMap<String, Value>)
  - pri **`onResume`** sa prečíta zo **`SharedPreferences`**
- všetky tri premenné sa inkrementujú pri onPause

Zistíte, že:

- aktivita, ak zmení orientáciu, tak sa reštartne, vytvorí sa nová inštancia a zavolá sa **`onCreate`**. Preto premenná **`localCounter`** sa vynuluje.
- ak si chcete niečo uchovať aj po zmene orientácie aktivity, treba to uložiť do bundle, zapíšete to tam v **`onSaveInstanceState`** a prečítate v **`onCreate`**
- ak si chcete niečo uchovať aj po reštarte aplikácie, treba to uložiť do **`SharedPreferences`**

AppLifeCycle.zip

Bundle?

Bundle má metódy [put/get][Int/Boolean/Char/Float/Any/...]

```
override fun onRestoreInstanceState(
         savedInstanceState: Bundle?) {
  super.onRestoreInstanceState(savedInstanceState)
  globalCounter = savedInstanceState?.getInt("COUNTER")?:0
  ...
}

override fun onSaveInstanceState(outState: Bundle?,
                outPersistentState: PersistableBundle?) {
  super.onSaveInstanceState(outState, outPersistentState)
  outState?.putInt("COUNTER", globalCounter)
  ...
}
```

AppLifeCycle.zip

SharedPreferences

`SharedPreferences` má metódy get[Int/Boolean/Char/Float/Any/...]

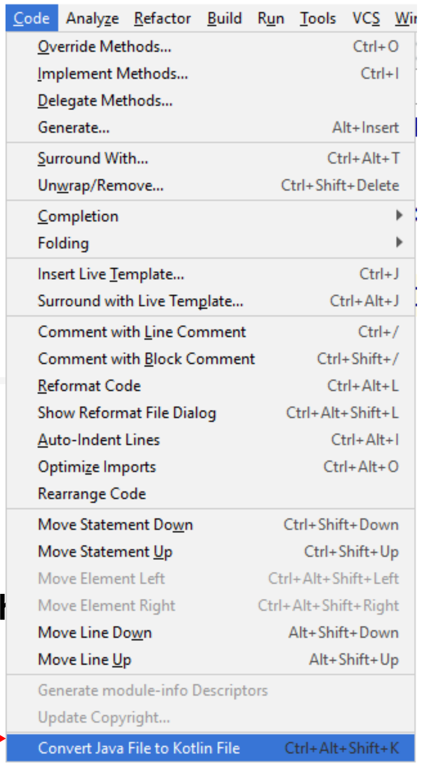
```
private lateinit var preferences: SharedPreferences
override fun onCreate(savedInstanceState: Bundle?) {
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    preferences = getSharedPreferences("lifecycle",
                                       Context.MODE_PRIVATE)
}
override fun onResume() {
    sharedCounter = preferences.getInt("kluc",0)
}
override fun onPause() {
    preferences.edit {
         this.putInt("kluc", sharedCounter)
         this.commit()
     }
}
```

AppLifeCycle.zip

Pikas.java

(auto-generovaný Code/Convert Java->Kotlin)

```
i = 0
iv.setImageDrawable(images[i])

quit.setOnClickListener { v ->
    Toast.makeText(this, "BYE BYE", Toast.LENGTH_LONG).sh
    this.finishAffinity()
}

prev.setOnClickListener {
    Log.d("PIKA", "onPREV")
    Toast.makeText(this@MainActivity, "PREV", Toast.LENGTH_SHORT).show()
    i--
    if (i < 0) i = images.size - 1
    iv.setImageDrawable(images[i])
}
next.setOnClickListener { v ->
    i++
    Log.d("PIKA", "onNEXT")
    Toast.makeText(this@MainActivity, "NEXT", Toast.LENGTH_SHORT).show()
    i = i % images.size
    iv.setImageDrawable(images[i])
}
```



Code Analyze Refactor Build Run Tools VCS Wi
Override Methods... Ctrl+O
Implement Methods... Ctrl+I
Delegate Methods...
Generate... Alt+Insert
Surround With... Ctrl+Alt+T
Unwrap/Remove... Ctrl+Shift+Delete
Completion
Folding
Insert Live Template... Ctrl+J
Surround with Live Template... Ctrl+Alt+J
Comment with Line Comment Ctrl+/
Comment with Block Comment Ctrl+Shift+/
Reformat Code Ctrl+Alt+L
Show Reformat File Dialog Ctrl+Alt+Shift+L
Auto-Indent Lines Ctrl+Alt+I
Optimize Imports Ctrl+Alt+O
Rearrange Code
Move Statement Down Ctrl+Shift+Down
Move Statement Up Ctrl+Shift+Up
Move Element Left Ctrl+Alt+Shift+Left
Move Element Right Ctrl+Alt+Shift+Right
Move Line Down Alt+Shift+Down
Move Line Up Alt+Shift+Up
Generate module-info Descriptors
Update Copyright...
Convert Java File to Kotlin File Ctrl+Alt+Shift+K

v java projekte nájdete

Pikas.zip

Konverzie Java <-> Kotlin

- **Java -> Kotlin**

Code/Convert Java File to Kotlin File (neuzná sa to ako DÚ v Kotline)

- **Kotlin -> JVM Byte code**

Tools/Kotlin/Show Byte Code

- **Decompile Byte code (to Java)**

```java
protected void onCreate(@Nullable Bundle savedInstanceState) {
   super.onCreate(savedInstanceState);
   this.setContentView(2131296283);
   final ObjectRef images = new ObjectRef();
   final IntRef i = new IntRef();
   View var10000 = this.findViewById(2131165189);
   if (var10000 == null) {
     throw new TypeCastException("null cannot be cast to non-null type android.widget.Button");
   } else {
```

Čo je Kotlin ?

https://proandroiddev.com/modern-android-development-with-kotlin-september-2017-part-1-f976483f7bd6