Android Studio
(ako začať)

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KAI, I-18

borovan 'at' ii.fmph.uniba.sk
http://dai.fmph.uniba.sk/courses/VMA/android/01Intro/

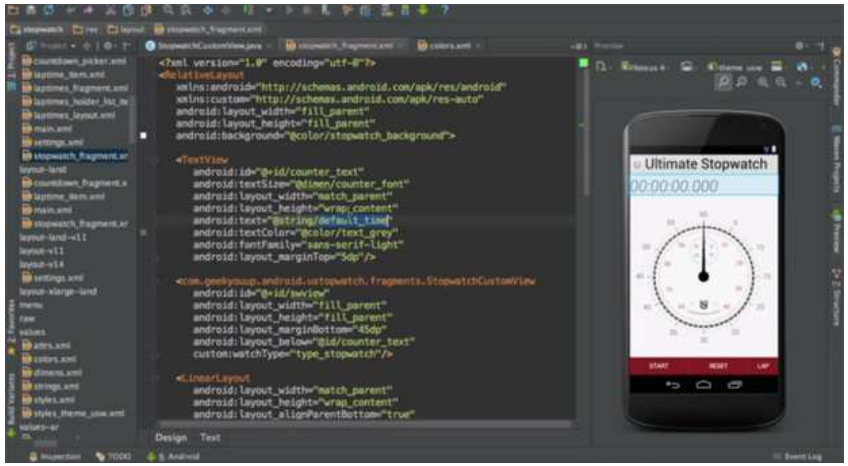
Vývojové platformy

- A.I.D.E. – Android IDE on Android
  Java+Android SDK/ C/C++ Android NDK
  https://play.google.com/store/apps/details?id=com.aide.ui&hl=sk

- Android Studio (IntelliJ iDEA)
  http://developer.android.com/sdk/installing/studio.html
  http://developer.android.com/tools/studio/index.html

- IntelliJ iDEA pluging for Android (**Professional Android IDE)**
  http://www.jetbrains.com/idea/

- ADT plugin pre Eclipse
  Android Development Tool
  Eclipse ADT plugin is no longer supported, as per this announcement in June 2015



Zdroje a Android Studio

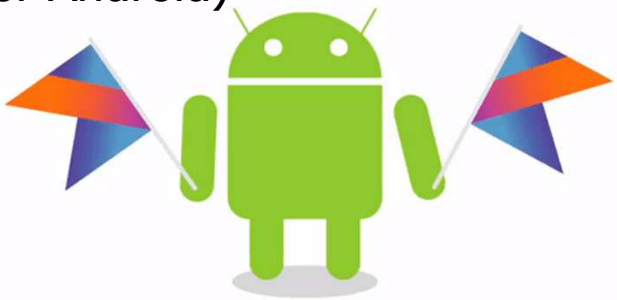
Android Studio eco-systém:

- Developer Android Forum (http://developer.android.com/)
- Stackoverflow (http://stackoverflow.com/)
- kotlin.org (https://kotlinlang.org/)
- iná literatúra (http://dai.fmph.uniba.sk/courses/VMA/android/pdfs/)
- (!) väčšinu odporúčaných kníh nájdete v našej knižnici, pav. I

univerzitná knižnica v bratislave

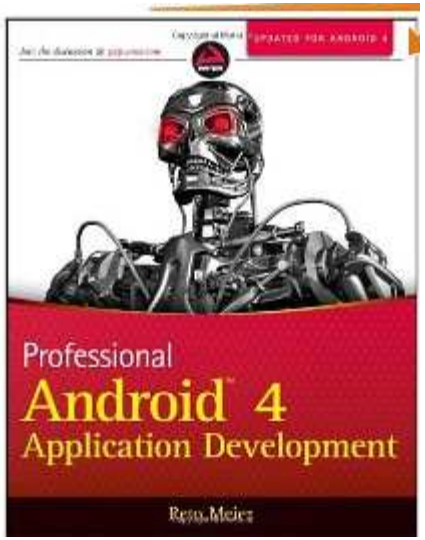
Používame Android Studio 3.5 (Official IDE for Android)
https://developer.android.com/studio/index.html

Už obsahuje aj Kotlin (1.3) support

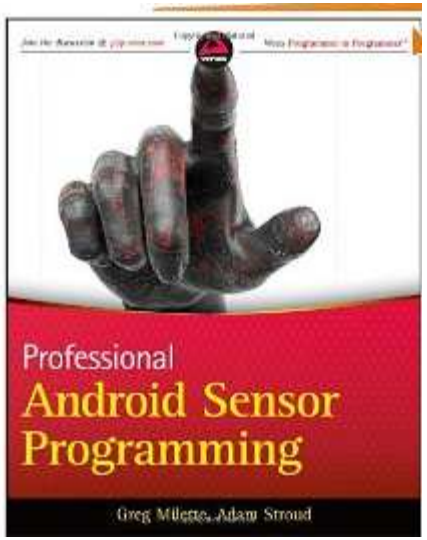


Professional Android 4

- 2012, Reto Meier, Amazon: 4/5



Android Sensor Programming



2012, Greg Milette, Adam Stroud, Amazon: 5/5

PART I LOCATION SERVICES

CHAPTER 1 Introducing the Android Location Service
CHAPTER 2 Determining a Device's Current Location
CHAPTER 3 Tracking Device Movement
CHAPTER 4 Proximity Alerts

PART II INFERRING INFORMATION FROM PHYSICAL SENSORS

CHAPTER 5 Overview of Physical Sensors
CHAPTER 6 Errors and Sensor Signal Processing
CHAPTER 7 Determining Device Orientation
CHAPTER 8 Detecting Movement
CHAPTER 9 Sensing the Environment
CHAPTER 10 Android Open Accessor

PART III SENSING THE AUGMENTED, PATTERN-RICH EXTERNAL WORLD

CHAPTER 11 Near Field Communication (NFC)
CHAPTER 12 Using the Camera
CHAPTER 13 Image-Processing Techniques
CHAPTER 14 Using the Microphone

PART IV SPEAKING TO ANDROID

CHAPTER 15 Designing a Speech-Enabled App
CHAPTER 16 Using Speech Recognition and Text-To-Speech APIs
CHAPTER 17 Matching What Was Said
CHAPTER 18 Executing Voice Actions
CHAPTER 19 Implementing Speech Activation

Prefessional Android Application Development

- 2014, Reto Meier, Amazon: 4/5

1. Hello, Android
2. Getting Started
3. Creating Applications and Activities
4. Creating User Interfaces
5. Intents, Broadcast Receivers, Adapters, and the Internet
6. Data Storage, Retrieval, and Sharing
7. Maps, Geocoding, and Location-Based Services
8. Working in the Background
9. Peer-to-Peer Communication
10. Accessing Android Hardware
11. Advanced Android Development

V knižnici FMFI

Bohužial len na prezenčnú výpožicku (t.j. len tam):

•Meier: Professional Android 4 Application

•Milette: Professional Android Sensor Programming

•Wii-Meng Lee: Beginning Android 4 Application Development

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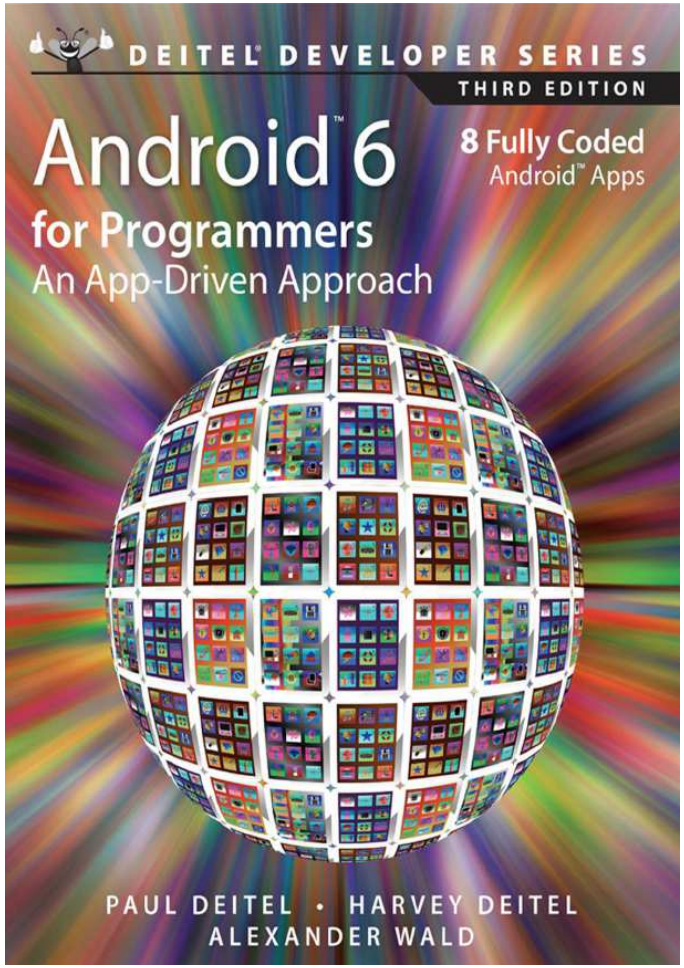
ANDROID™ 6 FOR PROGRAMMERS AN APP-DRIVEN APPROACH

- Paul Deitel • Harvey Deitel • Alexander Wald, 2016, 3rd Edition, Amazon 4.4/5

8 konkrétnych appiek detailne vysvetlených

1. Welcome App
2. Cannon Game
3. Tip Calculator
4. Weather Viewer
5. Flag Quiz
6. Twitter® Searches
7. Doodlz
8. Address Book



Java vs. Kotlin

tradičný kurz postavený na Java som zmenil na jazyk Kotlin

Dôvody:

- ako iOS má svôj moderný jazyk Swift, aj Android má svoj Kotlin
- Java je trochu *skamenelina* medzi modernými jazykmi (Swift, Kotlin, Scala)
- Kotlin je Googlom oficiálne podporovaným vývojový nástroj pre Android
- projekt Kotlin má >5 rokov, kompiluje do JVM, funguje s Android Studio
- oboznámite sa s niektorými princípmi moderných jazykov – *challenge*

- Reference: https://kotlinlang.org/docs/reference/
- Online: https://play.kotlinlang.org/byExample/

Android Studio 3.* Development Essentials – Kotlin Edition

- https://www.amazon.com/Android-Studio-3-4-Development-Essentials/dp/096001098X
- sources: https://www.ebookfrenzy.com/retail/as34kotlin/page.php

Inštalácia Android Studio (3.5):
https://developer.android.com/studio

Predmet nemá cvičenie, ale:

- ozvite sa v prípade problémov inštalácie na platformy napr. Linux.
- Jožo, Lukáš, ja sa vám posnažíme problém vyriešiť

Inštalácia Android Studia:

- SDK Packages: Tools/SDK Manager tab SDK Platforms
- AVD: Android Virtual Device

Android SDK Packages

Tools/SDK Manager tab SDK Platforms

Settings for New Projects

Appearance & Behavior › System Settings › Android SDK

Manager for the Android SDK and Tools used by Android Studio

Android SDK Location: C:\Users\borovan\AppData\Local\Android\Sdk Edit

SDK Platforms SDK Tools SDK Update Sites

Each Android SDK Platform package includes the Android platform and sources pertaining to an API level by default. Once installed, Android Studio will automatically check for updates. Check "show package details" to display individual SDK components.

Name	API Level	Revision	Status
Google Play Intel x86 Atom System Image	29	7	Not installed
Google Play Intel x86 Atom_64 System Image	29	7	Not installed
Android Q Preview			
Android TV Intel x86 Atom System Image	Q	1	Not installed
Android 9.0 (Pie)			
Android SDK Platform 28	28	6	Installed
Sources for Android 28	28	1	Installed
Android TV Intel x86 Atom System Image	28	8	Not installed
China version of Wear OS Intel x86 Atom System Image	28	3	Not installed
Wear OS Intel x86 Atom System Image	28	3	Not installed
Intel x86 Atom System Image	28	4	Not installed
Intel x86 Atom_64 System Image	28	4	Not installed
Google APIs Intel x86 Atom System Image	28	9	Not installed
Google APIs Intel x86 Atom_64 System Image	28	9	Not installed
Google Play Intel x86 Atom System Image	28	8	Not installed
Google Play Intel x86 Atom_64 System Image	28	8	Not installed
Android 8.1 (Oreo)			
Android SDK Platform 27	27	3	Installed
Sources for Android 27	27	1	Not installed
Android TV Intel x86 Atom System Image	27	7	Not installed
Intel x86 Atom System Image	27	1	Not installed
Intel x86 Atom_64 System Image	27	1	Not installed
Google APIs Intel x86 Atom System Image	27	9	Not installed
Google Play Intel x86 Atom System Image	27	3	Installed

Hide Obsolete Packages Show Package Details

OK Cancel Apply Help

- Appearance & Behavior
  - Appearance
  - Menus and Toolbars
  - System Settings
    - Passwords
    - HTTP Proxy
    - Data Sharing
    - Updates
    - Memory Settings
    - Android SDK
  - Notifications
  - Quick Lists
  - Path Variables
- Keymap
- Editor
- Plugins
- Build, Execution, Deployment
- Kotlin
- Tools

Android SDK Packages

Tools/SDK Manager tab SDK Tools

Settings for New Projects

Appearance & Behavior › System Settings › Android SDK

Reset

Manager for the Android SDK and Tools used by Android Studio

Android SDK Location: C:\Users\borovan\AppData\Local\Android\Sdk Edit

SDK Platforms | SDK Tools | SDK Update Sites

Below are the available SDK developer tools. Once installed, Android Studio will automatically check for updates.
Check "show package details" to display available versions of an SDK Tool.

Name	Version	Status
Android SDK Build-Tools		Update Available: 29.0.2
GPU Debugging tools		Not Installed
LLDB		Not Installed
NDK (Side by side)		Not Installed
CMake		Not Installed
Android Auto API Simulators	1	Not installed
Android Auto Desktop Head Unit emulator	1.1	Not installed
Android Emulator	29.0.11	Installed
Android SDK Platform-Tools	29.0.2	Installed
Android SDK Tools	26.1.1	Installed
Documentation for Android SDK	1	Not installed
Google Play APK Expansion library	1	Not installed
Google Play Instant Development SDK	1.8.0	Installed
Google Play Licensing Library	1	Not installed
Google Play services	49	Installed
Google USB Driver	11	Installed
Google Web Driver	2	Not installed
Intel x86 Emulator Accelerator (HAXM installer)	7.5.2	Installed

Hide Obsolete Packages | Show Package Details

OK | Cancel | Apply | Help

- Appearance & Behavior
  - Appearance
  - Menus and Toolbars
  - System Settings
    - Passwords
    - HTTP Proxy
    - Data Sharing
    - Updates
    - Memory Settings
    - Android SDK
  - Notifications
  - Quick Lists
  - Path Variables
- Keymap
- Editor
- Plugins
- Build, Execution, Deployment
- Kotlin
- Tools

Android Virtual Device

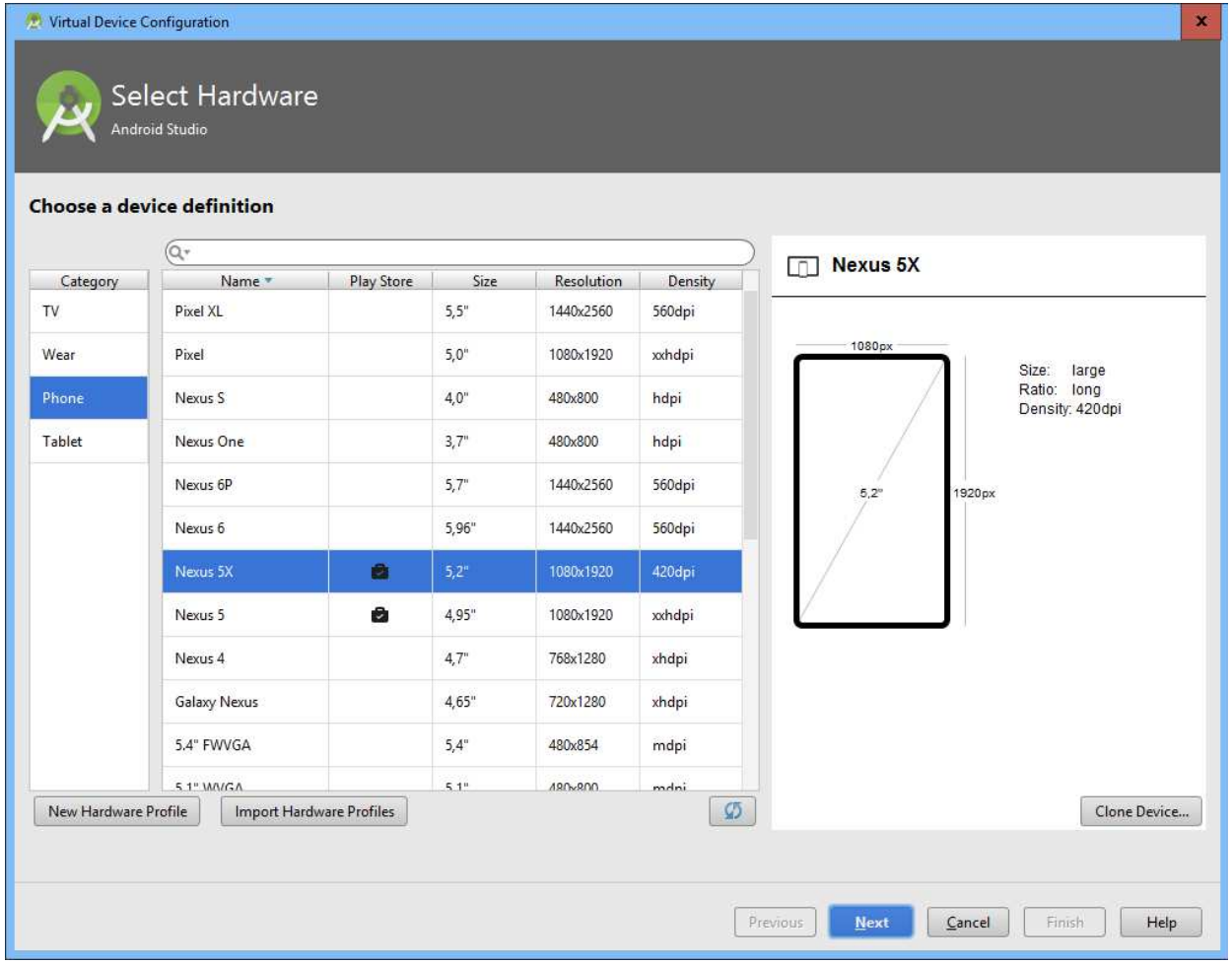
Tools/AVD manager

Nakonfigurujte si AVD zodpovedajúci vašmu zariadeniu

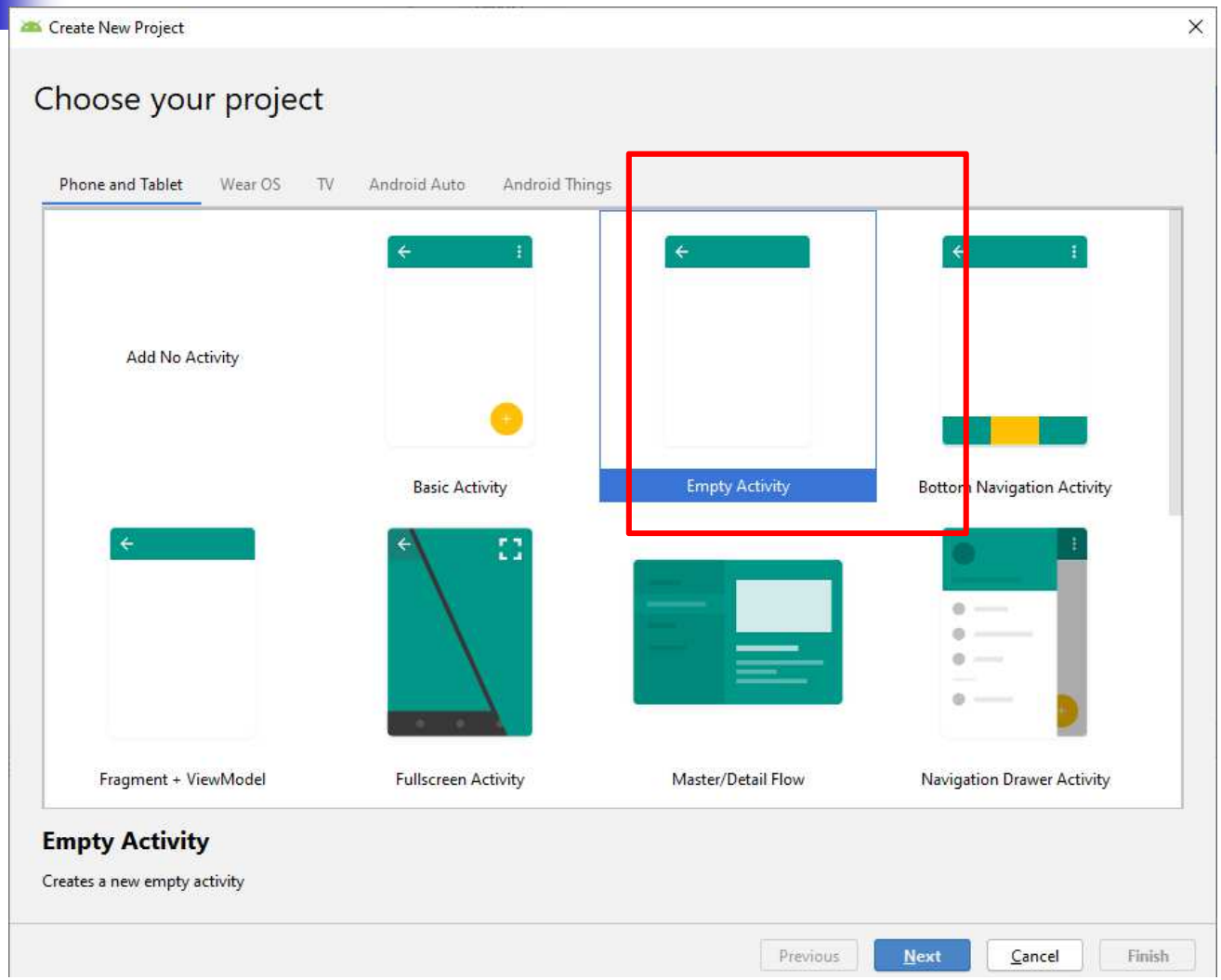
alebo si vyberte zo zoznamu predvolených,

- Create Device
- modifikujte

nastavenia podľa vášho zariadenia



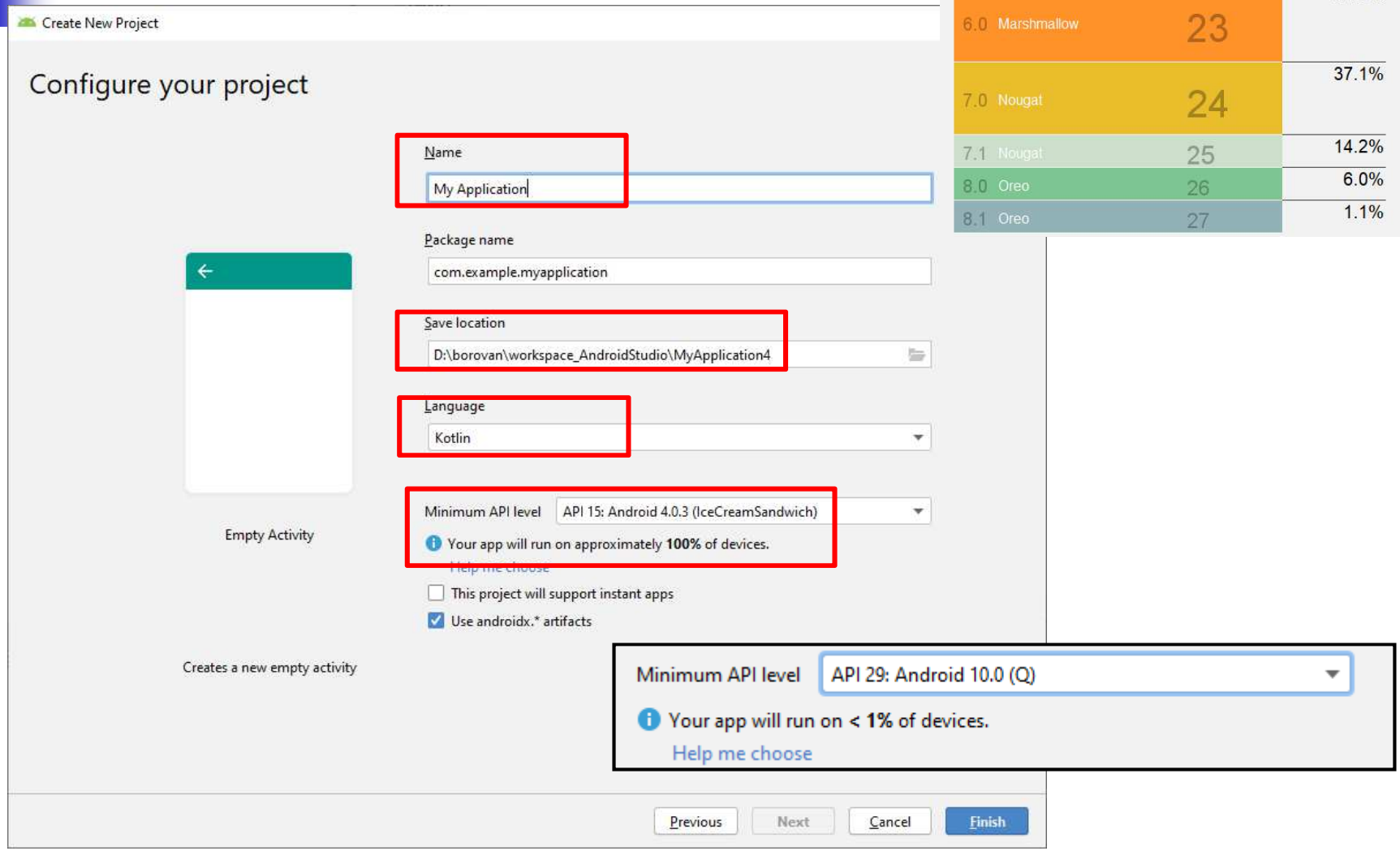
Nový projekt
(File/New/New Android Project)



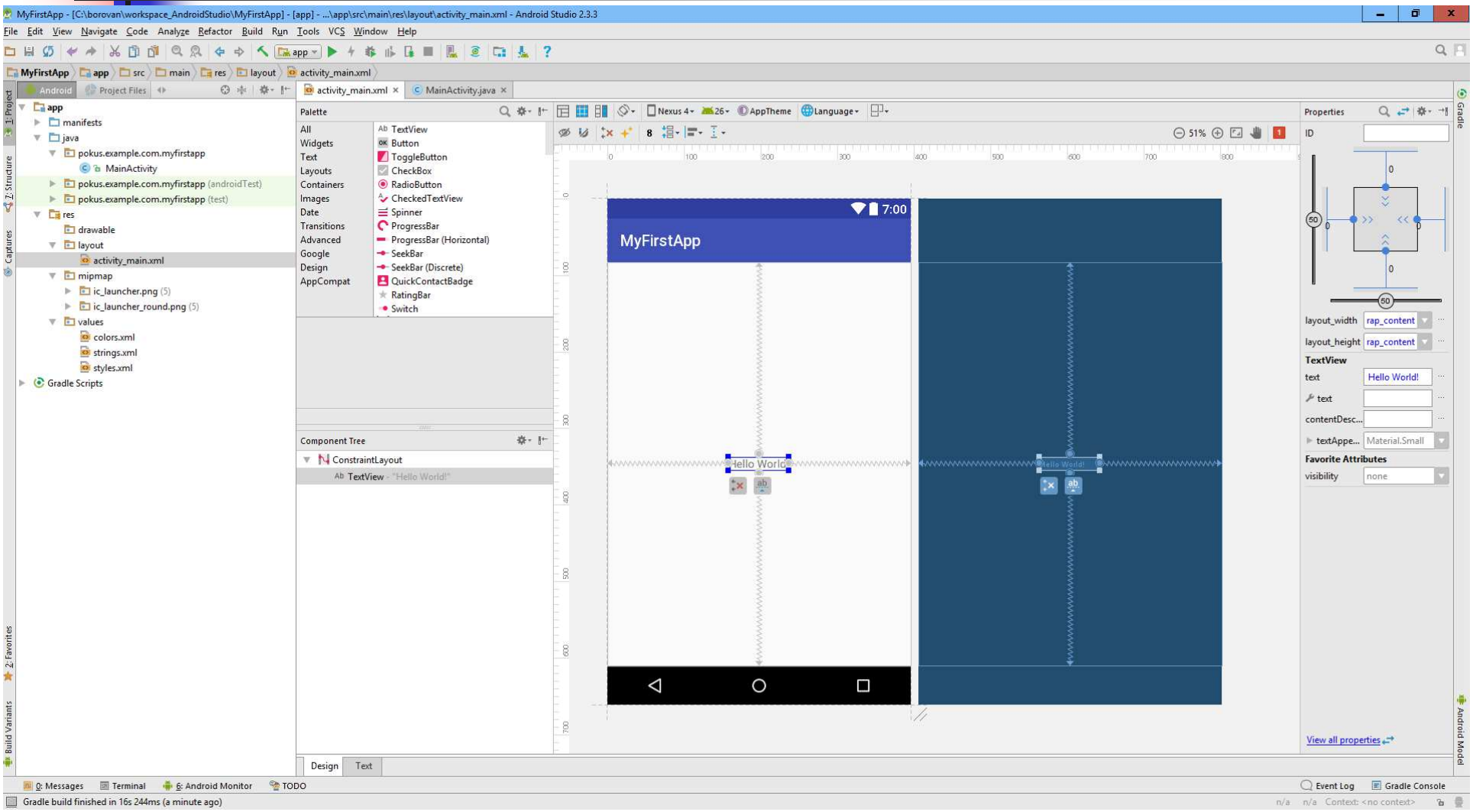
Nový projekt

(File/New/New Android Project)

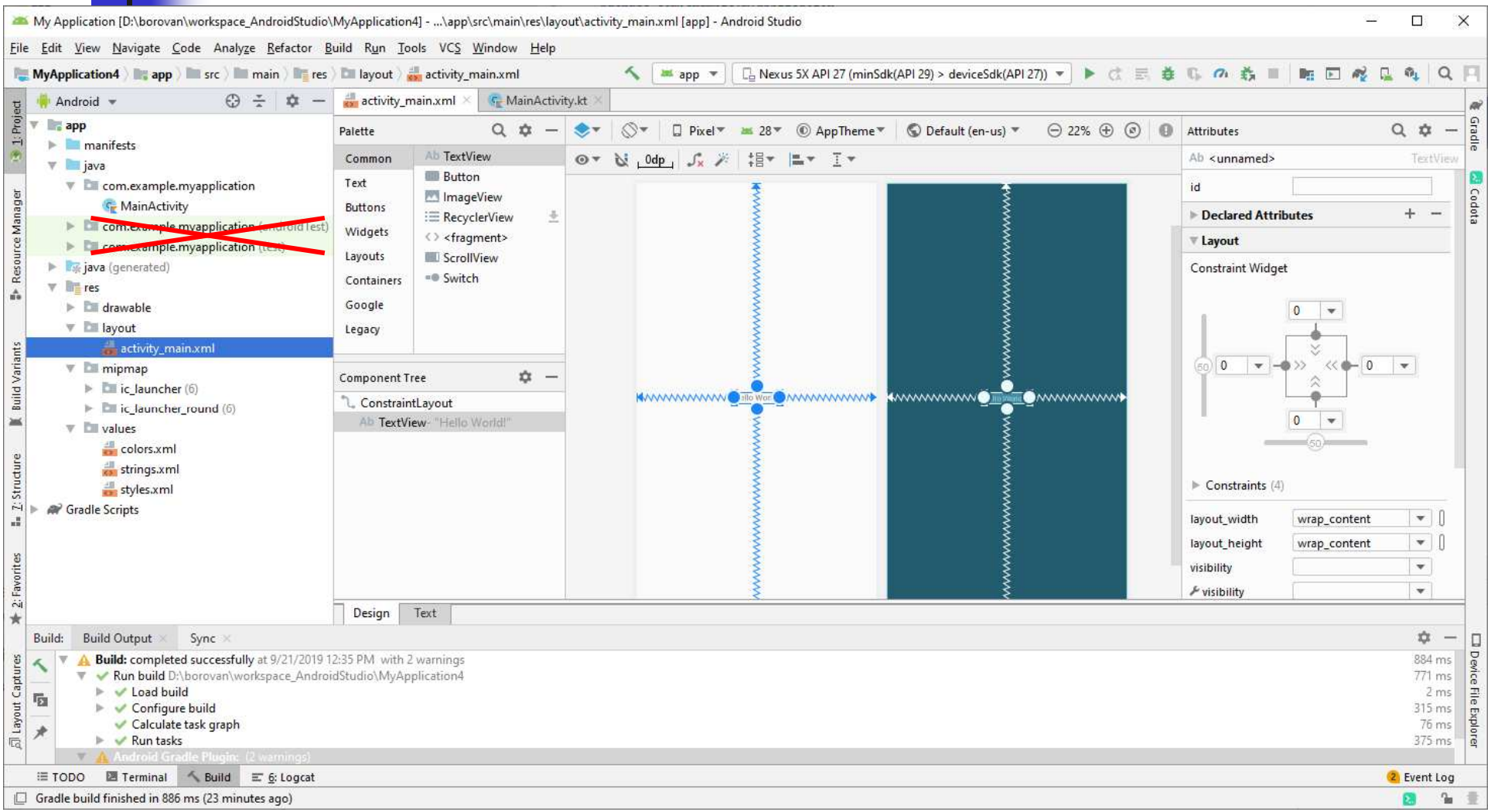
ANDROID PLATFORM VERSION	API LEVEL	CUMULATIVE DISTRIBUTION
4.0 Ice Cream Sandwich	15	
4.1 Jelly Bean	16	99.6%
4.2 Jelly Bean	17	98.1%
4.3 Jelly Bean	18	95.9%
4.4 KitKat	19	95.3%
5.0 Lollipop	21	85.0%
5.1 Lollipop	22	80.2%
6.0 Marshmallow	23	62.6%
7.0 Nougat	24	37.1%
7.1 Nougat	25	14.2%
8.0 Oreo	26	6.0%
8.1 Oreo	27	1.1%



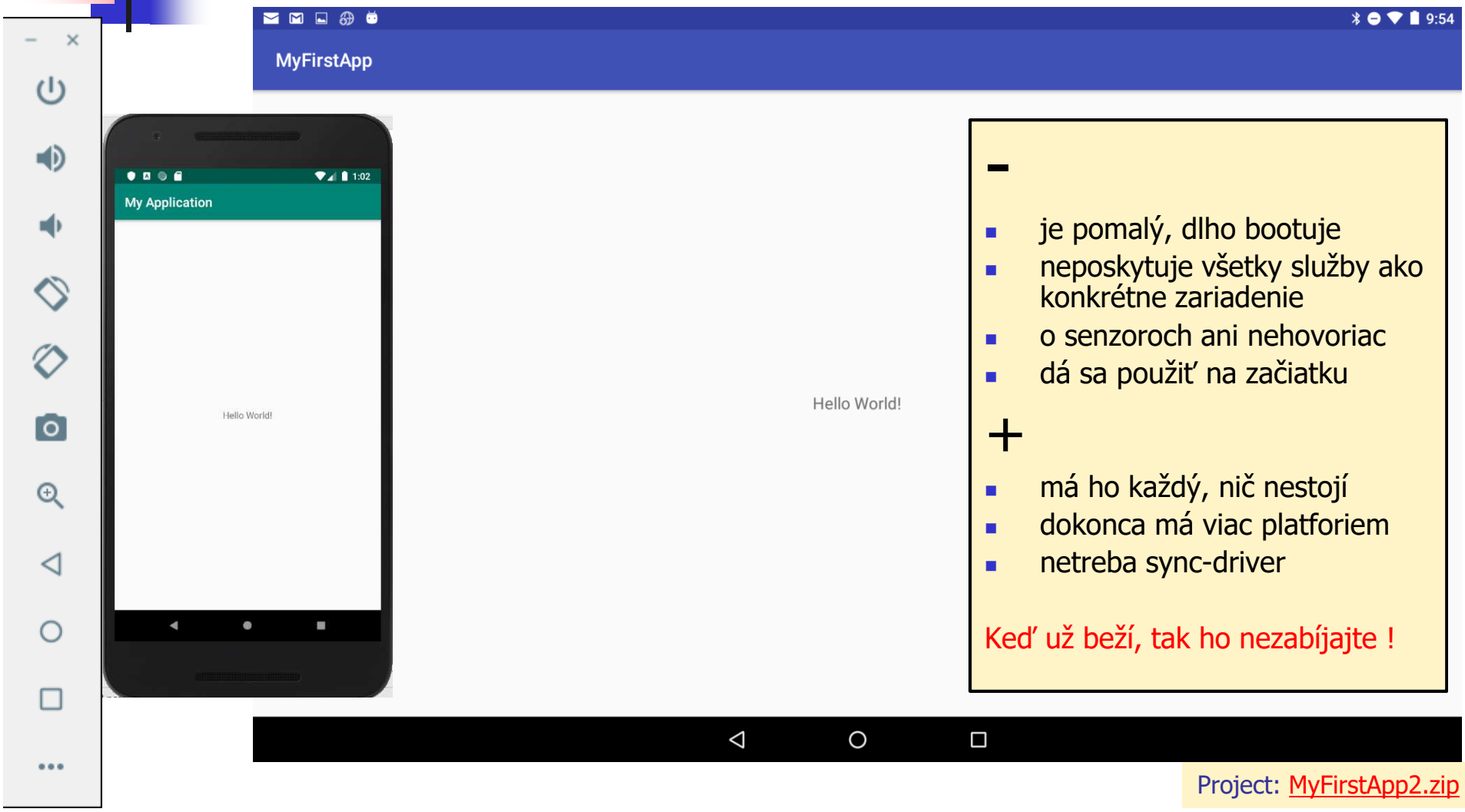
Nový projekt
(java)



Nový projekt
(kotlin)



Pýtajte sa
kým nedostanete



−

- je pomalý, dlho bootuje
- neposkytuje všetky služby ako konkrétne zariadenie
- o senzoroch ani nehovoriac
- dá sa použiť na začiatku

+

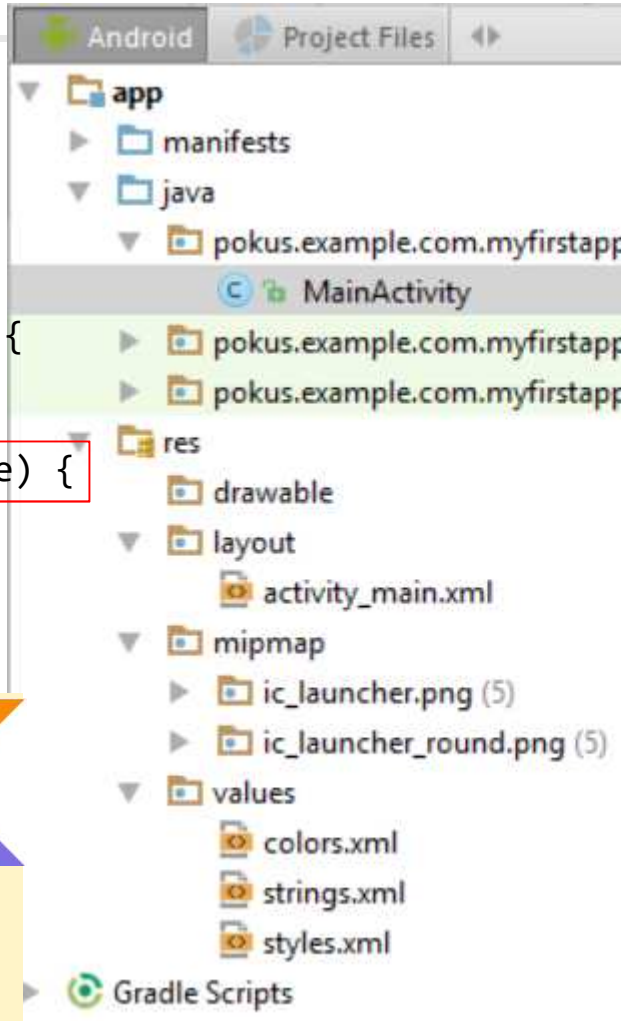
- má ho každý, nič nestojí
- dokonca má viac platforiem
- netreba sync-driver

Keď už beží, tak ho nezabíjajte !

Project: MyFirstApp2.zip

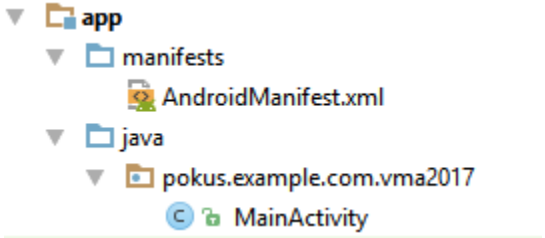
Čo dostaneme zadarmo

```
package pokus.example.com.myfirstapp;

import android.support.v7.app.AppCompatActivity;
import android.os.Bundle;

public class MainActivity extends AppCompatActivity {

    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        setContentView(R.layout.activity_main);
    }
}
```




```
import android.support.v7.app.AppCompatActivity
import android.os.Bundle

class MainActivity : AppCompatActivity() {

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

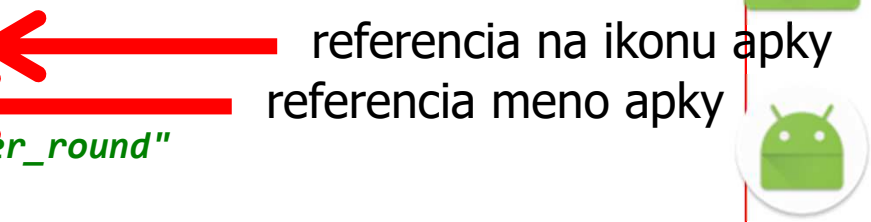
Project: MyFirstApp2.zip



AndroidManifest.xml

(automaticky vygenerovaný súbor aplikácie)

```
<manifest xmlns:android="http://schemas.android.com/apk/res/android"
    package="pokus.example.com.myfirstapp">

    <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>
```



Project: MyFirstApp2.zip

AndroidManifest.xml

(v AS ochudobnel, mnohé veci sa presunuli do build.gradle)

Najhlavnejšie tagy:

- **<uses-sdk** popisuje min./max. SDK a cieľovú verziu SDK

  Akú verziu SDK potrebujem pre moju verziu Androidu ?

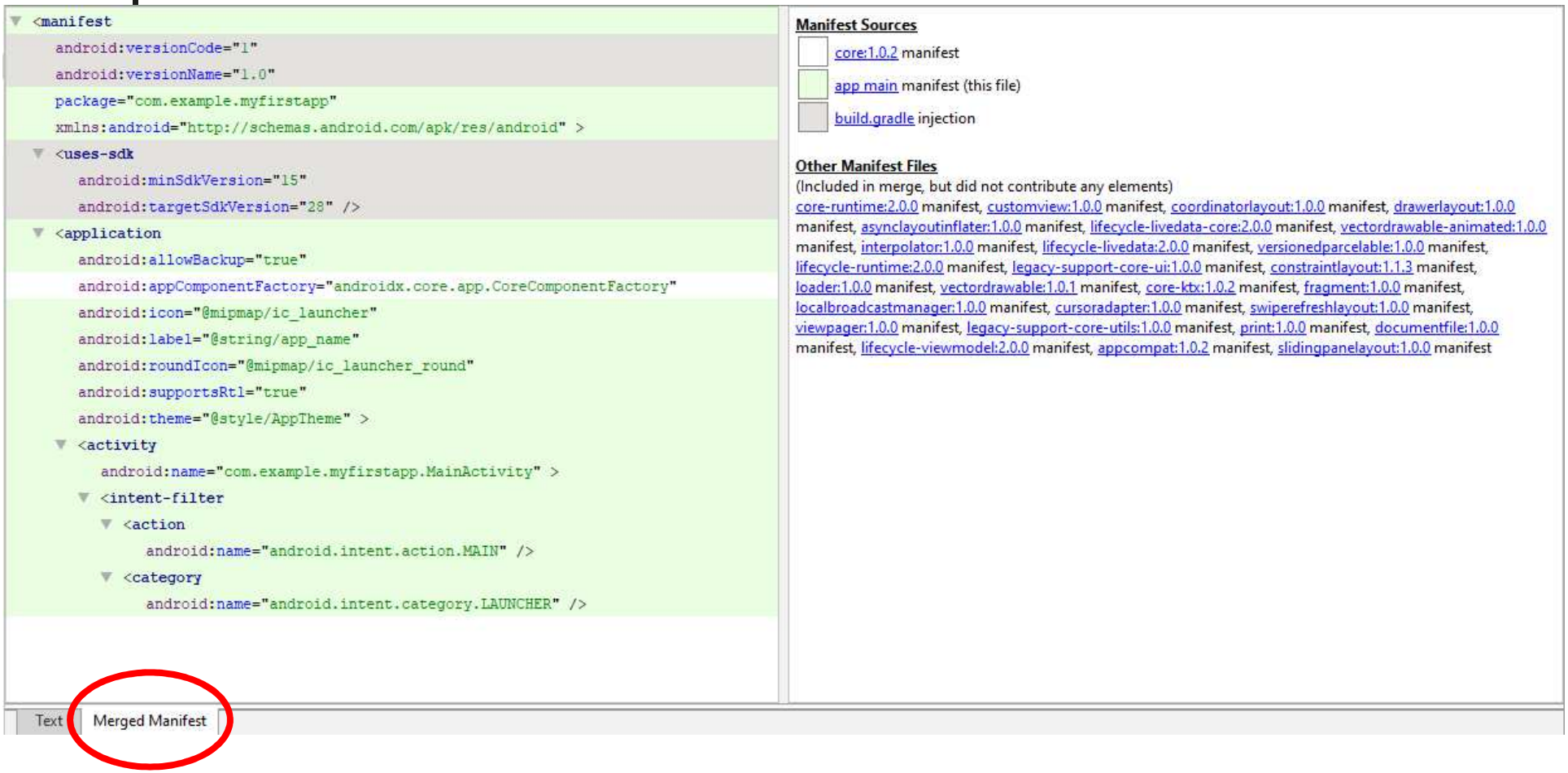
  http://developer.android.com/guide/topics/manifest/uses-sdk-element.html#ApiLevels
- **<uses-configuration** a **<uses-feature**

  popisujú HW predpoklady na spustenie apky, display, klávesnicu, senzory
- **<uses-supportScreens** popisuje rozliško HVGA, QVGA, QVGA, WQVGA
- **<uses-permissions** popisuje práva, ktoré apka musí mať schválené
- **<application** je jediná a popisuje ikonu, logo, meno, ... aplikácie
- **<activity** popisujú package, intent, filtre pre aktivitu, može ich byť viac
- **<service** popisujú aplikácie bežiace na pozadí, tzv. servisy
- **<provider** popisuje Content Provider, napr. lokálnu databázu LiteSQL
- **<receiver** popisuje Broadcast Receiver prijímajúci nejaké Intenty
- **<uses-library** popisuje externé knižnice, napr. Google Maps, ...

viac na: http://developer.android.com/guide/topics/manifest/manifest-intro.html

MergedManifest

(spája AndroidManifest a build.gradle)



Project: MyFirstApp2.zip

build.gradle

(konfiguračný súbor pre gradle)

- build tool, podobne ako make, maven

```
apply plugin: 'com.android.application'
apply plugin: 'kotlin-android'
apply plugin: 'kotlin-android-extensions'
android {
    compileSdkVersion 28
    defaultConfig {
        applicationId "com.example.myfirstapp"
        minSdkVersion 15
        targetSdkVersion 28
        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

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)
- menus – pre aktivity (bude neskôr)
- values (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

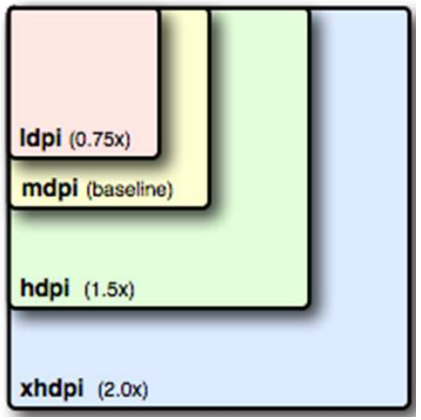
Resources/Drawables/Mipmap

(ikona - viacero rozlíšení)

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

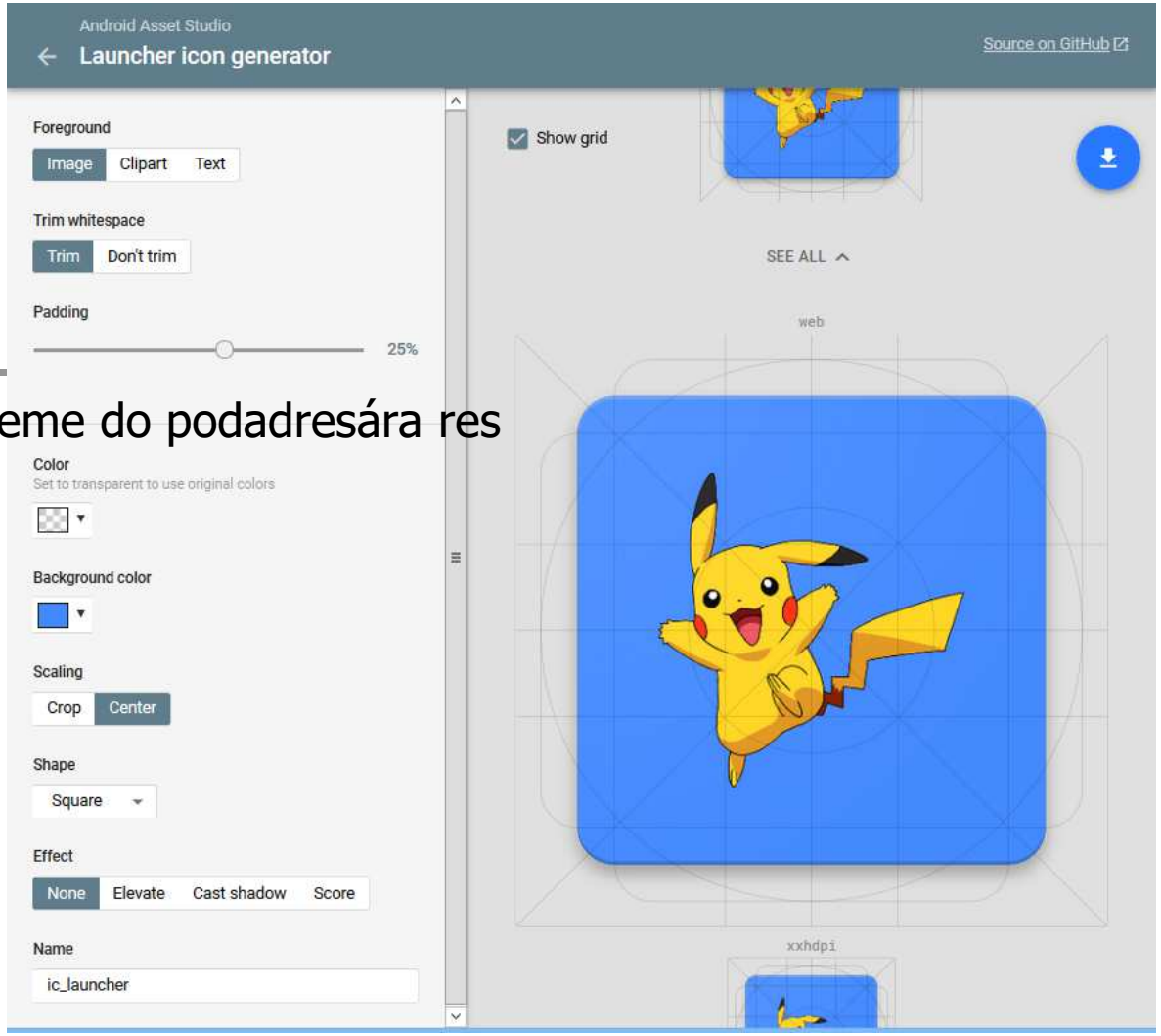
pomer l/m/h/xh/x²h/x³h-dpi 3:4:6:8:12:16 - geom.postupnosť s koef. Sqrt(2) $\sqrt{2}$

- 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)



Android Asset Studio

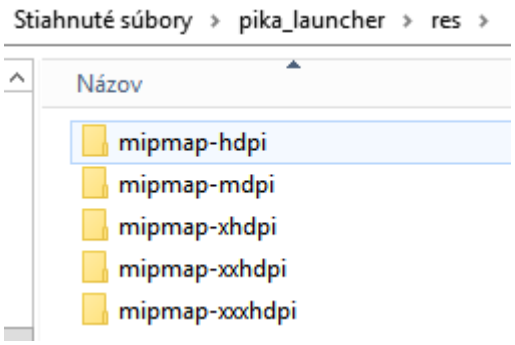
Icon generator

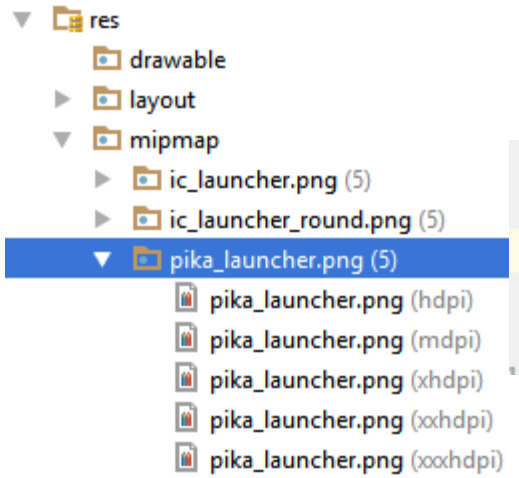


výsledok priamo nakopírujeme do podadresára res

Ikony/obrázky sa

sa objavia v projekte





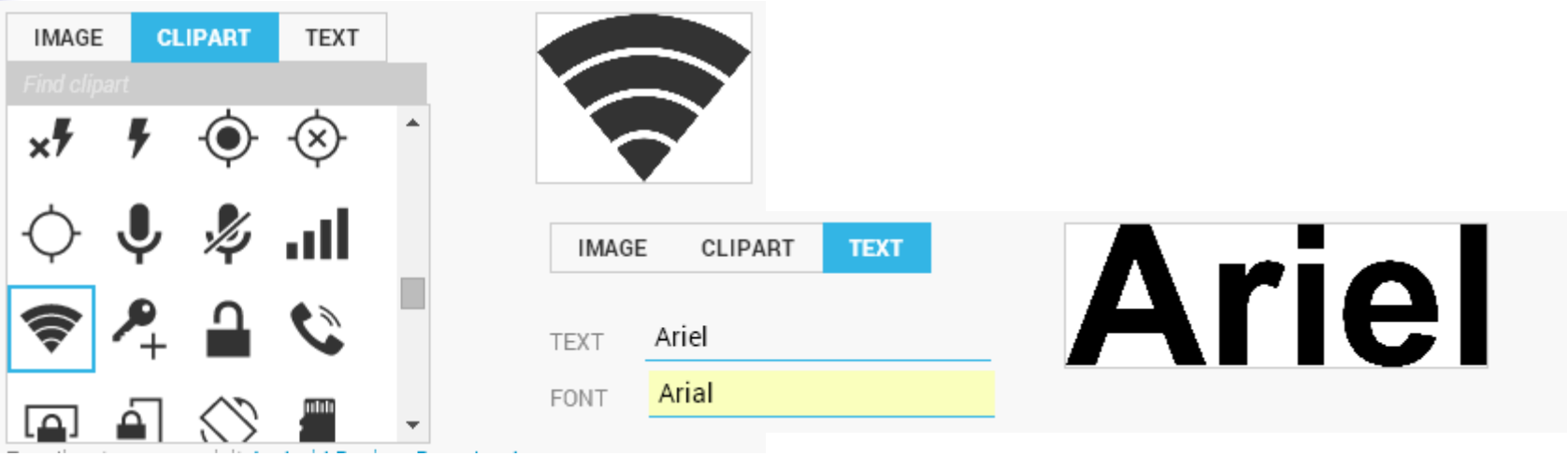

```
5   <application
6       android:allowBackup="true"
7       android:icon="@mipmap/pika_"
8       android:label @mipmap/pika_launcher
9       android:roundIcon="@mipmap/ic_launcher_round"
```

Project:Pikas.zip, Pikas2.zip

Android Asset Studio

(jedna z alternatív)

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



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

Resources/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
dp = Density-independent Pixels
sp = Scale-independent Pixels

Project:01Intro/MyFirstHello.zip

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>
```

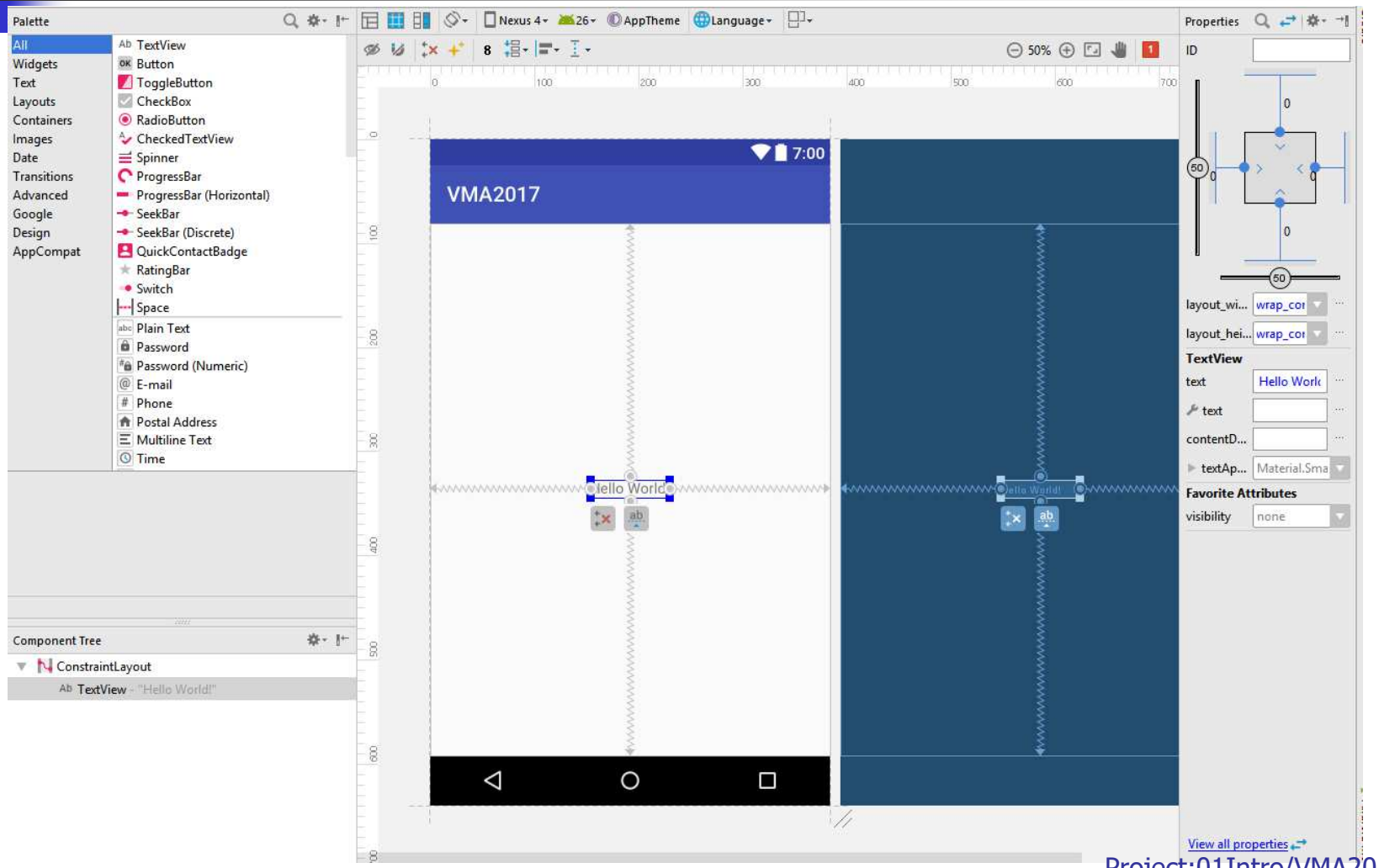
- plurals (quantity strings)

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

Project:01Intro/MyFirstHello.zip

Resources/Layout

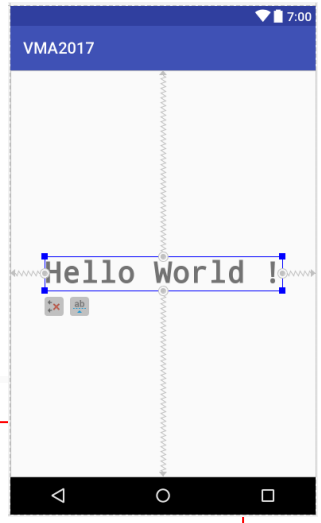
(Design View)



Project:01Intro/VMA2017.zip

Resources/Layout

(Text View)



wrap_content
fill_parent=
match_parent

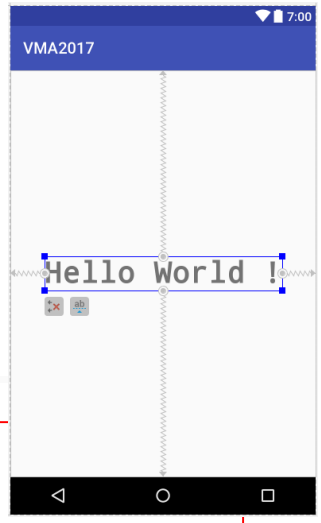
```
<android.support.constraint.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
       xmlns:app="http://schemas.android.com/apk/res-auto"
        xmlns:tools="http://schemas.android.com/tools"
         android:layout_width="match_parent"
         android:layout_height="match_parent"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

Bad style

Project:01Intro/VMA2017.zip

Resources/Layout

(Text View)



wrap_content
fill_parent=
match_parent

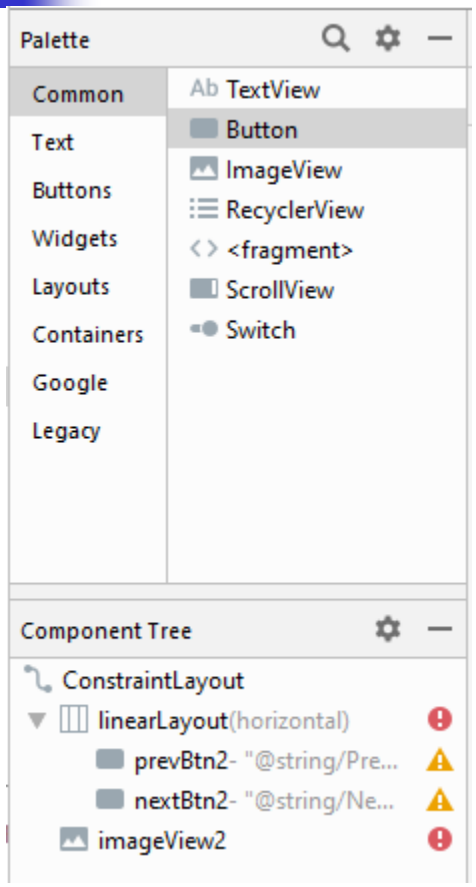
```
<android.support.constraint.ConstraintLayout
    xmlns:android="http://schemas.android.com/apk/res/android"
       xmlns:app="http://schemas.android.com/apk/res-auto"
        xmlns:tools="http://schemas.android.com/tools"
         android:layout_width="match_parent"
         android:layout_height="match_parent"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

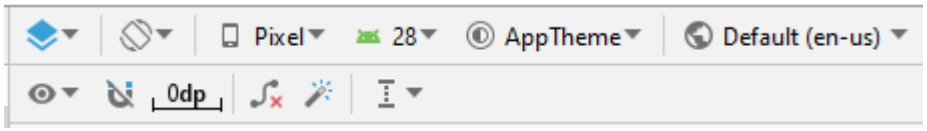
```
<resources>
    <string name="app_name">VMA2017</st
    <string name="IntroString">Hello Wo
</resources>
```

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

Project:01Intro/VMA2017.zip

Layout Manager





Design/Blueprint/Design+Blueprint

Layout: Landscape/Portrait/...

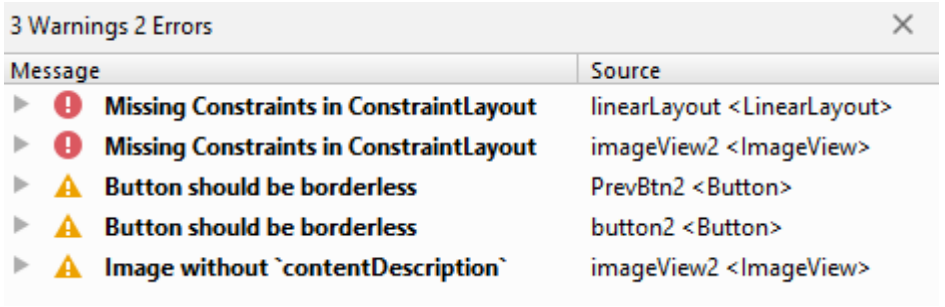
Pixel: AVD/Pixel2/Pixel#

API Level: 26/27/28/...

:

: lokalizácie:

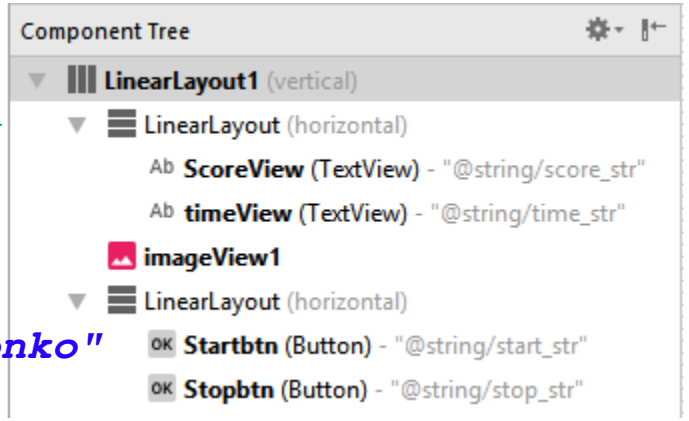
: warnings, errors



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" />
```

Žiadne warnings



zjednodušené pre účely slajdu

Project:tro/VMA2013.zip

Logovanie

- Log
- Toast
- Snackbar

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

```
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])
})
```

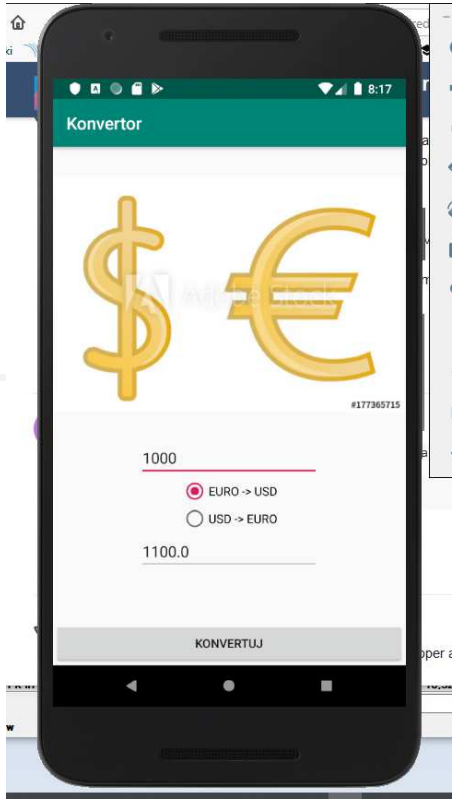
Project:Pikas2.zip

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

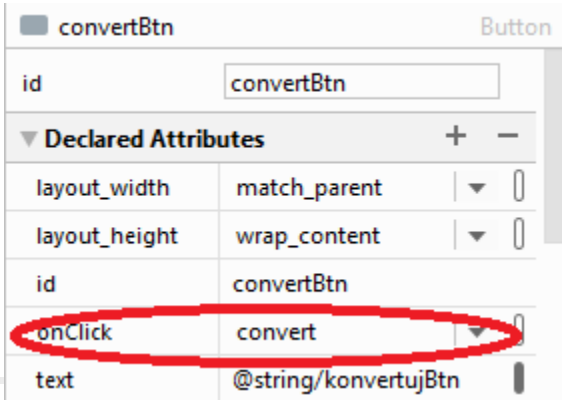



```
override fun onCreate(savedInstanceState: Bundle?)
    super.onCreate(savedInstanceState)
    setContentView(R.layout.activity_main)
    convertBtn.setOnClickListener({
        Toast.makeText(this, "convert", Toast.LENGTH_SHORT).show()
        if (inputText.text.isNotEmpty()) {
            val input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

Project:Konvertor.zi

a

Konvertor EURO USD




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

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


    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")
        }
    }
```

Project:Konvertor.zi

Hitparáda

(Hall of Fame)