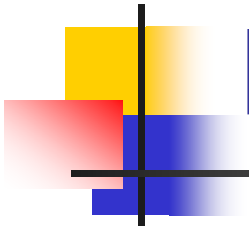
Pokračovanie

Layout, View, Intent
List, Canvas, Menu

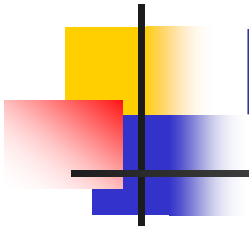
Peter Borovanský
KAI, I-18

borovan 'at' ii.fmph.uniba.sk



Bolo minule

- layouts, najmä constraint layout
- ListView, najmä kvôli DÚ2
- intent, intent data
- `<intent-filter />` a AndroidManifest.xml
- `startActivity, startActivityForResult`



Bude dnes

- intent, intent data
- Canvas
  - onTouch, onDraw, invalidate, postInvalidate
- SurfaceView

PhotoActivity

(data z intentu)

Princíp intent-**`startActivityForResult`** spolu s **`onActivityResult`** ešte raz:

```
val takePictureIntent = Intent(MediaStore.ACTION_IMAGE_CAPTURE);
   // test, či existuje komponent, ktorý spracuje intent
if (takePictureIntent.resolveActivity(getPackageManager()) != null) {
   Toast.makeText(this@PhotoActivity,
            "smile ... taking picture", Toast.LENGTH_LONG).show();
   startActivityForResult(takePictureIntent, REQUEST_IMAGE_CAPTURE);
} else {
    Toast.makeText(this@PhotoActivity,
            "sorry ... no picture", Toast.LENGTH_LONG).show();
}

private val REQUEST_IMAGE_CAPTURE = 690
```

https://developer.android.com/reference/android/provider/MediaStore.html#ACTION_IMAGE_CAPTURE

Project: List.zip

PhotoActivity
(data z intentu)

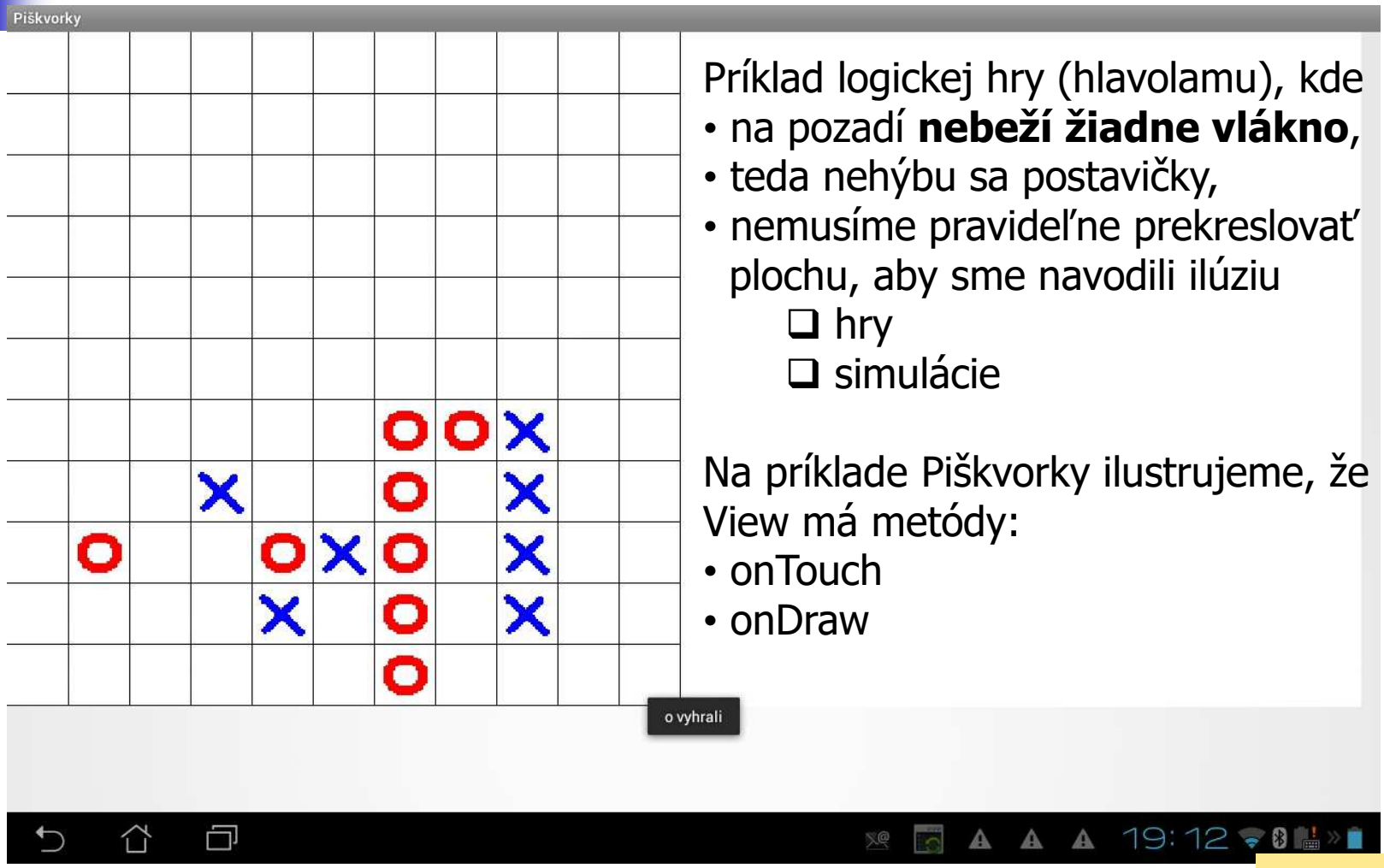
V callback **onActivityResult** získavame z intentu data a interpretujeme ako bitmapu, teda odfotený obrázok:

```
private val REQUEST_IMAGE_CAPTURE = 690

override fun onActivityResult(
        requestCode: Int,
        resultCode: Int,
        data: Intent?) {
    if (requestCode == REQUEST_IMAGE_CAPTURE &&
        resultCode == RESULT_OK) {
       Toast.makeText(this@PhotoActivity, "thanks ...",
                      Toast.LENGTH_LONG).show()
       val extras = data?.getExtras()      // elvis operátor
       val imageBitmap = extras?.get("data") as Bitmap
       pictureImageView.setImageBitmap(imageBitmap)
    }
```

Project: List.zip

Piškvorky

(logická hra v canvase)



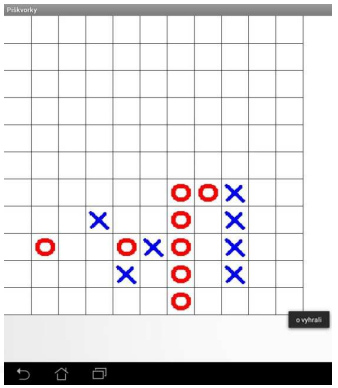
Príklad logickej hry (hlavolamu), kde
- na pozadí **nebeží žiadne vlákno**,
- teda nehýbu sa postavičky,
- nemusíme pravideľne prekreslovať plochu, aby sme navodili ilúziu
  - ❑ hry
  - ❑ simulácie

Na príklade Piškvorky ilustrujeme, že View má metódy:
- onTouch
- onDraw

Project:List.zip

onTouch vo View

(onTouchEvent)

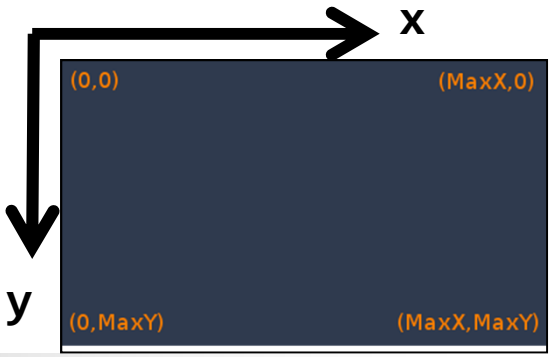


```
class PiskyView(context: Context, attrs: AttributeSet) :
    View(context) {    // Piškvorky sú podtrieda View
                       // načítanie bitmapy obrázkov, postavičiek
     o_img = resources.getDrawable(R.drawable.o).toBitmap()
     x_img = resources.getDrawable(R.drawable.x).toBitmap()

override  fun onTouchEvent(e:MotionEvent): Boolean {
    if (e.action == MotionEvent.ACTION_DOWN) {
       val iX = (e.x / cellSize).toInt()              // transformácia
       val iY = (e.y / cellSize).toInt()              // pixlov na bunku
       if (iX >= SIZE || iY >= SIZE) return true      // mimo hraciu dosku
        if (playGround[iY][iX] == -1) {               // voľné políčko ?
           playGround[iY][iX] = onTurn                // polož značku hráča
           onTurn = 1 - onTurn                        // na ťahu, a ide súper
           invalidate()          // toto nakoniec prekreslí view
            val winner = check(iX, iY)                // vyhodnotenie víťazov...
            if (winner != -1)
               Toast.makeText(getContext(),"x vyhrali",Toast.LENGTH_LONG).show(
             } else
```

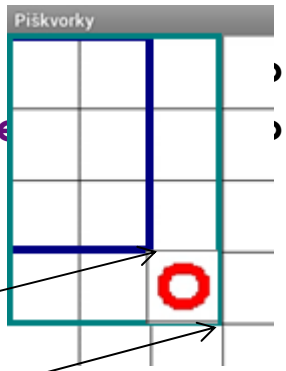
Project:List.zip

onDraw vo View

(kreslenie do Canvas)




```
override protected fun onDraw(canvas: Canvas) { //  paint()
    minSize = Math.min(getWidth(), getHeight()) - 2
    cellSize = minSize / SIZE

    canvas.drawColor(Color.WHITE)
    val p = Paint()
    p.setColor(Color.BLACK)
    p.setStrokeWidth(1F)
    for (i in 1..SIZE) {
      canvas.drawLine(i*cellSize, 0F, i*cellSize,
      canvas.drawLine(0F,i*cellSize, minSize, i*ce
    }
    for (y in 0 until SIZE) {
       for (x in 0 until SIZE) {
          canvas.drawBitmap(o_img,srcRect,
                                  destRect,
                                  p);
```



Project:List.zip

AndroidCanvasExample

Maľovátko

(MotionEvent actions)


```
private val mPath: Path
override protected fun onDraw(canvas: Canvas) {
   super.onDraw(canvas)
   canvas.drawPath(mPath, mPaint)
}
override fun onTouchEvent(event: MotionEvent): Boolean {
   val x = event.x
   val y = event.y
   when (event.action) {
     MotionEvent.ACTION_DOWN -> {
       startTouch(x, y) invalidate()   }
     MotionEvent.ACTION_MOVE -> {
       moveTouch(x, y)  invalidate()   }
     MotionEvent.ACTION_UP -> {
       upTouch() invalidate()          }
   }
   return true
}
```

https://examples.javacodegeeks.com/android/core/graphics/canvas-graphics/android-canvas-example/

Project:List.zip

Maľovátko

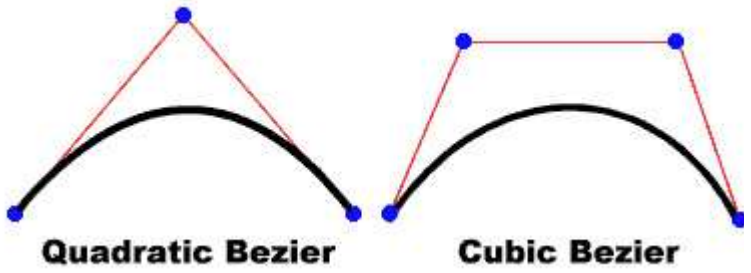
(bezier vs. linear - nebezier)


```
private fun startTouch(x: Float, y: Float) {
  mPath.moveTo(x, y)
  lastX = x
  lastY = y
}
private val TOLERANCE = 5f
private fun moveTouch(x: Float, y: Float) {
  val dx = Math.abs(x - lastX)
  val dy = Math.abs(y - lastY)
  if (dx >= TOLERANCE || dy >= TOLERANCE) {
     // mPath.quadTo(lastX, lastY, (x+lastX)/2, (y+lastY)/2)
     mPath.lineTo(x, y);
     lastX = x
     lastY = y
  }
}
```

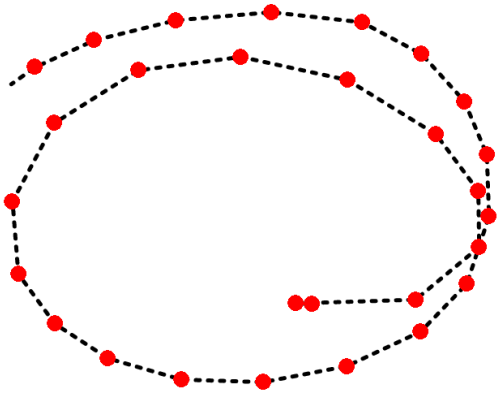
https://examples.javacodegeeks.com/android/core/graphics/canvas-graphics/android-canvas-example/

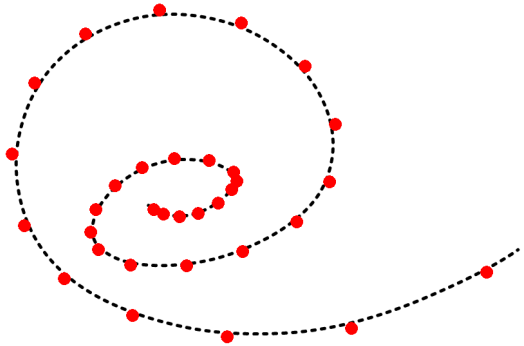
Project:List.zip

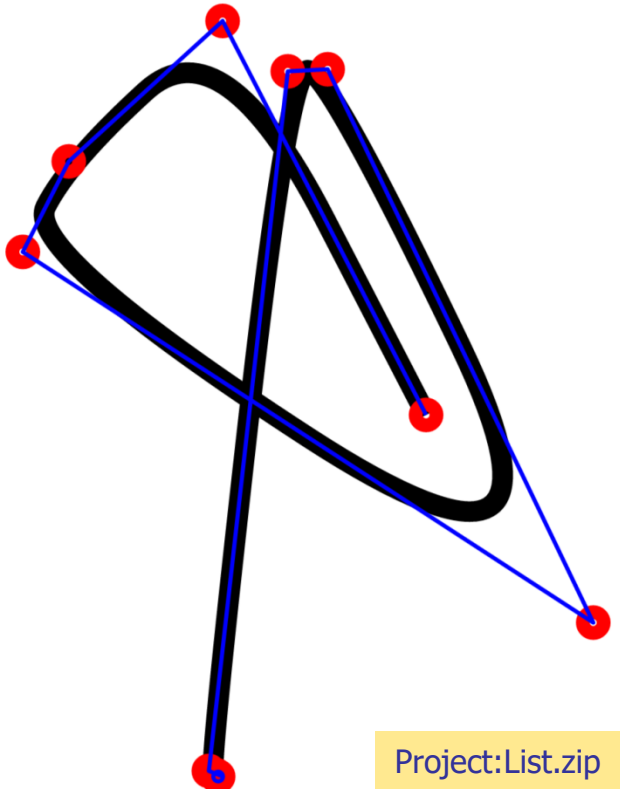
Bézier



- `lineTo(x,y)`
- `quadTo(controlX, controlY, x, y)`
- `cubeTo(controlX1, controlY1, controlX2, controlY2, x, y)`







Project:List.zip

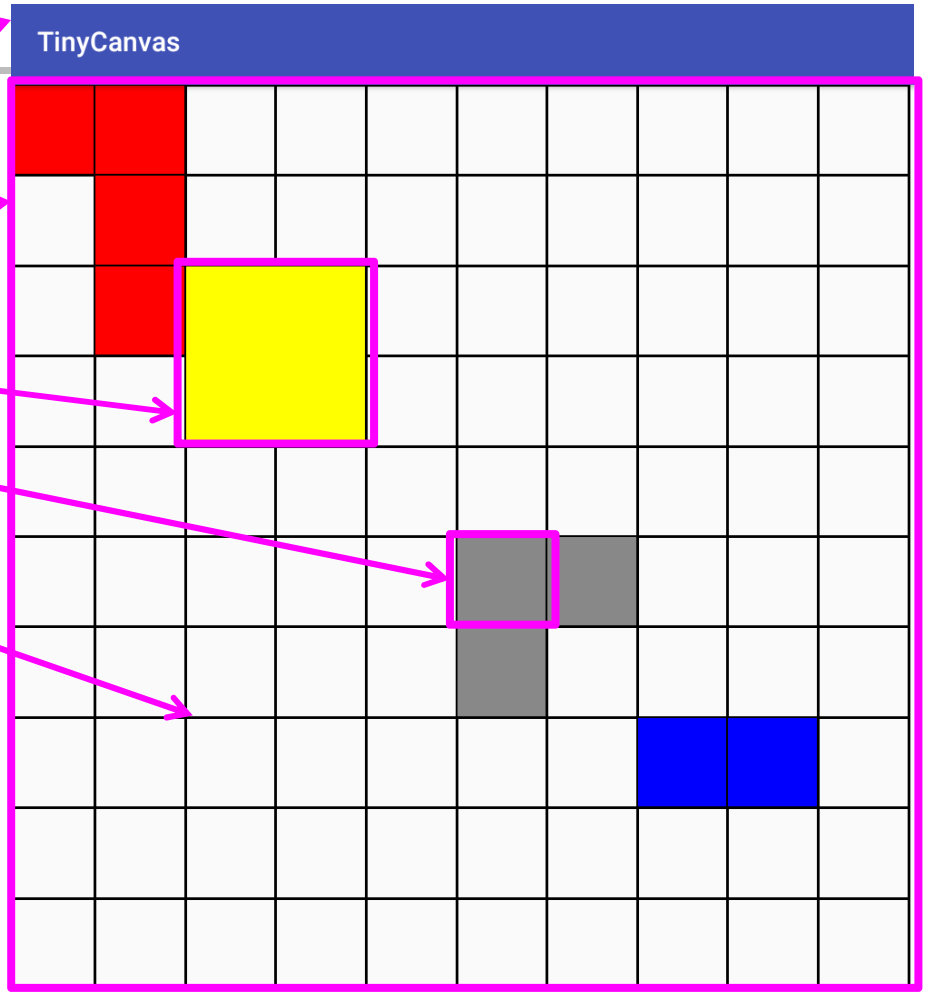
Hierarchia

Objektov/tried:

- **`Canvas`**
- **`Scena`**
- **`Tvar`**
- **`Stvorcek`**
- **`Mreza`**

Každý reaguje na:

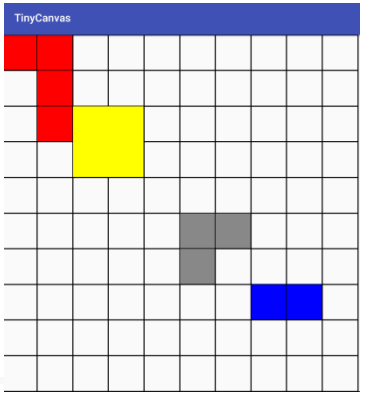
- **`onTouch`**
- **`onDraw()`**



Project:List.zip

Hierarchia

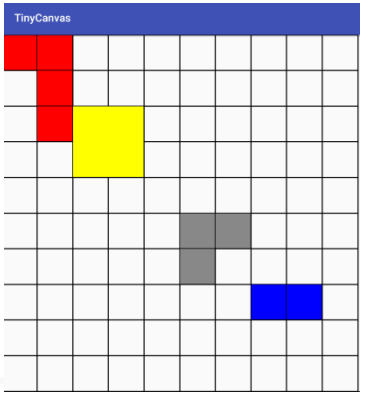
(Tvar)




```
class Tvar(private val stvoceky: List<Stvorcek>) {// tvar je zoznam
    fun onDraw() {      // vykresli tvar - vykresli každý štvorček
        for (stvorcek in stvoceky) stvorcek.onDraw()
    }
    fun onTouched(motionEvent: MotionEvent): Boolean {
        if (isIn(motionEvent)) { // bol tvar zasiahnutý eventom ?
            var reDraw = false   // oznám všetkým prekresli sa
            for (stvorcek in stvoceky)
                reDraw = reDraw or stvorcek.onTouched(motionEvent)
            return reDraw        // true, ak treba invalidate()
        } else
            return false
    }
    private fun isIn(motionEvent: MotionEvent): Boolean {
        var isIn = false         // ak niektorý zo štvorčekov bol
        for (stvorcek in stvoceky) // zasiahnutý
            isIn = isIn or stvorcek.isIn(motionEvent)
        return isIn
    }
}
```

Project:List.zip

Hierarchia
(Stvorcek)

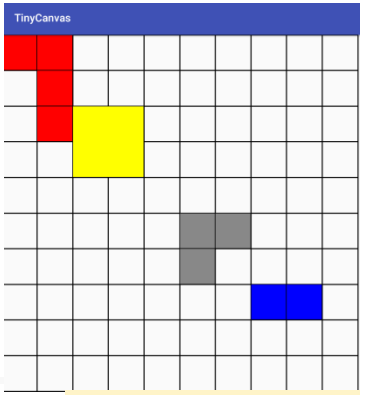



```
fun onDraw() {
     val r = Rect(x +1, y +1,x+sizeX-1,y + sizeY -1);
     CanvasView.c!!.drawRect(r, p);
}
fun onTouched(event: MotionEvent): Boolean {
    int action = event.getAction();
    if (action == MotionEvent.ACTION_DOWN ) {
            ... START ... }
    else if (action == MotionEvent.ACTION_UP ||
        action == MotionEvent.ACTION_CANCEL ) {
            ... END ...
    } else if (action == MotionEvent.ACTION_MOVE) {
            ... MOVE ... }
}
fun isIn(event: MotionEvent): Boolean {
    return  x <= event.getX() && event.getX() <= x + sizeX
            &&
            y <= event.getY() && event.getY() <= y + sizeY;
}
```

Project:List.zip

Hierarchia

(top level Canvas)




```
override fun onTouch(view: View,
                     motionEvent: MotionEvent): Boolean {
    if (scena.onTouched(motionEvent));
    invalidate()
    return true
}

override fun onDraw(canvas: Canvas) {
    super.onDraw(canvas)
    c = canvas
    m?.onDraw()
    scena.onDraw()
}
```

Objektov/tried:

- Canvas
- Scena
- Tvar
- Stvorcek
- Mreza

reagujú na:

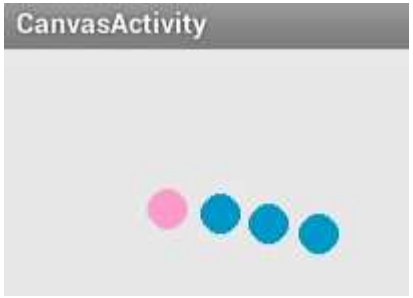
- onTouch
- onDraw()

Project:List.zip

Vlákno (Thread) vo View

(dynamická hra v canvase, simulácia cez thread)

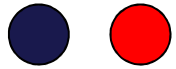
```
class CanvasView(context: Context, attrs: AttributeSet) :
    View(context), View.OnTouchListener, View.OnKeyListener {
   var touchX = 100f; var touchY = 100f       // interface
   var ballX = 200f;  var ballY = 200f

init {
   setOnTouchListener(this) setOnKeyListener(this)
   val th = object : Thread() {
      override fun run() {                    // život vlákna
         while (!stopped) {
            if (!paused) {                    // simulácia
               ballX += (touchX-ballX)/touches/50
               ballY += (touchY-ballY)/touches/50
               touchX = (ballX+50*touchX[i])/51
               touchY = (ballY+50*touchY[i])/51
              try {                           // pozdržanie
                 Thread.sleep(100)
                 postInvalidate()             // prekreslenie v GUI vlákne
               } catch (e: InterruptedException) {
   th.start()                                 // spustenie vlákna
}
```



Project:List.zip

onDraw vo View

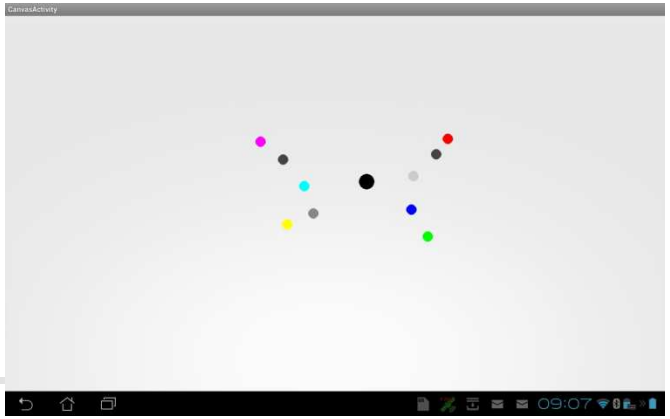
```
override protected fun onDraw(canvas: Canvas?) {
    super.onDraw(canvas)

    if (canvas != null) {
        val p = Paint()

        for (i in 0 until touches) {
            p.setColor(colors[i])
            tu už canvas nemôže byť null
            canvas!!.drawCircle(touchX[i], touchY[i], 10F, p)
            canvas.drawCircle(touchX[i], touchY[i], 10F, p)
        }
        p.setColor(Color.BLACK)
        canvas!!.drawCircle(ballX, ballY, 15F, p)
        canvas.drawCircle(ballX, ballY, 15F, p)
    } else
        Log.d("Canvas", "null")
}
```



Project:List.zip

onDraw vo View

(MultiTouch)



MotionEvent poskytuje

- pointerCount – počet bodov reakcie
- getX(i), getY(i) – body reakcie
- typ reakcie (ACTION_DOWN,…)

```
override fun onTouch(v: View, event: MotionEvent): Boolean {
    Log.d("Canvas", "counts:" + event.pointerCount)
    val maskedAction = event.actionMasked
    if (maskedAction == MotionEvent.ACTION_DOWN ||
        maskedAction == MotionEvent.ACTION_POINTER_DOWN) {
        touches = event.pointerCount
        for (i in 0 until event.pointerCount) {
            Log.d("Canvas", "X:" + event.getX(i))
            Log.d("Canvas", "Y:" + event.getY(i))
            touchX[i] = event.getX(i)
            touchY[i] = event.getY(i)
        }
    return true // event handled
```

Žiadne dva prsty sa nedotknú naraz

Project:List.zip

onKey vo View

Vstup z klávesnice, ak by sme nejakú mali...

```
override fun onKey(arg0: View, arg1: Int, arg2: KeyEvent):
                Boolean {
    val rnd = Random()
    when (arg1) {
        KeyEvent.KEYCODE_DPAD_LEFT -> ballX -= rnd.nextInt(50)
        KeyEvent.KEYCODE_DPAD_RIGHT -> ballX += rnd.nextInt(50)
        KeyEvent.KEYCODE_DPAD_UP -> ballY -= rnd.nextInt(50)
        KeyEvent.KEYCODE_DPAD_DOWN -> ballY += rnd.nextInt(50)
        KeyEvent.KEYCODE_SPACE -> {
            ballX += rnd.nextInt(100) - 50
            ballY += rnd.nextInt(100) - 50
        }
        else -> return false  // event handled unhandled
     }
     invalidate()
     return true  // event handled
}
```

Project:List.zip

Option Menu

(onCreateOptionMenu)

```
<menu
    xmlns:android="http://schemas.android.com/apk/res/android">
    <item android:id="@+id/pause" android:icon="@drawable/pause“
          android:title="Pause">
    </item>
    <item android:id="@+id/play"  android:icon="@drawable/play“
          android:title="Play">
    </item>
    <item android:id="@+id/stop" android:icon="@drawable/stop"
          android:title="Stop">
    </item>
</menu>
```

```
override fun onCreateOptionsMenu(menu: Menu): Boolean {
    val inflater = menuInflater
    inflater.inflate(R.menu.activity_canvas, menu)
    return super.onCreateOptionsMenu(menu)
}
```

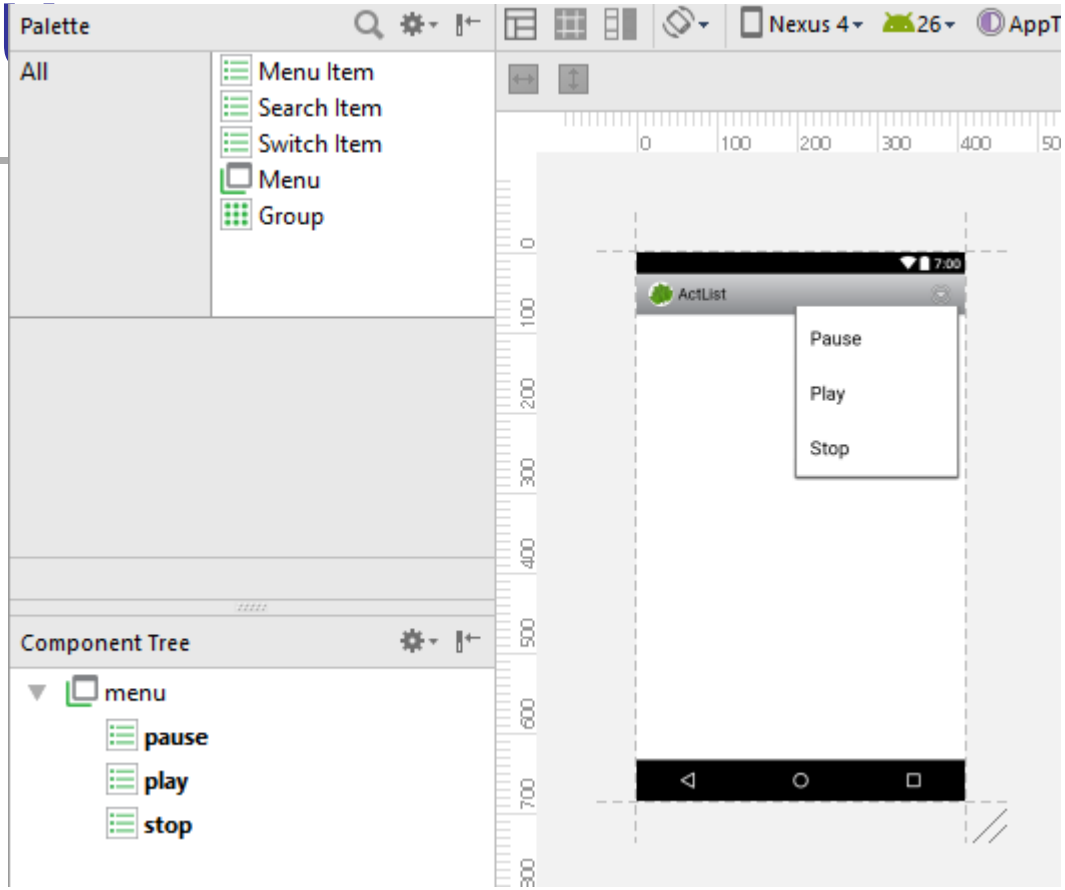
Project:List.zip

Option Menu

(onCreateOptionMenu)

Rovnako dobre to môžete navrhovať v editore

Spôsob zobrazenia a renderovania závisí na API level zariadenia




```
<menu
      xmlns:android="http://schemas.android.com/apk/res/android">
   <item android:id="@+id/pause" android:icon="@drawable/pause“                android:title="Pause">
     </item>
   <item android:id="@+id/play"  android:icon="@drawable/play"    android:title="Play">
     </item>
   <item android:id="@+id/stop" android:icon="@drawable/stop"     android:title="Stop">
     </item>
</menu>
```

```
@Override
```

Project:List.zip

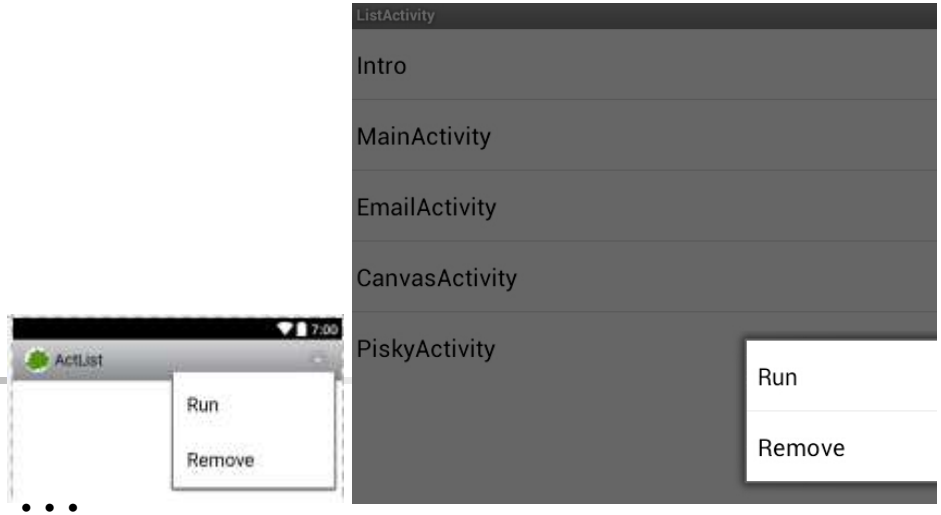
Option Menu

```
Thread th = new Thread() {
fun run() {
    while (!stopped) {
        if (!paused) {
            ...
```

```
override fun onOptionsItemSelected(item: MenuItem): Boolean {
    when (item.getItemId()) {
        R.id.pause -> {
            canvasView1.paused = true
            return true
        }
        R.id.play -> {
            canvasView1.paused = false
            return true
        }
        R.id.stop -> {
            canvasView1.stopped = true
            return true
        }
        else -> return super.onOptionsItemSelected(item)
    }
}
```

Project:List.zip

Context Menu



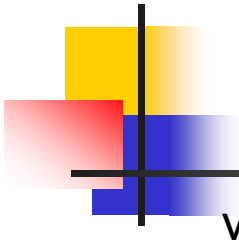

```
Override fun onCreate(
    savedInstanceState:Bundle?) {  ...
   registerForContextMenu(listView1); // na rozdiel od
} // OptionMenu, ContextMenu treba registrovať k príslušnému view
override fun onCreateContextMenu(menu: ContextMenu?, v: View?,
                menuInfo: ContextMenu.ContextMenuInfo? ) {
      getMenuInflater().inflate(R.menu.list_menu, menu)
}
```

```
override fun onContextItemSelected(item: MenuItem): Boolean {
  val info = item.getMenuInfo() as AdapterContextMenuInfo
  val className = actList.get(info.id.toInt())
  when (item.getItemId()) {
     R.id.remove -> {
          actList.removeAt(info.id.toInt())
           la.notifyDataSetChanged()
          return true
     }
```

Project:List.zip

invalidate() vs. postInvalidate()

(sumár poznatkov)



vo **View**, ak chceme modifikovať obsah, používame:

- `view.invalidate()` v GUI vlákne, t.j. v event handleroch onKey, onTouch
- `view.postInvalidate()` v iných (non-GUI) vláknach, ktoré chcú view modifikovať, alternatíva `Activity.runOnUiThread` (z minulej prednášky)

toto však nenastane hneď (podobne, ako Event Dispatch Thread vo JavaFx) nastane to po VSYNC (vertical synchronization), 40 fps ~ každých 25 ms

Všetky View sú kreslené v jednom GUI vlákne. Preto, ak

- chceme lepšie kontrolovať renderovanie (veľa) objektov,

resp.

- renderovanie objektov trvá dlho

používame triedu **SurfaceView**. To je však náročnejšie

- na cpu
- programovanie.

SurfaceView

(podtrieda View, nadtrieda ako GLSurfaceView, VideoView)

SurfaceView je typicky renderované iným vláknom pomocou SurfaceHolder.Callback

```
class GamePanel(context : Context) : SurfaceView(context),
                                     SurfaceHolder.Callback {

    lateinit  var thread : GameThread              // vlákno hry
    init {
       getHolder().addCallback(this); //kto implementuje SurfaceHolder
       thread = GameThread(this);
       setFocusable(true);
    }
    override fun surfaceCreated(holder: SurfaceHolder?) {
       thread.start();                          // entry point pre SfV
    }

    override fun surfaceDestroyed(holder: SurfaceHolder?) {
       // exit point SfV-treba zastaviť vlákno hry a počkať kým skončí
```

https://developer.android.com/reference/android/view/SurfaceView.html

Project:List.zip

GameThread

(čo robí vlákno hry - alternatíva k invalidate)

```
class GameThread(val gamePanel: GamePanel) : Thread() {
                          // zapamätáme v konštruktore GameTread
    override fun run() {  // hlavný cyklus vlákna, hry, simulácie
        val surfaceHolder = gamePanel.holder
        while (running) {
            try {
                canvas = surfaceHolder.lockCanvas();
                synchronized (surfaceHolder) {
                    for (i in gamePanel.pikaList.indices)
                        gamePanel.pika[i].update(gamePanel.getWidth(),
                                                 gamePanel.getHeight())
                    gamePanel.showPika(canvas) // draw
                    running = gamePanel.killed < gamePanel.pika.length
                try {Thread.sleep(FRAME_PERIOD-elapsedTime)} catch (){}
                }
            } finally {
                surfaceHolder.unlockCanvasAndPost(canvas) }
```

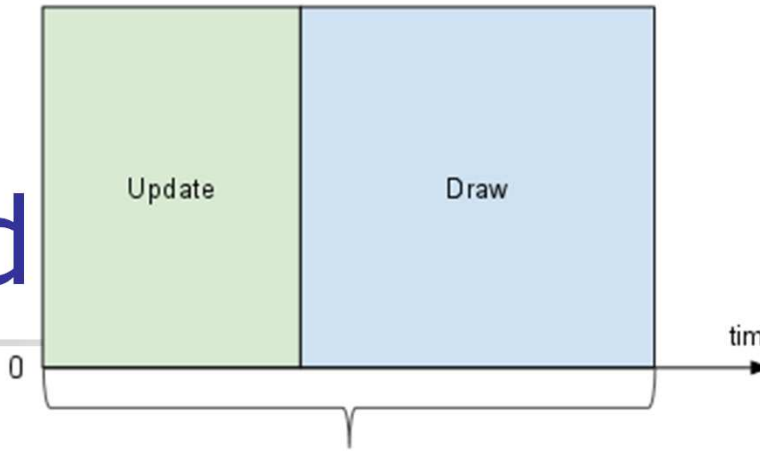
vlákno nemusí byť jediné

elapsedTime

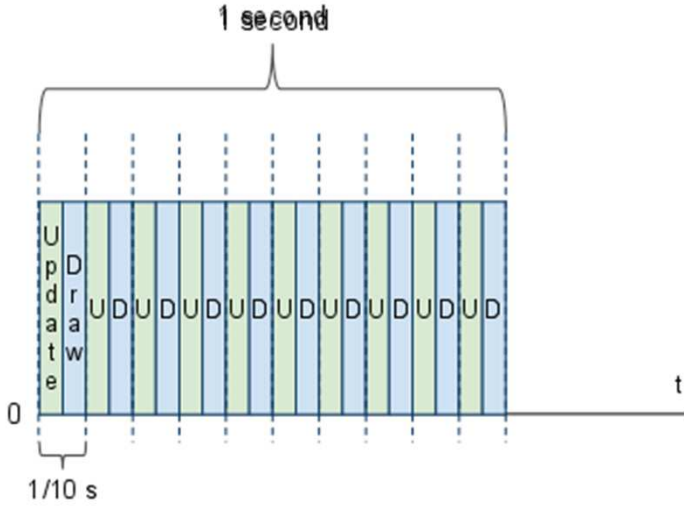
Project:01Intro/ActiList.zip

Project:List.zip

Frame per second



- 1 Frame per Second

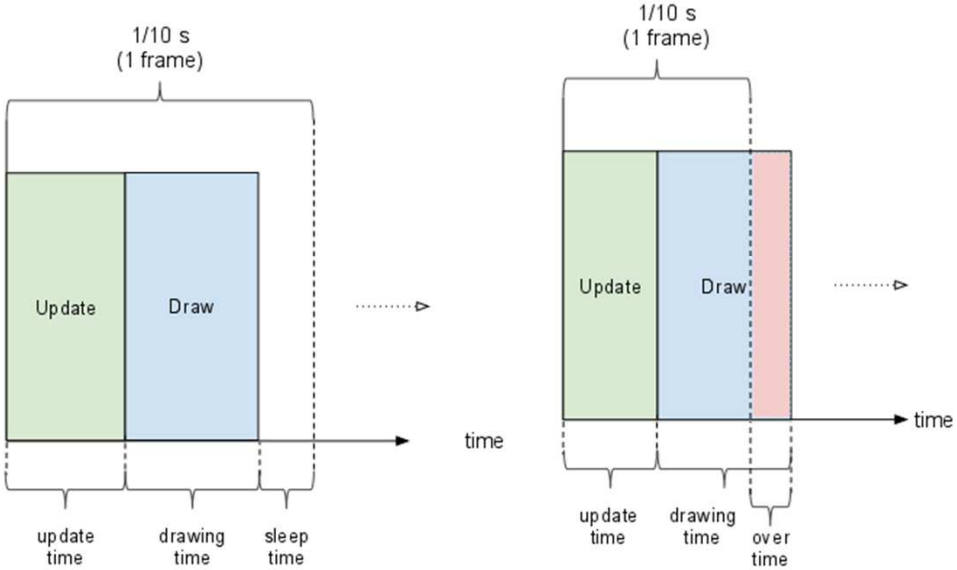


Chceli by sme viac, napr. 10 fps

```
FRAME_PERIOD = 1000 / 10; //10 fps
```

Môže sa nám stať, že to

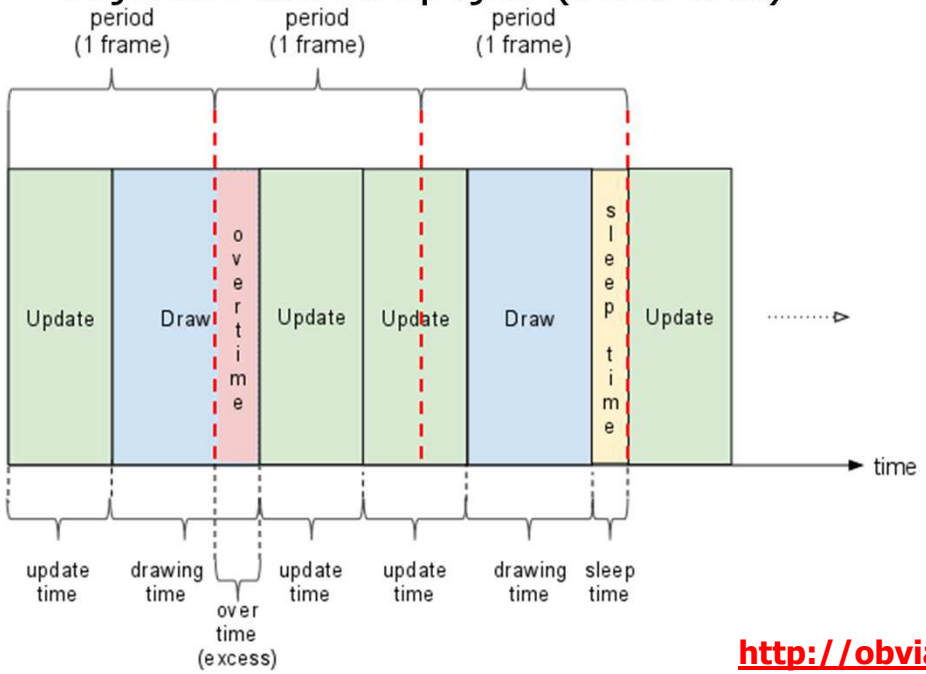
stihneme alebo nestihneme



http://obviam.net/index.php/the-android-game-loop/

Čo ak nestíhame vykreslovať

- ak nestíhame vykreslovať, nemali by sme zmenšiť rýchlosť hry,
- rýchlosť hry nie je rýchlosť vykreslovania,
- radšej niektoré prekreslenia scény vynecháme, sústredíme sa na update stavu hry,
- výsledkom je hra, ktorá sa nespomaluje kvôli vykreslovaniu, ale pohyby objektov nie sú spojité (seká to...)

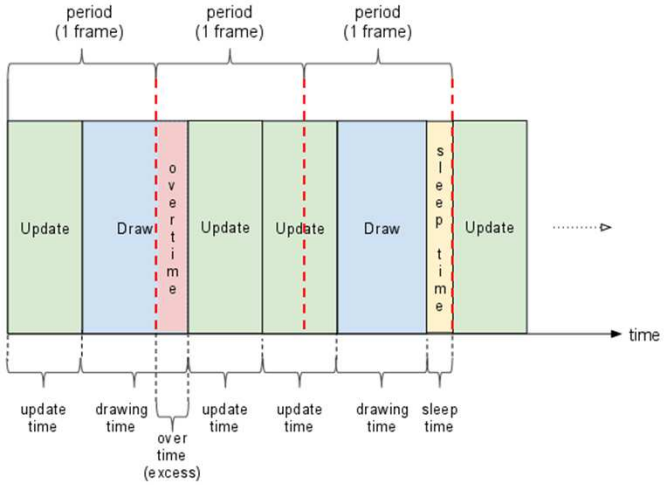


http://obviam.net/index.php/the-android-game-loop/

```
FRAME_PERIOD = 1000/50; //50 fps
```

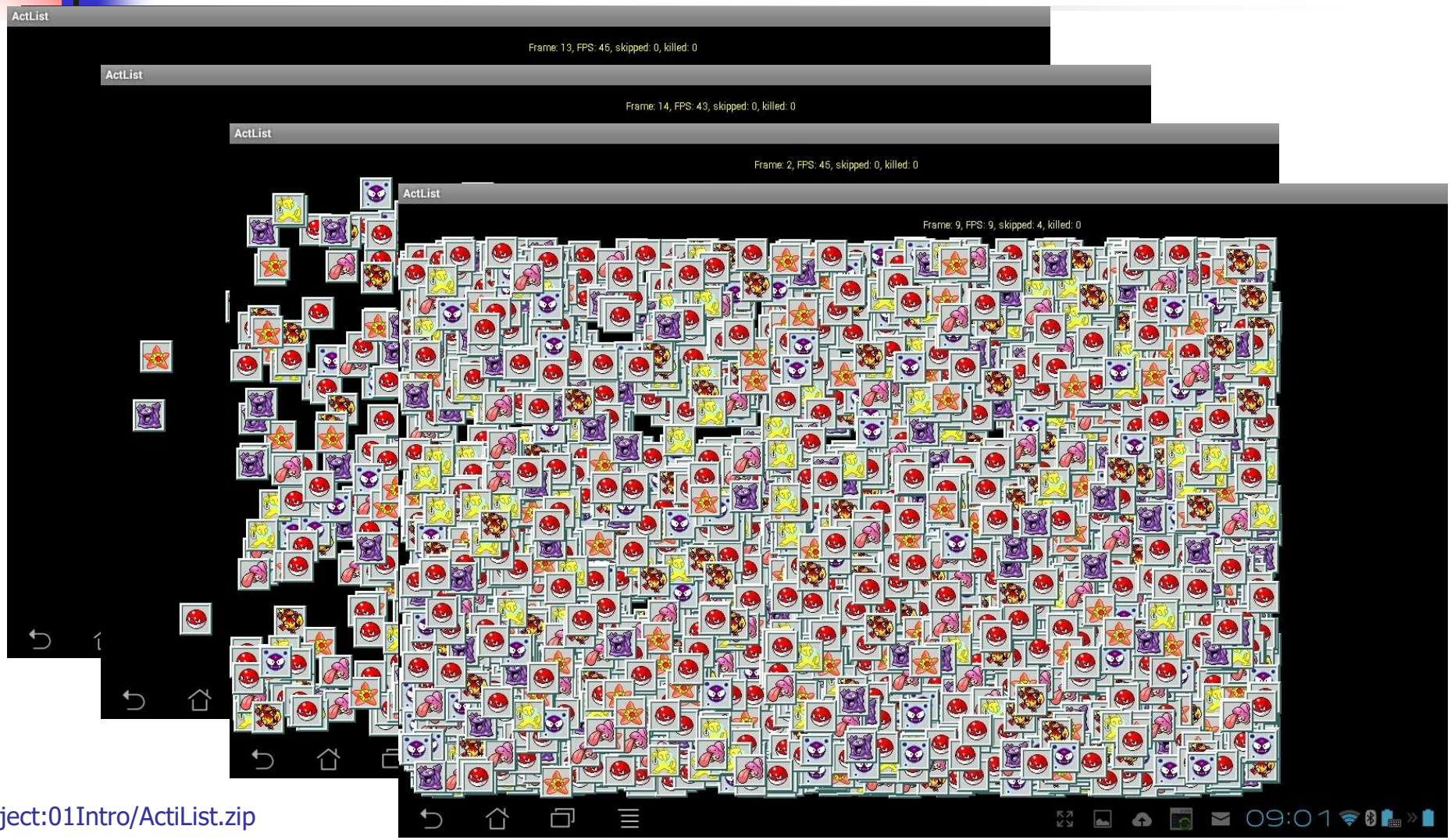
Preskočíme pár vykreslovaní

```
if (elapsedTime <= FRAME_PERIOD) { // lepší prípad, stíhame
   try {                           // počkáme zvyšný čas
        Thread.sleep(FRAME_PERIOD - elapsedTime)
   } catch (InterruptedException e) {}
}
while (elapsedTime > FRAME_PERIOD) { // nestíhame
   for (int i = 0; i < r.pika.length; i++)
        r.pika[i].update(r.getWidth(), r.getHeight())
   elapsedTime -= FRAME_PERIOD
   skippedInPeriod++
}
framesInPeriod++
```



http://obviam.net/index.php/the-android-game-loop/

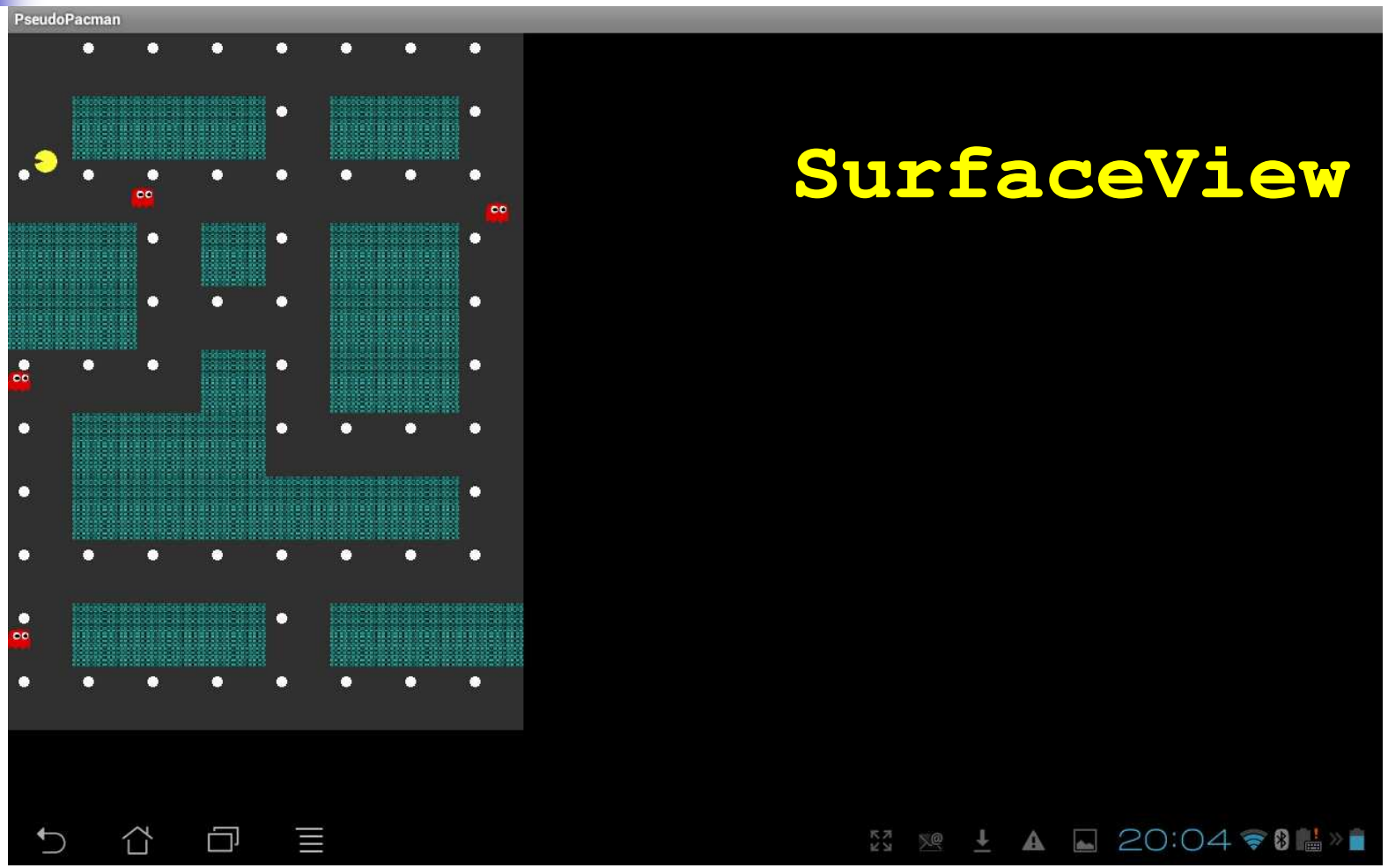
5, 50, 500, 5000 Pikachus



Project:01Intro/ActiList.zip

Študentské projekty

R.Kriek, Pacman.zip



Prémie miesto úloh

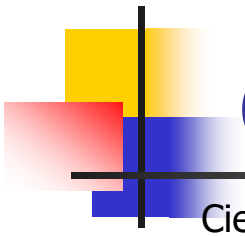
(a budú ďalšie)

- Dorobiť do hier PacMan či Tetris ovládanie pomocou akcelelačného a orientačného senzora zariadenia
- PacMan (2D = pohyby vľavo, vpravo, hore, dole) = 5 bodov (clonuj)
- Arcanoid = Naprogramujte dnes už hernú klasiku, hru Arkanoid, ešte z čias Commodore 64. Pre inšpiráciu, resp. ak netušíte o akú hru ide, sa inšpirujte z google play, akýkoľvek arkanoid... Podmienkou je vaša vlastná implementácia.

- Kalkulačka v 7mičkovej sústave (classic)
- Díško – tringelt advisor (clonuj)
- Maľovátko (clonuj existujúci projekt)

- InstantApp (absolute challenge)
- MasterDetail (fragmenty)

Domáca úloha 3 - Gameska
(deadline do 25.nov)



Cieľom domácej úlohy je, aby ste navrhli a naprogramovali pomocou triedy Canvas, SurfaceView, resp. podtried nejakú logickú **ALEBO** akčnú hru.
Pravidlá hodnotenia:

- **5 bodov**, ak je hra funkčná, hrateľná, ale žiaden super dojem, bez bonusových features...
- **10 bodov**, ak je radosť si zahrať, hoc aj hra môže byť jednoduchá, ale je vyšperkovaná zaujímavými fičúrkami, graficky cool, ...
- **+1 bod**, ak vaša úloha NEBUDE remake z DÚ 1 (čo ste robili pre MIT Inventor), informujte o tom v README.TXT, aby sme sa neuhľadali k smrti...,
- **+1 bod**, ak kód nebude v Jave ale v Kotline, informujte o tom v README.TXT, aj keď u tejto úlohy sa zdrojáky budú pozerať...
- ak kód, resp. výrazná časť z neho, nebude vaše dielo, **0 bodov**.

Ako uložiť dáta/nastavenia
(lokálne/na server)

- SharedPreferences - umožní uložiť dvojice (kľúč, hodnota) pre hodnoty typu int, boolean, string, float, … a podskytuje metódy
  - [get|put][Boolean|Float|String|Long|Int]
- Súbory – ukladá do internej resp. externej pamäte zariadenia
- Databáza – sqlite (http://www.sqlite.org/) - open-source, sql-standard, malá a ľahko použiteľná DB vo vašom zariadení
- Vlastný server – protokol najčastejšie http-https
  - ~~najčastejšie (v bakalárkach) AMP – Apache-MySQL-PHP~~ **OLD STYLE**
- Cloudový server - poskytuje nejaké SDK pre našu platformu
  - www.parse.com – iOS, Android, JS, Unity, PHP, Xamarin, Arduino, ...
  - Firebase API – iOS, Android, C++
  - Google datastore API – iOS, Android, JS, PHP, ...

príde neskôr...

Kľúče si nejako pomenujeme:

```
LOGIN_ENTRY_KEY = "login";
SUCCLOGS_ENTRY_KEY = "SUCC";
```

SharedPreferences

(nič jednoduchšie...)

LoginActivity si pamätá login a passwd, v prípade úspešného prihlásenia, a tiež počet úspešných a neúspešných prihlásení

```
SharedPreferences settings =
        getPreferences(Activity. MODE_PRIVATE); // alebo
        getSharedPreferences("seti", Activity. MODE_PRIVATE);
                    ...MODE_WORLD_READABLE, MODE_WORLD_WRITABLE
        PreferenceManager.getDefaultSharedPreferences(this);
```

Načítanie:

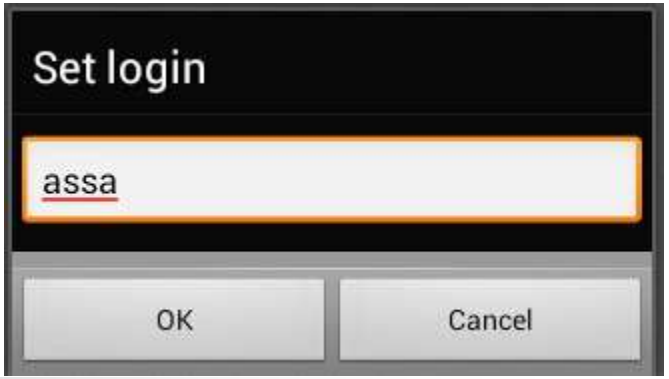
```
settings.getString(LOGIN_ENTRY_KEY, "");//"" default hodnota
settings.getInt(SUCCLOGS_ENTRY_KEY, 0); //0 ak sa nenachádza
```

Uloženie:

```
settings.edit().putString(LOGIN_ENTRY_KEY, ...);
settings.edit().putInt(SUCCLOGS_ENTRY_KEY, ...);
settings.edit().commit();
```

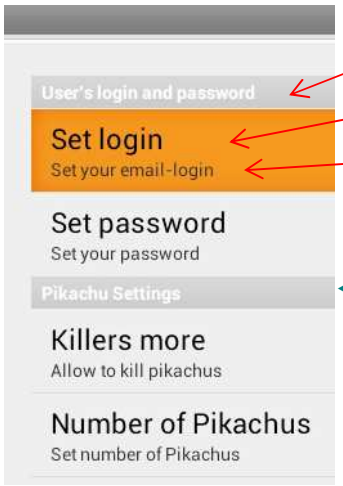
Project:01Intro/ActiList.zip

PreferenceActivity




```
public class MyPreferenceActivity extends PreferenceActivity {
public void onCreate(Bundle savedInstanceState) {
   super.onCreate(savedInstanceState);
   addPreferencesFromResource(R.xml.settings);
```

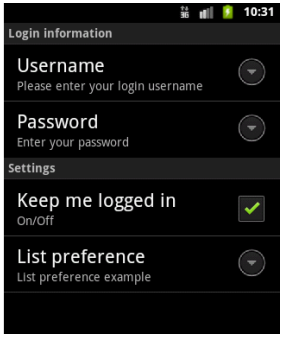
```
<PreferenceCategory
   android:title="@string/pref_login_pass_profile" >
      <EditTextPreference
         android:title="@Set login"
         android:summary= "Set your email-login"
         android:key="prefLogin"/>
<EditTextPreference
         android:title="@string/pref_pass"
         android:summary="@string/pref_pass_summary"
         android:key="prefPass"/>
</PreferenceCategory>
```

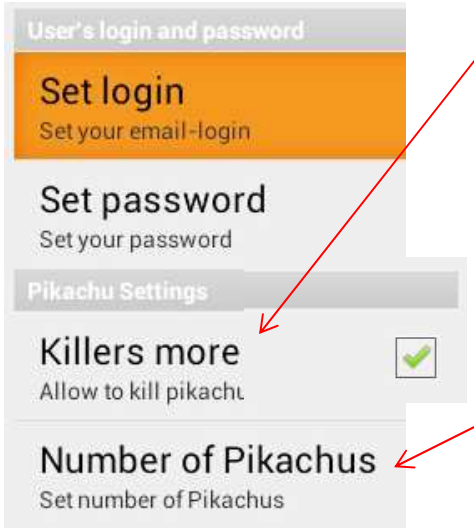


Project:01Intro/ActiList.zip

PreferenceCategories

(xml)



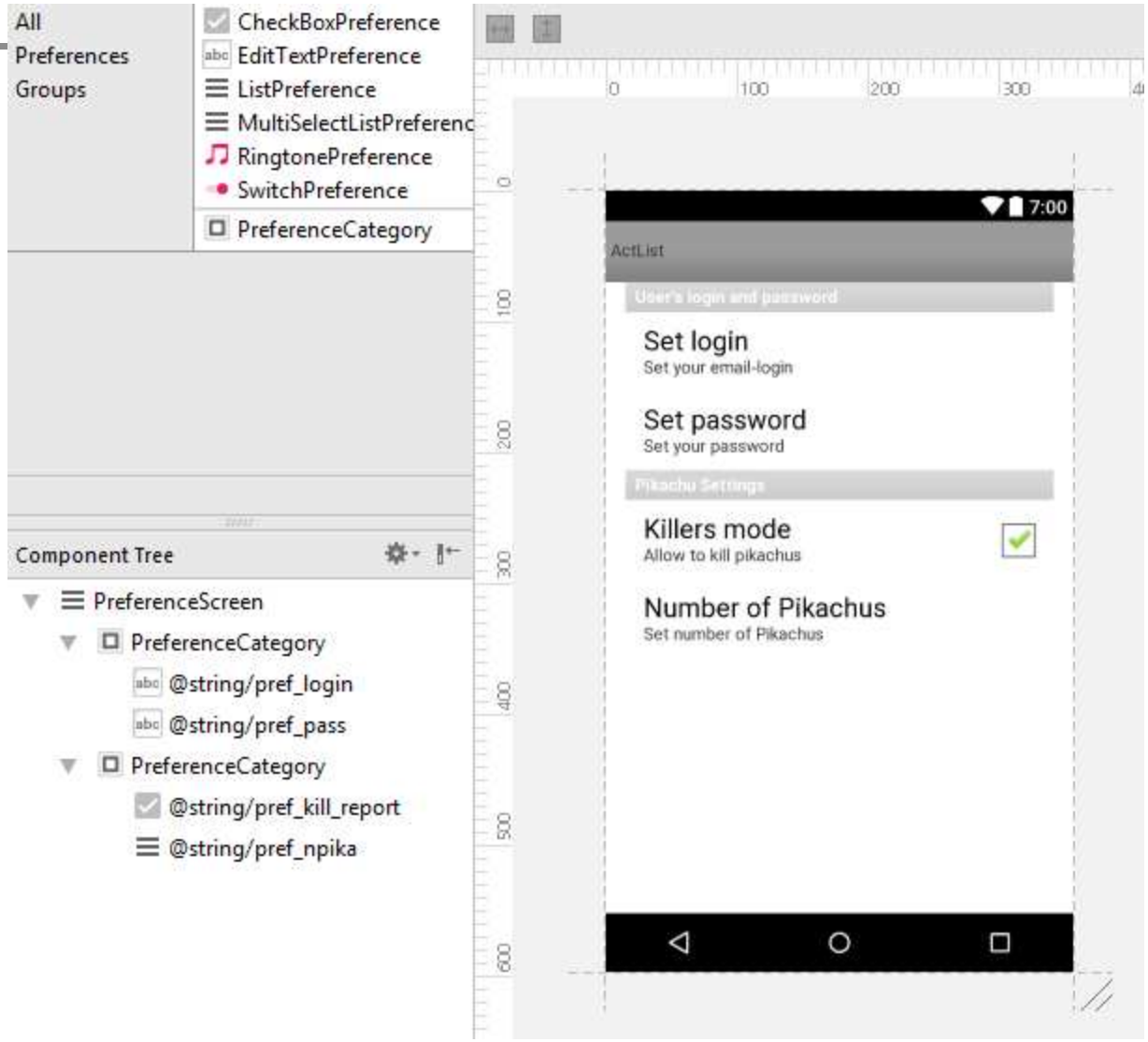



```
<PreferenceCategory android:title= "Pikachu settings" >
    <CheckBoxPreference
        android:defaultValue="true"
        android:key="prefKill"
        android:summary="Allow to kill pikachus"
        android:title="@Killers mode" >
    </CheckBoxPreference>

    <ListPreference
        android:key="prefCount"
        android:entries="@array/pikaCount"
        android:summary="Set number of Pikachus"
        android:entryValues="@array/pikaValues"
        android:title="Number of Pikachus" />
</PreferenceCategory>
```

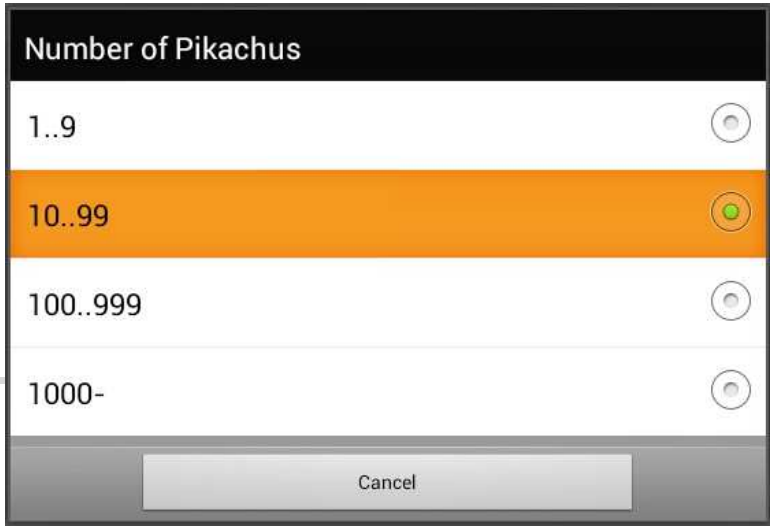
Project:01Intro/ActiList.zip

PreferenceCategories

(editor)



ListPreferences




```
<resources>
<string-array name="pikaCount">
        <item name="1">1..9</item>
        <item name="10">10..99</item>
        <item name="100">100..999</item>
        <item name="1000">1000-</item>
    </string-array>
<string-array name="pikaValues">
        <item name="1">5</item>
        <item name="10">50</item>
        <item name="100">500</item>
        <item name="1000">5000</item>
    </string-array>

</resources>
```

Project:01Intro/ActiList.zip

Externé adresáre/súbory

(nie je najskvelejšia idea, ale ak potrebujete, tak ...)

Ak chceme informáciu zapísať do súboru, najprv si musíme vybrať adresár, do ktorého chceme písať/čítať:

```
Resources res = getResources();                 // read-only
InputStream is = res.openRawResource(R.raw.tada);
...
File directory = Environment.getExternalStorageDirectory();
alebo  Environment.getExternalStoragePublicDirectory(
                        Environment.DIRECTORY_MUSIC);
                        Environment.DIRECTORY_PICTURES);
                        Environment.MOVIES);
                        Environment.DCIM);     // kamera
                  . . .
directory.isDirectory();
directory.isFile();
directory.exists();
```

Project:01Intro/ActiList.zip

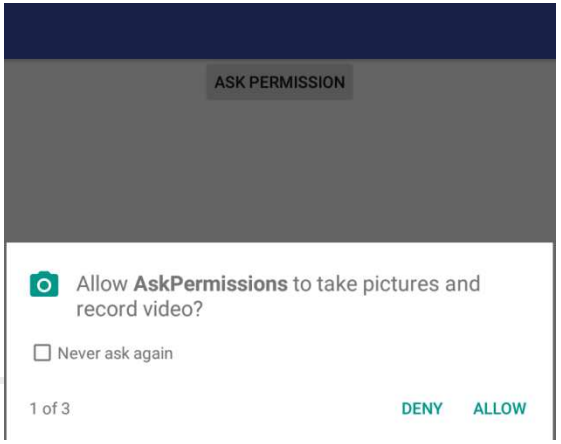
Súbory

```
String fileName = "settings.my";
String fullPath = directory.getAbsolutePath() + fileName;
try {
   File f = new File(directory, fileName);
   test či f.exists()
   FileInputStream fis = new FileInputStream(f);
   alebo
   FileInputStream fis = openFileInput(fullPath);
   FileOutputStream fos = openFileOutput(fullPath,
                                  Context.MODE_PRIVATE);
                                        Context.MODE_APPEND);
} catch (...) {
```

```
<android:uses-permission android:name="android.permission.WRITE_EXTERNAL_STORAGE"/
<android:uses-permission android:name="android.permission.READ_EXTERNAL_STORAGE"/>
```

Project:01Intro/ActiList.zip

Runtime Permissions



Povolenia sú:

- neohrozujú vaše privátne dáta (INTERNET, BLUETOOTH, ACCESS_WIFI)
- nebezpečné (ACCESS_FINE_LOCATION, [READ/WRITE]_CONTACTS)

Ak máte Android <= 5.1 || target SDK < 23, <uses-permissions v Manifest.xml, Povolenia sa získavajú staticky pri inštalácií, ak užívateľ odmietne, neinštaluje sa.

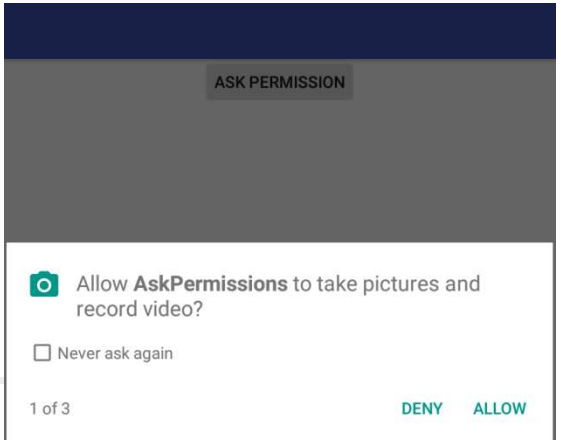
Inak (Android >= 6.0 || target SDK >= 23) aplikácia môže žiadať počas behu. Ak užívateľ odmietne, aplikácia beží ďalej.

Aj dynamické permissions píšete do AndroidManifest.xml

```
<uses-permission android:name="android.permission.CAMERA" />
<uses-permission-sdk-23 android:name="android.permission.READ_CONTACTS" />
<uses-permission-sdk-23 android:name="android.permission.WRITE_CONTACTS" /
<uses-permission-sdk-23 android:name="android.permission.ACCESS_FINE_LOCATION" /
```

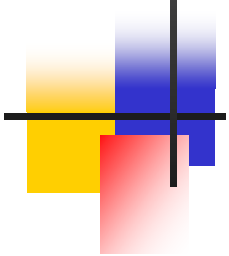
Project:01Intro/AskPermissions.zip

Runtime Permissions



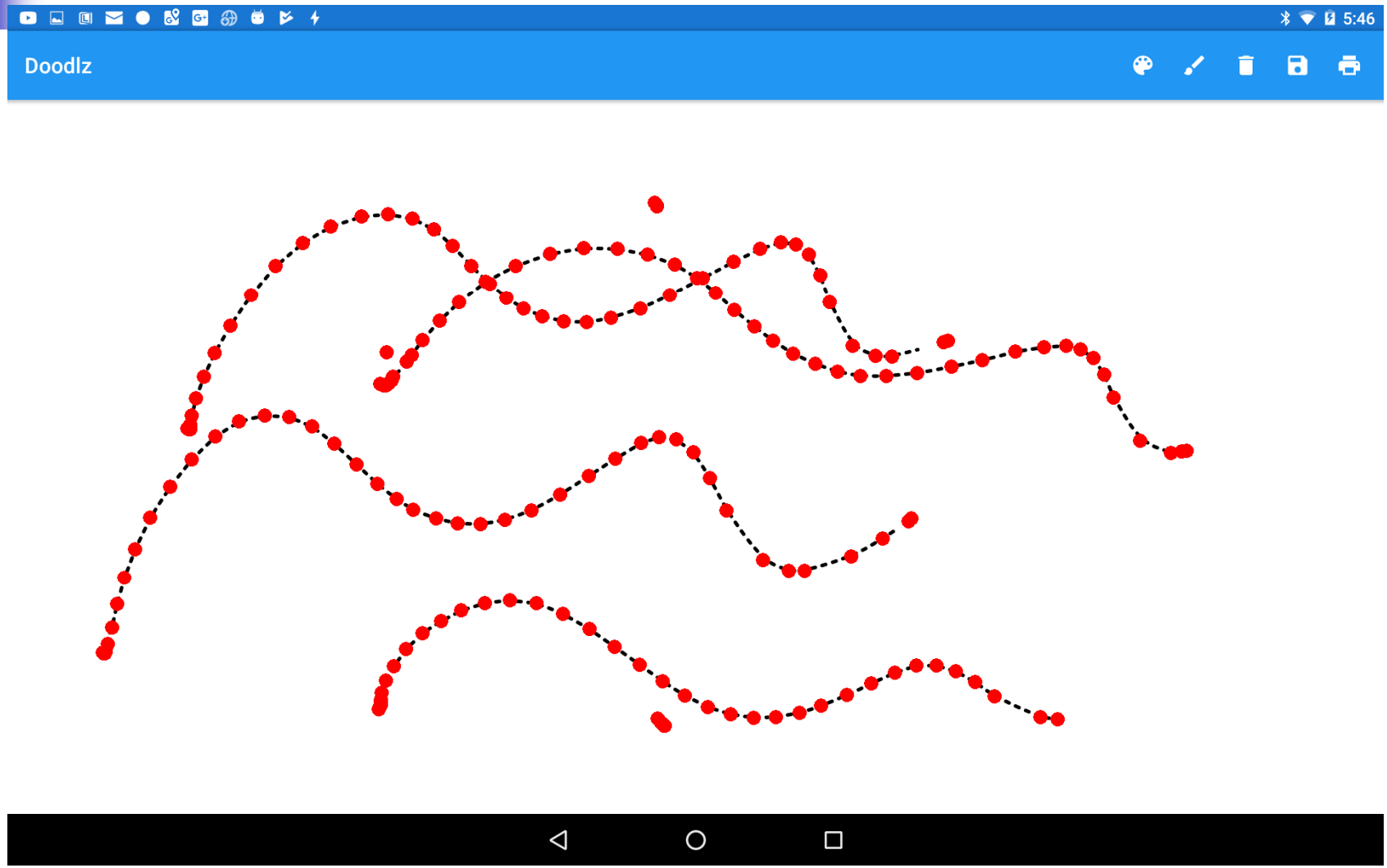

```
final int RUNTIME_PERMISSION_REQUEST_CODE = 999;
final String[] perms = new String[] {
   Manifest.permission.WRITE_CONTACTS, Manifest.permission.CAMERA,
   Manifest.permission.ACCESS_FINE_LOCATION };
...
if (getApplicationContext().checkSelfPermission(
   Manifest.permission.READ_CONTACTS) !=
   PackageManager.PERMISSION_GRANTED) {
      requestPermissions(perms, RUNTIME_PERMISSION_REQUEST_CODE);
}
public void onRequestPermissionsResult(int requestCode,
           String permissions[], int[] grantResults) {
  switch (requestCode) {
     case RUNTIME_PERMISSION_REQUEST_CODE: {
        for(int i = 0; i < grantResults.length; i++) {
           Log.d("Permissions", grantResults[i] ==
              PackageManager.PERMISSION_GRANTED ? "GRANTED": "DENIED");
```

Project:01Intro/AskPermissions.zip



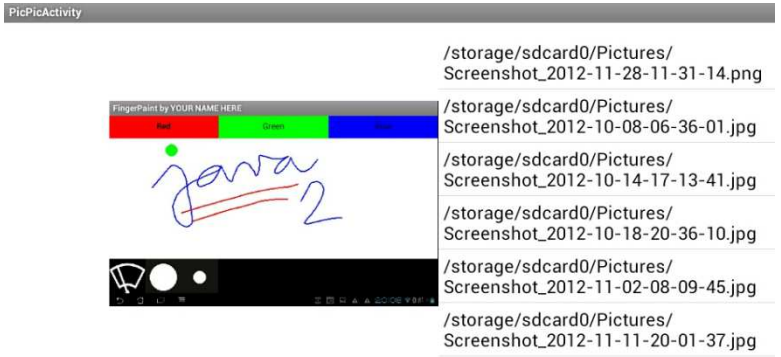
Prémia

(na tému maľovátka)



PicPicActivity

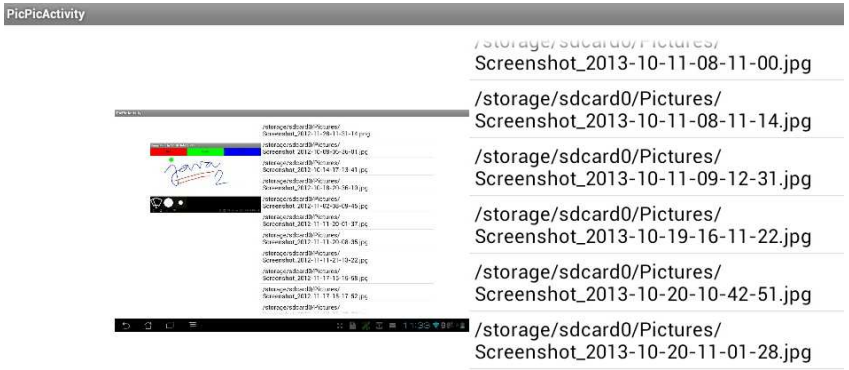
(picture picker)




```
ArrayList<String> fileNames = new ArrayList<String>();
File directory = // vylistuj všetky obrázky z Pictures
        Environment.getExternalStoragePublicDirectory(
                Environment.DIRECTORY_PICTURES);

if (directory.exists() && directory.isDirectory()) {
   File[] files = directory.listFiles(); // všetky súbory
   for (File f : files) {                      // bez filtrovania
        if (f.isFile())                  // nie je to podadresár
            fileNames.add(f.getAbsolutePath());      // pridaj
}
ListView lv = (ListView) findViewById(R.id.listView1);
lv.setAdapter(new ArrayAdapter<String>(PicPicActivity.this,
        android.R.layout.simple_list_item_1, fileNames));
```

Project:01Intro/ActiList.zip

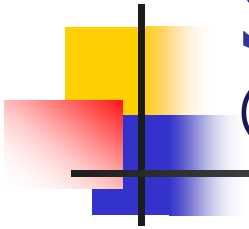
ImageView
(BitmapFactory)



Ak klikneme na položku v zozname, chceme aby sa zobrazil obrázok

```
public void onItemClick(AdapterView<?> av, View v, int indx,
                                                    long arg3) {

   String absolutePath = (String)av.getItemAtPosition(indx);
   File imgFile = new  File(absolutePath);
   if (imgFile.exists()){
        Bitmap myBitmap = BitmapFactory.
                decodeFile(imgFile.getAbsolutePath());
     ImageView iv = (ImageView)findViewById(R.id.imageView1);
     iv.setImageBitmap(myBitmap);
}
```

Project:01Intro/ActiList.zip



SQLite

(SQLiteDatabase, execSQL)

```
SQLiteDatabase mydb = openOrCreateDatabase("MYDB",
        SQLiteDatabase.CREATE_IF_NECESSARY, null);

mydb.execSQL("drop table if exists pics;");

mydb.execSQL("create table pics ( filename TEXT,
                                  size INTEGER
                                );");
File[] files = directory.listFiles();
   for (File f : files) {
      if (f.isFile()) {
          mydb.execSQL("insert into pics values ('"+
          f.getAbsolutePath() + "'," + f.length() + ");");
      }
}
```

Project:01Intro/ActiList.zip

SQLite
(Cursor, query)

```
ArrayList<String> fileNames = new ArrayList<String>();
Cursor cc = mydb.query("pics",       // meno tabuľky
        new String[] { "filename", "size" }, // stĺpce
        null, null, null, null, null); // where, group, order
if (cc.moveToFirst()) {                // false ak je prázdna
   while (!cc.isAfterLast()) {         // cyklus až do konca
        int colindx = cc.getColumnIndex("filename");
        if (colindx >= 0) {            // index stĺpca filename
                String fileName = cc.getString(colindx);
                fileNames.add(fileName);      // hodnota
        }
        cc.moveToNext();                      // ďalší z cursora
   }
}                                      // ďalej nepotrebujem cc
cc.close();
```

Project:01Intro/ActiList.zip