Mobile- and Web-based Software

Lecture 2: Hello World

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Agenda

- Manifest file
- Build process
- APK file

Android project elements

- Package: unique identifier
- Java source
- Resources
  - Layout (XML)
  - Themes and styles (XML)
  - Text elements (XML)
  - Animations and other dynamic graphics (XML)
  - Images, sound, video, etc.
- R.java (generated automatically)
- AndroidManifest.xml
- External libraries (.jar or other projects)

Manifest file

Manifest file

- Application descriptor
- Meta information
- Pre-defined component list
  - Can be modified dynamically from code
- XML format
- The system checks the descriptors and components in the Manifest
- Other meta information like minimal Android version, permissions, etc.
- It is checked by the system before installation

Manifest content

- Java package – **unique identifier**
- Permissions (e.g.: Internet access, Location information, Phone calls, etc.)
- Minimum API level
- Hardware and software requirements (e.g. necessary camera, etc.)
- External APIs (e.g.: Google Maps API)

Manifest example 1/2

```
<?xml version="1.0" encoding="utf-8"?>
<manifest xmlns:android=
  "http://schemas.android.com/apk/res/android"
    package="hu.bute.daai.amorg.examples"
    android:versionCode="1"
    android:versionName="1.0" >
    <uses-sdk android:minSdkVersion="7" />
    <application
        android:icon="@drawable/ic_launcher"
        android:label="@string/app_name" >
        <activity …>…</activity>
    </application>
</manifest>
```

Unique package name (identifier)

Minimum supported version

Application icon and label

Manifest example2/2

```
<?xml version="1.0" encoding="utf-8"?>
<manifest …/>
    …
    <application …>
        <activity
            android:name=".MainActivity"
            android:label="@string/app_name">
            <intent-filter>
                <action android:name=
                  "android.intent.action.MAIN"/>
                <category android:name=
                  "android.intent.category.LAUNCHER"/>
            </intent-filter>
        </activity>
    </application>
</manifest>
```

Activity class and title

Application entry point

Appears in the applications list

Manifest attributes and tags

- `android:icon`: application icon
- `android:name`: Application name with package name
- `android:label`: Application title
- List of components:
  - `<activity>`: Activity
  - `<service>`: Service
  - `<provider>`: Content provider
  - `<receiver>`: Broadcast receiver
- The *Activities*, *Services* and *ContentProviders* that are not present in the Manifest, are not visible for the system
- **However** *BroadcastReceivers* can be defined dynamically from code: `registerReceiver()`

What is true about Manifest file?

A. Only Activities should be listed in it.

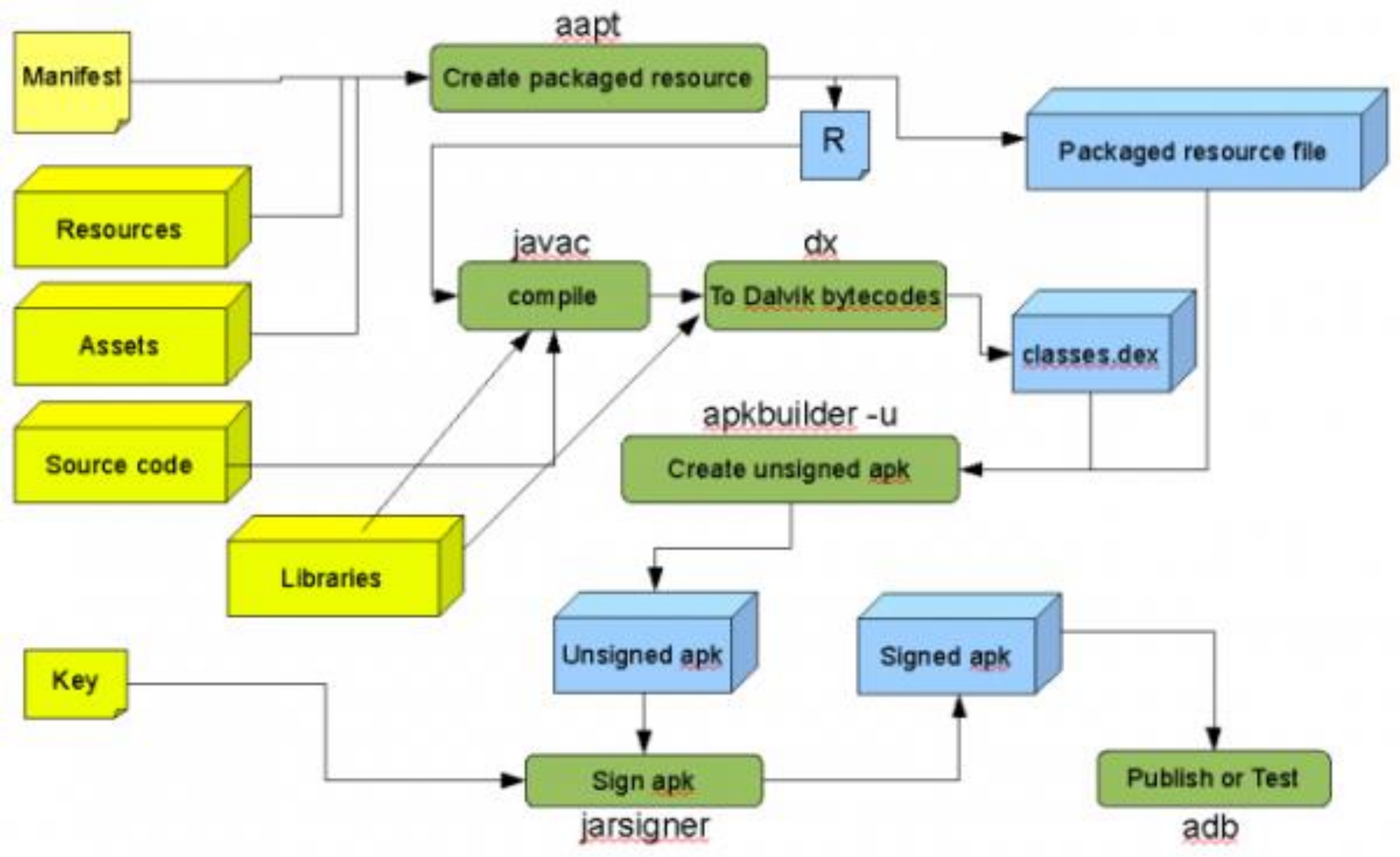
B. It can contain only one Activity component.

C. All components must be listed in it (except dynamically attached BroadcastReceivers).

D. Can contain XML and Java code as well.

APK file

Build mechanism (source >.apk)



Source: http://androidmaterial.blogspot.hu/2011/05/how-to-build-android-application.html

The .apk file

- It is close to Java .jar files, but has major differences
- ZIP file, can be extracted
- Compressed file with the following typical content:
  - META-INF folder
    - CERT.RSA: certificate
    - MANIFEST.MF: meta information
    - CERT.SF: resource list and SHA1 prints

```
Signature-Version: 1.0
Created-By: 1.0 (Android)
SHA1-Digest-Manifest: wxqnEAI0UA5nO5QJ8CGMwjkGGWE=
...
Name: res/layout/exchange_component_back_bottom.xml
SHA1-Digest: eACjMjESj7Zkf0cBFTZ0nqWrt7w=
...
Name: res/drawable-hdpi/icon.png
SHA1-Digest: DGEqylP8W0n0iV/ZzBx3MW0WGCA=
```

  - Res folder: resources
  - AndroidManifest.xml (meta): name, version, permissions, components, etc.
  - classes.dex: Dalvik binary
  - resources.arsc

Android LogCat

- System debug output
- Application and system log can be monitored
- Built-in Log class with different log level support:
  - v(String, String) (verbose)
  - d(String, String) (debug)
  - i(String, String) (information)
  - w(String, String) (warning)
  - e(String, String) (error)
- Log.i("MyActivity", " Position: " + position);
- Can be redirected into a file
  - logcat –f <filename>
  - http://developer.android.com/tools/help/logcat.html

Questions?