Praktikum Entwicklung von Mediensystemen (Android)

Wintersemester 2014/15

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Media Informatics munich

Today

- Organization
- Android 101
- Hands-On
- Assignment 01

Organization

- Android!
- 6 ECTS
- Bachelor: Vertiefendes Thema
- Master: Gruppenpraktikum
- Thursday, 16-18h, Amalienstr. 17, A107
- koestersr@cip.ifi.lmu.de
- http://www.medien.ifi.lmu.de/lehre/ws1415/pem/
- Hand in assignments via Uniworx

Roadmap

- October: Lectures
  - Individual assignments
- November, December, January: App development in teams
  - Groups of 4 (tbc)
  - 4 Milestone presentations (everyone is up once)
- January: Final presentation and showcase
- Next lectures: 16.10. and 30.10.2014

ANDROID 101

Android in a Nutshell

- AOSP (Android Open Source Project) maintaining code, open source
- Linux subsystem
- Specialized Java VM (Dalvik and ART)
- Currently version 4.4 (KitKat)
- Google adds additional services
  - Google Play Store
  - Google Apps (Mail, Chrome, Maps, …)

Lots of Cool Features

- Multiple sensors
  - Accelerometer, gyroscope, magnetometer,
- Communication interfaces
  - NFC, Bluetooth LE, Wifi, cellular
- GPS and cell location
- Cameras
- High definition displays
- Hardware keys and virtual controls

Programming Languages

- Mainly: Java (converted to Dalvik bytecode)
  - Baseline 1.6, some features of 1.7+
  - Limited namespace from classic JDK
  - Additional namespaces for new features
- Resources: XML
  - Layouts
  - Resource files (localizations, settings)
- NDK for native C/C++ programming

System Resources

- Apps compete for the “main” display
- Could be paused/terminated at all time
- Can be interrupted by various events
  - Phone call
  - App switch
  - …
- Limited number of resources available

Network Connectivity

- Changing network availability
- Flaky connectivity and unpredictable bandwidth

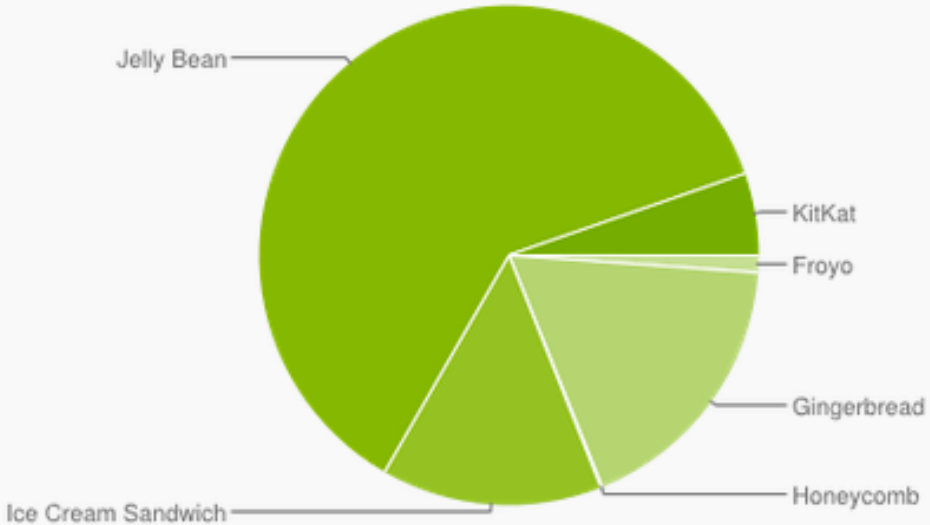
- Plan accordingly
  - Keep the in/out data small
  - Cache static data
- Network requests must be executed on separate threads (i.e. not on main thread)

Device Fragmentation

- Multitude of different device configurations out in the wild
  - Screen size and resolution
  - Features and sensors
  - …
- No standard configuration that can be targeted
- Low adaptation rate of new Android versions (if available at all)

Version Distribution

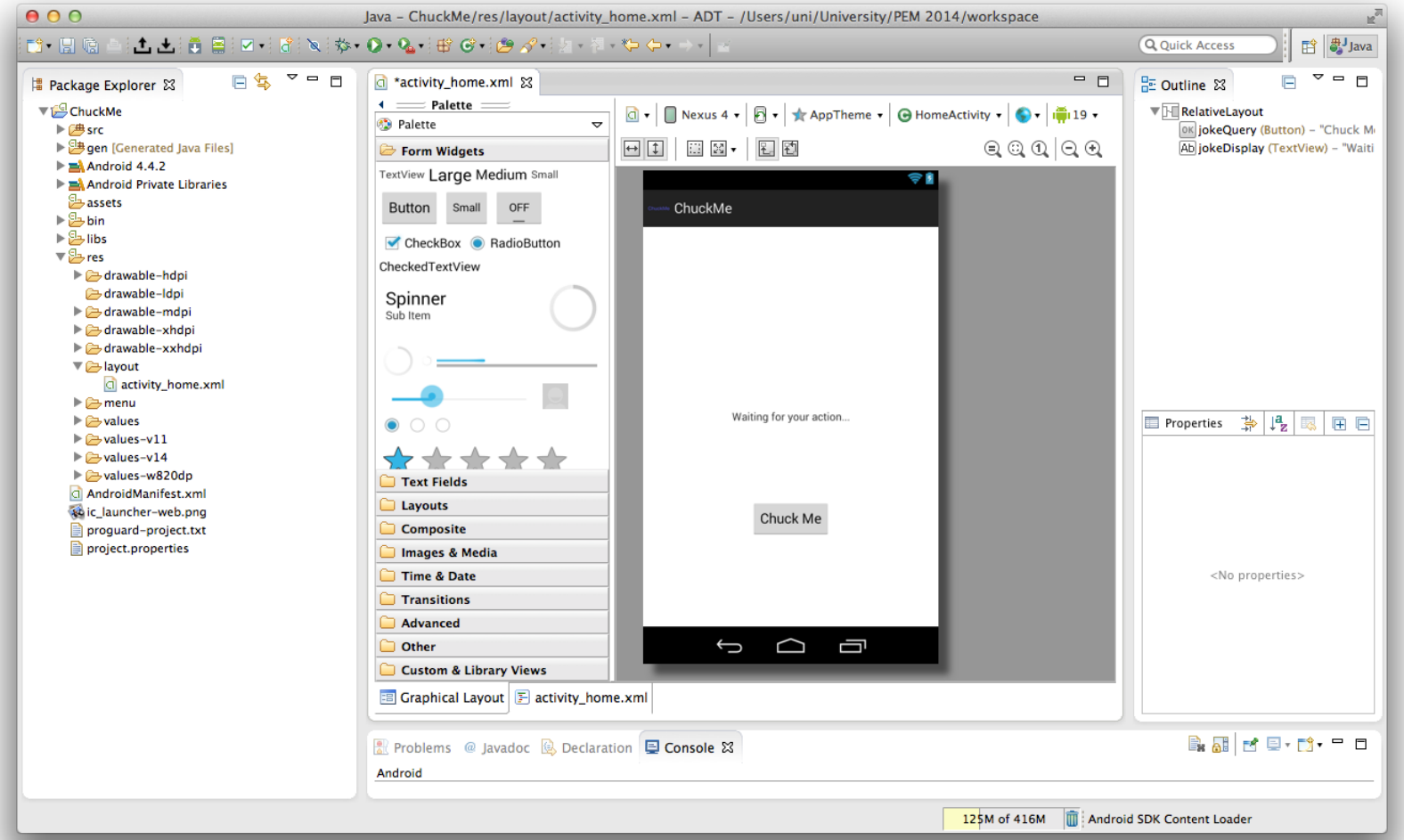
Version	Codename	API	Distribution
2.2	Froyo	8	1.1%
2.3.3 - 2.3.7	Gingerbread	10	17.8%
3.2	Honeycomb	13	0.1%
4.0.3 - 4.0.4	Ice Cream Sandwich	15	14.3%
4.1.x	Jelly Bean	16	34.4%
4.2.x		17	18.1%
4.3		18	8.9%
4.4	KitKat	19	5.3%



Data collected during a 7-day period ending on April 1, 2014.
Any versions with less than 0.1% distribution are not shown.

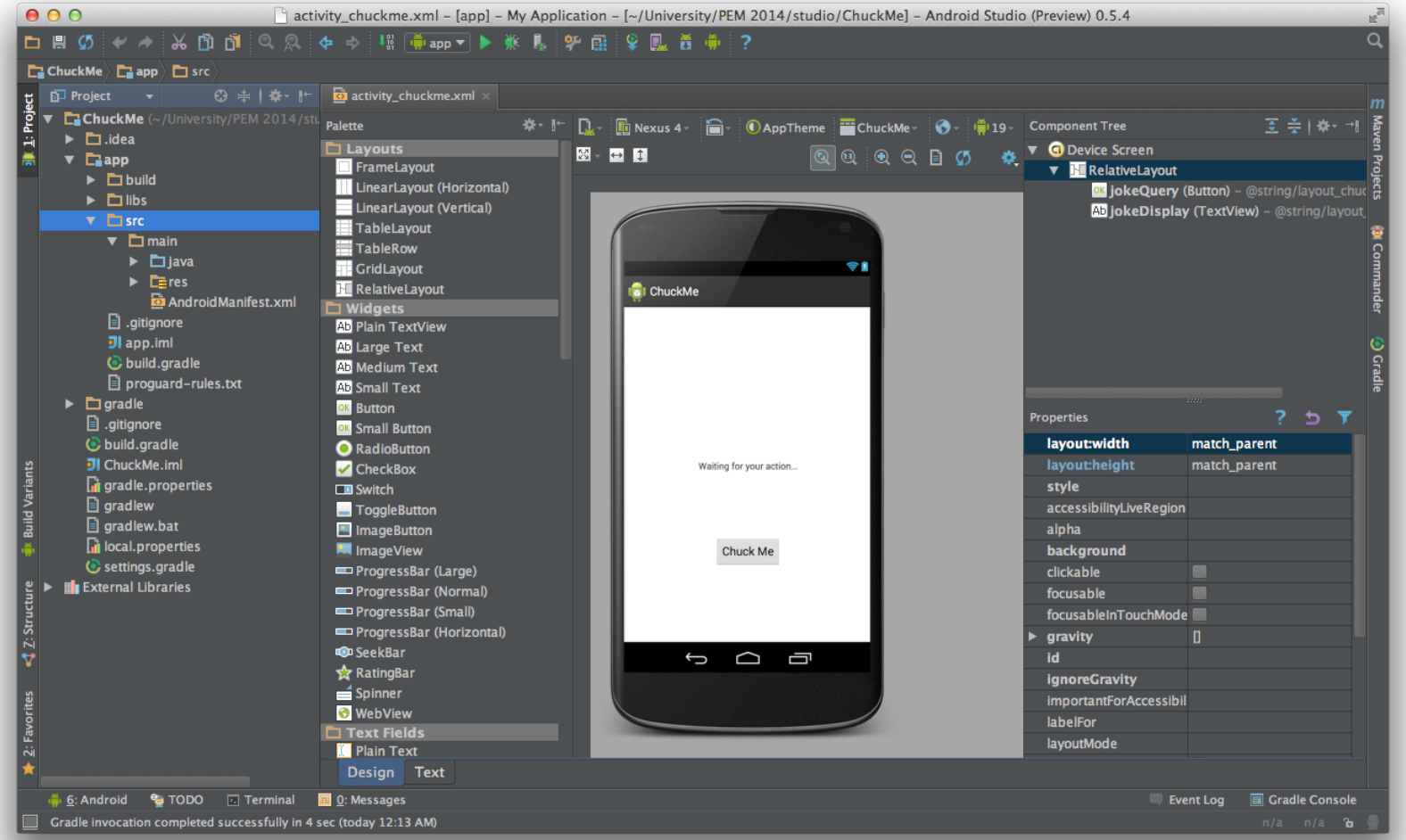
http://developer.android.com/about/dashboards/index.html

Android Developer Tools(Eclipse)



Developer Tools

Android Studio (IntelliJ)



HANDS-ON

SDK and Emulator

Emulator images for almost all Android versions

Intel provides x86 images that vastly increase performance

(install via SDK Manager)

Project Structure

/src

Source files within respective packages

/res

Resources, including layouts, image assets and localizations

/libs

Precompiled libraries (jars) used for the project

/gen

Auto-generated files (changes will be overwritten)

Manifest.xml

- General app settings
  - App unique identifier (package)
  - API version targets
- Contains available Activities and Services
- Lists required permissions
- Additional ways to define IntentFilter, BroadcastReceiver and Provider
- Can also be used specify hardware requirements

Activities & Services

- Activity is main UI element that is being displayed
- Normally takes up the entire screen
- Specific lifecycle for various states
- New Activities will be stacked on top

- Long running operations should be handled in a Service
- Different runtime behavior, running in background
- Multiple Activities can bind to one service

Layouts & Resources

- UI layouts are defined in special XML files
- All resources automatically have a unique id assigned which are used as a reference throughout the app
- Easy to adapt localization functionality
- Automatic resource selection based on device capabilities

ADDITIONAL INFORMATION

Assignment 01

- Individual assignment
- Set up development environment
- First steps with Android
- Layouts, Widgets, Interaction, http

- Due next week (16.10.)
- Submission via Uniworx

Next Lecture

- Next lecture next week 16.10.2014

Resources

- Android Developers
  - http://developer.android.com/design
  - http://developer.android.com/training
  - http://developer.android.com/guide
- Google IO Session Recordings
  - https://developers.google.com/events/io/2012
  - https://developers.google.com/events/io/2013
- Google IO Schedule App
  - https://code.google.com/p/iosched