



Distributed Systems – Exercises

Leyna Sadamori

leyna.sadamori@inf.ethz.ch

VS Exercises

- Programming exercises
 - Three assignments
 - One open project
- Theoretical exercises
 - Exam preparation for Part 1 (Mattern)
 - Exercises for Part 2 (Wattenhofer)



Grading

- Maximum achievable points:

Written exam	180 points
Assignments 1–3 *	30 points
Project *	15 points
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Total	225 points

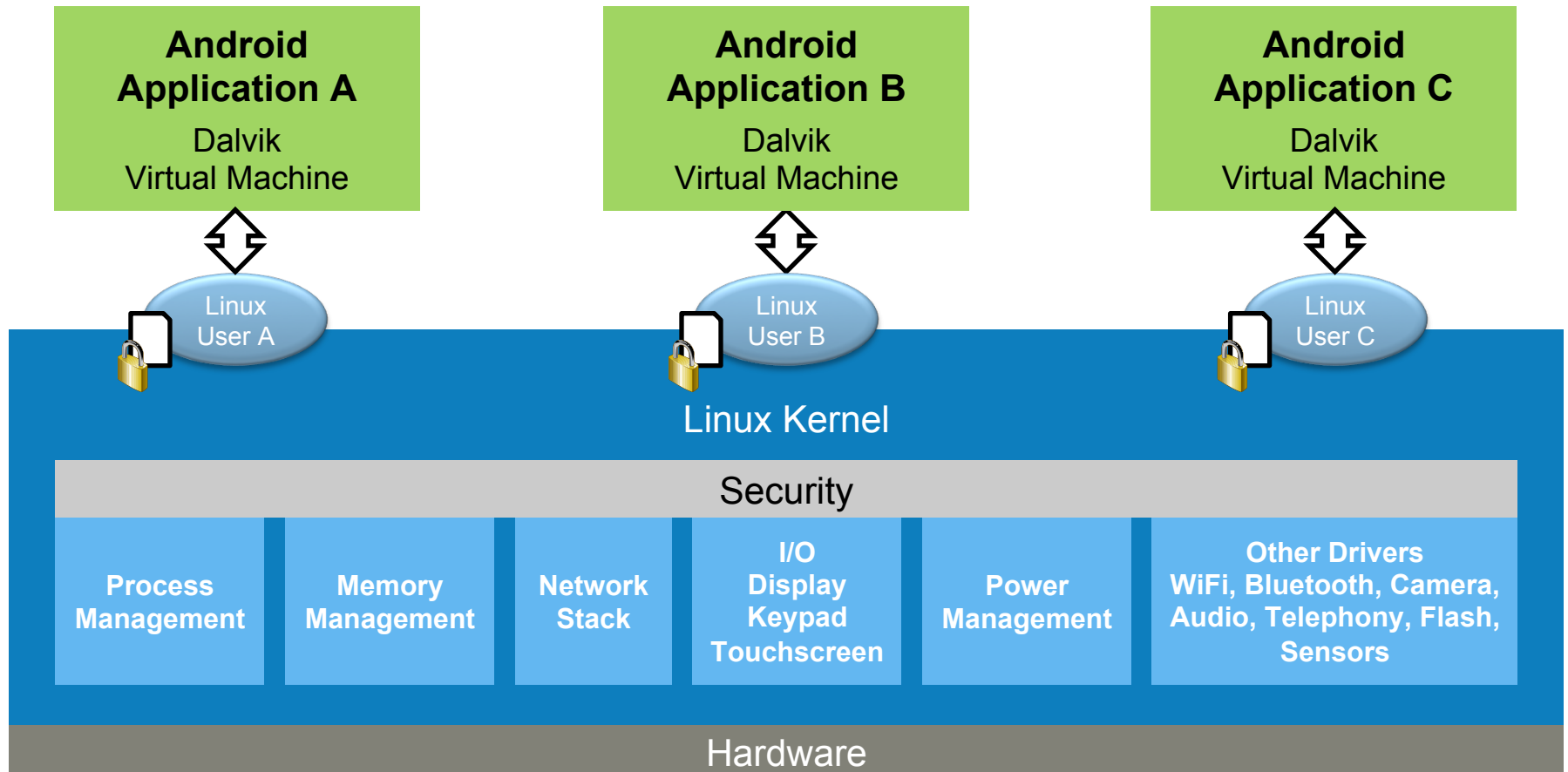
- Points from practical part (marked by *) can be carried forward from last year



ANDROID

Mobile Platform for Distributed Systems

Platform Internals



Java vs. Android



Java App

Android App

Program Logic	
Java Libraries (common)	
Java User Interface	Android User Interface
Java-Specific Libraries	Android-Specific Libraries
	App Management



Android Key Terms

- «Activity»
 - Logical unit of a user activity (like window in a computer program)
 - Usually full-screen
- «View»
 - Hierarchical UI element
 - Combined in layouts and extended to Widgets with more functionality
- «Service»
 - Background activity without UI, e.g., music player or FTP server



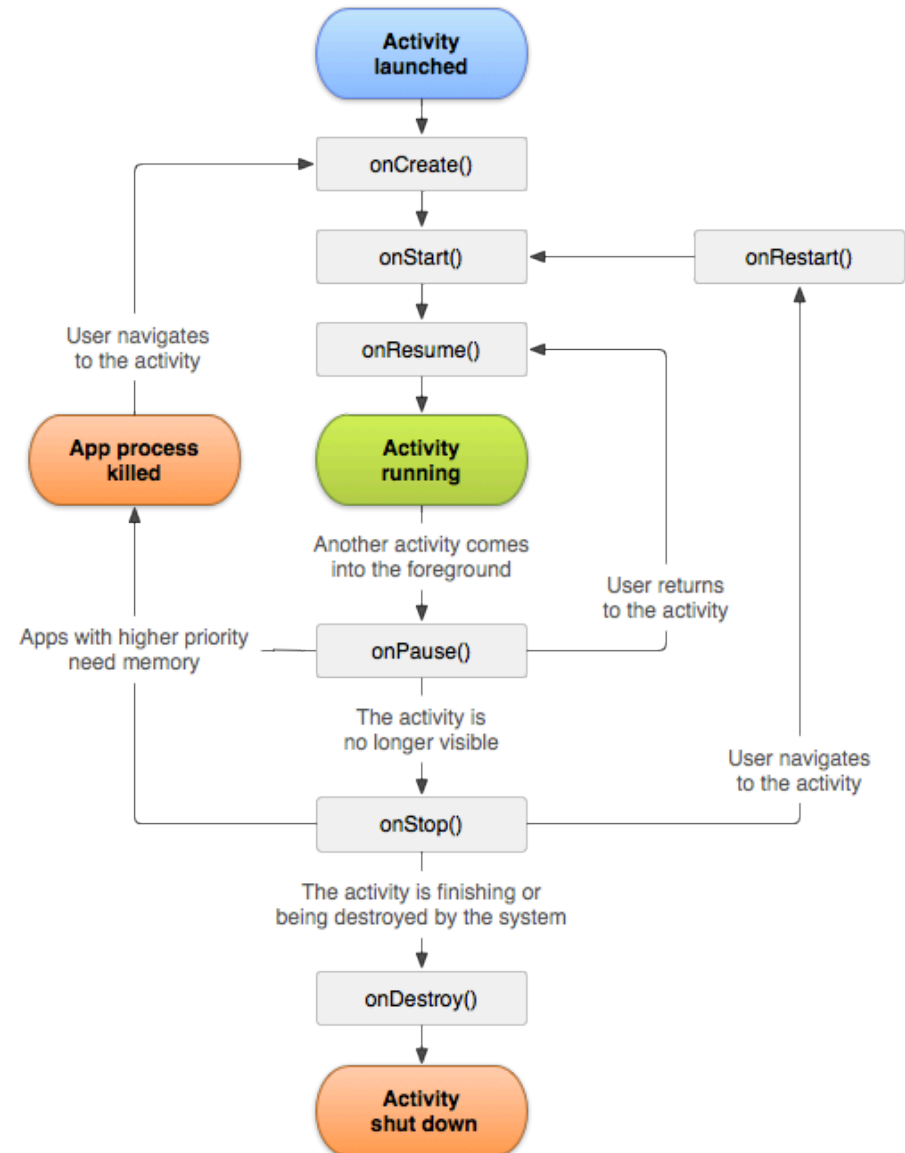
Android Key Terms

- «Intent»
 - Asynchronous message to bind components
 - Starts or switches between «Activities»
 - Intent Filters are used to only act on specific Intents
- «BroadcastReceiver»
 - Listens for global events (Intents)
e.g., «headphones were plugged» sent by system
 - Can be used to pass system events for further processing
 - Can inform the user about system events



Activity Lifecycle

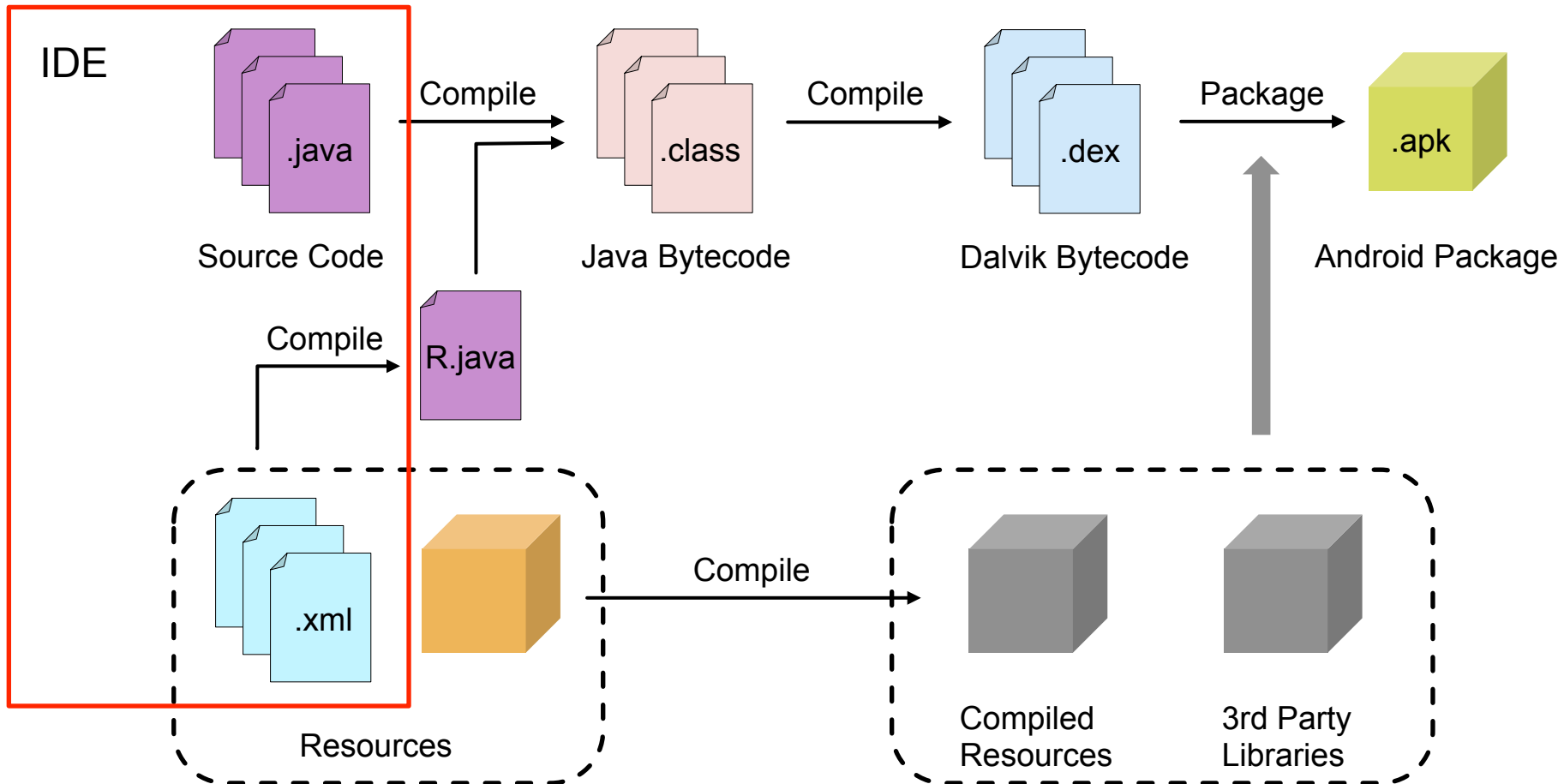
- Multi-Tasking
 - OS keeps apps alive as long as possible
 - On memory shortage, processes are killed according to their priority
- States of an Activity
 - Running (resumed)
 - Paused
 - Stopped
 - Finished/killed





Build Tools

Android Build Process in a Nutshell



Android SDK Components

- SDK Tools
 - Development and debug tools, emulator, etc.
- SDK Platforms
 - APIs for target platforms
- SDK Build Tools
- Support libraries
 - Libraries to support backward compatibility

- All available at different revisions
 - Use same major revisions for compile-sdk, build tools and support libraries



Programming Exercises

Team



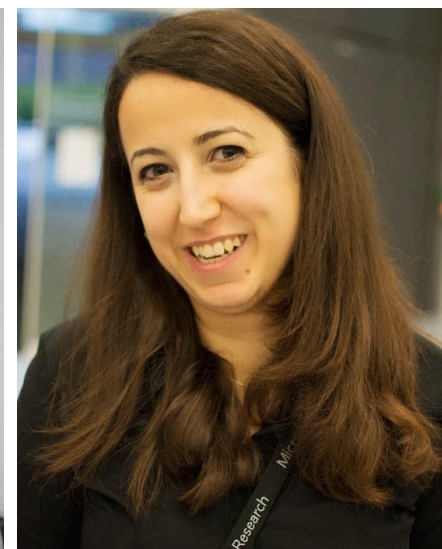
Leyna Sadamori



Marian George



Mihai Bâce



Anwar Hithnawi

Organization

- Teams of three
 - Development with emulator
 - Testing on actual phone
- Smart phones
 - Use your own Android – no rooting required
 - Nexus 5 with Android 4.4.3 available by us
- Grading
 - Per group



Schedule



- **A1: GUI, sensors and Bluetooth Low Energy**
 - 28 Sep 2015 – 09 Oct 2015 (1.5 weeks)
- **A2: HTTP, REST, Web Services**
 - 09 Oct 2015 – 19 Oct 2015 (1.5 weeks)
- **A3: Group communication and logical time**
 - 19 Oct 2015 – 30 Oct 2015 (1.5 weeks)
- **A4: Project (with presentation)**
 - 02 Nov 2015 – 18 Dec 2015 (6.5 weeks)



Homework

Create Groups

- Log in to submission system
 - <https://www.vs.inf.ethz.ch/edu/vs/submissions/>
- First „exercise“ is to register a group
- Leader starts a group
- Add partners
- Specify which phone you will be using
 - Own Android
 - Lecture phone (Nexus 5)



Submission System



- Deliverables are submitted via the submission system
 - Only team leader can submit files
 - Team members must **sign** the submission **to accept** submission
 - **Repeat** signature procedure for every **new upload**
- Registration „exercise“
 - Submit an empty file (0 bytes) *register.txt*
 - Sign this submission



Get a phone if necessary

- A number of Nexus 5 are available
 - Reset of device is recommended
 - Android 4.4.2 pre-installed
 - For the BLE task, you have to **update to 4.4.3!**
 - Pick-up today, after 1 p.m. in CNB H 108

- Activate debugging
 - «Settings > About phone > Build number» – Tab several times
 - «Settings > Developer options > Android debugging»



Install the Toolchain

- Java SE JDK
 - <http://www.oracle.com/technetwork/java/javase/downloads/index.html>
- Android SDK and Android Studio
 - <http://developer.android.com/sdk/index.html>
- Use Android SDK Manger to get at least
 - Android 6.0 (API Level 23) SDK Platform
 - Android SDK Build Tools Rev. 23.0.0
 - Android 4.3.1 (API Level 18) x86 System Image
- Device driver
 - Android Composite ADB Interface
 - Google for your OS / device combination
 - E.g. for Google phones (windows only)
 - <http://developer.android.com/sdk/win-usb.html>

Test Your Toolchain

- Create an AVD in the «Android Virtual Device Manager»
 - Device: Nexus 5
 - Target: Android 4.3 - API Level 18
 - CPU: x86
 - Emulator Options: Host GPU
- Run Sample Application
 - Import an Android code sample
 - Pick the BasicNetworking sample project
- Run the project as Android application
 - On the AVD
 - On your phone

Android Tutorial

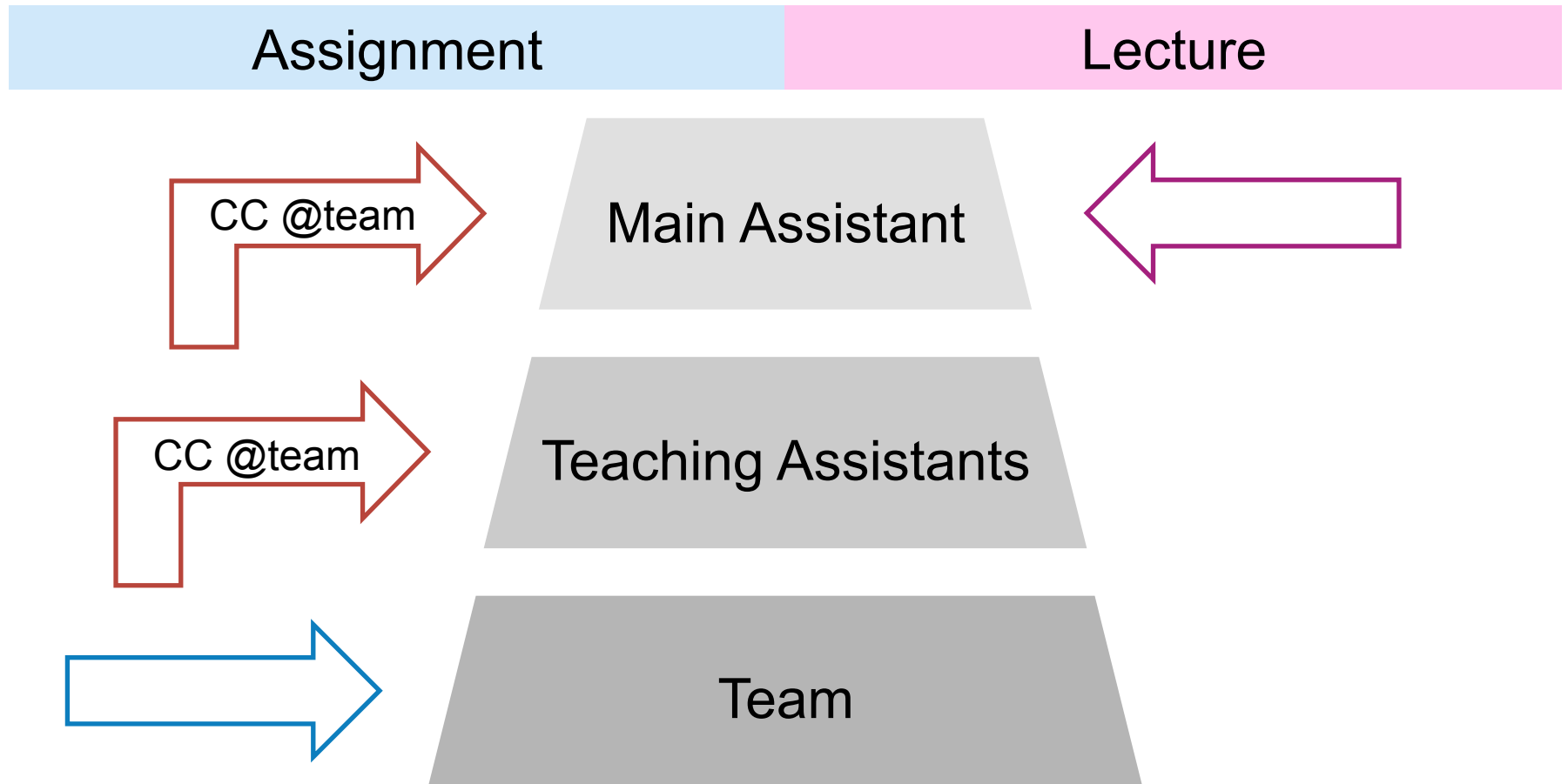
- Monday, 28 September 2015
 - Introduction to Android programming
 - «Live-Hacking» together with you
→ Be prepared!
- Monday, 28 September 2015
 - Assignment 1





Teamwork

Escalation strategies



Online Help

- You'll find a lot of resources in the Internet
- For general introductions, you can start here:
 - <http://developer.android.com/guide/index.html>
- For specific problems → Google
 - Forums, e.g., stackoverflow.com
 - Be careful with online resources. Always look at context!