ETH
Eidgenössische Technische Hochschule Zürich
Swiss Federal Institute of Technology Zurich

inf | Informatik
Computer Science

Distributed Systems 2012 – Assignment 1

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The Exercise

- Objectives
  - Get familiar with Android programming
    - Emulator, debugging, deployment
  - Learn to use UI elements and to design an Activity
  - Learn how to connect Activities and Services using Intents
  - Learn how to use the Sensor API
  - Tackling problems with developing a real app

- Dates:
  - Exercise begins: Now
  - Exercise is due: 9:00am, October 12, 2012

The Exercise

- **Task 1:** Sensors and Actuators
  - Create an application to access all available sensors
  - Use selected actuators
- **Task 2:** AntiTheft Alarm
  - Create an application to *"secure"* the device against theft
- **Task 3:** Enhancements
  - Come up with creative solutions to deal with shortcomings of the simple alarm

Task 1: Sensors and Actuators

- **Objectives:**
  - Learn how to create an Android project
  - Familiarize yourself with UI Elements
  - Understand the concept of Activities and Intents
  - Learn to use the sensor API
- **Todo:**
  - Write an app that displays all available sensors in a `ListView`
  - Show sensor readings in a second activity
  - Trigger actuator events in a third activity

Hints

- Project names: VS_*nethz*_Sensors (leader's nethz ID)
- Do not forget to add all components (Activities, Services) to the application in the manifest file
- Do not forget the permissions in the manifest file
- Listing all the sensors:

```
private SensorManager sensorMgr = null;
private List <Sensor> sensors;
```

```
sensorMgr = (SensorManager) getSystemService(SENSOR_SERVICE);
sensors = sensorMgr.getSensorList(Sensor.TYPE_ALL);
```

- Also see: http://developer.android.com/guide/topics/sensors/sensors_overview.html

Hints

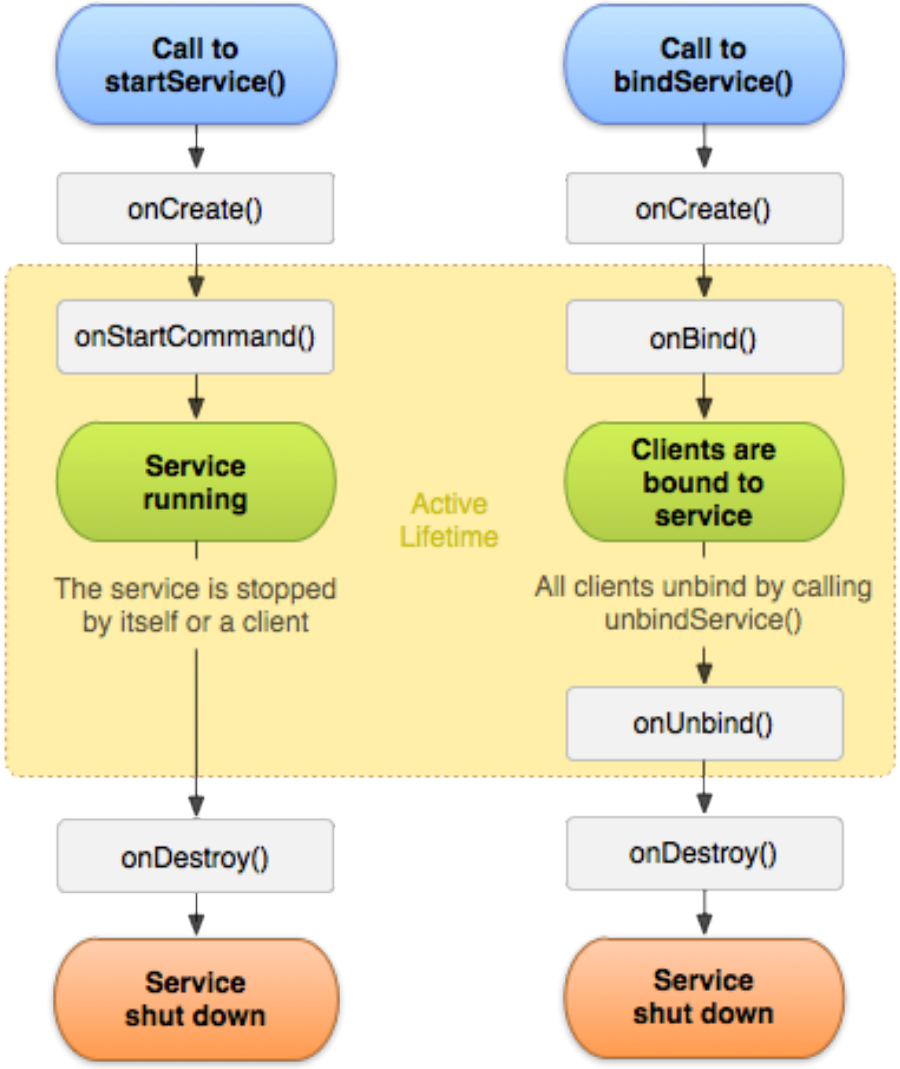
- When starting `SensorActivity`, the Intent should carry the information which sensor to display in detail
- `SensorActivity` should implement the `SensorEventListener` interface and continuously present the sensor's value(s)
- Check the `ArrayList<String>` and `ArrayAdapter<String>` classes, as they are useful to hold the sensor values as `Strings` for the `ListView`
- Also see: http://commonsware.com/Android/excerpt.pdf

Task 2: AntiTheft Alarm

- **Objectives:**
  - Transfer the knowledge of Task 1 into a real app
    - Understand problems stemming from a framework under development
  - Think about how to make use of the sensors
  - Learn how to use background Services
- **Todo:**
  - Write an app to *"secure"* the device against theft
    - Sound an alarm when the device is moved without authorization

Hints

- Study service lifecycle
- A Started Service (unbound service) is good for us



http://developer.android.com/guide/components/services.html

Hints

- We know that this service always runs in the same process as its clients, we don't need to deal with interprocess communication
- See the **LocalService.java** and the **ServiceStartArguments.java** examples
- Do not forget to declare the Service in the manifest file!

Task 3: Enhancements

- Visualize sensor readings with Graphics API

- Problems with Task 2 include:
  - Headphones can suppress alarm
- Possible solutions:
  - Silent alarm (SMS, e-mail)
  - Send GPS coordinates
  - (BroadcastReceiver for headphones)
- **Todo:**
  - Come up with a creative solution

Designing Compelling and Usable Applications

- Purpose of the app
  - How does the app make life better?
  - Understand your user!
- Context of the app
  - Target user group: student/child/elderly
  - Activity: sitting/walking/driving/etc.
  - Environment: office/street/car/home/etc.
  - Device: phone/tablet/coffee machine

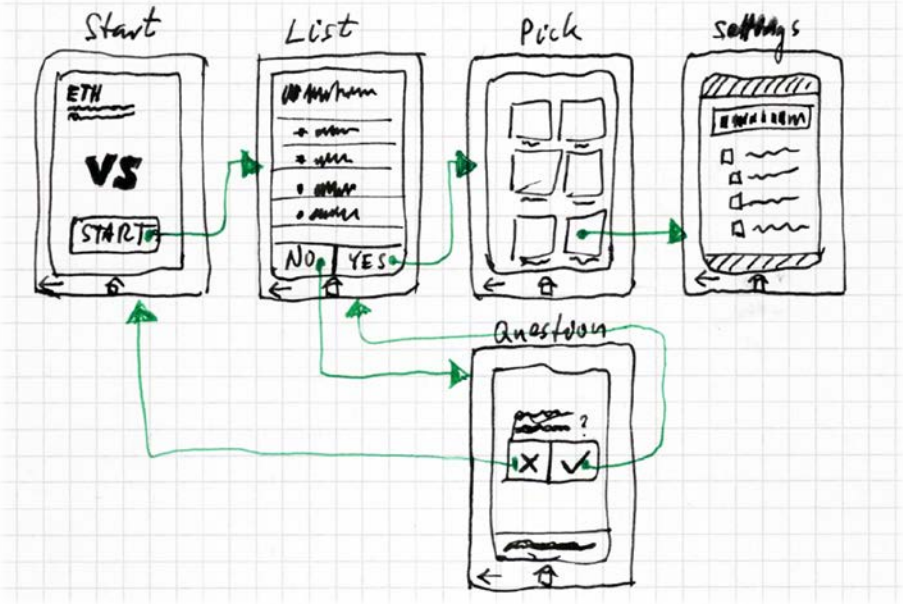
The 10 Usability Principles (Jakob Nielsen)

1. Keep the interface simple!
2. Speak the user's language!
3. Minimize the user's memory load!
4. Be consistent and predictable!
5. Provide feedback!
6. Design clear exits and closed dialogs!
7. Offer shortcuts for experts!
8. Help to recover from errors, offer Undo!
9. Prevent errors!
10. Include help and documentation!

www.useit.com

Workflow Prototyping and Evaluation on Paper

- Concrete guidelines: http://developer.android.com/design
  - Visual appearance, e.g., icon design
  - Purpose of user interface elements
  - Layout of user interface elements
  - Behavior, conventions of system features



Hints – Settings Activity (1)

MySettingsActivity.java

```
package ch.ethz.inf.vs.android.nethz.project;
import android.os.Bundle;
import android.preference.PreferenceActivity;

public class MySettingsActivity extends PreferenceActivity {
    @Override
    protected void onCreate(Bundle savedInstanceState) {
        super.onCreate(savedInstanceState);
        // Load the preferences from an XML resource
        addPreferencesFromResource(R.xml.preferences);
    }
}
```

Do not forget to add this Activity to your application in the manifest file!

Hints – Settings Activity (2)

\res\xml\preferences.xml

```
<?xml version="1.0" encoding="utf-8"?>
<PreferenceScreen xmlns:android="http://schemas.android.com/apk/res/android">
    <PreferenceCategory android:title="Server IP settings">
        <CheckBoxPreference
           android:key="network_mode_enable"
           android:title = "Stream to server"
           android:summary = "Enable to stream the sensor values to the server"
           android:defaultValue = "true" />
        <EditTextPreference
            android:key = "server_ip"
           android:dependency = "network_mode_enable"
           android:title = "IP address"
           android:summary = "IP address of the fancy server"
           android:layout = "?android:attr/preferenceLayoutChild"
           android:dialogTitle = "IP address of the Tracker"
           android:defaultValue = "192.168.1.1" />
        <EditTextPreference
           android:key = „server_port"
           android:dependency = "network_mode_enable"
            . . . />
    </PreferenceCategory>
</PreferenceScreen>
```

Hints – Settings Activity (3)

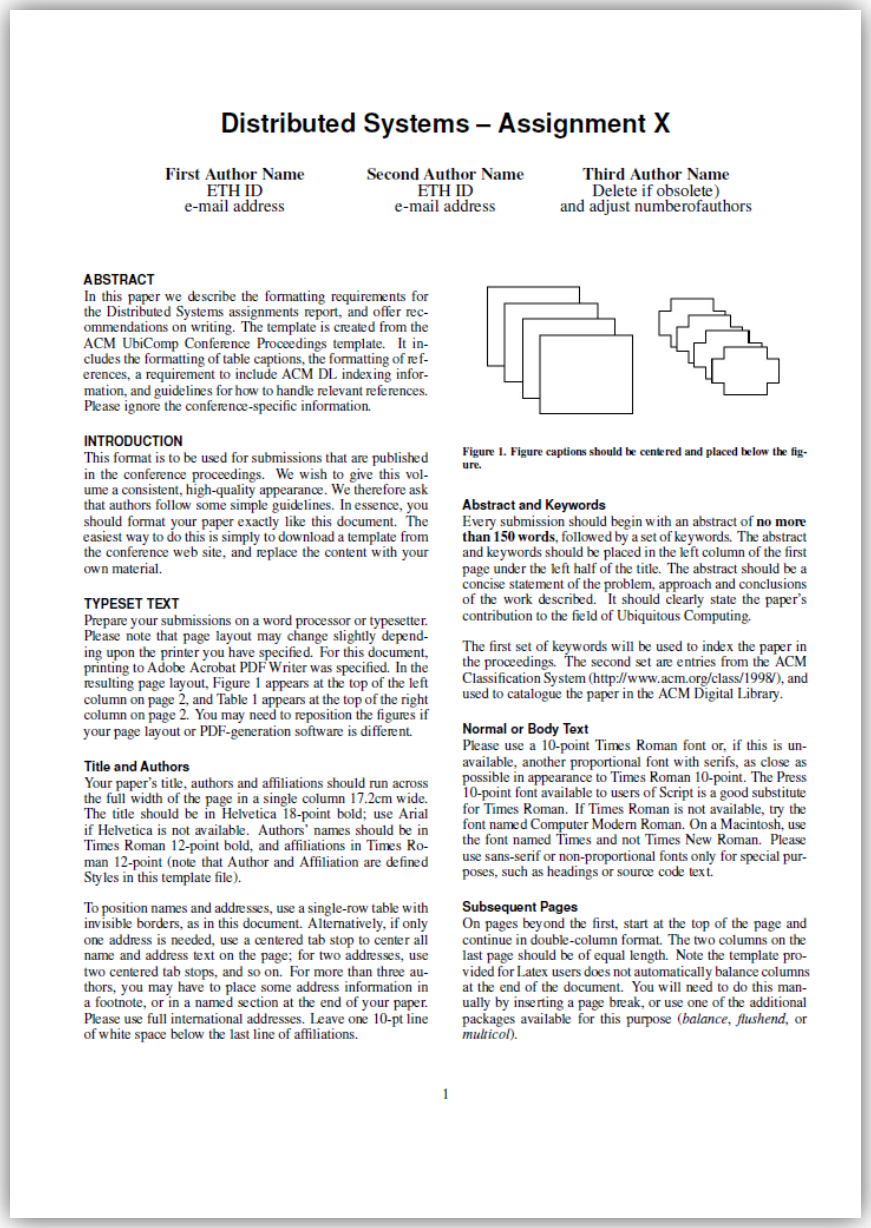
MyMainActivity.java

```
import android.preference.PreferenceManager;
```

```
SharedPreferences sharedPrefs =
      PreferenceManager.getDefaultSharedPreferences( getApplicationContext() );

boolean network_mode_enable =
      sharedPrefs.getBoolean( "network_mode_enable", false );

InetAddress saddr =
      InetAddress.getByName( sharedPrefs.getString( "server_ip", "192.168.1.1" ) );

int sport =
      Integer.parseInt( sharedPrefs.getString( "server_port", "8080" ) );
```

Report

- Required for each project
- LaTeX or Word
- English *or German*
- About 2 pages
- Include:
  - What you have learnt
  - Program structure
  - Development decisions
  - Problems and solutions
  - Code snippets, UML diagrams
  - App Snapshots
  - Who did what



Distributed Systems – Assignment X

First Author Name
ETH ID
e-mail address

Second Author Name
ETH ID
e-mail address

Third Author Name
Delete if obsolete)
and adjust numberofauthors

ABSTRACT

In this paper we describe the formatting requirements for the Distributed Systems assignments report, and offer recommendations on writing. The template is created from the ACM UbiComp Conference Proceedings template. It includes the formatting of table captions, the formatting of references, a requirement to include ACM DL indexing information, and guidelines for how to handle relevant references. Please ignore the conference-specific information.

INTRODUCTION

This format is to be used for submissions that are published in the conference proceedings. We wish to give this volume a consistent, high-quality appearance. We therefore ask that authors follow some simple guidelines. In essence, you should format your paper exactly like this document. The easiest way to do this is simply to download a template from the conference web site, and replace the content with your own material.

TYPESET TEXT

Prepare your submissions on a word processor or typesetter. Please note that page layout may change slightly depending upon the printer you have specified. For this document, printing to Adobe Acrobat PDF Writer was specified. In the resulting page layout, Figure 1 appears at the top of the left column on page 2, and Table 1 appears at the top of the right column on page 2. You may need to reposition the figures if your page layout or PDF-generation software is different.

Title and Authors

Your paper's title, authors and affiliations should run across the full width of the page in a single column 17.2cm wide. The title should be in Helvetica 18-point bold; use Arial if Helvetica is not available. Authors' names should be in Times Roman 12-point bold, and affiliations in Times Roman 12-point (note that Author and Affiliation are defined Styles in this template file).

To position names and addresses, use a single-row table with invisible borders, as in this document. Alternatively, if only one address is needed, use a centered tab stop to center all name and address text on the page; for two addresses, use two centered tab stops, and so on. For more than three authors, you may have to place some address information in a footnote, or in a named section at the end of your paper. Please use full international addresses. Leave one 10-pt line of white space below the last line of affiliations.

Figure 1. Figure captions should be centered and placed below the figure.

Abstract and Keywords

Every submission should begin with an abstract of **no more than 150 words**, followed by a set of keywords. The abstract and keywords should be placed in the left column of the first page under the left half of the title. The abstract should be a concise statement of the problem, approach and conclusions of the work described. It should clearly state the paper's contribution to the field of Ubiquitous Computing.

The first set of keywords will be used to index the paper in the proceedings. The second set are entries from the ACM Classification System (http://www.acm.org/class/1998/), and used to catalogue the paper in the ACM Digital Library.

Normal or Body Text

Please use a 10-point Times Roman font or, if this is unavailable, another proportional font with serifs, as close as possible in appearance to Times Roman 10-point. The Press 10-point font available to users of Script is a good substitute for Times Roman. If Times Roman is not available, try the font named Computer Modern Roman. On a Macintosh, use the font named Times and not Times New Roman. Please use sans-serif or non-proportional fonts only for special purposes, such as headings or source code text.

Subsequent Pages

On pages beyond the first, start at the top of the page and continue in double-column format. The two columns on the last page should be of equal length. Note the template provided for Latex users does not automatically balance columns at the end of the document. You will need to do this manually by inserting a page break, or use one of the additional packages available for this purpose (*balance*, *flushend*, or *multicol*).

1

Report – Possible Structure

- Abstract
  - Summarize your key take-away points of A1 for Android programming in a **brief** first sentence, e.g., (at least) Activity vs Service and hardware access
  - State which tasks you solved to which degree
  - Highlight your custom extensions
- One section per app
  - App design and program structure (cf. figure on slide 13)
  - Development decisions
  - Problems and solutions
  - Code snippets, UML diagrams, app Snapshots
  - Who did what
- Conclusion
  - Discuss the lessons learned in more detail
  - Comment on open issues if any

Deliverables

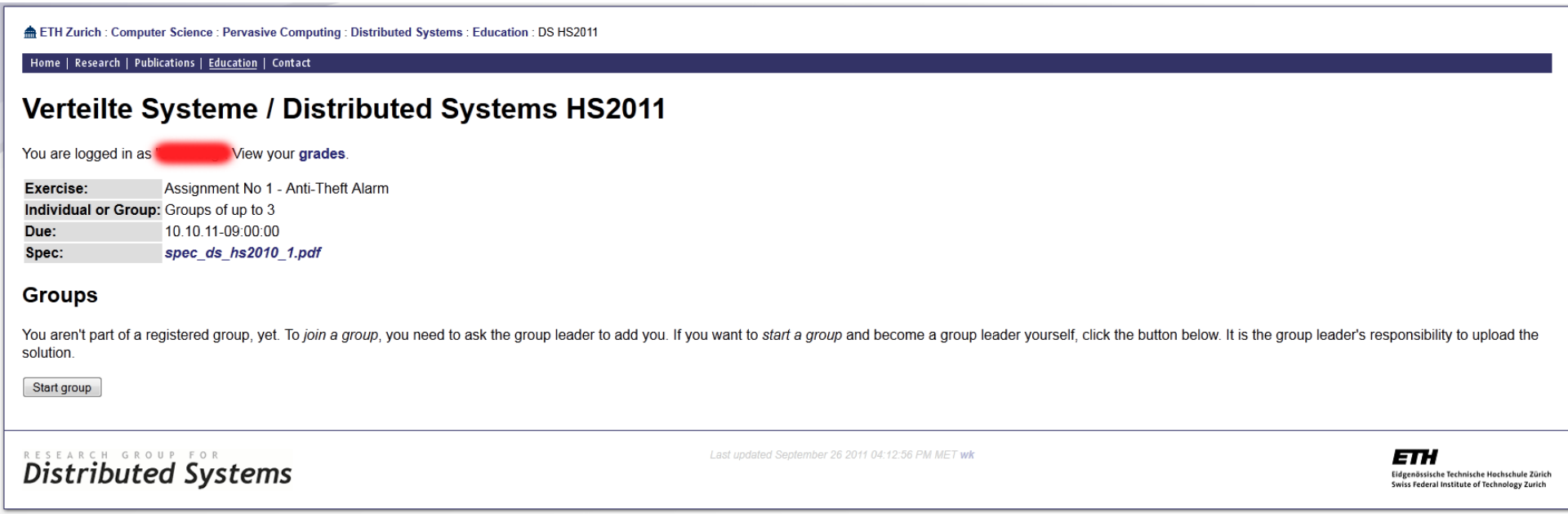
- https://www.vs.inf.ethz.ch/edu/vs/submissions/
- Use your *nethz* logins
- File names: **report.pdf** and **code.zip**
- New uploads will overwrite the old ones
- Check uploaded files

LEADER:

- Create group
- Add members
- Upload files

MEMBERS:

- Sign the submission



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Exercise:	Assignment No 1 - Anti-Theft Alarm
Individual or Group:	Groups of up to 3
Due:	10.10.11-09:00:00
Spec:	***spec_ds_hs2010_1.pdf***

Groups

You aren't part of a registered group, yet. To *join a group*, you need to ask the group leader to add you. If you want to *start a group* and become a group leader yourself, click the button below. It is the group leader's responsibility to upload the solution.

Start group

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Distributed Systems

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Leader creates a group

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Groups

You are the leader of this group. You have to upload the solution. Every time you change the submissions, the others will have to re-sign confirming they agree with the submission. However, it is sufficient if they only do so *once for the final version*. Please bear this in mind when you make last minute changes!

NETHZ ID	Role	Last change	Remove	Signature
[redacted]	LEADER	26.09.11-16:48:22	**Close group**	Not required

[redacted] Add

Submission

Upload your submission files to the server. Please note the supported *filename(s)* and *format(s)*. You may change your submission until the deadline of this assignment. However, be aware that only your most recent submission is kept and can be marked.

It is your responsibility to check that the files below have been uploaded correctly! Please use the links to check your submission!

Filename	Last Change	Size	Maximum Size	Supported Formats	Upload	Status
report	nA	nA	2 MB	pdf	Browse...	Missing submission
code	nA	nA	12 MB	zip	Browse...	Missing submission

By clicking on *Submit Changes*, you declare the above documents to be **your own work, only**. Any contributions made by other people must be acknowledged and sources must be properly referenced!

Submit Changes

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Leader adds teammates

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NETHZ ID	Role	Last change	Remove	Signature
[redacted]	LEADER	26.09.11-16:19:30	**Close group**	Not required
[redacted]	MEMBER	26.09.11-16:19:36	**Remove**	Not signed yet **BAD**
[redacted]	MEMBER	26.09.11-16:20:21	**Remove**	Not signed yet **BAD**

Submission

Upload your submission files to the server. Please note the supported *filename(s)* and *format(s)*. You may change your submission until the deadline of this assignment. However, be aware that only your most recent submission is kept and can be marked.

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Filename	Last Change	Size	Maximum Size	Supported Formats	Upload	Status
report	26.09.11-16:23:12	120.95 KB	2 MB	pdf	Browse...	Submission available
code	26.09.11-16:23:12	120.95 KB	12 MB	zip	Browse...	Submission available

By clicking on *Submit Changes*, you declare the above documents to be **your own work, only**. Any contributions made by other people must be acknowledged and sources must be properly referenced!

Submit Changes

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Leader uploads the files

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Due:	10.10.11-09:00:00
Spec:	***spec_ds_hs2010_1.pdf***

Groups

You have been added to a group by **soeroesg**. Please make sure that you sign for the work submitted by the leader. Every time the submission is changed, you will have to re-sign. So we recommend you sign the submission only once *(i.e. for the final submission)*. Your group members are as follows:

NETHZ ID	Role	Last change	Remove	Signature
[redacted]	LEADER	26.09.11-16:19:30	Not available	Not required
[redacted]	MEMBER	26.09.11-16:19:36	**Remove me**	Missing signature **BAD** [**Sign**]
[redacted]	MEMBER	26.09.11-16:20:21	Not available	Not signed yet **BAD**

Submission

You are not the leader for this group exercise. You may view but not change the submission.

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report	26.09.11-16:23:12	120.95 KB	2 MB	pdf	Submission available
code	26.09.11-16:23:12	120.95 KB	12 MB	zip	Submission available

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Member logs in

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[redacted]	LEADER	26.09.11-16:19:30	Not available	Not required
[redacted]	MEMBER	26.09.11-16:19:36	**Remove me**	26.09.11-16:24:15 **OK**
[redacted]	MEMBER	26.09.11-16:20:21	Not available	Not signed yet **BAD**

Submission

You are not the leader for this group exercise. You may view but not change the submission.

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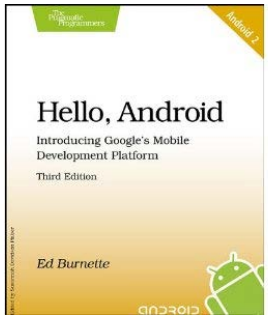
Member signs the submission

Remarks

- Point reduction if the project does not compile!

- Task 2 and Report are necessary to meet the minimum requirements.
- Elements of Task 1 can be reused in Assignment 2.

Books



- Ed Burnette – Hello, Android (Pragmatic Bookshelf 2010)
  http://kronox.org/documentacion/Hello.Android.new.pdf

- Mark L. Murphy – The Busy Coder's Guide to Android Development (CommonsWare)
  http://commonsware.com/Android/

- Arno Becker – Android Grundlagen und Programmierung
  http://www.dpunkt.de/ebooks_files/free/3436.pdf

Have fun!

Questions?