Internet of Services

Project Introduction

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Service-centric Networking
Telekom Innovation Laboratories and TU Berlin
Introduction
Project Organization

- You will be working together in small teams
  - Each team will get a specific topic
  - 3-4 students per topic
  - Teams will have to organize themselves, i.e. come up with a project plan etc.

- Working mode:
  - The project has 9 ECTS (approx. 6 SWS)
  - Project duration: 15 weeks

- Workload per person per week:
  - Max: 15 – 18 hours
  - Realistic: 10 – 15 hours
Introduction
Prerequisites

- **Prerequisites**
  - Basic knowledge of computer science
  - Practical experience in object-oriented programming and software design

- **Good to have**
  - Practical experience in Web Services (Protocols and APIs)
  - Mobile Computing (especially Android)
  - Experience with IDEs (e.g. Eclipse) and Version Control Systems
  - Unit Testing with Junit
  - Working with DBMS (e.g. SQL)

- **Attendance**
  - Attendance to all appointments is mandatory
Introduction
Project Organization

- In general:
  - Each team will design, develop, test, and document an application, service, or architecture - depending on the topic
  - There will be a first presentation of each team’s results at June 2\textsuperscript{nd}, 2014
  - The final results will be presented by each team on July 15\textsuperscript{th}, 2014
  - Furthermore, there will be regular meetings with the supervisors

- Talks
  - Milestone Talks: 15 minutes + 5 minutes Q&A
  - Final Talks: 20 minutes + 10 minutes Demo / Q&A

- Next Step:
  - Meet with your supervisor right after this meeting and discuss the further steps
Introduction
Project Organization

- Teams are required to define a project plan
  - Define and distribute tasks
  - Estimate each task's time consumption

- During the project, you are required to track who worked on what task and what time he spent

- There will be a Redmine Project Management System with SVN, Wiki, ticketing system, as well as support for Gantt-charts, etc.
Introduction
Project Topics

- **Topic 1: Personal Social Node (PSN)**
  - *Supervisor: Gökhan Coskun, Sebastian Göndör (3 - 4 Places)*

- **Topic 2: Indoor Positioning**
  - *Supervisor: Bersant Deva, Sebastian Zickau (3-4 Places)*

- **Topic 3: Enriching Geocoding Services using the OpenMobileNetwork**
  - *Supervisor: Konstantin Clemens, Abdulbaki Uzun (3-4 Places)*
Topic 1
PSN: Motivation

- Problem: distributed profiles and friends' lists
  - Different accounts at existing centralized online social networks (facebook, google plus, linkedin etc.)
  - Personal homepages and blogs presenting profiles and shared data
  - Email / chat communication from different accounts

- Approach: create an integrated solution to merge this data distribution
  - Use a popular, modern, free content management system (Drupal) which is
    - Your personal homepage
    - Your blog page
    - Your email interface
    - Your representation in a distributed social network

- Challenge: make use of existing web standards / protocols
  - http, imap, oauth, open id, rss, webrtc, xmpp, tls/ssl, opensocial, dns
Topic 1
PSN: Expected outcome

- Conceptual model for Personal Social Node
  - How to realize social networking functionality with existing web standards / protocols with a content management system

- Implementation and Evaluation
  - Evaluate Drupal and its modules wrt the conceptual model
  - Extend Drupal and implement necessary modules
  - Evaluate the proposed system in terms of performance (wrt number of friends, size of files to share etc.) and usability

- Optional
  - Implement an Android APP that connects to your Personal Social Node
Topic 2
Idea: Harry Potter‘s Marauder‘s Map: YouTube - Video

Link to Online-Video shown during the presentation of this topic

https://www.youtube.com/watch?v=qZPH1eZ9GuY
Topic 2
Hogwarts – University of Witchcraft and Wizardry aka TU Berlin
Topic 2
Dumbledore’s Office aka MAR 6.011 indoor maps, 6th floor
Topic 2
Mobile Application - Detail - MAR 6.011 - now

Bersant and Sebastian presenting topic at IoSP
OK, idea is not new:

- Latitude
- Nearby friends (facebook)
- glympse.com
- ...

Indoor location

- Use WLAN-IDs, Cell-Ids
- Bluetooth Low Energy beacons (iBeacon, Raspberry Pi), etc.
- Use Google Location Service
- OpenStreetMaps
- Open Mobile Network, etc.
- Use Google/Here Indoor Maps
- Use tub2go-API
- ...
Topic 2
Context and Privacy - Addressing additional features and issues

- Context Information
  - If a friend is inside the student canteen, he/she is likely to have lunch
    - Often I want to know where my friends are sitting in the canteen
  - If a friend is inside the library, he/she is likely to read/copy/bring back books
  - If a friend is for more than 60min inside a lecture hall or seminar room, he/she studies
  - ...

- Privacy concerns
  - How often do I update my location?
  - Who can see my location?
  - Can I opt-out? (time constrained, I only post my location for the next 30min)
  - Am I allowed only to see people who are in the same building, floor, etc.
  - ...

Topic 2
Tasks: 4 students

- Related Work:
  - Indoor positioning / indoor mapping services / indoor LBS
  - Positioning technologies, digital maps
  - Addressing privacy and security issues
  - User context analyses
  - Use of TUB indoor plan, maybe using a tub2go-API
- Implement Android client app
  - With maps and double opt-in option
- Implement server application
  - with user information, location service and context information
  - Implement private social "only friends" network
- Testing, Evaluation and documentation
The *OpenMobileNetwork* is an open platform that provides approximated and semantically enriched mobile network and WiFi access point topology data published as *Linked Data*.

Since 2012, users from all over the world contribute to this dataset by running one of our dedicated *Measurement Clients* on their mobile devices.

In compliance with the principles of *Linked Data*, many interlinks to other *Linking Open Data (LOD) Cloud* datasets enable various applications:
- e.g., *Semantic Location-based Services* or *Power Management in Mobile Networks*.

### Introduction

- **Topic 3: Enriching Geocoding Services using the OMN**
- **OpenMobileNetwork**

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*Internet of Services Project – ST 2014*

Prof. Dr. Klüper, S. Göndör, S. Zickau, M. Slawik, et al. | TU Berlin
OpenStreetMap is a collaboratively editable open map of the world

There is a wide collection of open software to enhance, clean, and maintain the data

Data comes in a general-purpose format:
- entities *node*, *way*, and *relation*
- keyed *tags* on entities
- references between entities

- Common geocoding approaches (e.g., *Nominatim*) utilize text search only
- Assembling referenced nodes, ways, and relations results in the geospatial geometry of the entities
- A graph reflecting entity containment and overlap may be used to search entities
- This graph may be enriched with network data from the *OpenMobileNetwork* for richer geocoding services
Topic 3: Enriching Geocoding Services using the OMN
Tasks and Requirements

- **Tasks:**
  - Extract entities and their geometries from OMN
  - Convert them into OSM format
  - Extract entities and their geometries from OSM
  - Implement an entity graph reflecting entity containment and/or overlap
  - Compute graphs with and without OMN entities
  - Implement a search algorithm to find paths in that graph
  - Implement a web service that offers an interface to search
  - Generate test data for searches
  - Assess the search quality/performance impact of OMN data

- **Requirements:**
  - Interest in **fiddling with data**
    - Crowdsourced data tends to be less clean!
  - Interest in **contributing** to a **platform with world-wide impact**
    - Put your fingerprint on a new open source tool that others might find useful!
  - Interest in **basic graph and search algorithms**
Introduction

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