Internet of Services

Project Introduction

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Service-centric Networking
Telekom Innovation Laboratories and TU Berlin
Established in December 2009
Prof. Dr. Axel Küpper
Part of TU Berlin and Telekom Innovation Laboratories
Web: http://www.snet.tu-berlin.de

Research Areas
- Mobile Computing
- Context-aware Computing
- Green ICT
- Cloud Computing
- Online Social Networks
- Semantic Web & Linked Data

Other Courses
- Mobile Services (ST)
- Geschäftsprozesse und IT-Dienste (ST)
- Electronic Commerce (WT)
- Digital Communities (WT)
Project Organization (1)

• 2-4 students will work in team on a specific topic
• Teams meet regularly with the supervisor
• Working mode:
  – The project has 9 ECTS (approx. 6 SWS)
  – Project timeframe: 15 weeks
• Workload per person per week:
  – Max: 15 – 18 hours
  – Realistic: 10 – 15 hours
• Attendance to all appointments is mandatory
• Meet with your supervisor right after this meeting and discuss the further steps!
Project Organization (2)

• Project plan
  – Teams define tasks, responsibilities and estimated workload
  – Teams track the time spent on tasks
  – Teams compare plan and actual time spent learn from the under- and overestimations

• Documentation
  – Dependent on topic, est. 20 – 30 pages

• There will be a Redmine Project Management System with SVN/GIT, wiki, ticketing system, etc.
Important dates

• General division:
  – First 1/3: research, conceptual work, planning
  – Second 2/3: implementation, practical work, doing

• Intermediate presentation
  – June 3rd, 1300 – 1700, Room C 230
  – Preliminary documentation due on 10th of June
    • Includes research, concept and work planning

• Final presentation
  – July 15th, 1300 – 1700, TEL Auditorium
  – Final documentation due on 22nd of June
    • Implementation overview, plan/actual comparison, etc.
Prerequisites (in general)

• 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 stuff)
  – Mobile Computing (especially Android)
  – Experience with IDEs (e.g. Eclipse)
  – Understanding of version control
  – Test-driven development, e.g. unit testing with Junit
  – Working with DBMS (SQL)
Assessment

• 30% documentation
• 20% presentation
• 50% implementation
Project Topics & Supervisors

• End-to-End entity-body confidentiality and integrity for HTTP (4-5 students)
  – Mathias Slawik, Dirk Thatmann

• ComGreen Movement Prediction (4 students)
  – Sebastian Göndör, Abdulbaki Uzun

• Location-based Authentication System for Cloud Services using GeoXACML (4 students)
  – Dirk Thatmann, Sebastian Zickau

• Social Networks: Friend Recommendation and Content Sharing (4 students)
  – Jeshurun Devendraraj, Sebastian Göndör

• Context-aware Personal Assistant with Linked Open Data
  – Abdulbaki Uzun, Bersant Deva

• Semantic Positioning 2: Child Tracking
  – Abdulbaki Uzun, Mohamed Salem
End-to-End entity-body confidentiality and integrity for HTTP

Mathias Slawik, Dirk Thatmann
Topic 1: Entity-body confidentiality and integrity for HTTP
Topic 1: Entity-body confidentiality and integrity for HTTP
Topic 1: Entity-body confidentiality and integrity for HTTP

• Tasks:
  – Analyze state of the art technologies, such as TLS and HTTP
  – Discuss the Trusted Cloud Transfer Protocol (TCTP), newly devised by SNET
  – Broaden your knowledge of browser extension APIs and application server frameworks
  – Design, implement and evaluate TCTP software

• Requirements:
  – Proficiency in object oriented programming languages, such as Java, C++, C# or Ruby
  – Knowledge of web technologies, esp. HTTP
  – Basic comprehension of computer security, esp. TLS
  – Any implementation know-how regarding either browser extensions (e.g., Firefox, Chrome, Internet Explorer) or application server frameworks (e.g., Ruby on Rails, Spring MVC, Grails)
ComGreen Movement
Predictions

Sebastian Göndör, Abdulbaki Uzun
Topic 2: ComGreen Movement Predictions
Topic 2: ComGreen Movement Predictions
Topic 2: ComGreen Movement Predictions

• Tasks:
  – Develop a smartphone application, that is able to acquire contextual information from smartphones and other viable sources
  – Implement a server application that is able to collect and maintain the contextual data from smartphones and other viable sources.
  – Design and implement a movement forecast algorithm, which is able to determine the location of a user at a given time in the future.
  – Build a visualization, that shows the predicted path on a map (e.g. Google Maps or the OpenMobileNetwork)

• Requirements:
  – Knowledge of web technologies
  – Programming and Database skills
  – Experience with data analytics (Data mining / Big Data) and complex algorithms would be beneficial
  – Experience with mobile programming in Android would be beneficial
Topic 3: Location-based Authentication

Location-based Authentication System for Cloud Services using GeoXACML

Dirk Thatmann, Sebastian Zickau
Topic 3: Location-based Authentication

- **Location-based Access Control (LBAC)**
  - User can only use a service at certain locations, e.g. hospital premises, service is blocked at every other location
- **Determine Location (WLAN, 3G, GPS, etc.)**
- **Use policy language XACML (eXtensible Access Control Markup Language)**
  - Extension for location information (GeoXACML)
- **Define location area (e.g. TUB campus, hospital)**
- **Example Application** – (e.g. TRESOR RubyOnRails prototype)
- **Define policy points, i.e. Information (PIP), enforcement (PEP), decision (PDP), administration (PAP)**
- **Use Mobile Devices (e.g. Android phones)**
- **Implementation of prototype + Evaluation**
Topic 3: Location-based Authentication
Topic 3: Location-based Authentication

• Tasks
  – Getting familiar with (Geo)XACML
  – Defining test cases, scenarios and an GeoXACML architecture in the context of cloud services
  – Deal with mobile and stationary devices
  – Implementation of a prototype
  – Implementation of a mobile app which access the cloud service
  – Evaluation of the architecture

• Requirements
  – Analyses of state-of-the-art Technologies
  – (Java, XML) programming skills
  – (Android) mobile development experience
  – Interest in location based service / policies / mobile device / cloud computing development
  – Teamwork
  – Communicating in English (desirable)
Friend Recommendation

Content Sharing
Topic 4: Friend Recommendation and Content Sharing in DOSNs

<table>
<thead>
<tr>
<th>Research</th>
<th>Set up</th>
<th>Invent</th>
</tr>
</thead>
<tbody>
<tr>
<td>existing DOSNs</td>
<td>your own DOSN</td>
<td>algorithms for friend recommendation</td>
</tr>
<tr>
<td>existing technologies</td>
<td>easy to install</td>
<td>solutions for content sharing</td>
</tr>
<tr>
<td></td>
<td>easy to use</td>
<td></td>
</tr>
</tbody>
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Context-aware Personal Assistant with Linked Open Data

Bersant Deva, Abdulbaki Uzun
Proprietary Approaches: Google Now & Siri
Topic 5: Context-aware Personal Assistant with Linked Open Data

• Tasks:
  – Get familiar with
    • Linked Data, Semantic Web
    • Context-aware services
    • Web services
  – Implement a personal assistant Android App
  – Implement an according Backend-System
  – Create test scenarios for different user locations
Topic 6: Semantic Platform for Context-aware Services
Linking Open Data Cloud

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Internet of Services - Project Introduction
The OpenMobileNetwork is a Live Crowdsourcing Platform for Semantic Context-aware Services built by following the principles of Linked Data.

- Ontologies expressed in RDF and RDF Schema describe mobile networks, their topologies and components (e.g., base stations, or WiFi access points).

- Utilizing this dataset in combination with interlinked information that is present in the LOD Cloud, new and innovative context-aware applications can be realized.
  - Semantic Location-based Services or Power Management in Mobile Networks.

Website: [http://www.openmobilnenetwork.org/](http://www.openmobilnenetwork.org/)
Topic 6: Semantic Platform for Context-aware Services

Introduction

- Enhance the existing *Semantic Positioning System* by a *Platform* for realizing *Semantic Context-aware Services* including 3rd party functionality
- User defines locations of relevance on a user interface including user profiles, relations and places
  - Data is mapped onto *Linked Data* in the background
- Enhance the existing smartphone app by a context-aware service
  - Use Case: „Tell me whenever my daughter leaves school!“
Topic 6: Semantic Platform for Context-aware Services
Tasks and Requirements

• Tasks:
  – Research in the field of Linked Data, Context-aware Computing and Proactive Location-based Services
  – Develop a platform including a user interface for defining locations of relevance for the user and 3rd parties
    • Automatically map locations of relevance (e.g., place, user profile, relations, other context) to Linked Data
    • Extend state-of-the-art semantic user profiles with feature for Semantic Context-ware Services
    • Create standardized interface between the Positioning Enabler Platform and the OpenMobileNetwork
  – Extend our smartphone app by a context-aware service

• Requirements:
  – Interest in the field of Linked Data (RDF, Ontologies, SPARQL)
  – Interest in the field of Location-based Services
  – Java and/or Android Development
  – Java Application Server (J2EE, Tomcat)
Contact information

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