Università della Svizzera italiana

Faculty of Informatics

An experimental location sharing platform

A bachelor thesis project at the Ubiquitous Computing Group

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Goal

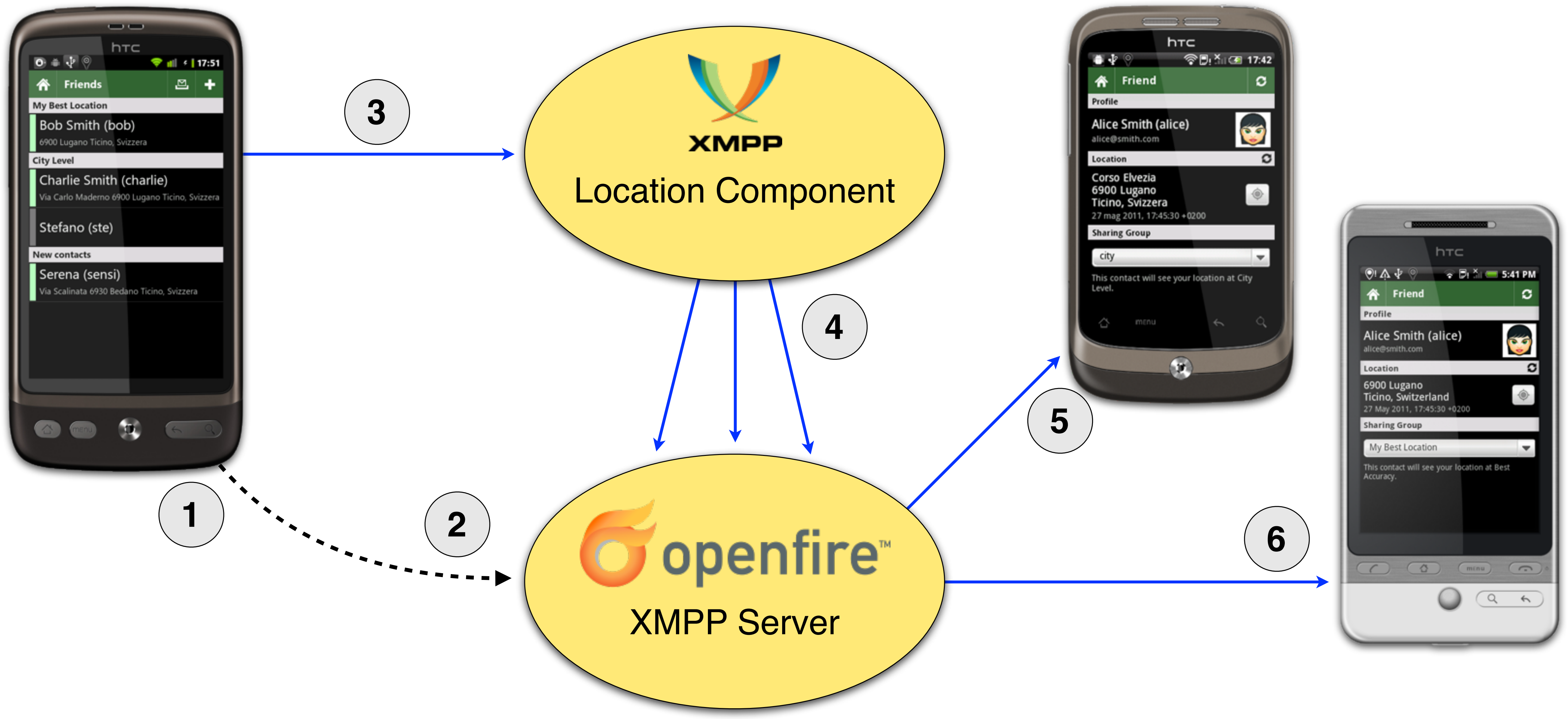
Development of a **novel** location sharing platform, based on Android, in order to **investigate** current issues, requirements, and future options for creating **privacy friendly** location sharing systems.

In order to do so, the application must be **robust** and **versatile** enough to inspect a wide range of location-sharing features and options, and their actual use by end-users.

Implementation

Given the requirements, in particular the **versatility**, we chose to implement the platform using the Extensible Messaging and Presence Protocol (XMPP) and its **Publish-Subscribe** extension.

It is composed of an Android **application** and a **custom** server-side **component** that modifies and broadcasts locations based on a set of **customizable rules**.



Friends

My Best Location

Bob Smith (bob)
6900 Lugano Ticino, Svizzera

City Level

Charlie Smith (charlie)
Via Carlo Maderno 6900 Lugano Ticino, Svizzera

Stefano (ste)

New contacts

Serena (sensi)
Via Scalinata 6930 Bedano Ticino, Svizzera

Friend

Profile

Alice Smith (alice)
alice@smith.com

Location

Corso Elvezia
6900 Lugano
Ticino, Svizzera
27 mag 2011, 17:45:30 +0200

Sharing Group

city

This contact will see your location at City Level.

Friend

Profile

Alice Smith (alice)
alice@smith.com

Location

6900 Lugano
Ticino, Switzerland
27 May 2011, 17:45:30 +0200

Sharing Group

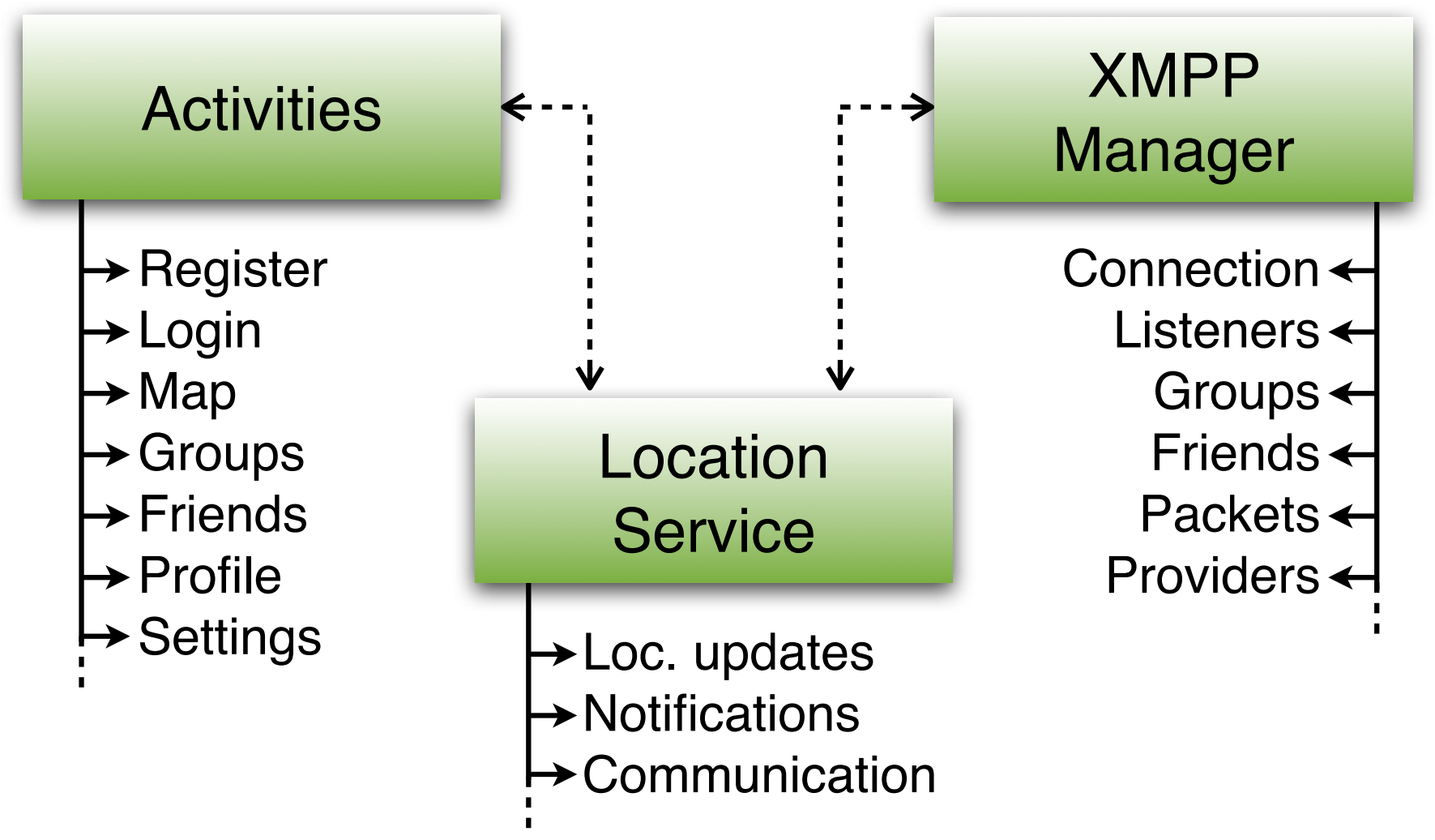
My Best Location

This contact will see your location at Best Accuracy.

1. Create custom groups: each one shares the location differently
2. Subscribe friends to the groups
3. Send current location at fixed intervals of time
4. Location is modified and published to the groups
5. Friend receives the modified location, e.g. at Best Accuracy
6. Friend receives the modified location, e.g. at City Level

Android application

The **application** is built in a **modular** fashion following different well-known design and UI patterns and could be easily **extended** in the future.



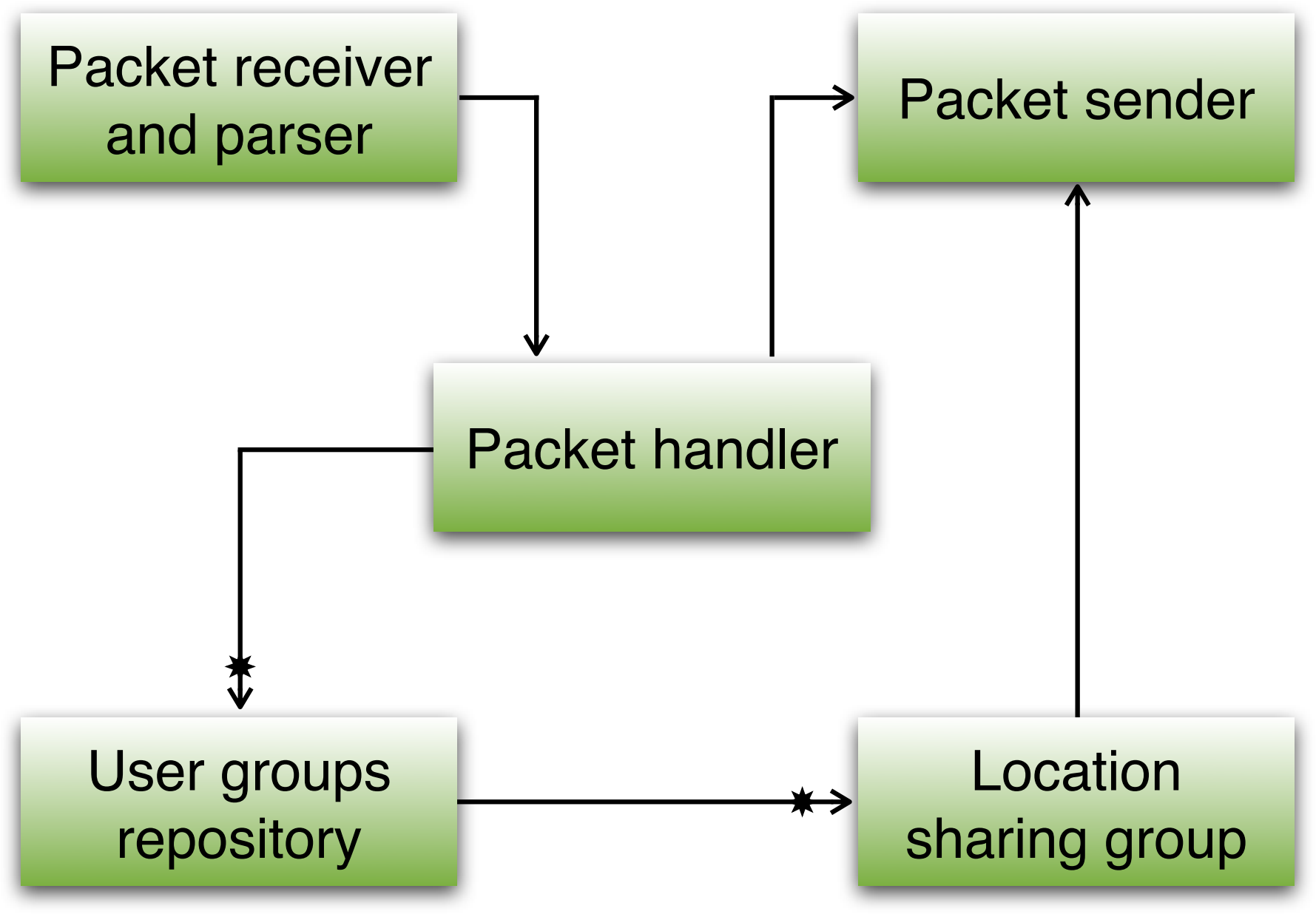
XMPP Server

The underlying work is done by a **XMPP/Jabber** server. We are using the free and open source **OpenFire**.

- handles **XMPP packets** which are messages, presences and IQs
- stores **data** such as users' profiles, sharing groups and locations
- manages the **Publish-Subscribe** protocol, e.g. pushing locations to the connected users

Location Component

The component keeps track of the connected **users** and their **groups**. Received locations are modified and sent to the various user's groups.



Features

- Security
  TLS and **SASL** mechanisms
- Privacy and control
  the user decides **who** to show **what**, **when and how**
- Modularity
  the platform could be easily **extended** with new **features**
- Efficiency
  the messages are **zipped** and the location **refresh** and **send** timers are customizable
- Standards
  Android development standards (e.g. values files, Java patterns);
  XMPP architecture standards (e.g. Geoloc packets and custom IQ stanzas following the Provider pattern)

Challenges

The biggest challenge has been finding an **efficient** way to share one's location in a **highly customizable** manner.

Solutions using **Google** Latitude API and **Yahoo!** Maps API were just not versatile enough, while using a **chat** based system would have been very inefficient.

Once decided the **protocol** to use, the next challenge has been dealing with the **Android Smack** XMPP library's lack of documentation, instabilities, bugs and not implemented features.

Finally, the whole platform had to be **modular** enough to be **extended** for extensive field studies in later projects.