Motivation

- Event-based communication, where messages are sent asynchronously between entities, has been identified as especially suited for mobile ad hoc networks due to the loose coupling it enables.
- Mobile applications that are based on such communication networks often depend and adjust to their environmental context including location.
- Consider a city visitor looking for a parking lot in his vicinity or a moving police car informing vehicles of an accident. These scenarios require location awareness of the participating entities and may utilise event-based communication.
- This project aims at evaluating PENCA, an event-based middleware service for mobile ad hoc networks that explicitly supports location context.
- To that end we created DGUIDE, a collaborative application built on top of PENCA. It is a city guide application enabling tourists move around the city of Dublin receiving information from various places of interest, in their vicinity.
- We evaluated DGUIDE and consequently PENCA using several usage scenarios.

Background

- The event based communication paradigm, where components interact by sending and receiving events, is suitable for use in ad hoc networks. Events have an event type used by the receiving entities to identify them.
- It is often useful to restrict the delivery of events at a particular area, the proximity, specified by the producer.
- Proximity = Area(shape, dimension, reference point), Naval. The proximity is mapped to a real world area.
- PENCA is a middleware service realising the proximity-group communication concept based on announcements and events. It provides Jini adapters to enable applications communicate using the event paradigm.
- PENCA provides for mobile ad hoc networks that explicitly supports location context.

DGUIDE overview

- DGUIDE(Dublin Guide) is a city guide application enabling city visitors to receive information relating to city spots in their vicinity.
- City visitors => consumers, city spots => producers.
- Communication => event-based communication paradigm realised by PENCA.
- Producers are grouped into categories (e.g., restaurants, hotels etc.).
- Category => event type.
- Consumer registers interest in categories and receives event from producers belonging to categories of interest.
- Consumers filter received events.

DGUIDE architecture

- DGUIDE Producer
  - Instantiates a PENCA producer, contains a Jini adapter for a specific event type, creates and disseminates events.
- DGUIDE Consumer
  - Instantiates a DGUIDE consumer, and contains a Jini adapter for every event type of interest. The DGUIDE consumer's Jini adapter is registered with the PENCA consumer's Jini adaptor and creates a chain of adapters. The DGUIDE consumer creates content filters, receives events and optionally stores them on disk.

Evaluation

- Scenario 1: A city visitor is walking looking for a taxi. The visitor is initially located outside the taxi proximity (Circle(50m)). The visitor moves towards the taxi area. The visitor enters the taxi proximity and delivers events.
- Scenario 2: A city visitor is walking in the city centre, receiving events from various city spots of interest. Events are delivered, only if visitor is located within a city spot proximity. City spots define a circular proximity with 150m radius.
- Scenario 3: A city visitor is looking for a restaurant. He collaborates with another visitor to receive events from a particular restaurant, even though it is not located within his transmission range. The restaurant defines a circular proximity with 300m radius.
- Scenario 4: A city visitor interested in hotels sets the content filter to control the events it receives. Four hotel producers disseminate events. Only events matching the filter are delivered.

Conclusion

- DGUIDE enables city visitors receive information of interest from city spots in their vicinity. They have the means to control the information they receive by using filters. They may also collaborate with other visitors to receive information from spots residing outside their wireless adapter range.
- DGUIDE users may receive information while on the move, from moving producers like taxis or buses.
- DGUIDE users may receive information from a large number of city spots.
- PENCA, a middleware service providing event-based communication to DGUIDE, is appropriate to support context-aware communication in collaborative applications targeting mobile ad hoc networks.