qWixP, a Qt- based, Wireless Information Exchange Platform

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Agenda

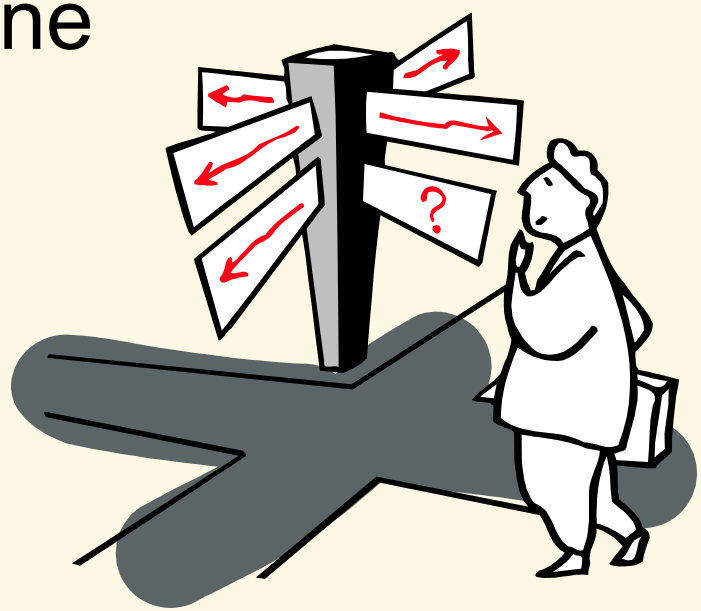
1. The Conference Scenario
    1. Motivation
    2. Design aspects

2. Conference Software
    1. Communication Platform
    2. Graphical User Interface

3. Summary, Status, Future Work

The Conference Scenario – Situation Today

„Impression, that unproductively cruising around is the most important activity of everyone on a conference.“



The Conference Scenario

- Login at Conference Desk
- Registration of Alias, BDA and/or IP
- Download of Client Software
- ... *Participation* ...
- Logout

The Conference Scenario – Information Types

Information to provide:

1. Conference or organizational information
   - ➢ Sessions, room numbers, schedules
2. Content-related information
   - ➢ Related researches, get papers
3. Personal information
   - ➢ Meeting with friends, e-mail, organize groups

The Conference Scenario – Design Aspects

Straight forward solutions are

application based approaches.

(e.g. CGI based web server)

- Network or system level issues are unconsidered
- On mobile systems: web browsers are hard to handle (due to small displays)
- HTML has too much rendering information

The Conference Scenario – Design Aspects

The present approach concentrates on:

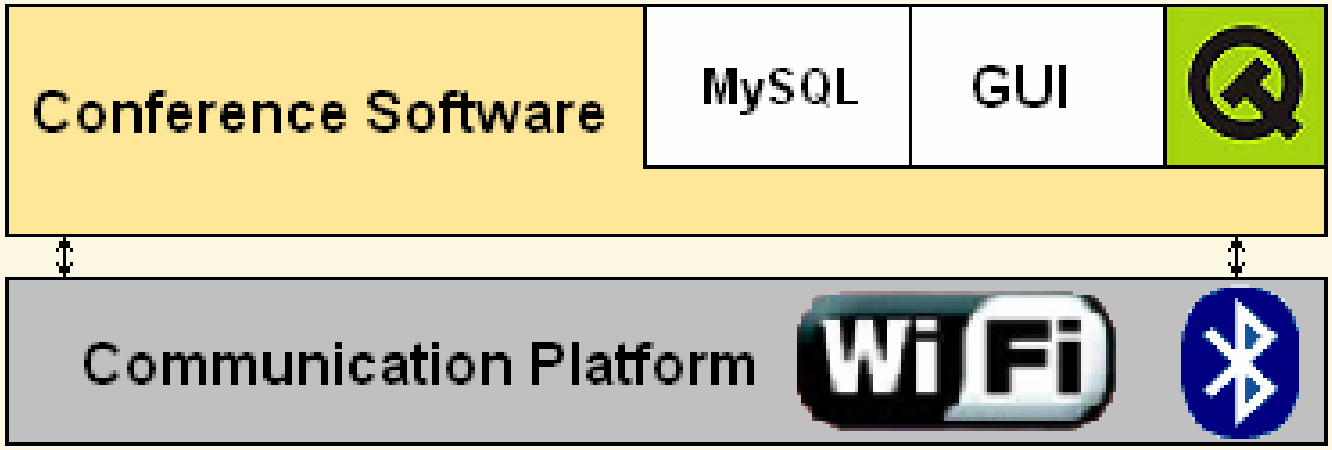
- System independent-implementation
- Heterogeneous, wireless network environments
- A continuous good usability
- Cost effective, resource saving implementation

"True Mobility" is only possible with PDAs

The Conference Scenario – Design Aspects

The conference system consists of:

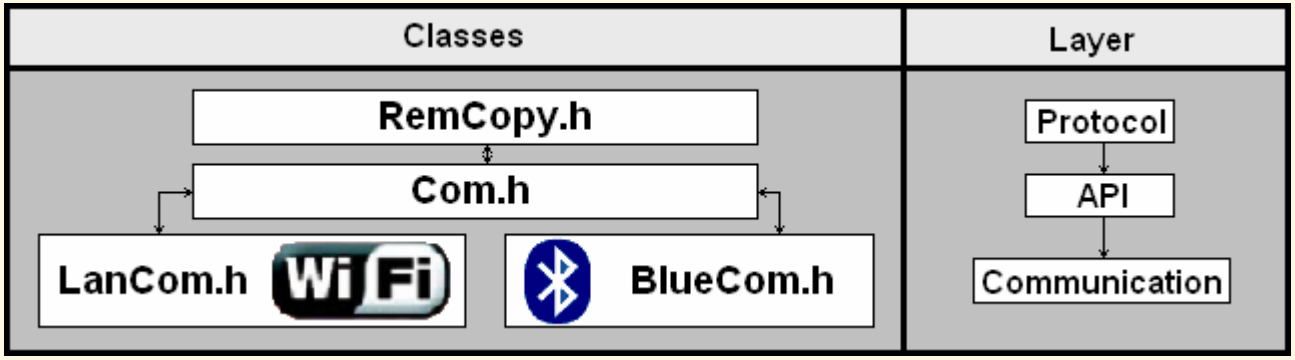
- The Graphical User Interface (Frank Reichenbach)
- An underlying Communication Platform (Holger Harms)



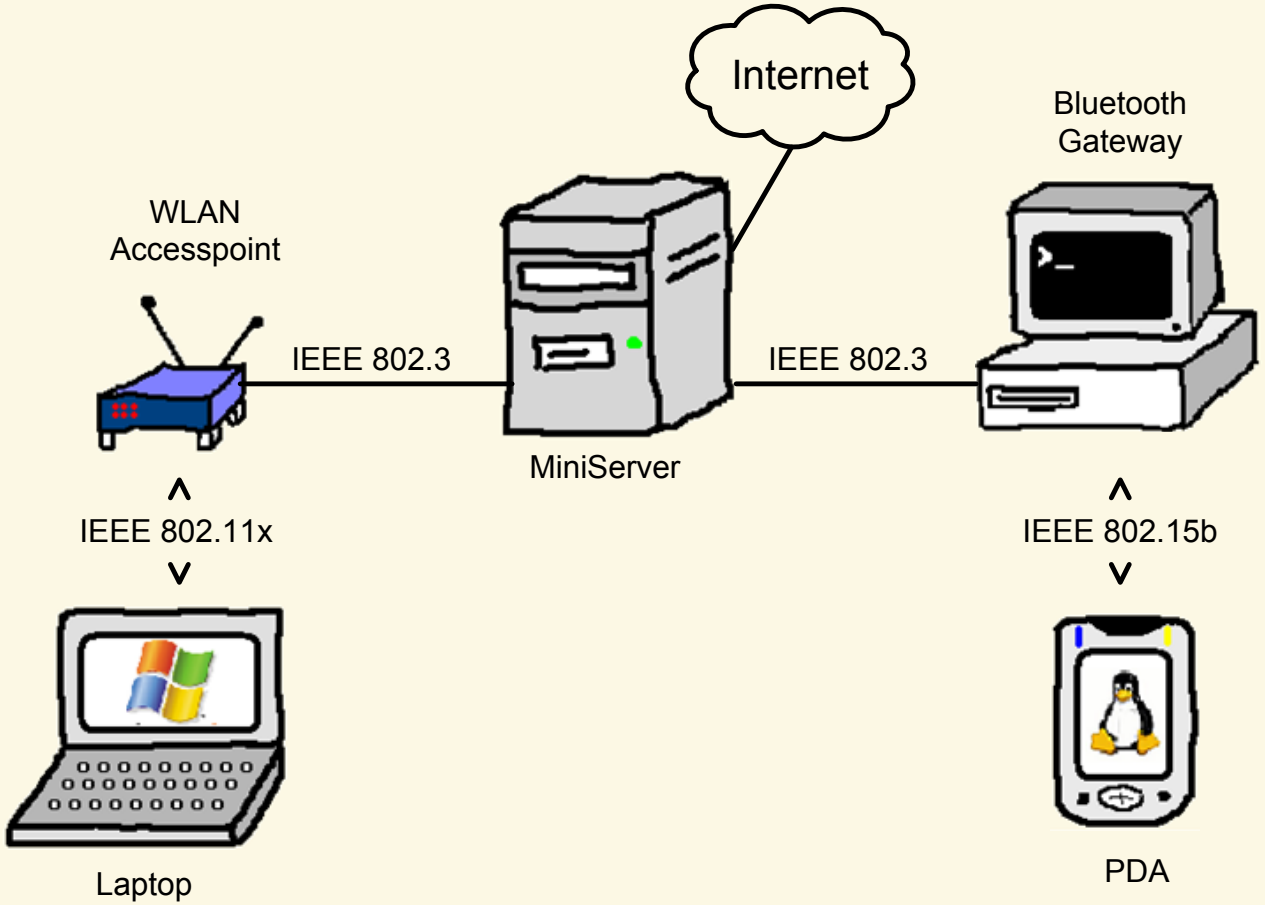
Communication Platform – Design Aspects

The Communication Platform consists of:

- A network layer protocol for data transfers
- A communication methodology independent programming API (wrapper class)
- Communication methods for Bluetooth and WLAN



Communication Platform - Infrastructure



Communication Platform - Architecture of the MiniServer

„MiniServer“ is a central multi-purpose server that:

- Stores all conference relevant data (paper, schedules)
- Maintains user relevant data (alias, IP/BDA, reachability)
- Stores infrastructural data (IP/location of BT gateways)
- Routes frames
- Provides e.g. e-mail, internet access (planned)

Communication Platform - Architecture of AP

- WLAN access points are transparent to the Communication Platform

- Bluetooth gateways are:
  - Linux based systems running a Bluetooth stack
  - Controlled by the MiniServer through system commands
  - Reporting the reachability of clients to MiniServer
  - Receiving periodically pings from clients

Communication Platform - Architecture of Clients

WLAN Clients

- Run on Win2k, WinCE and Linux
- Roaming is supported by standard (IEEE 802.11b)
- Datagrams are supported

Bluetooth Clients

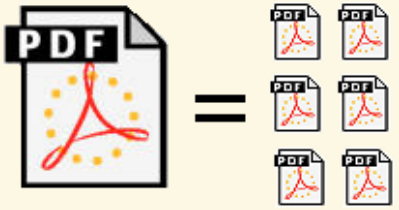
- Only run on Linux based architectures (BlueZ required)
- Support services like localization

  (by means of identifying their actual gateway)
- Datagrams and roaming were implemented by hand

Communication Platform – Features

- Fault tolerant, address type independent communication
- Segmentation and reassembly (SAR)
- Automatical, horizontal handover (roaming) of clients
- Aspects like localization, translation of alias and IP/BDA
- Datagrams, also for Bluetooth
- Different frame types

Communication Platform – Frame Types



The heterogeneity of data inside a conference system motivates to introduce different frame types:

1. Frames for generic data exchange (Data)
   - Unsequenced (chat) and sequenced data
2. Frames for special conference services (Command)
   - Locate user, resolve alias, subscribe, unsubscribe, ping
3. Commands for maintaining the infrastructure (System Command)
   - Reset gateways, report reachability information

Conference Software – Design Aspects

The Conference Software consists of:

- Graphical, platform-independent client application
- Server application for maintaining conference data

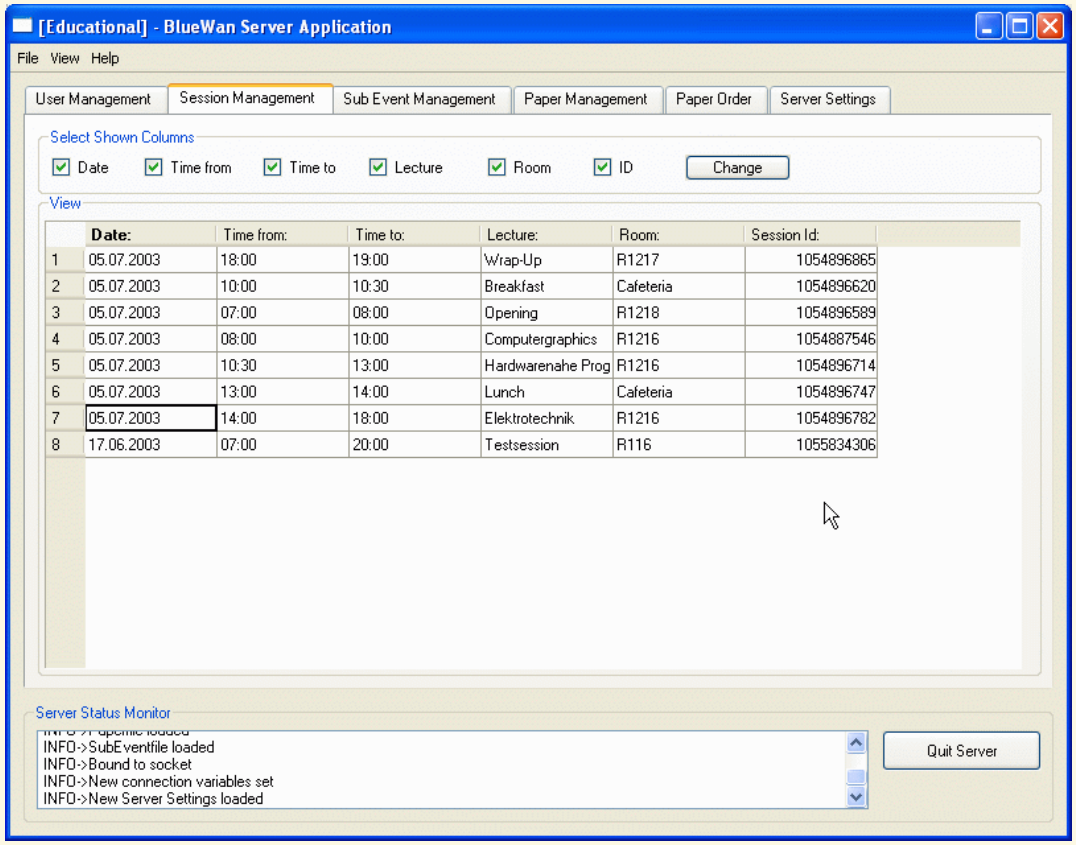
Conference Software – Design Aspects (Server)

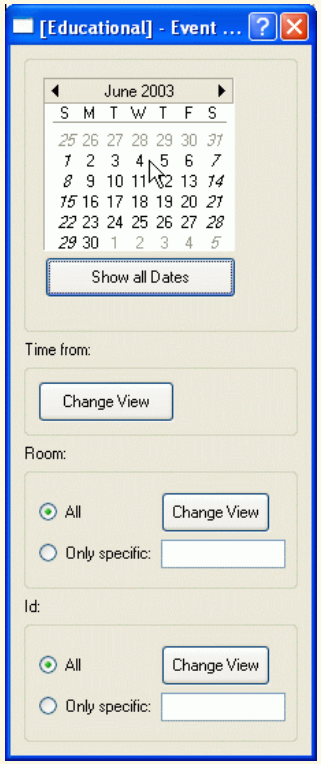
Requirements for the server application:

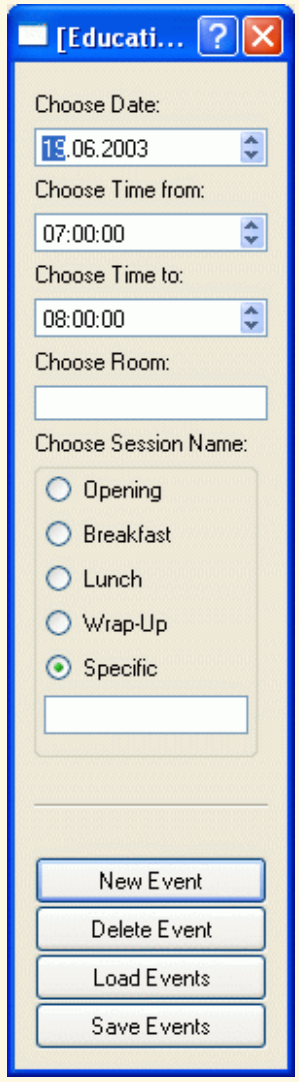
- Clearly arranged, easy to use GUI
- Connection to database (mySQL)
- Efficient and fast data management
- Easy configuration of settings and parameters
- Status monitoring

- Platform-independent implementation (Win2k, Linux)

Conference Software – Server Application

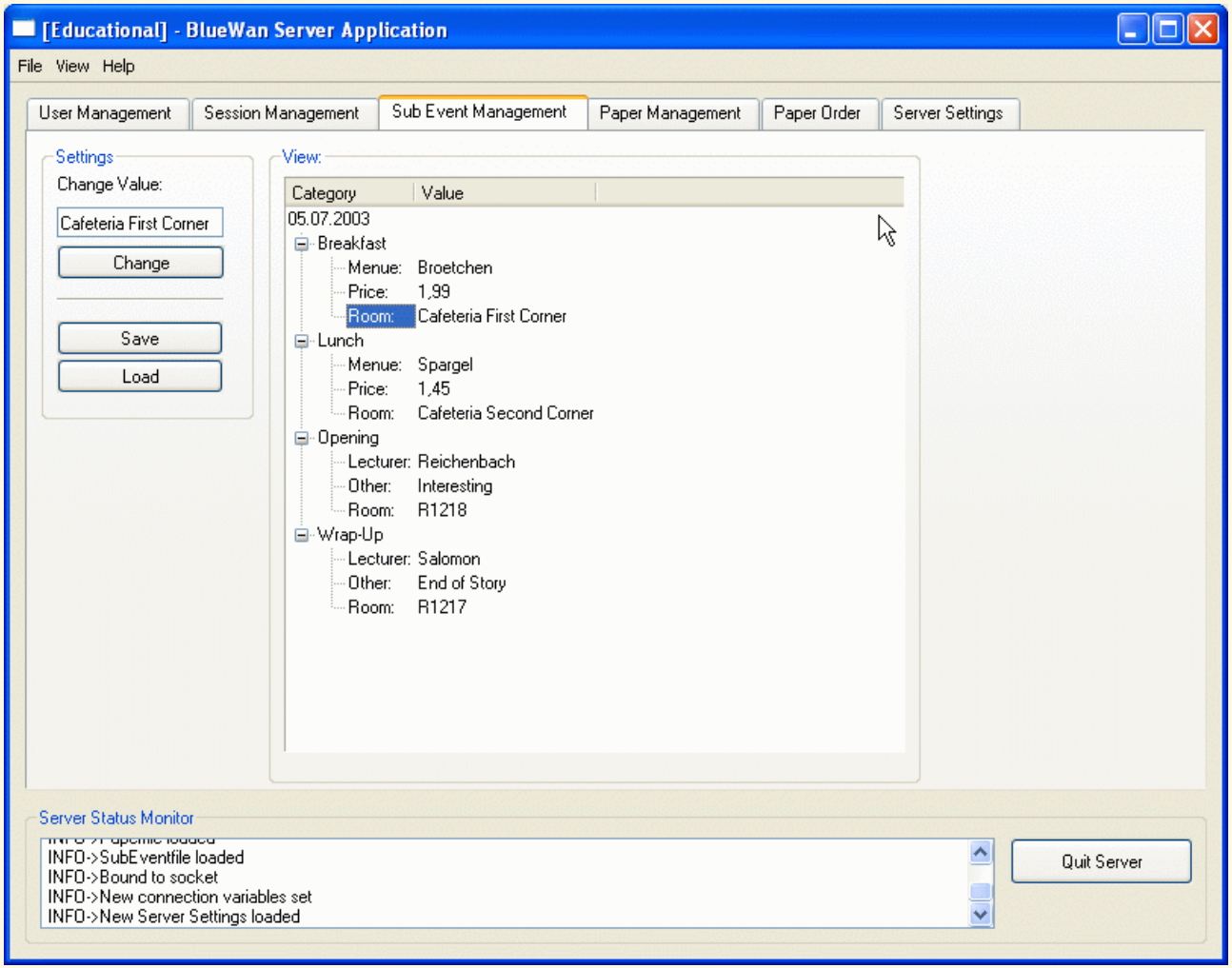






- User Management
- Session Management
- Search Function
- Paper Management
- Calendar
- Settings

Conference Software – Server Application



- Events can be maintained in SubEvent Management

Conference Software – Design Aspects (Clients)

Requirements for Client Application:

- Platform-independent implementation
  (Win2k, WinCE, Linux, embedded Linux)
- Easy-to-use, intuitive GUI
- Consideration of additional input devices (Touchscreen)

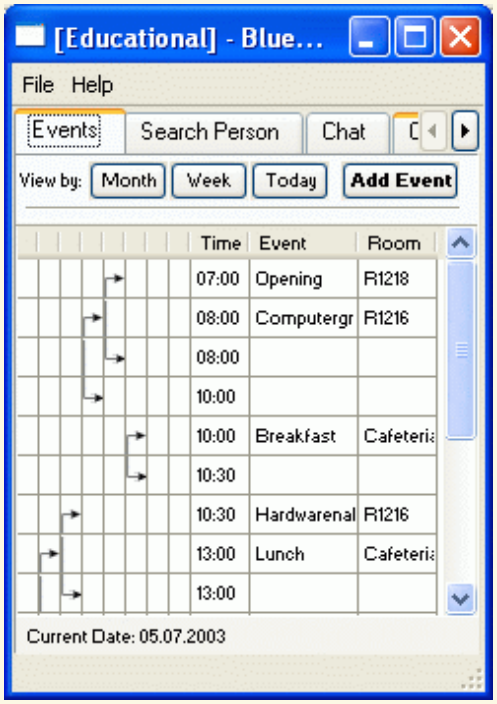
Conference Software – Design Aspects (Clients)

PDA related optimizations for clients:

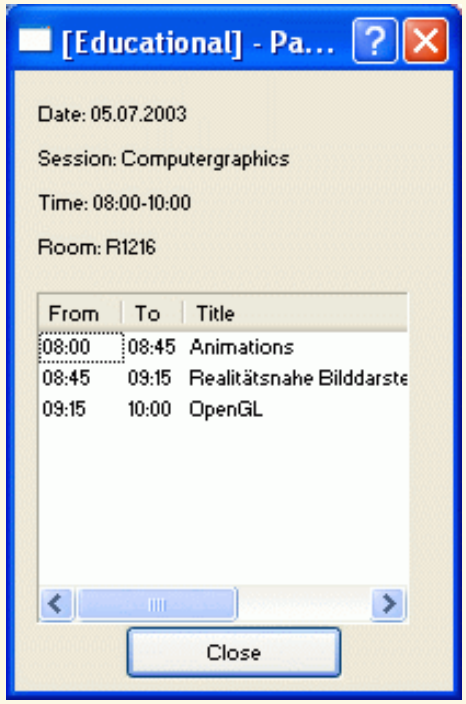
- Naturally low resolution (iPAQ 240*320)
- Less memory available
- Avoidance of network traffic
- Minimization of power consumption (CPU load)

Conference Software – Client Features

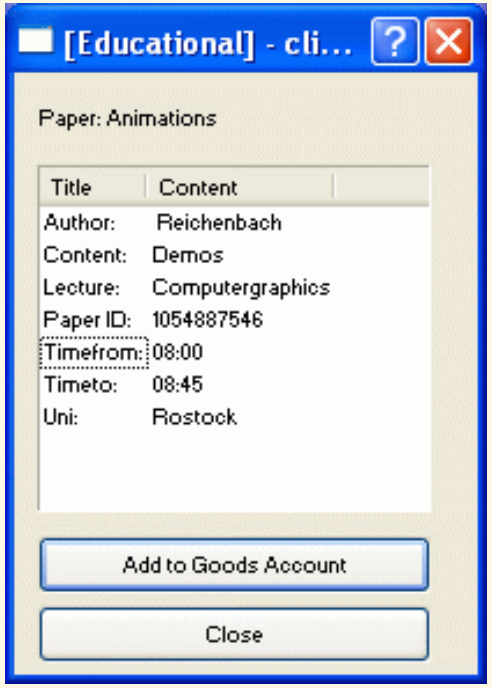
Day



Session



Details

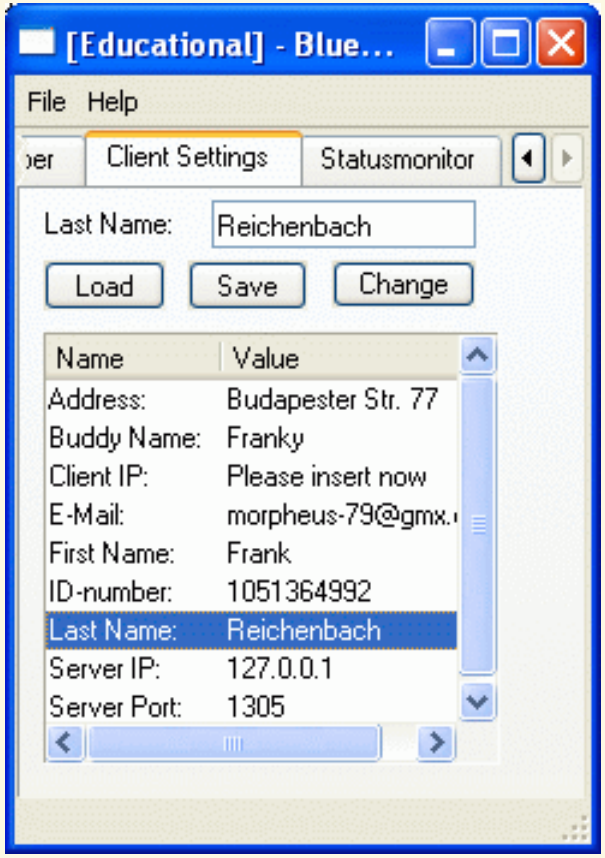


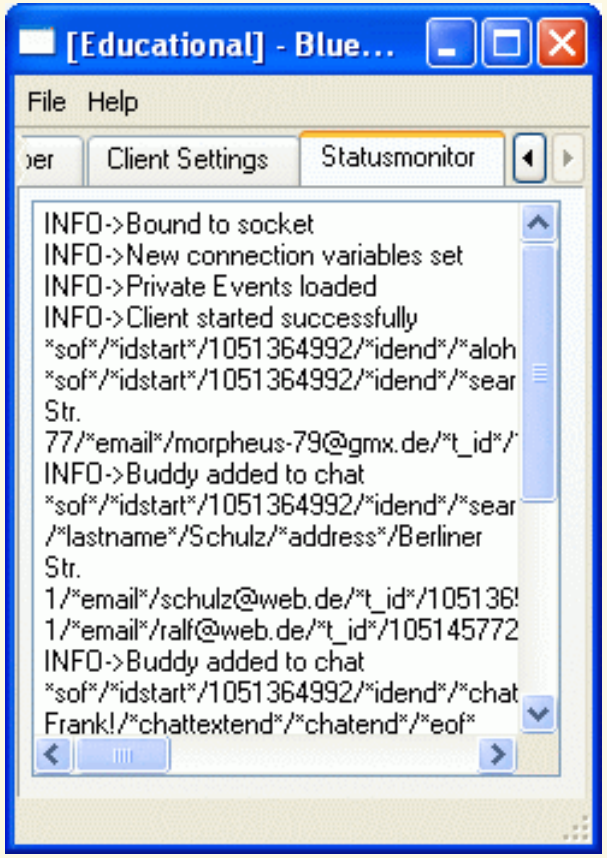
- Events are structured and shown hierarchically

Conference Software – Client Features

- Search function to find other users (user detail view available)
- Found persons can be invited to chat

Conference Software – Client Features (Settings)





- Easy configuration of settings and network parameter
- Automatical log of errors, status and debugging information

Summary, Status, Future Work

Major parts have been implemented in student projects:

- Communication platform (Clients, Bluetooth gateways, MiniServer)
- Network protocol
- Server GUI on a Linux system, data management with mySQL
- Client GUI for PC and ARM-based PDA running embedded Linux

Future Research:

1. Minimization of network traffic
2. Porting applications to other operating systems (e.g. WinCE client)
3. Investigations regarding Security issues ⇔ Power consumption

Questions?

Thank you!