

qWixP, a Qt- based, Wireless Information Exchange Platform



Ralf Salomon, *Holger Harms*,
Frank Reichenbach, Thomas Kirste

Agenda



1. The Conference Scenario

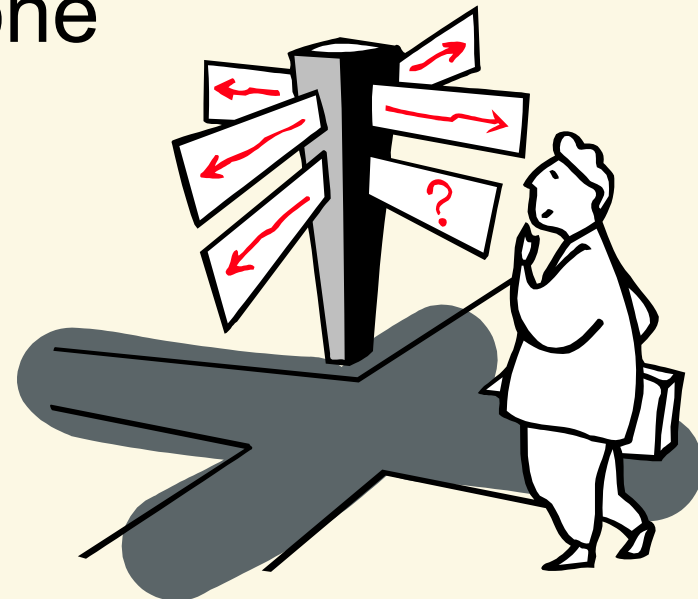
1. Motivation
2. Design aspects

2. Conference Software

1. Communication Platform
2. Graphical User Interface

3. Summary, Status, Future Work

„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

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



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 present approach concentrates on:

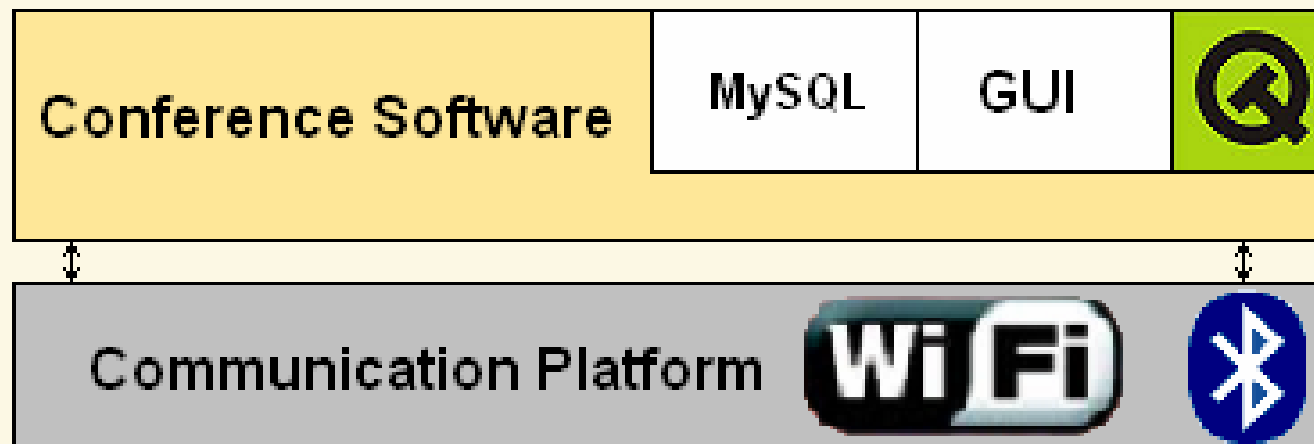
- System independent-implementation
- Heterogeneous, wireless network environments
- A continuous good usability
- Cost effective, resource saving implementation



"True Mobility" is only possible with PDAs

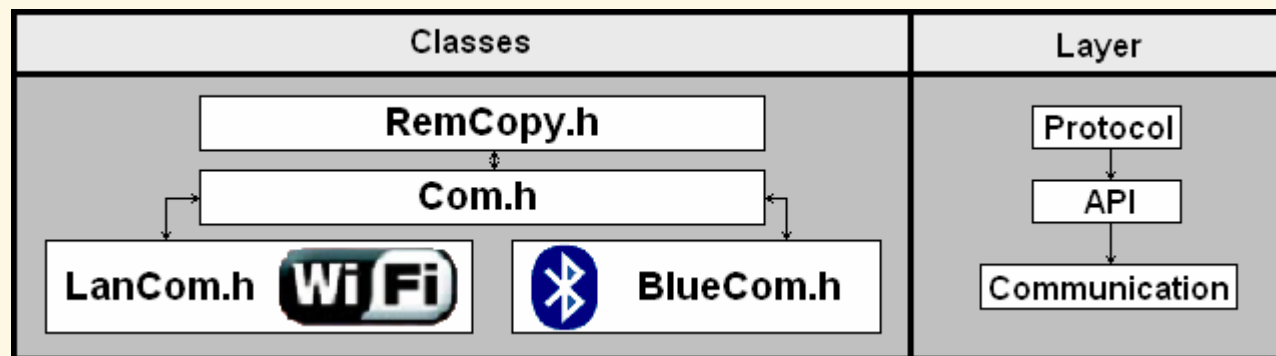
The conference system consists of:

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

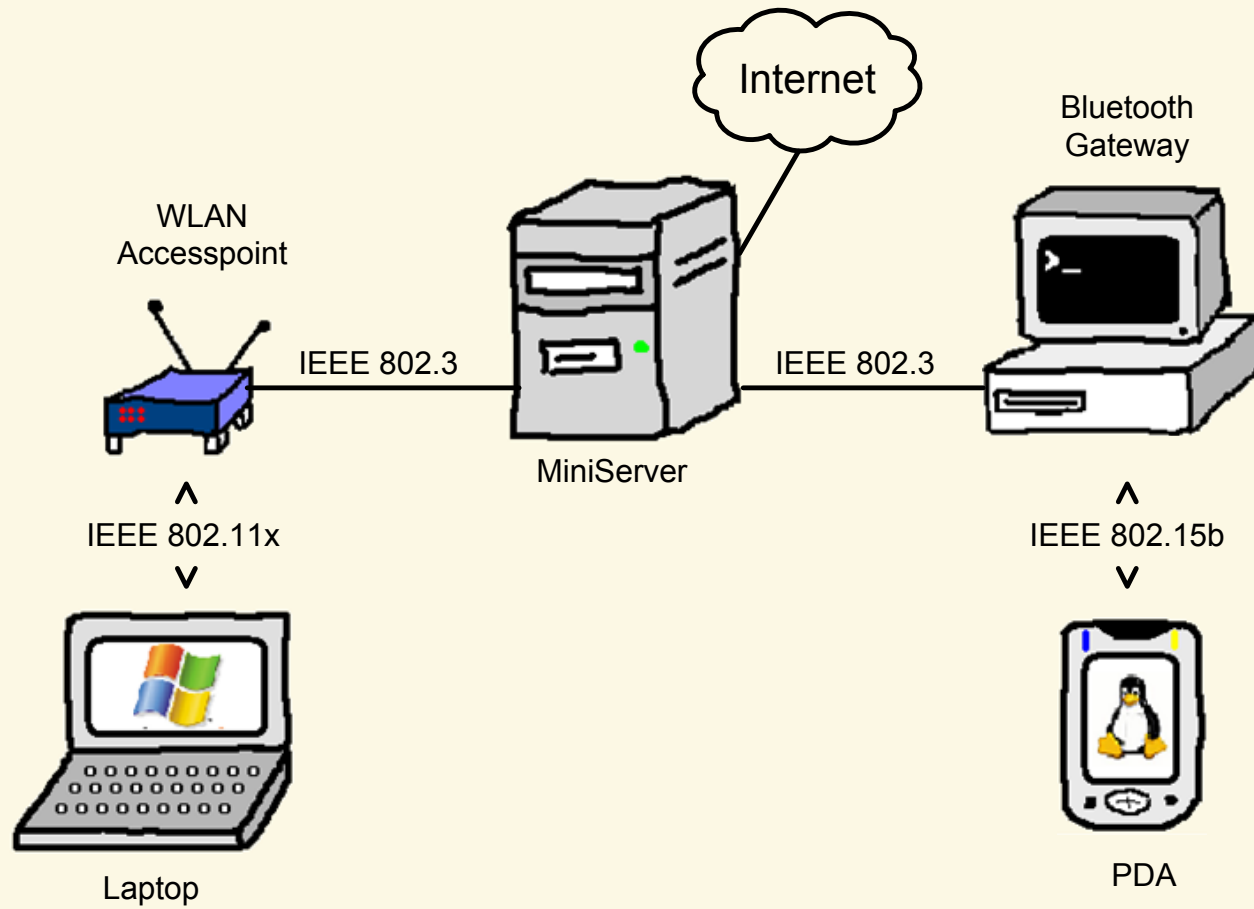


The Communication Platform consists of:

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



Communication Platform - Infrastructure





„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)

➤ 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





WLAN Clients

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

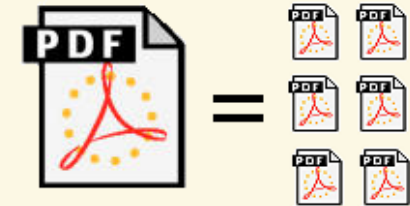
Bluetooth Clients

- 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

- 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

The Conference Software consists of:

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



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

The screenshot shows the main window of the BlueWan Server Application. The title bar reads "[Educational] - BlueWan Server Application". The menu bar includes "File", "View", and "Help". Below the menu bar are tabs for "User Management", "Session Management", "Sub Event Management", "Paper Management", "Paper Order", and "Server Settings". The "Session Management" tab is active. A "Select Shown Columns" section has checkboxes for "Date", "Time from", "Time to", "Lecture", "Room", and "ID", all of which are checked. A "Change" button is next to these checkboxes. Below this is a "View" section containing a table with the following data:

	Date:	Time from:	Time to:	Lecture:	Room:	Session Id:
1	05.07.2003	18:00	19:00	Wrap-Up	R1217	1054896865
2	05.07.2003	10:00	10:30	Breakfast	Cafeteria	1054896620
3	05.07.2003	07:00	08:00	Opening	R1218	1054896589
4	05.07.2003	08:00	10:00	Computergraphics	R1216	1054887546
5	05.07.2003	10:30	13:00	Hardwarenahe Prog	R1216	1054896714
6	05.07.2003	13:00	14:00	Lunch	Cafeteria	1054896747
7	05.07.2003	14:00	18:00	Elektrotechnik	R1216	1054896782
8	17.06.2003	07:00	20:00	Testsession	R116	1055834306

At the bottom of the window is a "Server Status Monitor" section with a scrollable log showing messages like "INFO->SubEventfile loaded" and a "Quit Server" button.

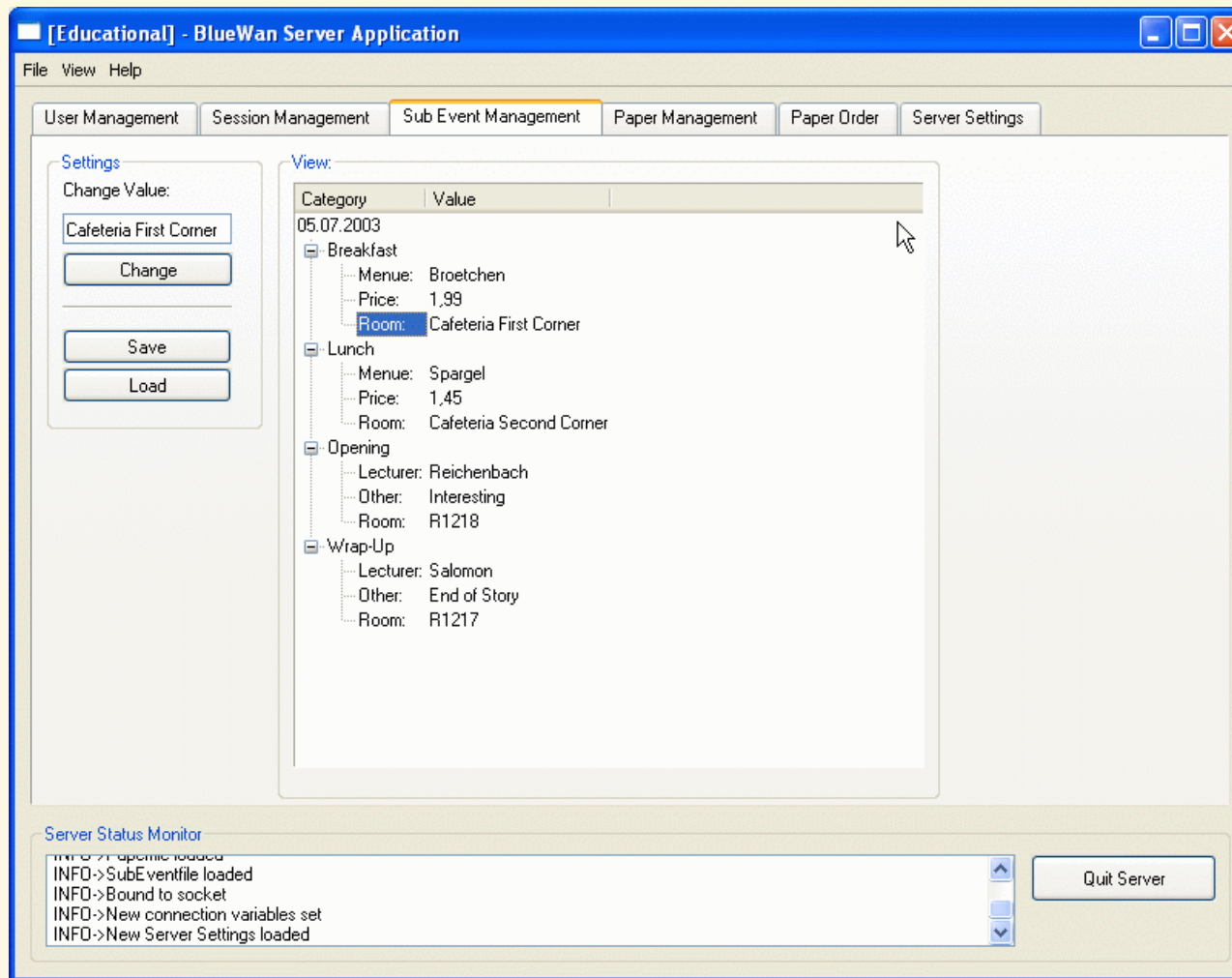
The screenshot shows a calendar interface for June 2003. The calendar grid shows days of the month. Below the calendar is a "Show all Dates" button. Underneath, there are fields for "Time from:" and "Room:" with "Change View" buttons. The "Room:" section has radio buttons for "All" (selected) and "Only specific:" with an input field. The "Id:" section also has radio buttons for "All" (selected) and "Only specific:" with an input field.

The screenshot shows a form for event selection and management. It includes the following fields and controls:

- "Choose Date:" with a date picker set to 15.06.2003.
- "Choose Time from:" with a time picker set to 07:00:00.
- "Choose Time to:" with a time picker set to 08:00:00.
- "Choose Room:" with an empty text input field.
- "Choose Session Name:" with radio buttons for "Opening", "Breakfast", "Lunch", "Wrap-Up", and "Specific" (selected). Below the radio buttons is an empty text input field.
- At the bottom, there are four buttons: "New Event", "Delete Event", "Load Events", and "Save Events".

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

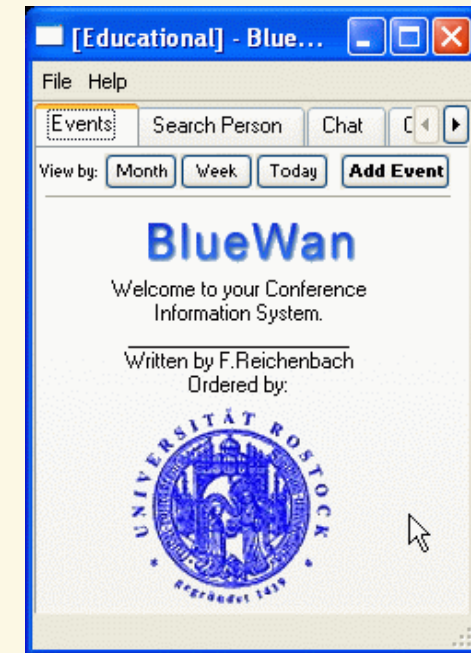
Conference Software – Server Application



➤ Events can be maintained in SubEvent Management

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)

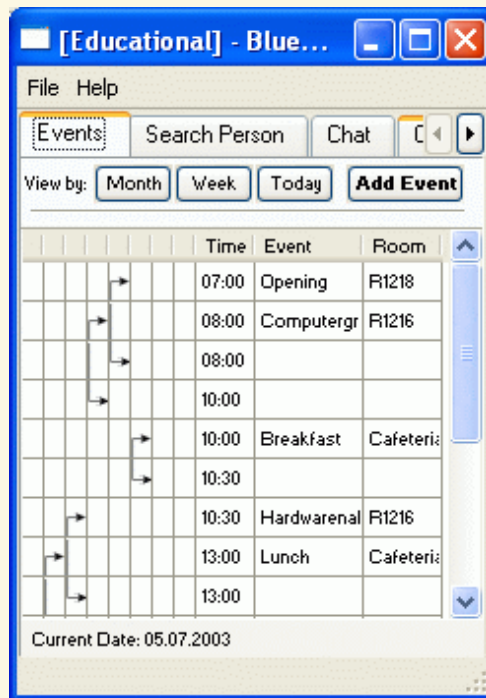
PDA related optimizations for clients:

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

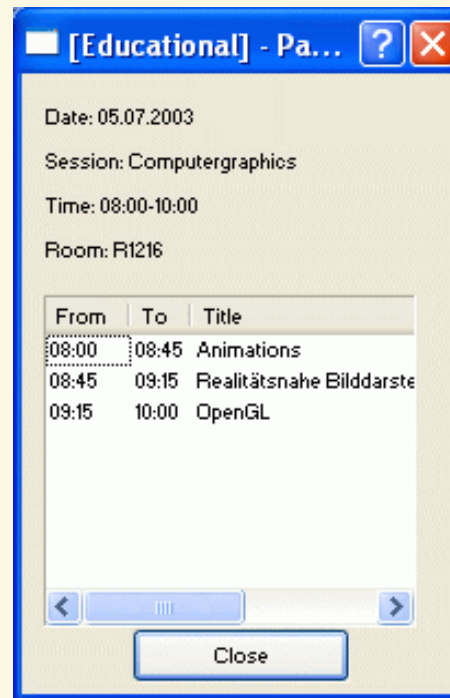


Conference Software – Client Features

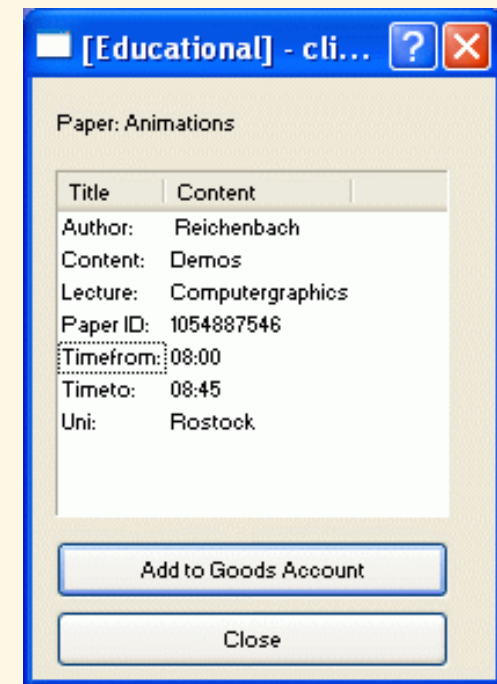
Day



Session

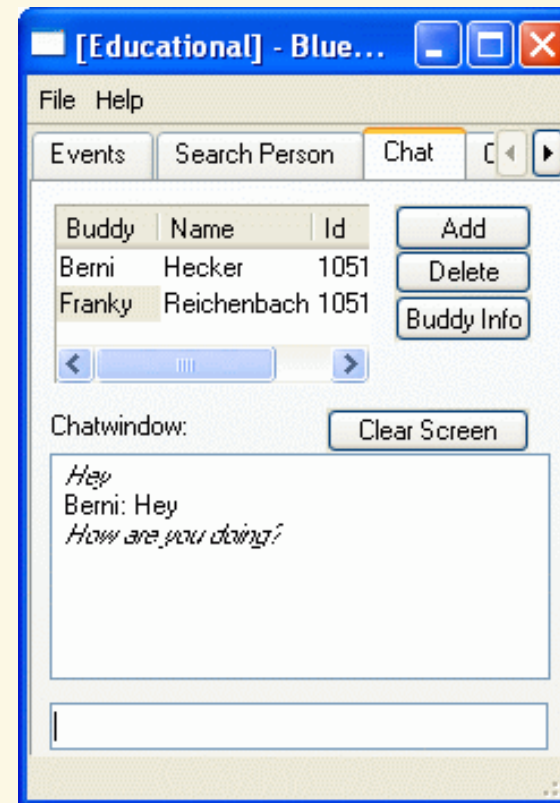
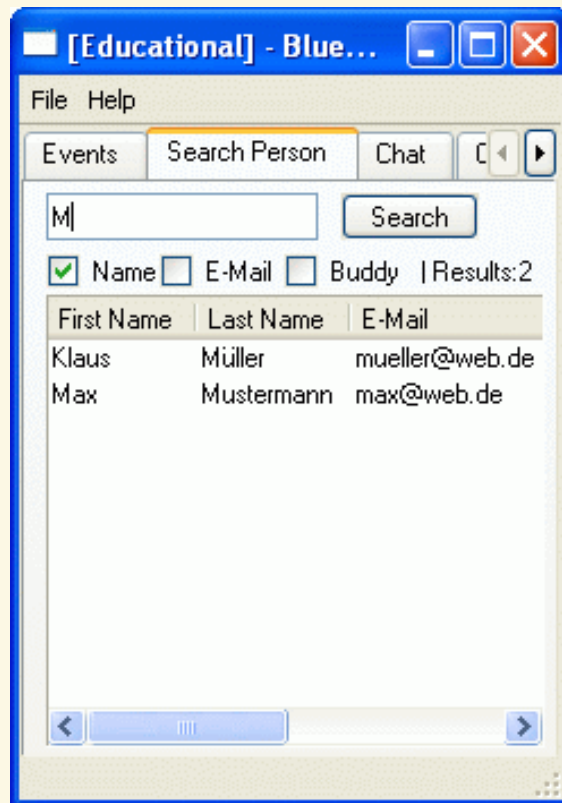


Details



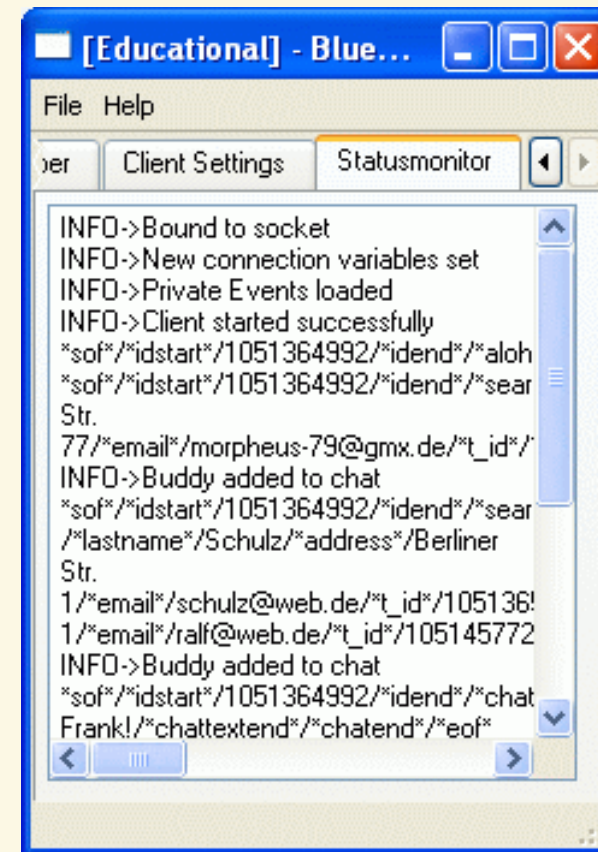
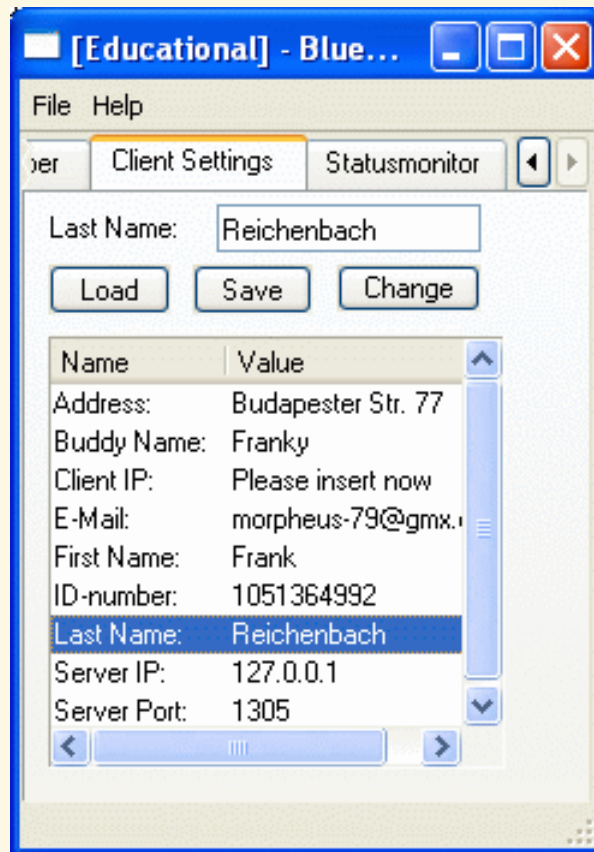
- Events are structured and shown hierarchically

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!