

P2P Meeting Tool

– A Peer to Peer Pervasive Computing Application -

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Abstract: P2P Meeting Tool is a meeting management tool, which uses Peer-to-Peer technology to realise a pervasive computing environment. Users can search for and join a meeting session without having to worry about the location or type of device or network connection (wired or wireless). This article describes the architecture and design considerations behind the Tool.

1 Introduction

Advent of powerful mobile devices allows one to run complex applications on them. One challenge lies in contacting the person on the move, without worrying about his location or type of device he is using. Peer-to-Peer technology makes this possible. P2P Meeting Tool is an application, which makes use of this technology to build a pervasive computing environment.

1.1 What is Pervasive Computing

Pervasive Computing promises a computing infrastructure that seamlessly and ubiquitously aids users in accomplishing their tasks and that renders the actual computing devices and technology largely invisible. It is computing power freed from the desktop - embedded in wireless handheld devices, automobile telematics systems, home appliances, and commercial tools-of-the-trade [IB].

1.2 What is Peer-to-Peer (P2P)

P2P computing is the sharing of computer resources and services by direct exchange between systems. These resources and services include the exchange of information, processing cycles, cache storage and disk storage for files. Devices in a P2P network talk directly to each other instead of using central servers. These devices can be anything, ranging from handhelds to powerful desktop computers – any device with a “digital heartbeat“ [Sc01].

1.3 P2P and Pervasive Computing

The P2P model is particularly interesting to pervasive developers because it enables them to assemble ad hoc networks quickly, without imposing configuration chores on the users [JX]. P2P networking provides a model that is well suited to the difficulties of wireless communication like inconsistencies of electromagnetic wave propagation, interference and battery exhaustion.

2 P2P Meeting Tool

This tool is a show case application of how P2P technology can be used in achieving a pervasive computing environment. The users can be located anywhere. They can be using a handheld or a desktop. They can be connected through the wired network or wirelessly. This tool has got two implementations, one for the notebooks and other for the handhelds, which can work together seamlessly.

2.1 Application Scenario

- 1 Thomas has set up meeting on 29.09.2003. The invitees to this meeting are Gabriel and Walter from Germany and Gupta and Sanjib from Bangalore, India. He logs into this application as a moderator on 27.09.2003, writes down and saves the meeting details like Title, Time, Agenda etc as “Meeting Project”.
- 2 On 29.09.2003, Thomas again logs in as moderator, opens the saved “Project“ and starts a new “Meeting Session“ for this project.
- 3 Gabriel and Walter log in to the application as Normal Users and then search for available Meeting Sessions. They get a list of existing sessions, including the one just started by Thomas. They select that and join (Figure 1).

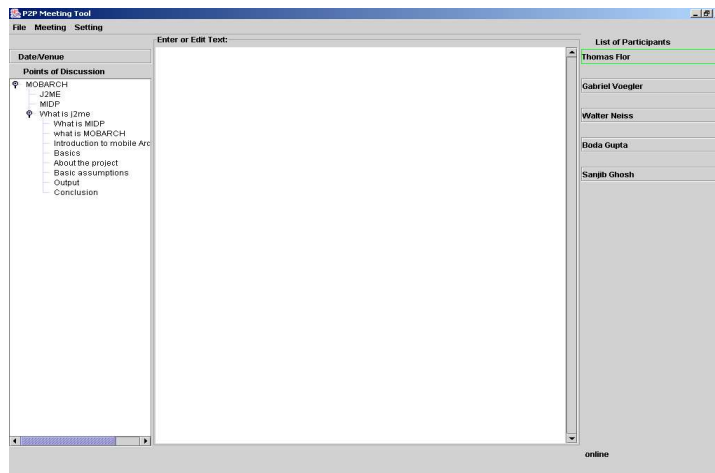


Figure 1: Screen shot of a Notebook User

- 4 Gupta is in Bangalore and is behind a corporate firewall. He uses Gabriel's machine as a "proxy"[JX] for him to communicate through the firewall.
- 5 Sanjib uses his Bluetooth enabled[BT] handheld for the meeting. He uses Gupta's machine as a "Relay"[JX] for his handy and logs in (Figure 2).



Figure 2: Screen shot of a PDA User

- 6 Sanjib can select Walter's name from the list of participants and view his Profile. He can edit his own profile also.
- 7 Thomas starts the meeting. He selects a point of discussion on his machine, the point being discussed now. The same point of discussion gets highlighted on each machine.
- 8 As the meeting progresses, Thomas writes down the meeting notes on his notebook for each point of discussion. The same meeting note is displayed on each user's machine and gets updated at particular interval.
- 9 Gabriel has got a very useful document with him, which he has made available for others to view. He chooses that particular document and downloads it. He can also view all the documents shared by all.
- 10 Once the meeting is over, Thomas can close the meeting. All participants get the closing message. All the related files and meeting notes are saved under the parent Project folder.

2.2 Architecture

The system architecture being followed is given in Figure 3 below.

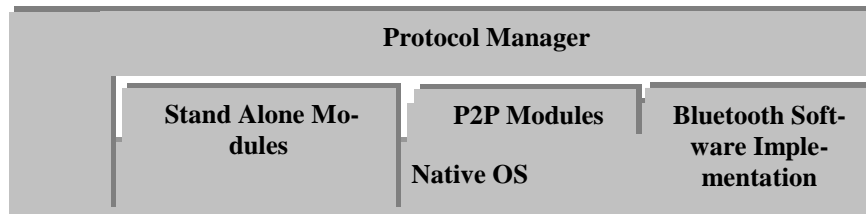


Figure 3: System Architecture

After Use Case Analysis of the scenario, we have arrived at a set of use cases. To realise these use cases, a set of modules (services) have been identified e.g. Login module, Search module, Data fetching module, Listing module etc. Some of these modules are “Stand Alone” modules i.e. they can work independent of the P2P network. Some of the modules are P2P modules (e.g. search module), which use the P2P network to accomplish their task. Some of the modules are a part of the Bluetooth Stack (e.g. Dynamic Discovery). The flow of control is managed by the Protocol Manager.

2.3 Implementation

The handheld and notebooks have got different capabilities. Also, the way they interact in a P2P network is different. Hence, we have got two separate implementations – one for notebooks and one for handhelds. But, both the implementations work seamlessly. The moderator, as obvious, has to use a notebook.

2.4 Development Environment

The tool is being developed and tested with Bluetooth USB dongle (Acer) and iPAQ 3970. Development environment is Windows 2000 professional. Development Platforms are J2SE 1.4.0 with JXTA (for notebook) and J2ME with JXME (for handheld).

3 Bibliography and References

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