Scalable Support for Work Groups and Groupwork

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Information access and information sharing are two important features in supporting work groups and groupwork. There are a large number of systems proving these functions. However, existing systems often support only few types of terminal devices when users now have a variety of them: WAP phones and terminals, PDA devices, and desktop and portable computers. This paper presents a portal system that supports all these levels of mobility and scalability.

Computer-supported co-operative work, Wireless Application Protocol, World Wide Web, Personal Digital Assistants, scalable user interfaces

Introduction

In successful modern organization information, knowledge and services must be readily accessible regardless of time, place or available terminal device. Recent development of wireless mobile terminals offers an excellent technical basis for such functionality. However, the wide variety of terminal devices will introduce new problems to the application development and information sharing.
We decided to use our own unit as a laboratory to explore how user interfaces and applications scale in a groupwork setting. Since working in groups is common in our unit, we chose to enhance communication within group and between-groups by constructing a *portal*. While community portals are quite common, our portal is accessibly with a wide variety of devices: desktop computers connected to Internet, PDA devices connected via WLAN, and WAP terminals connected to GSM network.
Initially, we observed a number of communication-related problems in our unit. For example, the debates commencing on email lists have often such high volumes that people complain about it – by writing yet another message to the list. Another problem is that making appointments is often difficult, because people are often out of office. And finally, although email lists are easy to use and accessible with a wide variety of devices, they only serve people who are on the

list. New members do not get access to the old discussions and so the same questions arise from time to time.

To solve these problems and to improve information sharing even further, we decided to build a *group portal* for our unit. A portal is a common entry point where the members can discuss, share thoughts and publish the public part of their personal calendar. A portal is something that can be accessed with all communication devices that the members use on a daily basis. A portal is also something that integrates well within the existing systems and practices - otherwise it will not be used. The major challenge was to make the service scalable for a number of different devices.

Related work

Although innovative, the Group Portal system is not an entirely novel idea. A number of previously developed systems, such as SharedNotes [2], Live AddressBook [4] or Awarenex [6], offer a variety of interfaces into a centralized storage of data, be it notes, connectivity or presence information while also supporting mobility. On the other hand, there are systems such as ComCenter [1] or Business Card Search Service [3] that give the user mobile access only to his/her personal information via a WAP-enabled phone. The Group Portal attempts to bring together all these levels of use from the shared public display to the user's mobile phone, thus supporting the work of a group regardless of time or place.

System implementation and architecture

The Group Portal system was implemented and designed in two stages. The design of the underlying infrastructure and user interface was carried out with the desktop browser in mind. Given the time constraints of the project, two GPL software packages, tForum [7] and WebCalendar [8], were used to form the basis of the system. These two packages were linked together by implementing a shared database connectivity layer and partially merging the database tables used by the two software packages. In the current implementation, user information is stored in a shared table, whereas the package specific data is stored in separate tables. The desktop version of the system formed the starting point for the design of the scalable versions. The PDA version was derived from the desktop version by implementing a separate set of stylesheets. Therefore all the content contained in the desktop version is also available in the PDA version. More fundamental changes were carried out while designing the WAP interface to the system. Due to the limitations of WAP enabled appliances, the structure of the information to be presented via the WAP interface had to be changed. In essence, a subset of

features from the desktop version was selected and implemented in the WAP version by a student project group as an assignment on a course offered at the Department of Computer and Information Sciences.
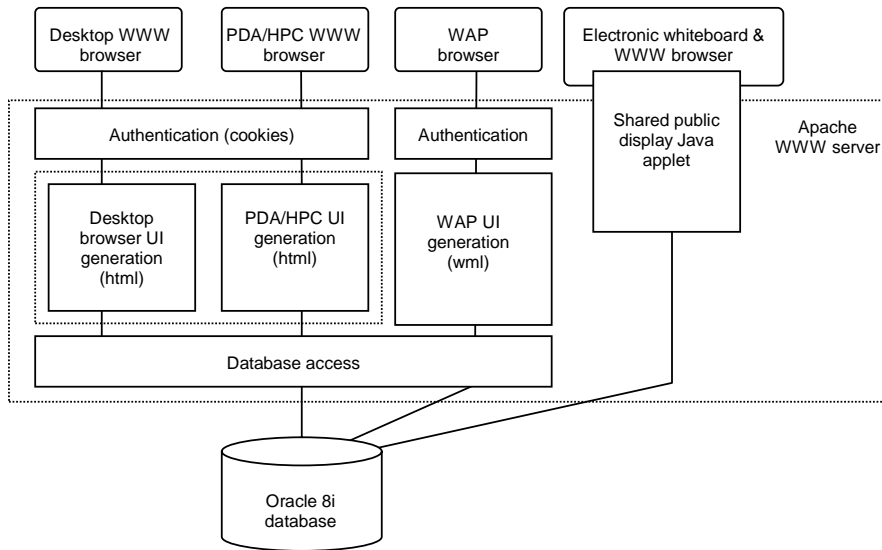

Figure 1. Architecture of the Group Portal system.

The architecture of the overall system is twofold, and roughly follows a three-level design where the user interface, application logic and content have been separated on different layers. Due to the differences in the WWW and WAP versions of the system, the only shared module between these two versions is the database access layer and the underlying database structure. The core of the system is formed by the server side PHP programs that are used to generate the layout for the different clients. The content is accessed via a unified database access module, and the device dependent output is served by the Apache WWW server. The username/password authentication to the system is handled via cookies for the WWW clients and via session management for the WAP clients.

Group portal

Our portal system has four major components: a discussion forum, a group calendar, a shared public display, and an instant messaging applet. Groupware applications are generally characterized how they support the four dimensions on the time and place axes (Fig. 2).

	Same location	Different locations
Synchronous	Instant messaging	Instant messaging
Asynchronous	Shared display	Group calendar
		Discussion forum

Figure 2. Group portal components on the time and place axes.

The group portal supports all segments in Fig. 2 to at least some extent. Clearly, the face-to-face process is least supported in our portal. The discussion forum has a three level structure: the forum is divided into *categories*, categories contain *boards*, and boards contain *topics*. Each topic is simply a linear list of messages that have been posted with the same subject line. The group calendar part of the portal makes it possible to share calendar entries. The access to a calendar entry can be *private*, *public* or *smartboard*. From the private entries others can only see that the person is occupied at that time, not the reason for this. Public calendar entries can be read by anyone who opens the person's shared calendar. Finally, if the access is defined as *smartboard*, the entry is visible to everyone and additionally it is also displayed on the electronic whiteboard via the shared public display applet at the unit's lobby. This status display shows current public events from the calendar, the most recent postings from the discussion forum, and the latest entries from the instant messaging system.

Synchronous communication or chatting over a network connection has evolved from a free-time activity to a serious business tool [5]. Basically, this allows users to post short messages that are immediately visible to all other users.

User interface

The layout of the Group Portal user interface scales according to the client that is used to access the service. Desktop browsers, for example Internet Explorer or Netscape Navigator, are presented with the normal desktop interface (Fig. 3) that is optimised for viewing in screen resolutions greater than 800 x 600 pixels.
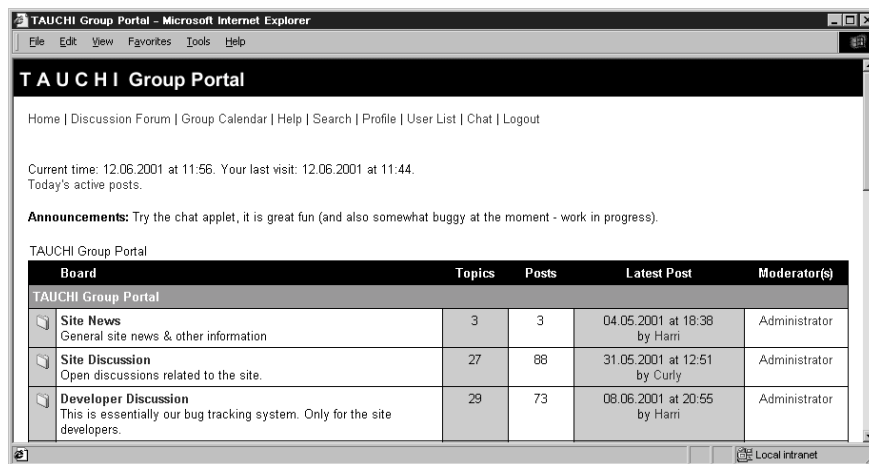

Figure 3. Desktop user interface.

At the current state of development the only fully supported PDA client is the Pocket Internet Explorer running under Windows CE operating system in Handheld PC (HPC) devices. Featuring a 640 x 240 screen resolution and hi-colour display, this client is presented with a similar user interface (Fig. 4) as the

desktop clients, however a specific stylesheet is used to control the layout of the content.
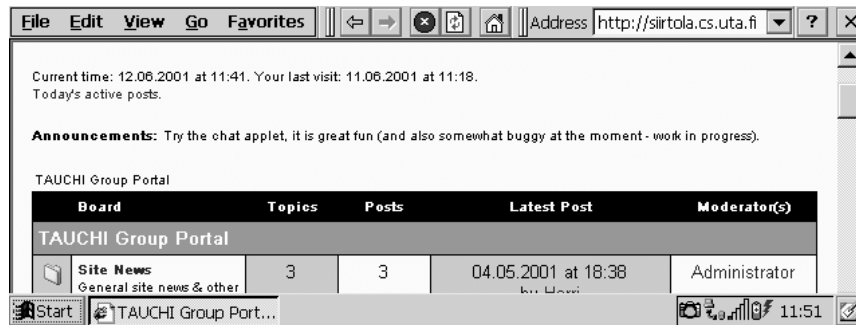

Figure 4. PDA user interface.

The main target platforms for the WAP interface were the WAP clients in Nokia 7110 and 6210 mobile phones. However, as the design architecture of the WAP interface is fully modular, additional clients can be added at later stages. Due to the limitations presented by current WAP browsers, the interface structure found in the WWW and PDA versions could not be directly adapted to the WAP version. Presenting the user with a deeper navigational hierarchy, the WAP interface (Fig. 5) contains all the primary functions of the Group Portal.

Figure 5. WAP user interface.

The Shared public display interface (Fig. 6) features a selected number of function found in the Group portal, presenting them in the form of a Java applet, viewable in a desktop browser. By automatically updating its views, this interface offers the users an up-to-date view to the status of the Group Portal.

Figure 6. Shared public display interface.

Experiences

Our group portal was deployed in the end of March 2001. The following list contains some observations after two months of use:

- The number of registered users is 46.
- Overall number of posts to the discussion forum is 297, of which 49 were posted via a WAP phone or email.
- The number of logins to the portal is 1332.
- The number of different discussion topics is 104, so the on the average, there are two replies to a posting.
- There are 397 entries in the group calendar, of which 359 are public and 36 are for the shared public display.

The group portal has been adopted quite well as an alternative to the excessive use of email lists. We have observed that the discussions in the portal are somewhat different than we used to have on the email lists, and also some of the people who were previously quite active have remained silent on the new medium. Currently we are continuing to develop the system, and collect data how the system is used.

Acknowledgements

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