A Service-Oriented framework to support dynamic deployment of awareness services in remote collaboration

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ABSTRACT

In order to develop good awareness tools, which efficiently support remote intense collaboration, those tools along with their theories need to be implemented, deployed and evaluated. Rather than presenting awareness tools or their evaluations, this position paper focuses on the provision of a generic remote collaboration infrastructure, which enables effortless deployment and seamless integration of awareness capabilities in remote intense collaboration. This new framework allows independently developed and deployed awareness capabilities to be integrated into the collaboration environment in a Service-Oriented manner. Despite recent advances in collaboration tools and applications, many systems still fall short of adequately providing various types of awareness that exist in intense collaboration. The approach proposed in this paper allows awareness researchers and developers to seamlessly integrate their own awareness tools in a non-invasive manner.

1. INTRODUCTION

Sharing various kinds of documents including multimedia files such as music and movies as well as work spaces is now a routinely used process in computer mediated group and community activities. While the capabilities of individual participants and available resources are very important factors in efficiently completing collaborative tasks, awareness plays a significant role in their successful completion. Many different types of knowledge (including both formal and tacit knowledge) acquired through awareness (background and peripheral information) make significant contributions towards building well-informed on-line communities as well as providing successful collaborative environment[6]. Modern on-line games are one such example of this.

While an awareness-rich environment could potentially lead to successful collaboration, inadequate and/or inappropriate awareness could lead to failed social interaction. In order to identify, develop and deliver appropriate and effective awareness, various awareness theories and practices need to be implemented and evaluated in an almost exploratory manner. To make this exploratory process easier, this paper proposes a service-oriented framework, which allows awareness tools to be developed and deployed independent of underlying shared/collaborative applications. This new approach enables awareness tools to be effortlessly deployed and seamlessly integrated in to the collaboration environment. This in turn allows awareness researchers to concentrate on developing and evaluating their awareness theories and tools rather than the software engineering and development processes.

2. AWARENESS VIA VISUALIZATION

Since the bandwidth of visual information is much higher than others, such as auditory and haptic information, many awareness tools visually present background/peripheral information. For example, Donath visualized on-line conversations[2]. It allowed users to have a better understanding of inhabitants and how the on-line environment is organized. Karahalios took a similar approach to visualize group conversations around a table allowing people to improve and enhance their negotiation and reflection processes[5]. Gutwin has tried to visualize gestural communication in order to convey implicit awareness information about colleagues' locations and activities[3]. DiMicco's work was aimed at revealing the insights into the interaction dynamics of a meeting through visualization of turn-taking patterns in a face-to-face meeting[1]. Ishii and his group took a more direct approach and displayed participants video images underneath the shared desktop image[4]. In general, visualizations used in these examples capture and visually summarize the dynamics of collaboration in order to improve the understanding of the collaboration process.

These previous works on the provision of awareness in collaboration suggest that there are two approaches in providing awareness through visual information. One is to integrate various awareness signals into a particular shared application, and the other is to visually present awareness information independently outside of the shared applications. This paper concerns the latter approach and aims to provide a general framework that allows awareness tools to be seamlessly integrated into the collaborative environment.

3. SORC FRAMEWORK

Visual Network Computing (VNC) is a networking technology, which allows users to remotely control another computer[7]. The VNC also allow a group of users to create a virtual Single Display Groupware (SDG) environment through its desktop sharing capability. During a typical VNC desktop sharing session, one VNC server provides the shared desktop environment while many VNC clients (thin-clients) take turns to control the shared desktop.We have recently developed a new Service-Oriented Remote Collaboration (SORC) framework. The original motivation for the

SORC framework was to address current VNC's shortcomings: 1) true multi-user support and 2) integration of third-party collaboration services. As illustrated in Figure 1, this new framework exploits a VNC proxy to mediate communication between the shared desktop (server) and multiple clients. Various collaboration services can be injected into a
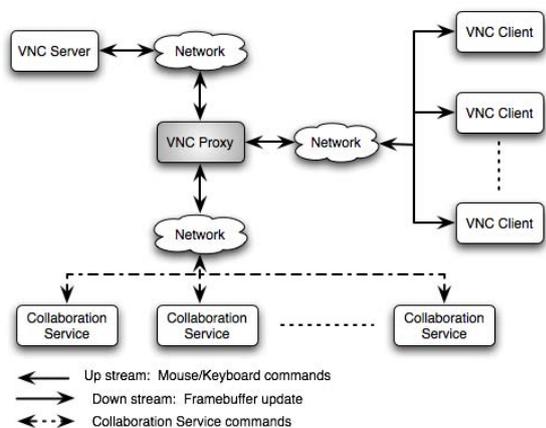

Figure 1: A schematic diagram of Service-Oriented Remote Collaboration framework.

VNC collaborative session at this VNC proxy without disrupting the existing/running VNC sessions.

4. AWARENESS VIA SORC FRAMEWORK

The SORC framework achieves the integration of collaboration services through the overlay of screen images at the VNC proxy (as shown in Figure 2). Since many awareness
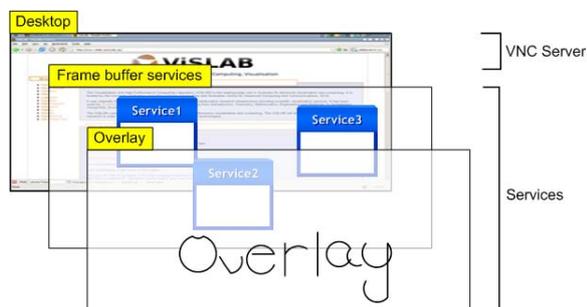

Figure 2: Screen image overlay for service integration.

tools visually present awareness information, we can easily exploit the SORC framework to integrate those independently developed and deployed awareness tools into the existing VNC collaborative environment. Figure 3 illustrates a conceptual image of various awareness tools being integrated into a typical SORC session. In this figure, two conversation visualizations are displayed at the top-left and bottom-right corners while ClearBoard[4]-like telepresence is overlayed on top of the shared desktop. We believe that this new method of providing awareness services presents new opportunities for both awareness researchers and awareness tools users. For instance, awareness researchers can exploit this platform to implement and deploy their tools in a timely manner so
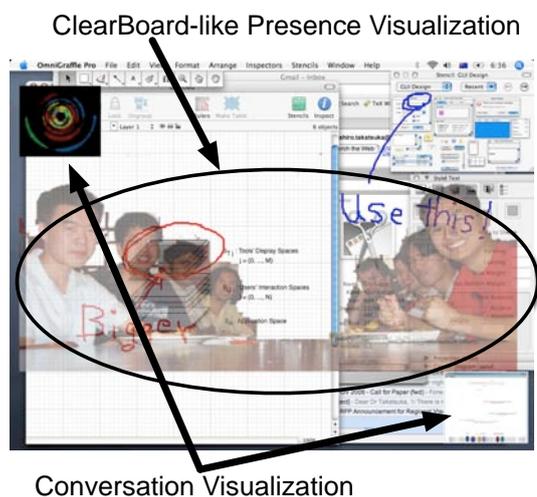

Figure 3: Conceptual awareness services are displayed on the snapshot of a real SORC session. Two types of conversation visualization tools and ClearBoard-like presence visualization are overlayed on top of a VNC session.

that more time can be allocated to carry out usability tests. End users might exploit this platform to dynamically configure their collaboration environment by augmenting it using various awareness tools. We will conduct rigorous user tests to evaluate these claims in our future studies.

5. CONCLUSION

We presented the use of our Service-Oriented Remote Collaboration (SORC) framework for the purpose of providing various awareness tools. The framework was built upon widely used VNC technology. Through its VNC proxy, the SORC framework achieves multi-user support with an appropriate floor control. Most importantly, it allows third-party awareness tools and other collaboration tools to be seamlessly integrated into the collaboration session. This enables awareness researchers to focus on awareness theory/tool development and evaluation, which should be independent of underlying shared applications and collaboration infrastructures.

6. REFERENCES

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