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1. INTRODUCTION

Communication and sharing of knowledge is a fundamental aspect of all scientific endeavors. We work within an ever-evolving, interconnected environment. Through email, newsgroups, chat, instant messaging and the recent advent of weblogs (or blogs), we have at our disposal a wide range of communication and collaboration facilities. However, the tools which directly support our scientific endeavors often exist within a vacuum. There is a divide between the interconnected world *in* which we work and the tools *with* which we work.

In this paper we explore two important communication related aspects of Unidata's Integrated Data Viewer (IDV) - real-time, multi-user collaboration and weblog publishing.

2. BACKGROUND

The IDV is Unidata Program Center's next generation visualization and analysis tool. Written in Java and based on the VisAD framework (Hibbard, 1998) it provides a wide range of 2 and 3 dimensional displays of earth science data and a variety of novel features.

3. REAL-TIME COLLABORATION

The real-time collaboration facility is a recent addition to the IDV and provides for the sharing of all application state among a group of users. Coupled with remote data servers, multiple users can load in new datasets, create and graphically annotate displays, and engage in text chat. These sessions can be captured and replayed, allowing for the creation of rich training and educational materials. This facility can be used in a variety of ways, peer-to-peer, client/server and many-to-many, supporting both ad-hoc and formal collaboration in classroom, laboratory and field settings.

The IDV's collaboration mechanism differs from the facility provided by the underlying VisAD framework (which supports sharing at the data/display-level). The IDV supports sharing of most application events: selecting new sources of data, creating displays and windows, changing viewpoints and display state, etc.

The process to begin a collaborative session involves one user starting a server on their IDV. This server listens for connections from other machines. Other users on remote machines can then easily connect to this server. There is no application limit to the

number of connections a machine can support. Once two machines running the IDV are connected application events are shared via an XML-based protocol.

The IDV allows the user to control whether events are sent and/or received for all connections as well as for individual connections. It is this capability that allows for different configurations of the collaboration. A text chat window is also provided that allows for textual communication among the users.

3.1 Peer-to-peer Configuration

The peer-to-peer configuration, shown in the figure below, supports ad-hoc collaboration between two remote users. In this case all events can be shared between the two running IDV processes.

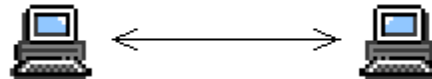


Figure 1: Peer-To-Peer Configuration

3.2 Client/Server Configuration

The single server/multiple clients configuration of the IDV, shown below, is well suited for the classroom setting, both locally as well as in a remote training environment. The instructor can be running the IDV as a collaboration server connected with each student machine. The IDV enables the instructor to allow individual students to "come up to the chalkboard", enabling them to share their activities with the rest of the class.

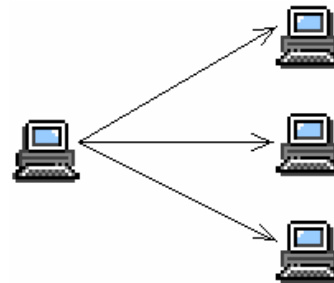


Figure 2: Client-Server Configuration

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3.3 Multiple User Configuration

The collaboration facility is quite flexible, supporting arbitrary configurations. For example, as shown below, a group of four users could be connected together with a fifth user just connected to one of the four. Any changes one of the users makes would get propagated to each of the other user's IDV applications.

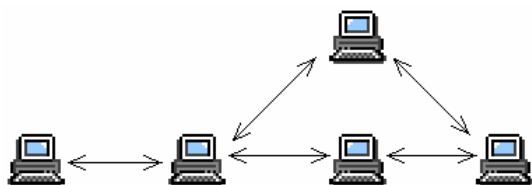


Figure 3: Multiple User Configuration

3.4 Event Capture

A user can also use the collaboration facility within the IDV to capture a usage session. All events that are shared within a collaborative session can be captured in a file and replayed.

For example, a course instructor preparing material for a lab could load in the requisite data set, create a display, type in commentary about the display in the chat window, add a new display and then create a graphical annotation around some interesting feature. The students could then replay this event capture, watching how the displays are created and reading along with the text chat messages.

4. WEBLOG PUBLISHING

Weblogs, a form of online journal or diary, are an increasingly popular mechanism for communication and knowledge management. The IDV provides a facility to easily publish scientific related content (images, movies, application state, etc.) to a number of different weblog services. This facility can act as a field project journal, a classroom lab book or an ad-hoc knowledge capture tool.

There are a variety of publicly available weblog servers (e.g., Blogger (<http://new.blogger.com>), AOL Journals (<http://journals.aol.com>)) as well as server software (e.g., Infocetera (<http://www.infocetera.com>), Moveable Type (<http://www.moveabletype.org>)).

The perspective that the IDV can be viewed as a content creation tool motivated integrating weblog publishing within the IDV. The IDV supports image and movie creation and the persistence of application state in the form of "bundle" files.

This facility does not provide anything that could not be accomplished with prior technology. However, it provides a push button ability to publish material. For example, imagine a researcher engaged in a field project. They see something of interest within the IDV. They take a screen snapshot of this. Save the image as a named file on disk. They create a web page that

references the image, move the files onto a web server and add links to other index pages to reference this content.

With the integrated weblog publishing provided by the IDV the user simply has to select the "Publish image" command in the IDV. They are prompted for a textual annotation and then the IDV uploads the annotation and related files to a remote weblog server.

The figure below shows a screen snapshot of a weblog provided by the Infocetera weblog server. Currently, the IDV only communicates to Infocetera based weblogs. However, supporting a variety of other weblog servers is planned.



Figure 4: Example Weblog

5. CONCLUSION

The collaboration and weblog publication facility will be in the IDV 1.1 release slated for early 2004. We intend to extend the publishing framework within the IDV, incorporating additional weblog servers and other publication media (e.g., email, html generation). We also hope to gain further insight into the role of collaborative facilities within both classroom and field project settings.

6. WEB LINKS

IDV: <http://my.unidata.ucar.edu/content/software/IDV>

VisAD: <http://www.ssec.wisc.edu/~billh/visad.html>

7. REFERENCES

Hibbard, W., 1998: VisAD: Connecting people to computations and people to people. *Computer Graphics*, 32(3), 10-12.