



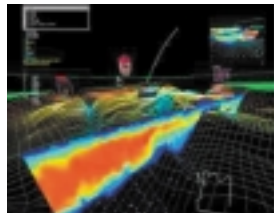
Internet2 applications enable collaboration among people and interactive access to information and resources in a way not possible on today's Internet. Here are some examples of the many Internet2 applications that researchers are developing and using today.

www.internet2.edu

Collaboration

Cave5D Collaborative Immersive Visualization of Environmental Data
Old Dominion University

<http://www.ccpo.odu.edu/~cave5d/homepage.html>

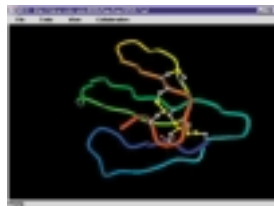


A collaborative virtual environment provides the next generation approach to viewing, analyzing and disseminating information and knowledge from large, complex datasets. These environments are constructed from obser-

ervations, model output, analysis products and real-time data streams accessible over high performance networks. Cave5D/Virtual Director (CVD), one of the first collaborative tele-immersive applications, allows multiple users to view, interact with and record data in real time using a CAVE™ Immersadesk or workstation. CVD, has a powerful remote collaboration capability so that multiple users at many worldwide remote locations have been able to participate in useful immersive virtual experiences.

Molecular Interactive Collaborative Environment (MICE)
San Diego Supercomputer Center

<http://mice.sdsc.edu/>



The Molecular Interactive Collaborative Environment (MICE) project is developing new methods for the visualization of complex scientific data. While most existing methods of representing scientific data are static and

two-dimensional, the technologies and high-bandwidth Internet2 connectivity being used and developed for MICE provide interactive three-dimensional environments. Using the MICE application, multiple users at different physical locations can interact via the network to collaboratively examine and manipulate a shared three-dimensional representation of a macromolecule in real-time.

Digital Video

ResearchChannel
ResearchChannel Consortium

<http://www.researchchannel.com/>



ResearchChannel is pioneering new methods of Internet-based demand and streaming distribution of

HDTV and better-than-broadcast-quality video through on-going collaborative technology experiments. ResearchChannel is a non-profit consortium of leading research institutions dedicated to building high-quality Internet, cable, and satellite-based channels to facilitate the communication of research information.

The Berkeley Internet Broadcasting System
University of California, Berkeley

<http://bmrc.berkeley.edu/bibs/>



The Berkeley Internet Broadcasting System (BIBS) is an interactive television system constructed using Internet2 Mbone IP-Multicast technology and RealNetworks streaming media technology. BIBS is being developed on

the UC Berkeley campus to support distance learning, distributed collaboration, and interactive television applications. The system supports hundreds of simultaneous programs that may include any number of audio, video, and data streams, reaches hundreds of remote viewers around the world, produces live webcasts for large lecture classes on the Berkeley campus and also archives them for on-demand replay.

Distributed Learning

The Virtual Cell
North Dakota State University

<http://www.ndsu.nodak.edu/instruct/mcclean/vc/>



The Virtual Cell is a development project of the North Dakota State University (NDSU) World Wide Web Instructional Committee. The Virtual Cell provides a virtual educational world in which students can learn about the

structure and function of the cell through immersive, role-based learning. The graphically-intensive representations of the cellular world require very high bandwidth networking for optimal performance. In order to meet these high-performance needs, the Virtual Cell application resides on a 100 megabit switched network that connects to NDSU's Internet2 gateway.

Tele-Immersion

Collaborative Architectural Layout via Immersive Navigation (CALVIN)

University of Illinois at Chicago

<http://www.evl.uic.edu/spiff/calvin/>



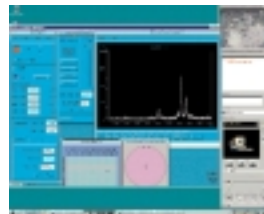
CALVIN is a testbed for using virtual reality in architectural design. CALVIN requires high-speed and high-bandwidth networks connected to super-computing resources and large data stores. CALVIN was designed to run in the CAVE

virtual environment; the CAVE is a 10x10x10 foot room constructed of translucent walls that are rear-projected with stereoscopic images. A participant wears a pair of LCD shutter glasses to view the imagery and uses a wand, with 3-buttons and a joystick, and equipped with a magnetic tracker, is provided to allow interaction with the virtual environment. For participants to collaborate effectively, virtual environments require high bandwidth and low latency not possible on the current Internet.

Remote Instrumentation

Mass Spectrometry: Remote Experimentation and Collaboration
University of Delaware

<http://www.udel.edu/topics/internet2/proj/maldi/>



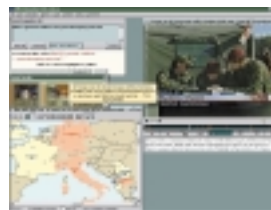
Ubiquitous high-speed network connectivity can allow geographically separated researchers to share costly, state-of-the-art equipment without traveling to the equipment itself. The Bruker Biflex III MALDI-TOF mass spectrometer

at the University of Delaware is such a shared resource. X Windows applications on an attached Sun workstation control the instrument, its laser, the data acquisition and analysis. The software display is shared to all remote researchers via a VNC server running on the Sun. Since each researcher has complete control of the apparatus, he or she can initiate or modify its operation as the need occurs. High-resolution displays of constantly changing views generate much network traffic. High-bandwidth networking can provide the fast updates of the displayed information needed for the collaborative nature of this research.

Digital Libraries

The Informedia Digital Video Library
Carnegie-Mellon University

<http://www.informedia.cs.cmu.edu/>



The Informedia Digital Video Library project is a research initiative that studies how multimedia digital libraries can be established and used. The Informedia project has pioneered new approaches for automated video and audio

indexing, navigation, visualization, search and retrieval and embedded them in a system for use in education, information and entertainment environments. Informedia uniquely combines speech recognition, image understanding and natural language processing technology to automatically transcribe, segment and index linear video segments. These same tools are applied to accomplish intelligent video search, navigation and selective retrieval of information.