Gridjam Performance as a Paradigm for Scientific Collaboration

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**GridJam** is a real-time, geographically distributed, multimedia event. It is an experimental project bringing together a visual artist, composer, musicians and computer scientists, while using the high-speed, low latency, international National LambdaRail optical network. It demonstrates real-time, low latency, interactive, distance computing through the complexity of a live, partly improvised, 3D visualized, musical performance, functioning as both a world-class work of art and a research project into high performance collaborative network computing. This multi-media performance serves as a paradigm, enabling creation of the necessary infrastructure for the Global Intermedia Gateway or GIG. The GIG is a program of education, research, and engagement with the world. It is a modular platform designed for distributive improvisation and collaboration. The primary design concept is that geographically distributed collaborators are placed in a virtual environment conducive to their collaboration and oriented to each other as if they were in the same room.

Project partners at several institutions are currently developing some of the key modular components that will achieve this and will become parts of the GIG toolkit. These include specially designed and adapted “Soundscape” software to accommodate special interactivity and latency conditions for multichannel audio streaming (Peter Otto, University of California at San Diego). It will also include a 3D Avatar system that places photo-realistic representations of collaborators inside an immersive environment (Pierre Boulanger, University of Alberta). This will enable participants to react to body language and facial expressions.

The GIG will use Flatland as its virtual reality immersive platform. Flatland is an open source API created at the University of New Mexico that provides basic immersive rendering functionality, multimodal user input paradigms, distributive interaction over TCP/IP, data logging and capturing, and other features relevant to the GIG. Flatland is used for scientific visualization and immersive simulation.
Gridjam
http://www.jackox.net/pages/gridjamindex.html) will utilize Jack Ox and David Britton’s Virtual Color Organ™ (VCO), visualizing Alvin Curran’s structured improvisational music. The VCO is a 3D immersive environment in which music is visually realized in colored and image-textured shapes as it is heard. The visualization remains as a 3D graphical sculpture after the performance. Colors, images, shapes, and even the motions and placement of the visualized musical shapes are governed by artist-defined metaphoric relationships, created by hand as aesthetic and symbolic qualities rather than algorithmically. The VCO visually illustrates the information contained in the music’s score, the composer’s instructions to the musicians, and the musicians’ contributions to the score as they improvise in reaction to each other’s performances and to the immersive visual experience.

The VCO is capable of having multiple visual organ stops. An organ stop on a traditional organ is a voice that affects the entire keyboard of notes. An organ stop in the VCO is the 3D immersive environment in which the visualized music will exist and also the visual vocabulary applied to the musical objects. Gridjam will take place in the black and white, hand drawn desert sand and rock structures coming from real deserts in California and Arizona. These landscapes are metaphors for instrument families in an orchestra. The original drawings by Ox, from which the 3D modeling was made, serve as the basic texture maps for all of the musical objects.

For the Gridjam, the musicians will perform together in a virtual space from geographically distributed sites thousands of miles apart. Imagine an immersive display system (e.g. a digital planetarium dome, a Scalable Adaptive Graphics Environment [SAGE], or a three to six wall CAVE virtual environment). Enclosed in this virtual world, hand-drawn high desert walls inspired by the California-Arizona desert surround us on all sides. The desert floor is bare, except for the six performing musicians.

All six performers appear together in this shared virtual space, though in reality, each is in a different city somewhere in the world. Four of the musicians, comprising the Del Sol String Quartet, normally perform no more than a bow’s length apart. Joining them in virtual space from a different physical studio is saxophonist, Anthony Braxton, whose mastery of improvisation with an ensemble requires quick and intimate interaction. We, the audience, feel immersed in this same environment, watching and listening from different participating venues around the world.

Alvin Curran, composer, sits in front of a Disklavier loaded with the sounds and effects that comprise his musical palette. An assortment of computer and electro-musical devices accompany him. He may be in San Diego or in Amsterdam—we do not know; we see him here in our desert, as does everyone at all the performance venues linked by the LambdaRail networks. This international fiber optical network carries 10,000 Gb/second through a direct line, with a small, predictable delay: between Amsterdam and Tokyo, the delay is the same as between the right and left sides of an orchestral stage.

The virtual conductor is not a person, but a signal that synchronizes time. The music unfolds sonically and visually; the dynamic range varies from nearly inaudible, sparse sounds to discreet isolated tones, to pulsing synchronous rhythms, to clouds and walls of sound, while recorded natural sounds from animals, people, and machines provide an underlying sonic backdrop.

The VCO creates a 3D immersive environment in which music is visually realized in colored and image-textured shapes as it is heard. The visual world created by the VCO consists of a desert landscape terrain using elaborately hand-drawn images: texture maps that form a valley surrounded by desert walls.

Complex geometrical objects representing visual metaphors of musical and sonic activity emerge as the music unfolds (See image above).

Gridjam, in partnership with the ARTS Lab, housed together with the Center for Advanced Research Computing (CARC) at the University of New Mexico, is in position to forge the path to visionary new technologies. We are partnering with the California Institute for Telecommunications & Information Technology (Calit2) at UC San Diego, the University of Alberta, the University of Amsterdam in collaboration with De Waag Society, and the Laboratory for Creative Arts and Technologies (LCAT) at Louisiana State University and the California Academy of Science are venue hosts and broadcasters.

Acknowledgements: