Scientific Workspaces of the Future (SWOF)
Progress Report January 24, 2003
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Project Overview: The goal of this expedition is to form a partnership between technology developers and end users to deploy and further develop next generation high-end collaborative and network based scientific visualization tools and systems designed to meet the specific needs of distributed applications communities. The initial application foci will be the atmospheric modeling and simulation community and computational molecular biology community. The expedition will build on the Access Grid and the emerging suite of tools for large-format tiled displays and remote and parallel visualization of large-scale scientific data.   A primary focus of the expedition is to develop and deploy user level tools that will enable significant use of the TeraGrid for collaborative science and distributed visualization.

Subproject – Application
Deployment of two basic AG based collaborative problem-solving virtual venues by the end of year one. One being a Virtual Computational Molecular Biology Laboratory – containing access to genomic and molecular biology databases and computational tools (e.g. BioCore, NAMD, GO, G-Whiz/WIT3, etc.) The computational biologists involved in the project will prioritize the specific selection of tools and databases. ANL will be responsible for managing this process and integrating these tools into the AG infrastructure. A major initial goal is to enable one or more existing distributed collaborations to begin working together via the Virtual CMB Laboratory on a regular basis and to incorporate this into teaching and training environments. (ANL, NCSA, ORNL) The second being a Virtual Atmospheric Modeling and Simulation Laboratory – will provide group access to Grid based simulation and modeling tools focused on climate and weather modeling, sample datasets useful for education and training.   The Virtual AMS Laboratory will also provide a point of contact for collaborative analysis of large-scale output from climate simulations. ANL will work with the MEAD project to develop this capability. (NCSA)

ANL (Maltsev)
Overview:
The bioinformatics group at MCS ANL participates in SWOF expedition in order to facilitate the development of integrated scalable automated system for evolutionary analysis of the biological data and the development of the metabolic reconstructions from sequence data.
Progress:
- Further development of GADU (Genome Analysis and Database Update pipeline)
    - Using GADU we have analyzed the sequence data from 106 publicly available genomes
    - Have developed the user interface to allow access to GADU by the users outside of ANL
    - Developed user interface and tools to allow users to customize GADU usage (choice of the databases, tools, etc)
- Tools development:
    - PhyloBlocks: We have developed an analytical pipeline for analysis of evolution of protein families and prediction of functions to the genes, PhyloBlocks, which includes the following publicly available tools: Blast, ANL Knowledge Base, Blocks, LAMA, ClustalW, HMMER, TreeView. We have developed flexible user interface that allows interactive analysis of the protein families by an expert and a number of tools for visualization to assist such analyses.

- o SVMMER: In collaboration with ORNL we have developed a Support Vector Machines algorithm-based tool for classification of the protein sequences and user interface for it.
- In collaboration with ANL technology team we have prepared a demo of PhyloBlocks and SVMMER on the tiled display and Access Grid

Milestones and Deliverables:

- Establish web-based access to metabolic and regulatory networks databases, being developed and maintained at MCS ANL. Specifically we will provide access to the following resources:
  - o Gwiz -- a new generation of the web-based computational environment for high-throughput genetic sequence analysis and metabolic reconstructions from sequence data; (5/. May, 2003)
  - o public server of EMP database of Enzymes and Metabolic Pathways, and (5/ – established (http://emp.mcs.anl.gov) , EMP integration into the Gwiz environment. May, 2003)
  - o Sentra database of prokaryotic signal transduction proteins (5/intitial server is established, http://www-wit.mcs.anl.gov/sentra). Design of the integrated Gwiz-Sentra interface. May 2003
- Establish a prototype of the web-based public server for high-throughput genetic sequence analysis and automated assignment of functions to the genes. This server will provide assess to bioinformatics tools, including publicly available genetic sequence analysis tools developed by the other groups (Blast, FastA, Blocks, Pfam, CATH, etc.), as well as tools developed by Computational Biology group at MCS (voting algorithms for automated assignment of functions to genes, SVMMER, PhyloBlocks, etc) (8/August, 2003)
- Develop a prototype of a toolkit for visualization and analysis of metabolic and regulatory networks and will provide a web-based access to these tools. (8/August 2003)
- Develop teaching materials on using these tools and databases for genome annotations and metabolic reconstructions in the framework of WIT. Provide web-based user-friendly interface for navigation, interactive analysis and representation of genomic data to the scientific community through the Gwiz server (3/. March, 2003)

Beloit College (Greenler) – Not funded
NCAR (Middleton) – Not funded
NCSA (Jakobsson)
Overview: Jakobsson will collaborate with Maltsev group on AG tutorial at Urbana for Argonne high-throughput genomics tools. Jakobsson will collaborate with SWOF visualization specialists in developing Tiled Display output useful for bioinformatics.
Progress:
Milestones and Deliverables:

- Create Tiled display output for viewing and analysis of unrooted phylogenetic trees (TreeView, PHYLIP, PAUP) Viewing, March 15; Analysis, first functionality, June 15; more advanced functionality, September 15
- Create Tiled Display output for viewing and analysis of sequence alignments (Clustal) Viewing, March 15; Analysis, first functionality, June 15; more advanced functionality, September 15
- Utilize AG and Tiled Displays between Argonne and NCSA to visualize and analyze above output in collaborative sessions immediately upon creation of Displays.
- Install High Throughput Genomics Server at NCSA Cluster there are a couple of pathways to this. Sudhakar is installing third party packages. Jakobsson's group is writing their own high throughput routines aimed at microbial genomics, has done proof-of-concept computation, will have prototype demo for high-speed comparative genomics for a class of microbial genes and flowchart for general high-throughput genomics server.
- Give AG tutorial at Urbana on use of Argonne annotation tools. Natalia's group will give tutorial for group at Urbana on April 22

NCSA (Shulten)

Overview:
Progress:
Milestones and Deliverables:

- Extend optimization of NAMD for Intel 64-bit architecture. (when?)
- Adapt NAMD to TeraGrid global file and resource allocations systems. (when?)
- Tune and evaluate NAMD potential as a distributed Teragrid application. (when?)
- Port interactive molecular dynamics features of VMD and NAMD to support on-demand grid-based interactive simulations. (when?)
- Couple NAMD to a quantum chemistry code as a grid-based application. (when?)
- Maintain a BioCoRE server at NCSA. (when?)
- Build a membrane systems portal using BioCoRE. (when?)
- Assist the Grid development team to achieve interoperability between the BioCoRE portal and the Alliance portal. (when?)
- Participate in relevant meetings and discussions. (when?)

NCSA (Wilhemson)

Overview:

The MEAD expedition is focuses on carrying out and analyzing model simulations of hurricanes and severe storms using the TeraGrid, integrating computation, grid workflow management, data management, model coupling, data analysis/mining, and visualization. The visualization effort is directed at both integration into the workflow specification and at providing an interactive environment for visualizing results of model ensemble and parameter studies called suites. These suites can consist of 10's to hundreds of simulations. In addition, additional focus will be on visualization of very large data single simulations where single field data volumes between 100 to 10,000 megawords.

Progress:

- Select target users for initial AG deployment have been identified
    - Joe Klemp and Bill Skamarock at NCAR Boulder CO
    - Lou Wicker, NSSL Norman OK
    - Kelvin Droegemeier, U. of Oklahoma
    - Future MEAD members including Sara Graves at U. of Alabama at Huntsville and Dale Haidvogel at Rutgers University
    - Bob WilhelmsonNCSA
- GeoWall purchased

Milestones and Deliverables:

- Purchase of AG nodes for initial users for Wilhelmson, Wicker, Droegemeier, and Klemp (Q1:03)
- Deployment of initial Access Grid nodes including multicast networking for Wilhelmson and Wicker (AG 1) (Q1:03)
- GeoWall and install in the Department of Atmospheric Sciences at UIUC (work with Jason Leigh) (Q1:03)
- Deploy TeraVision capabilities to Wilhelmson and Wicker (Q1:03)
- Work with NCSA visualization group on collaboration and visualization capabilities discussed in their milestones (Q1:03)
- Provide initial data set at one time for rendering in ParaView (work with Jim Ahrens). (Q1:03)
- Deployment of initial Access Grid nodes including multicast networking for Droegemeier and Klemp (AG 1) (Q2:03)
- Deploy test version of AG 2.0 code with collaboration tools to Wilhelmson and Wicker (Q2:03)
- Demonstrate use of GeoWall with Vis5D and for MISR satellite data analysis (Q2:03)
- Test Vis5D streaming video application between NCSA, NSSL, and ANL. (Q2:03)
- Interactive ParaView animations on a remote cluster for viewing large datasets (Q2:03)
- Demonstrate AG, TeraVision, and GeoWall capabilities at All Hands Meeting (Q2:03)

- Choose a visualization application for refactoring into a distributed application for use with the AG (Q2:03)
- Refactor chosen visualization application (Q3:03)
- Use AG 2.0 toolkit to refactor and deploy distributed visualization application (Q3:03)
- Evaluate impact, provide feedback to technology developers, review and redeploy next version (Q3:03)

ORNL (Samatova)

Overview:

- *Develop a suite of integrated computational tools for genome-scale functional characterization of biomolecular machines.* We will collaborate with colleagues at Argonne National Laboratory in development of the interactive Access Grid based data analysis tools and utilize their expertise in this area. We will develop various algorithms for reliable and systematic prediction of a function(s) of a given protein sequence which "fuse" knowledge extracted from diverse and distributed biological databases and various existing bioinformatics tools. The algorithms will be built on top of the integrated biological database environment provided by Argonne National Laboratory. The algorithms will be integrated into the Argonne's high-throughput genome analysis server. That will be accessible via the Access Grid.
- *Extend algorithmic applicability to the scale of whole genomes through implementation of optimized versions suited for Terascale computers*. We will develop high performance parallel (if possible) versions of these algorithms.
- *Develop a suite of tutorials on how to use the algorithms for functional characterization of biomolecular machines.* We will develop tutorials on using the algorithms for functional characterization of genomes. The tutorials will be available via the Access Grid infrastructure.*Progress:*
- Implemented multiple algorithms for statistical validation of prediction results for the SVMMER (including leave-one-out, k-fold cross-valdation)
- Implemented two classifiers for function prediction: one is based on decision trees (C4.5) and the other one is based on association rules (Ripper)
- Multiple bug fixes in the SVMMER
- Performed a comparative performance analysis between three prediction algorithms: SVMs, decision trees, and association rules
- Wrote a paper on the method and performance results
- Applied the SVMMER to the annotation of several uncharacterized ORFs

Milestones & Deliverables:

- Develop an algorithm for function prediction using structural information and get preliminary results (2/2003)Write a paper on the developed method (4/2003)Incorporate this algorithm into the SVMMER by writing a GUI Web-based interface (3/2003)Incorporate feature selection methods into the SVMMER (3/2003)Add more features to the SVMMER (e.g., selection of the kernel, feature selection, making it thread safe – not hang on user request) (3/2003)Train Eric Jackobsson from NCSA to use SVMMER (2/2003)Prepare an AG-enabled demo of using SVMMER and PhyloBlocks for collaborative decision making. The demo will include the parties from NCSA (Jackobson), ANL (Maltsev), and ORNL (Samatova et. al.)Give a tutorial(s) over AG to Jacobsson's students(3/2003)Prepare a web-based tutorial for self-learning on SVMMER (4/2003)**Subproject – Technology**

The technology effort focuses on extending the concept of AG Virtual Venues to support access to high-performance remote visualization services. This includes the development of:

- Grid Based Visualization Testbed -- Initial deployment and testing will be done between existing AG nodes, Tiled Displays and Grid based visualization servers located at ANL, NCSA and LANL. Additional deployments will be targeted at EVL, BU and other sites to be identified. These deployments will focus on the minimal development needed to port existing visualization tools to the Virtual Venue services model and demonstrate their utility.

- Application Specific Visualization Tools -- Deployment of application specific scientific visualization packages in Grid visualization mode. The applications partners will make specific selection of visualization tools to be ported to the Grid based visualization environment developed in this part of the expedition. Our goal will be to deploy one major visualization tool for each of the two virtual laboratories that use AG level graphics support and one each that can exploit high-resolution tiled displays. ANL will work closely with NCSA in this task.

Develop Grid based collaborative software infrastructure services address needed to provide APIs and related service interfaces for applications developers that will enable a variety of existing tools to be integrated into the collaborative framework defined by version 2.0 of the Access Grid. Current development directions for the Access Grid have targeted developing an OGSA compliant Virtual Venue server and associated collection of standard collaboration services. We propose to add to this set of collaboration services by developing several new capabilities by integrating existing tools. Since the Expedition process is not focused primarily on development we note that the approach taken here is mainly integration of existing tools with the Virtual Venue services model, not new development.

ANL (Stevens)
Overview: The ANL focus as part of the SWOF project is on overall management of the effort and contributions in the area of collaboration technologies such as the Access Grid and visualization tools. ANL will leverage existing efforts in the construction of AG 2.0 for use in the SWOF project as well as existing work in visualization tools for the AG.
Progress:
- Held SWOF face-to-face and AG based meeting; 10/9/2002, 11/13/2002, and 1/22/2003, bi-weekly meeting scheduled for updates and issues.
- Identified target applications for visualization and/or collaborative use
  - Biology
    - PS viewer
    - PDF viewer
    - Word
    - VMD
    - Treeview
  - Atmospheric
    - VisAD
    - Vis5D
    - NCAR Graphics
- Prototyped sharing environment on tiled display and AG desktop using VNC, rdesktop, and windows terminal server.
- Continued development of AG software to support Personal Interface to the Grid (PIG), continued to test hardware, produced PIG hardware recommendation spec.
- PIG AGDP document started, documenting setup and including list of tested hardware.
- Several individual meeting with application groups to work on milestones and deliverables.
Milestones and Deliverables:
- Release Virtual Venue services interface model (latest 5/2003)
- Conduct AG based quarterly expedition meeting (done, biweekly meeting starting)
- Deploy initial Grid based visualization services for applications communities (4/2003)
- Test initial web based interface to the Access Grid(6/2003)
- Test Chromium based network visualization service from TeraGrid visualization server (7/2003)
- Deploy initial Tiled Display remote visualization testbed and test interfaces to TeraGrid visualization servers (6/2003)
- Demonstrate 3Dand VR interfaces for the Access Grid (6/2003)

- Demonstrate initial virtual computational molecular biology laboratory to target systems biology community including basic tools, directory services, initial databases and scientific datasets (11/2003)
- Demonstrate initial virtual atmospheric modeling and simulation laboratory to target UCAR community including basic tools, directory services, initial databases and scientific datasets (11/2003)

Boston University (Bresnahan)

Overview:

Boston University will contribute to the SWOF effort on two different fronts. The first component focuses on the deployment of the SWOF in the community while the second focuses on bringing new technologies into SWOF. The first component of our SWOF effort will be in providing distributed infrastructure support. We will focus our training and documentation activities to directly support software releases and deployment, and will require close collaboration with and input from developers and members of target communities. The second component of our contribution to the SWOF effort will be in the area of integrating 3D/VR capabilities with the AG. Of particular interest to us is the integration of visualization technologies using tiled display walls. We propose to be an early deployment site for the remote visualization testbed and will integrate the SWOF tiled display capabilities with our Deep Vision stereoscopic, tiled display wall. Additionally we propose to develop and demonstrate 3D/VR remote rendering and navigation capabilities based on the AG 2.0 service model.

Progress:

- Attended SWOF kickoff meetings over the AG and at ANL. Ensured that information about these events was conveyed to EOT/PACS participants before and after the meetings.
- Personal Interface to the Grid (PIG)
  - Installed a PIG node, which is being used on a regular basis.
  - Worked with director of Center for Integrated Space Weather Modeling (CISM) to determine appropriate PIG deployment to CISM leaders across the US, including the need for multicast bridging. This experience should prove valuable in helping SWOF target communities to plan similar deployments.
- AG Documentation Project
  - Sent information about the AGDP to people planning to write documents on GeoWall and PIG in support of the SWOF expedition.
  - Published documents on the AGDP on Remote PowerPoint (by Eric He of University of Kansas) and Network/Telco Bridge (by David McInteer of University of Kentucky).
- AGiB Tutorial: Network Troubleshooting
  - Tutorial is currently in beta stage, and scheduled for public release on January 30. Network troubleshooting is a significant issue, especially for new nodes, so this tutorial should be an excellent resource for the next waves of AG deployment related to SWOF and AG 2.0. Substantial review took place both before the alpha release, and during an alpha review period. This tutorial was primarily authored by Shannon Schraegle of OSC. Jennifer Teig von Hoffman of Boston University wrote the original draft outline, and substantial input was also provided by Mary Bea Walker of NCSA and Leslie Southern of OSC.
- AG User Seminar Series
  - Developing a seminar on localized audio over the AG by Robert Putnam of Boston University, to be held in February 2003.
  - Scheduled a seminar by Gregg Vanderheiden of University of Wisconsin TRACE Center for Wednesday, February 12, 2003, at 12PM EST on the AG.
  - Discussing possible ParaView seminar with Richard Strelitz of LANL.
  - General-interest AG seminar held on Remote PowerPoint in December 2002 by Eric He, University of Kansas.
- Outreach

- o Introduced Raquell Holmes of BU to the SWOF community. Raquell is a cell biologist, involved with EOT/PACI, and has been an AG user since its early days.
  - o Sent information about the SWOF expedition to Bob Riddle of Internet2, who is interested in potential linkages.

Milestones and Deliverables:
- Publish documentation for all major AG software releases, including new enhancements and advanced visualization services, in close collaboration with appropriate developers (ongoing)
- Coordinate technology transfer issues and interactions with PACS and EOT partners, participating in conference calls, meetings, and other activities (ongoing)
- Encourage deployment of new technologies through AG Users Seminar Series (ongoing)
- Provide AGDP overall vision and guidance (ongoing)
- Maintain and update existing AGDP documents, including the Authors' Guide (ongoing)
- Develop, edit, and contribute to new AGDP documents and AG-in-a-Box web-based tutorials (ongoing)
- Recruit members of appropriate development and target community groups to participate in the AGDP by authoring documents, and by serving on review and general support teams (ongoing)
- Participate in scientific workspaces planning meetings and virtual venue discussions
- Design 3D/VR navigation interface based on Virtual Venue interface specification; Participate in the visualization testbed (ongoing)
- Development of 3D/VR navigation interface with Virtual Venue support; Participate in deployment and testing of Tiled Wall visualization components (9/2003)
- Demonstrate integrated navigation and remote rendering using Virtual Venue service; Deploy end-to-end prototype of Grid-based data management, visualization and rendering (12/2003)

Brown University (van Dam)
Overview:
Progress:
- Installed basic AG capability at Brown (PIG nodes)
- Began integration and extension of GROMACS and VMD for interactive MD simulation and visualization (first outside demo scheduled for Feb. 6)
- Currently reinstalling management software on 48-node rendering cluster to provide public node IP addresses and enable interactive allocation of resources for remote rendering applications
- Installed new firewall with multicast routing capabilities (currently debugging multicast routing)

Milestones and Deliverables:
- Install basic AG (PIG configuration) capabilities at Brown (completed, pending Multicast routing on new TCASCV firewall installed) (1/2003)
- Reinstallation of cluster management software (ROCKS) on 48-node rendering cluster, including public IP addresses on rendering nodes to enable remote rendering access (1/2003)
- Integration of GROMACS with VMD to enable interactive steering and visualization of MD simulations (first demonstration, with continued enhancement) (1/2003)
- Establish interaction with Biology teams at UIUC, ORNL and ANL; assist in development Biology software toolkit specification (goals: establish interaction and first draft of toolkit specification) (2/2003)
- Install and test Grid-based visualization services on TCASCV rendering and display resources (goal: or as software infrastructure is defined) (3/2003)
- Participate in audio services enhancements for AG 2.0; remaining milestones for deliverables to be determined as AG 2.0 release schedules are defined (2/2003)
  - o Automatic gain control
  - o Audio level-triggered flagging of video window containing active speaker
  - o AG specification for positional audio

- Participate in development of VMD/GROMACS/NAMD remote analysis and visualization demo for All-Hands Meeting (goal: plan for demo, with Bio teams) (3/2003)
- Participate in continued development of VMD as platform for multi-site, streaming remote molecular visulazation platform (goal: coordination with UIUC) (2/2003)

EVL (DeFanti)

Overview:

EVL will focus on bringing newlow-cost technology for stereoscopic display (GeoWall) of weather data and chemistry data, high resolution graphics streaming technology (TeraVision), volume visualization for the GeoWall, and access to EVL's 15 node LCD tiled display and smaller 4 node LCD tiled display for SWOF multi-site technology experiments. EVL will plans to use real data sets to stress test display technology and use SWOF sites as endpoints to test its TeraVision streaming system.

Progress:

- Deployment/training for AGAVE systems at a number of sites
    - All the parts for Wilhelmson's AGAVE have arrived except for the half-terabyte disk.
    - Vis5D now works on AGAVE in clone mode stereo under Linux.
- Deployment and Testing of TeraVision on a constrained number of sites to allow "walk-up and plug-in" distribution of laptop visuals
    - 90% of TeraVision version 2.0 has been completed. This includes:
    - New plug-in architecture to allow new network protocols, compression modules and other video manipulation modules to be integrated very quickly.
    - RLE compression module: This is the only option for compression modules so far. Newer compression algorithms will be integrated later. Module has been tested and ready to be integrated.
    - Multicasting Module (with scatter-gather calls): Module has been tested and ready to be integrated.
    - Protocol for a much more intelligent server-client communication mechanism which will make it easier to control multiple clients and servers on different machines (done and ready)
    - Files Streaming using different file formats (.gif, .bmp, .jpeg, .ppm, .xpm etc) (Done and ready)
- Deployment and Testing of voxel-based volume rendering on the AGAVE
    - Prototype loads data into texture memory of commodity graphics card and displays it in passive stereo. User can manipulate a cutting plane through the volume. (Nvidia and ATI have been tested under Windows; Nvidia has been tested under Linux)
- Human factors experiments on use of tiled displays for increasing parallelism and group awareness between two sites and support for testing of collaborative tiled display visualization
    - Results of preliminary design study are completed and available.

Milestones and Deliverables:

- Deployment/training for AGAVE systems at a number of sites
    - Hands-on tutorial on how to build an AGAVE from scratch will be held at EVL and over AG. (2/2003)
    - Testing of Wilhelmson's data on Vis5D running on AGAVE. (2/2003)
    - AGAVE Document in AG format on "How to Build an AGAVE" is underway. (2/2003)
    - Testing of RasMol on AGAVE. (3/2003)
- Deployment and Testing of TeraVision on a constrained number of sites to allow "walk-up and plug-in" distribution of laptop visuals
    - EVL can deliver TeraVision hardware to ANL. (2/2003)
    - EVL can deliver TeraVision 2.0 software to ANL and begin preliminary testing. (3/2003)
    - EVL can deliver TeraVision hardware to Wilhelmson. (3/2003)

- o Begin testing of TeraVision between ANL, NCSA, EVL. (4/2003)
- Deployment and Testing of voxel-based volume rendering on the AGAVE
    - o Support for custom color/opacity transfer functions. (3/2003)
- Human factors experiments on use of tiled displays for increasing parallelism and group awareness between two sites and support for testing of collaborative tiled display visualization
    - o Can begin testing any tiled display programs that NCSA, ANL and others can provide. (2/2003)
    - o Study involves placing collaborators between two separate AG nodes and having them perform a variety of information discovery and knowledge crystallization tasks using a full suite of available technologies AG, tiled display, touch plasma white board screens. The expected outcome of the experiments are a better sense of how to layout collaboration technologies in SWOFs.
        - 1st detailed experiment of SWOF rooms at EVL. (2/2003)
        - 2nd detailed experiment of SWOF rooms at EVL. (3/2003)
        - 3rd detailed experiment of SWOF rooms at EVL. (3/2003)
        - 4th detailed experiment of SWOF rooms at EVL. (4/2003)

LANL (Ahrens)
Overview:
The focus of the LANL effort is to extend the open-source visualization toolkit (vtk) and end-user tool (ParaView) to support Grid services. ParaView/vtk are designed to handle extremely large datasets via techniques such as streaming, parallelism and hardware-accelerated rendering. Extending these packages to support Grid-based interactions will support the large dataset sizes being generated by the geographically-distributed atmospheric and computational biology application communities.

Progress:
- Initial prototype of tiled-rendering service complete.
- Initial modifications to ParaView client/server architecture to support Grid-services are complete (i.e. generalizing ParaView's communication layer and adding socket communication as a test case).

Milestones and Deliverables:
- Develop initial version of tiled-display rendering service in ParaView/VTK. (3/2003)
- Develop initial versions of data management and visualization services in ParaView/VTK, tailored to meet specific application community needs. (6/2003)
- Test and integrate Grid system services with ParaView/VTK. (9/2003)
- Initial version of visualization and rendering Grid-enabled ParaView/VTK complete. (11/2003)
- User testing and feedback. (along with each milestone)

NCSA (Semeraro)
Overview:
NCSA will collaborate with members of both the biology and storm prediction workspaces in order to realize useful collaborative visualization technology built on the Access Grid 2.0 infrastructure. NCSA visualization personnel will work with scientists in both disciplines to identify useful collaborative technology. Once identified NCSA will collaborate with the Access Grid development team to build the applications. Initial efforts are focused on building shared image markup tools for the storm workspace and similar interactive tools for displaying phylogenetic trees for the biology workspace. These capabilities will be accessible from workstations or high-resolution tiled display systems.

Progress:
- Shared image mark up tool is nearly complete. A tool exists that will allow two users to collaboratively annotate a shared image. The application is being extended to a general number of users. Functionality is being added to share various parts of the annotation and the image. The application is being ported to the tiled display.
- Work has begun with Eric Jackobson's group to port a phylogenetic tree visualization application to the tiled display and to enable collaborative use.

Milestones and Deliverables:

- Shared image whiteboard. Develop an application that will allow the user to share images with remote users. In addition a white board like overlay system will be provided that will enable interactive mark up of the images by all users. (4/2003)
- Shared animation system. Develop an application that will allow the user to share animations with remote collaborators. Shared control and synchronization will attempt to ensure that each participant will see the same frame at the same time and allow shared VCR type of playback and control. (6/2003)
- Shared analysis and visualization system. Develop or adapt an existing analysis package for collaborative use in the AG environment. Candidate packages include VisAD, Vis5D, and applications based on NCAR Graphics. (9/2003)

Trace Center (Vanderheiden) (Nonfunded)

Overview:

- We are moving the EOT based research on speech to text translation via the Grid from its exploration to implementation and deployment stage. This will help to ensure that individuals with hearing impairment and deafness (who do not otherwise have a natural barrier to visualization technologies) are able to take advantage of and participate in visualization based educational and scientific work sessions and work spaces.
- We are working with the expedition visualization team and related visualization projects to explore techniques for ameliorating the problems for people with visual impairments introduced by visualization based education or work sessions, and defining research directions for enhancing the ability of individuals with moderate visual impairments to participate effectively in visualization based educational and scientific work spaces.

Progress:

- Experimental speech-to-text translation with "Remote On-the-fly Corrections" at 3 plenaries of SC2003 in Baltimore. The system used for this experiment was a precursor of the speech-to-text system we are integrating into SWOF.
- Specification of requirements and initial design for the speech-to-text system. This system will be available for SWOF sessions from July 2003

Milestones and Deliverables:

- Requirements and Design specification (2/2003)
- Text transcription service available for testing by AG participants (up to 100 hours available) (6/2003)
- Field testing in two selected Access Grid sessions. Report/paper on the results of field testing. (8/2003)
- Report on barriers to and strategies for participation of individuals with visual impairments in visualization based educational and scientific work spaces (9/2003)

Subproject – Outreach

OSU (Southern) (Not funded)

Overview:

An objective of OSC and PACS is to deploy SWOF technologies as related to the Alliance. OSC has partnered with ANL and NCSA to produce a number of AGiB tutorials for managers and end users and plans to continue this work. OSC along with PACS plans to develop a number of online Grid Computing tutorials that may also relate to the new AG grid services model.

OSC and PACS will continue to participate in AG events, offer workshops/seminars using the AG, and bring these technologies to the end-user.

Progress:

- Developed AG Network Troubleshooting Tutorial in conjunction with Boston University (Teig von Hoffman) and NCSA (Walker).
  - This tutorial is the 6th tutorial for the AG that was developed using WebCT and the 1st in a series of troubleshooting tutorials. All AG tutorials are hosted by the NCSA server at webct.ncsa.uiuc.edu:8900/public/AGIB/. The tutorial underwent an alpha and beta review process and is soon to be released to the general

public. This tutorial was primarily authored by Shannon Shraegle of OSC. Jennifer Teig von Hoffman of Boston University wrote the original draft outline, and substantial input was also provided by Mary Bea Walker of NCSA and Leslie Southern of OSC.

- Participated in SWOF kickoff meeting at ANL.
- Participate in weekly teleconference calls concerning AG tutorial development.

Milestones:

- Maintain existing asynchronous AG tutorials
    - Support discussion spaces
    - Track usage.
    - Update information with new developments.
    - Remove outdated materials.
- updates to the existing AG tutorials to support the new AG 2.0 packaging
- identify and develop AG tutorials
    - develop troubleshooting series of tutorials
- adopt, test, and deploy distributed infrastructures for computation and visualization environments
- participate in relevant meetings and discussions

Publications:

- J. Binns, T. Disz, I. Judson, T. Leggett, S. Lefvert, R. Olson, M. E. Papka, R. Stevens, T. Uram, *Access Grid v2.0*, Poster Session, GlobusWorld, San Diego, CA, January 2003.
- J. Leigh, A. Johnson, K. Park, A. Nayak, R. Singh, V. Chowdhry, *Amplified Collaboration Environments*, VizGrid Symposium, Tokyo, November 2002.
- R. Singh, J. Leigh, T. DeFanti, F. Karayannis, *TeraVision : A High Resolution Graphics Streaming Device for Amplified Collaboration Environments*, VR Grid Workshop, KISTI, Daejeon, Korea, November, 2002.

User communities: