

Collaboration Technology for the Fusion Community

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Access Grid Project Goals

- Enable Group-to-Group Interaction and Collaboration
 - Connecting People and Teams via the Grid
- Improve the User Experience: Go Beyond Teleconferencing
 - Provide a Sense of Presence
 - Support Natural Interaction Modalities
- Use Quality but Affordable Digital IP Based Audio/video
 - Leverage IP Open Source Tools
- Enable Complex Multisite Visual and Collaborative Experiences
 - Integrate With High-end Visualization Environments
 - ActiveMural, Powerwall, CAVE Family, Workbenches
- Build on Integrated Grid Services Architecture
 - Develop New Tools Specifically Support Group Collaboration



Group-to-Group Interaction is Different

- Large-scale scientific and technical collaborations often involve multiple teams working together
- Group-to-group interactions are more complex than than individual-to-individual interactions
- The Access Grid project is aimed at exploring and supporting this more complex set of requirements and functions
- The Access Grid will integrate and leverage desktop tools as needed



Our Approach

- Attack research questions in the context of real world experience
 - Build up a critical mass of groups using the AG Platform
 - Involve multiple groups in trying new ideas and evaluation
- Build working infrastructure as well as prototype software
 - Argonne has five working AG nodes under development
 - New Software is used weekly/Daily as part of standard nanocruises
- Involve multiple groups in deployment, use and research
 - Active collaborations with over a dozen groups working on AG technology
- Release software early and often (use open source model)
- Contribute to the community code base



Access Grid

The Access Grid™ project's focus is to enable *groups* of people to interact with Grid resources and to use the Grid technology to support group to group collaboration at a distance

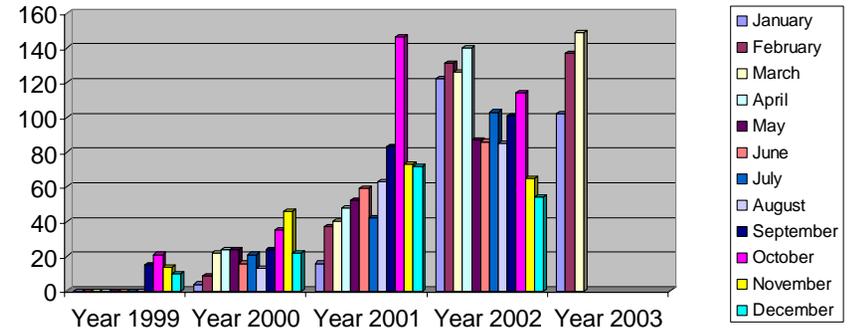
- Supporting distributed research collaborations
- Distributed Lectures and seminars
- Remote participation in design and development
- Virtual site visits and team meetings
- Complex distributed grid based applications
- Long term collaborative workflows



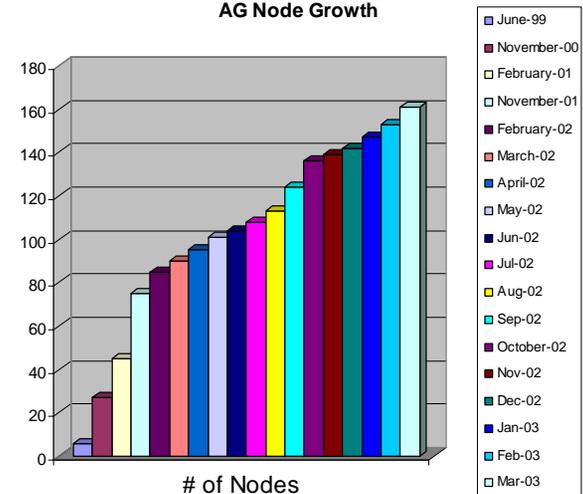
Access Grid Overview

- Access Grid 1.0
- Virtual Venues
 - Static Media Configurations
 - Assumed Multicast Technology
 - Single Server assumption
- Virtual Venues Client
 - Web Browser
- Nodes
 - Non-extensible single reference platform
 - AG 1.1 → 1.2 PIGs introduced
 - Applications layered outside of AG software

Scheduled Events



AG Node Growth



What is the Access Grid?

- **Virtual Venues**
 - Places where users collaborate
- **Network Services**
 - Advanced Middleware
- **Virtual Venues Client**
 - User Software
- **Nodes**
 - Shared Nodes
 - Administratively scoped set of resources
- **Resources**
 - Provide capabilities

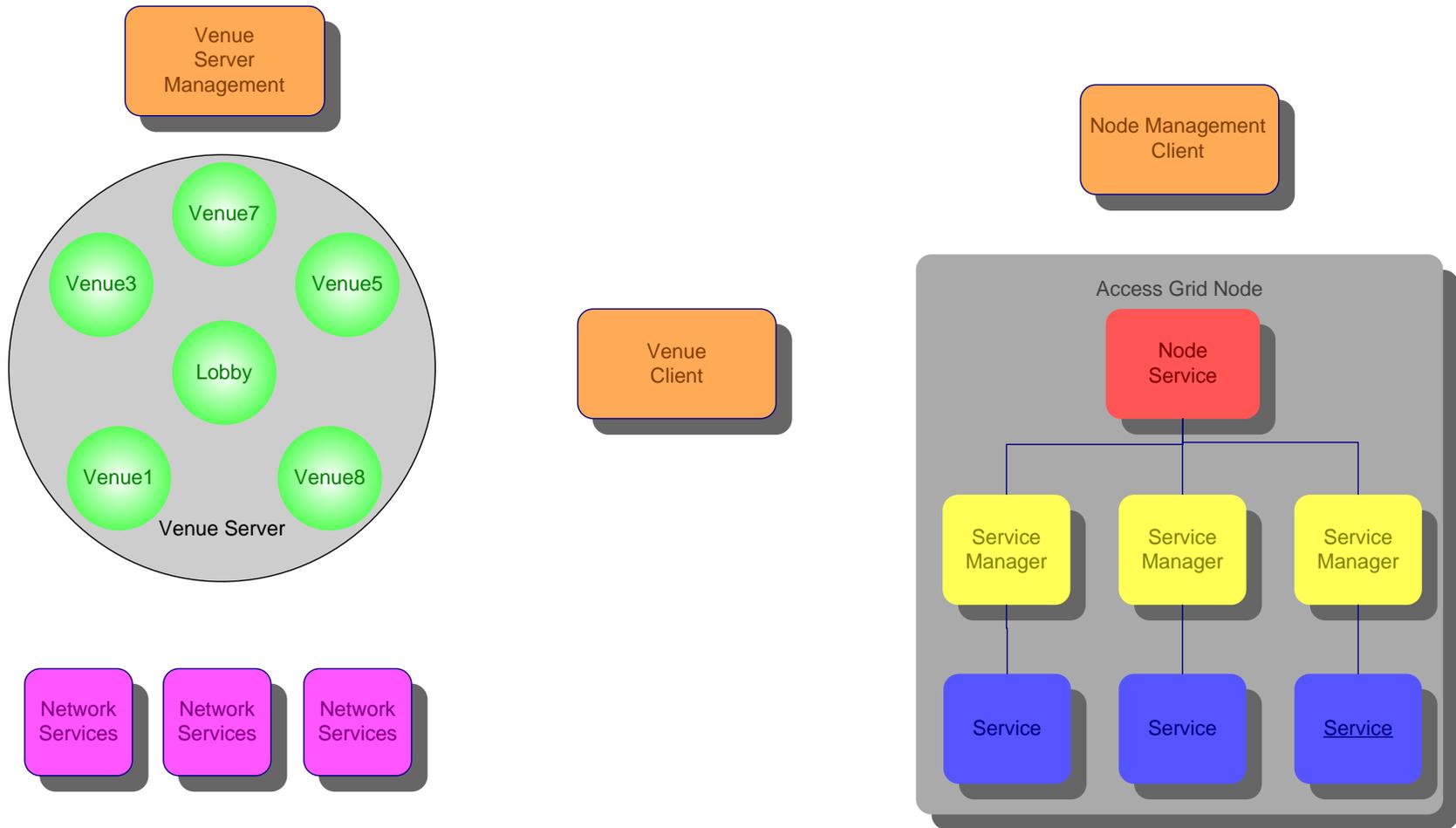
Users collaborate by sharing:

- Data
- Applications
- Resources

- Personal Nodes
 - User scoped set of Resources



Access Grid Architecture



Access Grid – The Novel Ideas

- Peer-to-peer Virtual Venues servers to enable worldwide, secure virtual communities through the use of high-end collaboration environments
- Collaborative work sharing beyond simple application sharing
- Integration of high-end visualization environments into collaborative spaces
- Methods of asynchronous collaboration: capture, synchronization, record, playback and annotation of collaborative experiences.



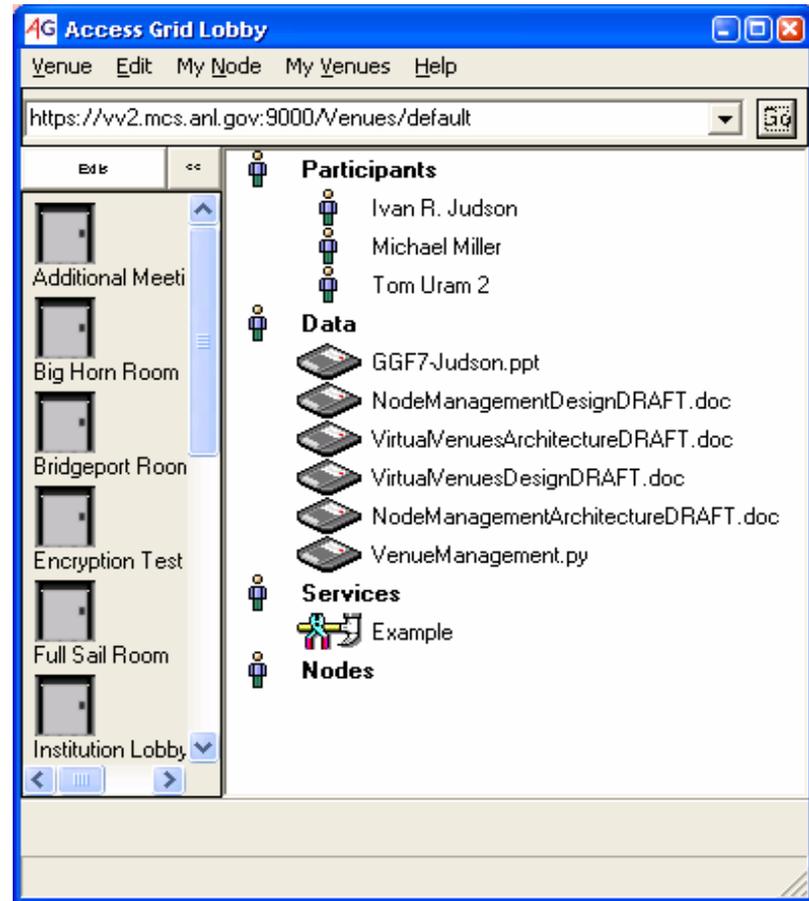
Virtual Venues

- What is a Virtual Venue?
 - A Virtual Venue is a virtual space for people to collaborate
- What do Virtual Venues provide?
 - Entry/Exit Authorization Information
 - Connections to other Venues
 - Coherence among Users
 - Venue Environment, Users, Data
 - Client Capabilities Negotiation
 - List of Available Network Services
 - Keep track of resulting Stream Configurations
 - Applications
- Virtual Venues have two interfaces
 - Administrative – Venue Management Software
 - Client – Virtual Venue Client Software



Virtual Venues Client

- Enable face-to-face meeting activities
- What can be done:
 - Sharing Data
 - Shared Applications
- Applications:
 - Distributed PowerPoint
 - Shared Web browser
 - Whiteboard
 - Voting Tool
 - Question & Answer Tool
 - Shared Desktop Tool
- Integrate legacy single-user apps



Access Grid Nodes

- Access Grid Nodes
 - Comprise a set of collaboration resources
 - Expose those resources through Node Services
- Basic Node Services include:
 - Audio & Video Services
 - Network Performance Monitoring Service
 - Network Reliability/Fallback Service
 - Leasing Service – Registering presence with a shared node
- Extended Node Services could be:
 - Display Service with enhanced layout control
 - Video Service supporting new codecs
 - Automatic performance adaptation
 - Application Hosting Service



Access Grid Nodes

- Access Grid 2.0 reference platforms:
 1. Advanced Node – Tiled Display, Multiple Video Streams, Localized Audio
 2. Room Node – Shared Display, Multiple Video Streams, Single Audio Stream (AG 1.x Node)
 3. Desktop Node – Desktop Monitor, Multiple Video Streams, Single Audio Stream (AG 1.X PIG)
 4. Laptop Node – Laptop Display, Single Video Stream, Single Audio Stream
 5. Minimal Node – Compact Display, Single Video Stream, Single Audio Stream
- What Hardware?
 - Cameras, Microphones, Speakers, Display, Input Devices
 - Get Audio Correct!
- Software Requirements?
 - Python 2.2, wxPython, GT2.0, pyGlobus



Access Grid vs. Commercial Desktop Tools

- AG targets beyond the desktop
 - large format multi-screen for AG Global Channels
 - room scale hands free full-duplex audio
- AG uses dedicated hardware
 - multiple machines, separation of function NT, Linux
- AG software is Open Source
 - extends and builds on community tools
- AG environment is integrated with Grid services
 - extensible framework designed to “plug-into” the Grid
- AG development is a Community Effort
 - you are welcome to join in the fun!!



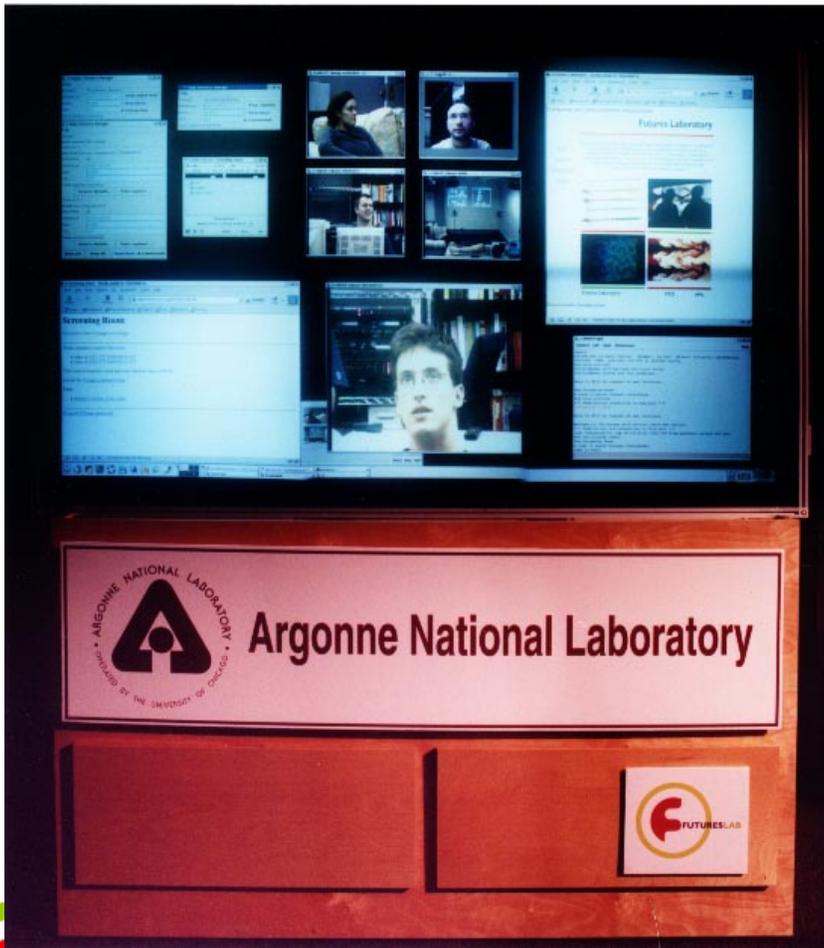
Personal Interface to the Grid (PIG)

- Motivated by the Fusion Grid Collaboratory
- Lower cost solution
- Single Computer solution
 - 2 cameras
 - Audio
 - Large format display
- Runs AG software



AG on Tiled Display

- Standard Access Grid
- Exploit existing efforts
 - DMX (DOE Funded)
 - VNC
 - Chromium (DOE Funded)
- Enable sharing
- Working with PCS and PPPL to standardize tools



Exposure of Fusion Community to AG

- PIGs deployed at MIT and GA
- Collaboration with PPPL on improving audio system
- Leveraging DOE Group to Group Middleware effort

The screenshot displays a multi-camera video conference interface. On the left, there are several small video windows showing participants from different locations, including 'ANL Workshop A...', 'SDSC Vislab MAIN', 'SDSC Vislab AUD...', and 'agvideo.bu.edu...'. The main window on the right shows a PowerPoint slide titled 'Access Grid' with the following content:

Access Grid

Digitally Linking "Intentionally Designed" Spaces

- Physical Groupwork spaces
 - seating, lighting, audio, video, screens, worksurfaces
- Virtual collaborative spaces
 - strong metaphors for resource organization
 - interaction scope management
- Agenda driven scenarios and work sessions
 - lectures, brainstorming, demos, meetings, planning
- Integration with GRID services
 - resource management, security, services brokering

Logos for FUTURES LAB and FusionGRID are visible at the bottom of the slide. A clock window in the bottom right corner shows the time as 2:40 PM on 7/1/2002.



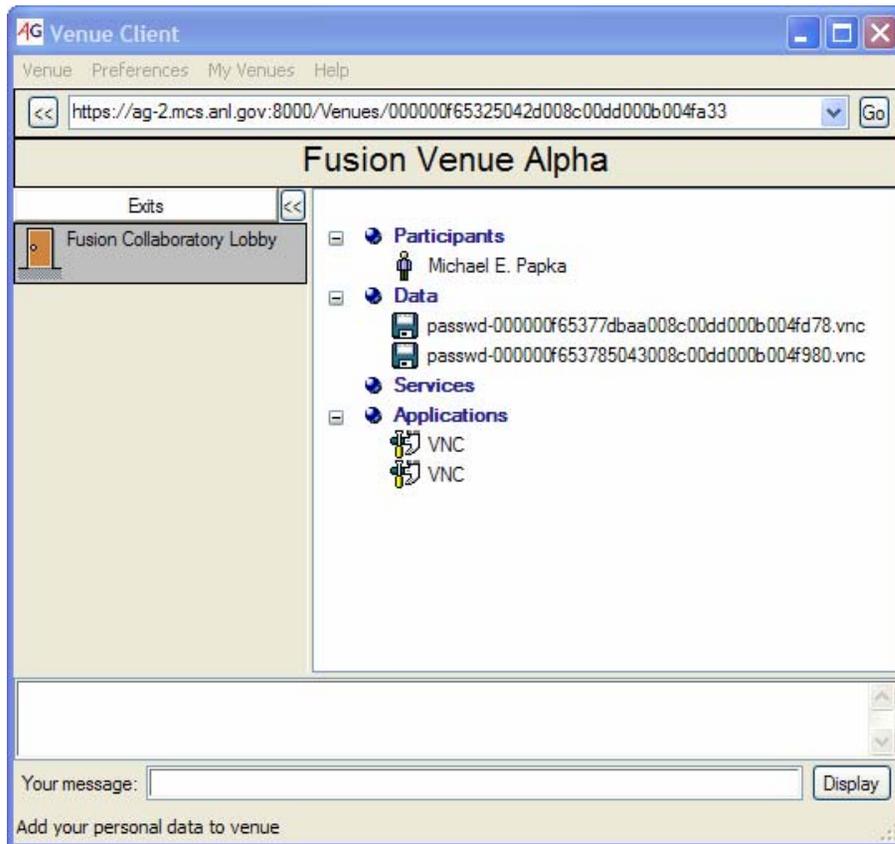
Fusion Community on the AG

Real-time visualization of fusion simulation over the AG

- Uses
 - University of Utah SCIRun
 - Stanford University Chromium library
 - Argonne National Laboratory H.26I SPU
- Enables
 - Remote collaboration with full resolution visualization
 - Collaborative analysis
 - Collaborative debugging



Fusion Grid Venue



- Fusion Collaboratory Venue
 - A place to share fusion data, collaboratory notes, shared applications
 - Contains shared VNC application



Acknowledgments

- This work is the combined effort of the entire Futures Laboratory at Argonne National Laboratory and DOE Fusion Grid Collaboratory.
- Funding for this work has been provided for in part by Department of Energy, National Science Foundation, and Microsoft Research

