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The Access Grid and the Latin American and Caribbean Engineering Institutions

Amado Gonzalez
Access Grid Node Director
Coordinator, Computer Services Controller
The Engineering Center
Florida International University
Minority Serving Institution Consortium
Miami, Florida
United States of America

Alson Been
Assistant Vice President of Information Technology
Bethune Cookman College
Minority Serving Institution Consortium
Daytona, Florida
United States of America

Stephenie Mclean
Director of the Minority Serving Institutions Consortium
National Center for Supercomputing Applications
ACCESS DC
Arlington, Virginia
United States of America

Sheldon Silvera
Network Administrator
The Engineering Center
Florida International University
Minority Serving Institution Consortium
Miami, Florida
United States of America

Abstract

The Access Grid, developed by Argonne National Laboratory, is the unifying element that will make a reality the goals and objectives of the Latin American and Caribbean Engineering Institutions. "Communication and a sense of unity among groups who share a common goal is the key to success in the world we live in." The Access Grid will enable the Latin American and Caribbean Engineering Institutions to eliminate geographical boundaries and increase new and higher level academic programs, distance learning and e-education, sharing of resources, faculty and curriculum development, cooperative programs, joint training and research programs, and

dissemination of scholarly achievements. The Access Grid will allow the Latin American and Caribbean Engineering Institutions to share with each other ideas for growth and the achievement of excellence in engineering education and research.

Keywords

Access Grid**,** Cyberinfrastructure**,** Computational Science, Collaborative Visualization Environments, Internet 2, Minority Serving Institution Consortium

Introduction

The purpose of this paper is to describe the Access Grid, the Minority Serving Institution Consortium and FIU's AMericasPATH (AMPATH), and how the synergy of these projects allowed FIU's Engineering Center to become a member of the Access Grid Community, and by doing so laydown the framework for the Latin American and Carribbean Institutions to follow. First, this paper will provide background information about the Access Grid, its goals, and the work of the Minority Serving Institution High Performance Computing Consortium. The Access Grid at Florida International University's Engineering Center has enabled the Engineering Center to engage cyberinfrastructure initiatives, and to facilitate access to its research and education mission and provide faculty development programs to the countries of Latin America, the Caribbean, and the world. Second, will be a description of the AMPATH project at FIU which has allowed the Latin American and Caribbean institutions to actively participate in Internet 2's, scientific and educational, activities.

As described by the International Committee for Future Accelerators (ICFA) Standing Committee on Interregional Connectivity (SCIC) Digital Divide Executive Report, February 8,2003 "Since networks of sufficient capacity and capability in all regions are essential for the health of our major scientific and education programs, as well as the democratization of global collaborations, we must encourage the development and effective use of advanced networks in all world regions". [2] Just like you must have a computational network in place there also must exist a human network; Access Grid Nodes create a human network that readily allows for open, real-time collaboration, training, scientific expeditions, education, support and allows collaboration access to a global community of scientist, engineers, and experts in the field.

Access Grid

Argonne National Laboratory is the nation's first national laboratory. In 1946 the US Department of Energy chartered Argonne, and it is one of the DOE's largest research Centers. Argonne National Laboratory has it origins in the University pf Chicago's Metallurgy Laboratory, which during World War two was part of the Manhattan Project. It was at the Metallurgy Laboratory where Enrico Fermi on December 2.1942, with his 50 colleagues created the world's first controlled nuclear Chain Reaction. Argonne's mission was the development of nuclear reactors for peaceful purposes, and expand research in science, engineering, and technology. "Argonne is not and has never been a weapons laboratory" [3] ANL focuses on four research areas, these are Basic Science, Scientific Facilities, Energy Resources, and Environmental Management. Within the **Mathematics and Computer Science Divisions** at Argonne National Laboratory exist the **Futures Lab**. The Futures Laboratory at ANL focuses its research efforts in advanced communications, collaborations, and advanced visualization technologies (teleimmersion) to advance collaborative computational science. The **Access Grid (AG)** was developed at Argonne National Laboratory's (ANL) Futures Laboratory; the Access Grid (AG) is a prototype software application with accompanying hardware that connects remote, geographically distant sites through a high bandwidth network. Participants hear and see one

another in real time over the AG for the purpose of scientific collaboration, education, training, and professional communication at all levels.

The Access Grid™ is an ensemble of resources including multimedia large-format displays, presentation and interactive environments, and interfaces to Grid middleware and to visualization environments. [1] The Access Grid is now used at over 200 Academic Institutions, and National Laboratories worldwide. Access Grid Nodes can be found in Australia, Brazil, Canada, China, Czech Republic, Finland, Germany, India, Ireland, Italy, Japan, Korea, The Netherlands, Portland, Puerto Rico, Russia, Singapore, Slovak Republic, Spain, Switzerland, Taiwan, Thailand, United Kingdom, and the United States.[1] The Access Grid resources are used "support group-to-group interactions across the Grid. The Access Grid (AG) is used for large-scale distributed meetings, collaborative work sessions, seminars, lectures, tutorials, and training. The Access Grid thus differs from desktop-to-desktop tools that focus on individual communication." [1]

The Access Grid is the doorway to **Virtual Venues,** these are virtual meeting spaces where scientist, engineers, humanist, physicists, educators, computational scientist, and many more come together to have real-time collaborations, and problem solving sessions. Institutions and people connect to these Virtual Venues over the Access Grid via a Node. Access Grid Nodes contain resources such as distributed applications which provide for a high quality user experience.

Objectives and Goals

Through the efforts and awards of the National Science Foundation, EDUCAUSE and the Education, Outreach and Training Partnership for Computational Infrastructure (EOT-PACI) a four year collaborative effort was begun known as the Advanced Networking for Minority Serving Institutions. (AN-MSI) The goal of the AN-MSI was to assist minority-serving institutions "in developing their computer and networking infrastructure, technical support, staff and national connections to become full participants in computer aided education and research". [6] We are thankful of EOT-PACI's AN-MSI efforts in helping us the MSI's. Building on the EOT-PACI efforts and work the MSI-HPC working group was born under the leadership of Stephenie Mclean of the National Center for Supercomputing Application (NCSA). This dedicated MSIHPC working group laid the groundwork for the Minority Serving Institution Consortium.

The **Minority Serving Institutions Consortium (MSIC)** works to build a 21st century **cyberinfrastructure** (CI) that best serves a diverse community of scientists, researchers and IT administrators. MSIC efforts have been successful in the increased participation of underrepresented minority women and men in **computational science** and **high performance computing**. The Consortium is committed to linking the best faculty, students, and staff at Minority Serving Institutions (MSIs) with top research institutions to engage in cutting-edge technology development and scientific discovery. The consortium is made up of 60 minority serving institutions from Historically Black Colleges and Universities (HBCUs), Hispanic Serving Institutions (HSIs), and Tribal Colleges and Universities (TCUs).[6]

"MSIC is committed to community building by understanding and being responsive to the needs of its community, recognizing its outstanding HPC efforts, and by adding value to the institution through education, training and collaborative research opportunities." (Stephenie Mclean, NCSA)

MSIC Goals:

1. To address obstacles to MSI participation in Cyberinfrastructure (CI) projects and research and to determine ways to encourage more individuals at MSIs to take leadership roles in high performance computing.
2. Design and implement strategies and programs that will expand the number of MSIs involved in Cyberinfrastructure.
3. Provide broad education and training to improve the knowledge base of those communities that has limited or no access to high performance computing

MSIC Objectives:

1. Increase the executive awareness of college executives to high performance computing programs and the importance of computational science.
2. Develop strategies that would allow greater flexibility for teaching faculty so that they would be able to spend more time on high performance computing and computational science research.

Work to bring together MSIs whose geographical and/or intellectual strengths indicate that collaborative connection activities will be stronger and more cost effective than separate efforts.[6]

AMPATH

AmericasPATH is a collaborative effort of Florida International University and Global Crossing, with support from the National Science Foundation through the Strategic Technologies for the Internet (STI) Program. Through the efforts of Julio Ibarra , Director, Heidi Alvarez, Assistant Director, and Eric Johnson, Chief Network Engineer, AMPATH was created in 2000 at Florida International University. Using Global Crossing's terrestrial and submarine optical-fiber networks, AMPATH is interconnecting the research and education (R&E) networks in South and Central America, the Caribbean and Mexico to US and non-US R&E networks via Internet2's Abilene network and the StarLight International Exchange Point. The purpose of the AMPATH project is to allow participating countries to contribute to the research and development of applications for the advancement of Internet technologies. The mission of AMPATH is to serve as the pathway for Research and Education Networking in the Americas and to the World and to be the International Exchange Point for Latin America and the Caribbean R&E networks. Additionally AMPATH fosters collaboration for grand challenge e-Science and Educational Outreach to underserved populations both in the US and abroad. [7]

Scope of Work

The specific areas that have been addressed and covered as part of the Access Grid activities have been Cyberinfrastructure, Computational Science, Collaborative Visualization, Internet 2, Outreach, and Education. What is Cyberinfrastructure? **Cyberinfrastructure** refers to the integration, coordination, and deployment of information technology and human resources to support modern science and engineering problems. Hardware resources of Cyberinfrastructure include computers, data storage, networks, visualization facilities, and scientific instruments. **Computational Science** is the systematic application of computing systems and computational solution techniques to mathematical models formulated to describe and simulate phenomena of scientific and engineering interest. *(National Coordination Office for Information Technology Research and Development).* **Visualization** of data can be approached by three components, filtering, mapping, and rendering. Filtering is the data component that is refined or prepared from a certain type of Grid, or computational resource or resources. Mapping is where the grid data is given its geometric form. Rendering, is the when the geometric form is made visible for the scientist and engineering to interact with and actively steer. In **Collaborative**

Visualization the goal is to have various researchers in different geographical locations, all working at the same time in an immersive space, either through virtual or augment reality.

Methodologies

What is the procedure, or steps, your institution can take in order to set up an Access Grid Node and actively participate in Access Grid activities? The first thing is to become familiar with the AccessGrid http://www.accessgrid.org, and the AccessGrid Documentation Project http://www.accessgrid.org/agdp , being lead by Jennifer Teig Von Hoffman of Boston University, and Alliance's Partners for Advanced Computational Services. [8] Here you will find existing AG community Institutions and research laboratories that have are already connected, and HOWTO's, Guides, and Tutorials on getting your University or Institution ready for Access Grid activities. Second you will need to begin to research Personnel Interfaces to the Grid and full Access Grid Node deployments, which require more equipment, and physical space at your institutions. Third, you will need to overcome the obstacles of executive awareness at your institutions, and I have found that the social barriers in place at many institutions and Universities are greater then the technical ones. Fourth, is your network capable to **Multi-cast** and is your university or institution an Internet 2 member. If your institutions is currently not on Internet 2, then it is important that you communicate with Julio Ibarra at AMPATH to discuss the benefits of AMPATH membership. [7] Fifth, you will need to have a dedicated team on site, and across the nation that will help your institution with Access Grid related difficulties as they arise. The Access Grid Team across the nation is already in place. We are a virtual organization, a community of scientist , faculty, researchers, and the Minority Serving Institution Consortium that are there to help your institutions takes on these endeavors to move forward and add value to your site.

Conclusions

The research and academic community has advanced the computer-to-computer interactions and communication. Human-to-human interaction though has not advanced as quickly as the machines have. For humans the means to communicate on a daily basis is still governed by face-to-face, telephones, radio, early forms of teleconferencing, and over the Internet using email. A majority of these human communications mediums have been plagued with false identities, unnecessary and time-consuming advertising, telemarketing, spam, noise, and overall garbage. How can the academic and research-intensive long term projects advance when they have to deal with these rudimentary forms of communication? Out of all these early forms of human communication only face-to-face is still the most effective in conveying our message through use of expressions and emotions, which are essential in human communication, and in actually confirming who you are communicating with. As we move into a global community of multi-disciplinary and multi-institutional collaborations and scientific expeditions the face-to-face communications becomes extremely difficult because of geography, time, resources, and war. The advanced research and academic teams of our time utilize the Access Grid to conduct multi-disciplinary and multi-institutional collaborations in computationally intensive, distributive and immersive environments, and by doing so have found a solution to the barriers of collaborative research and communications that are in place due to geography, time, resources, and war.

Recommendations

Get involved in Access Grid activities, dedicate a physical space and set up an Access Grid Node, advance your University with Cyberinfrastructure efforts, begin to develop computational science, visualization, and high performance computing courses. Get familiar with the key AccessGrid facilities and who the key AccessGrid people are. Encourage and demand multi-disciplinary and multi-institutional projects. Do not quit, no matter what barriers and obstacles may be encountered. We all experience those individuals or groups that do not want to see success because they feel it will surpass them or are just afraid and fearful of emerging technologies. If your institution does not have the resources, get them! Find out what is available through grants, participation in working groups, and partnerships. Be prepared to work hard, and always remember it is for our students, our future, our children.

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