TECHNICAL REPORT

GRID COMPUTING EDUCATION SUPPORT

DOE Instrument Number: DE-FG02-04ER25628

DATE: 9/15/2004 – 9/14/2007

RECIPIENT: Global Grid Forum, Inc.

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January 15, 2008
Submitted by Steven Crumb, Executive Director, GGF

Executive Summary

At the outset of this project in the fall of 2004, the Global Grid Forum (GGF) was enjoying its third year of significant growth. Chartered groups populated by leaders from the Globus Project and key technologies firms such as IBM and HP were showing strong progress. Interest from "end-user" organizations such as NASA, Boeing, and large pharmaceutical firms was peaking in what appeared to be a very useful emerging technology. It was at this time that the "Grid Computing Education Support" project enabled GGF to expand and improve its Student Scholar program.

During the course of the project, over sixty undergraduate and graduate students participated, many of whom remained involved in GGF beyond their original funded scholarship. Many participated in technical working groups after they returned home from their funded meeting, some in writing GGF technical documents. Many scholar program alumni went on to work in grid-related fields for companies engaged in GGF and one of the students has started his own technical company.

In this report we compare results with original plans, noting lessons learned in this project that will benefit other similar projects aimed at engaging students with professionals and professional organizations.

Introduction

The Global Grid Forum (GGF) was launched in 2001 as an international community of researchers, developers, and users of grid technologies. Birthed as an open forum for the exchange of experiences in the early days of the technology, GGF became a community where requirements were gathered, best practices were discussed, and specifications were published leading to interoperable software solutions.

In 2004, GGF had experienced its third year of growth not only from US-based organizations IBM and HP, but also by international organizations like Fujitsu Labs, and numerous government funded programs in the UK, Korea, Japan, Australia, and others. Additionally, US government funded programs like Globus as well as NASA and lead-edge commercial end-users like Novartis and Boeing were also engaging to leverage this promising technology.

It was at this time that the GGF Student Scholar program was introduced which enabled GGF the opportunity to bring over sixty qualified graduate and under-graduate students with interests in grid technologies to its three annual events over the three-year program. The expectation of this program was three-fold:
- to advance the awareness and interest of computer science students in grid computing;
- to facilitate networking between these students and grid luminaries resulting in focused and relevant research when they returned to their campuses;

- to encourage the long-term engagement by scholars in GGF activities specifically and in the grid industry more broadly.

Project Results

During the course of the three-year project, GGF brought together its global community three times a year in various locations, some domestic and some international. The goal was to bring as many as ten students to each event. To support the scholar program, GGF established a process to recruit scholar candidates, evaluate their qualifications, host qualified scholars at GGF events, and create an "alumni" network to keep in touch with past scholars. An open call for participation was distributed through numerous email networks, some managed by GGF and others managed by academic participants in GGF. Applicants were required to submit their research interests, how these interests involved grid computing, and what their future research plans were. These applications were reviewed by an objective "panel" of individuals recruited from the community who ranked them in order of qualification. GGF staff then contacted the qualified students and arranged for their participation at the upcoming event.

During the event, scholars were asked to perform activities that enabled them to gain an understanding of the community, its core processes, and key leaders. Scholars were encouraged to attend sessions consistent with their interests and research. GGF organized a "Scholar Breakfast" where scholars had an opportunity to dine with key grid luminaries and talk about their research focus and how it be made more relevant to the state of the technology. Scholars were also given encouragement by GGF leadership to become "evangelists" for the technology and for GGF when they returned to their campuses.

After each event, scholars were contacted for evaluation of the program and encouraged to keep GGF informed of their research progress. This ongoing contact was critical in determining the success of the program in terms of meeting its goals. Many stories can be told of the impact of this activity (some of which is still being experienced), but for purposes of evaluation, a small number of these will be described.

The first goal of the project was to advance the awareness and interest in grid technologies and in the GGF. This goal was met as measured by the ongoing participation in GGF groups by the majority (55%) of funded scholars. In some cases, scholars not only participated in groups, but took up the pen to co-author GGF documents (e.g., GFD.57).

A second goal of the project was to facilitate networking between scholars and key grid luminaries in the community. The success of this networking goal is difficult to measure as it often happened during the "Scholar Breakfasts" and in private conversations. However, it can be measured by the research topics chosen by scholars that related directly to grid computing challenges. In many cases, undergraduate students who came to GGF events later entered graduate school and chose grid topics for their graduate work.

A final goal of the project was to encourage long-term engagement in GGF specifically and in the grid industry more broadly. In numerous cases, scholars continued to contribute to GGF activities well after their participation in an event. In some cases, scholars became group secretaries, helped plan events near their campuses, and in one case, sent his own students to GGF events after he had graduated and obtained work on his campus. And recently, GGF received word that a former scholar recently launched his own business (MAAT France, a company of MAAT Gknowledge group, see: http://www.maat-g.com).

Lessons Learned

The project revealed four distinct challenges that were difficult to overcome. First, as a US-government funded project, the expectation was that primarily US-based students (i.e., those not only studying at a US campus, but likely to stay in the US after graduation) would be the prime recipients of the funding. In reality, the bulk of US-based students funded were foreign-born students studying at a US campus. The second challenge was that of being a global organization and the necessity to hold some of our events in overseas locations. Because of the timing of the events (normally during school periods), US-based students found it nearly impossible to take off a full week of courses to attend an event in Europe or Asia. So, several scholars selected for oversees events actually resided in those overseas locations. As a result of these two lessons learned, GGF has been able to collaborate with Europe-based consortia that have since provided funding for Europe-based scholars at Europe-hosted events.

The third lesson learned involved the number of scholars that were able to be supported by this project. Initially, GGF had expectations of ten students per event. However, with international events and the increased cost of travel, this expectation was lowered to 6-10 students per event, depending on location. The final lesson learned is the challenge of keeping connected with past scholars due to their movement out of academia and into their occupation. This challenge resulted in less precise measurements in some of the project goals.

For future programs of this nature it would be useful to leverage other DOE student programs, for instance the DOE "Science Undergraduate Laboratory Internships (SULI)" program. For example, contacting SULI alumni (or the subset who worked in information technologies or computer science) with information about the GGF scholarship program and ensuring that GGF scholarship alumni apply for SULI scholarships.

Conclusion

In summary, the GGF student scholar program funding resulted in over sixty students personally experiencing an emerging technology and a global community committed to its adoption. Students for the most part remained engaged during their academic years and in some cases into their professional careers. While outside the scope of this project

to measure, numerous papers, theses, and dissertations with a grid theme were published, contributing to the base of experience and knowledge in this emerging field. The funding that served as the basis of this project has equipped future technologists and leaders with a firm understanding of grid technologies and of its global impact.

APPENDIX A – TABLE OF STUDENT SCHOLARS

SCHOLAR	SCHOOL	EVENT	LOCATION
Gonzalez-Beltrain, Alejandra	Queens University - Belfast, UK	GGF12	Brussels
Groth, Paul	University of Southampton - UK	GGF12	Brussels
Naqvi, Syed	ENST - France	GGF12	Brussels
Spinnato, Piero	Create-Net - Italy	GGF12	Brussels
Voisin, Bruno	NUI Galway - Ireland	GGF12	Brussels
Cheng, Haiyan	Virginia Polytechnic Institute and State University	GGF13	Seoul
Kulshrestha, Archit	Louisiana State University	GGF13	Seoul
Manset, David	University of the West of England	GGF13	Seoul
Oprescu, Ana-Maria	Vrije Universiteit - Amsterdam	GGF13	Seoul
Sithole, Ernest	University of Ulster at Coleraine - Northern Ireland	GGF13	Seoul
Wohrer, Alexander	Vienna University of Technology	GGF13	Seoul
Congiusta, Antonio	University of Calabria - Italy	GGF14	Chicago
Huang, Dayong	Louisiana State University	GGF14	Chicago
Padmanabhan, Anand	University of Iowa	GGF14	Chicago
Samsi, Siddharth	The Ohio State University	GGF14	Chicago
Agarwalla, Bikash	Georgia Institute of Technology	GGF15	Boston
Brnadic, Ivona	University of Vienna	GGF15	Boston
Nunez Corrales, Santiago	Santiago Nunez Corrales	GGF15	Boston
Meneses, Esteban	Costa Rica Institute of Technology	GGF15	Boston
Nagaraja, Guruprasad Bangalore	Southern Illinois University	GGF15	Boston
Battre, Dominic	University of Paderborn	GGF16	Athens
Qi, Li	Huazhong Univ of Science & Tech	GGF16	Athens
Rasheed, Hassan	Royal Institute of Technology	GGF16	Athens
Reinicke, Michael	University of Bayreuth	GGF16	Athens
Siddiqui, Mumtaz	University of Innsbruck	GGF16	Athens
Yousaf, Muhammad M.	University of Innsbruck	GGF16	Athens
Cassidy, Kathryn	Trinity College Dublin	GGF17	Tokyo
Dowling, Charless	DePaul University	GGF17	Tokyo
Huang, Hao	University of Virginia	GGF17	Tokyo
Kelley, Ian	Cardiff University	GGF17	Tokyo
Slezak, Diego Fernandez	University of Buenos Aires	GGF17	Tokyo
Stark, Dylan	Louisiana State University	GGF17	Tokyo
Bharathi, Shishir S.	University of Southern California	GGF18	Washington DC
Chekraborty, Promita	Louisiana State University	GGF18	Washington DC
Gardner-Clarke, Sandra	National Institutes of Health	GGF18	Washington DC
Nagaraja, Guruprasad B.	Southern Illinois University at Carbondale	GGF18	Washington DC
Sun, Yiming	Indiana University	GGF18	Washington DC
Thomas, Mark R.	The Aerospace Corporation	GGF18	Washington DC
Zhu, Jing	San Diego Supercomputing Center	GGF18	Washington DC

Balman, Mehmet	Louisiana State University	OGF19	Chapel Hill
Chang-Yen, Ian	University of Louisiana at Lafayette	OGF19	Chapel Hill
Chilappagari, Sairam	George Mason University - Fairfax, VA	OGF19	Chapel Hill
Jones, Neil	University of California - San Diego, CA	OGF19	Chapel Hill
Kertcher, Zack	University of Chicago	OGF19	Chapel Hill
Nazir, Amril	University College London	OGF19	Chapel Hill
Salayandia, Leonardo	University of Texas at El Paso	OGF19	Chapel Hill
Sreepathi, Sarat	NC State University - Raleigh	OGF19	Chapel Hill
Wood, Jeff	Elizabeth City State University	OGF19	Chapel Hill
Yildirim, Esma	Louisiana State University	OGF19	Chapel Hill
Basso, Alessandro	University of Westminster, London	OGF20	Manchester UK
Georgatos, Fotis	University of Cyprus	OGF20	Manchester UK
Hernandez, Jesus Israel	University of Edinburgh, UK	OGF20	Manchester UK
Hessler, Sven	University of Innsbruck, Austria	OGF20	Manchester UK
Isaiadis, Stavros	Univ of Westminster, Harrow School of CS	OGF20	Manchester UK
Memon, Ahmed Shiraz	Technical University of Aachen, Germany	OGF20	Manchester UK
Sosa, Chris	University of Virginia	OGF21	Seattle
Tugurlan, Christina	Louisiana State University	OGF21	Seattle