The Computerworld Honors Program

Honoring those who use Information Technology to benefit society

Final Copy of Case Study

LOCATION:
Armonk, NY, US

YEAR:
2011

STATUS:
Laureate

CATEGORY:
Collaboration

ORGANIZATION:
IBM

ORGANIZATION URL:
http://www.ibm.com

PROJECT NAME:
World Community Grid

PROJECT OVERVIEW
World Community Grid's mission is to create the world's largest public virtual supercomputer to address research projects that benefit humanity. Our initiative is based on the belief that technological innovation combined with visionary scientific research and large-scale volunteerism can help make the planet a better place for all humanity. World Community Grid addresses the expectations of three key stakeholder groups. • Research partners - enabling and accelerating research into humanitarian issues • Current members (540K +) – ability to support humanitarian issues, altruistically or for deeper personal reasons. • Communities with significant economic, health and humanitarian needs - allows communities and groups to promote their mission through the WCG web-site's social networking tools. Members of World Community Grid are contributing their individual computer resources to collectively form a virtual super-computer. The result is a global, public, volunteer, grid-based research tool that is available free of charge to scientists anywhere on the planet who are conducting not-for-profit, humanitarian-based research. Many important humanitarian research projects are not attempted for a variety of reasons. Perhaps the barrier is the high cost of computer infrastructure. Or the results would provide benefit mostly to emerging markets. Often the research is too nascent to acquire public funding. World Community Grid was developed to support passionate and talented scientists and researchers facing these kinds of challenges and limitations. And in keeping with IBM's commitment to this approach, all results are in the public domain and therefore made available to the global scientific community. What made World Community Grid possible was the advent of viable, secure and robust grid technology several years ago. Until this breakthrough, conducting innovative research to solve complex scientific problems required access to a super computer, of which there are a very limited number. Access to this technology is tightly managed because these resources are expensive to purchase and operate and they are also complex to manage and maintain. When World Community Grid members are not using their computer - whether they are out grabbing lunch, have stepped away for a meeting or are thinking in-between keystrokes – their computer is

contributing to the grid. Users can select which specific research projects they want to support and are also encouraged to invite friends, co-workers, family members, whomever – to also become members of World Community Grid.

SOCIETAL BENEFITS

World Community Grid delivers benefits to society including. • Accelerating difficult humanitarian research that would otherwise require years of lab work • Expanding research in previously unsponsored or neglected areas • Focusing on global humanitarian issues • Encouraging new data and computationally-rich approaches to long-standing problems

PREVIOUS PROJECT UPDATED/EXPANDED?

This is not a previously submitted project, however wanted to clarify that the project was launch in 11/2004 however new research projects are continuously being added to World Community Grid, based on review of submissions from researchers all over the world One of the most exciting projects initiated on the grid in 2010 was “Computing for Clean Water”. Based at Tsinghua University in Beijing, this project is investigating the use of carbon nanotubes to facilitate creation of clean drinking water. In addition, Phase 2 of the Clean Energy Project at Harvard University was initiated in 2010. As well as the second Phase of the Dengue Fever project and Phase 2 of the Muscular Dystrophy project. Implementation of the core technology for the project is complete. However, many aspects of the technology and infrastructure that are the basis of World Community Grid are being enhanced and expanded on an on-going basis. Focus areas include adding support for various browsers and operating systems, as well as GPU gaming devices, and enhancing the agent that manages interaction across the network. Factors that drive this include the increasing number of members as well as the need to support new projects being brought onto the grid. In addition, social media integration was added in 2010, allowing members to share information with their friends on the projects they are supporting as well as the time they are donating.

PROJECT IMPLEMENTATION COMPLETE?

Yes

PROJECT BENEFIT EXAMPLE

Two examples: 1) The FightAIDS@Home project being run at The Scripps Research Institute in LaJolla, CA allows scientists to screen millions of compounds against various HIV protease and integrase target proteins. The team is attempting to identify drug candidates which can prevent AIDS from spreading in the body, especially for drug resistant strains. Prof. Arthur J. Olson's Laboratory is running this research project and the latest results identified seven promising compounds. In follow-up laboratory experiments, they appeared to be effective inhibitors against a drug-resistant strain of HIV protease. This new way of inhibiting the HIV protease might prove to be a significant breakthrough and advance over conventional inhibitors, which are defeated by the frequent mutations of the AIDS virus. One refereed paper has been published with another soon to be published regarding this research. Dr. Olsen states that “World Community Grid has enabled my lab at Scripps to engage in critical computational research to design new anti-HIV drugs based on molecular structure. This is work that we would not have attempted in the absence of this powerful public computing grid. World Community Grid has allowed us to complete very complex research studies in six months that would have taken five years.” 2) Another example, the Help Defeat Cancer project, with the Cancer Institute of New Jersey (Rutgers University). Researchers conducting experiments using a much broader

ensemble of biomarkers and stains than is possible using traditional computer resources. Dr.David Foran has been able to expand their general technique, originally developed using World Community Grid, to be useful in other cancers and for certain other diagnostics. This is a significant improvement and advance for cancer diagnosis. The NIH funded project, scheduled for completion in 10/2011, has already deployed the software at three cancer centers with plans to make the imaging tools and reference library available to all major US cancer centers. The project has published over ten refereed papers related to this project, to date. David Foran's work at Rutgers. "World Community Grid made it possible for us to analyze in one day the number of specimens that would take approximately 130 years to complete using traditional computer [resources]…"

IS THIS PROJECT AN INNOVATION, BEST PRACTICE? Yes

ADDITIONAL PROJECT INFORMATION

World Community Grid shifts new "computationally-intensive" research approaches from commercial priorities to humanitarian priorities. Since World Community Grid was established, it has delivered in excess of 580 million research computation results, supporting over 15 important medical and humanitarian research projects including "Human Proteome Folding", " Nutritious Rice for the World", "Help Fight Childhood Cancer" and "Discovering Dengue Drugs-Together" to just name a few. Over 540,000 members in over 200 countries on 6 continents have connected to the grid. This represents over 1.5 million devices. To date, over 425,000 years of computer runtime have been donated to support research projects running on World Community Grid. Mobilizing multiple stakeholders has been critical to the success of the project. World Community Grid relies on a network of dedicated partners, each bringing their special expertise and unique contribution. These businesses, associations, foundations, government agencies, and universities have been instrumental in the development and operation of World Community Grid. There are currently over 430 organizations who are official partners of World Community Grid, and many thousands more teams are visible on the site. These partners include 6 public sector agencies, 50 associations, 67 universities and 170 nonprofit organizations worldwide. A complete list of partners may be found on our Web site: http://www.worldcommunitygrid.org/about_us/viewOurPartners.do Here's a representative list of research institutions who have run or are currently running projects on World Community Grid that address humanitarian issues: • University of Texas Medical Branch (USA) • Universite Pierre et Marie Curie (France) • Chiba Cancer Center and Chiba University (Japan) • Ontario Cancer Institute (Canada) • New York University (USA) • The Scripps Research Institute (USA) • Harvard University (USA) • University of Washington (USA) • University of Cape Town (South Africa) • Fiocruz (Brazil) • The Cancer Institute of New Jersey (USA) • Institute for System Biology (USA) • Tsinghua University (China) World Community Grid does receive guidance from a group of international scientists (outside of IBM and within IBM Research) from all over the world. They help identify and review research projects focused on issues of humanitarian concerns.