



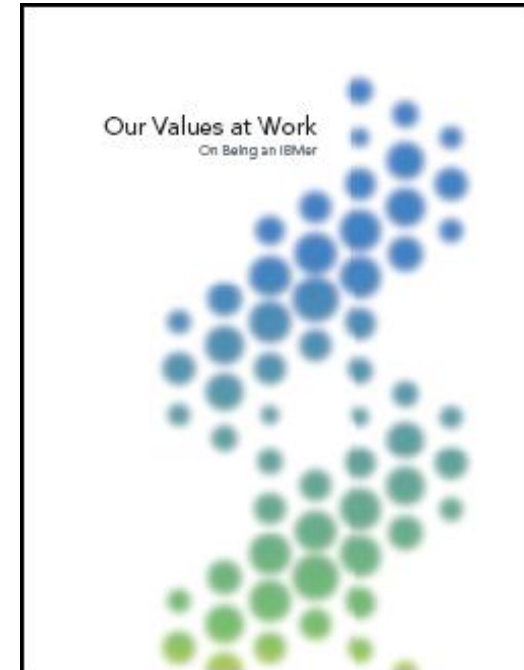
Corporate Citizenship & Corporate Affairs

World Community Grid

Innovation that Matters for the World

IBM's Approach: Based on Values

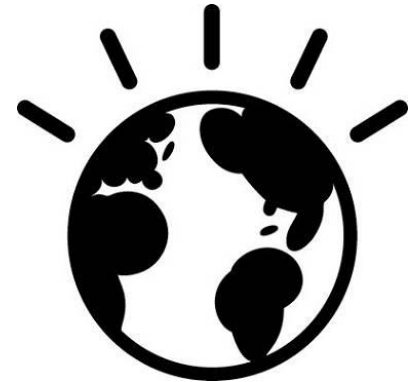
- Dedication to Every Client's Success
- Trust and Personal Responsibility in all Relationships
- **Innovation that Matters – for our company and the world**



What is smart?

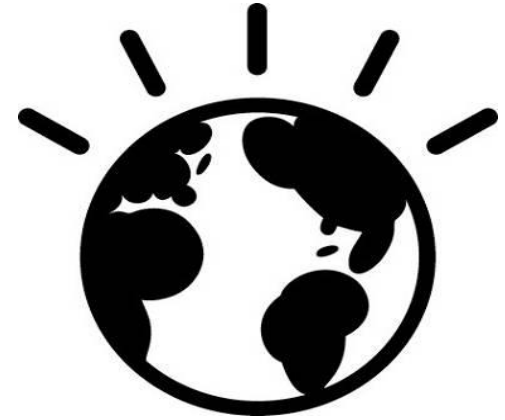
“There is much serious work ahead of us, as leaders and as citizens. Together, we have to consciously infuse intelligence into our decision-making and management systems...not just infuse our processes with more speed and capacity. We are moving into the age of the globally integrated and intelligent economy, society and planet. The question is, what will we do with that?”

**-Samuel J. Palmisano, Chairman and CEO,
IBM Corporation**



What is smart?

- Interconnected
 - Any to any linkage of people, process, and systems
 - Social media and the internet used to collaborate
 - Globally integrated resource pools accessible
- Instrumented
 - Event capture and filtering for timely response
 - Sensor solutions deliver new insights for action
 - Systems that automatically adjust to your business
- Intelligent
 - Deep discovery/search collaboration with clients/partners
 - Work automated for and changed by LOB leaders
 - Best practices for aligning IT to business needs



Using existing grid computing technology to address critical humanitarian issues

What if...?

- **...the idle time of each of the world's estimated 1 billion PCs could be linked to focus on humanity's most pressing issues?**

- **...scientists could access this extraordinary computational power and dramatically accelerate the pace of research from years to months?**



In November 2004, IBM launched World Community Grid with the goal of creating the world's largest public computing grid to benefit humanity.

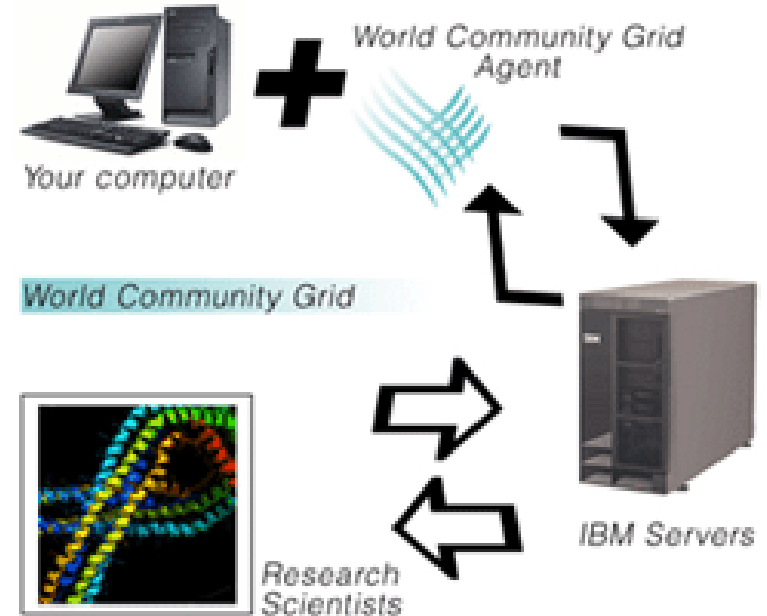
Grid technology applied to humanitarian problems

- Grid technology creates a large system with massive computational power that far surpasses the power of a supercomputer.
- Only research conducted by public and not-for-profit organizations is accepted by World Community Grid.
- With more than 540,000 members, 1.7 million registered computers and 400,000 years of run time – and growing, World Community Grid is enabling research to be completed faster than ever before.



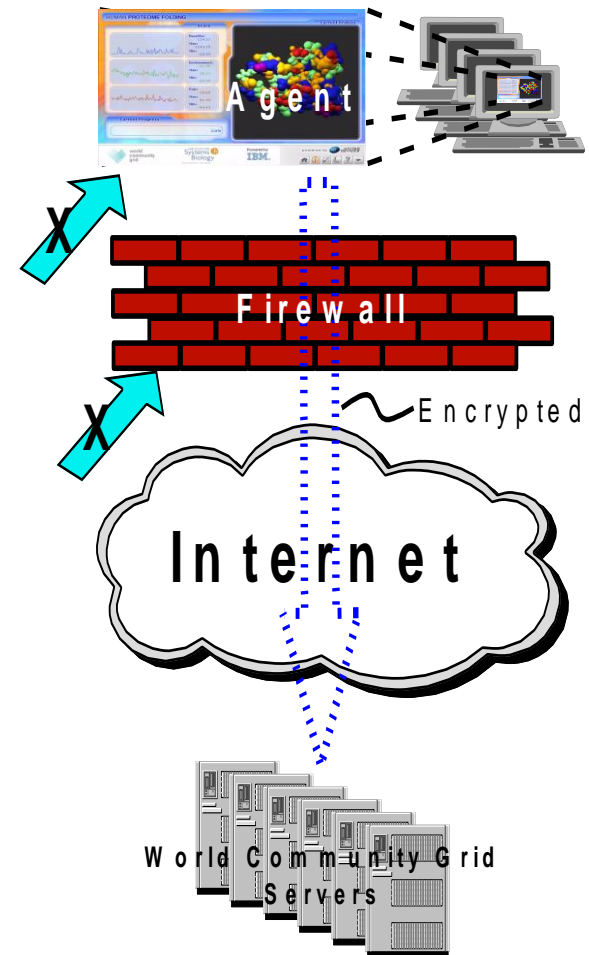
Individual computers linked to assist in research

- To volunteer, individuals register and download a small software program from worldcommunitygrid.org.
- The individual computer asks the server for and receives work, which is then processed when the computer has idle capacity.
- When the software program finishes the computation, it sends the work back to the server and receives new work.
- The more computers that assist in processing work, the quicker research is completed.



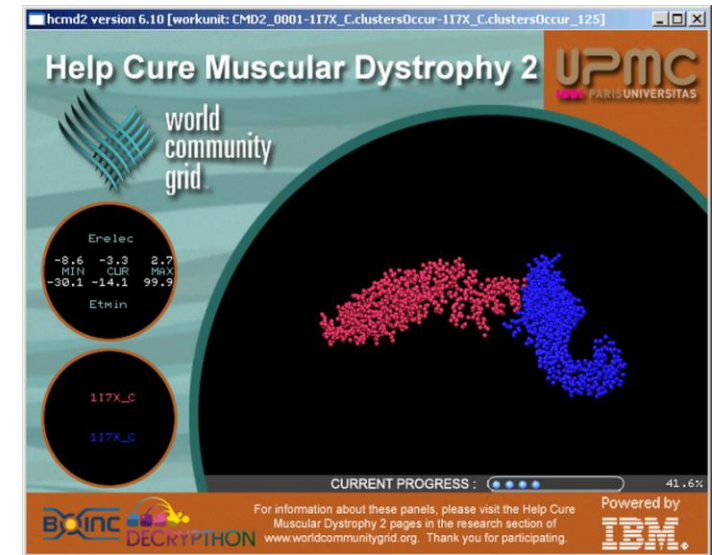
Security a top concern to ensure trust

- The individual computer -- not the server -- always initiates contact, further securing your computer.
- Communications and files are encrypted.
- Communications are limited and unsolicited communications are not accepted.
- Programs work through a firewall and uses public-private key authentication.



Help Cure Muscular Dystrophy Phase 1 and 2

- **Phase 1: Sponsored by the Association Francaise Contre Les Myopathies (Paris, France)**
 - Launched December 2006 and completed June 2007.
 - Searched for binding sites between proteins, genes, their genetic variations, ligands (potential drugs) involved in neuromuscular diseases, with a particular focus on Muscular Dystrophy.
 - Conceptualized and confirmed a numerical methodology discriminating protein partners from non-interacting pairs of proteins (for a pool of protein pairs whose interaction was known).
- **Phase 2: Sponsored by Decryphon (a partnership of AFM/IBM/CNRS) and the Universite Pierre et Marie Curie.**
 - Launched May 2009
 - This phase of the project will apply the numerical method on protein pairs whose interaction is unknown to discover new potential protein partners.
 - Contribution to this project will result in valuable information for biologists and physicians, and eventually will benefit all researchers working on genetic diseases, particularly, neuromuscular diseases.
 - This phase of the project will apply the methods validated and refined in Phase 1, to determine how all of over 2000 proteins, involved in neuromuscular diseases, interact with each other.



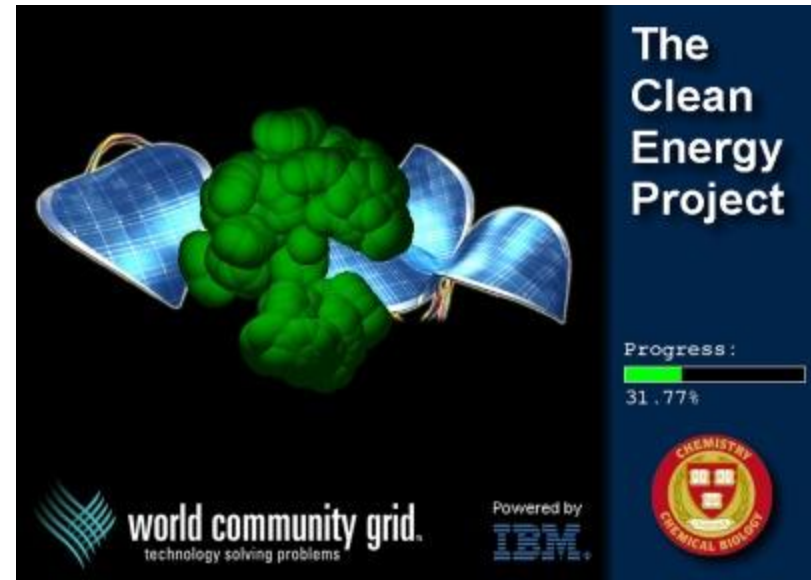
Help Fight Childhood Cancer

- Launched March 2009
- Sponsored by Chiba Cancer Center Research Institute and Chiba University
- The main goal of the project is to find drugs that can disable three particular proteins associated with neuroblastoma, one of the most frequently occurring solid tumors in children. Identifying these drugs could potentially make the disease much more curable when combined with chemotherapy treatment.
 - the project's researchers are using computational methods to identify new candidate drugs that have the right shape and chemical characteristics to block three proteins - TrkB, ALK and SCxx, which are expressed at high levels or abnormally mutated in aggressive neuroblastomas. If these proteins are disabled, scientists believe there should be a high cure rate using chemotherapy.
 - The researchers have prepared a library of three million compounds - or potential drug candidates (called ligands) - and will use World Community Grid to simulate laboratory experiments to test which of these compounds block these proteins.



The Clean Energy Project Phase 1 and Phase 2

- **Phase 1:** Launched December 2008 and completed in October 2009
- Sponsored by the Aspuru-Guzik group at Harvard University
- The main goal of the project is to calculate the electronic properties of tens of thousands of new materials and to determine which of these are the best candidates to make the next generation of affordable solar cells.
 - **Phase 1:** was run to establish a method to determine how molecules stack together in a crystalline form. With 2000+ years of computational time donated to this project, we now have a huge number of molecular structures to use for statistical studies of how solar cell materials are affected by packing structure (density and contacts with neighboring molecules) and temperature.
 - **Phase 2: Linux version launched June 28, 2010**
- The mission of Phase 2 is to find new materials for the next generation of solar cells and later, energy storage devices.



The Clean Energy Project

Progress: 31.77%

world community grid. technology solving problems

Powered by IBM

CHEMISTRY CHEMICAL BIOLOGY

The image shows a progress bar for 'The Clean Energy Project' at 31.77%. It features a central graphic of a green molecular structure surrounded by blue solar panels. Logos for 'world community grid.', 'Powered by IBM', and a circular logo for 'CHEMISTRY CHEMICAL BIOLOGY' are also present.

Nutritious Rice for the World

- Launched May 2008 and completed in April 2010
- Sponsored by the University of Washington Data Center
- Project created the largest and most comprehensive map of the structure of rice proteins and their related functions
 - Help agriculturalists and farmers pinpoint which plants should be selected for cross-breeding to cultivate better crops that produce more rice grains, ward off pests, resist disease or hold more nutrients.
 - Knowledge gained can be easily transferred to wheat and corn.
- Rice is the main food staple of more than half of the world's population.
 - Every year, 10 million people die of hunger and hunger-related diseases.



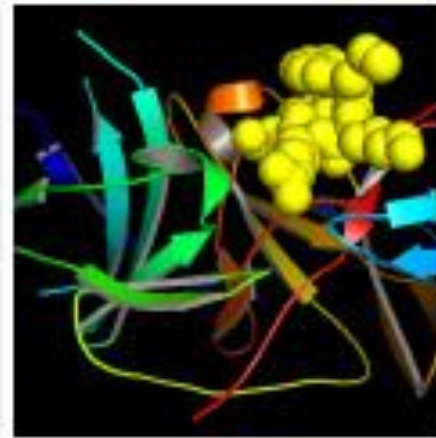
Help Conquer Cancer

- Launched November 2007
- Sponsored by the Ontario Cancer Institute (OCI), Princess Margaret Hospital and University Health Network
- The project will improve the results of protein X-Ray crystallography in order to increase understanding of cancer and its treatment.
 - X-Ray crystallography will enable researchers to determine the structure of many cancer-related proteins faster, leading to improved understanding of the function of these proteins, and enabling potential pharmaceutical interventions to treat this deadly disease.



Discovering Dengue Drugs – Together Phase 1 and Phase 2

- Sponsored by the University of Texas Medical Branch and the University of Chicago
- The project will complete extensive calculations to identify new drug-like molecules with potent antiviral activity against viruses that belong to the family called Flaviviridae, which include dengue, hepatitis C, West Nile, and Yellow fever viruses.
- **Phase 1:** Launched August 2007 and completed August 2009
 - Phase 1 was designed to serve as a comprehensive screening of approximately 3 million small "drug-like" molecules and identify several thousand molecules which attach to these virus enzymes in a manner that disables them. Molecules such as these may lead to drugs which can keep the disease from spreading in the body. The purpose of Phase 1 was to reduce the number of molecules being examined to only those that are the most promising candidates. These molecules will be further examined in Phase 2.
- **Phase 2:** Launched February 2010
 - Phase 2 is to identify promising drug leads to combat dengue, hepatitis C, West Nile, Yellow fever, and related viruses.

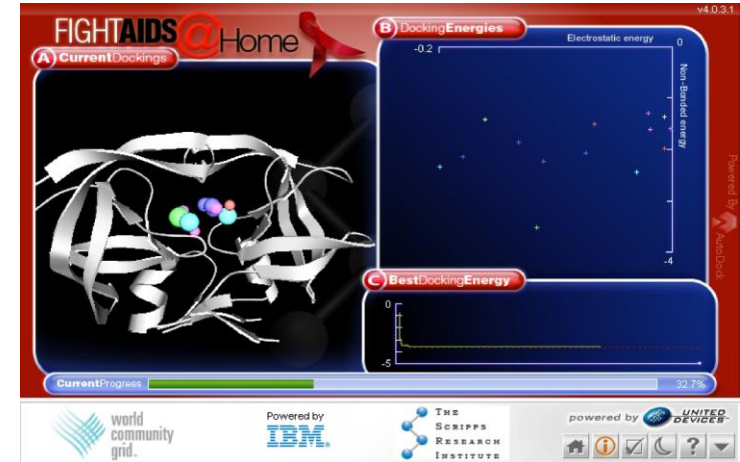


FightAIDS@Home: Phase 1 and 2

“World Community Grid has enabled my lab Scripps to engage in research projects that we would not have attempted in the absence of this powerful public computing grid. It’s allowed us to complete complex work in six months that would have taken five years.”

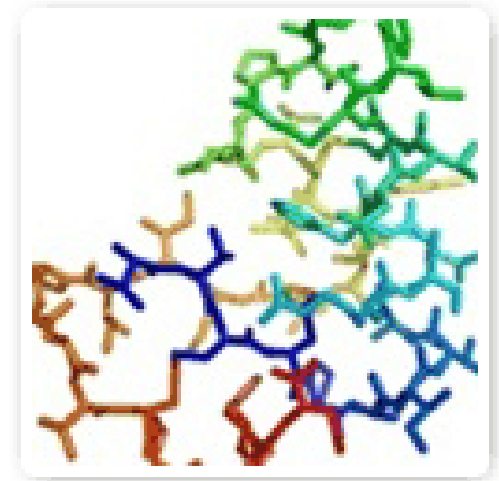
- Professor Arthur Olson, Scripps Research Institute

- Sponsored by the Scripps Research Institute.
- **Phase 1:** Launched November 2005 to identify new inexpensive and effective anti-HIV drugs based on molecular structure
- First stage completed with over 2 quadrillion calculations processed.
 - Virtually screened 2,000 drug compounds and discovered potential leads.
 - Leads are being presented to chemists for the design of better drugs that can be used in clinical trials.
- **Phase 2:** Virtually screening 230,000 compounds against wild-type HIV protease
 - Scripps has already identified 40 chemicals that merit further laboratory testing and several of these have gone to the second phase of testing, moving closer to potential drugs.
- Four additional experiments in development



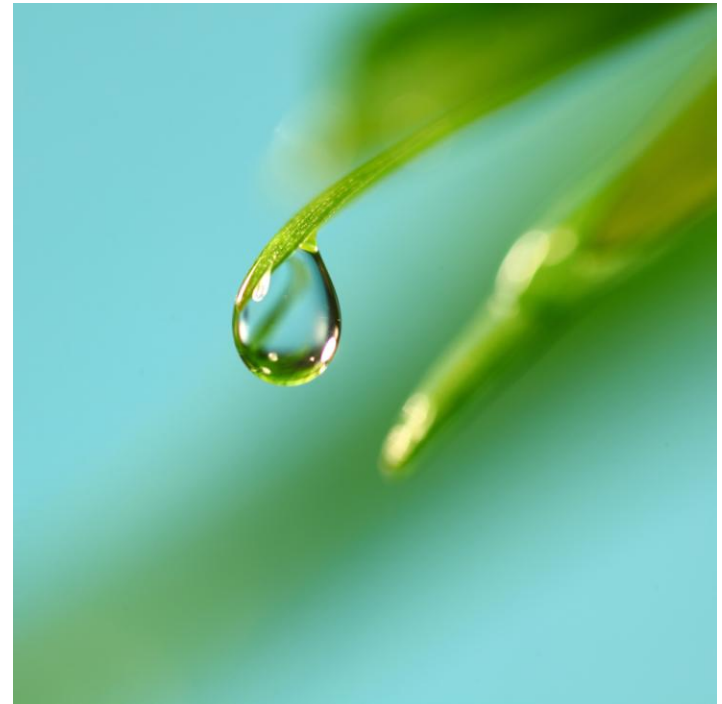
Human Proteome Folding Project: Phase 1 and 2

- **Phase 1:** Sponsored by the Institute for Systems Biology
- Launched November 2004 and completed July 2006
 - Produced a database that describes the structure of approximately 120,000 protein domains that could not be described previously using traditional approaches.
 - Database of protein structures is helping scientists take the next steps to understanding how diseases that involve these proteins work and, ultimately, how to cure them.
- Research would have taken 100 years, but was completed in 12 months with World Community Grid.
- **Phase 2:** Sponsored by New York University
 - Launched October 2006
 - Focusing on a small number of proteins that are key markers for disease diagnosis and impact, with a special focus on proteins linked to malaria and cancer.
 - One particularly interesting research effort is examining the manner by which malaria is transmitted by nursing mothers to children.



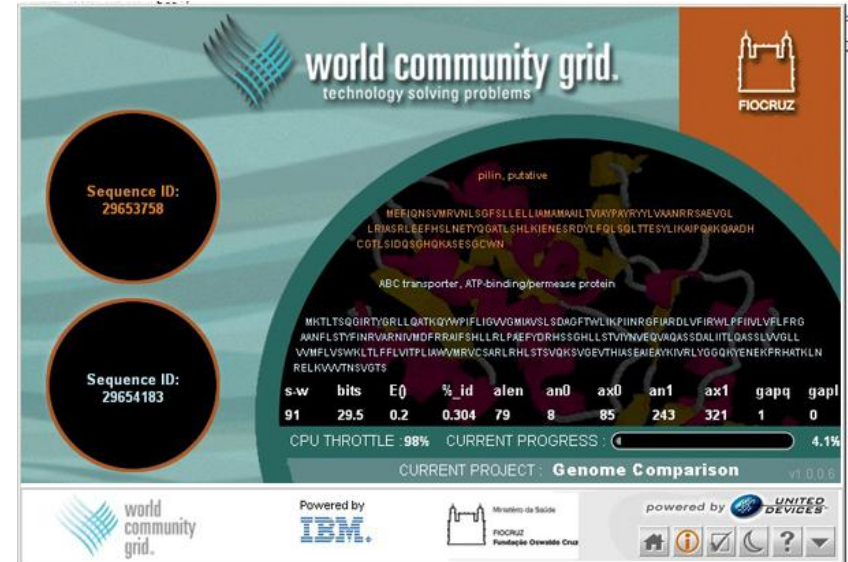
Computing for Clean Water

- Launched September 20, 2010
- Sponsored by CNMM, at Tsinghua University in Beijing
- The mission of Computing for Clean Water is to provide deeper insight on the molecular scale into the origins of the efficient flow of water through a novel class of filter materials. This insight will in turn guide future development of low-cost and more efficient water filters.
- This project uses large-scale molecular dynamics calculations - where the motions of individual water molecules through the nanotubes are simulated - in order to get a deeper understanding of the mechanism of water flow in the nanotubes.



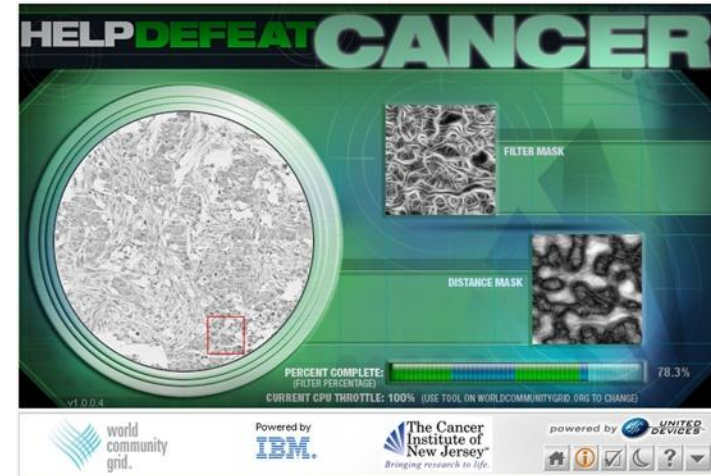
Genome Comparison Project

- Launched November 2006 and completed in July 2007
- Sponsored by Fiocruz (Brazil)
- Performing pair-wise comparisons among and between all genes for all sequenced organisms (from human beings to fruit flies to yeast)
- Database of the results has been built and is available to the research community
 - Provides a huge head start in understanding what these proteins do, how they play a role in disease processes, and ultimately in understanding how to devise a drug to combat a disease involved with the particular protein in question.
- Paper announcing the database available on [News & Updates](#).



Help Defeat Cancer

- Launched July 2006 and completed June 2007
 - Sponsored by The Cancer Institute of New Jersey, Rutgers University and UMDNJ – Robert Wood Johnson Medical School
 - Long-term goal: Improve understanding of the underlying mechanisms of cancer to improve treatment and therapy planning for cancer patients.
-
- World Community Grid helped accelerate research to detect and track subtle changes in measurable parameters that could facilitate the discovery of prognosis clues, which are not apparent by human inspection or traditional analysis alone.
 - Researchers have created a web-based, robotic prototype to automatically image, analyze, archive and share tissue microarrays.
 - Initial focus: breast cancer, followed by head and neck cancers



You can make a difference!



Join....and Help Spread the Word!

- Join World Community Grid today!
- Encourage your colleagues, family and friends to join as well.

Become a Partner

- Expand your organization's volunteerism on critical humanity issues and further strengthen the reputation of your organization.
 - Partner status is recognized on the World Community Grid website and your logo is posted on the site.
- As a partner, you are asked to do two simple things:
 - Post World Community Grid widget and partner story on your web site(s).
 - Establish a team that has contributed a minimum of 50 days of run time and continues to contribute 2 days of run time per day.

Future projects include broad array of research



- Several project proposals are in the review pipeline, including the modeling of disease pandemics, crop yields, and urban area evacuation
- Potential areas of research for future proposals include environmental research; natural disasters and hunger; new and existing infectious disease research; genomic and disease research
- Projects are chosen based upon their ability to utilize the computational power of World Community Grid and make the most difference to our world

Help identify promising new research projects



- World Community Grid plans to run 7-10 projects a year.
- Universities, public and not-for-profit organizations can submit “Request for Proposals.”
- World Community Grid chooses projects based upon specific criteria, taking into consideration those that will most benefit through grid technology.
- IBM helps prepare the research for World Community Grid, including designing, testing and deploying software application.

www.worldcommunitygrid.org

www.ibm.com/ibm/ibmgives