World Community Grid

Our history

- World Community Grid started in 2004 on a platform using United Devices software.

- In 2005 we started using BOINC for Linux and Mac.

- In 2006 we started using BOINC for Windows.

- In 2007 we stopped porting new projects to UD.

- In 2008 we dumped UD and we are fully on BOINC.

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What do we do?

- We run humanitarian research for non-profit organizations for free when they don't have the resources or the interest to do the work themselves.

- We try to keep things interesting for the volunteers so that our member/devices retention stay above 30% of registrations.

- Keep the IBM Executives happy by launching exciting research projects which put IBM in good light in the media. IBM is a great example of good corporate citizenship.

- At the end of a project we follow-up with researchers to make sure they (1) put the results in the public domain and (2) mention World Community Grid in whatever they publish.
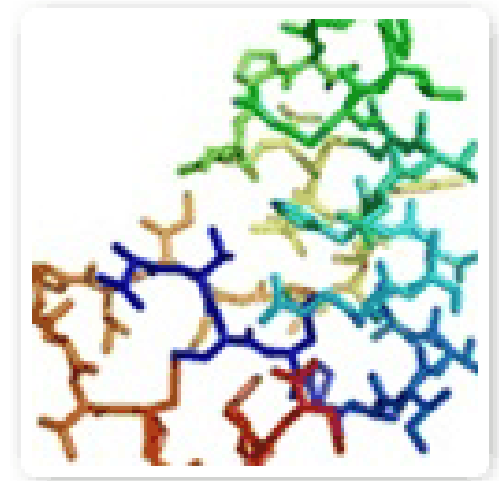
Research

- We can port about 6 new research projects per year but research are not exactly breaking down our doors to run research so we have to track down research projects.

- We have a well tested process for running research projects from the time a proposal comes into the door to the time the last result is sent back to the researchers.

- We are experts on several research programs including: Rosetta, AutoDock, and WRF. We're soon to be experts on CHARMM and Q-CHEM.

- Since 2004, we have "launched" 11 research projects on World Community Grid. We'll review each one briefly on the following pages.

IBM

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.


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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
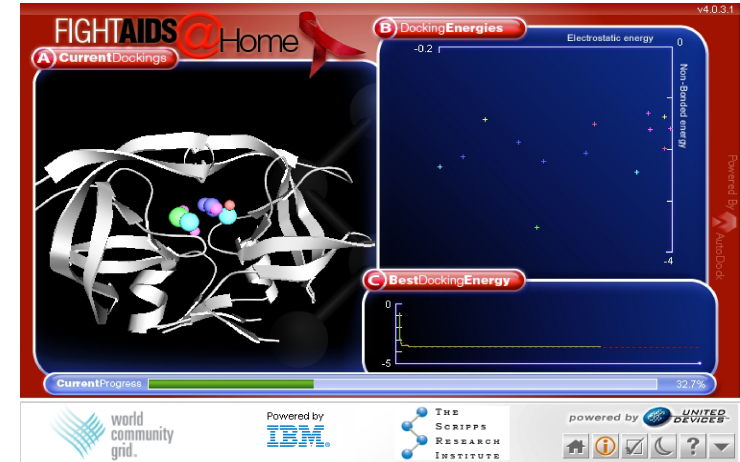
Help Defeat Cancer

- 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
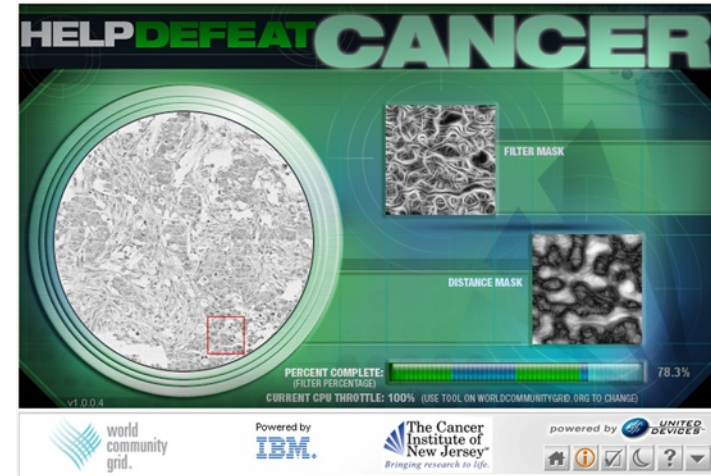
Genome Comparison Project

- 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)

- Building database of the results which will be available to the research community

  - Provides a huge headstart 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.

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Help Cure Muscular Dystrophy – Phase 1

- **Phase 1**: Launched December 2006 completed in June of 2007.

- Sponsored by sponsored by the Association Francaise Contre Les Myopathies (Paris, France)

- The project is searching for binding sites between proteins, genes, their genetic variations, and ligands (potential drugs) involved in neuromuscular diseases, with a particular focus on muscular dystrophy.

- Goal: Reveal more specifically how these components interact, which should ultimately lead to a better understanding of the role the proteins play in these complex diseases and to improved treatments.
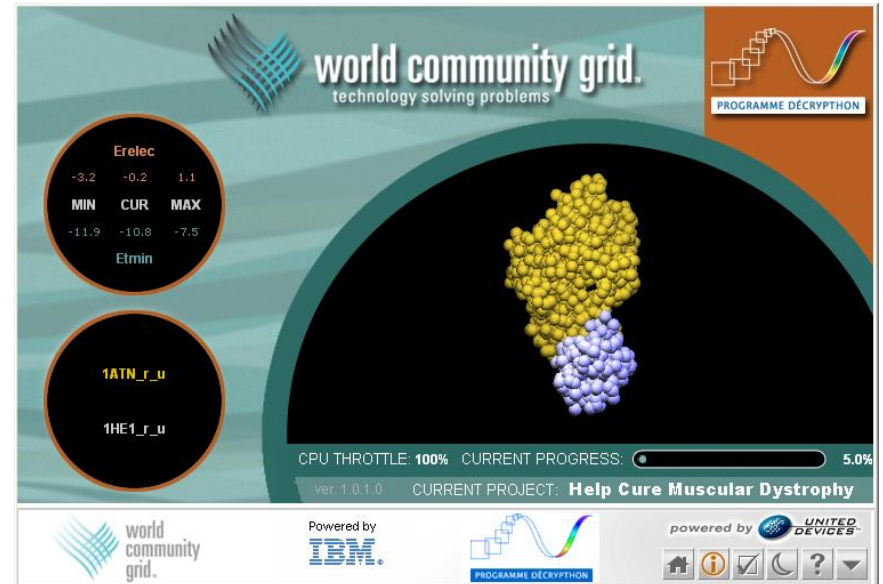
Discovering Dengue Drugs – Together – Phase 1

- Launched August 2007

- Sponsored by 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.

  - Calculations will accurately determine how tightly small drug–like molecules bind to the different flavivirus proteases. Compounds predicted to bind tightly to viral proteases will be tested for anti–flavivirus activity.
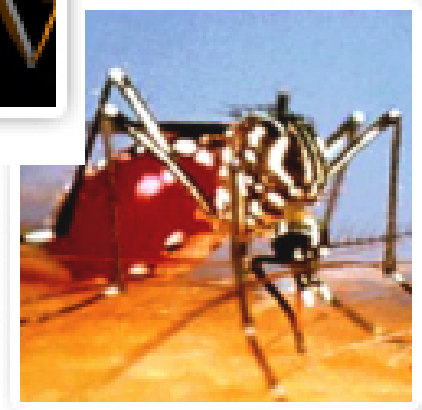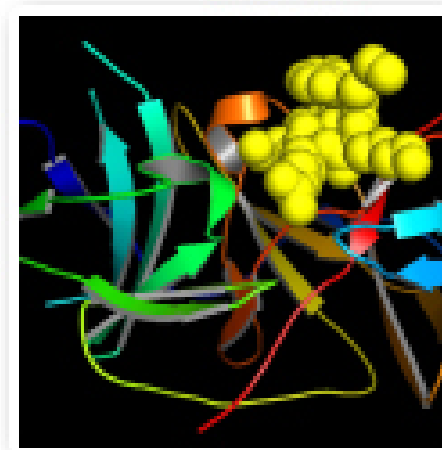
AfricanClimate@Home - Phase 1

- Launched September 2007

- Sponsored by the Climate Systems Analysis Group, University of Cape Town, South Africa

- The project will lead to the identification of combinations of key parameterizations that best simulate the varying climates of Africa.

  - More accurate models will give researchers a better understanding of the implications of various natural and man-made influences on the African climate.

  - Policy makers can then make important adaptation and mitigation decisions related to agriculture and water (e.g., planning irrigation infrastructures and promoting appropriate drought resistant crops on the best available information.

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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.

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Nutritious Rice for the World

- Launched May 2008

- Sponsored by the University of Washington Data Center

- Project will create 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.

Near Future New Project Pipeline

- Alternative energy fuels

- Dengue Fever – Phase 2

- Pediatric Cancer inhibitor search

- Muscular Dystrophy – Phase 2

- Climate Modeling – Phase 2

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