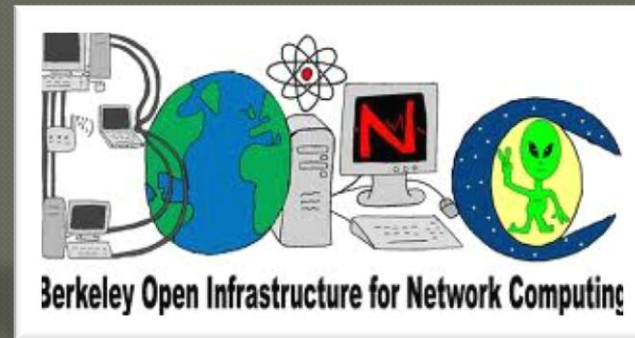# High Performance Computing

Iowa Summer Institute in Biostatistics
July 28, 2011

By: Tommy Keller, Tara Negrón, Toni Salvatore, and Emily Simmons

Volunteer Computing

- Distributed Computing
  - Autonomous computers interact to achieve one common goal

- Volunteer unused computer time

- Great Internet Mersenne Prime Search
  - First volunteer
  computing project

Berkeley Open Infrastructure for Network Computing

- BOINC

World Community Grid

- Non-profit Research Computing Organization
  - To benefit the health and safety of humanity

- Affordable access to supercomputers
  - For projects that can not be done on one computer

- Ranks in top 5 super computers in the world

How it Operates

- Work Units
  - Divide the computations into manageable sections

  - Makes for accurate results and efficiency of computations

- BOINC software for server communication

How it Operates

- BOINC software
  - Means of communication between computers
  - Sends out work units
  - Allows work units to be sent to same platform e.g. Win, XP, SP2
  - Allows work units to send to computers equipped with necessary files
  - Allows work units requiring large RAM to only be sent to computers with large RAM

Research Projects

- Nine completed projects

- Eight projects are currently underway

Research Projects

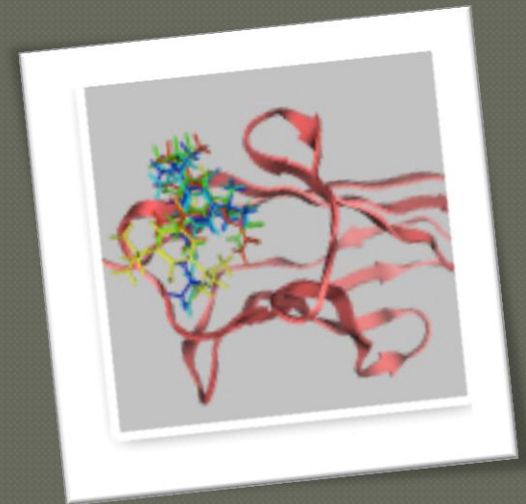- Completed Projects
  - Influenza Antiviral Drug Search
  - The Clean Energy Project
  - Discovering Dengue Drugs Together
  - Nutritious Rice for the World
  - African Climate@Home
  - Help Cure Muscular Dystrophy
  - Genome Comparison
  - Help Defeat Cancer
  - Human Proteome Folding

Research Projects

- Active Projects
  - Computing for Clean Water
  - The Clean Energy Project - Phase 2
  - Discovering Dengue Drugs - Together – Phase 2
  - Help Cure Muscular Dystrophy – Phase 2
  - Help Fight Childhood Cancer
  - Help Conquer Cancer
  - Human Proteome Folding – Phase 2
  - FightAIDS@Home

Costs

- Increased power consumption
  - Computer is being used when it would usually be off
- Increased CPU contention can decrease computer performance
  - Manual settings can prevent WCG from running while other applications are in use
- Specific projects are bad for laptops
  - Solar Power
  - Muscular dystrophy, Clean Water and Childhood Cancer are good projects to run on laptops

Benefits

- Faster and Cheaper
- Sparks public interest in science
- Allows anyone with a computer to participate
- Safe for your computer
- Can run from Win, Lin, Mac systems
- Entertainment

Entertainment

- Forums
- Screen Savers
- Badges
- Signatures

SekeRob Joined Jul'05 Country Italy Team BOINC.Italy
Total run time   22.5 Years   rank 2 169 • 19-IT • 12-team
Accumulated points 17 861 745   rank 2 083 • 21-IT • 12-team
Results returned   35 958   rank 2 074 • 20-IT • 14-team
Run time/project 1.32 Years (Emerald) Performance 27.8 Gflops www.wcgrid.org

world
community
grid.

Contributions

- 562,000 individuals and representatives from 218 countries are involved

- More than 488,000 years of unused computing time have been donated since 2004

- 9 projects have been completed

References

- *World Community Grid - Home*. Web. 18 July 2011. <http://www.worldcommunitygrid.org/>.
- *BOINC*. Web. 18 July 2011. <http://boinc.berkeley.edu/>.
- "IBM - How It Works - World Community Grid - United States." *IBM - United States*. Web. 18 July 2011. <http://www.ibm.com/podcasts/howitworks/021307/index.shtml>.