The CCRG operates a state-of-the-art Supercomputer Laboratory, also known as "Black Hole Lab". The lab currently hosts two main clusters dedicated to perform project-specific research tasks:

The NewHorizons and BlueSky Linux Clusters

NewHorizons is a Linux-based specialized cluster dedicated to federally funded research in numerical relativity and computational relativistic astrophysics. Currently, it is a 736-core computational cluster with 64-bit AMD (2.6GHz and 3.0GHz) and Intel (3.47 GHz) CPUs, 2.9 TB of RAM, interconnected with a high-speed, low-latency QDR InfiniBand fabric, and 200TB storage pool. It was initially purchased in 2007 and upgraded until recently through several NSF awards: (1) "MRI: Acquisition of an Advanced Computer Cluster for Computational Relativity and Gravitation" [1] (PI: Campanelli); (2) "SCREMS: Next Generation Parallel Computing Infrastructure for Numerical Relativity" [2] (PI: Zlochower); (3) "CDI-Type II: Collaborative Research: Computing Supermassive Black Hole Mergers in Astrophysics" [3] (PI: Campanelli). It was also supported through RIT's start-up (PI: Campanelli) and other cost-share funds.

A new NSF MRI award ([4]) provides funds for the acquisition of a 600-core, high-speed, large-memory computer cluster, "BlueSky," dedicated to supporting interdisciplinary research at the frontiers of gravitational physics, relativistic astrophysics, advanced high performance computation, and scientific visualization. The cluster will be augmented with experimental GPU enabled nodes.

The gravitySimulator and GRAPE clusters

The "gravitySimulator" ([5]) is a special-purpose 32-node supercomputer that achieves speeds of 4 Tflops in solving the gravitational N-body problem. gravitySimulator was purchased in 2004 through an NSF MRI award ([6]). Three stand-alone GRAPE-6 computers are also been added in 2009 to complement the computing power of the gravitySimulator. More information about this cluster can be found [8].

Other Computer Resources

Some of our largest simulations are done at the TeraGrid/XSEDE and the Open Science Grid sites. The Numerical Relativity group is collaborating with the petascale Blue Waters Project ([11]), through an NSF PRAC award ([12]). Blue Waters is expected to be the most powerful supercomputer in the world for open scientific research when it comes online in 2011.

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Links: