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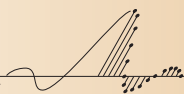
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## BRIEF

# THE GOOGLING OF ASTRONOMY

By Pam Frost Gorder

The largest astronomical search engine ever created just spawned its first hit. Though still under development, the National Virtual Observatory (NVO) promises to unite all the world's astronomy data under one searchable Web interface. A recent test run uncovered a dim star known as a brown dwarf, which had gone unnoticed among 175 million celestial objects in two mammoth databases—the Sloan Digital Sky Survey at Johns Hopkins University, and the Two Micron All Sky Survey at the California Institute of Technology.

The early finding hints at what the NVO could accomplish once it goes online, which could be as early as 2006, says Davy Kirkpatrick of Caltech's Infrared Processing and Analysis Center (IPAC). Because brown dwarfs are small orbs that resemble Jupiter-like gas planets, the NVO could contribute to the search for extrasolar planets.

Bruce Berriman, also of IPAC, led the team whose search methods yielded the brown dwarf. Their investigation of one small area of the sky, which would have taken hours of painstaking work before, was done in minutes. "Once we had the engine up and running, we increased the sample size [of stars] by 50 percent without apparently trying," Berriman recalls.

He says the NVO isn't a search engine so much as a matching engine, because it takes a single object and unites all the relevant data that was previously scattered in multiple databases. Astronomers will be able to get a more complete view of a star's properties from their desktops instead of a telescope.

Bob Hanisch, NVO project manager and astronomer at the Space Telescope Science Institute in Baltimore, hopes that mining the NVO for discoveries will be as easy as querying Google, the Internet search engine.

Much of the processing will be done at individual databases on a computational Grid, so the researchers have worked to develop support applications that will break apart users' initial queries and then assemble all the results into a single package. The main hurdles have been social and political, rather than technical, because 17 institutions worldwide are participating in the project. "Just keeping in touch with people is a challenge, not to mention getting everyone to agree on standards," Hanisch says.

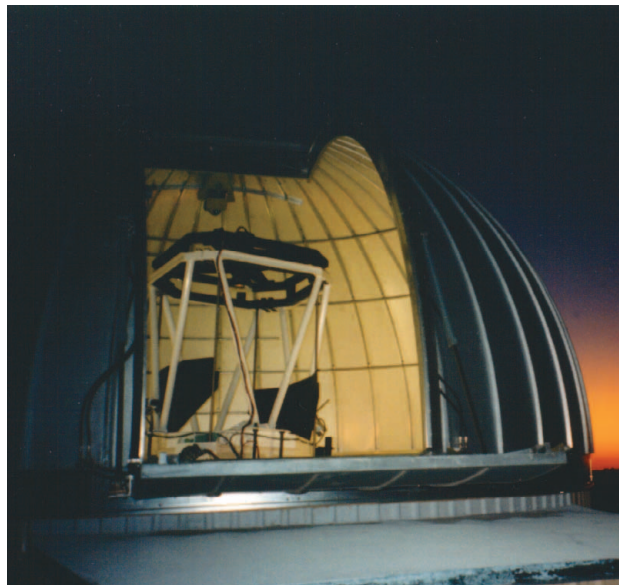
At Johns Hopkins, NVO co-principal investigator Alex Szalay and senior scientist Ani Thakar are among astronomers building those standards into the NVO framework. Because the Sloan survey is the largest of all the databases—2 to 3 Tbytes of catalog data and 40 Tbytes of raw data—they're responsible for constructing core Web services such as SkyQuery ([www.skyquery.net](http://www.skyquery.net)), which enables the use of several different protocols for database querying.

“We believe that the era of multiterabyte digital archives—multipetabyte by the end of the decade—will usher in a new paradigm for scientific research,” Thakar says. This data-intensive science will require efficient access to vast and distributed data facilities, so he and his colleagues are building the next generation of scientific databases in which the data is parallelized for Grid computing from the very beginning.

Other disciplines might soon create their own version of the NVO. “The only thing about the project that’s unique to astronomy is the metadata—the collection of terms and their relationships that we use to describe our data,” Hanisch says. “There are similar efforts already underway in physics, solar astronomy, space physics, atmospheric physics, and oceanography, and we are sharing experiences and infrastructure where we can.”

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Pam Frost Gorder is a freelance science writer living in Columbus, Ohio.



The northern Two Micron All Sky survey telescope at Mt. Hopkins, Arizona, at sunset. (Photo courtesy of the Infrared Processing and Analysis Center.)

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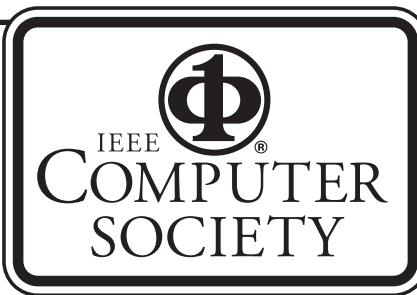
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