NASA/IPAC EXTRAGALACTIC DATABASE

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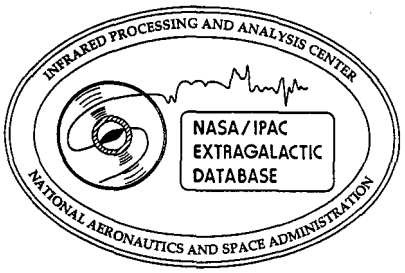

ABSTRACT

A brief historical introduction of the NASA/IPAC Extragalactic Database is given, followed by an overview of the operational status as of May 1992.

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1. THE PAST

Extragalactic research is one of the fastest-growing sub-disciplines within astronomy and astrophysics. In response to that growth, and in direct aid of that research, the *NASA/IPAC Extragalactic Database* (NED) was created by Helou and Madore. From conception to funding the NED Team moved swiftly to establish the first version of the extragalactic database which was verified and loaded within the first year of full operations; it consisted of 54,000 objects culled mostly from major published galaxy catalogs. Within 18 months end-to-end software prototypes had been written, fully integrated and tested. The system consisted of a database management system (DBMS) seamlessly connected to a user-friendly interface which incorporated a very high-level, customized, extragalactic name interepreter. "Experimental Operations" of NED, available to the astronomical community over the electronic (SPAN and Internet) networks, were inaugurated with the summer 1990 meeting of the American Astronomical Society in Albuquerque, New Mexico, and within six months of that date NED was averaging 600 user-logins per month.

2. THE PRESENT

As NED becomes an everyday tool for astronomers it is changing the way that extragalactic research is being done around the United States and around the world. As news of this service moves throughout the community the interactive sessions continue to grow. And they have been growing at an accelerated pace, with the doubling time for the number of sessions currently being about six months (see Figure 1 for a plot of recent statistics). In the first quarter of 1992 NED serviced over 6,000 interactive user sessions. And this statistic does not include batch requests, a feature added in mid-1991 to ease the interactive load on the system and on the users. This service allows large jobs to be submitted remotely, processed automatically and deposited into an anonymous ftp account for retrieval by the user at their convenience after automatic notification by the NED system.

While the vast majority of NED users are from the USA (with the *Space Telescope Science Institute* being our most frequent regular patron), almost all major astronomical centers are in regular contact with the database. Almost daily usage is seen from the Netherlands, Italy, Canada and Australia, with requests often originating from such far-flung places as Japan, Korea, Finland, Sweden, Israel, South Africa, Chile, Brazil and indirectly from our colleagues in Russia.

Between May 1991 and February 1992 a major expenditure of NED manpower was dedicated to migrating the database from the IM/DM system running on a CYBER to a SYBASE system on a UNIX platform. During 1992 a commercial user interface will be tested for the next major release of NED which will be capable of supporting multiple windows, data-table scrolling, line graphics, and eventually digital images.

NED is a continuously evolving, real-time research archive built around known extragalactic objects. Recent inclusions to our list of searchable objects cover all wavelengths, and (in addition to the major optical galaxy catalogs) they include the *Greenbank 5GHz Catalogs*, the *IRAS Faint Source Catalog*, the *Abell Clusters*, the *Einstein Extended Medium Sensitivity Survey*, *Case Galaxies*, *QSO Absorption-Line Systems*, *KISO Ultraviolet Excess Galaxies*, and Zwicky's *Catalogue of Compact and Post-Eruptive Galaxies*. NED supports searches by names and aliases, and by location, with total sky coverage. Filters on object types are being implemented as a new service. As of 1992, NED contained over 400,000 names for 200,000 objects. To this we can add nearly a quarter million citations linked to 15,000 bibliographic references. NED also provides on-line access to nearly 5,000 abstracts of articles (from the AJ, ApJ, A&Ap, MNRAS and PASP) pertaining to extragalactic astronomy; and this number of abstracts is increasing by about 1,200 per year. Both *Nature* and the *IAU Circulars* have been recently added to the list of periodicals being scanned by NED on a regular basis. Finally, the titles and abstracts of recently published theses pertaining to extragalactic research are being provided as yet another NED service.

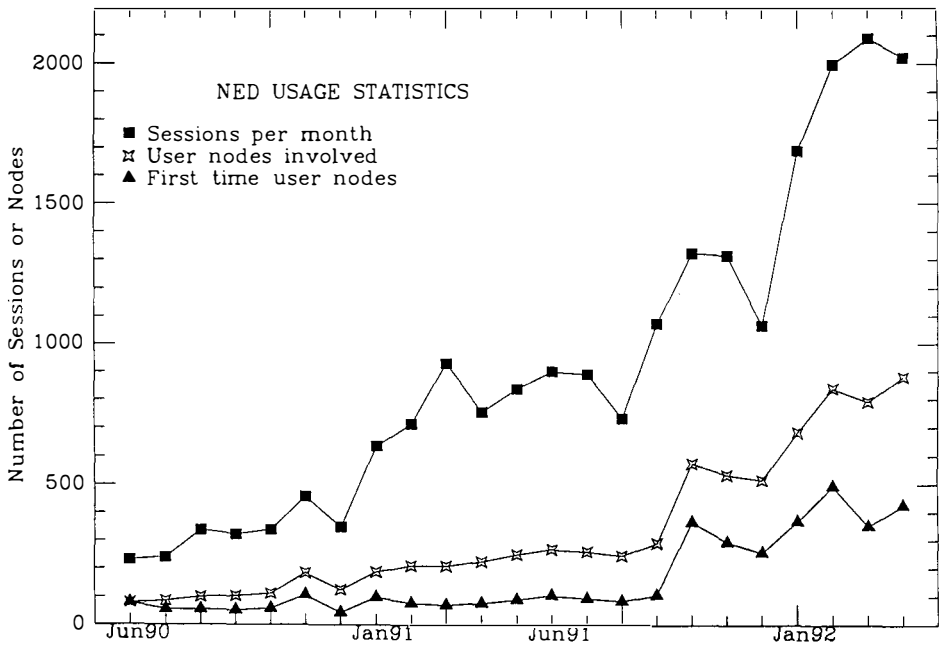

Figure 1. – Growth of NED usage as measured by interactive sessions registered each month since its opening to the public in June of 1990.

3. THE FUTURE

Of vital concern to NED and its ever-widening user community is the need to maintain existing functions while at the same time increasing the breadth of the NED services. We are currently moving on two major fronts to broaden the NED services: introducing detailed, referenced data, and sample-generating capabilities using filters on object attributes. The first data with detailed pointers back to the original literature will be positions and redshifts as measured at any wavelength (at present NED displays only one (referenced) optical position and one high-quality (unreferenced) redshift). Next, we will be making available total continuum flux densities (radio, x-ray, optical magnitudes and colors, etc) and total line fluxes (HI, CO, Hα, etc.). Morphology and classification frames are also well into the prototyping stages. Finally, we are scoping the implementation of data pointers to other types of observed data, (such as rotation curves, HI diameters, etc) as well as derived quantities (such as virial mass, cluster membership, distances, etc.)

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ADDENDUM: HOW TO ACCESS AND USE NED

Access to NED is provided over INTERNET or SPAN. A VT100 terminal or VT100 emulation software is needed at the user's home terminal. On INTERNET, a connection to NED may be set up with the command `telnet ned.ipac.caltech.edu` (absolute address as of this writing is `134.4.10.118`). From a node on SPAN, use the command `set host IPAC` (absolute address is 5.857). Once connected and prompted for a "login", respond with `NED`; no password is needed. From this point on the system is self-documenting, especially through use of the `HELP` utilities and the "control-H" key. First-time users may want to read the `TUTORIAL` offered in the first screen. Regular users are encouraged to read the NED `NEWS` occasionally as it is changed regularly, reflecting additions to the NED database and its complement of tools and features.