

## **Advanced Technologies for Accessing and Disseminating Nuclear Data**

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Scientific Digital Visions is developing software technologies that support the U.S. and International nuclear data programs. Much of our effort has been supported by the Small Business Innovation Research (SBIR) Program at the U.S. Department of Energy, a program that provides early funding for the development of strategic technologies. This program has allowed us to develop new Internet technologies, database technologies and scientific data management tools. Collaborations have been established with the National Nuclear Data Center (NNDC) and San Jose State University to facilitate the development of these technologies, tailoring them to the needs of the nuclear data community. The collaboration with the NNDC has produced new methods of accessing information in the Nuclear Science References (NSR), Evaluated Nuclear Structured Data File (ENSDF), and NuDat databases. Our collaboration with San Jose State University has focused on testing and evaluating software that interacts with the NNDC databases through software applications such as MacNuclide. Our goal is to further improve the access and dissemination of large-scale nuclear databases over the Internet.

Development of nuclear data software for desktop computers has created considerable problems for the nuclear data community. While the desktop computer allows us to exploit new developments in user interactivity and graphics, it has forced us to create secondary databases that are derived from the primary NNDC databases. Infrequent updating of these secondary databases has traditionally diminished the utility of existing nuclear data software.

We are developing technologies that improve the methods of accessing the NNDC databases from desktop computers. A key component of this technology is known as a registry system. This software is located on the NNDC server and tracks the addition, deletion, and modification of nuclear data in the relevant databases. Remote applications, known as user profilers, communicate with the registry system which responds by sending a list of records that have changed. The user profiler then requests specific records to be transferred to the desktop computer. The volume of information stored in the databases is substantial. Also, users may only be interested in a subset of the data. Filters are used to limit the information transferred from the NNDC. These filters, which are known as profiles, can be created in two ways. One method for defining a profile is to interact with a nuclear data application such as MacNuclide. The application can define which nuclides and information are of interest to the user based on how the user interacts with the application. In another method, the user can specify which databases and key information to track. The profiler then downloads only that information which is of interest to the user. More importantly, nuclear data applications can use this technology to automatically update the local databases. We have implemented this technology for the ENSDF, NSR, and NuDat databases.

Two web-based services which use the registry system are being established. The first uses a Java database technology and an interactive scientific graphics technology developed separately under the SBIR program, and a nuclide chart graphics developed by SJSU to visually represent changes to the NSR database. Nuclides in the nuclide chart are colored on the basis of the number of new references. Bar graphs display the number of references as a function of A, Z, and N. Clicking on a bar will retrieve references from the NNDC, generate a formatted list of references represented by that bar, and display the references in a window. It is a new way to view information in the NSR database. A demonstration of the service is available at <http://trinity.digitalcreativity.com/NSRstats>. In order to facilitate the demonstration, we have used a copy of the registry system database that we have installed on the NNDC server. The demonstration thus currently provides a snapshot of NSR. We will relax this constraint when the technology has been fully tested. A second NSR service is in the process of being established. Users will be able to define a set of nuclides, individually or by mass chain, and monitor the NSR database for new references. Software has been written to establish the user profiles and to monitor changes. We are currently in the process of creating a web page to formally establish the service. It will be posted at the site <http://trinity.digitalcreativity.com/NSRprofiler>.

We have recently begun development on technologies in several key areas of nuclear data: scientific graphics and electronic publishing, the accurate and consistent management of scientific data, and Java database systems. Research in these areas is sponsored by the Department of Energy through the SBIR program. Additionally, SBIR proposals have been submitted to the DOE to develop technologies for evaluation tools, handling of gamma-ray spectral libraries, and database clusters. Although it is too early at this time to disclose details of these projects, we envision their eventual use at the NNDC and in nuclear data applications within the nuclear data community.

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