MacNuclide Nuclear Data Project

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This report describes significant advances that have been made in the MacNuclide project during the last two years. Version 1.0 of the software is available for the MacOS and Windows'95 operating systems while the recently released Version 2.0 is available only on the MacOS. Approximately 2,000 copies of the software are now in use throughout the world, received as a free download through the web site at http://www.macnuclide.com. An upcoming release of the software will run on most of the operating systems and platforms in use.

Version 2.0 of MacNuclide was released during late spring of 1998. Our goals in developing version 2.0 were to provide a comprehensive overhaul of the underlying software architecture, converting the code from C to C++, provide modest improvements in functionality, implement changes to the graphical user interface, but primarily to prepare the code for a larger conversion into Java. We have released this version to provide an early test of design changes and network access technologies. The defined nuclide attributes were expanded considerably. We have included methods to select groups of nuclides on the basis of chemical classifications (e.g., lanthanides), their membership in naturally-occurring decay chains (e.g., uranium decay series), nuclides of astrophysical importance, nuclides with magic numbers of neutrons or protons, and nuclides that lie along the valley of stability or which are neutron rich or neutron deficient. Skeleton level schemes were modified to include improved management of displayed properties. The latter accomplishments are primarily due to technologies developed by Scientific Digital Visions and made available to the project.

We are pleased to announce that MacNuclide is now a platform-independent application. A new version of MacNuclide has been written in Java and should run on any computer that supports Java. Nearly all of the functionality has been implemented at the time this report was prepared. Chart displays and interactivity are in place along with skeleton level scheme displays and other elements of the graphical user interface. The software is currently driven by a hard-wired database containing a list of known elements. This has facilitated development of the internal data architecture and data searching methods. The software has been successfully tested on the MacOS, Windows, Linux and Solaris operating systems, covering most of the desktop computer market. We have released a beta-test version of Java MacNuclide on the site http://www.macnuclide.com. While the version is fairly robust, there are a few minor platform compatibility issues and known entomological features that need to be addressed.

Code reuse is one particularly interesting advantage of Java. We are exploring this feature in two ways. Initial efforts, through a collaboration with the Isotopes Project, studied the possibility of accessing Isotope Explorer from MacNuclide. The level scheme graphics software was supplied to us as an applet. We have successfully initialized and demonstrated the approach is feasible. In a second study, we slightly modified the nuclide chart software in such a way that it was a stand-alone applet that could be initialized from

another application or that could be placed on a web page. The applet was tested on a Nuclear Science References (NSR) statistics page created by Scientific Digital Visions, and available at http://trinity.digitalcreativity.com/NSRstats. The purpose of the page is to provide a visual representation of references recently added to the NSR database. Interactive bar graphs show the number of recent references as a function of A, Z, and N, and the nuclide chart applet shows the number of references as a function of nuclide. Interacting with the bar graph will display a list of references for that nucleon range. We intend to add some of the interactivity features of MacNuclide to the applet in later versions. When completed, the nuclide chart applet will provide an intuitive interface to web-based nuclear databases.

Extended capabilities are under development through a partnership with Scientific Digital Visions and the National Nuclear Data Center (NNDC). Nuclear properties are processed using a proprietary technology under development by Scientific Digital Visions. The technologies allow a comprehensive definition of the data, including units and uncertainties. This company has also partnered with the NNDC to develop new Internet technology to access information in the various NNDC databases. Its initial use in MacNuclide will be to access specific information about a nuclide in the ENSDF, NSR or NuDat databases. Later improvements will include automatic updating of the local database(s). Other technologies to be implemented through these partnerships include advanced management of databases and scientific graphics.

The authors wish to acknowledge the efforts of the National Nuclear Data Center and Scientific Digital Visions, Inc., and the funding provided by the U.S. Department of Energy under grant DE-FG03-91-ER40630.

A free copy of the latest released version of MacNuclide can be obtained through the web site www.macnuclide.com. Further information or requests for preliminary releases can be made by contacting the authors by electronic mail at cstone@macnuclide.com.