

# **Study of Retrieval, Utilize and Circulation System for Nuclear Data in Computerized Media**

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We have shown and have developed a new type of nuclear data retrieval system, in which a nuclear reaction data compilation is applied as an example. To get benefits from recent computer and network technologies, we adopt the IntelligentPad architecture as a framework of the present system. We set the future aim of our database system toward the “effective” use of nuclear reaction data: I. “Re-produce, Re-edit, Re-use”, II. “Circulation, Evolution”, III. “Knowledge discovery”. We discuss the appropriate concepts, which fit for the above purpose.

## **1. Introduction**

Recently, we have shown and have developed a new type of nuclear data retrieval system, in which a nuclear reaction data compilation is applied as an example. To get benefits from recent computer and network technologies, we adopt the IntelligentPad architecture as a framework of the present system [1]. This software architecture has many useful features for handling multimedia, media-based system construction, and graphical user interface. IntelligentPad is not only a specific software package, but also the fundamental environment architecture to support the effective utilization of computerized resources.

We designed the client-server retrieval system. The server system is constructed on a relational database, and the client system is constructed on an IntelligentPad software package [2]. Our system is called CONTIP, which is an abbreviation of “Creative, Cooperative and Cultural Objects for Nuclear data and Tools” [3]. The current trial system has mainly two features: i) interactive data visualization and comparison and ii) 2D intuitive data navigation (Figure 1.). We will develop CONTIP to realize effective utilization of nuclear reaction data: I. “Re-production, Re-edit, Re-use”, II. “Circulation, Coordination and Evolution”, III. “Knowledge discovery”.

## **2. Major concepts for the development**

For effective utilization of nuclear data, seamless linkages between measured experimental data and its application should be important. Considering these linkages, it is

essential to link accumulation, evaluation and circulation on the same system. Furthermore, there are interdependences among them: evaluation of accumulated data, circulation of evaluated data, and re-accumulation evaluated data. Therefore, we should consider constructing the framework so as to achieve this continuous cycle. In addition, we should consider integrating the different databases which have different compilation policy or evaluation policy. Using the integrated database, we can retrieve and utilize the various resources concerned with nuclear data (Figure 2).

In order to realize the purpose of the above, we consider the three major concepts for the development. i) Medialization: All utilities are constructed with the synthesis of simple pads. A retrieved data is also introduced as a data pad. Data browsing, Visualization, Comparison, etc., are simultaneously available on this system (Figure 3). ii) Access architecture: Once we have all computational resources on the synthetic media, we should consider to give a so-called ‘field’, to navigate and share among users. iii) Unified data description format: For the effective re-use of precious information of nuclear data, from compilation stage to the end-user stage, all nuclear data information should be described by something unified description framework.

Once our knowledge for the nuclear data, which include not only numerical experimental data but also the background information of the experiment, evaluation policies, etc., are described by using computational “media” which can be edited by many users and be shared on the net, it will be a strong basis for our knowledge sharing. It is helpful that users who are responsible for the nuclear data use such basis.

### 3. Current development

With the above background and motivation, current development is underway. In this section, some examples of our development are shown which fit for the above purpose of nuclear data information.

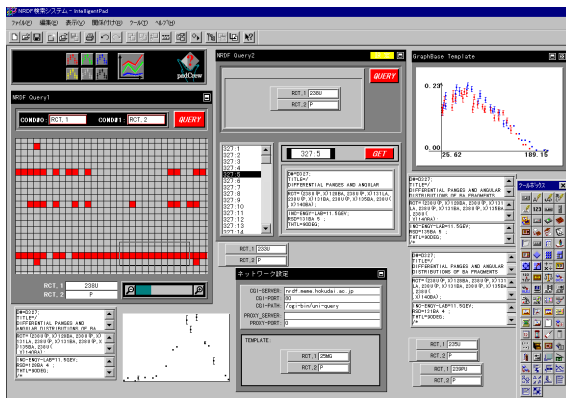


Fig.1. A Snapshot of utilities.



Fig.2 Nuclear data market framework

For the extension of the system, e.g., use of the other application on the system, we can do it by introducing the proxy pad, like Figure 4. In this figure, accession to the database is achieved by using database proxy pad.

On the other hand, Gnuplot proxy is introduced in order to use plotting function for the retrieved data. By dragging and dropping to the Gnuplot proxy, numerical data is transferred to the Gnuplot application, and graphic pad displays plotting image which made by the Gnuplot (Figure 5).

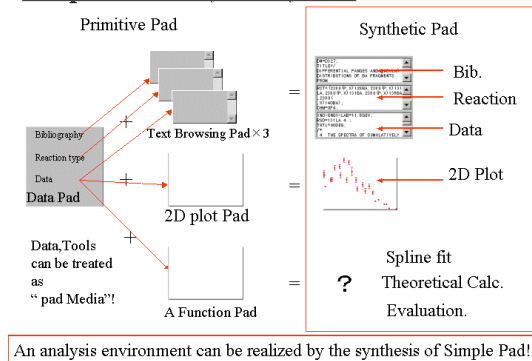
In addition, it is natural that we have necessity which we should discuss or evaluate some nuclear data for an application via the network. Once the description of each data is unified among whole users, e.g., we adopt the basis of pad description for data and tool; each pad can be distributed via the net with holding the ability of editing. By using PIAZZA technology [4], which gives sharing environment of the pads via the net, as shown in Figure 6 and 7, it is possible to give so-called “interactive information sharing field”. In the Figure 6, this snapshot is user A’s desktop of the system. User A distributes new data to sharing space via drag and drop operation. On the other hand, as shown in Figure 7., distributed new data is available for user B via the sharing interface. User B can edit the formerly distributed data. In this case, user B adds new data, and re-distributes them.

#### Database Proxy

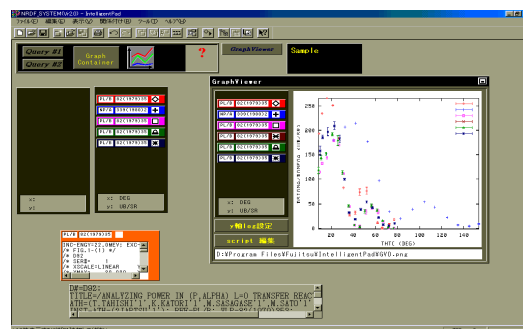


**Fig.4.** Database proxy. Introducing proxy pad, other application can be used.

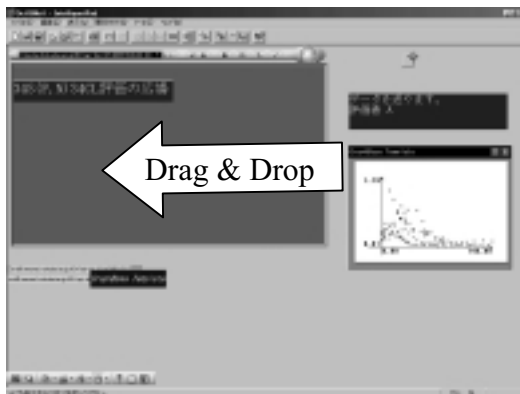
#### Re-production, -use, -edit



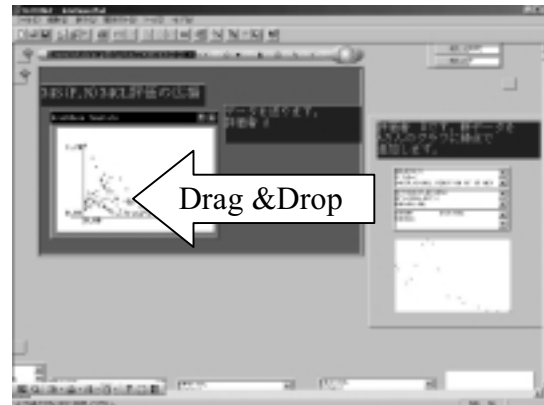
**Fig.3.** Synthetic description of data and tools.



**Fig.5.** Data plotting interface. Proxy for Gnuplot is introduced.



**Fig. 6.** Example of the information sharing. User A distributes new data to sharing space via drag and drop operation.



**Fig.7.** This snapshot is user B's desktop. User B can edit and re-distribute the formerly distributed data.

#### 4. Summary

We discuss and develop the effective utilities for nuclear data. And actually we consider the important concepts such as i) Medialization of nuclear data and tools, ii) Access architecture and iii) Unified data description format. Current IntelligentPad for Windows trial package is available freely via <http://www.pads.or.jp/>. We are going to release “mile-stone” package for nuclear reaction data retrieval system by using above IntelligentPad, which includes EXFOR data toward the next year.

For the further development, recently, so-called semi-structure description of data likes HTML is familiar to describe for a publication. For example, XML [5] is a recent development of such description format, and by using such format; unified description of nuclear data from author level to end-user level is expected to be available. We will consider the semi-structure description format of nuclear reaction data.

#### References

- [1] Y.Ohbayasi, et al, Jour. of Info. Sci. 26 (1), pp.29-37.
- [2] Y. Tanaka, Information and software technology 38(3)1996 201
- [3] IntelligentPad consortium. <http://www.pads.or.jp/>
- [4] PIAZZA project is developed under the initiative of Meme Media Laboraotry, Hokkaido University.
- [5] XML See <http://www.w3c.org/>