Report on the status of IT environment

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Abstract

A new stand-alone type editor for EXFOR is being developed in Hokkaido University Nuclear Reaction Data Centre (JCPRG). A new EXFOR editor was designed to allow compilers to save the compilation time by using advanced features of the editor. The features included in the latest release are described such as collapsible/expandable items, filterable and dynamic suggestion fields. The implementation of "Import" function is under development. Entry E9808 was taking to test EXFOR output.

1 Introduction

The world-wide network of nuclear reaction data centres (NRDC) [1] was established to collect and provide nuclear data to the scientific community. Nuclear reaction data have widely been used in many fields such as design and operation of nuclear power plants, medical isotopes, radiotherapy, etc. as well as fundamental researches. Currently the 13 data centers included in the NRDC collaborate mainly for collection, dissemination, compilation and exchange of experimental data by using the unified EXFOR (Exchange Format) format. The list and scope of 13 data centres from 10 countries and 2 international organizations are shown in Table 1 [2]. The Hokkaido University Nuclear Reaction Data Centre (JCPRG, former Japan Charged-Particle Nuclear Reaction Data Group) became a member of the NRDC Network [3] in the early 80s. In 1969, EXFOR format was designed for the collection, exchange and dissemination of experimental nuclear data [4, 5]. The EXFOR format was further developed to cover charged-particle induced and photo-nuclear reaction data in addition to neutron-induced reaction data. Although the EXFOR format can be used for both compilation and dissemination, some centres may have their own formats for data services. For example, JCPRG (Japan Charged-Particle Nuclear Reaction Data Group) developed NRDF (Nuclear Reaction Data File) format, which is specialized for compilation and dissemination of charged-particle induced reaction data measured in accelerator-based facilities in Japan. In order

to compile experimental nuclear data in EXFOR and NRDF formats, JCPRG developed web-based editor named as HENDEL (Hyper Editor for Nuclear Data Exchange Libraries) [6]. The HENDEL editor has been used as a standard compilation editor system at JCPRG since 2001 [7]. The main advantages of the HENDEL can be listed as: 1, a web-based user interface; 2, easy in use; 3, output in both formats EXFOR and NRDF.

Table 1. Nuclear Reaction Data Centres (NRDC)

Centre	Scope	Country
NNDC	ND, CPND and PhND measured in USA and Canada	USA
NEA DB	ND and CPND measured in NEA DB countries not covered by other centers	France
NDS	ND, CPND and PhND not covered by other centers	Austria
CJD	ND measured in former USSR	Russia
CNDC	ND and CPND measured in China	China
ATOMKI	CPND measured in collaboration with ATOMKI	Hungary
NDPCI	ND, CPND and PhND measured in India	France
JAEA/NDC	Evaluation	Japan
JCPRG	CPND and PhND measured in Japan	Japan
KNDC	ND, CPND and PhND measured in Korea	Republic of Korea
CDFE	PhND (coordinated with other centers)	Russia
CNPD	CPND (coordinated with other centers)	Russia
UkrNDC	ND, CPND and PhND measured in Ukraine	Ukraine

For beginners of EXFOR compilation, the HENDEL system is very useful because it requires very limited knowledge on EXFOR, and it is now also used by new EXFOR compilers in Kazakhstan and Mongolia. During instruction of EXFOR compilation to other centre within the framework of the Asian nuclear database collaboration, we found that the current web-based editor (HENDEL) must be upgraded to accommodate various types of data which are not compiled at JCPRG but compiled by other Asian compilation teams. Therefore we have started development of a new editor specialized for EXFOR outputs. Motivated by the platform independent features of Java, the JCPRG embarked on a project to develop an advanced EXFOR editor for data compilation. The developing editor, called ForEX (For EXFOR) would address the growing needs of traditional EXFOR compilers as well as advanced functionalities [8]. ForEX was designed by the influence of the HENDEL editor. We adopted Java Swing API for building GUI (Graphical User Interface) application. Advanced features implemented in the program can allow compilers to save their time.

2 Method

One important aspect of the development process is the building fast, light, and user-friendly editor to compile nuclear reaction data with maximum flexibility. To achieve user-friendliness, we implemented the following functions: 1) collapsible/expandable items, 2) add/remove buttons, 3) a filterable suggestion field, 4) text filtering for a table, and 5) a dynamic suggestion field.

In addition to the new functions, some external tools such as DANLO and CHEX can be executed in ForEX. DANLO is a tool to extract a dictionary of codes in EXFOR and is utilized for ForEX. CHEX is a checking program for the EXFOR format.

Java, as a programming language is platform independent. “Write once, run anywhere” (WORA), is a slogan created by Sun Microsystems to illustrate the cross-platform benefits of the Java lan-

guage. However, testing on each OS may be necessary to assure correct functionality of the program. At present, the test was only performed in Microsoft Windows and Linux, and will be performed in Mac OS in near future.

3 Result & Discussion

The main window of ForEX editor is divided into four sections (Fig. 1). The menu bar at the top is used to perform common operations, which includes the 'File' and 'Edit' menus. Under the menu bar, three very frequently used controls are provided: 'DANLO' for extraction of the new dictionaries from the backup dictionary file, 'CHEX' for checking of EXFOR entries c reated by compiler. The main task of the 'EXFOR' button is to get EXFOR output format. The left panel is used to display the content menu, which consists input forms for bibliography and information commonly applied to all data sets of the EXFOR entry (Subentry 1). The right section of the window is used to input experimental nuclear data. Initially the ForEX editor adopted the design

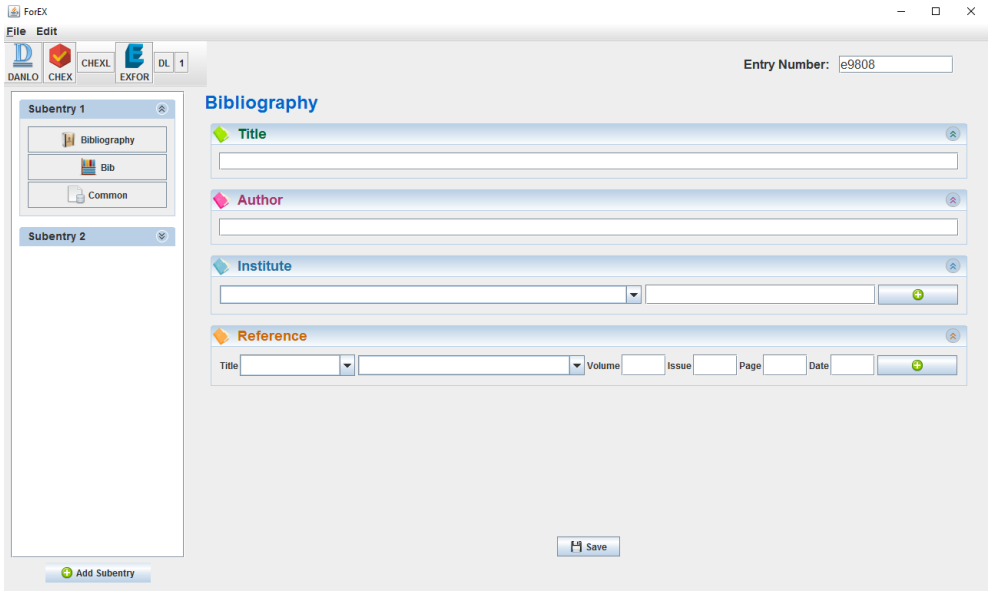


Fig. 1: Main window of the ForEX graphical interface.

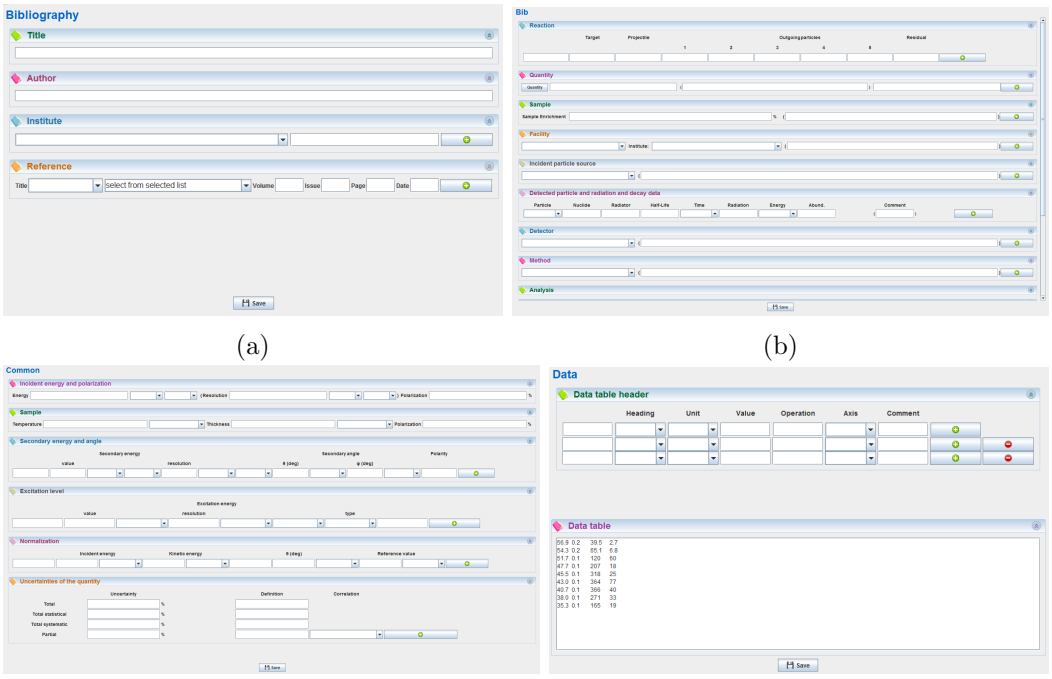
of input forms of HENDEL, but then it was modified so that they become more close to the EXFOR structure. Fig. 1 illustrates the layout of the Bibliography, Bib, Common and Data panels.

ForEX is connected with external tools, DANLO and CHEX. When the DANLO button is clicked, the FileChooser dialog box is shown. This allows extraction of a backup dictionary file (DAN_BACK_NEW.XXXX) in working directory as shown in Fig. 3.

The following functions were implemented to improve efficiency, functionality and usability.

1) Collapsible/expandable item

ForEX editor intended to make the compilation "user friendly" by simplifying tasks and decisions, and by creating a visual representation of a user interface to which compiler can more easily relate. For instance, the reaction information consists of information of projectile, target, emitted particles and so on. During input of the other data, the reaction information is unnecessary to see. Therefore, the collapsible/expandable function for each item is imple-



(a) (b)

(c) (d)

Fig. 2: a) Bibliography, b) Bib, c) Common and d) Data panels.

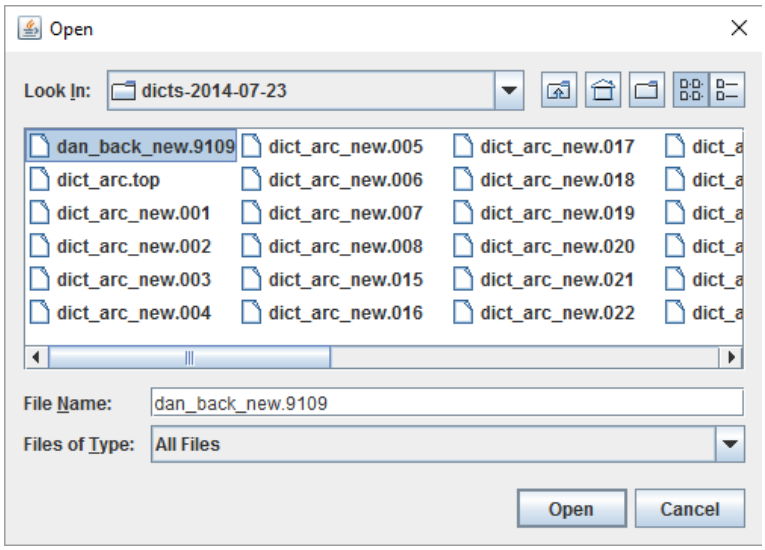


Fig. 3: FileChooser dialog box.

mented. This function makes the screen space more efficient and better visualized as shown in Fig. 4.

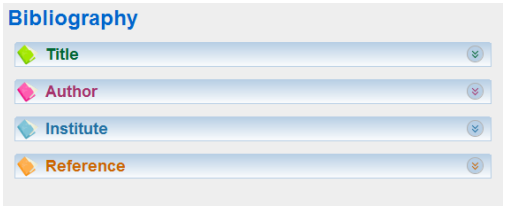


Fig. 4: Example of collapsible/expandable items for Bibliography section. The buttons at right sides of items enable us to collapse and expand data input/select areas.

2) Add/remove buttons

Add/remove buttons were adopted to Bibliography, Bib, Common and Data sections. The item panels can be added/removed interactively by buttons as shown in Fig. 5. If the "+" button is clicked, additional line is prepared for another data input. On the other hand, the "-" button can be clicked when the line is unnecessary for data input.

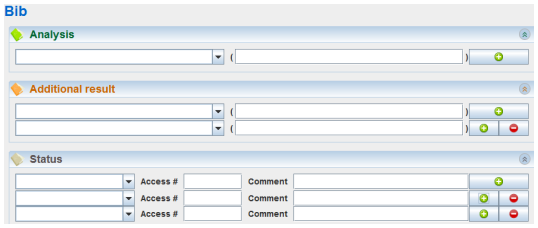


Fig. 5: Buttons to add/remove input areas. In the right sides, there are "+" and "-" buttons to add and remove lines for the input data.

3) Filterable suggestion field

Since there are several codes for some keywords, compilers often find it very difficult to select the correct code. Therefore, it is better to have a function of automatic completion for compilers. It is implemented by filterable suggestion fields to allow compilers to save time and avoid mistakes. The compiler can type into the suggestion field and input will be automatically completed to the next matching item in the suggestion field. Let us assume that the currently selected item is "CERE Cerenkov detector" but the compiler is looking for "chamber", after typing away, suggestion field shows the list of related candidates. The example of suggestion field is illustrated in Fig.6.

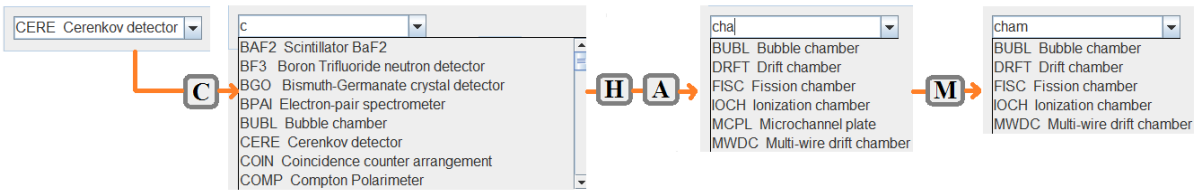


Fig. 6: The example of suggestion field implemented for Detector field. The codes were suggested interactively by the part of the input keyword.

4) Text filtering for a table

Similar to the concept of filterable suggestion fields, codes can be suggested by a keyword input. In particular, there are several codes related to reactions which is similar; therefore, with text filtering, an appropriate list of reaction codes can be obtained easily as shown in Fig. 7. It shows that, when the kryword PAR is typed, the similar and related keywords are listed.

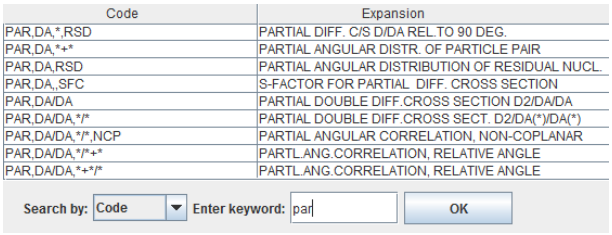


Fig. 7: Filterable reaction code.

5) Dynamic suggestion field

The purpose of a dynamic suggestion fields is to make data input easier and more reliable. For example, the compiler chooses an input from one list, which restricts the related contents of another list. The dynamic suggestion field presents two suggestion fields working in conjunction with one another, prompting end users with only relevant data. For example, in the Reference part, there are several classification of codes, such as "Journal", "Conference", "Book", "Experimental data library" and "Progress Report". The example of dynamic suggestion field is shown in Fig. 8.

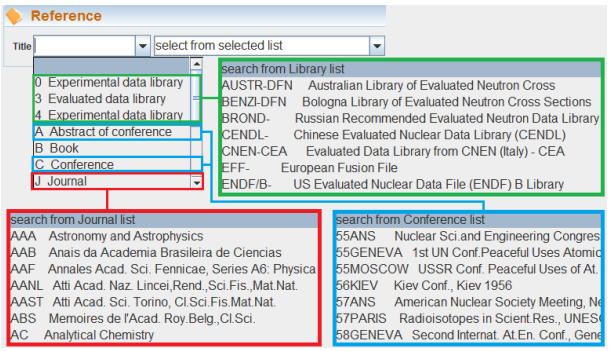


Fig. 8: The example of dynamic suggestion fields.

6) EXFOR output

The EXFOR format is designed for the exchange of data within the NRDC. EXFOR Exchange files consist of 80 character ASCII records [9]. The columns 1-11 consist of information-identifier keyword field, columns 12-66 consist of information field, which may contain coded information or free text. Columns 67-79 used to identify a record within the entry file. The BIB section contains the bibliographic information (e.g., title, authors, reference), detailed information (e.g., reaction, decay-data, facility, detector, method) associated with the data presented. It is identified on an exchange file as that information between the system identifiers BIB and ENDBIB. The format of the Common Data (COMMON) and Data (DATA)

sections are equivalent; however, the context is different. Each section is a table of data with its associated data headings and units. The DATA section is identified as that information between the system identifiers DATA and ENDDATA. The common data consists of fields containing constant parameters and there is only one data line in the Common Data section. The COMMON section is identified as that information between the system identifiers COMMON and ENDCOMMON. The entry #E9808 was taken as a test entry to compare the contents of EXFOR file. The identical EXFOR output is shown in Fig. 9. But there are some issues that must be solved. That is related to exchange data between BIB and COMMON sections. Next issue corresponds to the multiplication of column data to the given value.

4 Summary

A new EXFOR editor system, ForEX, is being developed as a standalone application, which provides an environment for compilation of numerical data with its bibliographic and experimental information in the EXFOR format. The initial design was taken from its predecessor (HENDEL editor). The Swing component library was used to implement the GUI. Currently various novel functionalities which improves efficiency of compilation were implemented in the program; 1) Collapsible/expandable item, 2) Add/remove buttons, 3) Filterable suggestion field, 4) Text filtering for a table, and 5) Dynamic suggestion field. Execution of the program was fixed in Windows and Linux operating systems. Testing on the Mac OS is in progress. Output to EXFOR format is being completed. Development of "Import" function is under construction, which allows to load existing EXFOR entries to further edit is under construction.

References

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TRANS             E000   20160320                                  E0000  0    0
ENTRY            E9808   20160320                                  E9808  0    1
SUBENT        E9808001   20160320                                  E9808  1    1
BIB                  9         12                                  E9808  1    2
TITLE       Excitation functions of the 197Au(a,2p)199Au and       E9808  1    3
            197Au(a,2n)199Tl reactions                             E9808  1    4
AUTHOR      (O.Hashimoto, H.Hamagaki, H.Yonehara, Y.Shida)         E9808  1    5
INSTITUTE   (2JPNTOK) Institute for Nuclear Study                  E9808  1    6
REFERENCE   (J,NP/A,413,(3),434,198402)                            E9808  1    7
MONITOR     (79-AU-197(A,X)79-AU-196,,SIG)                         E9808  1    8
FACILITY    (CCW,2JPNTOK) Institute for Nuclear Study              E9808  1    9
            (ISOCY,2JPNOSA) Research Center for Nuclear Physics    E9808  1   10
DETECTOR     Low Energy Photon Spectrometers (LEPS)                E9808  1   11
METHOD      (ACTIV) Stacked with Tl foils                          E9808  1   12
            (GSPEC) Traced over 4 half-life period                 E9808  1   13
HISTORY     (20070825T) On. Converted from NRDF D0808              E9808  1   14
ENDBIB             12         0                                    E9808  1   15
COMMON              2         3                                    E9808  1   16
ERR-T       ERR-1                                                  E9808  1   17
PER-CENT    PER-CENT                                               E9808  1   18
10.          20.                                                   E9808  1   19
ENDCOMMON           3         0                                    E9808  1   20
ENDSUBENT          19         0                                    E9808  199999
SUBENT        E9808002   20160320                                  E9808  2    1
BIB                 2         2                                    E9808  2    2
REACTION    (79-AU-197(A,2P)79-AU-199,,SIG)                        E9808  2    3
DECAY-DATA  (79-AU-199,3.14D,DG,158.4,1.123)                       E9808  2    4
ENDBIB              2         0                                    E9808  2    5
NOCOMMON            0         0                                    E9808  2    6
DATA                3         7                                    E9808  2    7
EN          DATA       DATA-ERR                                    E9808  2    8
MEV         MB         MB                                          E9808  2    9
        42.       0.08       0.02                                  E9808  2   10
        53.       0.19       0.05                                  E9808  2   11
        56.       0.16       0.04                                  E9808  2   12
        62.       0.24       0.06                                  E9808  2   13
        75.       0.24       0.06                                  E9808  2   14
        91.       0.26       0.06                                  E9808  2   15
       106.       0.27       0.06                                  E9808  2   16
ENDDATA             9         0                                    E9808  2   17
ENDSUBENT          16         0                                    E9808  299999
SUBENT        E9808003   20160320                                  E9808  3    1
BIB                 2         2                                    E9808  3    2
REACTION    (79-AU-197(A,2N)81-TL-199,,SIG)                        E9808  3    3
DECAY-DATA  (81-TL-199,7.42HR,DG,247.3)                            E9808  3    4
ENDBIB              2         0                                    E9808  3    5
NOCOMMON            0         0                                    E9808  3    6
DATA                3         5                                    E9808  3    7
EN          DATA       DATA-ERR                                    E9808  3    8
MEV         MB         MB                                          E9808  3    9
        54.      51.0        8.7                                   E9808  3   10
        72.      15.0        3.2                                   E9808  3   11
        88.       8.0        1.7                                   E9808  3   12
       102.       2.9        0.8                                   E9808  3   13
       116.       2.3        0.8                                   E9808  3   14
ENDDATA             7         0                                    E9808  3   15
ENDSUBENT          14         0                                    E9808  399999
ENDENTRY            3         0                                    E980899999999
ENDTRANS            1         0                                    Z999999999999
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Fig. 9: EXFOR output of entry E9808.