WP2000-15

EXFOR retrieval software on PC: development and integration with other products

V. Zerkin, NDS-IAEA

Introduction

The EXFOR database is basically placed on Alpha/VMS. The software includes utilities for checking of input data, updating, retrieval systems (for Telnet and Web), maintenance of dictionaries, etc. The programs are written in FORTRAN using VMS Text Libraries tools.

In order to meet requirements of users who do not have fast access to Internet, EXFOR-CD retrieval system was developed by NDS in 1997. This was based on MS-Windows and runs as a standalone application. Both VMS and Windows based retrieval systems use the same index files that are generated with EXFOR/VMS software. In other words, they are strongly dependent from Alpha/VMS.

At the same time due to many reasons there is strong and urgent need of migration of nuclear databases from VMS to other platforms and/or to build platform independent software. Also important fact is that modern relational database software become more and more powerful, available and popular.

This project was initiated to develop platform independent software for organization of EXFOR as a relational database, to develop EXFOR retrieval system distributed on CD-ROM with advanced features and to develop a tool for using EXFOR data together with other products.

1. Objectives of the new EXFOR retrieval system

The objectives of software development for porting the EXFOR database to the PC and other platforms were to provide:

1. Maximum platform independence of porting EXFOR to a database environment
2. All coded EXFOR information available as criteria of data search
3. User access to information from EXFOR Dictionaries during interactive sessions for data retrieval (as on-line help, codes explanation, etc.)
4. Easy to call graphic presentation of retrieved data.
5. Tool for analysis of the full contents of EXFOR database.
6. Reduction in programming efforts that are needed for production of user copies of the database and further development of the retrieval software.

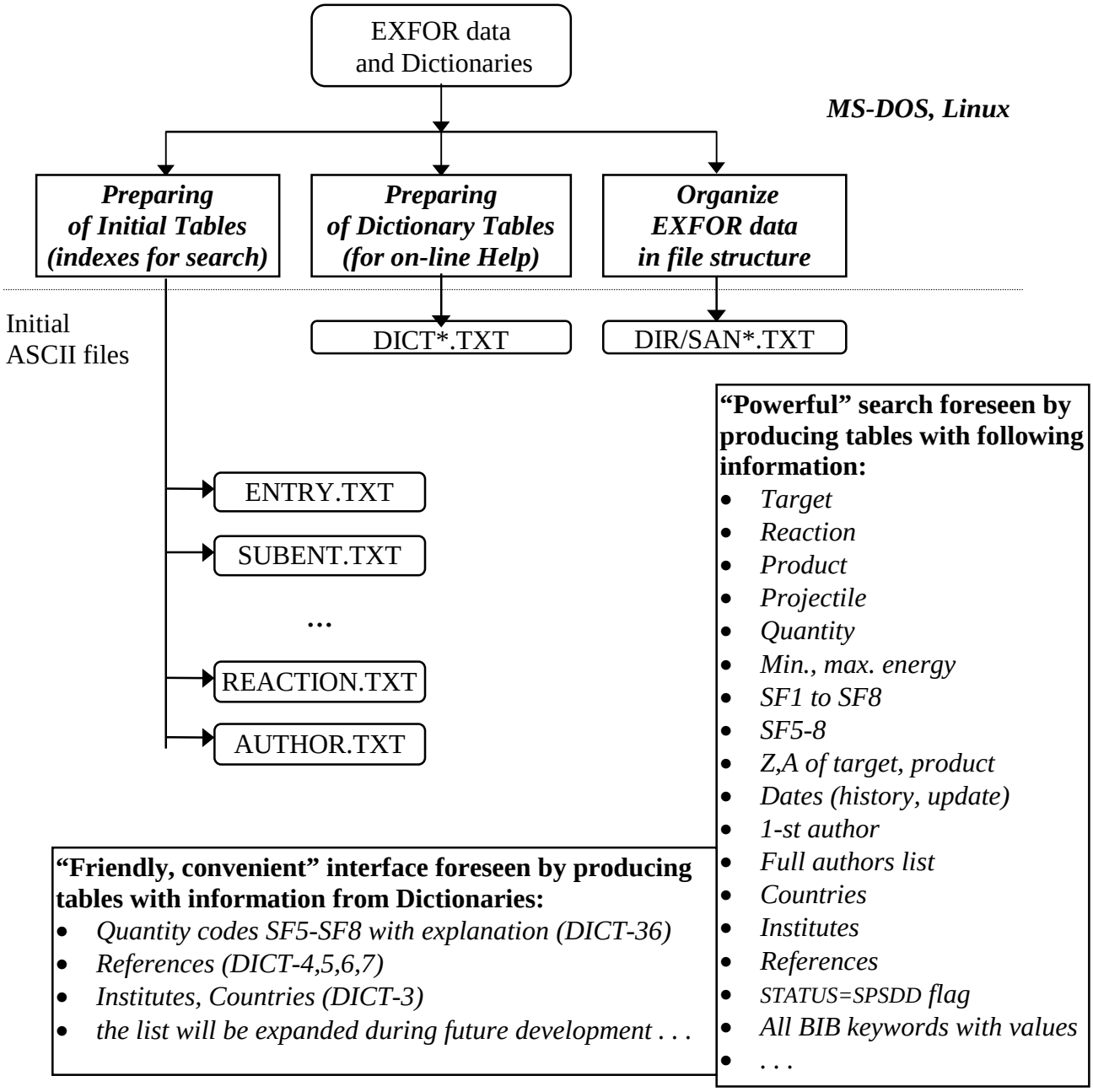
To meet these objectives an EX-II retrieval system (temporary name) was developed in 1999-2000.

2. EX-II development

2.1. EX-II Utilities. Preparation of data and tables

The first part of EX-II is a set of platform independent utilities preparing initial tables and EXFOR data to be managed by a database system. The utilities read EXFOR data and Dictionaries, extract information foreseen as a search criteria and on-line help (see Fig.1) and put it into the set of ASCII files. These files will be imported to a relational database to initiate tables. The utilities also split all EXFOR data to a set of text files (single file for each subentry) and put them into a directory structure using appropriate naming convention for easy search by database software.

Fig.1 EX-II Utilities



2.2. EX-II Retrieval System based on ACCESS-97

Second part of EX-II has to present EXFOR as a relational database using various appropriate database management systems with the data retrieval as the main user oriented function.

First implementation of the EX-II Retrieval System, based on ACCESS-97 relational database management PC program, was developed in 2000 (see Fig.2). It has following advantages:

- **for Users:**
  1) powerful search with many criteria;
  2) advanced criteria (based on SQL-SELECT): variety of criteria, wildcards, various combinations of criteria, on-line help and input of criteria based on Dictionaries;
  3) plotting of cross section data by ZVView (converter of EXFOR-Computational format may be extended with NNDC help);
  4) MS-Access gives non-professional programmers a large variety of tools, allowing them to manipulate information and create their own retrievals without large efforts;

- **for Data Centers Programmers:**
  1) development of the retrieval system requires much less effort in programming;
  2) SQL based search is very flexible, universal and fast (optimized by manufacturers);
  3) simple programming of user interface as Access-Forms;
  4) using of SQL queries in combo-boxes of Access-Forms provides advanced on-line help, simplifies input of search parameters (see Fig.3), reduces number of user's errors;
  5) using of External Viewers (Netscape, Notepad, ZVView) significantly simplify programming of many operations, such as viewing, printing, Internet connection, etc.

The EX-II/ACCESS-97 Retrieval System was distributed to the Network of Nuclear Data Centers for testing and getting feedback in April-2000.

2.3. Resume

Main benefits of EX-II development:
- initialization of database became platform independent;
- EX-II/ACCESS-97 can be considered as a Windows replica of EXFOR developed in short time without large programming efforts;
- EX-II/ACCESS-97 provides new advanced retrieval tool for PC users.

EX-II development plans:
- to continue development of the Access version;
- to investigate the possibility of implementation of EX-II in other environment;
- to integrate the system with evaluated libraries.

Fig.2 EX-II Retrieval System based on ACCESS-97

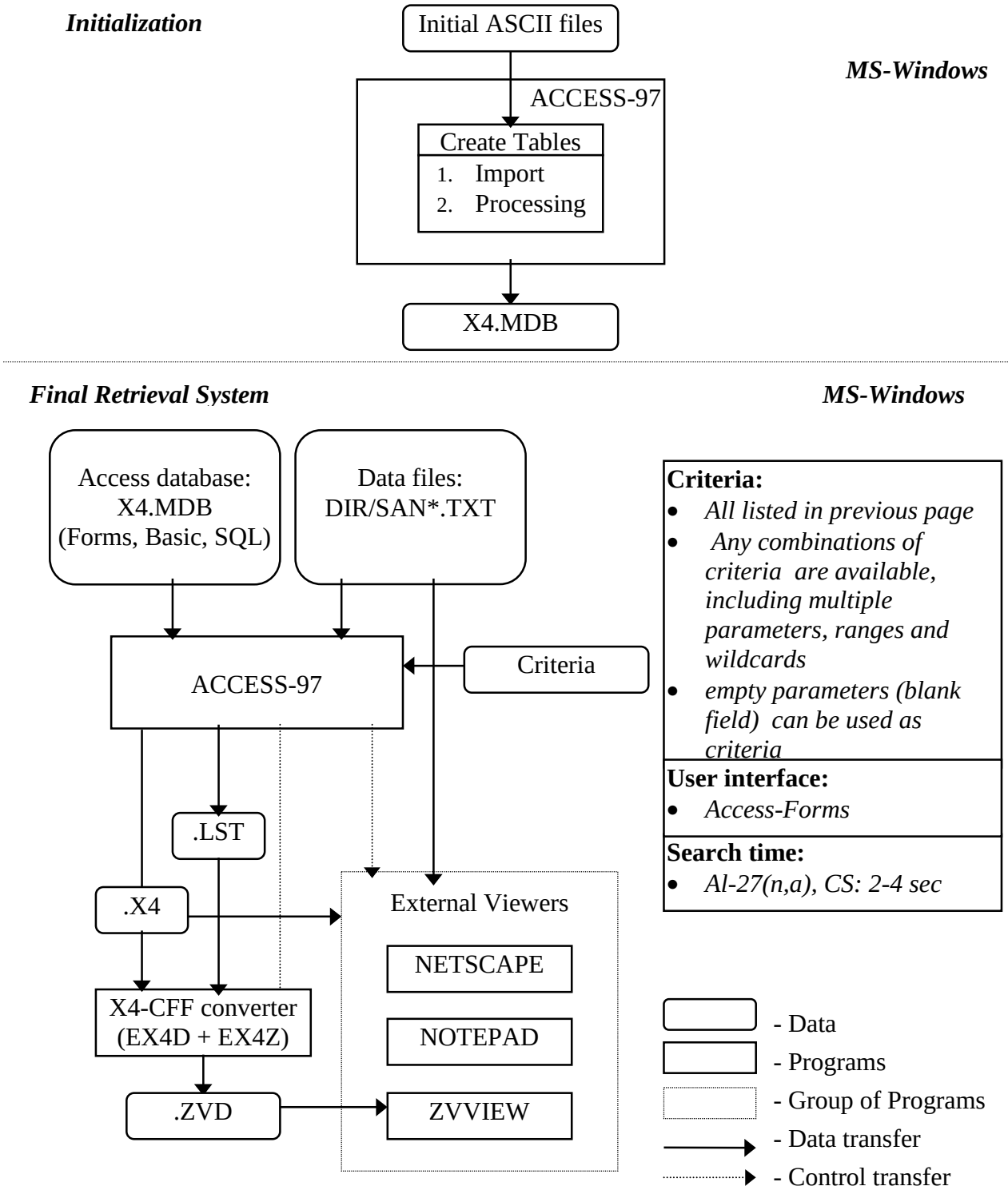
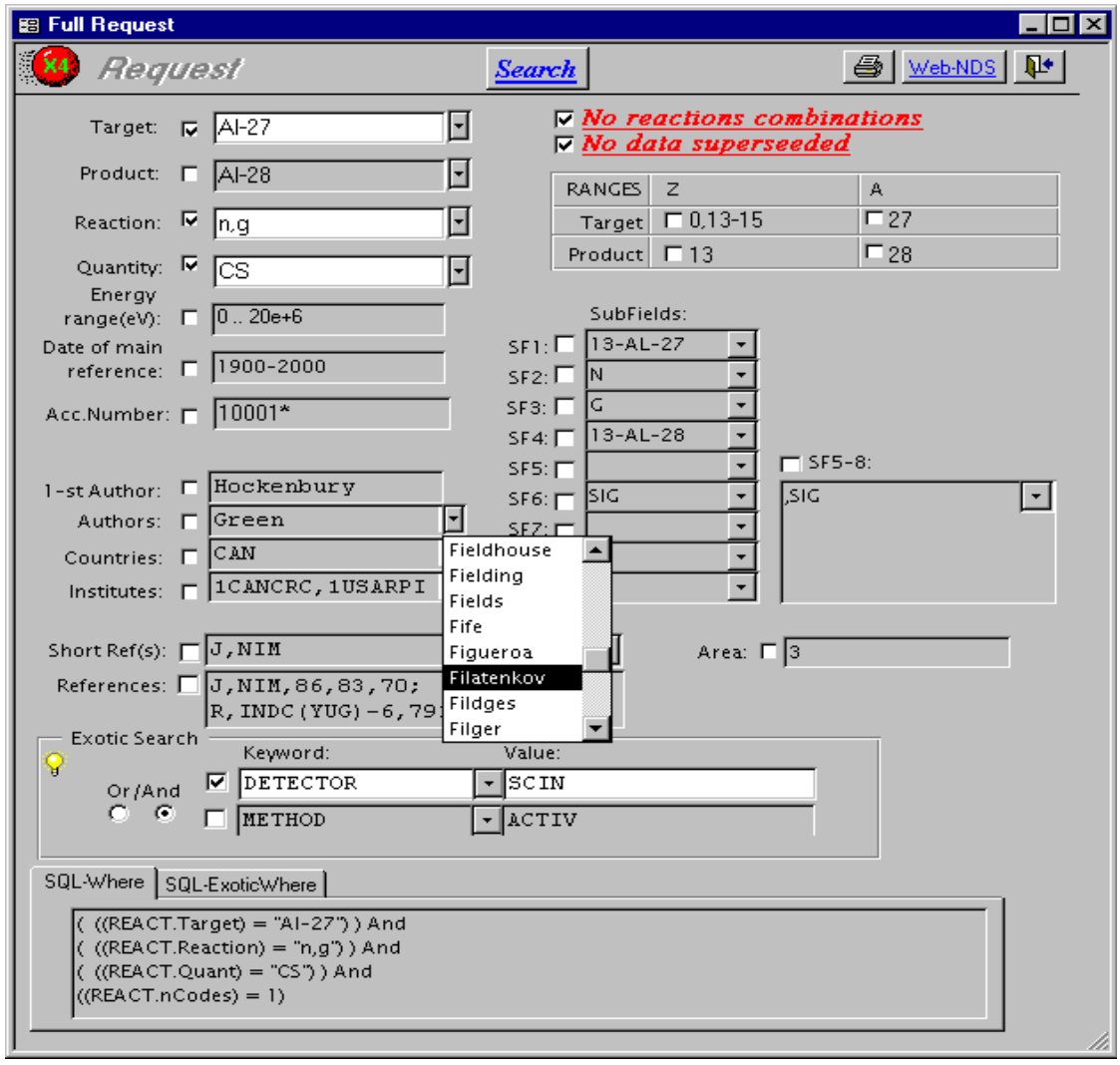
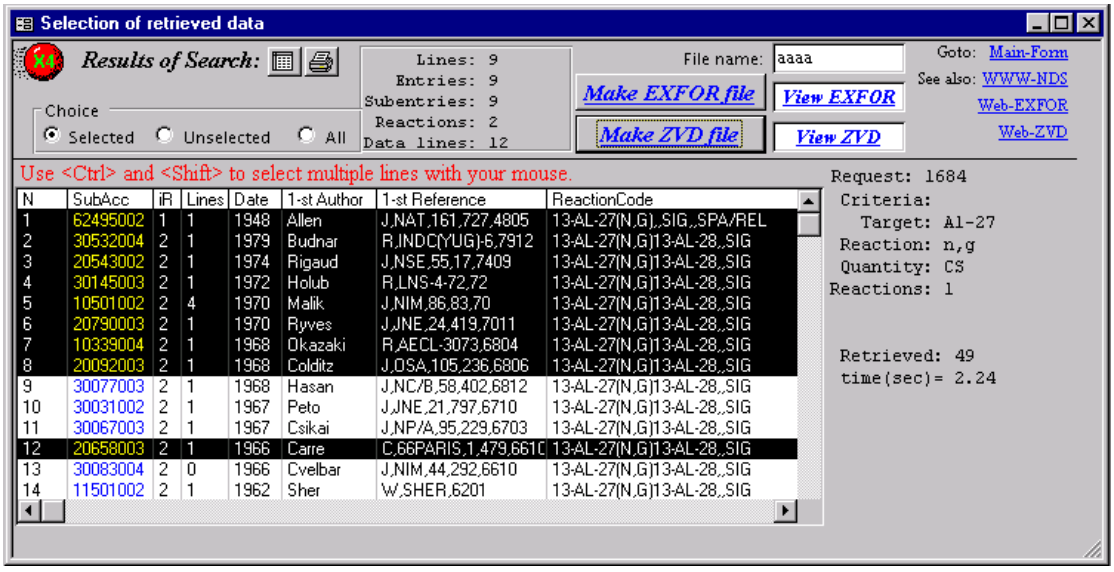


Fig.3 EX-II / ACCESS-97 Forms: Data Request and Choice





3. "FENDL in Pictures"

"FENDL in Pictures" is a pictorial representation of the technical quality of the data contained in the Fusion Evaluated Nuclear Data Library. This product is an example of integration of EXFOR retrieval system based on ACCESS-97 with the ZVVIEW graphics utility for production of an interactive Web Atlas of nuclear data.

FENDL-2.0 Activation file including more than ten thousand reactions is made into Web pages with summary table of materials, reaction codes, values of the χ^2 deviation between evaluations and experiments, and plots of evaluated curves in comparison with experimental data points.

All HTML pages and GIF pictures were generated automatically on a PC. These were then transferred to the NDS Web Server and could be copied to a CD-ROM for distribution. User can call interactive plotting program ZVVIEW with chosen data on local computer and retrieve original experimental data from NDS Web EXFOR Service by clicking the appropriate hyperlinks .

Total number of materials is 667, reactions (plots): 11805, experiments found: 4688.

Fig.4 Example of Web pages from "FENDL in Pictures"