

**EXFOR-Relational as multi-platform database  
with several retrieval interfaces:  
details of technology, current progress and nearest plans**

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EXFOR-Relational project is essentially a further development of the EXFOR/Access project, started in 1999. In 2001 it became part on the Nuclear Reaction Database (NRDB) project, which plans to integrate CINDA, EXFOR, ENDF and their Dictionaries in one relational database system. Work on NRDB project, started in 2000, is being performed by NDS and NNDC in collaboration. Each relational database is being developed independently, but their integration and common use is foreseen in their structure. The structure of the databases and current development are regularly discussed among the collaborators. The NDS has the primary responsibility for implementing the system.

**Mainly used technologies**

Along with the development of EXFOR-Relational, several modern technologies were studied and tested in several systems environment. (Note the positive role of “Workshop on relational database and java technologies for nuclear data”, BNL, 2000). Finally, the main components of the technology and their interconnection were defined. This technology is based on usage of platform independent components with the goal of reaching universality, effectiveness and long life of the new database system. The final product should provide a full set of EXFOR database utilities (including loading, updating, data backup) and retrieval systems, to be used on different types of PC, in local network and through the Web. All software should work on most popular operating systems and several DBMS and be easily portable to other platforms.

Basic components of the technology used in the development of EXFOR-Relational are following:

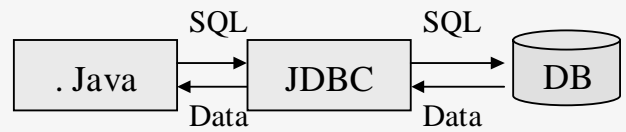
- programming languages:           Java, C
- language to access database:     SQL
- drivers to database access:       JDBC, ODBC
- database management system:    any Relational, supporting SQL
- also used (not key components): Perl, JavaScript, html, XML
- tested to be used in future:      Fortran-C-ODBC-Database

A typical connection of components used to access database in different type of applications is shown in Fig.1. Basic components of the technology were tested in most\* of possible client-server combinations of platforms. Java/JDBC with SQL is mainly used for access to database (see Fig.1a). This is the most universal approach existing on most platforms. An essential thing in the development is that all software is always tested on several DBMS in order to be sure that very generic (no specific) features are used.

*\*Note. EXFOR/Access Retrieval system using Microsoft Access technology with VBA (Basic), DAO and MS-Jet is still distributed on CD-ROMs; it will be replaced by EXFOR/Java on CD (see below).*

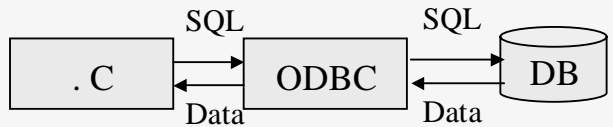
a) **Database utilities, Retrieval systems, other programs**

Used platforms: all

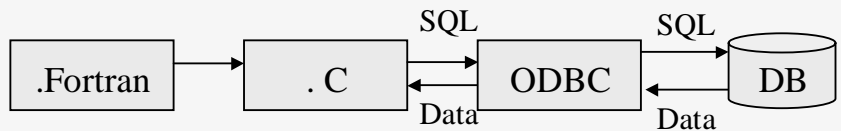


b) **Legacy codes, other programs**

Used platforms: all DB on Windows, MySQL on Linux



Tested platform: MySQL on Linux

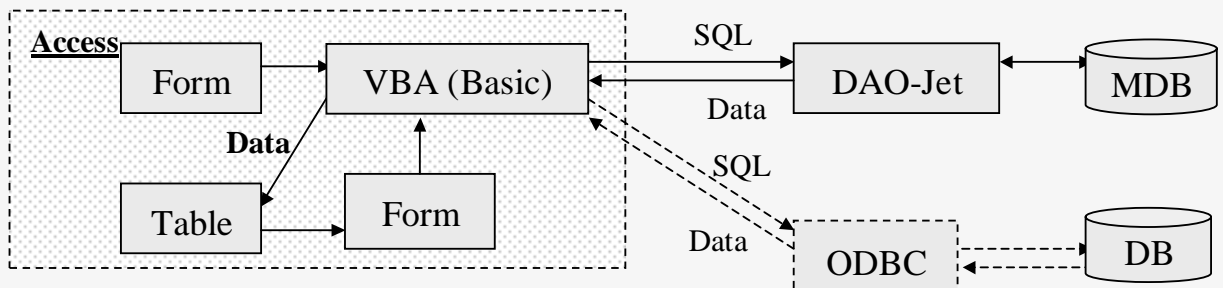


c) **Web Retrieval Systems**



Platform (05/2002): Linux-Apache-Tomcat(Jserv)-MySQL(SyBase)

d) **MS-Access Retrieval system (CD-ROM, LAN)**



Platform: Windows only

Fig.1 Chains of access of different software to databases

The programs are used on any platform without any change in the source code. All differences are concentrated and described in Configuration file (see Fig.2). Usually, the program reads this file at the beginning. All configuration parameters can be redefined on the fly: e.g. user can change working database (data source, database location and even type of DBMS) within the same retrieval session.

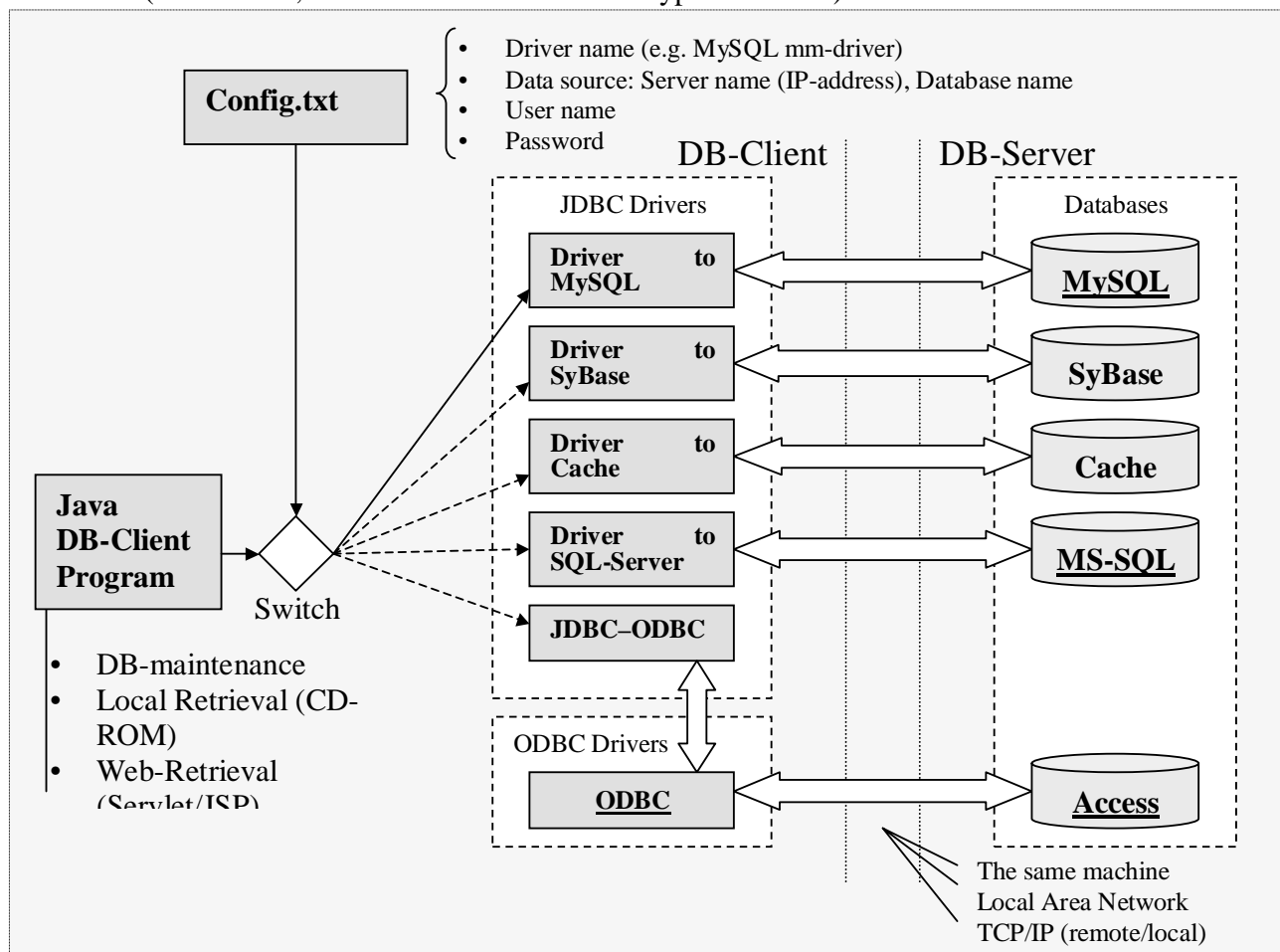


Fig.2 Access Java programs to databases; tested database management systems

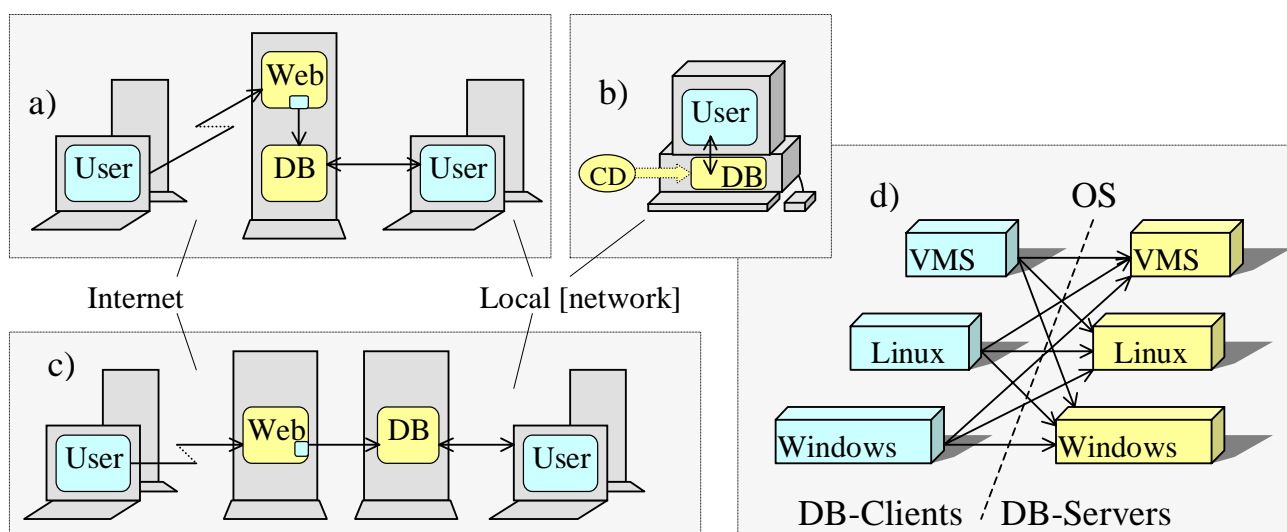


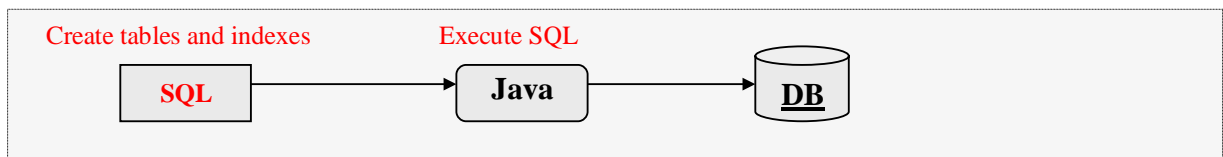
Fig.3 Client-server: a-c) typical location on computers, d) tested location on operating systems

### Present status and nearest plans

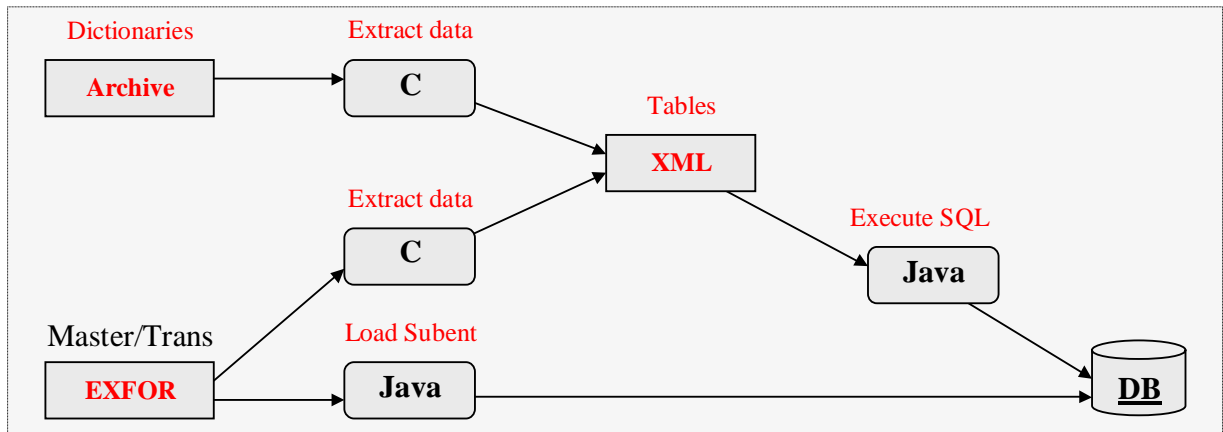
Software of EXFOR Relational contains several parts:

1. Create database and update its schema
2. Load/update data and help/dictionaries in the database
3. Web retrieval system
4. CD-ROM retrieval system

### Create/update database schema



### Load/update utilities



### Web retrieval system

Until now, Web retrieval system works on a Linux platform, but all components also exist for Windows. The test version was developed in June-2001 (<http://zlinux.iaea.org/exfor/>) using Apache/JServ/MySQL and also installed at BNL in March-2002 using Apache/Tomcat/SyBase.

