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THE VERSATILITY OF A CONSERVATION DATABASE DESIGNED ON IMAGE PROCESSING EQUIPMENT

1. Introduction

Record keeping is nowadays standard practice in conservation. Any treatment given to an object is recorded. Important information is noted on its individual record card. This includes the method of examination, any observations made, methods of cleaning and any changes made, stabilisation and restoration, the results of any analytical research done, as well as recommendations for its future care and handling. All this data assists conservators and researchers in a number of ways. In addition to the written record, photographs and X-rays are taken to clarify or obtain further information.

The conservation section of the Antiquities department in the Ashmolean Museum has now over 10,000 written records, over 3,000 slides, hundreds of X-radiographs and black and white photographs, and several thousand large format colour transparencies.

The conservation records constitute the most comprehensive collections database in the Department. The only efficient way of dealing with such a vast number of records is computerisation. The system being developed is the first stage in a process that will eventually include all text and image based accession records and will not only be an invaluable tool for collections management and conservation audits but could also be made accessible to researchers world-wide.

2. Description of the project

2.1 *Introduction*

The computerisation of the conservation records began in the early 1980s on the University's mainframe and, more recently, on PCs. By 1990, the image handling capabilities of desk top computers made the combining of text and image based records a realistic proposition and a system, based upon Apple Macintosh was purchased in 1992 with University funding. The equipment acquired comprised a Quadra 700 with a 16 inch monitor, a logical drive for reading optical disks, a Microtek colour flat bed scanner (SM IIXE), a JVC CCD camera (KY-F30), a 300 Dpi (dots per inch) Personal Laser writer and several software packages, such as 4th Dimension First, Image grabber, OptiLab and Adobe Photoshop.

4th Dimension First (4D First) was chosen for the database as this was the only off the shelf software available at the time which was capable of

handling both text and image based data. It is a very powerful tool which allows the creation of a database structure with files and fields to very specific needs.

The database already in existence on the PC was converted to the current database. Because the number of fields was different for each database not all the information ended up in the correct fields and a large amount of manual editing was needed. Looking back it probably would have been quicker to enter all the records again.

Before I discuss how we have adapted 4D First for the Ashmolean conservation database, I will first, for those not familiar with the program, give a short explanation of the basic structure of this database.

2.2 *About 4th Dimension First*

4D First works with three environments; the design, the user and the runtime. The design environment is where the structure of the database is created, i.e. the files the database is going to contain, the fields for each database, how the files will be related to each other etc. The user environment is where one enters and manages data after having created a database structure in the design environment. From the user environment one can go to the runtime, an environment used to run a custom application. The runtime environment does not concern us here.

The database information is stored in files. Each file has two layouts, an input layout and an output layout. In the user environment layouts are used to enter and manage data. The input layout shows one record at the time. Its makes it possible to enter, view and modify information in a single record. The output layout displays several records as a list. It is possible to browse through records, select records and print a selection of records as well as enter and modify in an output layout. It is possible to switch from input to output layout and visa versa, as well as from one file to another file. The structure can be expanded further with related files and sub files (Fig. 1).

In working with the database it was found that the structure of 4D First is rather complicated and it does take the first time user some time to find his/her way around.

2.3 *The database structure*

As it would have been very time-consuming for members of the conservation team to familiarise themselves with the design part of 4D First, it was decided to contract this out. Peter Robinson of Oxford University Computing Services designed the database structure and its layouts to the requirements of the department. We, my colleague Judith Philpott and I, welcomed his advice as we had no experience with Apple Macintosh before we started.

The conservation database is built up of two related files, the conservation

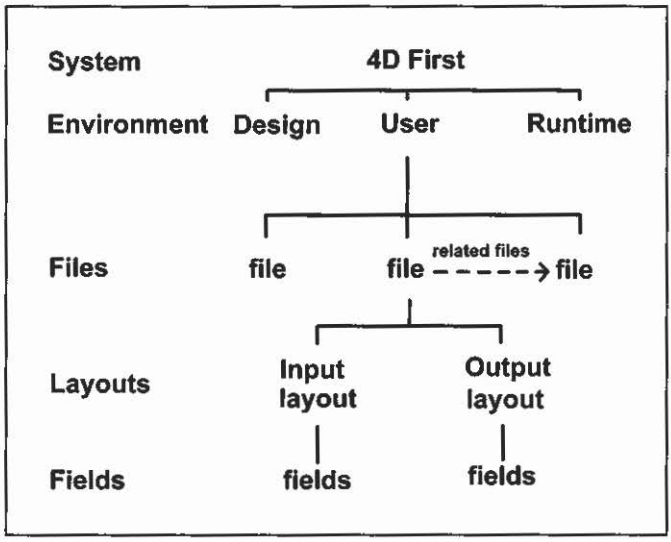

Fig. 1 – Basic structure of 4D First.

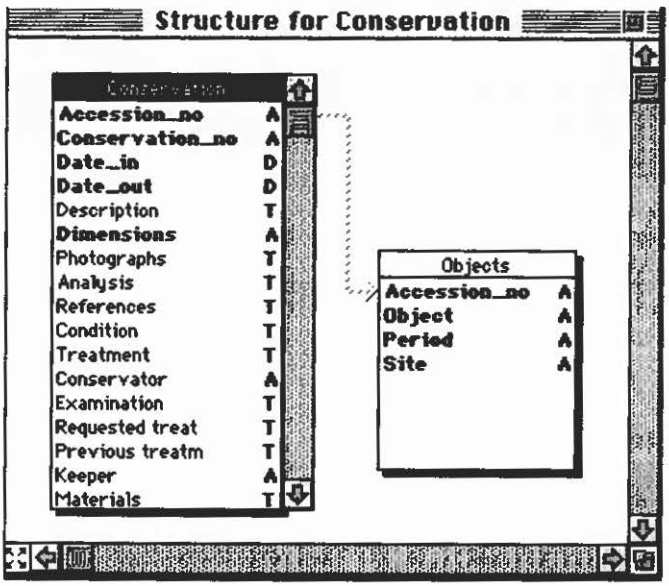

Fig. 2 – Related Conservation and Objects file

file and the object file, which are linked by the accession number field (Fig. 2).

The advantage of related files is that data is stored more efficiently. Also when the data is updated in one place, the change is reflected everywhere

the data is used. This means for the conservation database that the accession number has to be entered otherwise fields from the object file can not be updated. When a new record is created in the conservation file for an object on a repeat visit, the fields placed in the object file are automatically updated in the conservation output layout as soon as the accession number is typed in. The fact that in the past groups of objects have been given the same accession number was a problem in that the object fields for all off them would have the last entered values. This has been solved by adding a,b,c, etc. to these accession numbers.

2.4 *Database layouts*

A request was made to design the input layout for the conservation database to be similar to the conventional record card as well as fit the screen format, in order to make it as straightforward for the user as possible. 4D First gives a selection of layout templates to generate input layouts automatically. There are two different types of layouts; one places a control panel on the left of the enterable areas and the other places a row of buttons at the bottom of the screen. For the conservation database the latter was chosen (Fig. 3)

The panels give the choice to save a new record or modifications, to cancel changes, to delete a record or navigate from the input layout to the output layout. For the conservation database an extra button was created to permit printing of a single record. For an unknown reason the program started to print all the records when the print option was chosen from within the conservation input layout. A way around this was first to select the one record and then click print. This complicated matters for the user and in the end a print button was designed which fulfils the job perfectly.

An included layout area is used for the input layout of the objects file . The included layout area can display several records at once. For the conservation database it means that records from objects with repeated visits to the laboratory can be viewed at once. The date in and out fields help to reconstruct the case history (Fig. 4).

2.5 *Fields and field types*

On the layout one can select and place fields to meet specific needs. Each field in a layout has a field type that dictates the kind of data that can be entered. The length of fields is set in the Design environment.

For the conservation database a series of alpha numeric fields with a set number of characters was designed to contain information of limited length, such as object, accession number, conservation number etc. For fields where more descriptive reports are needed, such as condition and treatment accounts, 4D First gives the opportunity to design scrollable text fields which allow text of differing length up to 32.000 characters. When this informa-

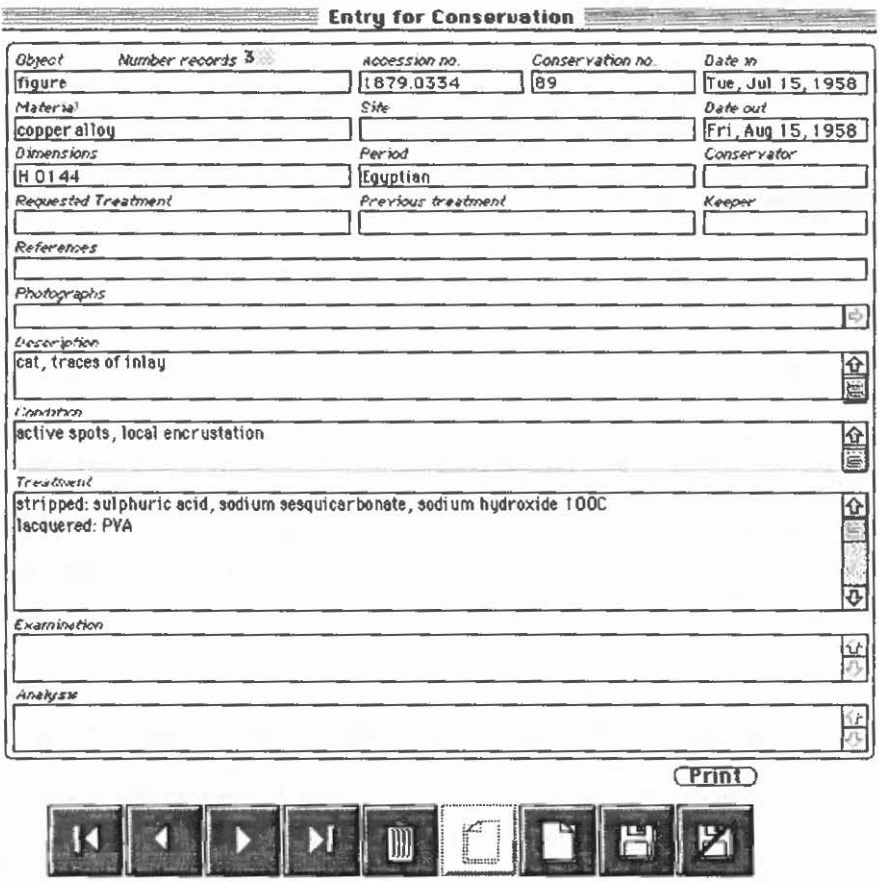

Fig. 3 – Input layout for Conservation file.

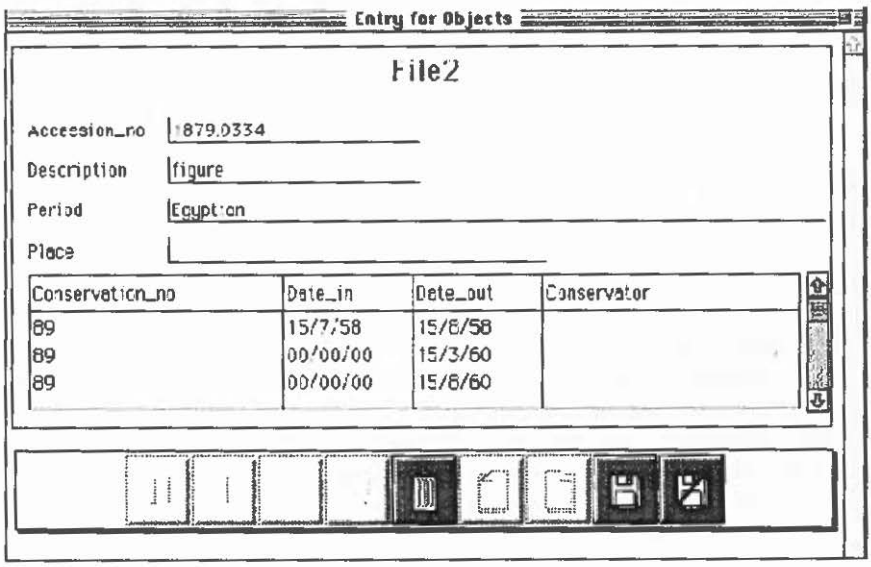

Fig. 4 – Input layout for Objects file.

tion is printed the database can be programmed to print it out consecutively. Date fields in the standard month/date/year format have been included. The date out field doubles up as a control for uncompleted treatments as this is the last one to be filled in. By doing a simple search by date a selected list of objects still under treatment or completed but still in the laboratory can be obtained.

2.6 *Field attributes*

Fields can be provided with attributes. Attributes affect the way in which 4D First processes data. An example of an attribute is the choice list. When entering such a field a list of options for that field is displayed. This list is very useful for the standardisation of nomenclature. It also can be used to exclude values from a field or require that only certain values can be entered. In the conservation database such a list will be linked, for example, to the field material. The word bronze refers to a specific make-up of copper alloy which is impossible to estimate; instead the term copper alloy is used in conservation.

2.7 *Entering and managing data*

Entering data can be done in the input or output file. Data for the conservation database will mainly be entered in the conservation input layout as it resembles the conventional record card. Values can be entered in arbitrary order and records can be updated and modified as many times as required. In using the database it was found that entering a new record automatically updated both the conservation and objects files but when modifying the accession number (the field which relates both files) changes had to be made in the conservation file as well as in the objects file, which is somewhat cumbersome.

An important characteristic of a database is that one can sort and execute searches. Retrieval facilities of 4D First allow full records to be viewed either for one object or a series of objects having any conservation keyword in common. Searches can be done for every field or combination of fields from one or more files using the search dialog box (Fig. 5). The searches are case insensitive and if the fields are indexed the searches are very quick.

3. Future developments

Thus far only the written database has been set up and it is still being tested and adjusted. The next phase of the project is the incorporation of the images. For the image database 4D Server will be used as it has the advantage over 4D First that it can open up images from within the application. This means that images will appear on the screen as thumbnail pictures next to the written record and can be viewed by simply clicking on them. There is no

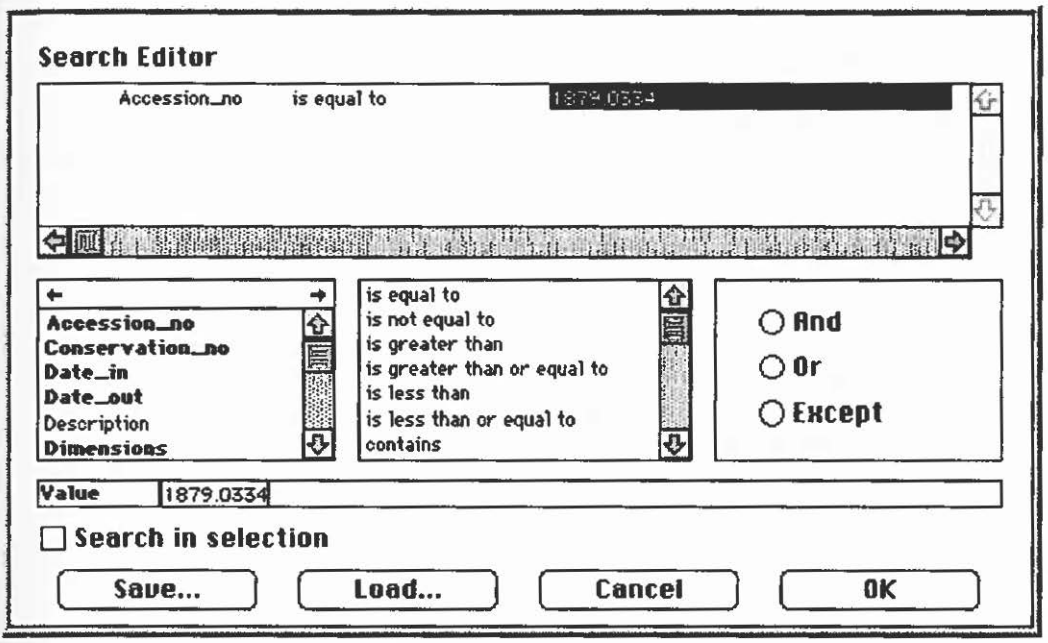

Fig. 5 – Search editor dialog box.

limit on the number of pictures attached to any record. As images are very demanding on the memory and hard disk space the Quadra 700 will be replaced with the Powermac 7200.

The digitisation of the images will be contracted out to a bureau. Apart from saving time, this was also seen as being more cost effective, as it will save the investment of money into the necessary equipment and staff time. The resolution at which the images will be digitised differs. For example X-radiographs will be scanned in on high resolution, as they contain information not directly visible for the conservator which can be extracted by means of image enhancement. Slides, on the contrary, just clarify the written text and there is no need for such a high resolution. The images will be delivered to us on CDs, which will double up as a backup system.

However, before the images can be digitised and linked up with the text database all the slides, black and white photographs and X-radiographs need to be provided with the objects accession number and an unique image number. This involves a lot of searching, dedication and time.

The total database will be stored on the University mainframe when the Conservation system is connected to the network . Alongside the computer database a paper archive will be kept.

3.1 *Applications of the database*

The development of a database using image processing equipment has the great advantage that the total record of treated objects, both textual and photographic, can be found in one place. This will vastly speed up the retrieval of information. Questions about the past treatment of a conserved object or its alterations over time can quickly be answered. As conservation science is constantly adjusting its treatment techniques, the database contains valuable information upon which new approaches can be based using its searching and sorting facilities.

In combination with analytical software packages, such as OptiLab, the computerised database has the potential for becoming an important research tool for conservation purposes in the near future. A very useful aspect of the system is the facility to enhance images. The obvious example is its use for X-radiographs; other examples are papyri and ostraca.

Finally, as the museum is already connected to the Internet, it is hoped that the database will be made available for conservators and researchers at international level. The degree of accessibility is still very much a point of discussion. Potentially visitors and researchers will be able to search via the computer for objects, thus minimising handling and improving security.

3.2 *Some final remarks*

In the long term computerisation will save time and effort but first the system must be up and running. It needs people and time to do the work and preparation. Although the design of the database and the digitising of images are contracted out, the project involves more work than anticipated at the start. There are many jobs to do which one can not foresee at the start of the project. In setting up the database it is our experience that it is quicker to start afresh than converting an existing database to another database, certainly when the number of fields differ. It is also advisable to get to know the software as soon as possible. We have found this allowed us to envisage various possibilities for the database which we could choose between and define our requirements before presenting them to the expert designing the database.

To conclude about the database package, 4D First is a versatile program with a large amount of options, although it is not always straightforward and user friendly to begin with, we have certainly found it will do the job well.

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ABSTRACT

The conservation section of the Antiquities Department in the Ashmolean Museum is currently developing a database for the conservation treatment records as well as the photographs and x-rays, using image processing equipment. 4th Dimension First was chosen for the database as this was the only off the shelf software available at the time, that was capable of handling both text and image based data.

The article describes the design of the text database and discusses the positive and negative aspects of the software package as experienced by the conservation team. Also mentioned are applications of the database and its future developments such as the design of the image database. To conclude about the database package, 4D First is a versatile program with a large amount of options, although not always straightforward and user friendly to begin with, it was found that it certainly would do the job well.