

INTRODUCTION

SRTSYS is a subroutine which can be used by FORTRAN or COBOL programs to sort lists into order or to locate by a key value a particular item in an ordered list. It has three entry points and is called as if it were three separate subroutines. QWIKST is used to sort lists of items into ascending or descending order of key using the machine collating sequence. BINSCH will find the location of a given key in an ordered list or report its absence. SRTSYS is used to tailor the machine code of the other two routines to operate on a particular list.

Suppose we have a FORTRAN array:-

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DIMENSION ARRAY (10,000)
```

We wish to sort the contents in ascending order, taking the third column as our key. We can code the problem as follows:-

```
CALL SRTSYS (40,4,ARRAY,0,9)
CALL QWIKST (1000)
```

Then if we wish to find and print the row whose third column contains a particular value which is specified on an input card we might code this as:-

```
READ(1,3) VALUE
CALL BINSCH (1,1000,VALUE,FOUND,LOC)

1 IF (.NOT.FOUND) WRITE(3,1)
  FORMAT (' ROW NOT FOUND ')

2 IF (FOUND) WRITE (3,2) (ARRAY(I,LOC),I=1,10)
  FORMAT (10 F8.2)
```

The routine has been used at Windscale and Calder Works for about 10 years and a recent check revealed that it was incorporated in some 60% of operational programs used on the site computer by the various departments of BNFL.

BACKGROUND

The SRTSYS package was developed to aid the management of FORTRAN direct access files. It was used to maintain indexes containing sort keys of various lengths, character or numeric, each with an associated record location on the file. Its usefulness quickly became apparent to FORTRAN programmers as a means of interrogating files and producing listings of selected data ordered by arbitrarily selected sort keys.

and efficient. If we replace the index entry to be deleted by either of its neighbours the usefulness of the index is unimpaired, in fact the presence of duplicates improves the efficiency of searching. A single pass of the index at the end of the update or at intervals will suffice to remove duplicates.

3. Read, Select, Sort and List

The reader will no doubt recognise in the above heading one of the commonest non routine DP applications. With the increasing size of computers a simple standard method based on a core sort is a very attractive and simple way of programming such applications. In half a megabyte we can sort over 6000 card images or over 3000 lines of print. Many files can indeed be maintained and processed as if they were tables.

CONCLUSIONS

The SRTSYS sort and search package has proved extremely popular with a number of programmers in a variety of quite different applications ranging from scientific information systems to everyday data processing. Its ready acceptance seems to indicate a real need for such a facility. An analysis of the ways in which it is used in different programs has not shown up any cases where it could be argued that its use led to inefficient use of machine resources or unduly complicated programs.

The indications are that its use simplifies programming and systems design, reduces the demand for file storage and shortens application running times.

Its use has been particularly beneficial in maintaining FORTRAN direct access file systems and in simple 'read, select, sort and list' applications. It is unlikely that increasing its flexibility would make it more useful as a programming aid and could easily make its use less easy to understand by the inexperienced programmer.

REFERENCES

- (1) C A R Hoare, QUICKSORT, Comm. ACM, July 1961
- (2) K E Iverson, 'A Programming Language', P141