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THE RECORDING OF LOAN POOL TRANSACTIONS VIA THE MAIN COMPUTER COMPLEX AND THE USE FOR SUCH A DATABASE

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1. INTRODUCTION

The Loan Pool organization is responsible for the centralised control and accounting of all the electronic equipment bought and used by Daresbury staff. The range of equipment supported by Loan Pool is extensive, covering in mid-1976 approximately 15,800 items with a total value of nearly £4M (the growth of Loan Pool support is illustrated in Table 1).

One of the functions of Loan Pool is to maintain accurate records of the locations and group holdings of individual equipment. Regular inventory checks are carried out to confirm the records and these are facilitated by the use of TSO allowing almost immediate cross-checking of the records.

A second important function of Loan Pool is to provide an exchange service for faulty equipment on a 'new lamps for old' basis. To the customer the appearance is almost always of a simple 'one for one' exchange but the transaction as followed up by Loan Pool may become quite involved depending on the course of action followed.

The regular transactions arranged by Loan Pool can easily be broken down as follows. Each transaction involves an alteration to the records and some corresponding action by Loan Pool.

(a) return for repair from user;

(b) issue of replacement to user;

(c) return to contractor for repair;

(d) return from contractor following repair;

(e) issue to local repair section for repair;

(f) return from local repair section after repair;

(g) temporary loan to SRC or University staff;

(h) return from loan to SRC or University staff;

(j) re-allocation to new user;

(k) recording of items for disposal as surplus;

(l) deletion of records following disposal or write-off action;

(m) sales to internal and external bodies;

(n) transfer to another SRC establishment;

(o) recording of bids for surplus equipment;

(p) control of purchase sequence:

  (i) initial entry into records;

  (ii) entry of contract number and due date;

  (iii) receipt and recording action;

  (iv) checks for completion of payment.

A complete record of all transactions handled by Loan Pool will supply the following information:

(a) volume of work passed through Loan Pool's books excluding inventory checks, stock taking, etc.

(b) a detailed history of individual items or generic groups (i.e. CAMAC) to calculate factors for reliability, etc.

(c) a direct comparison between two similar units (i.e. VDU's) to determine the better unit.

The method now adopted to update Loan Pool's inventory produces an archived copy of each book, date coded with the day the job was completed. Over a period of time the books such as CAMAC, NIM may be up-dated 20-30 times so that the archives hold records of the form

GEN10101 (1 Jan - current year)

GEN10201 (1 Feb - current year) ...

These records, in addition to forming a safety net for the inventories, provide the source from which the records of all transactions can be extracted.

When Loan Pool records were first accessed by TSO in November 1975 it became possible to hold on the computer a complete history of transactions completed from that day. The development of a system to extract the information proceeded intermittently and the first working system worked interactively on TSO. This system however tended to tie up a terminal for too long and the sequence was re-designed using the batch procedures available. The system now used is explained in this paper.

Appendix B details some inventory procedures that were developed in parallel with the system for recording Past Transactions, and there are a number of similarities in the way the operator must make use of the main data-base. The transfers to Rutherford will appear as a subset of the 'Past Transactions' for each set of Loan Pool records.

2. THE PRESENT SYSTEM

The flow chart in fig. 1 shows the general procedure. It is illustrated for the set of CAMAC records "CAM1". Although all the operator actions are shown to be sequential there is considerable scope for overlap within the flow chart depending on operator experience.

The job of any transactions recording is basically to compare two datasets and note all the differences as:

(a) insertions

(b) deletions

(c) alterations (treated as combined insertion and deletion)

The simplest way to accomplish this is to select the records from one file, one at a time, and search the other file completely each time until that record is found. If the record is not found then this is recorded in an 'output' file as an insertion or deletion. This involves two complete search procedures, i.e:

(a) look for OLD items in NEW

(b) look for NEW items in OLD

Such a double ended search tends to become expensive in computer time with typical sets of Loan Pool records (i.e. 1400 items per book). The main core time can be reduced by 50% if the following slightly different approach is used to tackle insertion of new items.

Loan Pool work involves the use of a current record for normal day-to-day use. This record, when taken into account with the data base for the past transactions programs, means that the need to "look for NEW items in OLD" is redundant provided that this record in its entirety is taken as a list of insertions, and these insertions are date coded by virtue of standard Loan Pool programs.

Such a "Forward Look" search is illustrated in Table 2. The listing so produced not only includes the history of each unit but also its present status and location.

A breakdown of the commands used is shown in Table 3 and detailed operating instructions are given in Appendix A.

Since the transfer of Daresbury equipment at CERN to Rutherford from July 1976, and the closure of NINA in April 1977 with the further transfer of equipment to Rutherford, the data base has been used to carry out the necessary inventory action. Details of this work are given in Appendix B.

3. SUMMARY AND CONCLUSIONS

The data base produced by the Loan Pool Past Transactions programs can be used in several ways:

(a) to produce a complete history of all movements of individual items;

(b) to enable particular movements (i.e. repairs) of instruments to be tied in with the Loan Pool Fault Recording system for the purpose of collating repair information;

(c) to prepare surveys of groups of instruments, i.e visual display units for the purpose of assessing their reliability absolutely and relatively, previously a long winded problem;

(d) to produce information to be used at senior management level as to:

  (i) level and experience of staff required to run Loan Pool;

  (ii) number of staff required;

  (iii) amount o- work progressed through Loan Pool;

(e) by senior management as a basis for a possible re-organisation of Loan Pool, Loan Pool inventories and the method in which the inventories are currently maintained.

APPENDIX A

OPERATING INSTRUCTIONS

In the following it is assumed that CAM1 is the set of records being processed and that archived versions of this set exist for the first day of each month for a period of one year.

A1 Checks

After completing the standard LOGON procedure carry out the following initial checks:

(a) check that CAM1 data does not appear in the catalogue (command = "LISTCAT" or "LC"). If it does appear then archive the dataset with the date code (command = "ARK (MONTH & DAY)"). Wait until the archive is complete.

(b) check that no date coded datasets of the form CAM11225 exist in the catalogue. If any of these are present then archive them (command = "ARCHIVE (DATASET NAME)").

A2 Restoration of Archives

1. List the archives (command = "LISTARCH DE") and tabulate the date coded versions of CAM1 in the format shown in Table 4. Ensure that when a year end intervenes the correct order is maintained, i.e.

listing		
CAM1 0101		CAM11101
CAM1 1101	tabulate as	CAM11201
CAM1 1201		CAM10101

2. Restore all the date coded archives (command = "RESTORE (DATASET NAME)" or "REST (DATASET NAME)". Alternatively

restore all the date coded archives using the special purpose commands "REST4" or "REST8", in the following manner:

"REST4 CAM1,0101,0201,0301,0401" (repeat until all datasets are written, using dummy numbers as fillers if required. This restores four datasets, i.e. CAM10101, CAM10201, CAM10301 and CAM10401).

"REST8 CAM1, ..." (exactly as REST4, but for eight datasets).

3. Restore PASTCAM1 (command = "RESTORE PASTCAM1").

4. Use the format of Table 4 to check that restoration has been initiated and completed.

5. If required list the catalogue and cross check against the archives and Table 4.

A3 Job Submission

1. The programs should not be run until all the datasets are restored or the sequence will fail. Two commands have been produced to simplfiy the process and these are "PAST" and "PASTA".

2. "PAST" command. To speed the process of submitting the jobs, four datasets at a time can be handled by this command. Use as follows:

(a) PAST CAM1,0101,0201,0301,0401

followed by

(b) PAST CAM1,0401,0501,0601,0701

etc.

Note particularly the correlation between numbers at (a) and (b) above where the last number of the first command becomes the first number of the second command.
This command is to be used only when at least four datasets remain to be processed.

3. "PASTA" command. This command is a sub-command of "PAST". It is used in the same way except that only two datasets are processed at a time. Use as follows:

(a) PASTA CAM1,0101,0201

followed by

(b) PASTA CAM1,0201,0301

etc.

4. Once all the jobs have been submitted (noting that the last CAM1 dataset does not have a corresponding job number or "p" dataset) the status of the jobs may be checked (command = "STATUS" or "ST"). All the jobs will be on the 'HOLD' queue in the form

DE0101

DE0201

DE0301

etc.

5. Use the release command to start the first job, i.e.

"RLSE DE0101"

Note that the release of the second and subsequent jobs is done automatically by JCL.

6. Wait until all the jobs are completed and proceed onto the merging sequence.

A4 Merging and sorting of records

Each job has created a corresponding new record of transactions, i.e. PO101, PO201, etc. These datasets must now be merged (command = "MERGE" or "M") in the following sequence:

"MERGE PO101 PO201"

"MERGE PO201 PO301"

:

"MERGE P1201 PASTCAM1"

The records forming PASTCAM1 are now in un-sorted order. To sort them one of the two following commands is used:

All books except CAM2, NIM1, NIM2, STD use:

"PASTS CAM1"

for CAM2, NIM1, NIM2, STD use:

"PASTS1 CAM2"

This procedure automatically submits a job in the correct form and produces a dataset named "SORTED". Once this dataset is confirmed to exist, it must be correctly renamed and printed and archived. Use the command shown

"PASTR CAM1"

A5 Deletion of obsolete records

Delete from the archives all but the latest version of CAM1 using the standard TSO command "DELARCH", i.e.

"DELARCH CAM10101" (repeat for each dataset)

or

"DELARCH (CAM10101,CAM10201,CAM10301,.....

(up to 7 datasets) .....)

Delete from the catalogue all the 'CAM1' date coded datasets and all the 'P' datasets using either the standard TSO command "DELETE" or the command "PASTD". This command will delete four datasets of the same generic heading, i.e.

(a) "PASTD CAM1,0101,0201,0301,0401"

or

(b) "PASTD P,0101,0201,0301,0401"

APPENDIX B

TRANSFER OF EQUIPMENT TO RUTHERFORD - INVENTORY ACTION

B1 Introduction

This appendix has been produced to detail the inventory action to be taken by Loan Pool staff following the closure of NINA. The following sections are covered:

(a) reasons for adopting the course of action outlined;

(b) problems in producing new programs;

(c) detailed explanation of programs;

(d) procedure to be adopted;

(e) summary of results.

In June 1976 all the experimental group holdings at CERN were transferred into the control of the Rutherford Laboratory. To ease the inventory action a suite of programs was produced and at the same time Rutherford staff were provided with a complete operating copy of all of Loan Pool's control programs. Rutherford staff at CERN have made good use of this system and it would therefore seem appropriate to include further transferred items within the same system and therefore all records must retain exactly the correct format and correct division into sets and sub-sets.

The transfer of records that occurred in June 1976 relied on a few straightforward PLI programs under CLIST control. With the six groups concerned (about 1800 items) the PLI programs produced did not need to be adaptable. The coming exercise required a similar suite of programs but now only one group at a time is to be transferred and the number of items will be always less than 300, and on average about 100. Thus the ability

to specify the transfer of any particular group should be built into the CLIST and not the PLI programs as before.

The overall suite of programs had to be produced such that the number of operator actions was reduced to an absolute minimum. Ideally a single code word followed by the group code should be the maximum.

The work was divided into two. Part 1 produces a card image set of records for the group being transferred. Part 2, on satisfactory completion of Part 1, then deletes that group from Loan Pool records. It was felt that such a split in the work was necessary in order to provide a time to examine the results halfway, as a boost to confidence.

B2 Program details

A list of the required commands is shown in Table 5.

(a) Creation of new datasets for group being transferred.

1. The basic structure of the programs is as follows:

(NUNA	(NONA	(NINA	(NINA))))
clist	clist	clist	PLI

2. NUNA - initiating command, i.e. "NUNA MLA" where MLA is the group being transferred.

3. NONA - prepares a load module adapted for the group being transferred using a write protected PLI program as the master.

4. NINA - submits the job to produce a new dataset for each of Loan Pool's books including only the items to be transferred.

5. PLI(NINA) - a simple PLI program that examines each record in turn and if the transferring group is identified as the

owner, this item is then written to the new file.

(b) Deletion of group records for group being transferred.

1. The basic structure is similar to the above but characterised by the prefix DEL (delete).

(DELNUNA	(DELNONA	(DELNINA	(DELFILE)	(NINA))))
clist	clist	clist	clist	PLI

2. DELNUNA, DELNONA, see NUNA, NONA above.

3. DELNINA - submits the job to delete all records in Loan Pool's books identified by the transferred group. After completion of the PLI (DELNINA) programs the new file is renamed to become the work file ready for submission of the standard Loan Pool UPDATE job.

4. DELFILE - this is a modified version of the standard CLIST command used for up-dating Loan Pool records. Its purpose is to produce a copy of the master file. This copy is then operated on by the PLI program to produce the new file without the deleted records.

5. PLI(DELNINA) - this program examines each record of the copy produced by DELFILE. Where the "group" is identified as the group currently being deleted then that record is not passed to the new file.

6. NINDONE - this is a CLIST to submit all the records to a batch program to copy the deletions so far produced into the master records.

7. NINARK - this CLIST archives all the deleted group records until such time as the new user can accommodate them.

8. DELNANA - this CLIST deletes all ".data" datasets and is used once all the batch jobs are complete.

(c) The commands "NANA (GROUP)" and "DELNANA" are also used as emergency outlets should processing fail for any reason.

B3 Operating procedure

(a) For the group being transferred ensure that the records are 100% correct by checking a 'mask' on that group.

(b) Enter "NUNA (GROUP)" onto the terminal. Once "READY" appears check a sample of the new datasets which are of the form

"(GROUP)(BOOK).data", i.e. "EGACAM1.data"

(c) Archive these datasets, using the command "NINARK (GROUP)".

(d) On completion of archival of the group datasets enter the command "DELNUNA (GROUP)". When "READY" appears examine some of the datasets to confirm that deletion has occurred.

(e) Submit the records for updating using the command "NINDONE". Note that this does not produce a new print-out, only a listing of the items deleted.

(f) Enter the command "DELNANA" to delete all the records used and reduce track space.

B4 Summary of results

The above procedure details a method of carrying out mass deletion of records under controlled conditions. At each stage of the procedure cross checks are available.

While the transferred group no longer exists in Loan Pool records it still exists in the archives in exactly the same format as required for Loan Pool use. Therefore such records can be merged into the copy of the Daresbury system provided to Rutherford staff with a minimum of effort.

A number of groups are being processed for inventory transfer at present. There are to date 16 recorded bids for transfer to Rutherford control, a total of nearly 4000 items. In addition to the 1700 items already transferred to Rutherford in 1976 this will mean that Daresbury has transferred 35% of its electronic equipment to Rutherford in addition to providing a purpose built inventory control system for those items.

TABLE 1

Growth of Loan Pool Support

At 1st April	Approx. number of units	Approx. value (£)
1963	26	6,588
1964	200	28,000
1965	630	110,000
1966	1800	340,000
1967	2500	475,000
1968	3500	670,000
1969	4800	920,000
1970	8000	1,520,000
1971	9500	2,000,000
1972	11000	2,300,000
1973	12500	2,900,000
1974	13500	3,700,000
1975	14500	4,300,000
1976*	15776	4,800,000
1977	14142	4,061,777

*At 1st July 1976

Estimated at 1st January 1978: 9500 units, value £3M

TABLE 2

Illustration of "Forward Look" Search

LAST PAST TRANSACTIONS RECORD	RECORD AT DATE 1	RECORD AT DATE 2	RECORD AT CURRENT
A ⟶	D	D	D
B ⟶	E	E	F
C ⟶	F	F	G
		G	

TRANSACTIONS RECORDED — NIL — E

Therefore Present Past Transactions Record

= Last Past Transactions Record

+ Deletions Date 1 to Date 2

+ Deletions Date 2 to Date 3

+ Current Record

= (A + B + C) + (E) + (D + F + G)

TABLE 3

List of Commands and Programs

1. CLIST

TITLE	ABBREVIATION	NOTES
DELARCH	-	Standard TSO
LISTARCH DE	-	Standard TSO
LISTCAT	LC	Standard TSO
MERGE	M	Standard TSO
PAST	-	Overall command to submit jobs.
PASTA	-	Subcommand of PAST
PASTD	-	Deletes groups of four datasets
PASTR	-	Renames, prints and archives sorted data.
PASTS	-	Sorts past transactions
PASTS1	-	Sorts past transactions for selected datasets.

2. PLI

A straightforward procedure using arrays to store all the records being searched. Searching is done using nested 'do while .... until...' loops. The two array bounds are 1500 x 80.

3. CNTL

JCL for job submission which uses two CAM1 datasets as input and a 'p' dataset as output.

TABLE 4

General Format of Check List for Past Transactions

No. (a)	Dataset (b)	Restore Initiated (c)	Restore Complete (d)	Job Submitted (e)	Job Complete (f)	Merge Complete (g)	Datasets (1) Archives (h)	Deleted (2) Catalogue (j)
1	(CAM1 0101)							
2	(CAM1 0201)							
3	(CAM1 0301)							
4	(CAM1 0401)							
5	(CAM1 0501)							
6	(CAM1 0601)							
7	(CAM1 0701)							
8	(CAM1 0801)							
9	(CAM1 0901)							
10	(CAM1 1001)							
11	(CAM1 1101)							
12	(CAM1 1201)							
13								
14								
15								
16	(PASTCAM1)							

PAST(CAM1) sorted ..... (PASTS or PASTS1)

PAST(CAM1) printed ..... (PASTR)

TABLE 5

List of Required Commands

User	Parameters	Sub-Commands	PLI Programs
NUNA	Group	NONA	NINA
		NINA	
NANA	Group	-	-
DELNANA	-	-	-
NINARK	Group	-	-
DELNUNA	Group	DELNONA	DELNINA
	-	DELNINA	-
		DELFILE	-
NINDONE	-	-	-

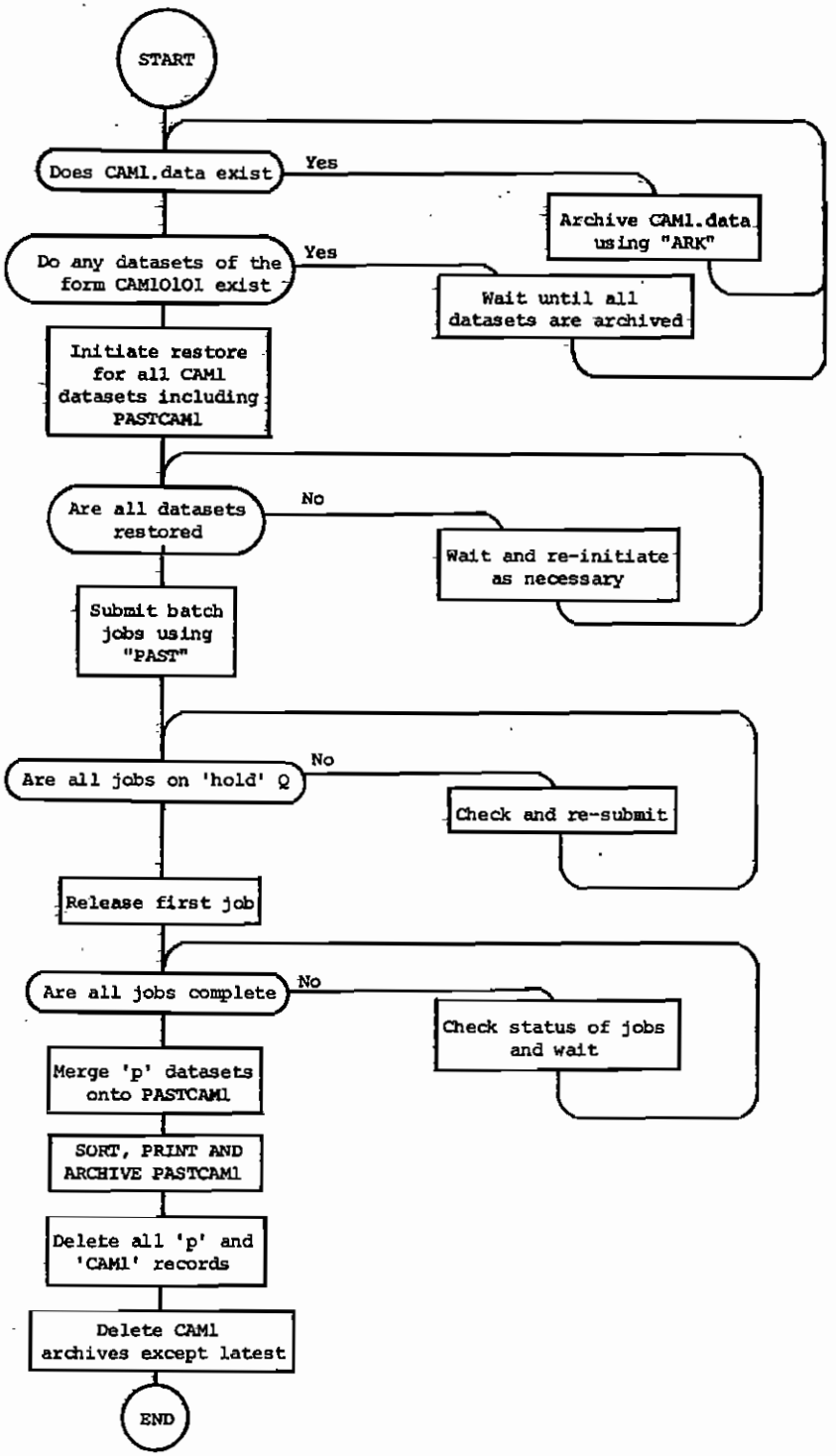

Fig. 1
System Flow Chart