

A DIRECT MAIL ADDRESSES APPLICATION
IN A TRANSACTION PROCESSING ENVIRONMENT
WITH SHORT RESPONSE TIME REQUIREMENTS

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The Swedish postal authority maintains an independent business division, POSTENS ADRESSREGISTER (PAR), involved in providing addresses of Swedish companies and organizations for direct mail purposes. For this division a direct mail addresses data base complete with application programs was developed on a HP 3000 Series III.

The addresses of the data base can be selected and retrieved in a real time dialogue using logically complex search criteria for qualifying the desired output. The selected addresses can then be printed. The system has been designed to allow a daily output of 100 000 addresses during office hours.

The data base has capacity for 600 000 addresses of firms and organizations. In addition there is space for 200 000 names of key management staff, e.g. managing directors, financial managers, of those firms. The data base has been particularly designed for this application using a combination of several KSAM and MPE files.

Each address in the data base is described by a number of search items such as telephone area code, postal number (ZIP), number of employees, annual business turn over as well as an arbitrary number of selection codes describing the line of business of each company.

Addresses may be retrieved according to any logical combination of the above mentioned search items. Thus it is possible to retrieve e.g. all financial managers of firms within a given annual turnover range, in a certain geographical area and belonging to a specified series of business lines.

The system is characterized by very efficient evaluation of complicated retrieval criteria. This provides short response times which is important for the users of the system. It is e.g. possible for a salesman to have a telephone conversation with a customer and at the same time using the system for inquiries.

Maintenance of the data base is carried out interactively from user terminals. Individual addresses can be retrieved at any time, amended and placed in an update file for batch updating at the end of the day.

The system has been designed and developed by DAFA in collaboration with IIP Sweden. DAFA is the Data Center for Administrative Data Processing, a Swedish government authority providing data processing and consulting services within the state administration.

2 PROBLEM DESCRIPTION

- 2.1 Business requirements
- 2.2 Previous ADP systems
- 2.3 Statement of objectives
- 2.4 Definition of requirements

2.1 Business requirements

There are some important factors that determine the competitiveness and success of companies in the direct mail business. The ones that are considered most important are:

- Accuracy of addresses
- Completeness of data base
- Correctness of address count
- Service level of operations

The accuracy of the addresses is perhaps the most important individual factor. Every time a company changes its mailing address, a corresponding change must be made in the addresses data base. The purpose is, of course, to keep the number of undelivered mail and by reason of that wasted advertizing material at a minimum. As there are close to 400 000 firms in Sweden this problem requires a lot of follow-up work taking into consideration that new companies are established daily and old companies disappear at the same rate.

Also of the same importance is the completeness of the data base. It is a basic requirement of customers of direct mail firms that the addresses they order and pay for cover all existing firms and organizations. There is today in Sweden no practical way of collecting addresses automatically. The work has to be done manually from whatever sources that can be found. In this tedious task it must be possible to check the existence of an address in the data base. If it is there the correctness is checked; if it is not there the new address is added to the data base.

In the direct mail business it is common practice among customers to ask for the estimated number of addresses of alternative target groups and target group combinations. This is usually done before an order is placed. The purpose is twofold. The customer wants to print the same number of advertizing material as there are addresses in his particular address selection. And he wants to buy the addresses from that direct mail firm who has the most complete coverage of the selected target groups. It is thus necessary to be able to retrieve the current count of addresses for any combination of selection criteria.

The mentioned problems are often discussed between the customer and the addresses firm salesman. They work out suitable target group combinations and plan the details of the customer's direct mail drive. In this process the salesman needs facilities for quick retrieval of current count information.

There are also other requirements related to the level of service that the direct mail firm wants to provide.

It must be possible to print addresses in different formats and on different stationary, adhesive labels etc. Sometimes the addresses must be delivered on the same or the following day. This means that a computer based system must as far as output be very flexible as to format, sorting order and possess a satisfactory retrieval and printing capacity.

2.2 Previous ADP systems

Pad had for several years been using a batch oriented ADP system which was run on a large IBM computer at the Post Office data center. The old system had specifically been developed for PAR. Unfortunately the system never was very successful. The main shortcomings were:

- Long turn-around times for addresses count information making this facility practically impossible to use.
- Monthly updating of the data base resulting in slow and difficult maintenance work.
- Duplicate and inaccurate addresses as there were no simple ways for scanning the address file for such errors.
- The generally low service level which is inherent to batch systems which are meant to support work the nature of which is transaction oriented.

So, very soon after the initial contacts were taken in 1977 PAR agreed to collaborate in a study of possible improvements to their ADP operations.

2.3 Statement of objectives

In the beginning of 1979 the objectives and basic requirements of a new system had been worked out.

The fundamental objective was that the new system had to support the users, i.e. salesmen, maintenance staff and production people, in the best possible way. The system had to be particularly designed to the processes the users were involved in.

This philosophy led to the conclusion that the new system had to be a terminal oriented transaction processing system. The following objectives were to be realized:

- Improved accuracy of the addresses through continuous revision and daily updating of the data base.
- Improved efficiency of the revision work with terminals for reviewing the data base content and for entering emendments and new addresses.
- Real time facility for retrieving the number of addresses in a given target group defined by any logical combination of retrieval criteria.
- Simplifying retrieval and printing of addresses from terminals used for entering output requests and formatting information.
- Future capacity for adding additional applications.

2.4 Definition of requirements

It was required that address retrieval be possible using any one or an arbitrary combination of the following search items:

- Target group codes (0-27 per address)
- Administrative district code
- Telephone area code
- Postal district
- Region code
- Annual turnover
- Number of employees

In addition for the above keys the following search items were required for address revision purposes:

- Reference number
 - 000 001-600 000 for address records
 - 600 001-800 000 for name records
- Organization short name
- Organization number

The volume and performance requirements were the following:

- 600 000 address records
- 200 000 staff name records
- 20 000 address amendments per month
- 30 - 40 printed retrievals per day
- 100 000 printed addresses per day
- 10 simultaneous terminal sessions
- 15 maximum number of terminals
- 1 000 terminal transaction during peak hour

3 sec maximum response time for 90 % of
terminal transactions
1 sec maximum response time for 90 % of
error messages
200 hrs effective use time per month
4 hrs maximum allowed down time
95 % minimum availability per month

The above requirements were part of the user requirement specifications which were prepared for inclusion in the tender invitations.

3 ALTERNATIVE SOLUTIONS

- 3.1 Tender invitations
- 3.2 Mini-computer solution

3.1 Tender invitations

At this point in time it was not yet decided whether the system was to be run on a service bureau or on dedicated equipment installed at PAR. The decision was to be made when the final costs for the alternatives were known.

So, tender invitations were sent to the Post Office computer center, DAFA and a number of computer manufacturers.

DAFA proposed a solution on their IBM 370/158 and a software package STAIRS also from IBM. The intention was to supplement STAIRS with tailor-made software for updating and for editing and printing the output. Terminals were to be installed at PAR and connected with DAFA over leased telephone lines.

Although the proposal was technically sound, the quoted price was not very competitive. Development cost was 285 000 Swedish Kronor and the annual production cost was estimated to 2 400 000 Kronor.

3.2 Mini-computer solution

DAFA, although participating in the competition with its own service bureau proposal, was asked to assist PAR in evaluating the tenders from the mini-computer manufacturers.

Finally HEWLETT PACKARD was chosen for delivering the necessary computer system and DAFA for providing all application development and project management. The following computer hardware was ordered:

- HP 3000 III 512 kbytes
- 4 disks 120 Mbyte
- 1 disk 50 Mbyte
- 2 tape drives
- 1 console 2635
- 1 printer 600 lpm
- 10 terminals 2640

It was decided to use COBOL and SPL for application programming and KSAM for data base management.

Investment in Swedish Kronor:

1 620 000	Computer system, terminals
680 000	Application development
2 300 000	System investment
400 000	Computer room, offices
2 700 000	Total investment (approx.)

Annual cost in Swedish Kronor:

700 000	Investment cost (15 %, 5 years)
160 000	Computer system maintenance
480 000	Operating staff, application maintenance
1 340 000	Total annual cost (approx.)

It is interesting to note that the annual cost of approximately 1.3 million Kronor is very much less than the quoted price from DAFA asking 2.4 million kronor for the same service in its service bureau proposal.

4 CONCEPTUAL SYSTEMS DESIGN

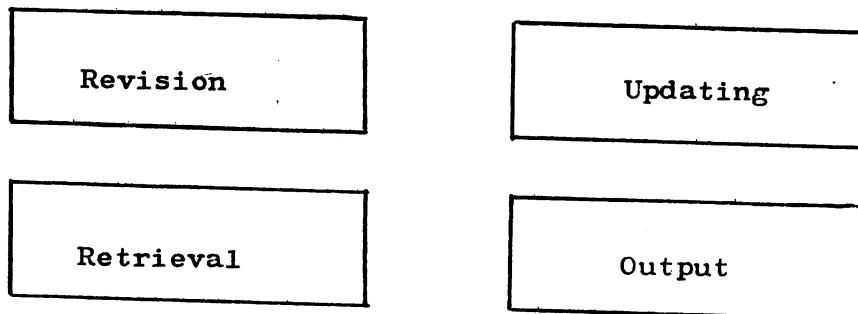
- 4.1 System description (functions)
- 4.2 Key inputs and outputs
- 4.3 System flowchart
- 4.4 Data base design
- 4.5 Response time analysis
- 4.6 Batch throughput analysis
- 4.7 Dialogue language
- 4.8 Application logic

4.1 System description (functions)

The business requirements of PAR as they have been implemented in the system comprise functions for:

- Interactive revision of addresses including facilities for entering amendments and new addresses.
- Updating the data base in batch mode, i.e. adding amendments and new addresses to the data base from a transaction file.
- Selecting addresses that correspond to a given combination of search criteria and retrieving the number of addresses in the found set.
- Entering editing and ordering specifications and requesting printed output (or on magnetic tape for off line printing) on the selected address set.

The above mentioned four functional requirements correspond to the following sub-systems of PARAD:



In addition there are functions for taking back-up copies of the data base and restoring the data base in case of damage.

4.2 Key inputs and outputs

This and the following pages show typical output from the system:

2	SÄFVEANS AB	AB VOLVO
	FACK	405 08 GÖTEBORG
	405 04 GÖTEBORG	
8		
8	NYA GLASMASTERIET	ALGOT NORD AB
	KUNSGATAN 79 B	BOX 74
10	440 20 VÄRGARDA	501 02 BORRS
12		
14	ALMEDAHL-DALSJÖFORS AB	AB IRO
	510 50 DALSJÖFORS	BOX 54
16		523 01 ULRIKSHAMN
18		
20	HUSQVARNA AB	NIFE JUNGNER AB
	FACK	FACK
22	561 01 HUSQVARNA	572 01 OSKARSHAMN
24		
26	GUNNEBO BRUK AB	HOLMENS BRUK AB
	590 93 GUNNEBOBRUK	601 38 NORRKÖPING
28		
30		
32	UDDEHOLMS AB	AB BOFORS
	UDDEHOLM	BOX 900
34	683 05 HAGFORS	690 20 BOFORS

Addresses printed on normal computer output stationary

ALMEDAHL-DALSJÖFORS AB
510 50 DALSJÖFORS

AB IRÖ
BOX 54
523 01 ULRIC

MUNKSJÖ AB
BOX 624
551 02 JÖNKÖPING

HUSQVARNA AB
FACK
561 01 HUSKV

ÖSTGÖTABANKEN
BOX 328
581 03 LINKÖPING

SAAB-SCANIA A
581 88 LINKÖ

HÖLMENS BRUK AB
601 88 NORRKÖPING

VERMLANDSBANK
FACK
651 01 KARLS

UDDEHOLMS AB
UDDEHOLM
683 05 HAGFORS

AB BOFORS
BOX 900
690 20 BOFORS

NITRO NOBEL AB
710 30 GYTTERP

ASEA AB
721 83 VÄSTER

UPPLANDSBANKEN HK
BOX 276 (STORA TORGET 7)
751 05 UPPSALA

AB FORTIA
BOX 604
751 25 UPPSALA

Addresses printed on adhesive labels



POSTENS ADRESSREGISTER
Fack, 101 10 STOCKHOLM

Anvisningar för postkontoret Kontrollera att namn och adress är korrekta. Ange i förekommande fall rätt uppgift på raden till höger om felaktig uppgift. Komplettera med besöksadress för adressat med fack, box eller storkundnummer. Återsänd kortet snarast till adressen på baksidan, gärna i fönsterkuvert, bl 2502.09

- | | |
|--|--|
| ☐ Adressen är korrekt | ☐ Företaget har upphört |
| ☐ Adressen är felaktig
Rätt adress anges | ☐ Företaget har bytt namn
Nya namnet anges |

Adress enligt PAR register

423482	KATRINELUNDS SKOLA
	HAGAVÄGEN 43
RI	
852 53	SUNDSVALL

Besöksadress

--

Bl PAR 106 (nov 78) Pv tr Sth 3620 □ 673-78

FÖRFRÅGAN

Postadress

OBS! Detta kort får inte delas ut

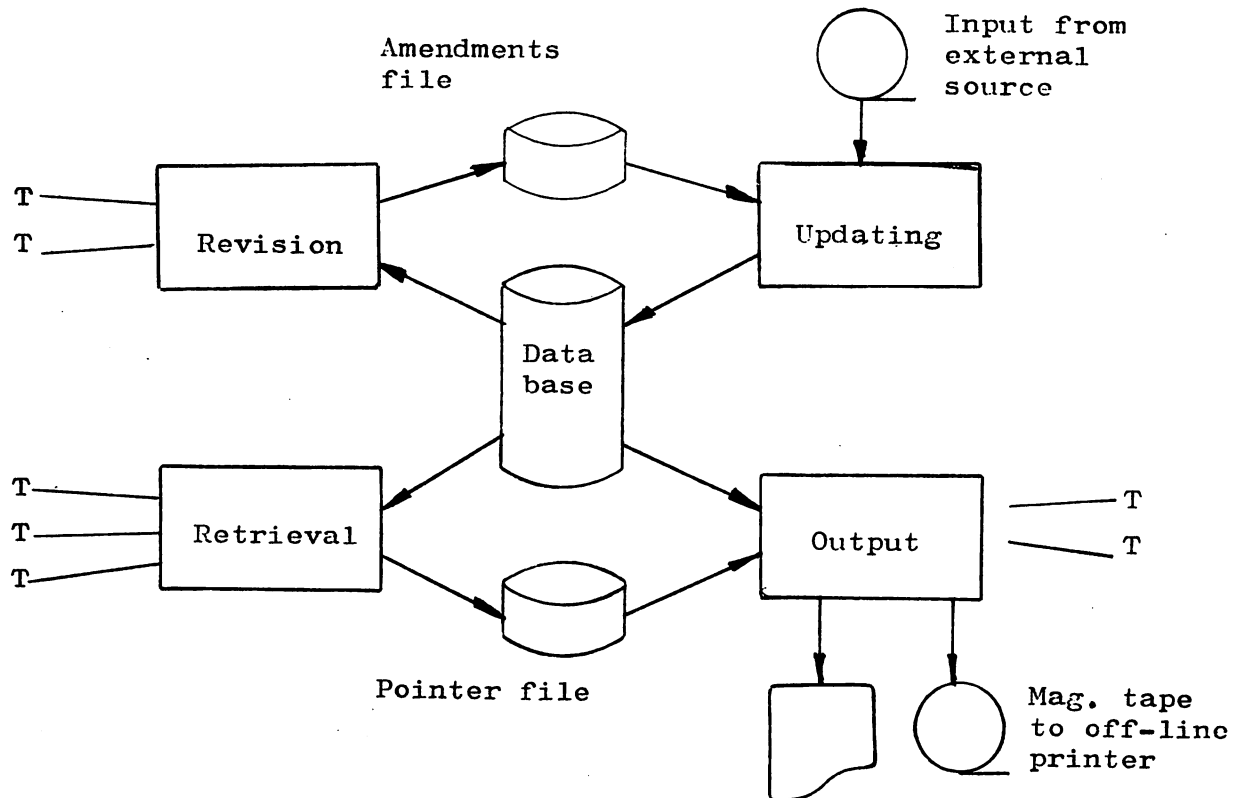
Postkontoret

851 01 SUNDSVALL

Ändras till

4.3 System flowchart

The four sub-systems relate to the data base according to the following flow-chart:



The amendments file contains amendments and new addresses that are entered from the terminals involved in revision work.

The amendments file and possible input of addresses from external sources are processed daily in a data base update run.

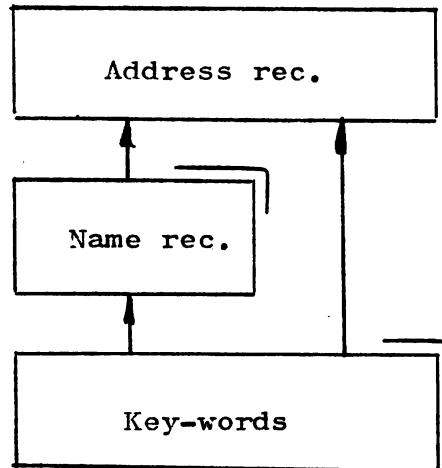
The address data base is a collection of several KSAM and MPE files and is described in the next section.

A pointer file is created as a result of evaluating address selection criteria. Each selection process creates its own pointer file.

The pointer files are input to the output sub-system and used there to indicate which particular addresses are to be retrieved from the data base and printed.

4.4 Data base design

The following diagram represents the logical structure of the addresses data base:



The address record holds the following data:

- Reference number (master id.)
- Organization number
- Company name
- Company address
- Visiting address
- Telephone number

The name record contains:

- Staff member name

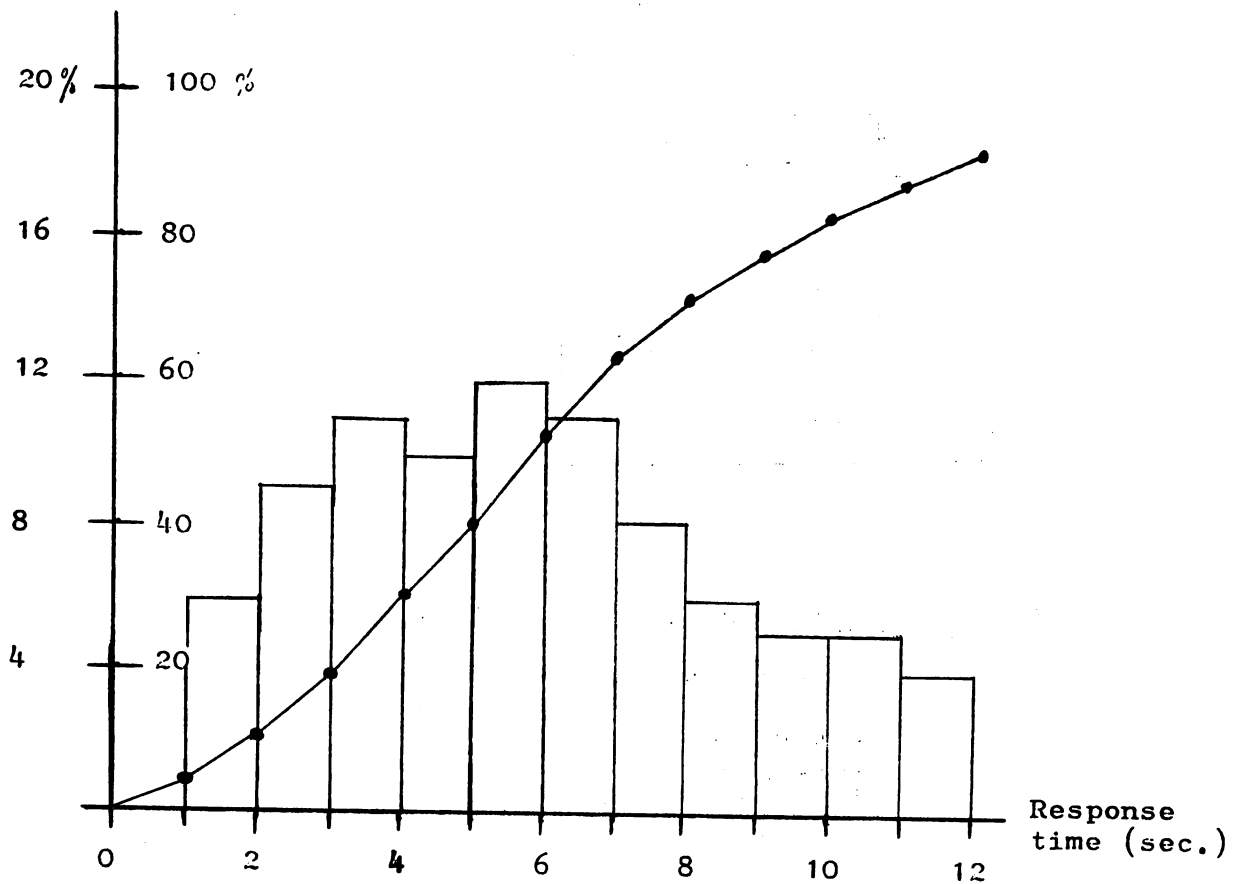
The key-word record contains:

- Address target group codes (0-27 per address)
- Staff member target group codes (0-3 per member)
- Administrative district code
- Telephone area code
- Postal district
- Region code
- Annual turnover code
- Number of employees code

The physical implementation of the data base had to take response time requirements and batch throughput capacity into consideration. After a thorough analysis the physical data base design was established. (The data base design will be discussed in detail at the presentation of this paper. It is not included in the documentation.)

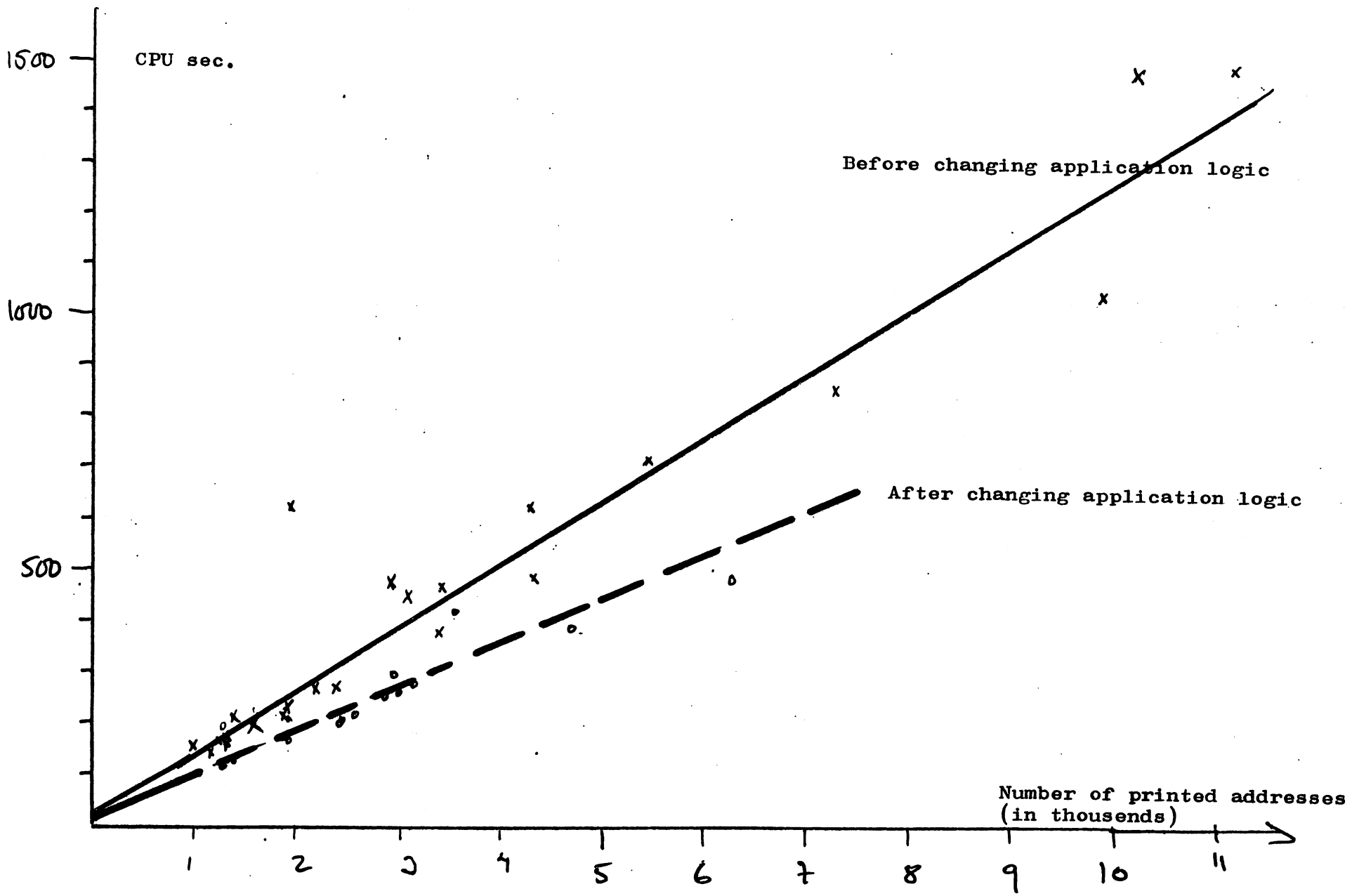
4.5 Response time analysis

The true response time for selecting addresses and retrieving count information of the found set has been measured during normal work conditions taking 1 500 inquiries into the evaluation. The response times show the following distribution:



4.6 Batch throughput analysis

On the following page the output capacity has been measured and plotted as a function of the number of printed addresses:



4.7 Dialogue language

To facilitate user interaction with the PARAD system an interactive language was developed. The language comprises statements for

Selecting addresses from the data base
Specifying and producing the printed output
Revising and amending addresses

The following sample statements explain the nature of the language:

```
:SELECTION
COMPANY OR STAFF ADDRESSES
?C
?M.47110-47119,48200
?M.49000
?AND
?T.08,031,040
?END
999 999 REFERENCES FOUND
TYPE CUSTOMER ORDER NUMBER FOR OUTPUT
?JB4711
```

```
:OUTPUT
TYPE OUTPUT SPECIFICATION
?0.JB4711,L1=FINANCIAL MANAGER
?1.24
?END
```

```
:REVISION
?R.123456          Will display the full address and
                    related information of the company
                    referenced by the number 123456

?N.ESELTE          Will display the company called
                    ESELTE or companies whose name
                    start with those characters
```

In addition to the language commands functional keys are used for:

Browsing forward and backward
Switching between address and name displays
Ordering inquiry cards to be printed
Adding and deleting addresses
Etc.

4.8 Application logic

(This part is not documented but will be discussed at the presentation of this paper.)

5 FOLLOW-UP OF USER SATISFACTION

- 5.1 User satisfaction
- 5.2 Remaining problems
- 5.3 Future development

5.1 User satisfaction

The management and staff of PAR have at several occasions expressed their great satisfaction with their new system. They feel they have got the necessary tools for reaching the initially stated objectives and believe that the new system is decisive for PAR's ability to compete on the direct mail market.

The project was completed in time and there were no cost overruns for the development and implementation work. As this is not often the case for ADP projects it certainly combined to the overall success of the project.

5.2 Remaining problems

There are very few remaining problems as most have been dealt with during the development work. However, a number of good ideas have emerged during the work and PAR is now in the process of implementing improvements to further make it easier for the users to interact with the system.

5.3 Future development

The management of PAR is already planning for new applications for their computer. Specifications have been prepared for order processing, invoicing and accounts receivables.