

Design Objectives for Large Commercial Data Processor

1. General Remarks

- 1.1 Objectives are considered without reference to the Basic and Sigma machines as now defined.
- 1.2 Commercial requirements are considered independently of technical computing requirements, even though it is desirable to have word-size and program compatibility between a large scale commercial system and a technical computing system of comparable scale.
- 1.3 Commercial requirements are treated in three major categories:
 - 1) batch processing
 - 2) in-line processing
 - 3) combined batch and in-line processing
- 1.4 It is assumed that the first production models of the large scale commercial data processor will be delivered to the field not later than 1961.
- 1.5 During the period these machines are in the field (say 1961 to 1966) it is felt that for this large scale system batch processing will predominate, although a considerable growth of in-line processing will be experienced.
- 1.6 An attempt is made to separate design objectives for the commercial system from design objectives for input-output units. This approach involves specifying performance requirements in such a way that multi-programming is an allowable technique for getting the required amount of work done.
- 1.7 Some very specific performance standards are set up for batch processing and in-line processing. These standards are inevitably empirical in nature. Nevertheless, they are considered to be reasonable. Without some specific standards it would be impossible to set unambiguous objectives.

2. Batch Processing Objectives

2.1 Definition of Standard Batch Process

The standard batch process consists of sorting 100,000 records given initially in random order on a tape. These records are 100 characters long and are to be sorted on a control field 12 characters long.

Sorting was chosen because:

- 1) it is a common data process
- 2) it is possible to avoid consideration of input-output equipment other than tapes

The parameters were selected so that a good balance is obtained when the job is performed on a 3-way basis using a 705 III system which has a 40K character memory, two DSUs and six 729 IIIs. The time taken by such a system to complete the job will be termed the standard batch process time (SBPT).

2.2 Minimum Performance Objective

The large scale commercial system must be capable of completing at least four standard batch processes in the SBPT — either one after the other or on a multiprogrammed basis. The only limitations placed on the amount of memory and number and type of tape units which may be assumed are that the rental of any system postulated must meet the requirements listed hereunder.

This objective is not intended to be used as an initial goal, but rather as a means of deciding when performance has dropped so low that the project has lost its original character.

2.3 Maximum Rental Objective

The large scale system postulated for testing the minimum performance objective must have a rental not in excess of three times that of the 705 III system defined above.

2.4 Performance-Rental Objective

Rental of the postulated large scale system must be less than or equal to rental of the specified 705 III system multiplied by the square root of the number of SBPs which the large system can complete in the SBPT.

3. In-Line Processing Objectives

3.1 Definition of Standard In-Line Process

A series of 10,000 transaction records, 40 characters in length, randomly ordered are to be read into the memory and used to update corresponding records in a random access file consisting of 100,000 records, each record being 100 characters long. The internal processing of each record amounts to 100 elementary arithmetic steps. For each transaction record, only a single file record is read from and written back on the RAM. It should be assumed that 1.5 seeks are required to find the desired file record.

The system taken as a comparison standard for in-line processing is the 650 RAMAC. The time taken by such a system to complete the job defined above will be termed the standard in-line process time (SILPT).

3.2 Minimum Performance Objective

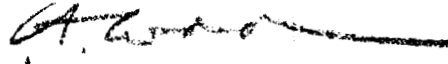
The large scale commercial system must be capable of completing at least 60 standard in-line processes in the SILPT — either one after the other or on a multiprogrammed basis. The only limitations placed on the number and type of random access memories which may be assumed are that the rental of any system postulated must meet the following requirement.

3.3 Performance - Rental Objective

Rental of the postulated in-line system must be less than or equal to rental of the 650 RAMAC multiplied by the square root of the number of SILPs which the large system can complete in the SILPT.

4. Combined Batch and In-Line Processing

The large scale system must be capable of executing any combination of standard batch and standard in-line processes using a multiprogrammed approach. In so doing, it must meet an appropriate combination of the batch and in-line performance objectives.



E. F. Codd
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