This paper presents a solution to avoid the problem of data dependence which is inherent to the database management system whose data model is hierarchical.

From a relational view of the hierarchical structure, it is possible to consider retrievals using a relational query language and a system which builds automatically research programs with optimization techniques.

1- The concept of data independence

It is now widely recognized that data independence is a serious criteria for a database management system to be a good database management system (DBMS). This important concept has been developed by CODD (3), DATE (6) and BRACCHI (1).

Data independence is generally viewed at two levels: a logical and a physical level. The applications of an enterprise are data dependent if the programs are tightly bound to the way data is physically recorded and the way data is accessed. So, it is not possible to change either without dangerous consequences on the programs. Now, for many reasons (optimization, new hardware, adding or deleting data or indexes, changing arithmetic representation, ...) such changes are necessary and frequent.

With physical independence a DBMS allows the users to be unaware of the storage structure, i.e. of the physical representation of the data they utilize. So, the application programs are not subjected to the variations of this physical representation. Logical independence acts at the level of the data model definition (the schema) which contains the logical definition of the whole information of the data base.

In fact, the users utilize a subset of this model (a sub-schema) whose definition is logically more adapted to their applications; from this point of view, we have a logical independence in the sense that all the programs concerned
with the data base will remain unchanged if we add new types of data (for new applications) or new fields in a data type.

In addition, and on grounds of expediency, every sub-schema may use particular names or subdivisions regarding the same information of the schema that means each user may reconstruct information contained in the schema for his proper point of view of the applications.

Last, but not least, independence between the schema, the sub-schema and the physical structure is achieved by the interfaces, a logical and a physical mapping model, which realize the correspondencies between on one hand the schema - sub-schema structure and on the other hand the schema and the storage structure.

These are the essential characteristics of a DBMS, but, in fact, the users' conception of the data is more or less dependent of the schema which is presented to them.

The purpose here is to analyze this aspect in a hierarchical data base and to show how a solution can be given using a relational model.

2- The hierarchical structure of IMS

A typical hierarchical DBMS can be represented by IMS (9). The structure of the schema is distinguished by a tree. The data base represented below shows such a structure : in a hospital we have informations associated with each patient and concerning the visits, the diagnosis made by the physician with application of medicine or decision of intervention and, in this case, a complementary diagnosis.

![An IMS data structure](image)

Figure 1: An IMS data structure