Data Management Systems

COMPUTER SCIENCES CORPORATION

DML

IDMS

SYSTEM 2000

General Information Manual

IGIM
General Information Manual

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PREFACE

IGIM is a general purpose data management system available to users of Computer Sciences Teleprocessing System (CSTS). IGIM, a flexible tool for the definition, creation, and maintenance of data bases, is especially suited for the easy implementation of information systems which require complex data interrelationships.

IGIM software is applicable to a wide variety of data management needs. Past and present applications include:

- Project Control
- Configuration Management
- Product Test and Anomaly Tracking
- Insurance Risk Management
- Cash Flow Management
- Equipment Maintenance
- Contracts Management
- Welfare Administration
- Library Indexing and Citation
- Personnel Records
- Property Management
- Highway Configuration and Indexing System
- Intelligence Data Analysis

CONTENTS

FIGURES

Figure

IGIM OVERVIEW

IGIM, a self-contained general-purpose data base management system, provides all the software capabilities required to create, maintain, and interrogate a large, complex data base. The system is designed to be used by persons without prior data processing experience. The following paragraphs provide a brief overview of IGIM and its capabilities.

DATA BASE STRUCTURE

An IGIM data base is normally composed of many files. Each IGIM file is composed of records, fields, and values.

The logical structure of an IGIM data base is maintained in user-controlled dictionaries. By manipulating the dictionaries, a data base can be easily modified and quickly adapted to changing requirements.

A special field in each record, called the key, has a unique value which allows the user to directly retrieve any record from the data base.

LANGUAGE SYNTAX

An IGIM user defines, creates, and maintains a data base and retrieves data from it through a free-form, English-like language which supports a powerful interactive query capability. The power of the language is enhanced with utility processors used to:

- Format reports and perform sorts and computation on the report information.

- Utilize and create files other than IGIM data base files. This capability is especially useful for the initial load of a data base and for performing volume updates to the data base.

- Create a file containing IGIM language statements (a procedure) which can be invoked for processing with a single command.

DATA CORRELATION

One of the most important features of IGIM is the capability to create and automatically maintain data relationships between files, between records, and between fields. A single data item can be a logical component of many records and many files, but still is stored in only one physical location within the data base.

Data correlation, the establishment of logical relationships among data elements, provides the capability to maintain a data base in a compact, integrated, and internally consistent form. The logical (or data) relationships which can be established include:

- Retrieval relationships, where the retrieval of one field causes the automatic retrieval of related fields.

- Indirect update relationships, where an update to one field causes an automatic update to a second field.

- Hierarchical and network relationships, where values have a parent-descendant relationship.

- Arithmetic relationships, where one field is defined as an arithmetic function that is the result of performing arithmetic operations on two or more fields.

DATA BASE PROTECTION AND PRIVACY

IGIM protects a data base through:

- Extensive data editing capabilities which protect the user from entering erroneous data into his data base.

- A history log (audit trail) which automatically records all data base transactions.

- A checkpoint/restore feature which provides quick data base recovery in the event of system failure.

IGIM ensures data base privacy through locks which may be applied selectively to any fields, records, or files in the data base to protect the data base from unauthorized access.

THE FRAMEWORK OF IGIM

This section describes the design philosophy of IGIM. In particular it describes:

- The conceptual organization of an IGIM data base.
- The IGIM language.

CONCEPTUAL DATA BASE ORGANIZATION

An IGIM data base is a set of hierarchically related units of data. (See Figure 1.) The top level of the hierarchy is the master dictionary. The lower levels of the hierarchy consist of file dictionaries, utility dictionaries, files, records, and fields.

DICTIONARIES

One of the fundamental differences between data base management and traditional file management is that an integral part of the data base is its definition. The data attributes and the data relationships are defined within the data base, not described by some external program which acts upon the data base.

The definition of an IGIM data base is maintained in files called dictionaries. Because the structure of the data base is defined in the dictionaries, the entire structure of the data base can be altered by altering the dictionaries; this is the basis of IGIM's flexibility.

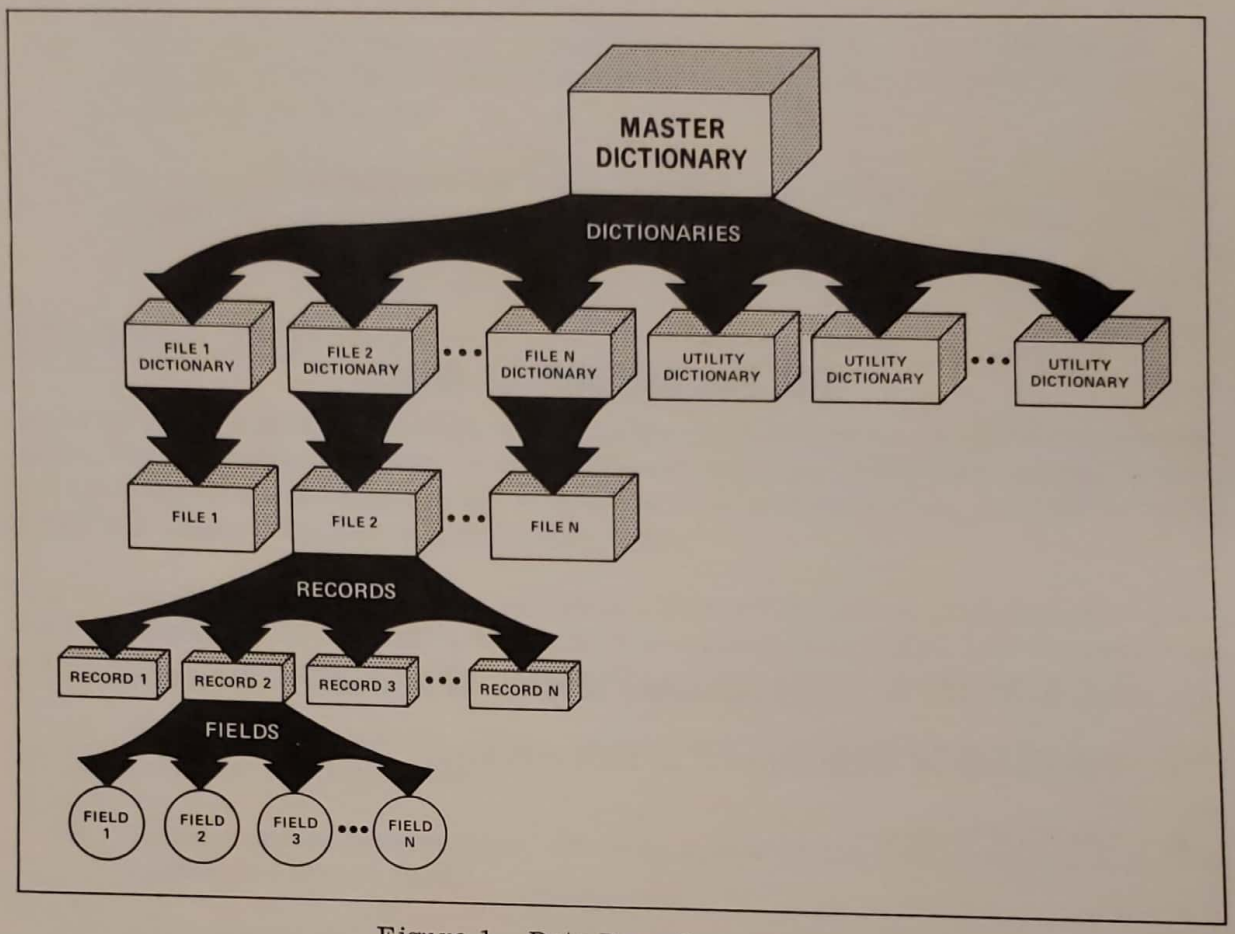


Figure 1. Data Base Organization

There are three kinds of dictionaries:

- The master dictionary
- File dictionaries
- Utility dictionaries

A dictionary is a file which describes another file. The master dictionary is maintained by the IGIM system. This dictionary contains security information and defines the lower-level dictionaries.

Utility dictionaries are constructed by the user to describe the application-specific requirements of IGIM's utility processors.

File dictionaries are defined by the user. For each user data file, a corresponding dictionary describes the attributes of the file's data, the logical relationships among the data in the file, and the file access rights of data base users.

FILES

The relationship between file dictionaries and user data files is illustrated in Figure 2. A similar relationship exists between the master dictionary and the file dictionaries.

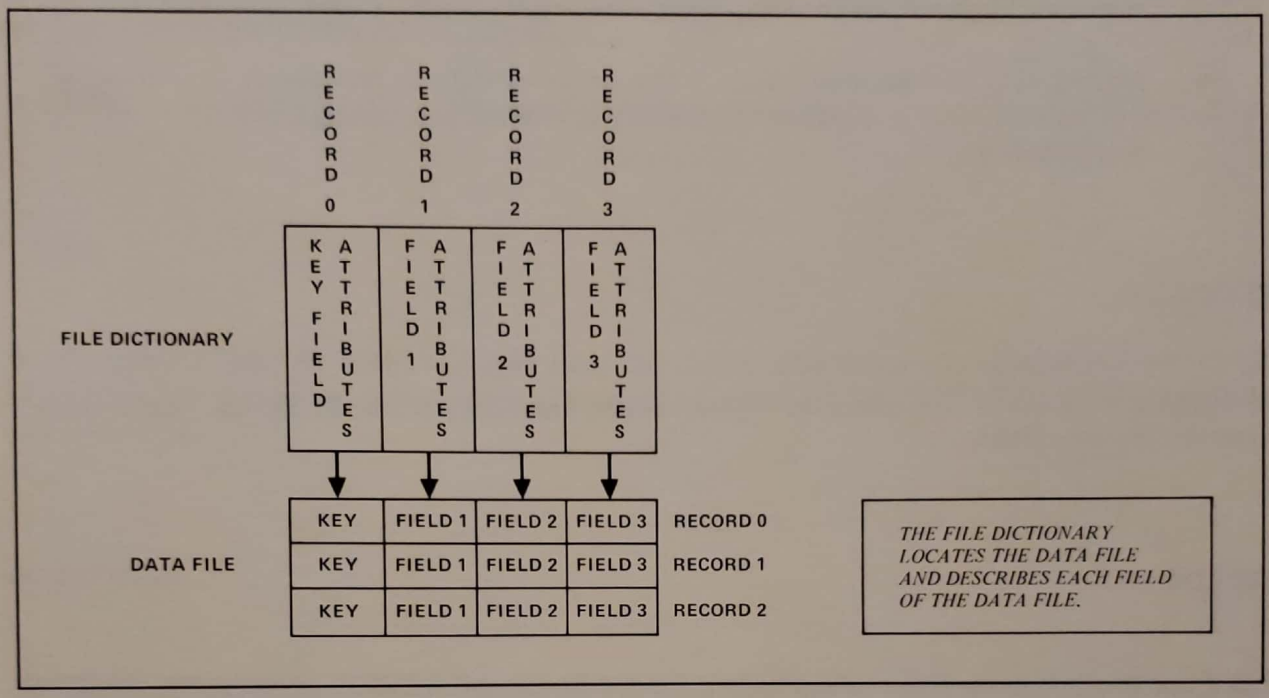


Figure 2. Relationship of the File Dictionary and the Data File

In a file dictionary, each record describes one field of the user data file. In Figure 2, the file dictionary defines a key field plus three additional data fields. Each record in the data file contains values for the four fields defined in the dictionary.

Among the attributes described in a dictionary are the print length of a field, constraints on the field's value, interrelationships with other data elements, and the manner in which the field is stored. (Refer to the section, Data Correlation and Data Validation.)

An IGIM file may contain an arbitrary number of records; the only physical size limitation on a file is that it must be smaller than the maximum data base size. This limit exceeds 200 million characters.

IGIM dictionaries can define interfile relationships. Therefore, there is no need to incorporate all data into a single file in order to relate all the data nor any need to repeat data in several files.

the framework of IGIM

The main advantages of using multifile data bases are:

- The ease with which a user can view a data base by its division into distinct file modules simplifies understanding of the data base structure.
- Reduced processing time. Data processing is applied to compact files rather than to a single massive file which must carry seldom used information.
- Elimination of data duplication. If a group of data is frequently repeated, it can be stored as a separate file entity and accessed through interfile relationships.

RECORDS

An IGIM record is variable length. Each record can contain 1 to 99 fields, one of which must be the key field.

FIELDS

The field is the lowest level of the data base organization. Data is normally entered into the data base by field. Fields are variable length and compacted so that no space is wasted. They may be multivalued and can contain hierarchically related values. (Refer to the section Data Correlation and Data Validation for a description of the extensive editing capabilities and interrelationships which can be defined for the fields of a file.)

A single field may have several user-defined synonym names. Synonym names serve two basic functions:

- Convenience. A field with the name EMPLOYEE HOME ADDRESS can be given a synonym name HA for ease of reference.
- The unique capability to assign different logical properties to a single data value. A data field may have different attributes dependent on the synonym name by which it is referenced.

IGIM LANGUAGE

The same basic IGIM language syntax is utilized for all four of the data management functions performed by the IGIM system – data base definition, file creation, data base maintenance and data base retrieval. Further, the user may modify the IGIM language by establishing synonym words for any word in the IGIM vocabulary and thereby tailor the language to his particular application.

The IGIM language is English-like and includes verbs, nouns, connectives and modifiers.

VERBS

IGIM supports over 40 verbs for data base definition, file creation, update and retrieval, as well as for the utility procedures. Typical verbs are ADD, CHANGE, LIST, COUNT, and DELETE.

MODIFIERS

Modifiers are used to restrict the use of a verb by limiting its action to certain records or parts of records. Typical modifiers are EQUAL, GREATER/THAN, NOT, ONLY, and WITH.

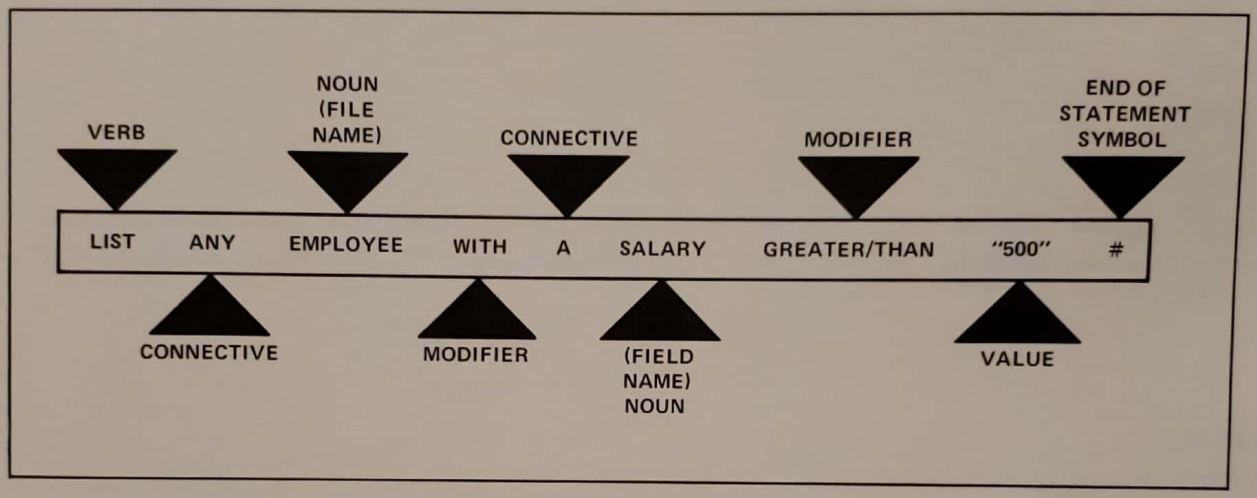
CONNECTIVES

There are logical connectives and convenience (optional) connectives. The logical connectives are ANDD and INN and are used with modifiers to conditionally qualify data for retrieval and update. Convenience connectives can be used to make IGIM statements appear more English-like, but they have no effect on IGIM processing. Convenience connectives include A, ALL, AND, ANY, FOR, FROM, IF, IN, OF, OR, and THE. Additional convenience connectives may be established by the user.

NOUNS

Nouns are the names assigned to fields and files at the time of data base definition. A few nouns assigned by IGIM exist in all standard IGIM files; all other nouns are assigned by the user as he defines his files.

An IGIM statement always begins with a verb and typically resembles the following example:



Note that each statement is terminated with a pound sign (#) character.

Each IGIM statement is processed to completion before the next statement may be specified. However, statements may be stored in a procedure list for later processing. (Refer to the section, Special Features and Capabilities.)