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1999-03-01

Identification cards — Integrated circuit(s) cards with contacts —

Part 7:
Interindustry commands for Structured Card Query Language (SCQL)

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Cartes d'identification — Cartes à circuit(s) intégré(s) à contacts —
Partie 7: Commandes intersectorielles pour langage d'interrogation de carte structurée (SCQL)

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Foreword

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In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 7816-7 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommitte SC 17, *Identification cards and related devices*.

ISO/IEC 7816 consists of the following parts, under the general title *Identification cards — Integrated circuit(s) cards with contacts*:

— *Part 1: Physical characteristics*

— *Part 2: Dimensions and location of the contacts*

— *Part 3: Electronic signals and transmission protocols*

— *Part 4: Interindustry commands for interchange*

— *Part 5: Numbering system and registration procedure for application identifiers*

— *Part 6: Interindustry data elements*

— *Part 7: Interindustry commands for Structured Card Query Language (SCQL)*

— *Part 8: Security related interindustry commands*

Annex A of this part of ISO/IEC 7816 is for information only.

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Introduction

This part of ISO/IEC 7816 is one of a series of standards describing the parameters for integrated circuit(s) cards with contacts and the use of such cards for international interchange.

These cards are identification cards intended for information exchange negotiated between the outside and the integrated circuit in the card. As a result of an information exchange, the card delivers information (computation results, stored data), and/or modifies its content (data storage, event memorization).

During the preparation of this part of ISO/IEC 7816, information was gathered concerning relevant patents upon which application of this part of ISO/IEC 7816 might depend. Relevant patents were identified in France, the patent holder is Gemplus. However, ISO cannot give authoritative or comprehensive information about evidence, validity or scope of patents or like rights.

The patent holder has stated that licenses will be granted in appropriate terms to enable application of this part of ISO/IEC 7816, provided that those who seek licenses agree to reciprocate.

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Identification cards — Integrated circuit(s) cards with contacts —

Part 7:
Interindustry commands for Structured Card Query Language (SCQL)

1 Scope

This part of ISO/IEC 7816 specifies

— the concept of a SCQL database (SCQL = Structured Card Query Language based on SQL, see ISO 9075) and

— the related interindustry enhanced commands.

2 Normative references

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The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC 7816. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO/IEC 7816 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO/IEC 9075:1992, *Information technology — Database languages — SQL2.*

ISO/IEC 7816-4:1995, *Information technology — Identification cards — Integrated circuit(s) cards with contacts — Part 4: Interindustry commands for interchange.*

ISO/IEC 7816-6:1996, *Identification cards — Integrated circuit(s) cards with contacts — Part 6: Interindustry data elements.*

3 Terms and definitions

For the purposes of this part of ISO/IEC 7816, the following definitions apply.

3.1
database basic user
SCQL user with no inherent rights

3.2
database file
structured set of database objects (tables, views, dictionaries) representing the content of a database

3.3
database object owner
SCQL user with the special right to create and drop objects and to manage privileges on these objects

3.4
database owner
initial SCQL user which manages objects and users of the database

3.5
dictionary
view on a system table

3.6
system table
table maintained by the card for managing the database structure and database access

3.7
table
database object with a unique name and structured in columns and rows

3.8
view
logical subset of a table

4 Symbols (and abbreviated terms)

For the purposes of this part of ISO/IEC 7816, the following abbreviations apply:

APDU	Application protocol data unit
API	Application programming interface
DB	Database
DB_O	Database owner
DBBU	Database basic user
DBF	Database file
DBOO	Database object owner
DF	Dedicated file
DO	Data object
ICC	Integrated circuit(s) card
IFD	Interface device
MF	Master file
SCQL	Structured card query language
SQL	Structured query language
TLV	Tag, length, value

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5 SCQL database concept

5.1 SCQL database

A database in a card according to this part of ISO/IEC 7816 is called a SCQL database (SCQL = Structured Card Query Language), since the commands for accessing are based on SQL-functionality (see ISO 9075) and coded according to the principles of interindustry commands as defined in ISO/IEC 7816-4. The database itself is a structured set of database objects called a database file DBF. Under a DF there shall be not more than one DBF which is accessible after selection of the respective DF. A database may be also directly attached to the MF.

Fig.1 shows an example for the embedding of a database in the card.

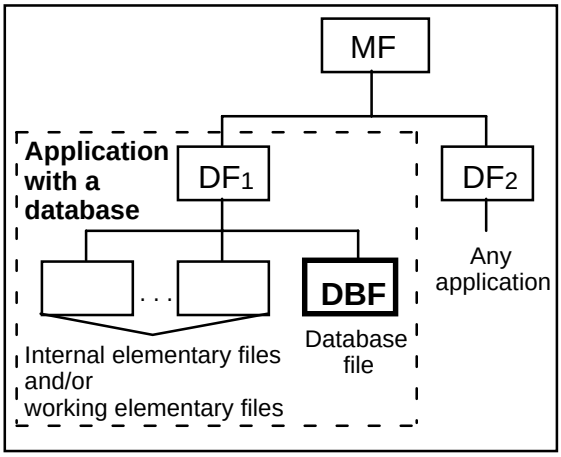

Figure 1 — Application with a database in a multi-application card (example)

An application system may interwork with a SQL database as well as with a SCQL database using the same SQL-API (API = Application Programming Interface). Thus, a card carrying a SCQL database may appear as a part of a distributed SQL database environment. Fig. 2 shows a typical SQL configuration with a card integrated in the system design.

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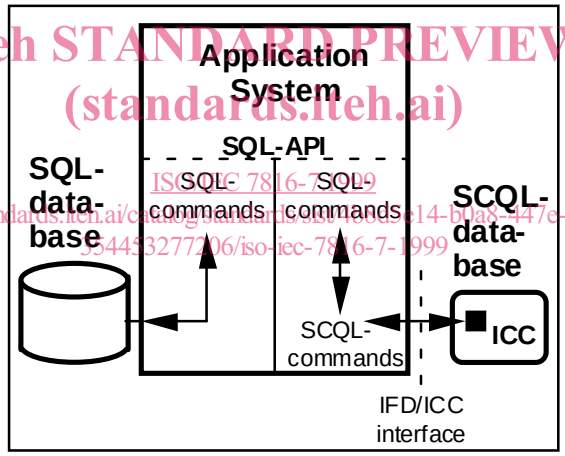

Figure 2 — SCQL database as part of a distributed SQL database environment (example)

5.2 SCQL tables

A SCQL database contains objects called tables, views and dictionaries. Each object can be referenced by a unique identifier.

A table is a structured data object with a unique name within a database. It consists of named columns and a sequence of rows. The number of rows may be conceptually unlimited (i.e., only restricted by the available memory space in the card), or limited. The table and the main characteristics are shown in fig. 3.

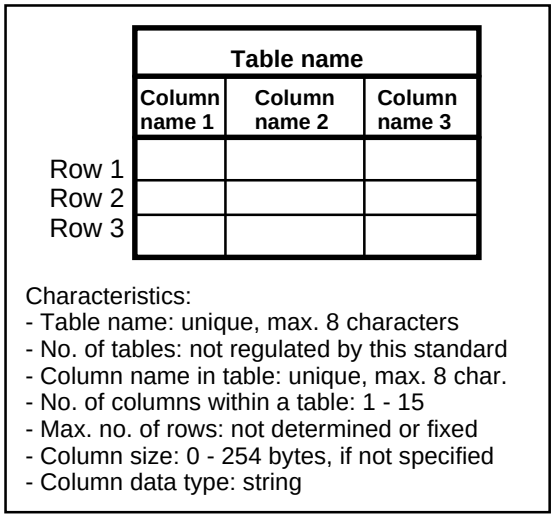

Figure 3 — SCQL table (example) and its main characteristics

After creation the table structure is persistent, i.e. neither an existing column can be withdrawn nor a new column can be inserted. On a table the following actions can be performed:

— read (select)

— insert

— update

— delete.

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5.3 SCQL views

A view is a logical subset of a table, which defines the part of the table accessible. Two types of views are to be distinguished:

— a view (see fig. 4), which by definition fixes the accessible columns, is called in this context a static view and

— a view (see fig. 5), which restricts the access to those rows whose contents matches defined conditions (e.g. to rows the value of which is greater '20'), is called in this context a dynamic view.

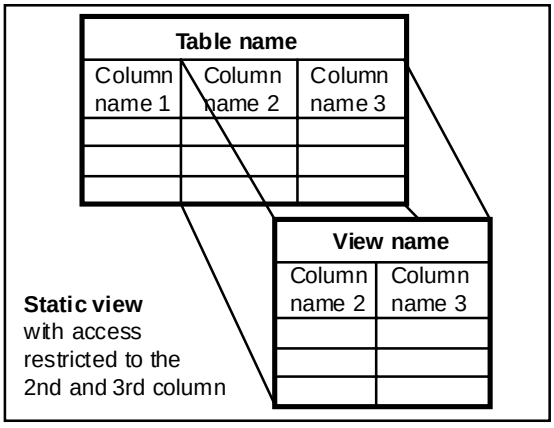

Figure 4 — SCQL static view (example)

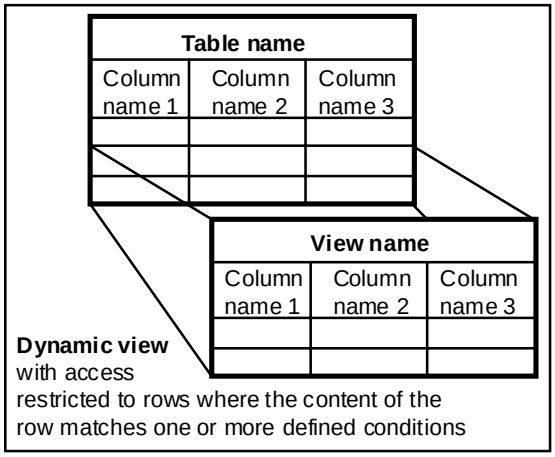

Figure 5 — SCQL dynamic view (example)

A combination of static view and dynamic view in the same view definition is also possible.

A view has like a table a unique name in a SCQL database. Several views may be defined on the same table.

On a view the following actions can be performed:

— read (select)

— update.

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5.4 SCQL system tables and dictionaries

A system table is maintained by the card and contains information necessary to manage the database structure and access. There are three system tables:

— the object description table (name *O)

— the user description table (name *U)

— the privilege description table (name *P)

The object description table contains information about the tables and views stored in the database.

The user description table contains information about the users which have access to the database.

The privilege description table contains information about the privileges onto the database tables and views. Privileges describe which tables and views can be accessed by which users, and which actions can be performed by those users on the respective table or view.

The figures 6 - 8 show the system tables with their mandatory columns.

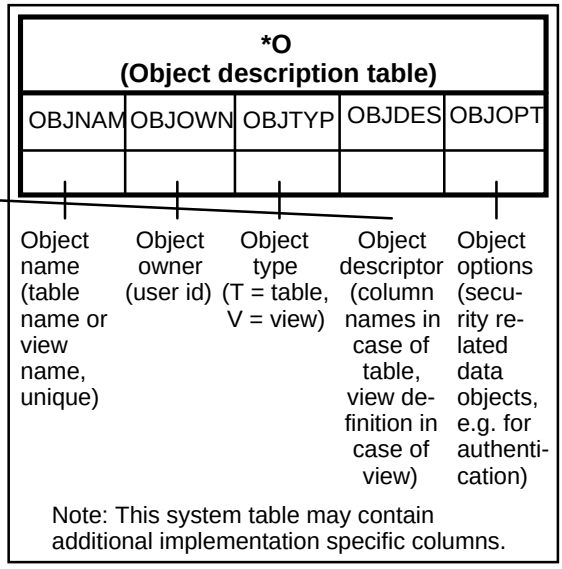

Figure 6 — Object description table

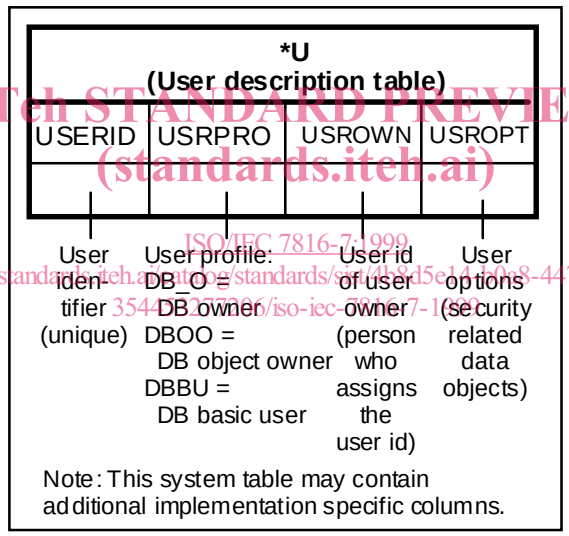

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Figure 7 — User description table

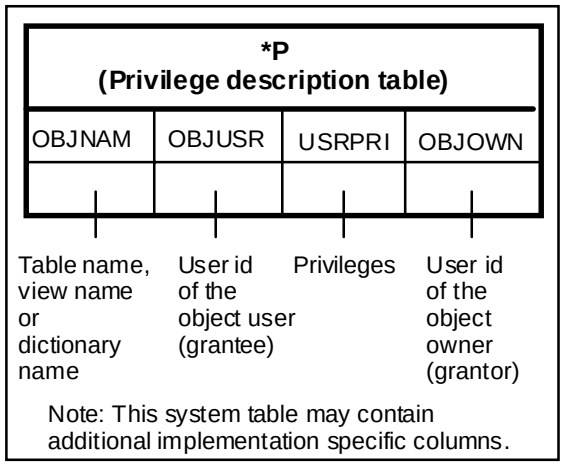

Figure 8 — Privilege description table

For access to the information contained in the system tables, views on these system tables can be created. A view on a system table is called a SCQL dictionary. The only action which a user can perform on a dictionary is reading (select).

5.5 SCQL user profiles

SCQL user profiles are characterized by special permissions. A user profile is attached to a user identifier stored in the user description table. Table 1 shows the profiles and the attached permissions.

Table 1 — SCQL user profiles and attached permissions

Profile	User	Permission
DB_O	Database owner	- Adding/dropping of users with profile DBOO or DBBU - Creation/deletion of objects (tables/views) - Granting/revoking of privleges for objects owned - Creation/deletion of dictionaries with access to all rows in the system tables - Access to objects not owned according to the privileges granted
DBOO	Database object owner	- Adding/dropping of users with profile DBBU - Creation/deletion of objects (tables/views) - Granting/revoking of privileges for objects owned - Creation/deletion of dictionaries with access to rows where the DBOO is registered as OBJOWN in *O, USROWN in *U or OBJOWN in *P - Access to objects not owned according to the privileges granted
DBBU	Database basic user with specific user id or the general user id PUBLIC	- Access to objects according to the privileges granted

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NOTE A user with the profile DB_O can only be inserted in the user description table during the SCQL database installation.

6 SCQL related commands

6.1 General aspects

The 'Structured Card Query Language (SCQL)' is based on the functionality of the standardized 'Structured Query Language (SQL)'. SQL statements are mapped onto SCQL operations within the PERFORM SCQL OPERATION command (see fig. 9 and table 2).