UNIT 2

Lecture 11

RDBMS

Codd’s 12 Rules for RDBMS

- **Codd's 12 rules** are a set of thirteen rules (numbered zero to twelve) proposed by **Dr. Edgar F. Codd,** a pioneer of the relational model for databases, designed to define what is required from a database management system in order for it to be considered ***relational***, i.e., an **RDBMS**.
- Codd produced these rules as part of a personal campaign to prevent his vision of the relational database being diluted, as database vendors scrambled in the early 1980s to repackage existing products with a relational veneer. Rule 12 was particularly designed to counter such a positioning.
- In fact, the rules are so strict that all popular so-called "relational" DBMSs fail on many of the criteria.

Codd's 12 Rules for RDBMS

- **Rule 0 : The Foundation Rule**
- **Rule 1 : The information rule**
- **Rule 2 : The guaranteed access rule**
- **Rule 3 : Systematic treatment of null values**
- **Rule 4 : Active online catalog based on the relational model**
- **Rule 5 : The comprehensive data sublanguage rule**
- **Rule 6 : The view updating rule**
- **Rule 7 : High-level insert, update, and delete**
- **Rule 8 : Physical data independence**
- **Rule 9 : Logical data independence**
- **Rule 10 : Integrity independence**
- **Rule 11 : Distribution independence**
- **Rule 12 : The non-subversion rule**

Rule 0: The Foundation Rule

- The system must qualify as *relational*, as a *database*, and as a *management system*.
- For a system to qualify as a relational database management system (RDBMS), that system must use its *relational* facilities (exclusively) to *manage* the *database*.

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1	RAM	3	CSE	40	121
2	SHYAM	5	CSE	50	122
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4	GOPAL	5	IT	65	121
5	RINKI	3	MECH	40	122
6	PINKI	3	ETC	90	123

PROJECT

Pno	Pname	Duration
121	P1	10
122	P2	20
123	P3	30

Rule 1: The information rule

- All information in the database is to be represented in one and only one way, namely by values in column positions within rows of tables.

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Rule 2: The guaranteed access rule

- All data must be accessible with no ambiguity.
- This rule is essentially a restatement of the fundamental requirement for primary keys.
- It says that every individual scalar value in the database must be logically addressable by specifying the name of the containing **table**, the name of the containing **column** and the **primary key** value of the containing row.

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Rule 3: Systematic treatment of null values

- The DBMS must allow each field to remain null (or empty). Specifically, it must support a representation of "**missing information and inapplicable information**" that is systematic, distinct from all regular values (for example, "distinct from zero or any other number", in the case of numeric values), and independent of data type.
- It is also implied that such representations must be manipulated by the DBMS in a systematic way.

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Rule 4: Active online catalog based on the relational model

- The system must support an online, inline, relational catalog that is accessible to authorized users by means of their regular query language. That is, users must be able to access the database's structure (catalog) using the same query language that they use to access the database's data.

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Rule 5: The comprehensive data sublanguage rule

- The system must support at least one relational language that
  1. Has a linear syntax
  2. Can be used both interactively and within application programs,
  3. Supports data definition operations (including view definitions), data manipulation operations (update as well as retrieval), security and integrity constraints, and transaction management operations (begin, commit, and rollback).

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Rule 6: The view updating rule

- All views that are theoretically updatable must be updatable by the system.

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Rule 7: High-level insert, update, and delete

- The system must support set-at-a-time *insert*, *update*, and *delete* operators.
- This means that data can be retrieved from a relational database in sets constructed of data from multiple rows and/or multiple tables.
- This rule states that insert, update, and delete operations should be supported for any retrievable set rather than just for a single row in a single table.

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Rule 8: Physical data independence

- Changes to the physical level (how the data is stored, whether in arrays or linked lists etc.) must not require a change to an application based on the structure.

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Rule 9: Logical data independence

- Changes to the logical level (tables, columns, rows, and so on) must not require a change to an application based on the structure.
- Logical data independence is more difficult to achieve than physical data independence.

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Rule 10 : Integrity independence

- Integrity constraints must be specified separately from application programs and stored in the catalog.
- It must be possible to change such constraints as and when appropriate without unnecessarily affecting existing applications.

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Rule 11 : Distribution independence

- The distribution of portions of the database to various locations should be invisible to users of the database.
- Existing applications should continue to operate successfully :
  - when a distributed version of the DBMS is first introduced; and
  - when existing distributed data are redistributed around the system.

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Rule 12 : The non-subversion rule

- If the system provides a low-level (record-at-a-time) interface, then that interface cannot be used to subvert the system,
- for example, bypassing a relational security or integrity constraint.

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Difference between DBMS and RDBMS

SNO	DBMS	RDBMS
1	DBMS stands for Database Management System, which consist of number of tables, and all the tables are treated as different entities. There is no relation established among these entities.	RDBMS stands for Relational Database Management System, which have the relationship with other tables.
2	DBMS includes the theoritical part that how data are stored in a table. It does not relate tables with another.	While RDBMS is the procedure way that includes SQL sysntaxes for relating tables with another and handling data stored in tables.
3	DBMS may satisfy less than 7 rules of Dr. E. F. Codd.	RDBMS usually satisfy more than 7 to 8 rules of Dr. E.F. Codd.

Difference between DBMS and RDBMS

SNO	DBMS	RDBMS
4	In DBMs only one user can access the same database, at the same time.	In RDBMS many users simultaneously access the same database.
5	In DBMS entity is more important.	In RDBMS the relation is more important than objects itself.
6	The DBMS is for small organizations.	The RDBMS is for large organizations.
7	It is less secure than RDBMS.	RDBMS is more secure than DBMS.
8	DBMS store and retrieve small amount of Data.	RDBMS store and retrieve large amount of Data.
9	Examples of DBMS are Foxpro and MS-ACCESS.	Examples of RDBMS are ORACLE, SQL 2000, and IBM DB2.

University Questions

1. Explain codd's 12 rules for RDBMS.
2. Explain the difference between DBMS and RDBMS.

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The link for my youtube channel is

https://www.youtube.com/channel/UCRWGtE76JlTp1iim6aOTRuw?sub_confirmation=1