Data Base System
Week 4th Topics

- Model
- Data Model
- Types of Model
- Relational Data Model Concepts and Terminologies
- DBMS vs RDBMS

Data Base System
Week 4th Topics

Model

- is the abstract representation of objects, events and their association

Data Model

- is the abstract representation of data about entities, events, activities and their association in an organization

Purpose

- To represent data in an understandable way

Parts of Data Model

- **Structural Part:** consists set of rules i.e. how a database can be developed i.e. terminologies
- **Manipulative Part:** defines the type of **operations** that can be performed on data
- **Set of Integrity Rules:** ensures the accuracy of data in DB also called constraints

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Categories of Data Models

1. **Object-based**
2. **Record-based**
3. **Physical.**

2. Record-based Data Model

- Used to describe external and conceptual level of database and can describe internal level to some extent
- Database consists of different records may be of different types
- Each record define a fixed number of fields

Types

- **Relational Data Model**
- **Network Data Model**
- **Hierarchical Data Model**

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Relational Data Model

- Dr. E.F Codd and his associate at IBM research laboratory proposed in 1970 by applying the rules of mathematics
- Presented a paper "A relational Model of Data for Large Shared Databanks" contained 12 rules
- A DBMS that satisfy these rules is called RDBMS
- INGRES (Interactive Graphics and Relational System) was an early relational model
- So relational data model represent data in DB as a collection of relations
- Relational Database is a collection of normalized relations with distinct relation names.

Structural Part: (Terminology)

a) Relation

- A relation is a table with columns and rows.
- Only applies to logical structure of the database, not the physical structure
- it represent entities and their relationships
- every relation will be visualized by name
- Every relation is a table but every table is not a relation
- Flat Table: A flat DB(File) consists of only one table

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Relational Data Model

b) Attribute

Attribute is a named column of a relation with unique name

c) Degree

Degree is the number of attributes in a relation

d) Tuple

Tuple is a row of a relation

e) Cardinality

Cardinality is the number of tuples in a relation

f) Domain

Domain is the set of allowable values for one or more attributes

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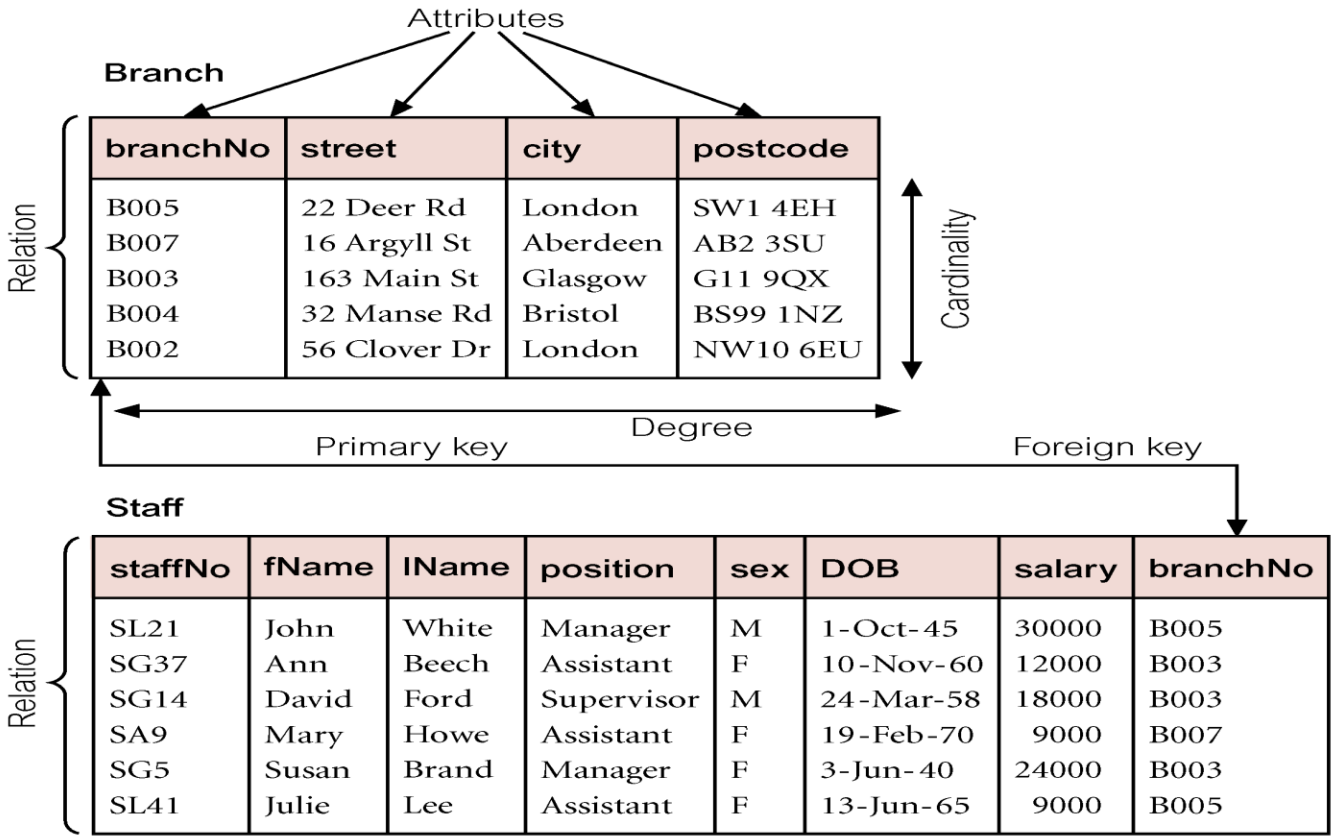
Relational Data Model



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Domain Example

Attribute	Domain Name	Meaning	Domain Definition
branchNo	BranchNumbers	The set of all possible branch numbers	character: size 4, range B001–B999
street	StreetNames	The set of all street names in Britain	character: size 25
city	CityNames	The set of all city names in Britain	character: size 15
postcode	Postcodes	The set of all postcodes in Britain	character: size 8
sex	Sex	The sex of a person	character: size 1, value M or F
DOB	DatesOfBirth	Possible values of staff birth dates	date, range from 1-Jan-20, format dd-mmm-yy
salary	Salaries	Possible values of staff salaries	monetary: 7 digits, range 6000.00–40000.00

Table 3.1 Alternative terminology for relational model terms.

Formal terms	Alternative 1	Alternative 2
Relation	Table	File
Tuple	Row	Record
Attribute	Column	Field

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Properties of Relations

- Relation name is distinct from all other relation names in relational schema.
- Each cell of relation contains exactly one atomic (single) value.
- Each attribute has a distinct name.
- Values of an attribute are all from the same domain.
- Each tuple is distinct; there are no duplicate tuples.
- Order of attributes has no significance.
- Order of tuples has no significance, theoretically.

Key

Uniquely identify a record

Representation of Relation

- Pictorial
- Schema (Extension)
- DD/D (Intension)
- Entity Diagram

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Base Relation

- Named relation corresponding to an entity in conceptual schema, whose tuples are physically stored in database.

View

- Dynamic result of one or more relational operations operating on base relations to produce another relation.
- A virtual relation that does not necessarily actually exist in the database but is produced upon request, at time of request.
- Contents of a view are defined as a query on one or more base relations.
- Views are dynamic, meaning that changes made to base relations that affect view attributes are immediately reflected in the view.

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DBMS	RDBMS
DBMS data is stored in the form of rows and columns	RDMS data stored in the form of Relations
Data stored in DBMS is temporarily	where as in rdbms is permanently
In DBMS keys are not used	In RDBMS keys are used
In DBMS duplication of rows and columns	But in RDBMS there is no duplication of rows and columns
DBMS is for single user only	RDBMS is for multi-user
DBMS does not satisfies codd's rules.	RDBMS satisfies codd's rules
Eg: DBMS: Sysbase foxpro	Eg: RDBMS: Oracle, SQl server

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Uses of RDBMS in different sectors:

Database is widely used all around the world in different sectors:

1.Banking: For customer information, accounts loans and banking transactions.

2.Airlines: For reservations and schedule information. Airlines were among the first to use database in a geographically disturbed manner-terminals situated around the world accessed the central database system through phone lines and other data networks.

3.Universities: For student information, course registrations and grades.

4.Credit card transactions: For purchases on credit cards and generation of monthly statements.

5.Telecommunications: For keeping records of calls made, generating monthly bills, maintaining balances on prepaid calling cards and storing information about the communication networks.

6.Finance: For storing information about holdings, sales and purchase of financial instruments such as stocks and bonds.

7.Sales: For customer, product and purchase information.

8.Manufacturing: For management of supply chain and for tracking production of items in factories, inventories of items in warehouses/stores and orders for items.

9.Human Resources: For information about employees, salaries, payroll taxes and benefits and for generation of paychecks.

10.Web based services: For taking web users feedback, responses, resource sharing etc.