

KUDRANT ACADEMY

SQL Essentials

Relational Database Concepts

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Objectives

- Learn how data is stored in a database.
- Learn how the data in a database is related.
- Learn about the relational database model.



What is the role of databases in an organization?

- A relational database is a collection of two-dimensional related tables controlled by the oracle server.
- A table is a collection of computer data that is organized, defined and stored as rows and columns.
- In non-relational systems, a table is called a file.
- A table represents entities and relationships.



Create Table Syntax

```
CREATE TABLE t1 (c1 NUMBER PRIMARY KEY);  
CREATE TABLE t2 (  
    c1 NUMBER PRIMARY KEY,  
    c2 NUMBER REFERENCES t1(c1),  
    c3 VARCHAR2(30) );
```

t1- table_name

c1-column name

t2-table name

c1-c3-column names



Relational Database Concepts

The principles of the relational model were first outlined by Dr. E.F. Codd in a June 1970 paper titled a Relational Model for database systems. This model became the basis for the relational database management system (RDBMS).

The relational model consists of the following:

- Collection of objects or relations that store data.
- A set of operators that can act on the relations to produce other relations.
- Data integrity for accuracy and consistency.



Relational Database Concepts

- Relational database systems were originally developed because of familiarity and simplicity. Because tables are used to communicate ideas in many fields, the terminology of tables, rows, and columns is familiar to most users.
- A relational database uses relations or two-dimensional tables to store information. For example, information about all the employees in a company may be stored in a database.
- In a relational database, several tables are created to store different pieces of information for a company HR database such as an employee table, a department table, a job table and a salary table.

Relational Database Concepts

- Each table in a relational database has a heading, or definition part, and a body, or content part.
- The heading part consists of the table name and column names. For example, the student table for an example university database has columns for student number, first name, last name, address, city, state, zip, class, major, and cumulative grade point average.

STUDENT

STENO	STDFIRSTNAME	STDLASTNAME	STDCITY	ST	STDZIP	STDMAJ	ST	STDGPA
123-45-6789	HOMER	WELLS	SEATTLE	WA	98121-1111	IS	FR	3
124-56-7890	BOB	NORBERT	BOTHELL	WA	98011-2121	FIN	JR	2.7
234-56-7890	CANDY	KENDALL	TACOMA	WA	99042-3321	ACCT	JR	3.5
345-67-8901	WALLY	KENDALL	SEATTLE	WA	98123-1141	IS	SR	2.8
456-78-9012	JOE	ESTRADA	SEATTLE	WA	98121-2333	FIN	SR	3.2

Relational Database Concepts

- The body shows the rows of the table. Each row in the student table represents a student enrolled at the university.
- Looking at the data, you can see that the student table contains 5 different rows which represent different university students.
- To facilitate communication, the naming convention for column names uses a table abbreviation std followed by a descriptive name. Mixed case in a name, highlights the different parts of a column name.

STUDENT

STDNO	STDFIRSTNAME	STDLASTNAME	STDCITY	ST	STDZIP	STDMAJ	ST	STDGPA
123-45-6789	HOMER	WELLS	SEATTLE	WA	98121-1111	IS	FR	3
124-56-7890	BOB	NORBERT	BOTHELL	WA	98011-2121	FIN	JR	2.7
234-56-7890	CANLY	KENDALL	TACOMA	WA	99042-3321	ACCT	JR	3.5
345-67-8901	WALLY	KENDALL	SEATTLE	WA	98123-1141	IS	SR	2.8
456-78-9012	JOE	ESTRADA	SEATTLE	WA	98121-2333	FIN	SR	3.2

Relational Database Concepts

- To understand a relational database, connections or relationships among tables must also be understood.
- The rows in a table are usually related to rows in other tables matching or identical values indicate relationships between tables.
- In the enrollment table, each row represents a student enrolled in an offering of a course. The values in the std number column of the enrollment table match the std number values in the student table.

ENROLLMENT

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1

Relational Database Concepts

STUDENT

OFFERNO	COURSE	OFFTER	OFFYEAR	OFFLOCATION	OFFTIME	FACNO	OFFD
1111	IS320	SUMMER	2013	BLM302	10:30:00		MW
1234	IS320	FALL	2012	BLM302	10:30:00	098-76-5432	MW
2222	IS460	SUMMER	2012	BLM412	13:30:00		TTH
3333	IS320	SPRING	2013	BLM214	08:30:00	098-76-5432	MW

Relational Database Concepts

The offer number column of the enrollment table matches the offer number column in the offering table.

ENROLLMENT

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1

Relational Database Concepts

The offer number column of the enrollment table match the offer number column in the offering table

OFFERING

OFFERNO	COURSE	OFFTER	OFFYEAR	OFFLOCATION	OFFTIME	FACNO	OFFD
1111	IS320	SUMMER	2013	BLM302	10:30:00		MW
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2222	IS460	SUMMER	2012	BLM412	13:30:00		TTH
3333	IS320	SPRING	2013	BLM214	08:30:00	098-76-5432	MW

Relational Database Concepts

- This graphical depiction of matching values, can clarify the concept of relationships among tables.
- In the table listings, the matching values are difficult to identify.
- In the graphical depiction, you should see that the first student row 123-45-6789 is related to the first enrollment rows and the student row 234-56-7890 is related to the second enrollment row.

STUDENT

STDNO	STDFIRSTNAME	STDLASTNAME	STDCITY	ST	STDZIP	STDMAJ	ST	STDGPA
123-45-6789	HOMER	WELLS	SEATTLE	WA	98121-1111	IS	FR	3
124-56-7890	BOB	NORBERT	BOTHELL	WA	98011-2121	FIN	JR	2.7
234-56-7890	CANDY	KENDALL	TACOMA	WA	99042-3321	ACCT	JR	3.5
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456-78-9012	JOE	ESTRADA	SEATTLE	WA	98121-2333	FIN	SR	3.2

Relational Database Concepts

Likewise, the first offering row, 1234, matches to the first four enrollment rows.
ENROLLMENT

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1

Relational Database Concepts

Likewise, the first offering row, 1234, matches to the first four enrollment rows.

OFFERING

OFFERNO	COURSE	OFFTER	OFFYEAR	OFFLOCATION	OFFTIME	FACNO	OFFD
1111	IS320	SUMMER	2013	BLM302	10:30:00		MW
1234	IS320	FALL	2012	BLM302	10:30:00	098-76-5432	MW
2222	IS460	SUMMER	2012	BLM412	13:30:00		TTH
3333	IS320	SPRING	2013	BLM214	08:30:00	098-76-5432	MW

Relational Database Concepts

The concept of matching values is crucial in relational databases. As you will see, relational databases typically contain many tables even for a small database. Large databases can have hundreds/thousands of tables. To extract meaningful information, it is often necessary to combine multiple tables using matching values. As shown above, you can match the table Offering (OFFERNO) and Enrollment (OFFERNO) to get some information from the database such as how many students are enrolled in a particular offering.

OFFERNO	STDNO	ENRGRADE
1234	123-45-6789	3.3
1234	234-56-7890	3.5
1234	345-67-8901	3.2
1234	456-78-9012	3.1



Relational Database Concepts

As shown above, you can match the table Offering (OFFERNO) and Enrollment (OFFERNO) to get some information from the database such as how many students are enrolled in a particular offering. As you will see in the SQL course, the operation of combining tables on matching values is known as a JOIN. The connections between tables or columns in which tables can be combined is crucial for extracting useful information.