

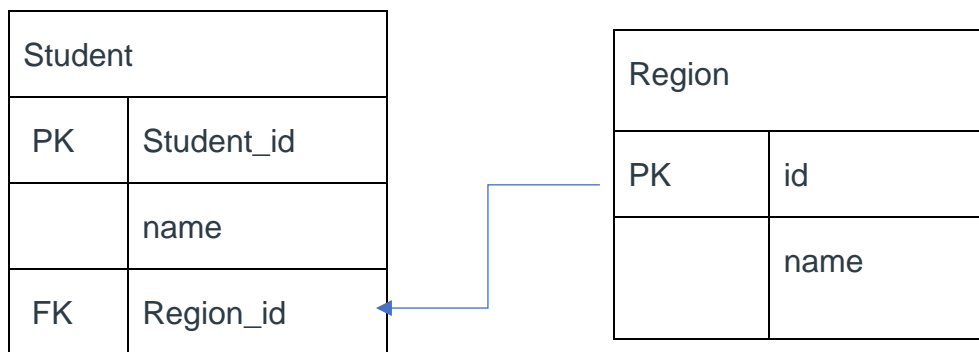
1. What are primary and foreign keys? Explain in detail. What are the implications of using these keys in different tables?

A primary key is a unique field or group of fields that identify records in a certain table. A primary key's value identifies a specific record and its field identifies a given table in a relational database.

A primary key has two main attributes:

- 1) It should contain a unique value for each row of data
- 2) It cannot be null.

A foreign key is when a primary key of one table is inserted into another table. And the second table should have a primary key of its own. A table can only have one primary key but is allowed to contain more than one foreign key.



From the above image, we can see that id is the primary key of Region, and region\_id is the foreign key of the Student. The link between id and Region\_id establishes a connection between the two tables.

The primary keys and foreign keys are essential to a relational database. We can query records from different tables in the database because the primary key and foreign key enable them to connect to each other. Besides, primary keys and foreign keys help ensure relationship integrity between tables. The records in both table will be properly related and thus avoid the 'orphaned records', such as an order without a customer's record.

2. What is data dictionary? What is it used for?

A data dictionary, also known as a data definition matrix, is a set of information about data within a database. It provides data format, structure, usage and so on. A data dictionary enables a system to collect, produce and use data following the same rules and avoid data inconsistencies.

An example of data dictionary is a table describing a database schema for users. It includes information like name, data type, constraints, rules, sources and usage. It helps database users to understand the data.

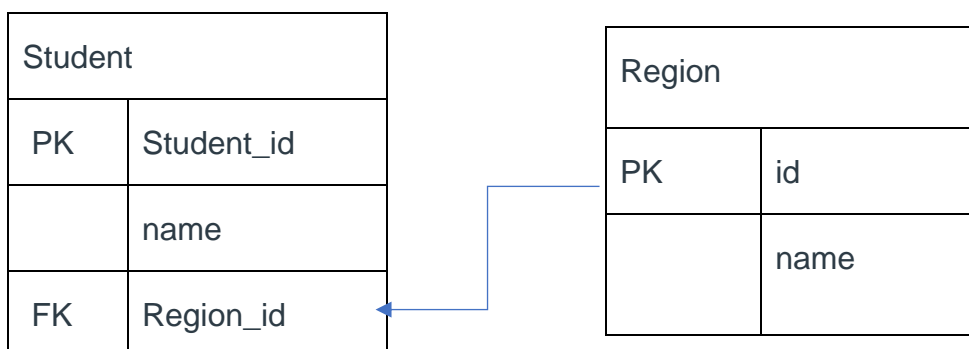
3. What is the significance of creating a column in a table? What is the significance of a row in a table?

A column is a collection of data values, of single data type, aligned vertically in a table. When we create a table, we need to create some columns to define data names, types, constraints and other attributes. Creating a column is significant because it is the first step to create a table and determines characteristics of data. Then we can store data values in different columns. The sound column and data integrity will determine the quality and efficiency we retrieve data from a certain table.

In a relational database, a row is providing a horizontally aligned set of data values, one in each column of the table. Every row in the same table has the same structure. A table is constructed by columns and rows. A row is important to understand table relations such as how a row in one table relates to other rows in other tables.

4. What is referential integrity and how is it used in relational databases for adding, removing and updating rows?

Referential integrity (RI) indicates that, in the context of relational database, the table relationship should be consistent. That's to say, any foreign key must reference a valid, existing primary key in the parent table.



Take the above image as an example, if we add, delete or remove a value of the primary key for Region table, all corresponding records in Student table should be modified using a cascading update. Cascading update and cascading delete enable us to make change to the linked table.

Referential integrity is important for a database management system because it prevents the entry of duplicate data, avoid 'orphaned values' and ensure the consistency between linked tables.