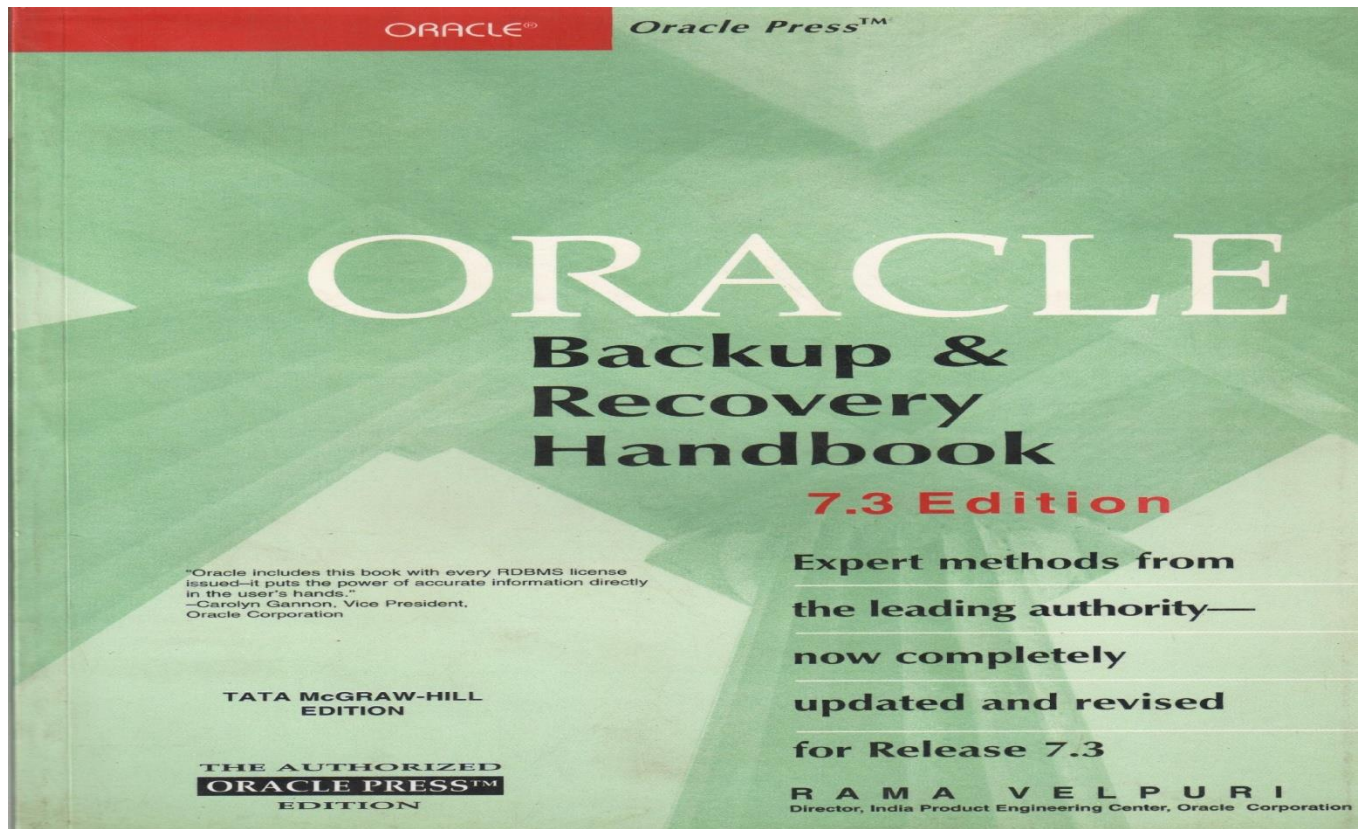


INTRODUCTION TO ORACLE AND SQL

Subject code: 16CACCA1C



Study Material Prepared by

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INTRODUCTION TO ORACLE AND SQL(with Practicals)

Objective:

To enable the students to know about oracle and SQL with practical knowledge

Theory: 60 marks; Int. – 15 marks; Ext. – 45 marks

UNIT-I:

Introduction to File – Flat File – Advantage and disadvantage of Flat File –

Introduction to Database - Types of database structure: Hierarchical Data Base –

Relational Data Base – Object Relational Data Base.

UNIT-II:

Introduction to Relational Database – Relational Database terms: Records – Fields –

Tables – Advantage and disadvantage of Relational Database.

UNIT-III:

Keys: Primary Key – Foreign Key – Candidate Key – Composite Key - Super Key –

Implementation of those keys on tables.

(Practical – 40 marks UE: 30 marks IA: 10 marks)

UNIT-IV:

Introduction to Oracle: Creating database – Creating tables – Setting Primary Key and

Foreign Keys on tables – Introduction to SQL queries: CREATE, ALTER, DROP,

RENAME, TRUNCATE, SELECT statements – Retrieving data – Restricting and

Sorting data.

UNIT-V:

Function – Single Row Function – Group Function – Reporting Aggregated data –

Displaying data from multiple tables – Sub Queries.

Text and Reference Books (Latest revised edition):

1. Oracle – backup and recovery handbook publication –Rama velpure - Tata McGraw Hill.
2. Oracle 8i on Windows NT – Meghraj ThakkarTech media publications.
3. Oracle power objects handbook Bruce kolste, David Petersen - Tata McGraw Hill.
4. Oracle 8 – Edwalen and steve Adrien de Luca- Tech Media publications.

UNIT-I:

Introduction to file:

A Collection of data or information that has a name called filename. Almost all information stored in a computer must be a file. Files can be opened, saved, deleted and moved to different folders. A file type can be determined by viewing the file icon or by reading the file extension. It can be a document, picture, audio or video.

Documents include text files such as word document, PDF, web pages. Pictures include JPEG, GIFS, and BMPS. Audio file include MP3, WAV. Video file include MPEG, MP4.

Flat file:

- A flat file database is a collection of records in which the data follows a uniform format and follows rules on value types where applicable. The database is flat because every line only holds one data input, depending on the categorization of the columns.
- Flat file databases store plain text records and binary files that are needed for a specific purpose in a single directory for easy access and transfer. Mainstream operating systems (OSes) like Windows, Linux, and macOS all use a series of flat files to launch and run the OS, all while conserving storage space and ensuring none of the files essential to running the OS are damaged or altered.
- One of the most common flat file examples is a comma-separated values (CSV) file. In a CSV file, table data is represented by lines of ASCII text. The value of each table cell in the example below is separated by a comma and each row is represented by a new line in Notepad.
- *Flat File Database* Keeping data in flat files provides a reliable and trustworthy method for transferring data remotely, while ensuring data retains its original state and authenticity. Since flat files do not require extensive storage space, they are often used in data warehouse and data lake projects to store large volumes of unstructured and semi-structured data.

 *Untitled - Notepad

File Edit Format View Help

```
"OrderID", "CustomerID", "OrderDate"  
"01", "001", "06/06/2021"  
"02", "369", "06/06/2021"  
"03", "151", "06/06/2021"  
"04", "014", "06/06/2021"  
"05", "061", "06/06/2021"  
"06", "220", "06/06/2021"
```

ADVANTAGE

- Easy to setup.
- Consume less space.
- No Special hardware / software requirement
- Inexpensive

DISADVANTAGE

- Prone to data duplication.
- Prone to error
- Hard to update
- Poor access control
- Cannot perform complex process

INTRODUCTION TO DATABASE:

Collected information which is in an organized form for easier access, management, and various updating is known as a database. Database is a systematic collection of data. Databases support storage and manipulation of data.

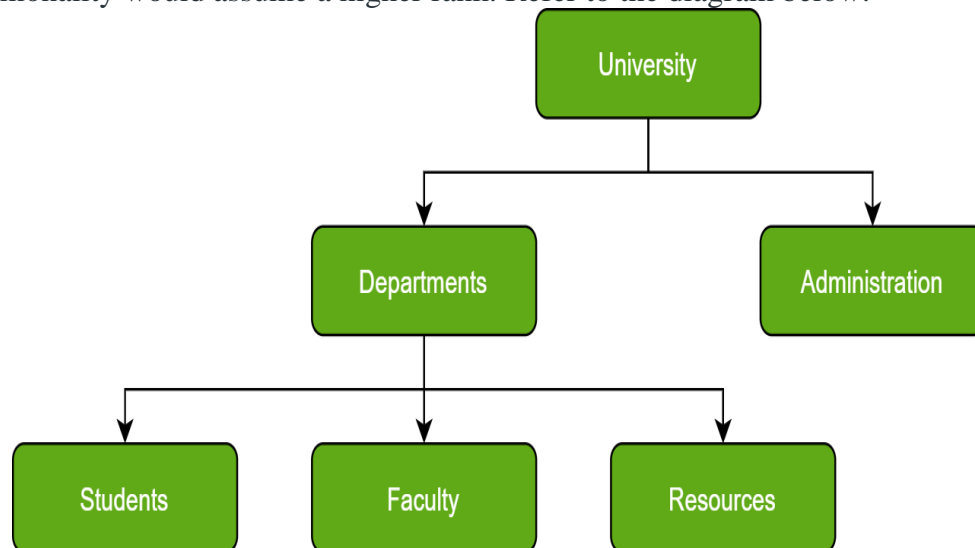
DBMS

- A database management system (DBMS) is a software package designed to define, manipulate, retrieve and manage data in a database.
- A DBMS generally manipulates the data itself, the data format, field names, record structure and file structure. It also defines rules to validate and manipulate this data.
- DBMS provides an interface to perform various operations like database creation, storing data in it, updating data, creating a table in the database and a lot more.
- It provides protection and security to the database. In the case of multiple users, it also maintains data consistency.

Types of database structure:

1. Hierarchical Databases :

Just as in any hierarchy, this database follows the progression of data being categorized in ranks or levels, wherein data is categorized based on a common point of linkage. As a result, two entities of data will be lower in rank and the commonality would assume a higher rank. Refer to the diagram below:



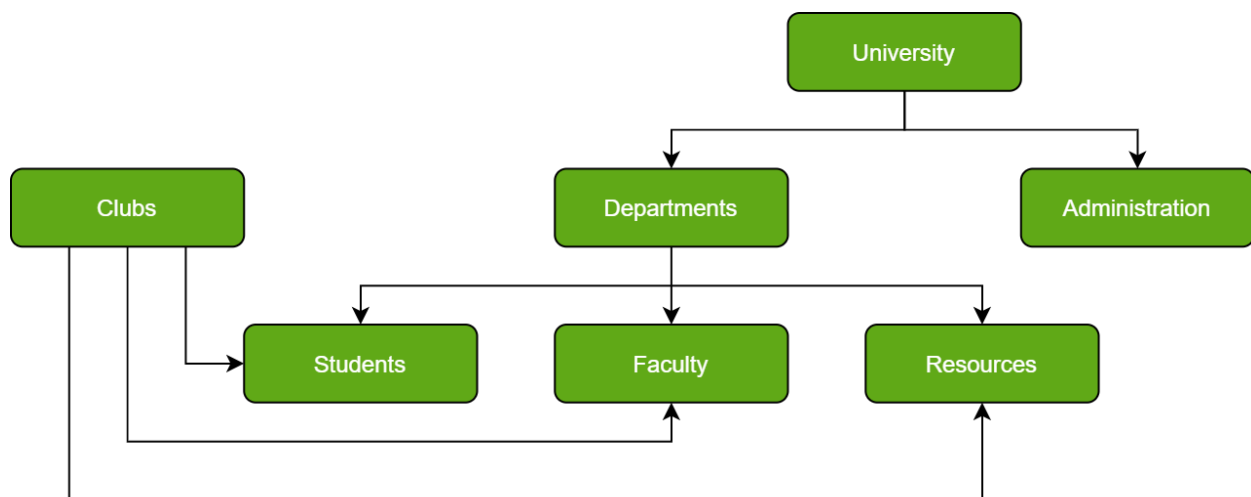
Do note how Departments and Administration are entirely unlike each other and yet fall under the domain of a University. They are elements that form this hierarchy.

Another perspective advises visualizing the data being organized in a parent-child relationship, which upon addition of multiple data elements would resemble a tree. The child records are linked to the parent record using a field, and so the parent record is allowed multiple child records. However, vice versa is not possible.

Notice that due to such a structure, hierarchical databases are not easily salable; the addition of data elements requires a lengthy traversal through the database.

2. Network Databases :

In Layman's terms, a network database is a hierarchical database, but with a major tweak. The child records are given the freedom to associate with multiple parent records. As a result, a network or net of database files linked with multiple threads is observed. Notice how the Student, Faculty, and Resources elements each have two-parent records, which are Departments and Clubs.

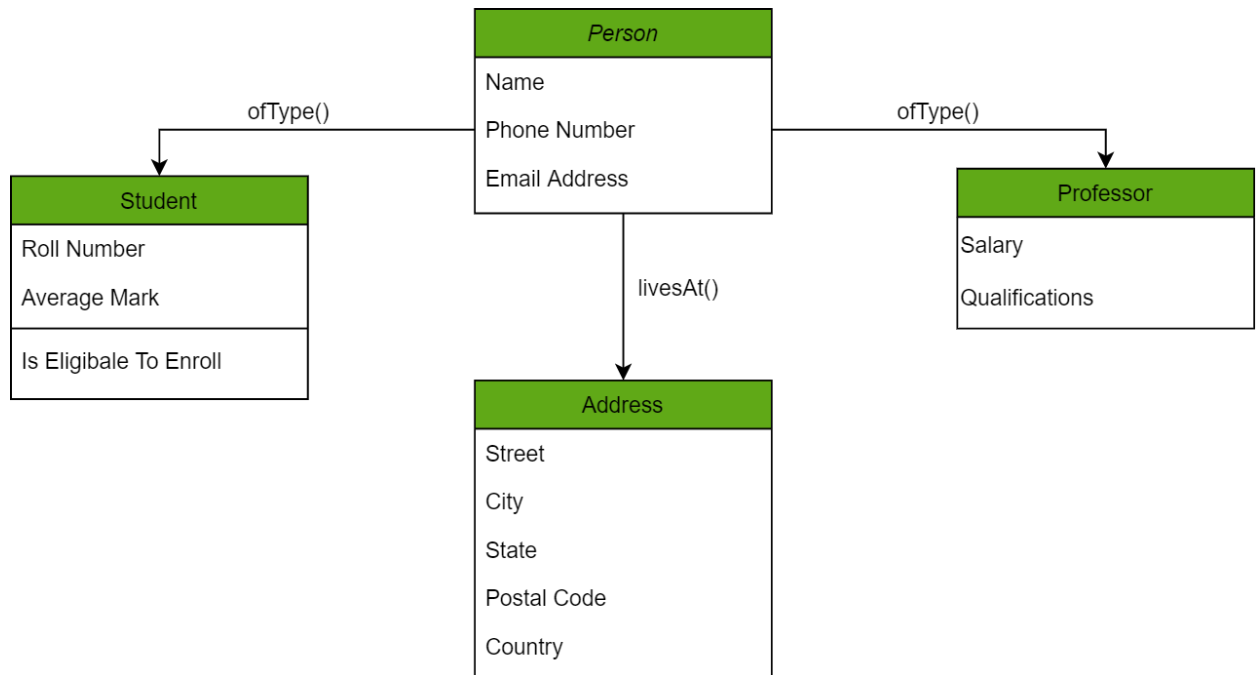


Certainly, a complex framework, network databases are more capable of representing two-directional relationships. Also, conceptual simplicity favors the utilization of a simpler database management language.

The disadvantage lies in the inability to alter the structure due to its complexity and also in it being highly structurally dependent.

3. Object-Oriented Databases :

Those familiar with the Object-Oriented Programming Paradigm would be able to relate to this model of databases easily. Information stored in a database is capable of being represented as an object which response as an instance of the database model. Therefore, the object can be referenced and called without any difficulty. As a result, the workload on the database is substantially reduced.



In the chart above, we have different objects linked to one another using methods; one can get the address of the Person (represented by the Person Object) using the livesAt() method. Furthermore, these objects have attributes which are in fact the data elements that need to be defined in the database.

An example of such a model is the Berkeley DB software library which uses the same conceptual background to deliver quick and highly efficient responses to database queries from the embedded database.

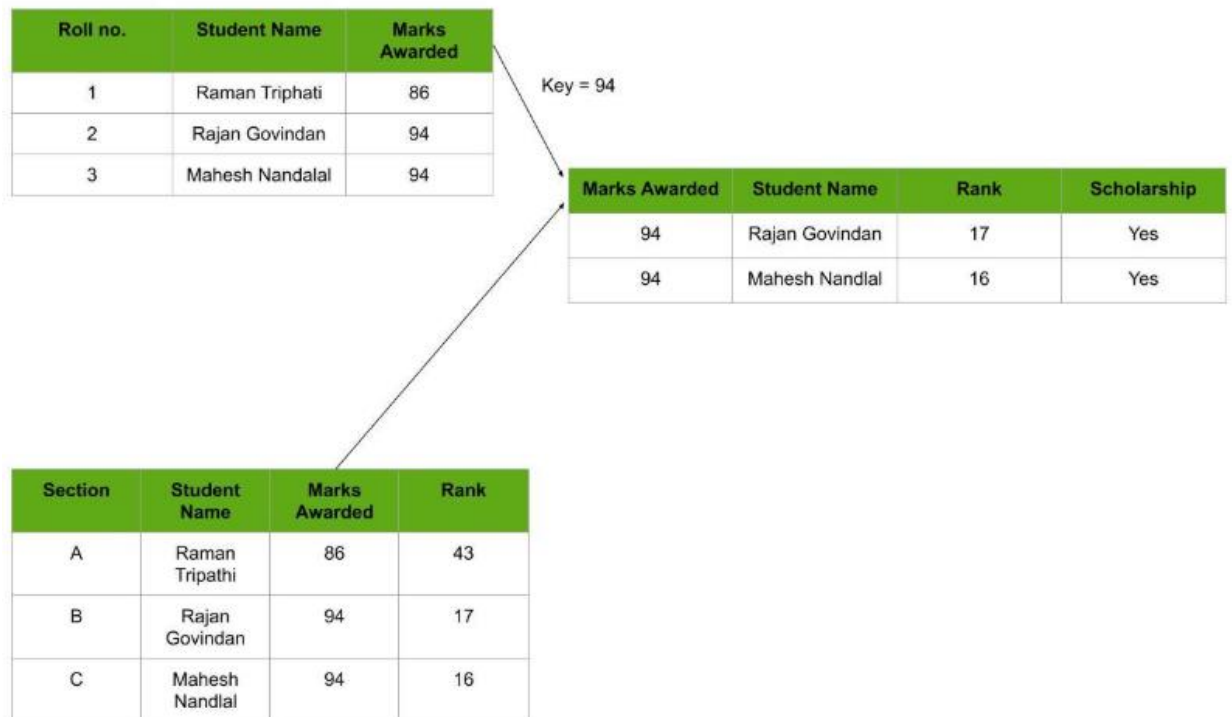
4. Relational Databases :

Considered the most mature of all databases, these databases lead in the production line along

with their management systems. In this database, every piece of information has a relationship with every other piece of information. This is on account of every data value in the database having a unique identity in the form of a record.

Note that all data is tabulated in this model. Therefore, every row of data in the database is linked with another row using a primary key. Similarly, every table is linked with another table using a foreign key.

Refer to the diagram below and notice how the concept of 'Keys' is used to link two tables.



UNIT II:

What is RDBMS?

RDBMS stands for **R**elational **D**atabase **M**anagement **S**ystem. RDBMS is the basis for SQL, and for all modern database systems like MS SQL Server, IBM DB2, Oracle, MySQL, and Microsoft Access.

A Relational database management system (RDBMS) is a database management system (DBMS) that is based on the relational model

What is a table?

The data in an RDBMS is stored in database objects which are called as **tables**. This table is basically a collection of related data entries and it consists of numerous columns and rows.

Remember, a table is the most common and simplest form of data storage in a relational database. The following program is an example of a CUSTOMERS table –

```
+----+-----+----+-----+-----+
| ID | NAME   | AGE | ADDRESS | SALARY |
+----+-----+----+-----+-----+
| 1 | Ramesh | 32  | Ahmedabad | 2000.00 |
| 2 | Khilan | 25  | Delhi     | 1500.00 |
| 3 | kaushik | 23  | Kota      | 2000.00 |
| 4 | Chaitali | 25  | Mumbai    | 6500.00 |
| 5 | Hardik | 27  | Bhopal    | 8500.00 |
| 6 | Komal  | 22  | MP        | 4500.00 |
| 7 | Muffy  | 24  | Indore    | 10000.00 |
+----+-----+----+-----+-----+
```

What is a field?

Every table is broken up into smaller entities called fields. The fields in the CUSTOMERS table consist of ID, NAME, AGE, ADDRESS and SALARY.

A field is a column in a table that is designed to maintain specific information about every record in the table.

What is a Record or a Row?

A record is also called as a row of data is each individual entry that exists in a table. For example, there are 7 records in the above CUSTOMERS table. Following is a single row of data or record in the CUSTOMERS table –

1	Ramesh	32	Ahmedabad	2000.00
---	--------	----	-----------	---------

A record is a horizontal entity in a table.

Advantages of Relational Database

1. Speed

Even though a relational database is poor in terms of performance, still its speed is considerably higher because of its ease and simplicity.

2. Security

Since there are several tables in a relational database, certain tables can be made to be confidential.

3. Simplicity

Compared to other types of network models, a relational database model is much simpler. It is free from query processing and complex structuring.

4. Accessibility

A relational database does not require any specific path for accessing the data. Even modifying data in the relevant column is made easy. So whatever the outcome shown is appropriate to the user.

5. Multi User

Multiple users will be able to access a relational database at the same time. Even if the data is updated, the users can access them conveniently.

Disadvantages of Relational Database

1. Cost

The underlying cost involved in a relational database is quite expensive.

2. Performance

Always the performance of the relational database depends on the number of tables. If there are more number of tables, the response given to the queries will be slower.

3. Physical Storage

A relational database also requires tremendous amount of physical memory since it is with rows and columns. Each of the operations depend on separate physical storage.

4. Complexity

Although a relational database is free from complex structuring, occasionally it may become complex too. When the amount of data in a relational database increases, it eventually makes the system more complicated.

5. Information Loss

Large organizations tends to use more number of number of database systems with more tables. These information can be used to be transferred from one system to another. This could pose a risk of data loss.

6. Structure Limitations

The fields that is present on a relational database is with limitations. Limitations in essence means that it cannot accommodate more information. Despite if more information are provided, it may lead to data loss.

Unit –III:

PRIMARY KEY in **DBMS** is a column or group of columns in a table that uniquely identify every row in that table. The Primary Key can't be a duplicate meaning the same value can't appear more than once in the table. A table cannot have more than one primary key.

Rules for defining Primary key:

- Two rows can't have the same primary key value
- It must for every row to have a primary key value.
- The primary key field cannot be null.
- The value in a primary key column can never be modified or updated if any foreign key refers to that primary key.
- In the following example, StudID is a Primary Key.

Example:

```
REATE TABLE `customer` (  
  `cust_id` int(11) NOT NULL,  
  `cust_name` varchar(100) NOT NULL,  
  `cust_address` text NOT NULL,  
  `cust_aadhaar_number` varchar(50) DEFAULT NULL,  
  `cust_pan_number` varchar(50) NOT NULL  
) ENGINE=InnoDB DEFAULT CHARSET=latin1;  
ALTER TABLE `customer` ADD PRIMARY KEY (`cust_id`);
```

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com

What is the Foreign key?

FOREIGN KEY is a column that creates a relationship between two tables. The purpose of Foreign keys is to maintain data integrity and allow navigation between two different instances

of an entity. It acts as a cross-reference between two tables as it references the primary key of another table.

Example:

DeptCode	DeptName
001	Science
002	English
005	Computer

Teacher ID	Fname	Lname
B002	David	Warner
B017	Sara	Joseph
B009	Mike	Brunton

In this key in dbms example, we have two table, teach and department in a school. However, there is no way to see which search work in which department.

In this table, adding the foreign key in Deptcode to the Teacher name, we can create a relationship between the two tables.

Teacher ID	DeptCode	Fname	Lname
B002	002	David	Warner
B017	002	Sara	Joseph
B009	001	Mike	Brunton

This concept is also known as Referential Integrity.

COMPOSITE KEY is a combination of two or more columns that uniquely identify rows in a table. The combination of columns guarantees uniqueness, though individually uniqueness is not guaranteed. Hence, they are combined to uniquely identify records in a table.

The difference between compound and the composite key is that any part of the compound key can be a foreign key, but the composite key may or maybe not a part of the foreign key.

CANDIDATE KEY in SQL is a set of attributes that uniquely identify tuples in a table.

Candidate Key is a super key with no repeated attributes. The Primary key should be selected

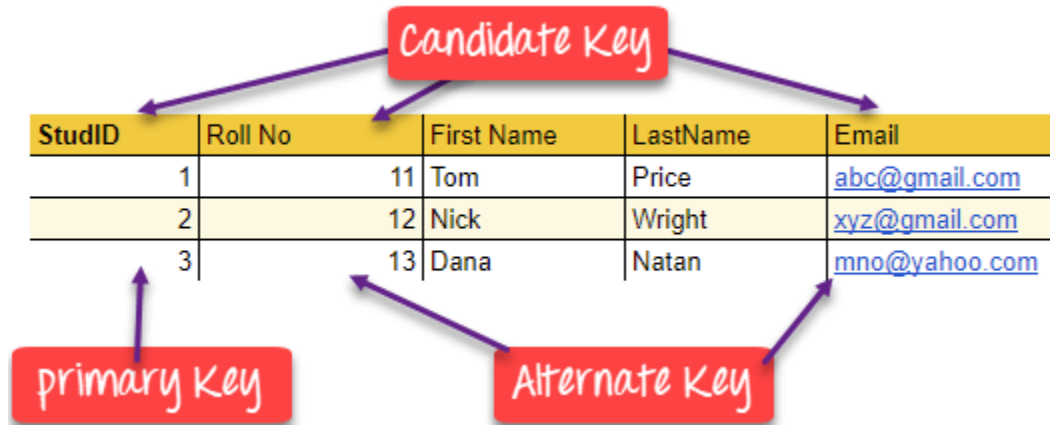
from the candidate keys. Every table must have at least a single candidate key. A table can have multiple candidate keys but only a single primary key.

Properties of Candidate key:

- It must contain unique values
- Candidate key in SQL may have multiple attributes
- Must not contain null values
- It should contain minimum fields to ensure uniqueness
- Uniquely identify each record in a table

Candidate key Example: In the given table Stud ID, Roll No, and email are candidate keys which help us to uniquely identify the student record in the table.

StudID	Roll No	First Name	LastName	Email
1	11	Tom	Price	abc@gmail.com
2	12	Nick	Wright	xyz@gmail.com
3	13	Dana	Natan	mno@yahoo.com



Candidate Key in DBMS