IT Department

Relation Keys

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Database Systems I (IT 215)

Fall 2025 - 2026

Week 4

October 27, 2025

Outline

- Super Key
- Candidate Key
- Primary Key
- Foreign Key
  - Referential Integrity
- Database Design Process

Primary Key

- A **primary key** is the column or columns that contain values that uniquely identify each row in a table.
- Primary key is unique.
- Primary key can't have null values.
- Each table has **only one primary key**.
  - One column
  - Or multiple columns (Composite Key)

Find the Primary Key

Primary Key → productCode

Product Table

productCode	pName	pCategory
BS8020	Shoulder Bag	Bags
MB1703	Boot	Shoes
BS0014	Backpack	Bags
BS9916	Shoulder Bag	Bags
MS3044	Sneakers	Shoes

Find the Primary Key

Primary Key

Cities_in_Australia Table

CityName	Population	Area (sq km)
Sydney	5200000	12368
Perth	2143000	6418
Canberra	478000	814
Taree	19104	48
Albury	58451	332

Find the Primary Key

Primary Key

Cities_in_World Table

CityName	Country	Language
Sydney	Australia	English
Quebec	Canada	French
Sydney	Canada	English
Paris	France	French
Paris	USA	English

Super Key

- **Super Key** is the column or columns that contain values that uniquely identify each row in a table,
  - **but a super key may contain additional columns that are not necessary for unique identification.**

Find Super Keys?

Book Table

bookID	ISBN	bookName
12	5610888110	Basic C#
23	1986622017	Adv. Java
24	2677709914	SQL

Super Keys:

1. {bookID}
2. {ISBN}
3. {bookID, ISBN}
4. {bookID, bookName}
5. {ISBN, bookName}
6. {bookID, ISBN, bookName}

Candidate Key

- **Candidate Keys** are super keys such that no proper subset of itself is also a super key (It has no unnecessary columns).
- **Candidate key** is **a minimal super key**.
- There may be several candidate keys for a table.

Find Super Keys and Candidate Key(s)?

Book Table

bookID	ISBN	bookName
12	5610888110	Basic C#
23	1986622017	Adv. Java
24	2677709914	SQL

Super Keys:

1. {bookID}
2. {ISBN}
3. {bookID, ISBN}
4. {bookID, bookName}
5. {ISBN, bookName}
6. {bookID, ISBN, bookName}

Candidate Keys:

1. {bookID}
2. {ISBN}

Candidate Key → Primary Key & Alternate Key

- If there is **one candidate key** → The same candidate key is the **primary key** of table.
- If there is **multiple candidate keys** → One is selected as primary key, and the rest of candidate keys are called **alternate keys**.
- **Alternate Key:** is a candidate key not used for primary key.

Find Super keys, Candidate Key(s), Primary Key and Alternate Key(s)?

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Super Keys:

1. {bookID}
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Candidate Keys:

1. {bookID}
2. {ISBN}

Primary Key: {bookID}

Alternate Key: {ISBN}

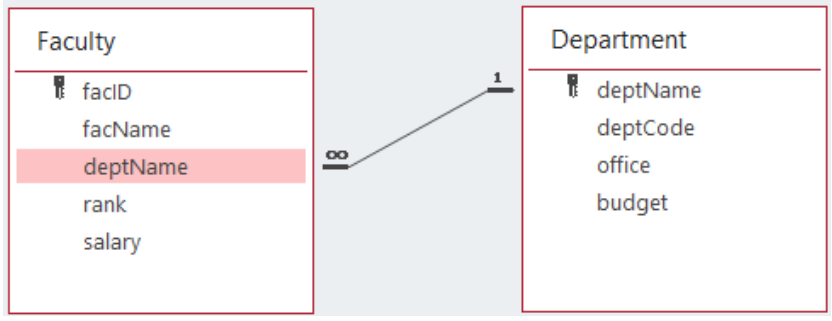
Find Super Keys, Candidate Key(s), Primary Key and Alternate Key(s)?

Player Table

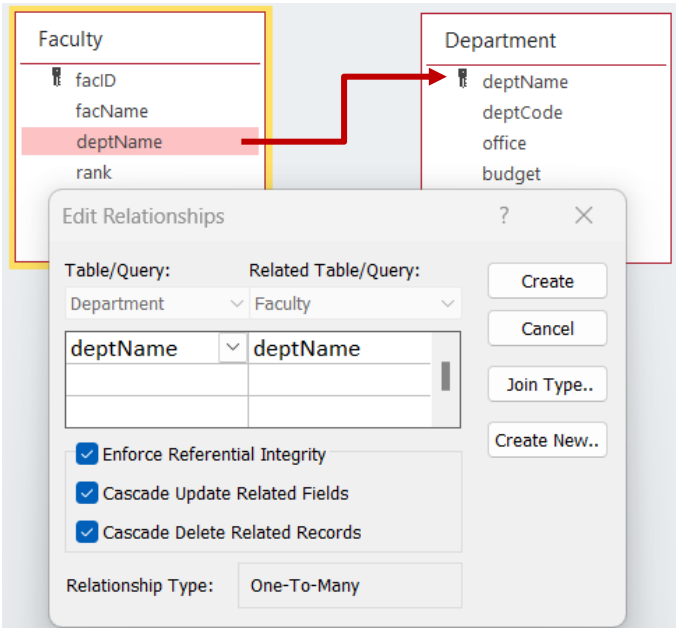
ID	Name	Height	Phone_No
32	Joe	177	+61273444621
37	Sandy	165	+61343788012
34	Mike	182	+61331645552

Foreign Key

- A **Foreign Key** is a column in one table that refers to the Primary Key in another table that is mainly used to link tables together.

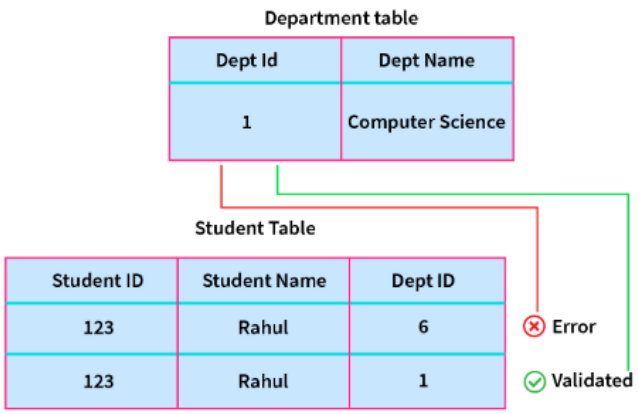


Referential Integrity



Referential Integrity

- **Referential Integrity:** If a foreign key exists in a table, either the foreign key value must match a primary key value of some row in its referenced table or the foreign key value must be null.



Database Design Process

- **Step 1 –** Define the Purpose of the Database
- **Step 2 –** Find and organize the information required
- **Step 3 –** Gather Data (field names), Organize in tables and Specify the Keys.
- **Step 4 –** Create Relationships among Tables
- **Step 5 –** Refine and Normalize the Design

Database Design Process (cont.)

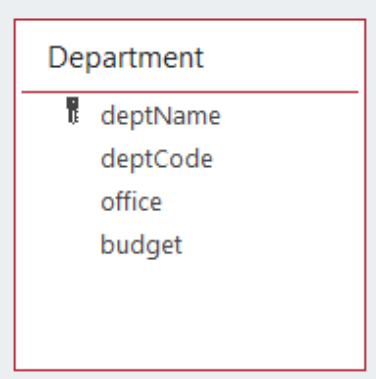
- **Step 1 –** Define the Purpose of the Database
  - Requirement Analysis
  - Understanding the goals and requirements for the database
  - This step helps preparing for the remaining steps.

Database Design Process (cont.)

- **Step 2 –** Find and organize the information required
  - Divide information items into major groups called tables (such as: Student, Department, Faculty, etc.).

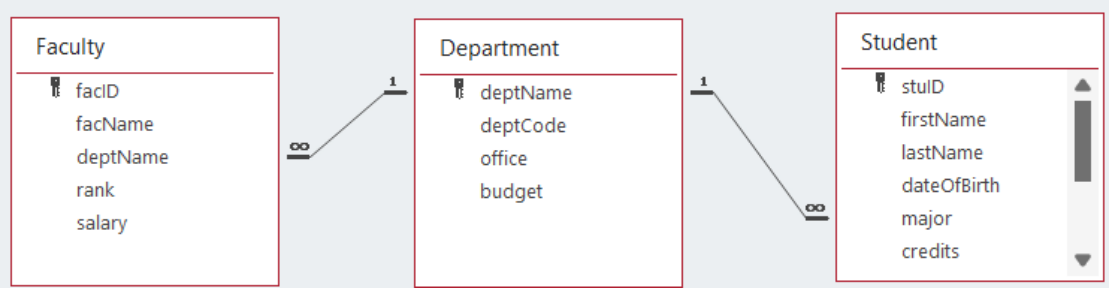
Database Design Process (cont.)

- **Step 3 –** Gather Data, Organize in tables and Specify the Keys.
  - Decide on what columns (fields) of data need to be stored in each table.
  - Specify each table's primary key.



Database Design Process (cont.)

- **Step 4 –** Create Relationships between the tables.
  - Look at each table and decide how the data in one table is related to the data in the other tables.



Database Design Process (cont.)

- **Step 5 –** Refine and normalize the design.
  - Apply the **Normalization Rules** to check whether your database is structurally correct and optimal.