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CertHE-Computing Skills for the Workplace

Module Code : ACCA4023 - Introduction to Web and Database Concepts

Week 02 : Database design modelling techniques

Trawsnewid Addysg; Trawsnewid Bywydau
Transforming Education; Transforming Lives



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So far

- Understand the concept – DBMS
- Identify different types of databases
- Components of DBMS
- DBMS system Architecture
- Benefits of DBMS

Objectives

- Data modelling concept
- Types of data modelling techniques
- Conceptual data modelling
- Logical data modelling
- Physical data modelling
- Conclusion

Data Modelling

What is Data Modelling?

Data modeling is the process of creating a data model for the data to be stored in a database. This data model is a conceptual representation of Data objects, the associations between different data objects, and the rules. Data modeling helps in the visual representation of data and enforces business rules, regulatory compliances, and government policies on the data. Data Models ensure consistency in naming conventions, default values, semantics, security while ensuring quality of the data.

Data Modelling

Data Model

The **Data Model** is defined as an abstract model that organizes data description, data semantics, and consistency constraints of data.

Data Model is like an architect's building plan, which helps to build conceptual models and set a relationship between data items.

The two types of Data Modeling Techniques are

1.Entity Relationship (E-R) Model

2.UML (Unified Modelling Language)

Why use Data Model?

The primary goal of using data model are:

- Ensures that all data objects required by the database are accurately represented. Omission of data will lead to creation of faulty reports and produce incorrect results.
- A data model helps design the database at the conceptual, physical and logical levels.
- Data Model structure helps to define the relational tables, primary and foreign keys and stored procedures.

Why use Data Model?

- It provides a clear picture of the base data and can be used by database developers to create a physical database.
- It is also helpful to identify missing and redundant data.
- Though the initial creation of data model is labor and time consuming, in the long run, it makes your IT infrastructure upgrade and maintenance cheaper and faster.

Types of Data Models

Types of Data Models: There are mainly three different types of data models: **conceptual data models, logical data models, and physical data models**, and each one has a specific purpose. The data models are used to represent the data and how it is stored in the database and to set the relationship between data items.

Types of Data Models

1. Conceptual Data Model
2. Logical Data Model
3. Physical Data Model

Conceptual Data Model (Big Picture View)

The **conceptual model** shows the **main ideas (entities)** and how they relate to each other.

It does **NOT** include technical details.

Conceptual Data Model (Big Picture View)

School System – Tables/Entities/Relation

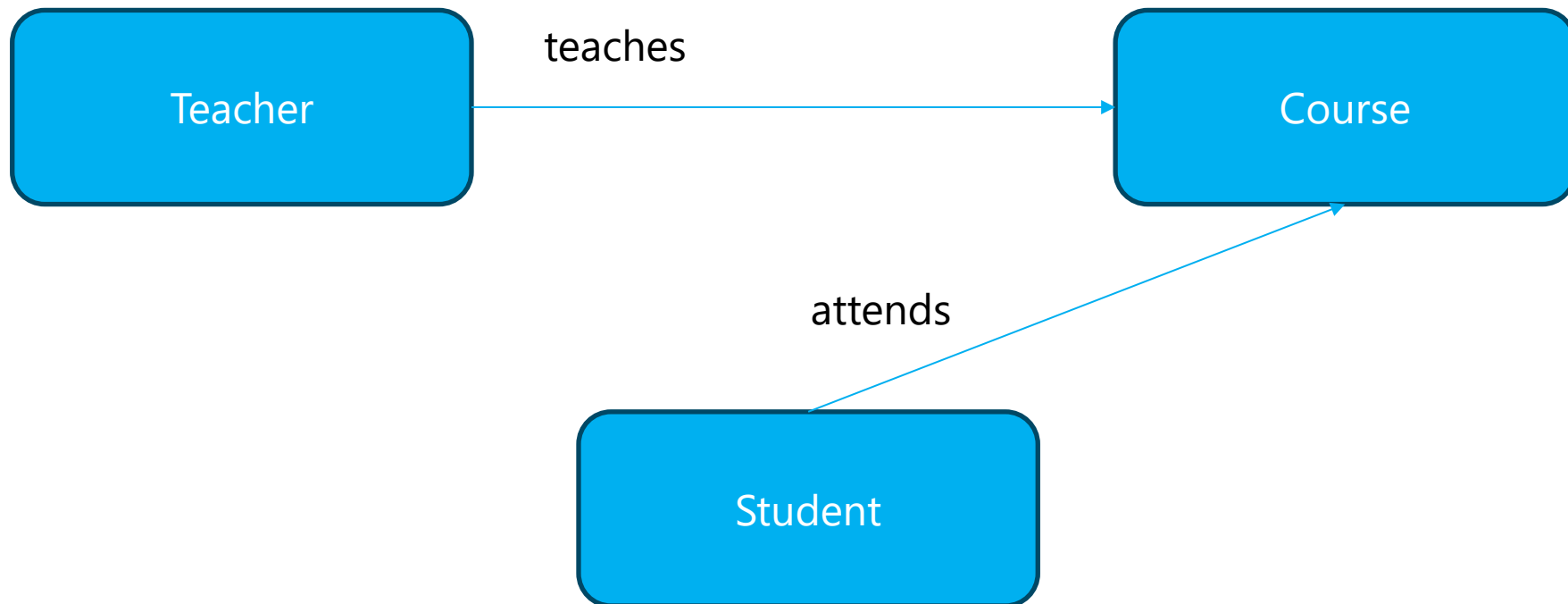
Student

Teacher

Course

Conceptual Data Model (Big Picture View)

School System – Tables/Entities/Relation



Conceptual Data Model

Very simple

High-level

For understanding the system

Logical Data Model (Detailed Structure)

The 3 basic tenants of Conceptual Data Model are

- **Entity:** A real-world thing
- **Attribute:** Characteristics or properties of an entity
- **Relationship:** Dependency or association between two entities

The **logical model** adds more details:

- Attributes (fields)
- Primary keys
- Relationships clearly defined

Logical Data Model (Detailed Structure)

School System

Student

- Student_ID (Primary Key)
- Name
- Age
- Email

Teacher

- Teacher_ID (Primary Key)
- Name
- Subject

Course

- Course_ID (Primary Key)
- Course_Name
- Teacher_ID (Foreign Key)

- One Teacher → Many Courses
- One Course → Many Students

More detailed
Structured
Still not technical

Physical Data Model (Real Database Implementation)

A **Physical Data Model** describes a database-specific implementation of the data model.

The **physical model** shows how the data is actually stored in a specific database system like Access, MySQL or Oracle.

It includes:

- Table names
- Column data types
- Indexes
- Constraints

Physical Data Model (Real Database Implementation)

Field Name	Data Type	Description
Student_ID	AutoNumber (PK)	Primary Key
Name	Short Text	Student name
Age	Number	Student age
Email	Short Text	Email address
Course_ID	Number (FK)	Links to Course

Field Name	Data Type	Description
Teacher_ID	AutoNumber (PK)	Primary Key
Name	Short Text	Teacher name
Course_ID	Short Text	Courses taught

Physical Data Model (Real Database Implementation)

Field Name	Data Type	Description
Course_ID	AutoNumber (PK)	Primary Key
Course_Name	Short Text	Course name
Teacher_ID	Number (FK)	Links to Teacher

Designing a Database Step by Step

College Library Borrowing System

From scenario → conceptual design → logical design → physical design in Microsoft Access

Conceptual design

What data exists?

Logical design

How is it structured?

Physical design

How will Access implement it?

Scenario: College Library Borrowing System

OVERVIEW

A small college library records book loans on paper. The librarian wants a database to store students and books, and to record which student borrowed which book, when it was borrowed, when it is due back, and when it is returned.

Emma Jones • Student S101

borrows

Database Basics • Book B001

Borrowed: 5 Oct 2026 • Due: 19 Oct 2026

Conceptual design



Logical design



Physical design

1. Understand the data requirement

CONCEPTUAL DESIGN

ASK STUDENTS

What information does the librarian need to store?

Look back at the scenario. What facts must the database remember?

Conceptual design



Logical design



Physical design

2. Identify the entities

CONCEPTUAL DESIGN

ASK STUDENTS

What are the main “things” we need to store information about?

Hint: look for the important nouns in the scenario.

Conceptual design



Logical design



Physical design

3. Identify the attributes

CONCEPTUAL DESIGN

ASK STUDENTS

What details describe each entity?

For example, what details describe Emma? What details describe Database Basics?

Conceptual design



Logical design



Physical design

4. Identify the relationships

CONCEPTUAL DESIGN

ASK STUDENTS

How are STUDENT, BOOK and LOAN connected?

Can one student borrow more than one book?

Conceptual design



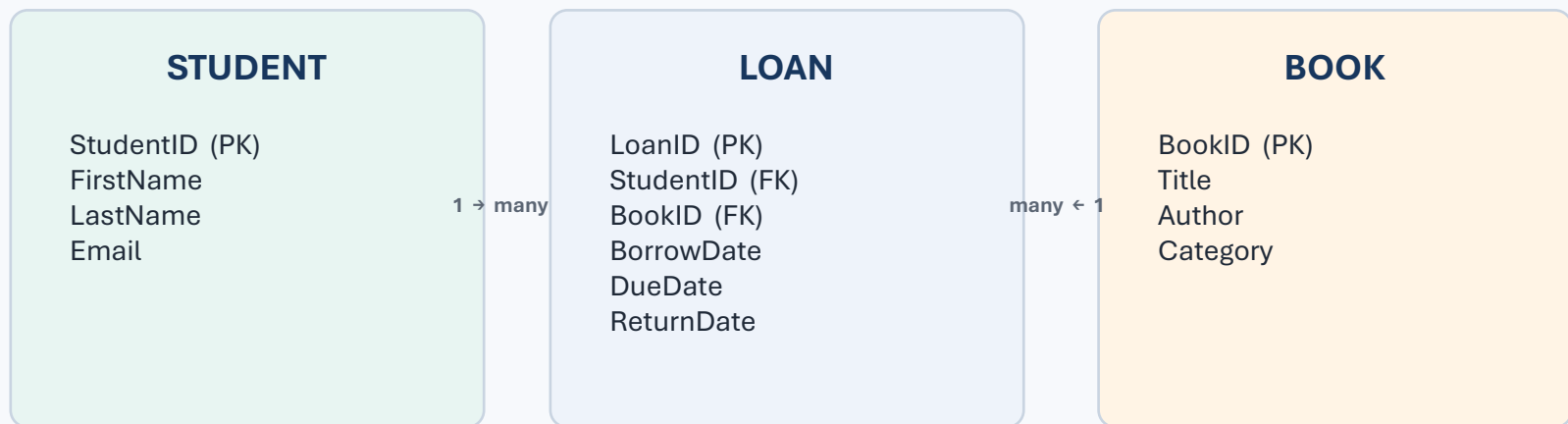
Logical design



Physical design

5. Convert the model into tables

ASK STUDENTS: How should the conceptual entities become database tables?



Conceptual design



Logical design



Physical design

6. Choose primary and foreign keys

LOGICAL DESIGN

ASK STUDENTS

How can we identify each record uniquely and connect the tables?

Why is “Emma Jones” not a safe primary key?

Conceptual design



Logical design



Physical design

7. Remove unnecessary duplication

LOGICAL DESIGN

ASK STUDENTS

What happens if we store student and book details in every loan record?

Which values would be repeated each time Emma borrows another book?

Conceptual design



Logical design



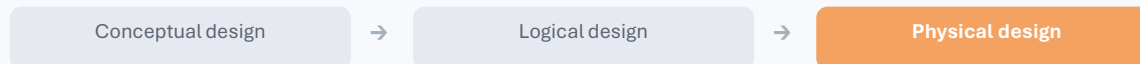
Physical design

8. Implement the tables in Microsoft Access

PHYSICAL DESIGN

ASK STUDENTS: What Access data type should each field use?

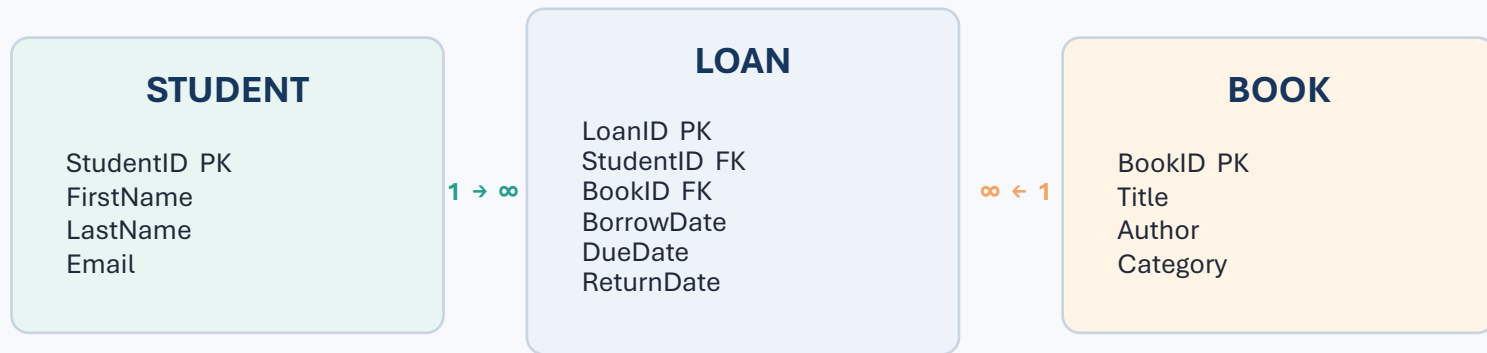
- 1 Create → Table Design
- 2 Create STUDENT and BOOK with Short Text IDs
- 3 Create LOAN with AutoNumber LoanID
- 4 Use Date/Time for BorrowDate, DueDate and ReturnDate
- 5 Set the primary key in each table



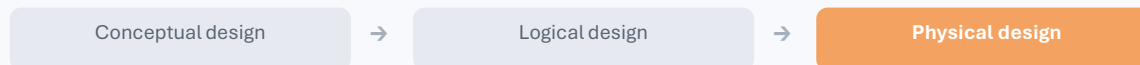
9. Create relationships in Microsoft Access

PHYSICAL DESIGN

ASK STUDENTS: Which fields should we join?



Database Tools → Relationships → drag matching key fields → Enforce Referential Integrity



10. Test the database with the scenario

PHYSICAL DESIGN

ASK STUDENTS: How do we prove the database works?

1

Enter records

STUDENT: S101 Emma Jones
BOOK: B001 Database Basics
LOAN: S101 + B001 + dates

2

Run a query

Show Emma Jones + Database
Basics + BorrowDate + DueDate

3

Create a form

Create → Form to enter student or
loan information more easily

Expected query result: Emma Jones | Database Basics | 05/10/2026 | 19/10/2026

Conceptual design



Logical design



Physical design

Database design: the complete progression

OVERVIEW

CONCEPTUAL DESIGN

1. Understand requirements
2. Identify entities
3. Identify attributes
4. Identify relationships

LOGICAL DESIGN

1. Convert entities to tables
2. Choose primary keys
3. Add foreign keys
4. Normalise the data

PHYSICAL DESIGN

1. Choose Access data types
2. Create tables
3. Create relationships
4. Enter/query data and build forms

Start with the real-world problem → design the structure → implement it in Access

Advantages and Disadvantages of Data Model:

Advantages of Data model:

- The main goal of a designing data model is to make certain that data objects offered by the functional team are represented accurately.
- The data model should be detailed enough to be used for building the physical database.
- The information in the data model can be used for defining the relationship between tables, primary and foreign keys, and stored procedures.

Advantages and Disadvantages of Data Model:

- Data Model helps business to communicate the within and across organizations.
- Data model helps to documents data mappings in **Extract** → **Transform** → **Load** ETL process
- Help to recognize correct sources of data to populate the model

Advantages and Disadvantages of Data Model:

Disadvantages of Data model:

- To develop Data model one should know physical data stored characteristics.
- This is a navigational system produces complex application development, management. Thus, it requires a knowledge of the biographical truth.
- Even smaller change made in structure require modification in the entire application.
- There is no set data manipulation language in DBMS.

Conclusion

- Data modeling is the process of developing data model for the data to be stored in a Database.
- Data Models ensure consistency in naming conventions, default values, semantics, security while ensuring quality of the data.
- Data Model structure helps to define the relational tables, primary and foreign keys and stored procedures.

Conclusion

- There are three types of conceptual, logical, and physical.
- The main aim of conceptual model is to establish the entities, their attributes, and their relationships.
- Logical data model defines the structure of the data elements and set the relationships between them.
- A Physical Data Model describes the database specific implementation of the data model.

Conclusion

- The main goal of a designing data model is to make certain that data objects offered by the functional team are represented accurately.
- The biggest drawback is that even smaller change made in structure require modification in the entire application.
- Reading this Data Modeling tutorial, you will learn from the basic concepts such as What is Data Model? Introduction to different types of Data Model, advantages, disadvantages, and data model example.

Lab Exercise: Creating a Simple Database

Table 1: Students

- In the Access interface, under **Table Tools**, go to the **Design View**.
- Name the table: **Students**.
- Define the fields as follows:

Field Name	Data Type	Description
StudentID	AutoNumber	Primary Key
FirstName	Short Text	Student's First Name
LastName	Short Text	Student's Last Name
DateOfBirth	Date/Time	Date of Birth
Email	Short Text	Student's Email Address

Lab Exercise: Creating a Simple Database

Enter Data into the Tables Students Table (5 Records)

StudentID	FirstName	LastName	DateOfBirth	Email
1	John	Smith	01/10/2000	john@example.com
2	Emily	Johnson	04/12/2001	emily@example.com
3	Michael	Brown	07/15/2000	michael@example.com
4	Sarah	Davis	02/20/2002	sarah@example.com
5	David	Wilson	09/30/2001	david@example.com

Lab Exercise: Creating a Simple Database

Table 2: Courses

- In the Access interface, create a new table.
- Name the table: **Courses**.
- Define the fields as follows:

Field Name	Data Type	Description
CourseID	AutoNumber	Primary Key
CourseName	Short Text	Name of the Course
Credits	Number	Number of Credits

- Set **CourseID** as the **Primary Key**.
- Save the table.

Lab Exercise: Creating a Simple Database

CourseID	CourseName	Credits
1	Mathematics	4
2	English	3
3	Computer Science	4
4	History	3
5	Physics	4

Lab Exercise: Creating a Simple Database

Table 3: Enrollments

- Create a third table.
- Name the table: **Enrollments**.
- Define the fields as follows:

Field Name	Data Type	Description
EnrollmentID	AutoNumber	Primary Key
StudentID	Number	Foreign Key from Students
CourseID	Number	Foreign Key from Courses
EnrollmentDate	Date/Time	Date of Enrollment

- Set **EnrollmentID** as the **Primary Key**.
- Save the table.

Lab Exercise 2: Creating a Simple Database

You are a database designer for a **local bookstore**. The store needs a simple database to manage its **inventory** of books and **authors** who write them. You will create two tables: one for **Books** and one for **Authors**, each with at least five records.

Lab Exercise 2: Creating a Simple Database

Field Name	Data Type	Description
BookID	AutoNumber	Primary Key (Automatically generated)
Title	Short Text	Title of the book
Genre	Short Text	Book's genre
Price	Currency	Price of the book
PublishedYear	Number	Year the book was published

Field Name	Data Type	Description
AuthorID	AutoNumber	Primary Key (Automatically generated)
FirstName	Short Text	Author's first name
LastName	Short Text	Author's last name
Country	Short Text	Author's country of origin
DateOfBirth	Date/Time	Author's date of birth

Lab Exercise 2: Creating a Simple Database

Books Table (5 Records)

BookID	Title	Genre	Price	PublishedYear
1	The Great Adventure	Fiction	\$15.99	2018
2	Science of Nature	Science	\$25.50	2021
3	Mystery at Midnight	Mystery	\$12.99	2017
4	The Art of Cooking	Cooking	\$30.00	2020
5	History of Civilizations	History	\$18.75	2019

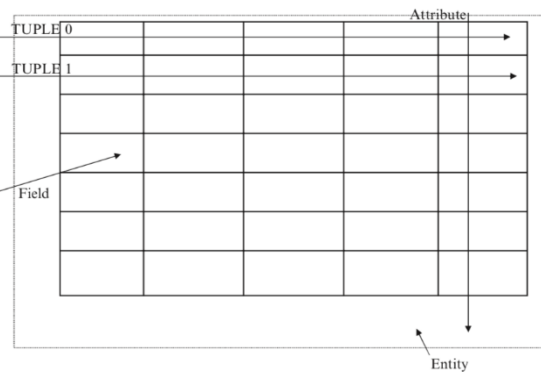
Authors Table (5 Records)

AuthorID	FirstName	LastName	Country	DateOfBirth
1	John	Smith	USA	01/10/1970
2	Emily	Johnson	Canada	03/22/1980
3	Robert	Brown	UK	05/05/1965
4	Sarah	Davis	Australia	07/14/1985
5	Michael	Lee	South Korea	10/01/1978

Relational Database Model

Keys, Domain, Attribute, Degree, Cardinality

- Relations must have a **key**. Keys can be a set of attributes.
- For each column of a table there is a set of possible values called its **domain**. The domain contains all possible values that can appear under that column.
- Domain is the set of valid values for an attribute.
- **Degree** of the relation is the number of attributes (columns) in the relation.
- **Cardinality** of the relation is the number of tuples (rows) in the relation.

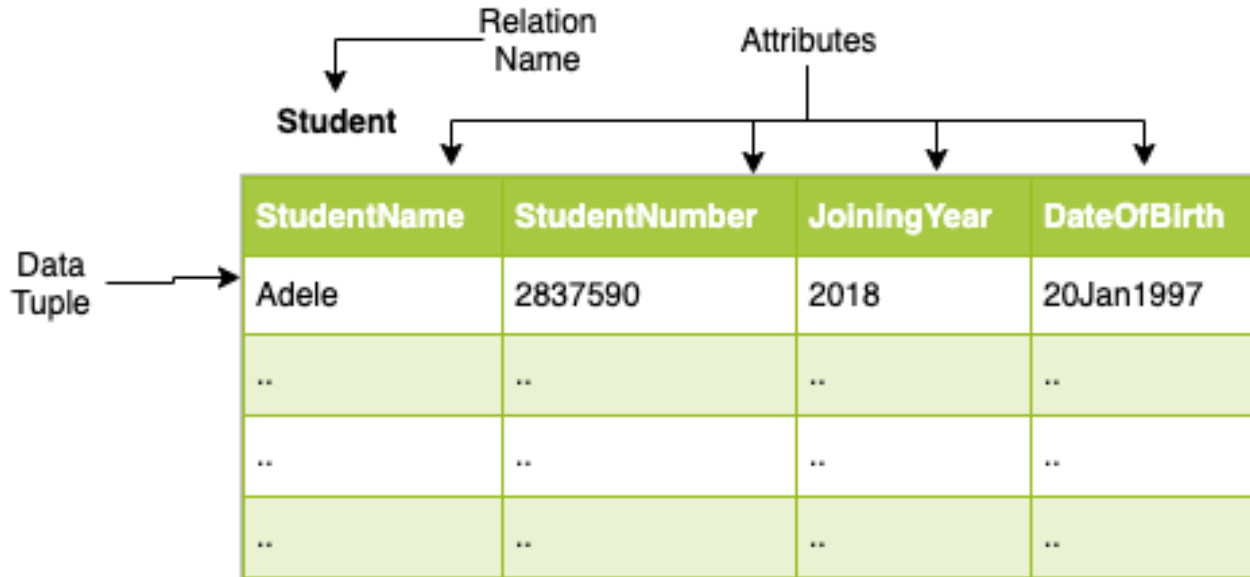


Example - Relation

Book Name	Author	Category	Votes
The Testaments	Margaret Atwood	Fiction	98,291
The Silent Patient	Alex Michaelides	Mystery & Thriller	68,821
Daisy Jones & The Six	Taylor Jenkins Reid	Historical Fiction	82,483
Ninth House	Leigh Bardugo	Fantasy	3,430
Will My Cat Eat My Eyeballs?	Caitlin Doughty	Science & Technology	29,594

- Cardinality of the relation?
- Degree of the relation?

E/R (Entity/Relationship) Model



Key

- An attribute or group of attributes, which is used to identify a row in a relation.
- 3 broad classification
 - Super key
 - Candidate key
 - Foreign key

Super Key

- A **subset of attributes** of an entity-set that **uniquely identifies** the entities.

Super Keys - Prof

{pid}

{pid, name}

{pid, dept}

{pid, rank, sal}

Prof - Relation

Pid	Name	Dept	Rank	Sal
P1	Adam	CS	Asst	6000
P2	Bob	EE	Asso	8000
P3	Calvin	CS	Full	10000
P4	Dorothy	EE	Asst	5000
P5	Emily	EE	Asso	8500
P6	Frank	CS	Full	9000

Candidate Keys

- Candidate key is a **minimal super key**.

Candidate Key - Prof

{pid}

This is also the **Primary Key**

Prof - Relation

Pid	Name	Dept	Rank	Sal
P1	Adam	CS	Asst	6000
P2	Bob	EE	Asso	8000
P3	Calvin	CS	Full	10000
P4	Dorothy	EE	Asst	5000
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Foreign Keys

- Set of fields or attributes in one relation that is used to “refer” to a tuple in another relation.

Prof - Relation

Pid	Name	Dept	Rank	Sal
P1	Adam	CS	Asst	6000
P2	Bob	EE	Asso	8000
P3	Calvin	CS	Full	10000
P4	Dorothy	EE	Asst	5000
P5	Emily	EE	Asso	8500
P6	Frank	CS	Full	9000

Class - Relation

Cid	Title	Dept	Year
C1	Database	CS	2011
C2	Signal Processing	EE	2012
C1	Database	CS	2012

Teach - Relation

Pid	Cid	Year
P1	C1	2011
P2	C2	2012
P1	C1	2012

{pid} of Teach → foreign key referencing Prof
{cid, year} of Teach → foreign key referencing Class

Example

Emp ID	Emp Name	Emp Age	Emp Exp	Emp Salary
123	Abc	25	2	12000
234	Def	39	10	40000
345	Ghi	29	5	22000

Identify the following in the Employee relation

- a. Super key(s)
- b. Candidate key(s)
- c. Primary key(s)

Identify Superkey, candidate key and primary key

Identify the following in the Employee relation

- Super key(s)
- Candidate key(s)
- Primary key(s)

BookID	Title	Author
1	The Great Gatsby	F. Scott Fitzgerald
2	To Kill a Mockingbird	Harper Lee
3	1984	George Orwell
4	Pride and Prejudice	Jane Austen
5	The Catcher in the Rye	J.D. Salinger

Table: Members

MemberID	Name	Address
1	Alice Johnson	123 Maple St.
2	Bob Smith	456 Oak St.
3	Carol White	789 Pine St.
4	David Brown	101 Elm St.
5	Emily Davis	202 Birch St.

Table: Loans

LoanID	BookID	MemberID	LoanDate
1	1	3	2024-06-01
2	4	1	2024-06-05
3	2	5	2024-06-10
4	5	2	2024-06-15
5	3	4	2024-06-20

Identify Superkey, candidate key and primary key

BookID	Title	Author
1	The Great Gatsby	F. Scott Fitzgerald
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3	1984	George Orwell
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Table: Loans

LoanID	BookID	MemberID	LoanDate
1	1	3	2024-06-01
2	4	1	2024-06-05
3	2	5	2024-06-10
4	5	2	2024-06-15
5	3	4	2024-06-20

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: A university database has a table named Students with columns StudentID, FirstName, LastName, and Email. The StudentID is a unique identifier assigned to each student.

Question: Which of the following can be considered a Primary Key for the Students table?

- A) FirstName
- B) Email
- C) StudentID
- D) Combination of FirstName and LastName

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

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Question: Which of the following can be considered a Primary Key for the Students table?

A) FirstName

B) Email

C) StudentID

D) Combination of FirstName and LastName

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: In the Employees table, there are columns: EmployeeID, SSN, FirstName, LastName, and Email. Both EmployeeID and SSN are unique for every employee.

Question: Which of the following is not a Candidate Key for the Employees table?

- A) EmployeeID
- B) SSN
- C) Salary
- D) Both A and B

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: In the Employees table, there are columns: EmployeeID, SSN, FirstName, LastName, and Email. Both EmployeeID and SSN are unique for every employee.

Question: Which of the following is not a Candidate Key for the Employees table?

A) EmployeeID

B) SSN

C) Salary

D) Both A and B

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A library database has a Books table with columns BookID, ISBN, Title, and Author. The BookID is an automatically generated unique identifier, and ISBN is the unique identifier for each published book.

What can be said about the keys in this table?

- A) Both BookID and ISBN are primary keys.
- B) Only ISBN can be the primary key, as it's unique for each book.
- C) Both BookID and ISBN are candidate keys, but only one can be chosen as the primary key.
- D) Title should be the primary key because it's the most important piece of information.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A library database has a Books table with columns BookID, ISBN, Title, and Author. The BookID is an automatically generated unique identifier, and ISBN is the unique identifier for each published book.

What can be said about the keys in this table?

A) Both BookID and ISBN are primary keys.

B) Only ISBN can be the primary key, as it's unique for each book.

C) Both BookID and ISBN are candidate keys, but only one can be chosen as the primary key.

D) Title should be the primary key because it's the most important piece of information.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

In a school database, the Students table has columns StudentID, FirstName, LastName, Email, and NationalID. The StudentID is a unique identifier auto-generated by the system, and the NationalID is unique for each student as well. Which of the following is the best choice for the primary key?

- A) FirstName and LastName combined.
- B) Email because it's unique.
- C) Either StudentID or NationalID can be selected as the primary key.
- D) FirstName should be the primary key.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

In a school database, the Students table has columns StudentID, FirstName, LastName, Email, and NationalID. The StudentID is a unique identifier auto-generated by the system, and the NationalID is unique for each student as well. Which of the following is the best choice for the primary key?

A) FirstName and LastName combined.

B) Email because it's unique.

C) Either StudentID or NationalID can be selected as the primary key.

D) FirstName should be the primary key.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: A university database has two tables: Students and Courses. The Students table has StudentID as its Primary Key, and the Courses table has CourseID as its Primary Key. There's a third table called Enrolments which records which students are enrolled in which courses.

Question: In the Enrolments table, which of the following should be used as a Foreign Key?

- A) StudentID
- B) CourseID
- C) Both A and B
- D) Neither A nor B

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: A university database has two tables: Students and Courses. The Students table has StudentID as its Primary Key, and the Courses table has CourseID as its Primary Key. There's a third table called Enrolments which records which students are enrolled in which courses.

Question: In the Enrolments table, which of the following should be used as a Foreign Key?

A) StudentID

B) CourseID

C) Both A and B

D) Neither A nor B

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: A table ProjectAssignments has columns: EmployeeID, ProjectID, and AssignmentDate. One employee can be assigned to multiple projects, and each project can have multiple employees.

Question: Which of the following is the best Composite Key for the ProjectAssignments table?

- A) EmployeeID
- B) ProjectID
- C) Combination of EmployeeID and ProjectID
- D) AssignmentDate

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

Scenario: A table ProjectAssignments has columns: EmployeeID, ProjectID, and AssignmentDate. One employee can be assigned to multiple projects, and each project can have multiple employees.

Question: Which of the following is the best Composite Key for the ProjectAssignments table?

A) EmployeeID

B) ProjectID

C) Combination of EmployeeID and ProjectID

D) AssignmentDate

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A table called Orders has the following columns: OrderID, CustomerID, ProductID, and OrderDate. The OrderID uniquely identifies each order, while both CustomerID and ProductID are required to uniquely identify an ordered product by a customer. What is the best key configuration for this table?

- A) OrderID should be the primary key.
- B) CustomerID should be the primary key.
- C) A composite key of CustomerID and ProductID should be the primary key.
- D) OrderDate should be included in the composite key.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A table called Orders has the following columns: OrderID, CustomerID, ProductID, and OrderDate. The OrderID uniquely identifies each order, while both CustomerID and ProductID are required to uniquely identify an ordered product by a customer. What is the best key configuration for this table?

A) OrderID should be the primary key.

B) CustomerID should be the primary key.

C) A composite key of CustomerID and ProductID should be the primary key.

D) OrderDate should be included in the composite key.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A table StudentCourses stores which courses students are enrolled in, with the columns StudentID, CourseID, EnrollmentDate, and Grade. Each student can enroll in multiple courses, and each course can have multiple students. What is the best key configuration?

- A) StudentID should be the primary key.
- B) CourseID should be the primary key.
- C) A composite key of StudentID and CourseID should be the primary key.
- D) EnrollmentDate should be the primary key.

Quiz

Primary Key, Candidate Key, Foreign Key, & Composite Key

A table StudentCourses stores which courses students are enrolled in, with the columns StudentID, CourseID, EnrollmentDate, and Grade. Each student can enroll in multiple courses, and each course can have multiple students. What is the best key configuration?

A) StudentID should be the primary key.

B) CourseID should be the primary key.

C) A composite key of StudentID and CourseID should be the primary key.

D) EnrollmentDate should be the primary key.

Create a New Database

- Open Microsoft Access.
- Click on Blank Database.
- Name it "CompanyDB" and click Create.

Create Employees Table

Field Name	Data Type	Description
EmployeeID	AutoNumber (Primary Key)	Unique identifier for each employee
FirstName	Short Text	First name of the employee
LastName	Short Text	Last name of the employee
DepartmentID	Number	Links to the Departments table

Create Departments Table

Field Name	Data Type	Description
DepartmentID	AutoNumber (Primary Key)	Unique identifier for each department
DepartmentName	Short Text	Name of the department

Create Projects Table

Field Name	Data Type	Description
ProjectID	AutoNumber (Primary Key)	Unique project identifier
ProjectName	Short Text	Name of the project
EmployeeID	Number	Links to the Employees table

Enter
Sample
Data

Employees Table

EmployeeID	FirstName	LastName	DepartmentID
1	Alice	Johnson	1
2	Bob	Smith	2
3	Charlie	Brown	1

Departments Table

DepartmentID	DepartmentName
1	IT
2	HR

Projects Table

ProjectID	ProjectName	EmployeeID
1	Website Redesign	1
2	Employee Onboarding	2
3	Data Analysis	3

Establish Relationships

1. Go to the **Database Tools** tab and select **Relationships**.
2. Add all three tables.
3. Create relationships:
 - Link **DepartmentID** in "Employees" to **DepartmentID** in "Departments".
 - Link **EmployeeID** in "Projects" to **EmployeeID** in "Employees".
4. Enforce **Referential Integrity**.
5. Save and close.

Run Simple Queries

Query 1: List Employees and Their Departments

1. Go to Create > Query Design.
2. Add Employees and Departments tables.
3. Drag FirstName, LastName, and DepartmentName into the query.
4. Run the query.

Query 2: List Projects and Assigned Employees

1. Go to Create > Query Design.
2. Add Projects and Employees tables.
3. Drag ProjectName, FirstName, and LastName into the query.
4. Run the query.

Activity – Submission point

<https://forms.office.com/e/NaNBAneFL5>



CustomerID	Customer Name	City
1	Alice	New York
2	Bob	Los Angeles
3	Carol	Chicago

OrderDetailID	OrderID	ProductName	Quantity
1001	101	Keyboard	1
1002	102	Mouse	2
1003	103	Monitor	1

OrderID	OrderDate	CustomerID
101	2025-01-10	1
102	2025-01-11	2
103	2025-01-12	1

<https://forms.office.com/e/X8nneDG8F9>

**Student Activity: Event Management
System**



Questions & Answers

Reference : <https://www.guru99.com/data-modelling-conceptual-logical.html>