SCS1309 Database Management Systems

Reference Guide

Microsoft Access

Microsoft Access is a powerful Database Management System (DBMS) developed by Microsoft. It integrates the relational Microsoft Jet Database Engine with an intuitive graphical user interface and software development tools. The primary function of Microsoft Access is to store, retrieve, and manage data efficiently, which is referred to as a database.

Key Steps in using MS Access

Database Creation:

Start by creating a new database and specifying the types of data you plan to store. For example, you could create a database to manage student information, class schedules, or attendance records.

Data Input:

Once the database is created, you can enter data into it. This could include daily attendance, student details, or course records, depending on the use case.

Query:

Queries are used to retrieve specific data from the database. Think of a query as a question you ask your database to fetch particular information.

Report :

Data retrieved can be organized into reports. These reports provide a professional format for printing and presenting information, such as attendance summaries or student grades.

Architecture of Microsoft Access

Microsoft Access organizes data and related functionalities into objects. Key objects in a desktop database include:

Tables: The fundamental building blocks where data is stored.

Queries: Used for searching and extracting data based on specific criteria.

Forms: Provide a user-friendly interface for entering and viewing data.

Reports: Used to present data in a formatted, printable layout.

Macros and Modules: Allow for automation and advanced functionality.

Unlike other database systems, an Access desktop database (".accdb") includes not only data but also tools for managing, automating, and interacting with the database.

Key Concepts in Database Management

Data Definition:
Refers to specifying the structure and format of the data, including creating tables, defining fields, and setting data types.

Data Manipulation:
It involves operations like adding, updating, or deleting data in the database using tools like queries or forms.

Data Control:
Focuses on maintaining data integrity, ensuring security, and managing permissions for users.

Major Objects in Microsoft Access

1. Tables
Tables are used to store and organize data into rows (records) and columns (fields).

- ➢ Each field in a table has a unique name and data type (e.g., text, number, date).
- ➢ Primary keys are used to uniquely identify records, ensuring data integrity.

Example: A Student Table might include fields like StudentID (Primary Key), Name, Address, and Grade.

2. Queries

Queries allow you to filter, search, and combine data from one or more tables.

Types of queries include:

- ➢ **Select Queries:** Retrieve specific data.
- ➢ **Update Queries:** Modify existing data.
- ➢ **Insert Queries:** Add new data.
- ➢ **Delete Queries:** Remove data.

Example: Retrieve all students in a specific class or update the grades of students after an exam.

3. Forms

Forms provide an interface for data entry and modification, ensuring user friendliness.

Forms can include drop-down menus, validation checks, and other controls to guide users.

Example: A Student Enrollment Form might allow administrators to enter student details while ensuring the data is correctly stored in related tables.

4. Reports

Reports format and summarize data for analysis or presentation.

They are customizable and can include charts, groupings, and calculated fields.

Example: Generate an attendance report summarizing student participation or a grade report for a class.

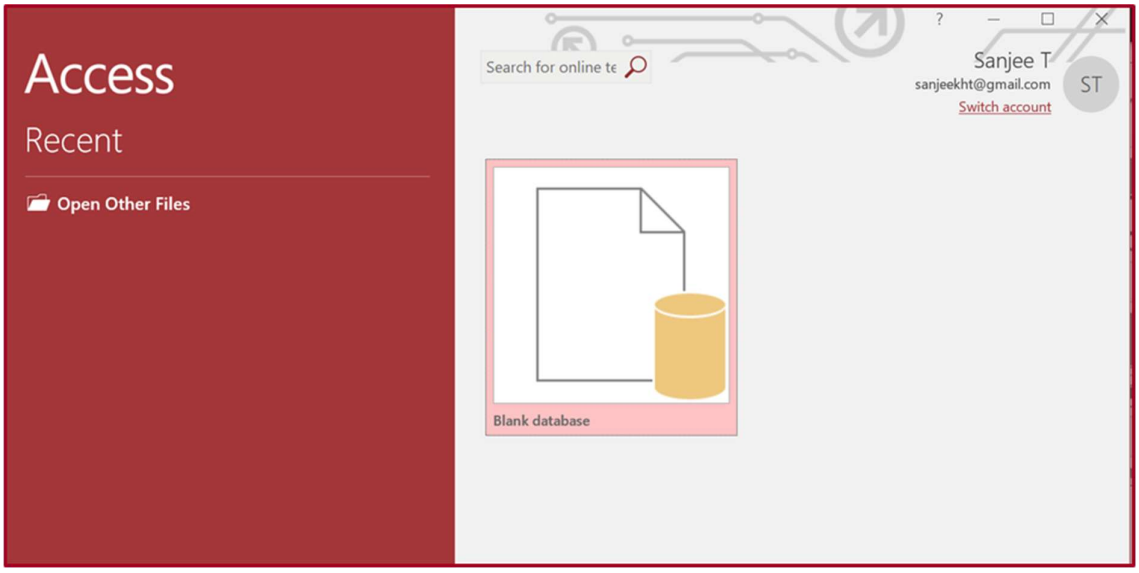
Create Blank Database

Step 1: Open MS Access

- ➢ Launch the Microsoft Access application on your computer.

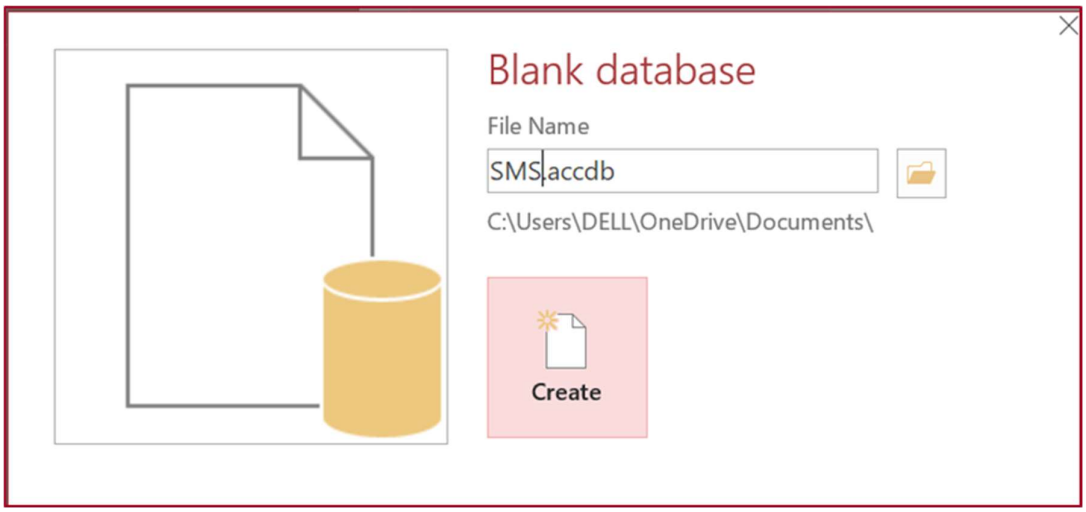
Step 2: Choose the Blank Database Option:

From the startup screen, select the option labeled "Blank database."



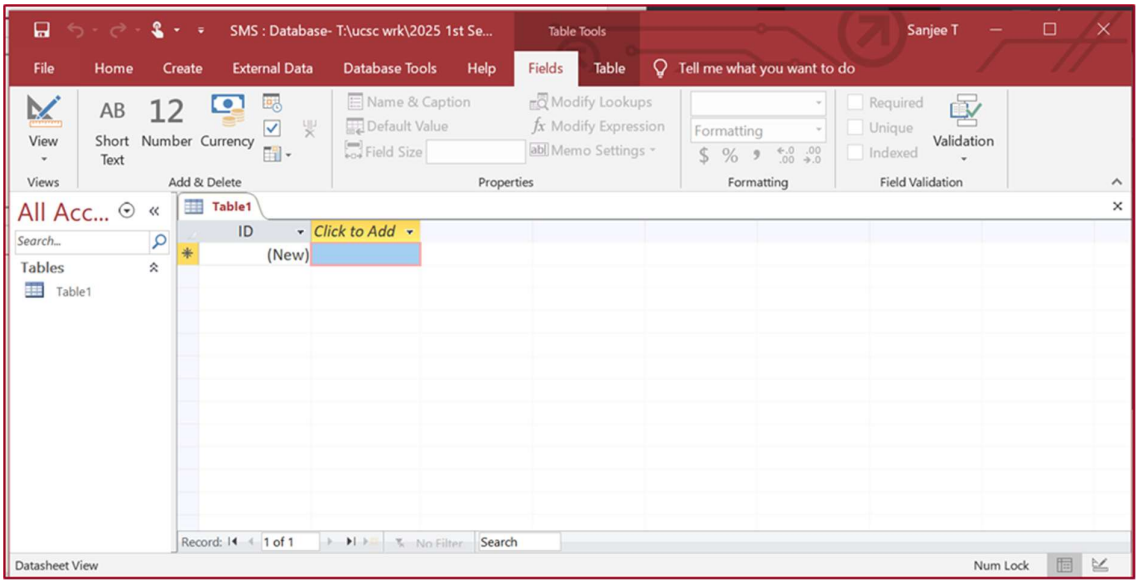
Step 3: Name Your Database:

Provide a suitable name for your new database, such as "StudentManagementSystem(SMS)," and specify the location where you want to save it.



Step 4: Click on the Create button to proceed.

- ➢ A new database file will be created, and Access will automatically display a blank table in Datasheet View.



This marks the starting point for further development. The blank table can now be customized by defining fields and entering data relevant to your application.

Data Types

A data type specifies the kind of data that can be stored in a particular field of a database. Microsoft Access supports various data types to handle different kinds of information efficiently.

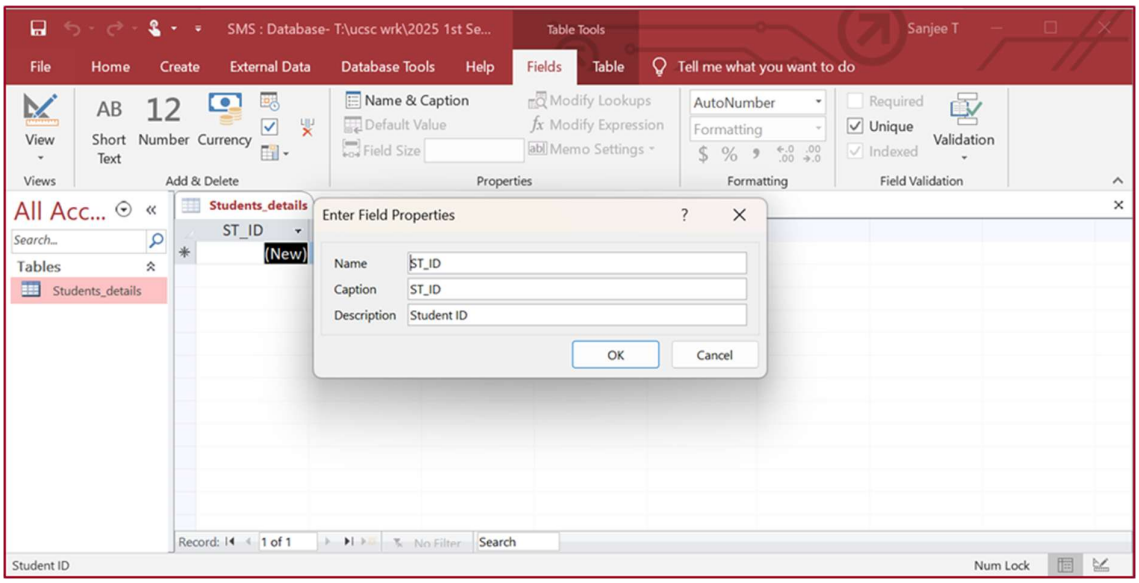
Type of Data	Description	Size
Short Text	Stores text or combinations of text and numbers, including numbers that do not require calculations (e.g., phone numbers).	Up to 255 characters.
Long Text	Stores lengthy text or combinations of text and numbers	Up to 63, 99 characters.
Number	Stores numeric data used in mathematical calculations.	1, 2, 4, or 8 bytes (16 bytes if set to Replication ID).

Date/Time	Stores date and time values for the years 100 through 9999.	8 bytes
Currency	Stores currency values and numeric data used in calculations involving up to four decimal places.	8 bytes
Auto Number	Stores a unique sequential number (incremented by 1) or a random number assigned by Microsoft Access when a new record is added to a table.	4 bytes (16 bytes if set to replication ID).
Yes/No	Stores Boolean values, such as Yes/No, True/False, or On/Off.	1 bit
Attachment	Stores files such as digital photos. Multiple files can be attached per record. This data type is not available in earlier versions of Access.	Up to about 2GB
OLE objects	Stores pictures, audio, video, or other Binary Large Objects (BLOBs).	Up to about 2GB
Hyperlink	Stores text or combinations of text and numbers as a hyperlink address.	Up to 8,192 (each part of a Hyperlink data type can contain up to 2048 characters)

Lookup Wizard	Not a data type itself but starts a wizard to create a simple or complex lookup field. A simple lookup uses another table or value list to validate contents. A complex lookup allows storing multiple values of the same data type per row.	Dependent on the data type of the lookup field
Calculated	Allows creating an expression using data from one or more fields. You can specify different result data types for the expression.	Dependent on the expression

Create Table

- The ID field has already been created, and we now want to rename it to suit our conditions.
- This is a **Student_details** table and this will be the unique identifier for our Students.



- Click on the **Name & Caption** option in the Ribbon and you will see the following dialog box.
- Change the name of this field to **ST_ID** to make it more specific to this table. Enter the other optional information if you want and click Ok.
- Once all the fields are added, click the Save icon. You will now see the Save As dialog box, where you can enter a table name for the table.

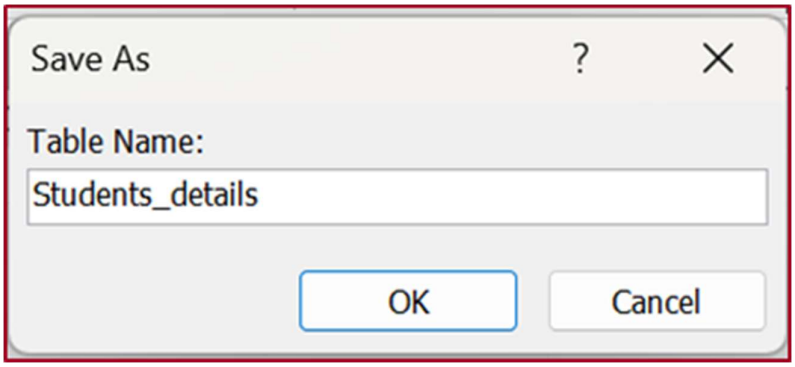
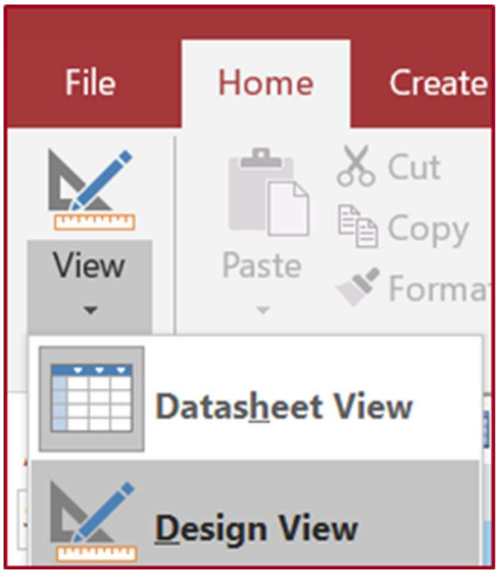


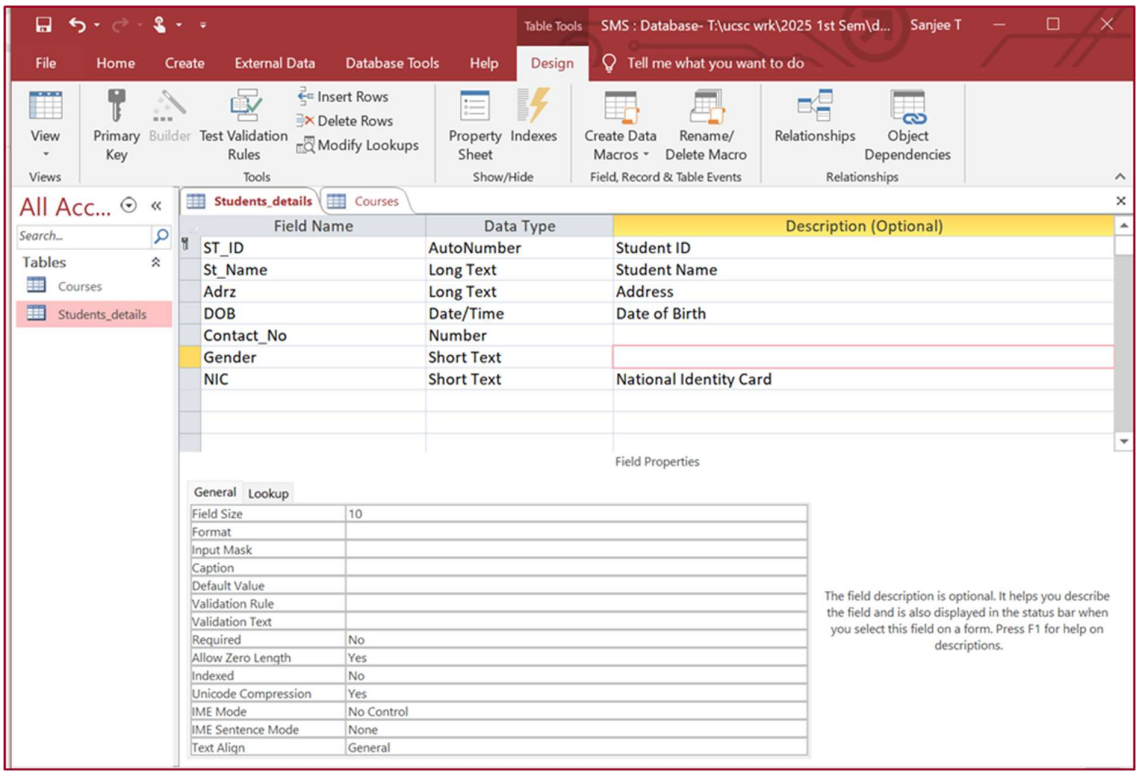
Table Design View

As we have already created one table using Datasheet View. We will now create another table using the Table Design View. We will be creating the following fields in this table.



In the tables group, click on Table and you can see this looks completely different from

the Datasheet View. In this view, you can see the field name and data type side by side.
We now need to make ST_ID a primary key for this table, so let us select ST_ID and click on the Primary Key option in the ribbon.



Adding Foreign Key for the Table

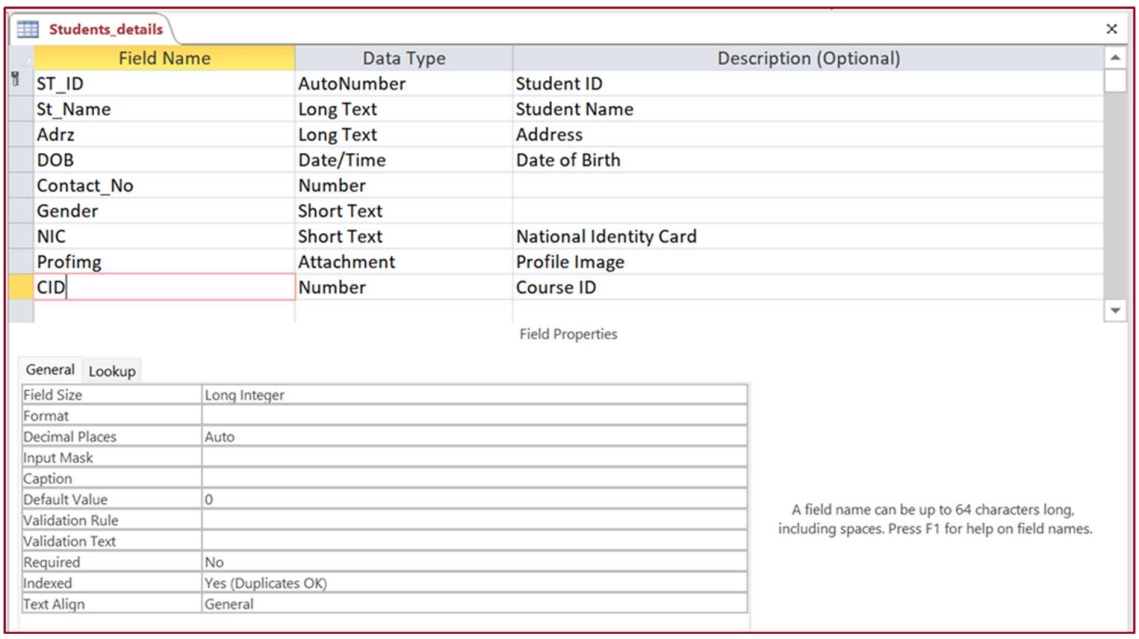
Step 1: Ensure a Courses Table Exists

- ➔ Verify that the Courses table exists with a Course_ID field set as the Primary Key.
- ➔ If not, create a table named Courses with the necessary details:
- ➔ Course_ID (Primary Key)
- ➔ Course_Name
- ➔ Other course-related fields as required.

Step 2: Add the Foreign Key Field

- ➔ Open the Student_Details table in Design View.
- ➔ In the first available row of the Field Name column, type Course_ID.

➔ Set the Data Type to match the data type of the Course_ID field in the Courses table (typically Number or Short Text).

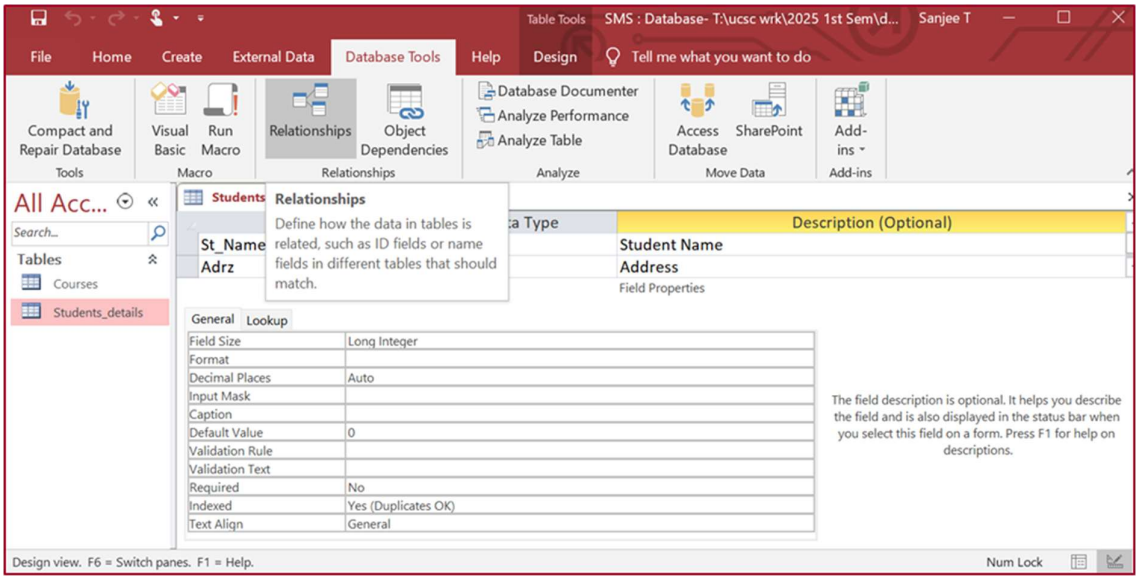


Step 3: Define the Relationship

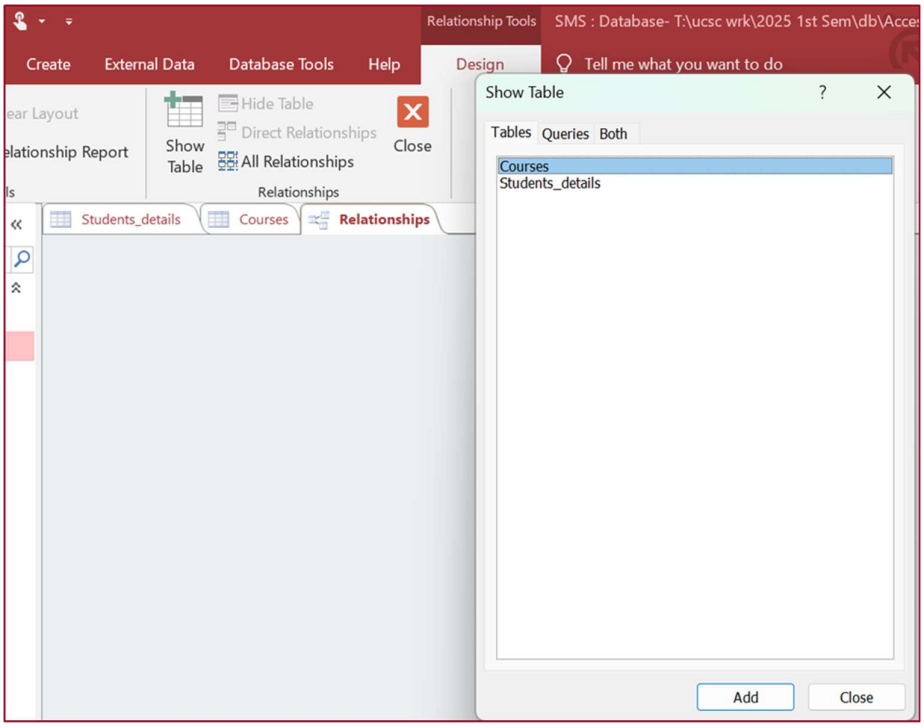
➔ Close the Student_Details table and return to the main MS Access window.

➔ Go to the Database Tools tab on the Ribbon and click on Relationships.

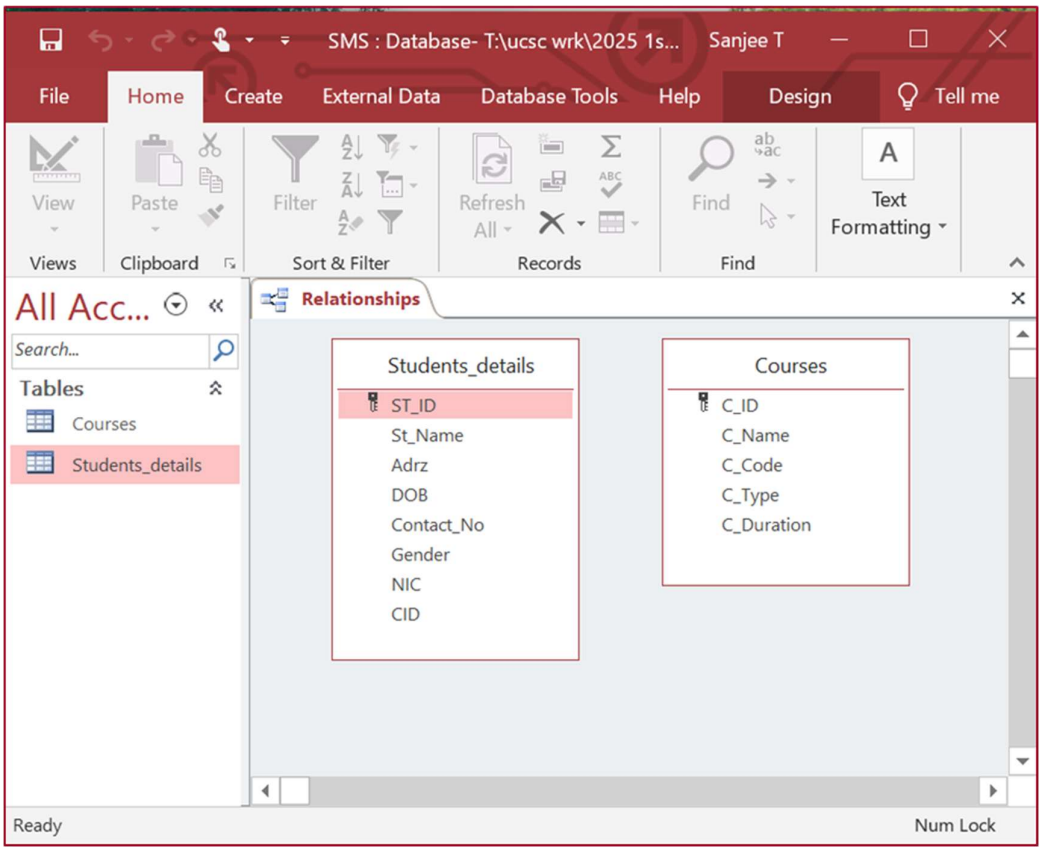
➔ In the Relationships window:



➔ Add the Student_Details and Courses tables to the workspace by dragging them from the Show Table dialog.

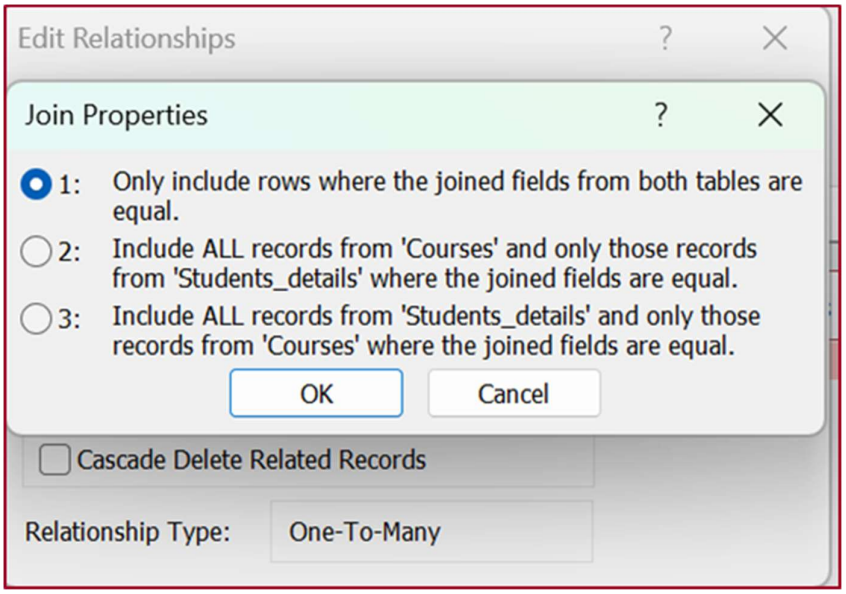


➔ Drag the Course_ID field from the Courses table and drop it onto the Course_ID field in the Student_Details table.



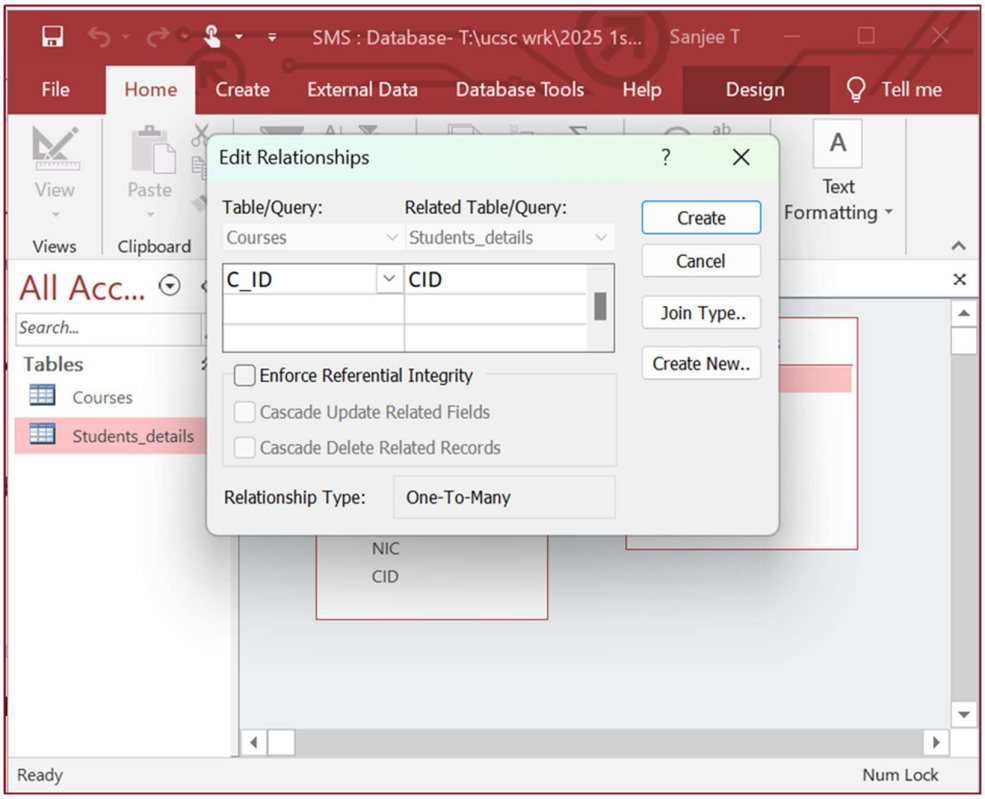
➔ The Edit Relationships dialog box will appear:

➔ Ensure the fields match.

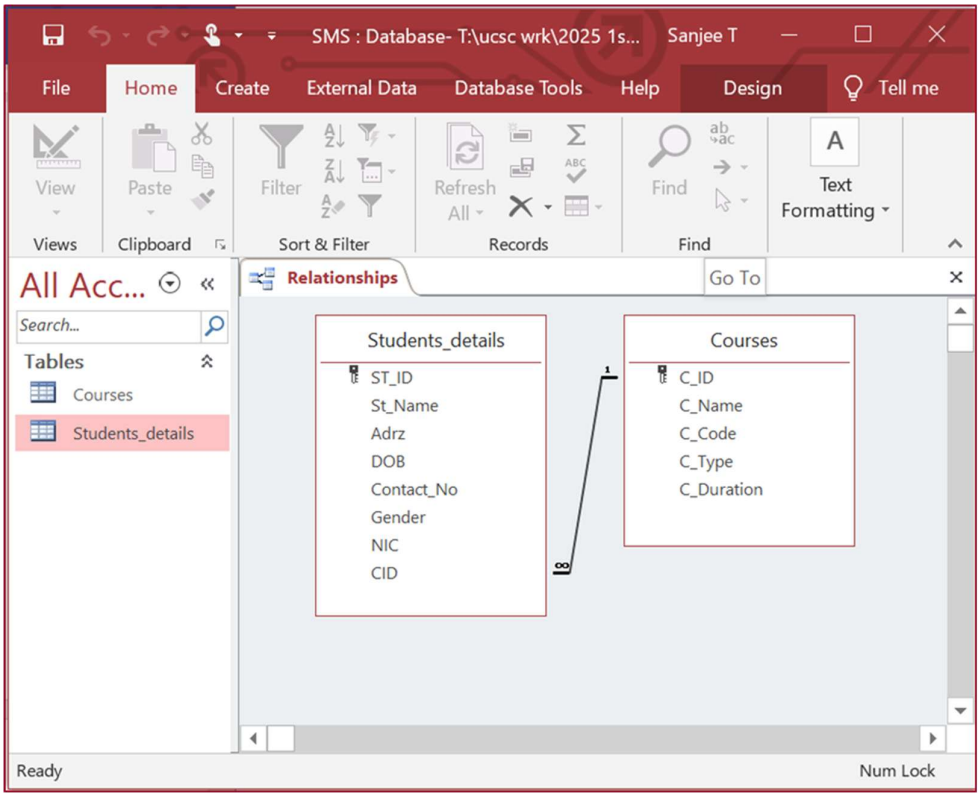


➔ Check Enforce Referential Integrity to maintain consistency.

➔ Optionally, enable Cascade Update Related Fields and/or Cascade Delete Related Records based on your requirements.



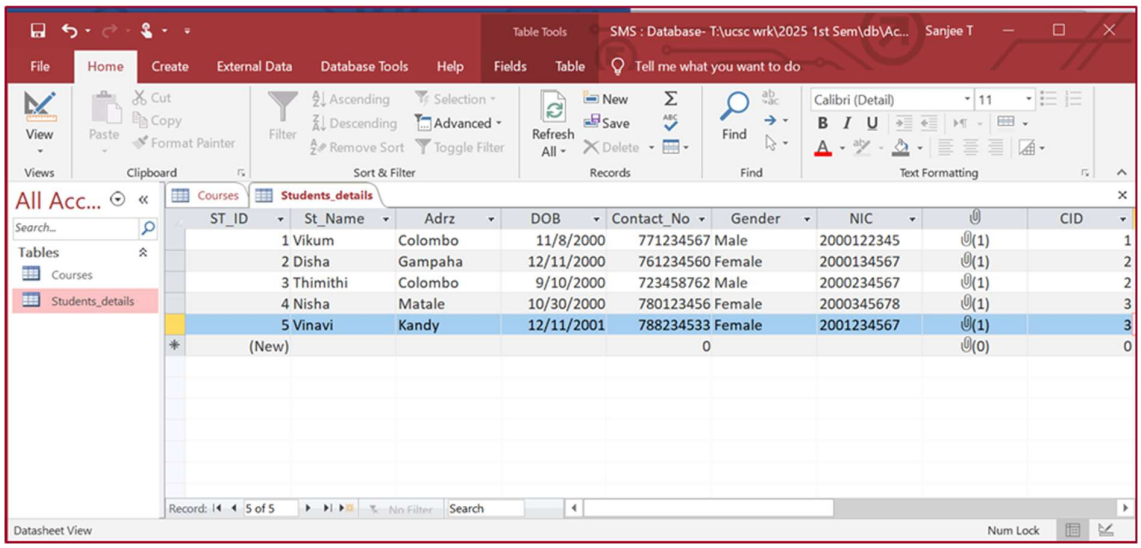
➔ Click Create to establish the relationship.



Step 4: Save Changes

➔ Save the relationship by clicking Save in the Relationships window.

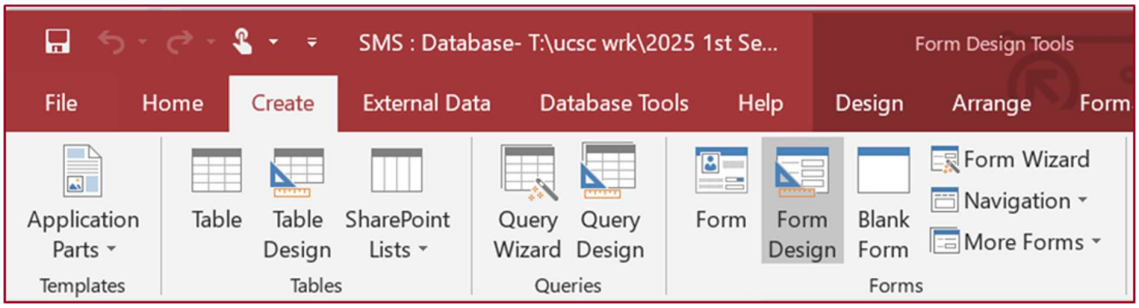
➔ Save and close all tables to ensure changes are applied.



Create a Form

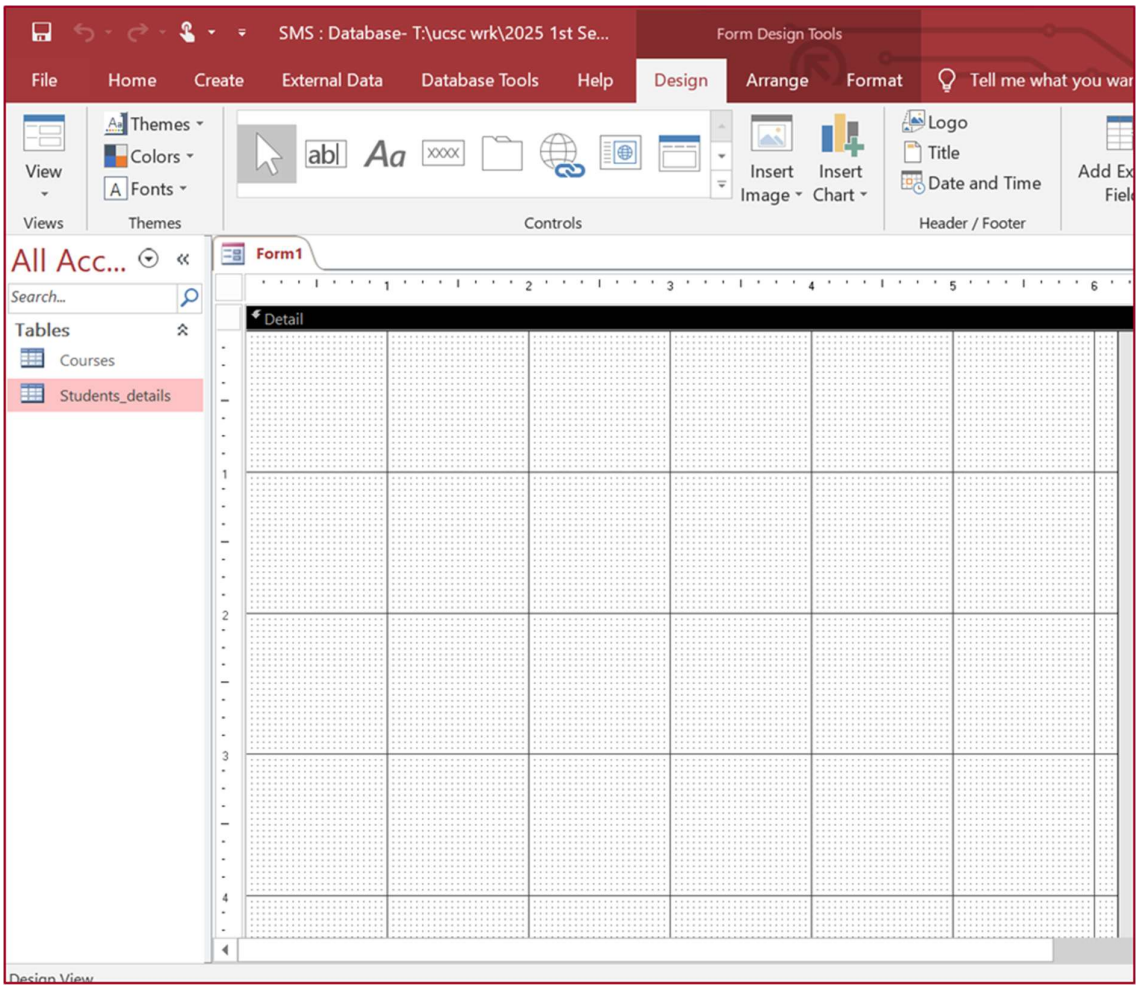
Step 1: Go to the Create Tab: Click on the Create tab in the Ribbon.

- Select Form Design: Click Form Design to create a blank form

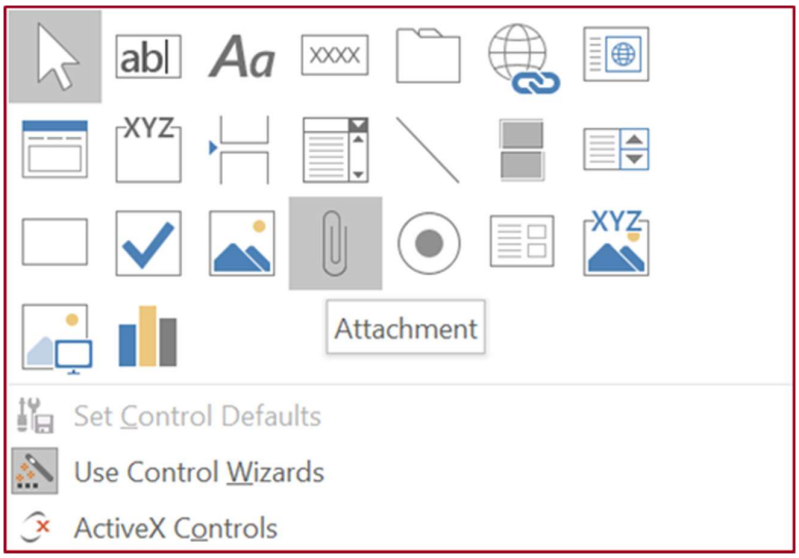


Step 2: Add and Arrange Controls

- Add Controls for Student Data:



- Go to the Design Tab:
- Use the Text Box control to add fields for Name, Gender, Address, Contact Number, and NIC.



Bind Controls to Fields:

- Select each text box and set the Control Source property to the corresponding field in the Property Sheet (View > Property Sheet).

Add Labels:

- Add labels for each text box (e.g., “Name,” “Gender,” etc.).
- Add Profile Picture:
- In the Design Tab, click Attachments and add an Attachment Control for the Profile_Picture field.
- Place the Attachment Control in the top-right corner of the form.

Step 3: Apply Styling

Set Font Styles:

- Use the Format Tab to choose fonts, colors, and sizes for labels and text boxes.
- Adjust the Form Size:
- Resize the form to ensure all controls fit nicely.

Step 4: **Save and Test the Form**

Save the Form:

Save the form by clicking File > Save and giving it a meaningful name, like StudentDetailsForm.

Step 5: View the Form:

Switch to Form View (using the View button in the Ribbon) to test how it looks and ensure all controls display the expected data.