

## Session 1.8

# Database Concepts

AN INITIATIVE BY

**UNICAL ACADEMY**

## What will be covered in this session?

- Data, Database, and Information
- Types of Databases
- Entity-Relationships and RDBMS
- SQL and SQL Queries practice using MS Access (or any other RDBMS)

### Part 2: Concepts of Testing (30 h)

- Types of Testing
- Common Testing Tools
- Manual Testing – Test cases, Data, Scenarios etc.
- Case-studies and Scenarios

### Part 3: Automated Testing (50 h)

- Selenium Overview
- Web Driver, Locators, Elements, and more
- Automation and Runs

### Part 4: Hands-on Sessions (100 h)

- Use cases and traceability
- Test data and scenarios
- Day to day work
- Defect prevention, RCA and other value add aspects

### Part 1: The Basics (20 hours)

- Organization & its working
- SDLC & STLC Overview
- Basics of OOPS, Database Java essentials for Testing
- Overview on few Testing roles Job Descriptions



Let's go!!!

# What is a Database? – in simple terms

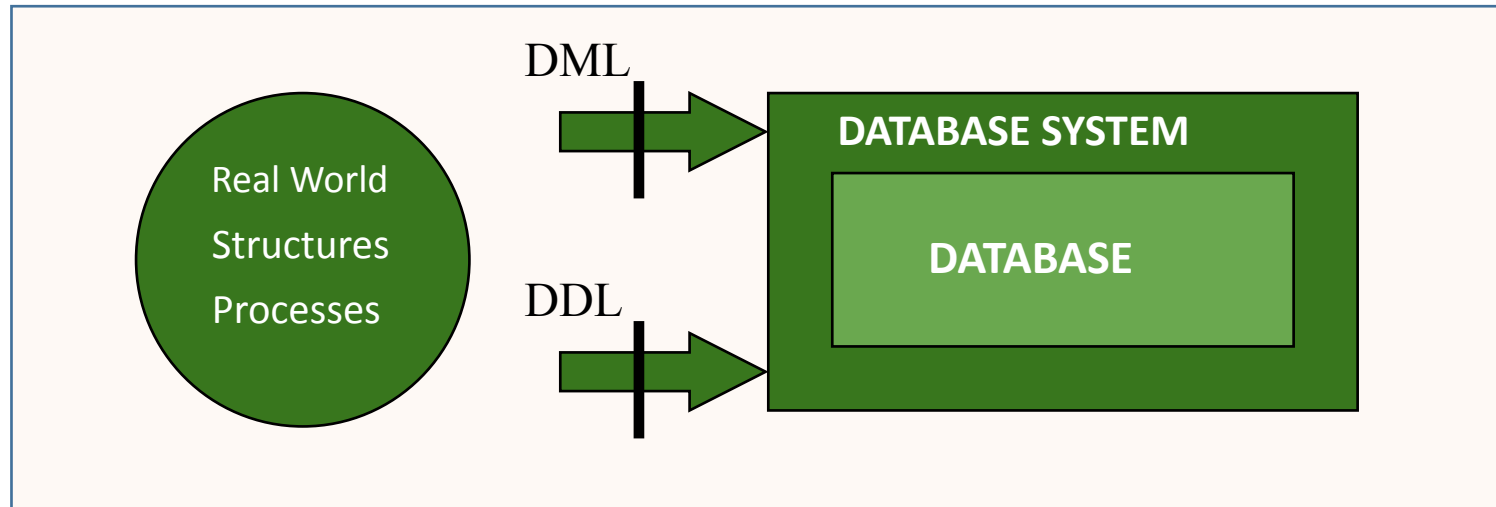
**Any of the below can be considered a Database -**

- Your personal address book in a Word document
- A collection of Word documents or Excel sheets
- A very large flat file on which you run some statistical analysis functions
- Data collected, maintained, and used in airline reservation

**In other words -**

- **Data** is a '**raw information**' that does not make sense to you on its own – unless you read the same in a meaningful way as '**Information**'.
- All of the above example contain 'Data' in one form or other form. You have to record, and retrieve the data from each file to comprehend the required 'Information'.
- The '**container**' or a 'file' that facilitates data storage is called '**Database**'.

## What is a Database? – A model of ‘real world’



- A **database** is a model of **structures** of real-world entities
- The **use of a database** reflect **processes** of real-world entities
- A **database system** is a **software system** which supports the **definition and use of a database**
- Models can be useful when we want to examine or manage part of the real world.

# What is a Database? – A model of ‘real world’

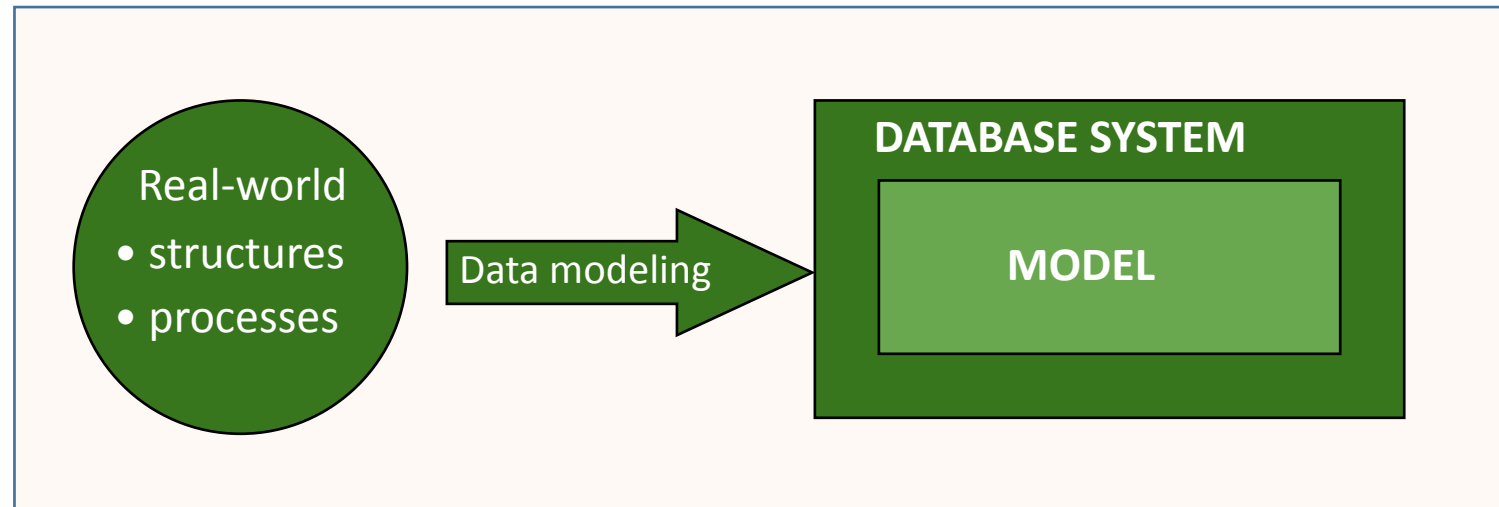
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## Data Modeling



- The **model** represents a perception of structures of real-world
- The **data modeling** process is to showcase structures of real-world and relationship among the various structures of the 'real-world'.
- In the data modeling process we **select** aspects and we **abstract**

# Types of Databases

## **Traditional way / 'Older' Approach:**

- Relational
- Flat-file based
- Hierarchical
- Network

## **The database types that we hear more in year 2021**

- SQL based Databases
- NoSQL Databases

## Popular Databases

Database Name	Developed in	Key Features / Points to ponder
MySQL	C++	Open source; used by several companies. Does not support XML or OLAP
MariaDB	C++	Open source; Built by utilizing MySQL source code; so – same features as MySQL
MongoDB	C, C++, JavaScript	Open source; Popular No SQL database – works based on ‘document-oriented’ approach. Supports JSON data structure
Redis	C	Open source; based on ‘linked list’ data structure
PostgreSQL	C	Open source; A powerful object-relational database
Cassandra	Java	Open source; supports distributed data centers
Oracle	C, C++	Not Open source; wide userbase with enterprise tools – from Oracle Corporation
Microsoft SQL Server	C, C++	Not an Open source; wide userbase from Microsoft Corp



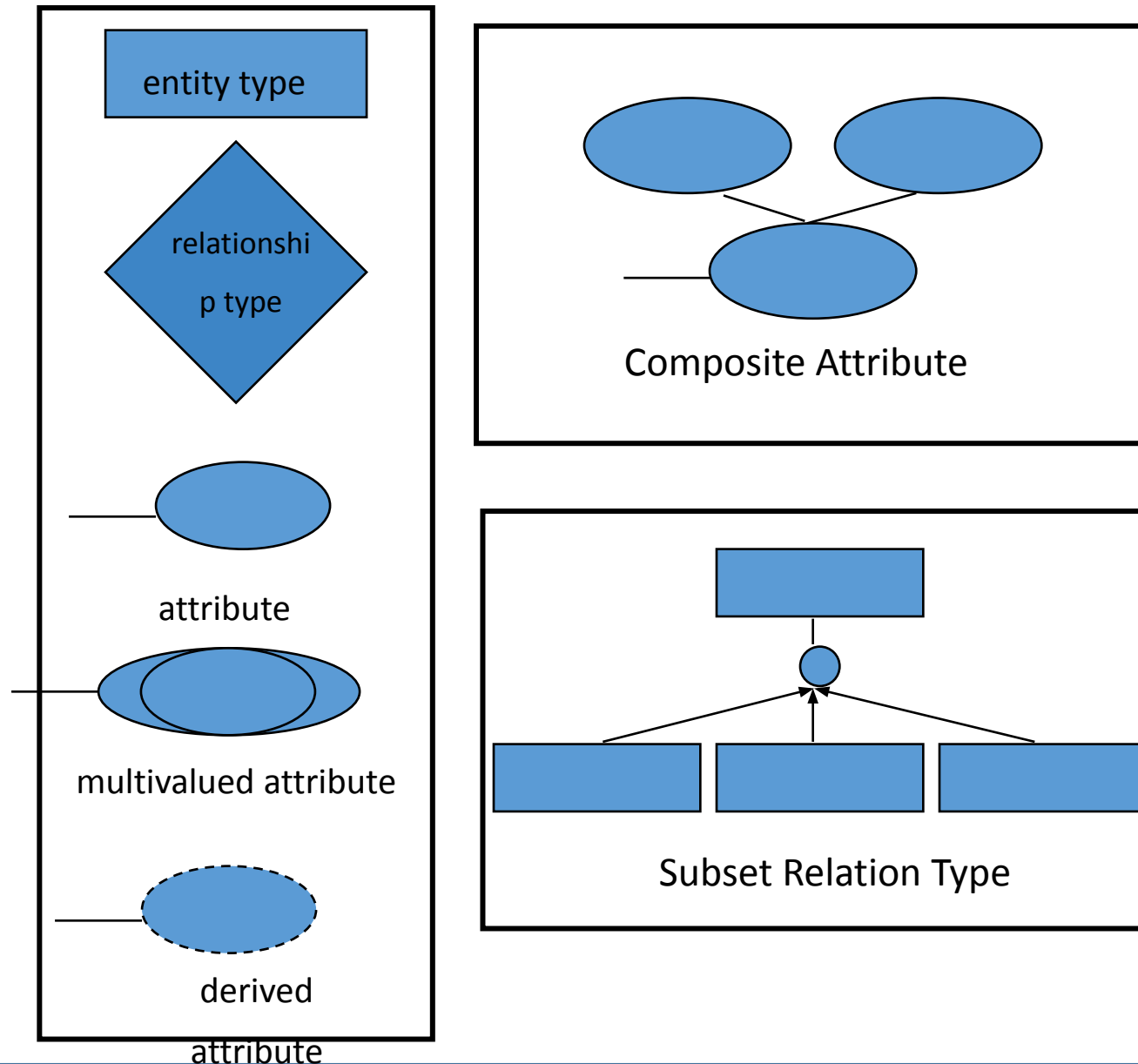
# Let's learn Basics of RDBMS

## RDBMS (Relational Database Management System) Overview

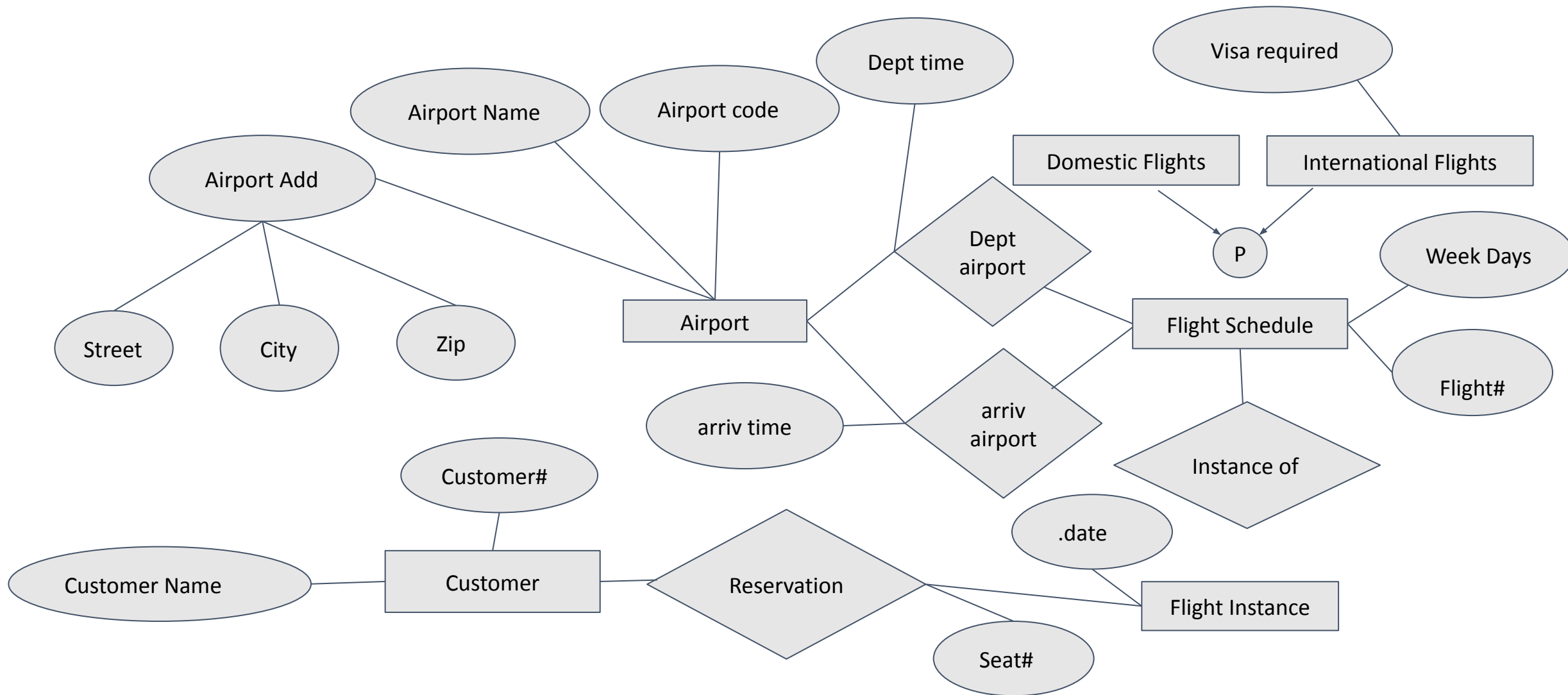
- RDBMS is built based on the concept known as 'Tuple Relational Calculus'
- First conceptualized by Edgar Codd while working on 'System R' at IBM
- At high level RDBMS is based on –
  - Independent Entities
  - Relation among various entities
  - Attributes in each Entity (RDBMS Table)
  - Constraints while relating entities
  - Constraints while manipulating attributes (RDBMS columns / fields)
  - Popular constraint is Referential Integrity constraint

## SQL Commands in RDBMS

Command Type	Commands	Syntax and corresponding notes / points
DDL: Data Definition Language	CREATE; ALTER; DROP; TRUNCATE	These are used to create a table, drop a table etc. Generally, System Administrator / DBA use these commands in production.
DML: Data Manipulation Language	INSERT; UPDATE; DELETE	INSERT INTO {table} {{columns list} VALUES {{values}}
DCL: Data Control Language	GRANT; REVOKE	GRANT {privilege} ON {table} TO {user} – to give privileges to a specific user or user group
DQL: Data Query Language	SELECT	SELECT {expression} FROM {TABLE} WHERE {clause – to fetch the data from a table
TCL: Transaction Control Language	COMMIT; ROLLBACK; SAVEPOINT	COMMIT; ROLLBACK; SAVEPOINT - These are used in conjunction with BEGIN TRANS END TRANS (SYNCPPOINT) based on success (return code) of the overall transaction.



## Example of ER Diagram (snippet of Flight booking system)



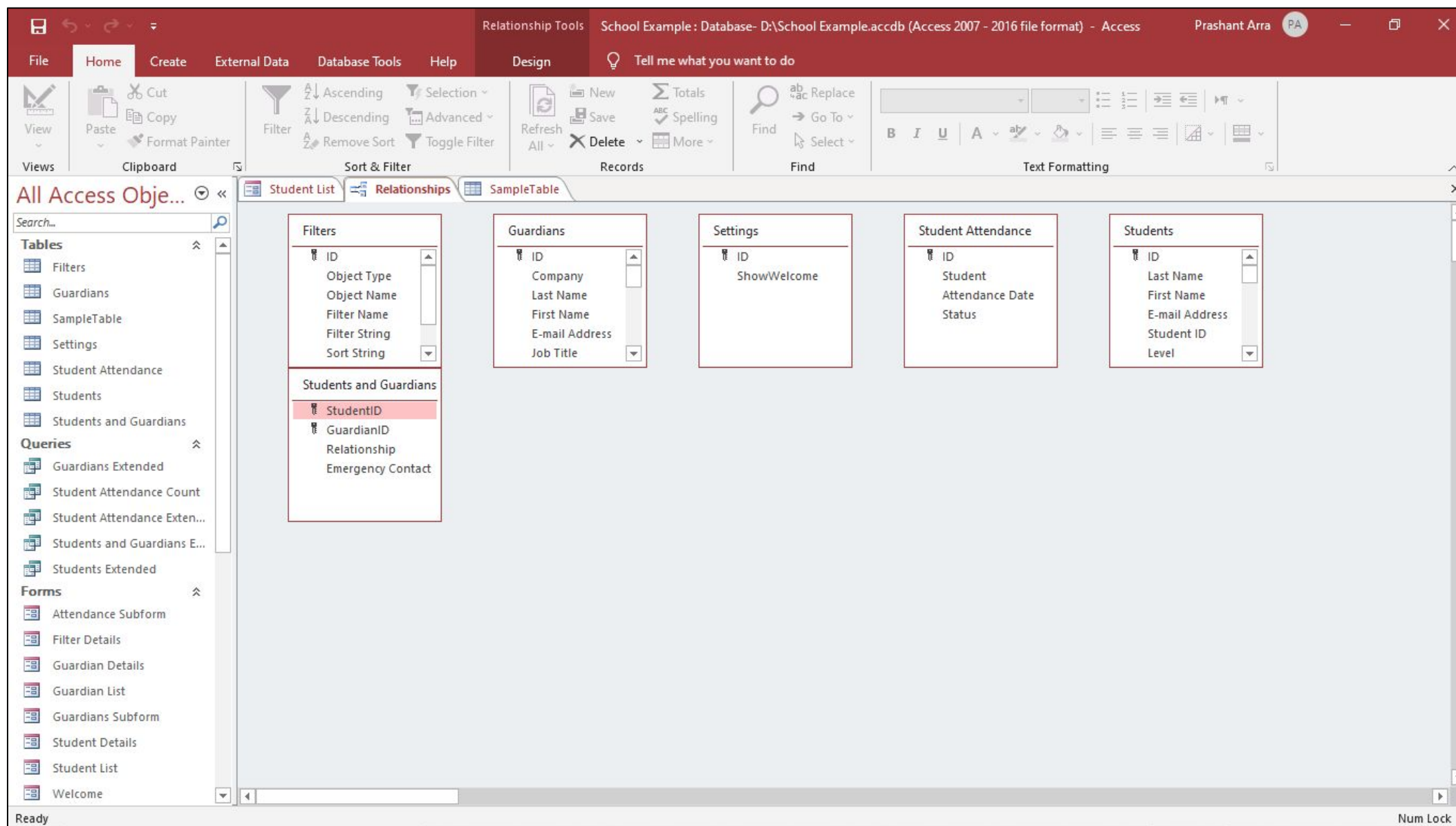
## Practice using simple MS Access

1. Open MS Access and use any of the given templates to get a feel of RDBMS
2. In the subsequent slides, 'Students' template is depicted. You can pick any of the models or you can create your 'own'

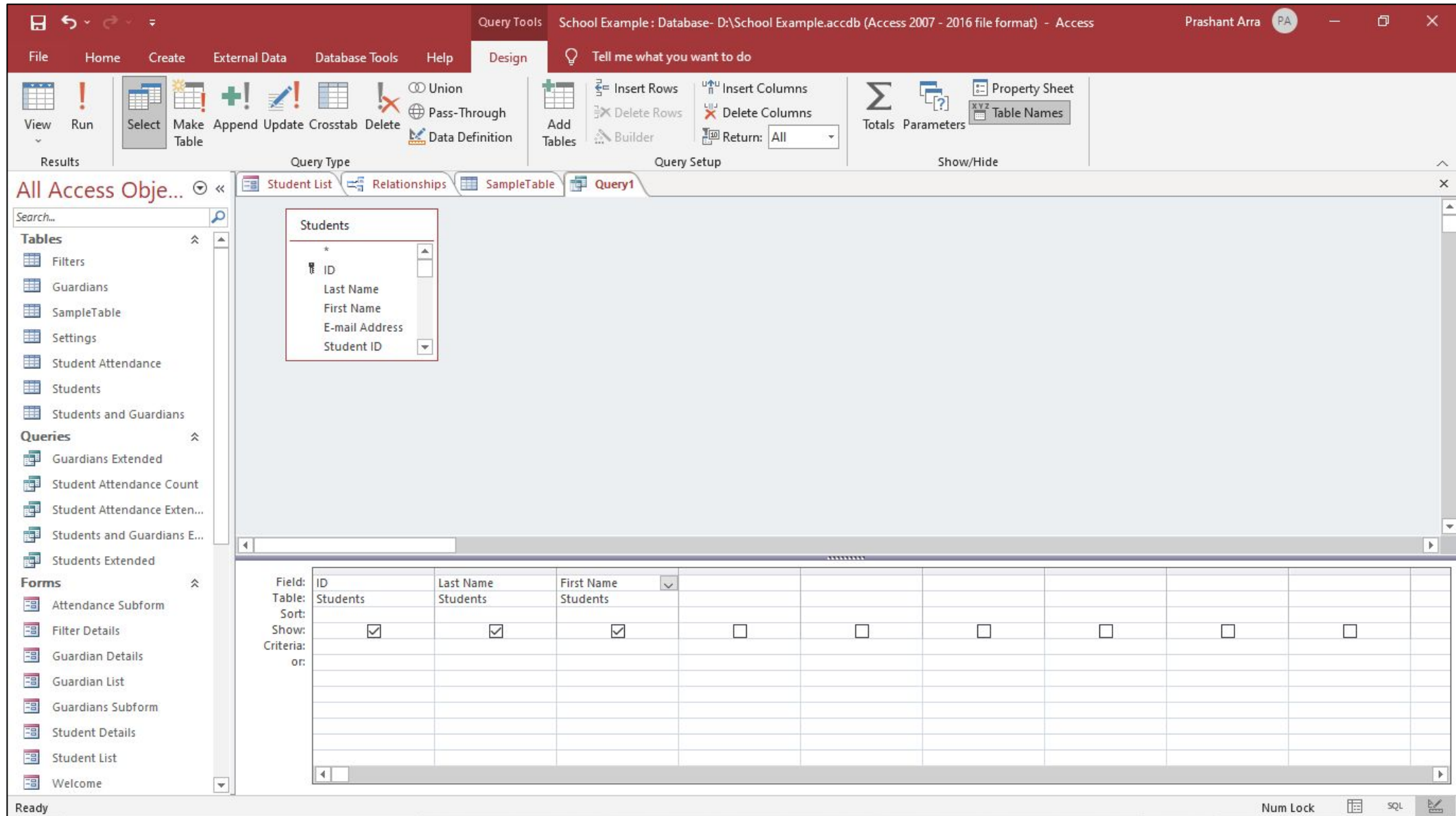
# Exercise 1: Create a 'Table'

The screenshot shows the Microsoft Access application window. The title bar indicates the file is 'School Example : Database- D:\School Example.accdb (Access 2007 - 2016 file format) - Access' and the user is 'Prashant Arra'. The ribbon is set to 'Design', and the 'Table Tools' contextual tab is active. The 'Design' ribbon includes groups for 'Views', 'Tools', 'Property Indexes Sheet', 'Create Data Macros', 'Rename/Delete Macro', 'Relationships', and 'Object Dependencies'. The 'All Access Objects' task pane on the left shows a list of tables, queries, and forms. The 'SampleTable' table is selected, and its design grid is displayed. The design grid has three columns: 'Field Name', 'Data Type', and 'Description (Optional)'. The first row contains the field 'ID' with the data type 'AutoNumber'. The 'Field Properties' pane at the bottom right shows the 'General' tab with properties for 'Field Size' (Long Integer), 'New Values' (Increment), 'Format', 'Caption', 'Indexed' (Yes (No Duplicates)), and 'Text Align' (General). A note at the bottom right states: 'A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.'

Design view. F6 = Switch panes. F1 = Help.

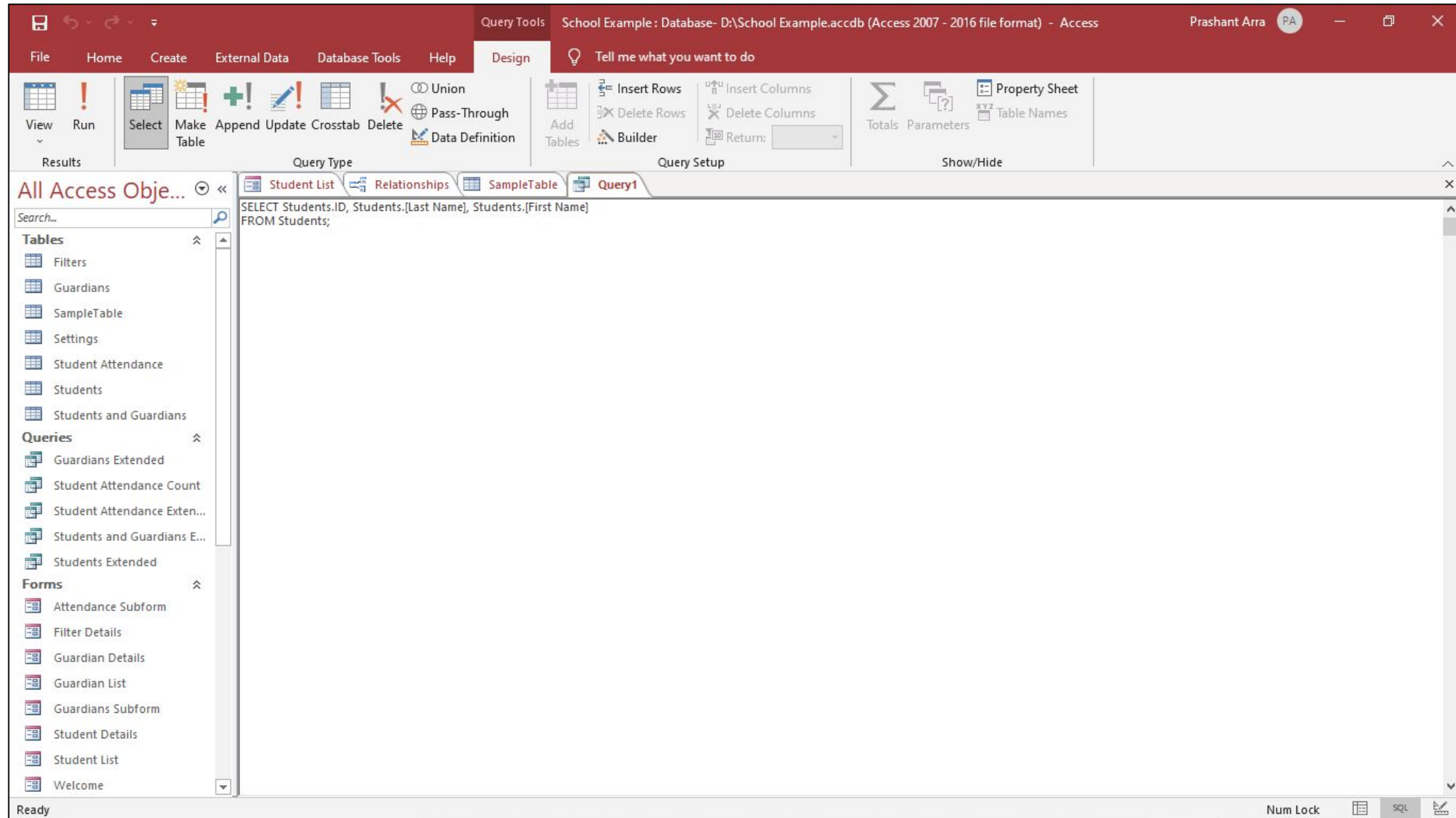


# Write queries – using Query builder / wizard





# Write queries – using plain SQL



# Execute queries – (wizard mode and SQL mode)

The screenshot shows the Microsoft Access application window titled "School Example : Database- D:\School Example.accdb (Access 2007 - 2016 file format) - Access". The ribbon includes tabs for File, Home, Create, External Data, Database Tools, and Help. The Home tab is active, showing options for Views, Clipboard, Sort & Filter, Records, Find, and Text Formatting. The left pane displays the "All Access Objects" task pane with a search bar and categories: Tables, Queries, and Forms. The "Students" table is selected under the Tables category. The main area shows the "Students" table in Datasheet View. The table has columns: ID, Last Name, and First Name. The data is as follows:

ID	Last Name	First Name
1	L1	F1
2	L2	F2
3	L3	F3
4	Last	First
5	Test Last	Test First
6	John	Berik
*	(New)	

The status bar at the bottom indicates "Record: 1 of 6" and "No Filter". The bottom right corner shows "Num Lock" and "SQL" buttons.

