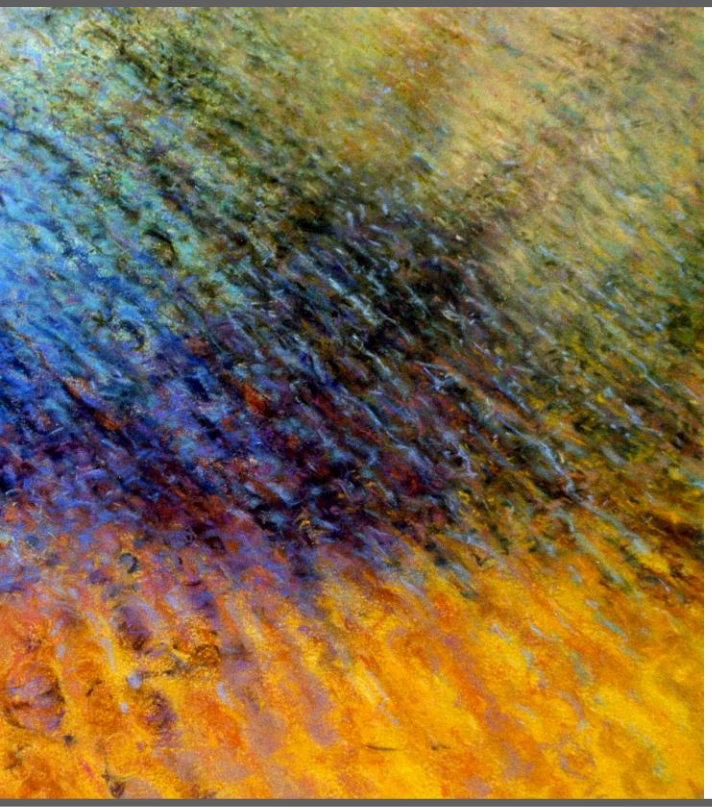
David M. Kroenke and David J. Auer

# Database Processing:

## Fundamentals, Design, and Implementation



## Assignment 1

# Getting Started with Microsoft Access 2013

# Assignment Objectives

- To be able to create databases in Access 2013
- To be able to create tables in Access 2013
- To understand Access 2013 data types
- To be able to insert data into tables in Access 2013
- To be able to create relationships between tables in Access 2013
- To be able to create Query-by-Example (QBE) queries in Access 2013
- To understand the use of the Form Wizard in Access 2013
- To understand the use of the Report Wizard in Access 2013

# Create 3 Tables for Assign 1

## Three tables: STUDENT, CLASS, and GRADE

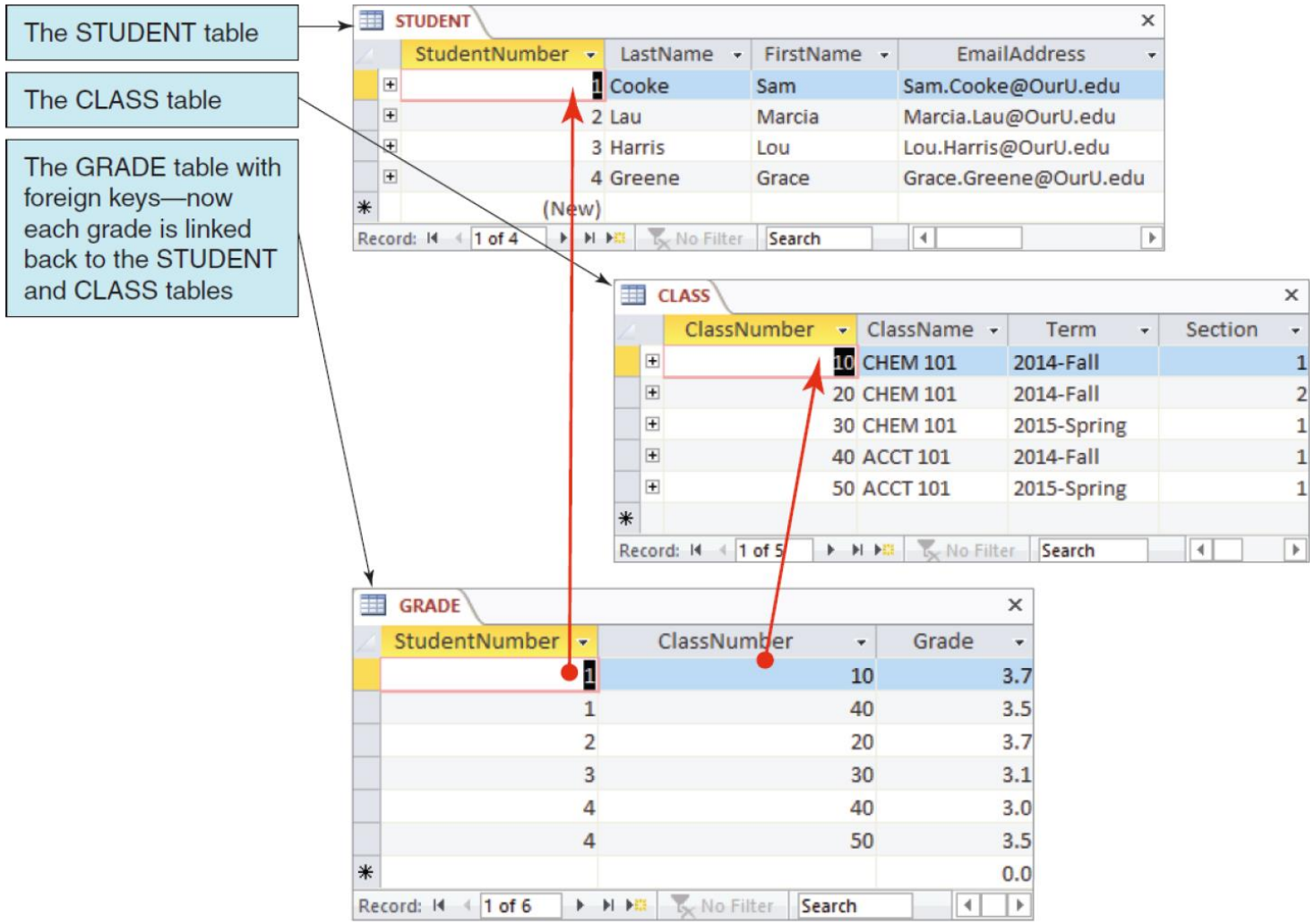
**STUDENT (StudentNumber, LastName, FirstName, EmailAddress)**

**CLASS (ClassNumber, ClassName, Term, Section)**

**GRADE (*StudentNumber*, *ClassNumber*, Grade)**

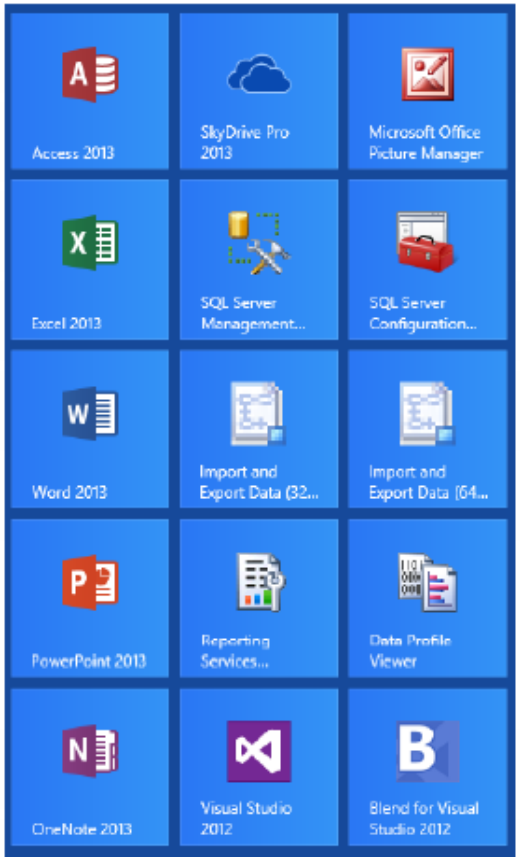
# Example Database Design

## Three tables: STUDENT, CLASS, and GRADE



# The Microsoft Access 2013 App Tile

The **Access 2013** app tile



# Microsoft Access—Table Keys

- Each table has a key.
- A **key** is one or more columns that identify a row.
  - StudentNumber in STUDENT
  - ClassNumber in CLASS
- Keys composed of more than one column are called **composite keys**.
  - (StudentNumber, ClassNumber) in GRADE
- See Chapter Three for a complete discussion of keys.
- In this Appendix, the following keys are relevant:
  - **Primary key**—the key used to identify rows in a table
  - **Foreign key**—the key used to link to another table
  - **Surrogate key**—a short, numeric key added to the table as an ideal identifier when other fields don't work as well

# Microsoft Access 2013
## Basic Data Types

| Data Type Name | Type of Data | Size |
|---|---|---|
| Short Text | Characters and numbers (Formerly "Text") | Maximum 255 characters |
| Long Text | Characters and numbers (Formerly "Memo") | Maximum 65,535 characters |
| Number | Numeric Data | Varies with number type |
| Date/Time | Dates and time from the year 100 to the year 9999 | Stored as 8-byte double-precision integers |
| Currency | Numbers with decimal places | One to four decimal places |
| AutoNumber | A unique sequential number | Incremented by one each time |
| Yes/No | Fields that can only contain two values | Yes/No, On/Off, True/False |
| OLE Object | An object embedded in or linked to an Access table | Maximum 1 GB |
| Hyperlink | A hyperlink address | Maximum 2,048 characters in each of the three parts of the hyperlink address |
| Attachment | Any supported file type can be attached to a record | Independent of Access |
| Calculated | Calculates a values from data in other field | Dependent upon data used in calculation |
| Lookup Wizard | Creates a multivalued field based on an Access table or query | Dependent upon data used in lookup |

# Example Database Design
## The STUDENT Table

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| StudentNumber | AutoNumber | Primary Key | Yes | Surrogate Key |
| LastName | Text (25) | No | Yes | |
| FirstName | Text (25) | No | Yes | |
| EmailAddress | Text (100) | No | No | |

# Example Database Design
## The CLASS Table

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| ClassNumber | Number | Primary Key | Yes | Long Integer |
| ClassName | Text (25) | No | Yes | |
| Term | Text (12) | No | Yes | |
| Section | Number | No | Yes | Integer |

# Example Database Design
## The GRADE Table

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| StudentNumber | Number | Primary Key, Foreign Key | Yes | Long Integer |
| ClassNumber | Number | Primary Key, Foreign Key | Yes | Long Integer |
| Grade | Number | No | Yes | Decimal, Fixed, Scale = 2, Decimal Places = 1 |

# Microsoft Access—Relationships

- StudentNumber in GRADE creates a relationship to StudentNumber in STUDENT.
- ClassNumber in GRADE creates a relationship to ClassNumber in CLASS
- StudentNumber in GRADE and ClassNumber in GRADE are examples of foreign keys.

# Creating a Database I

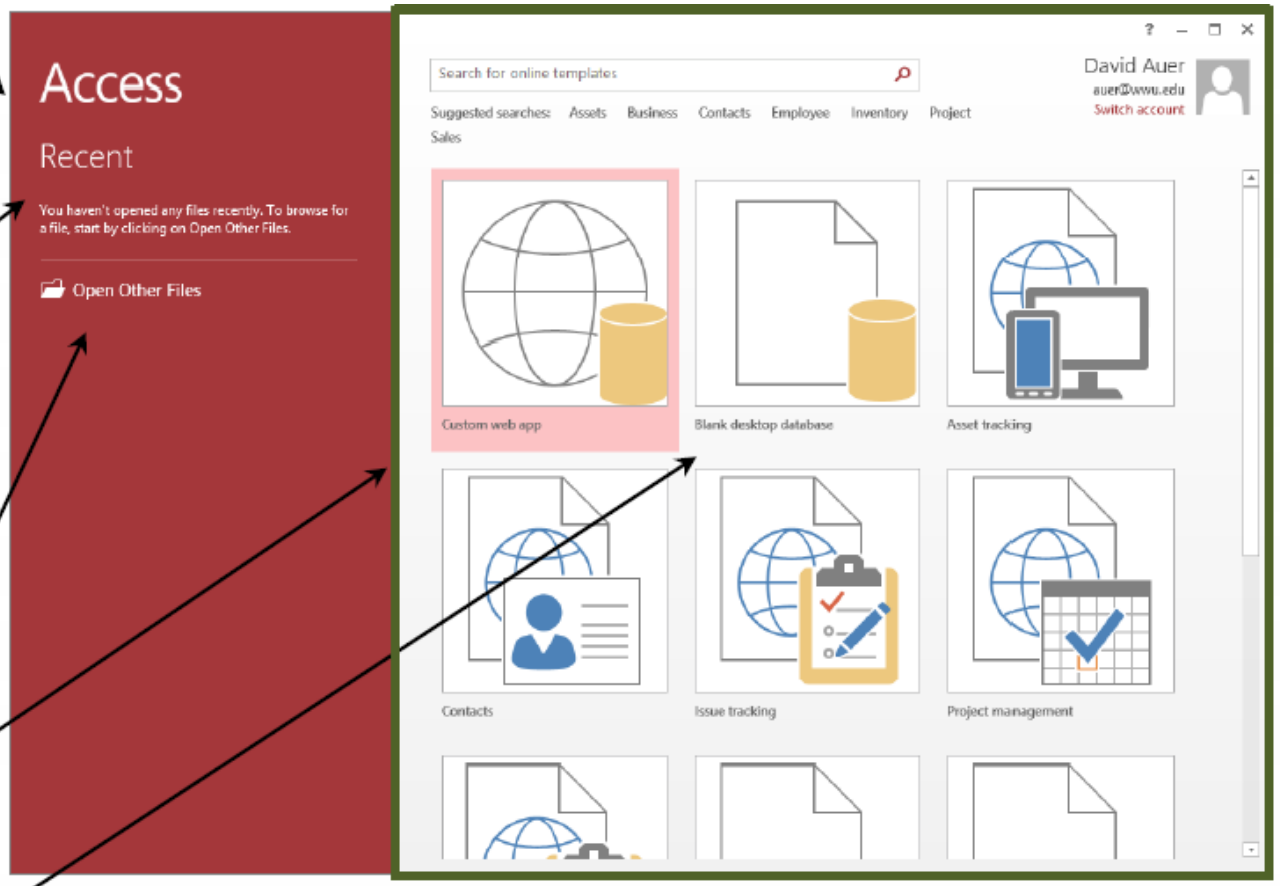
The **Access 2013** Backstage start screen

The **Recent** file list—there are currently no files listed because this is the first time Access has been opened

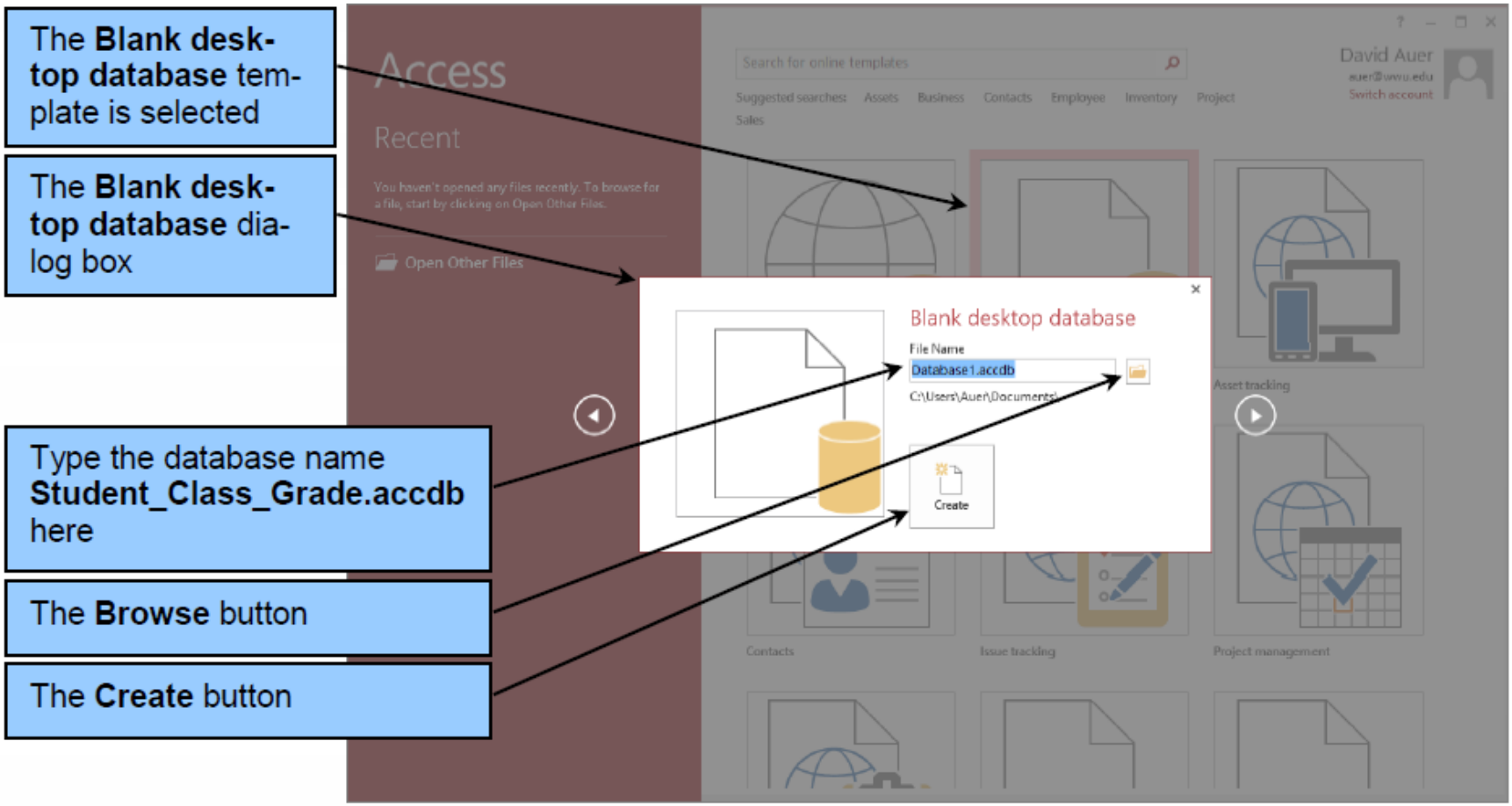
The **Open Other Files** button—use this to open an existing file

The **New** pane showing available templates for a new diagram document

Select the **Blank desktop database** template

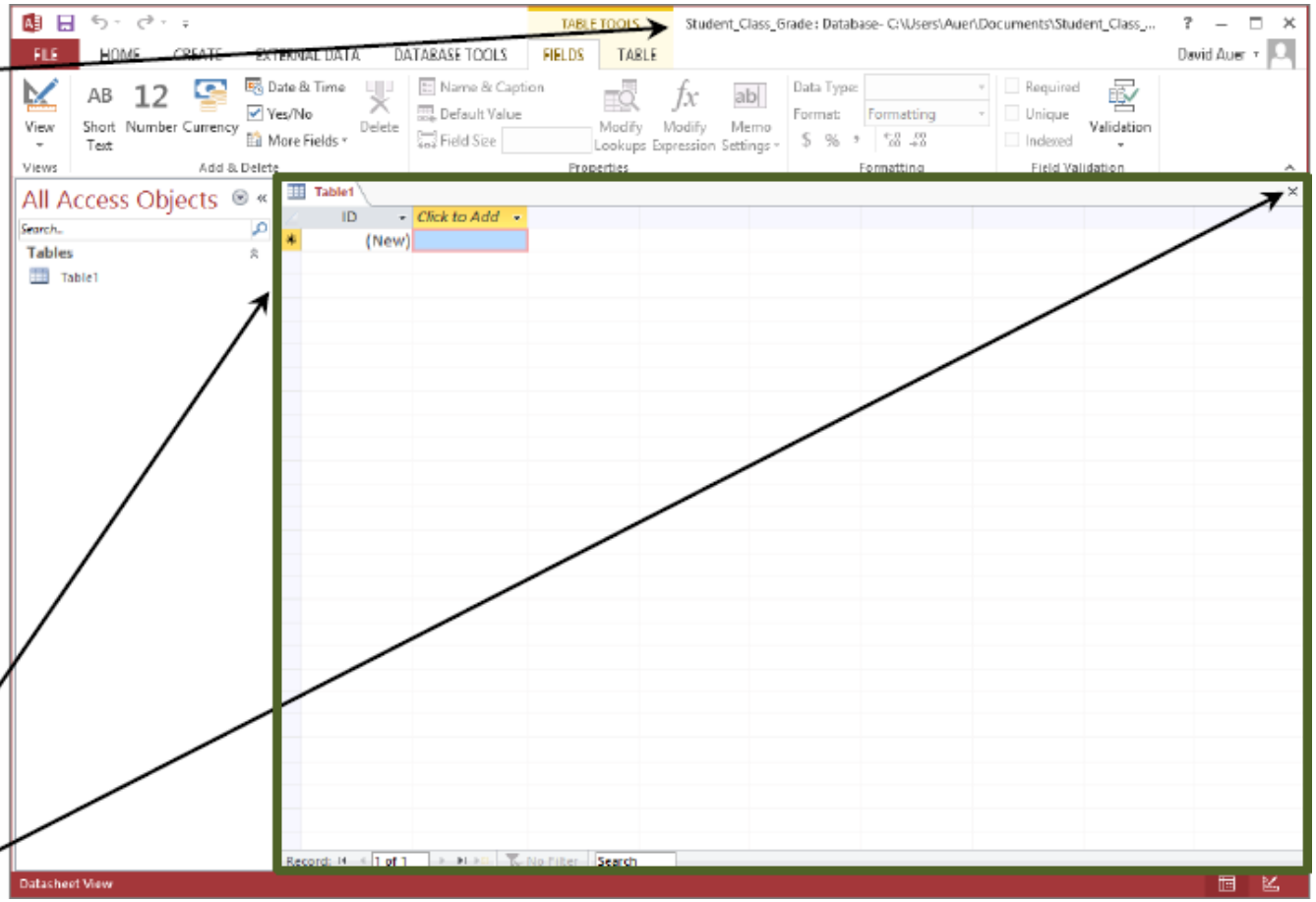


# Creating a Database II



# Creating a Database III

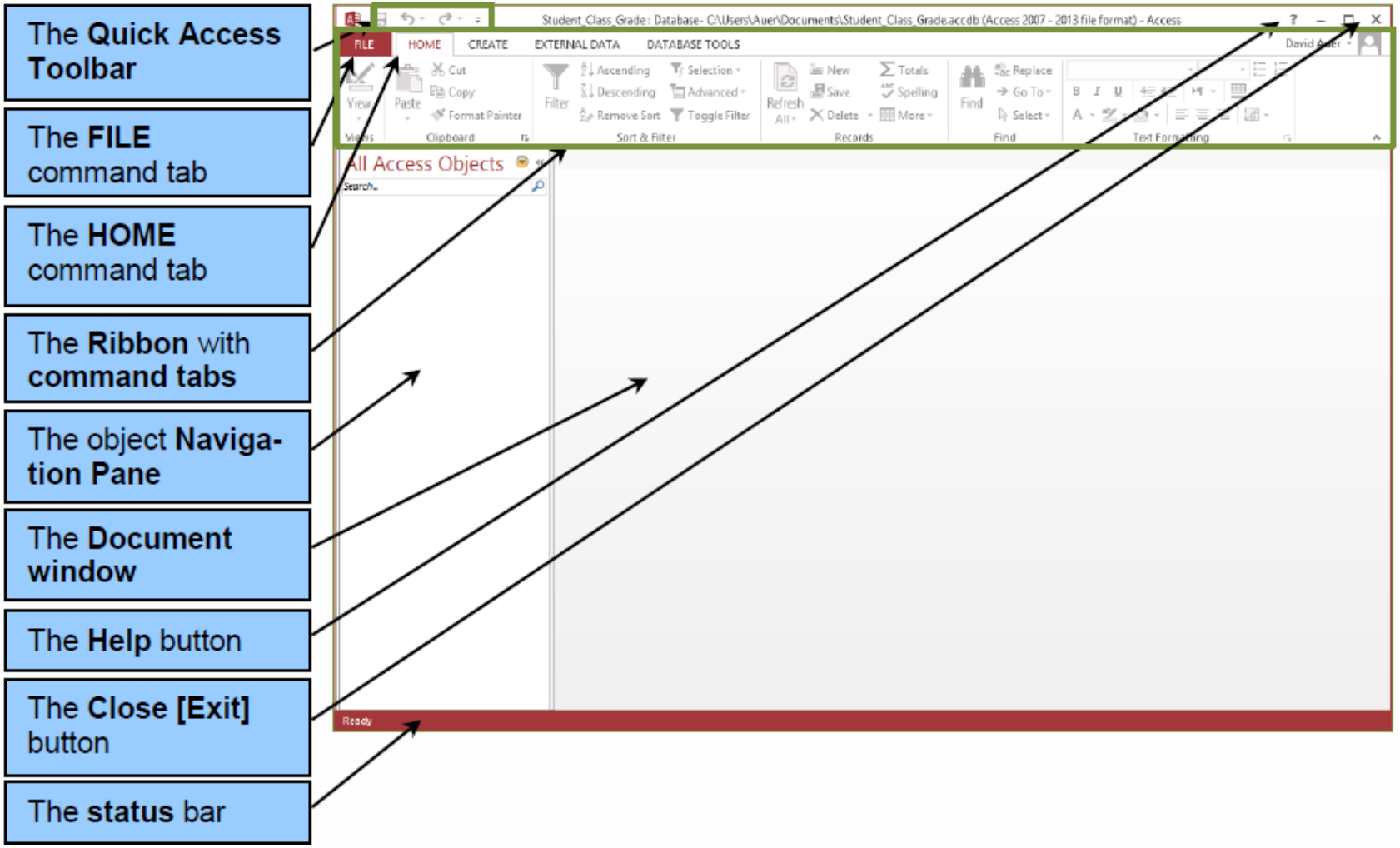
The database name **Student_ Class_Grade : Database**




The Document Window using the tabbed documents interface

The **Close** button

# The Microsoft Office Fluent User Interface

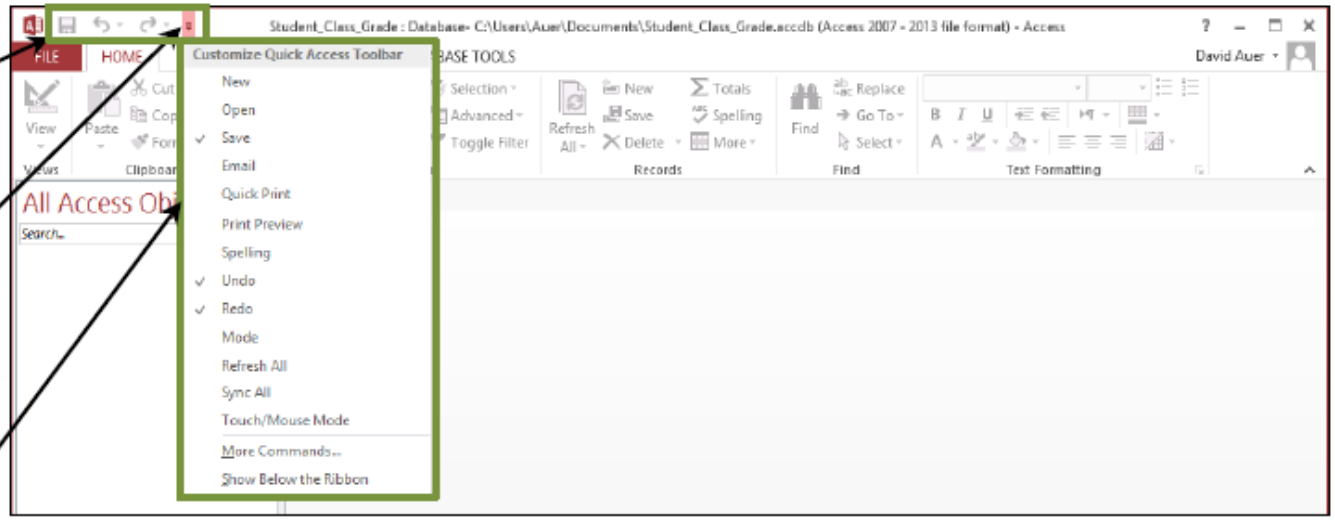


# The Quick Access Toolbar

The **Quick Access Toolbar**

The **Customize Quick Access Toolbar drop-down list** button

The **Customize Quick Access Toolbar drop-down list**—click an item to add it to the toolbar



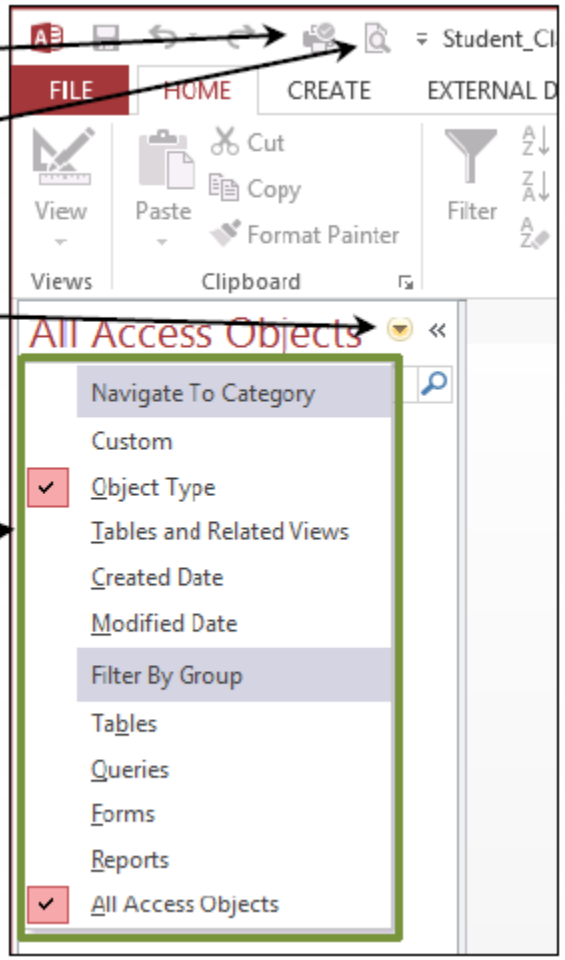
# Database Objects and the Navigation Pane I

The **Quick Print** button

The **Print Preview** button

The **Navigation Pane** drop-down list button

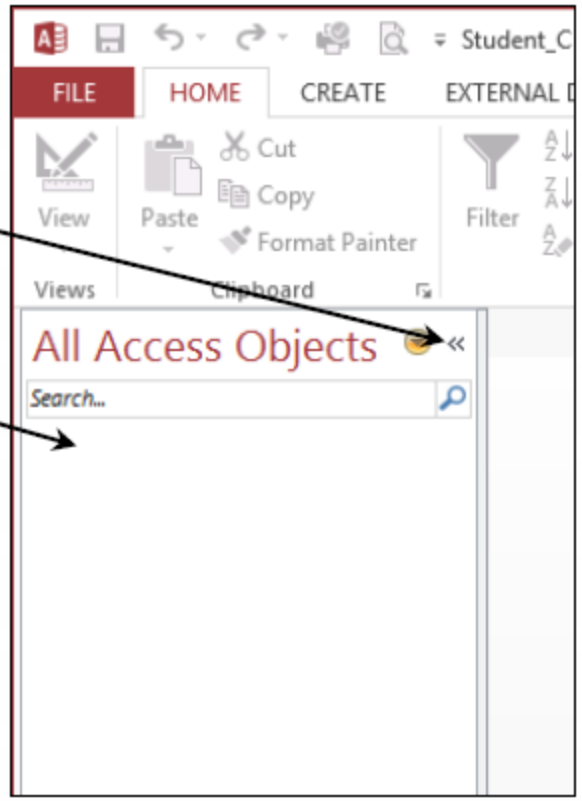
The **All Access Objects** drop-down list



# Database Objects and the Navigation Pane II

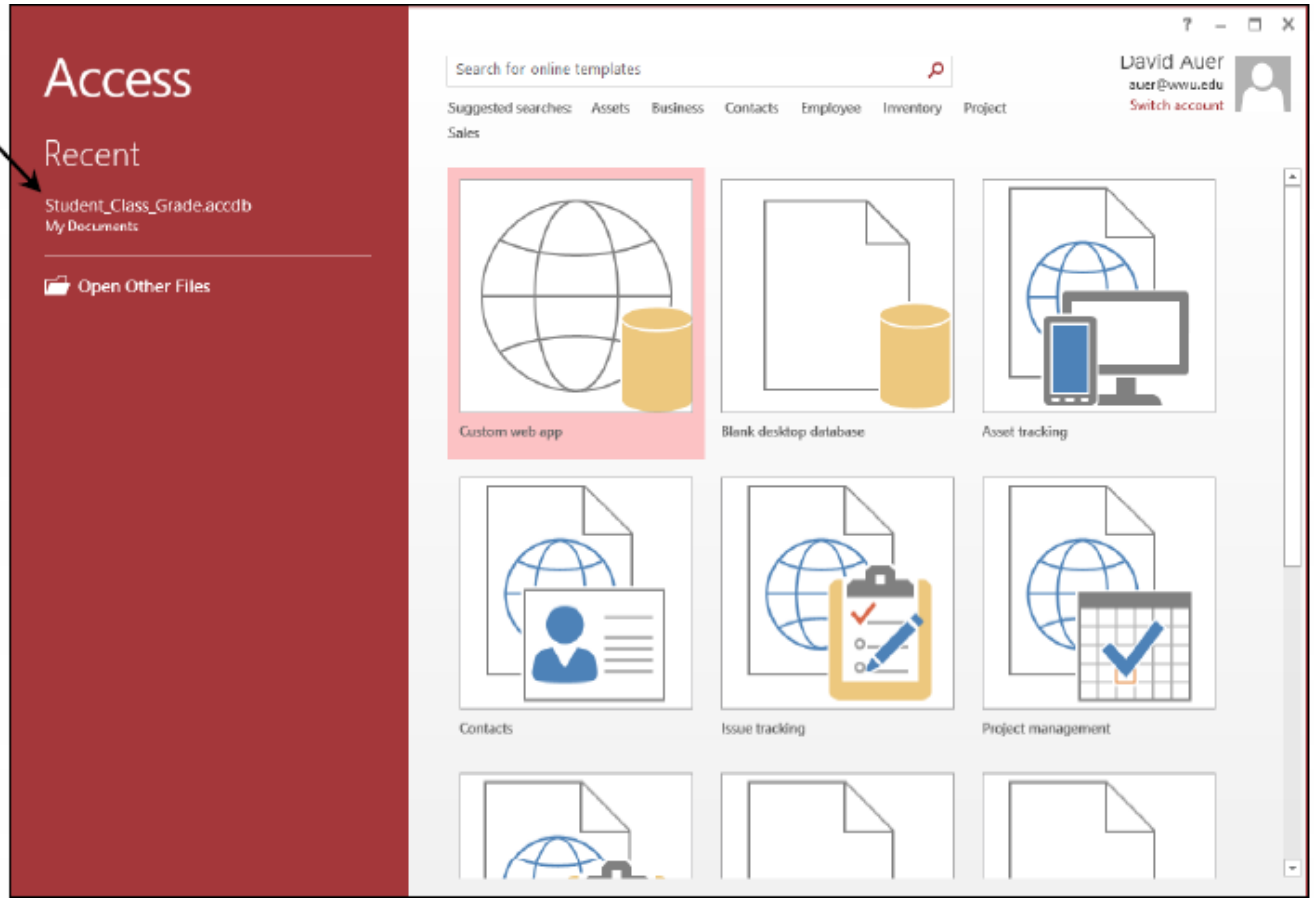
Use the **Shutter Bar Open/Close** button to hide or display the Navigation Pane

The Navigation Pane is empty because we have not created any objects for this database



# Opening an Existing Database:
## The Backstage View

The **Student_ Class_Grade .accdb** database in the Recent data-bases list

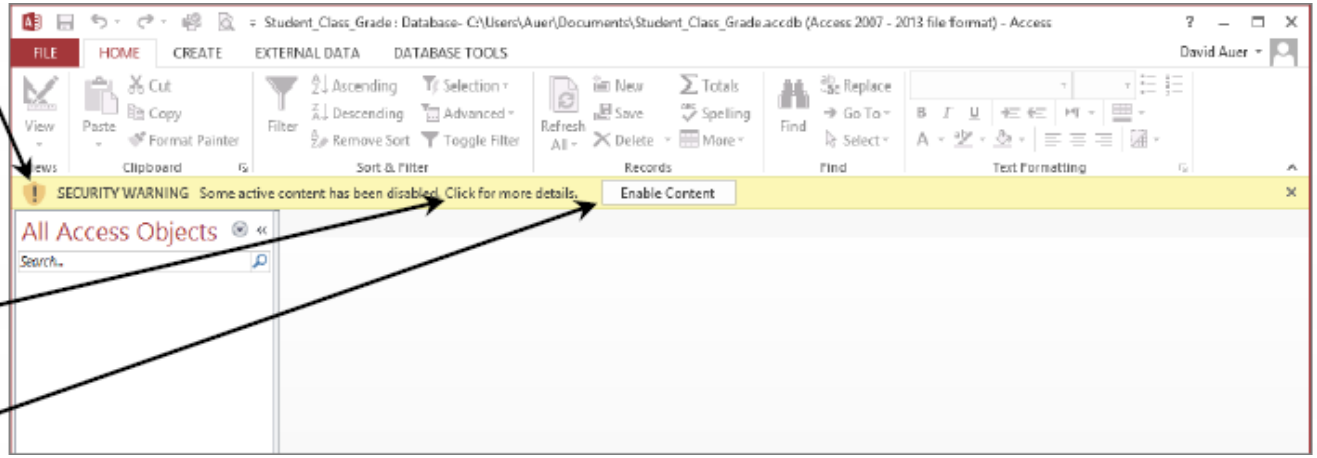


# The Security Warning Bar

The **Security Warning** Bar

The **Click for more details** link

Click the **Enable Content** button

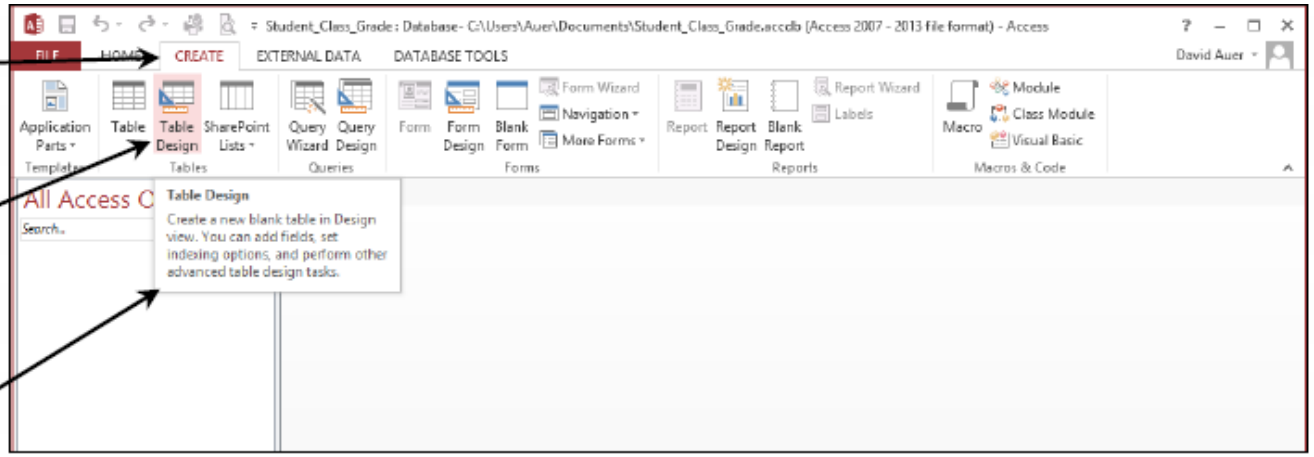


# Creating a Table I

The **CREATE** command tab

The **Table Design** button

The **tool tip** for the button shows that new table object will be created

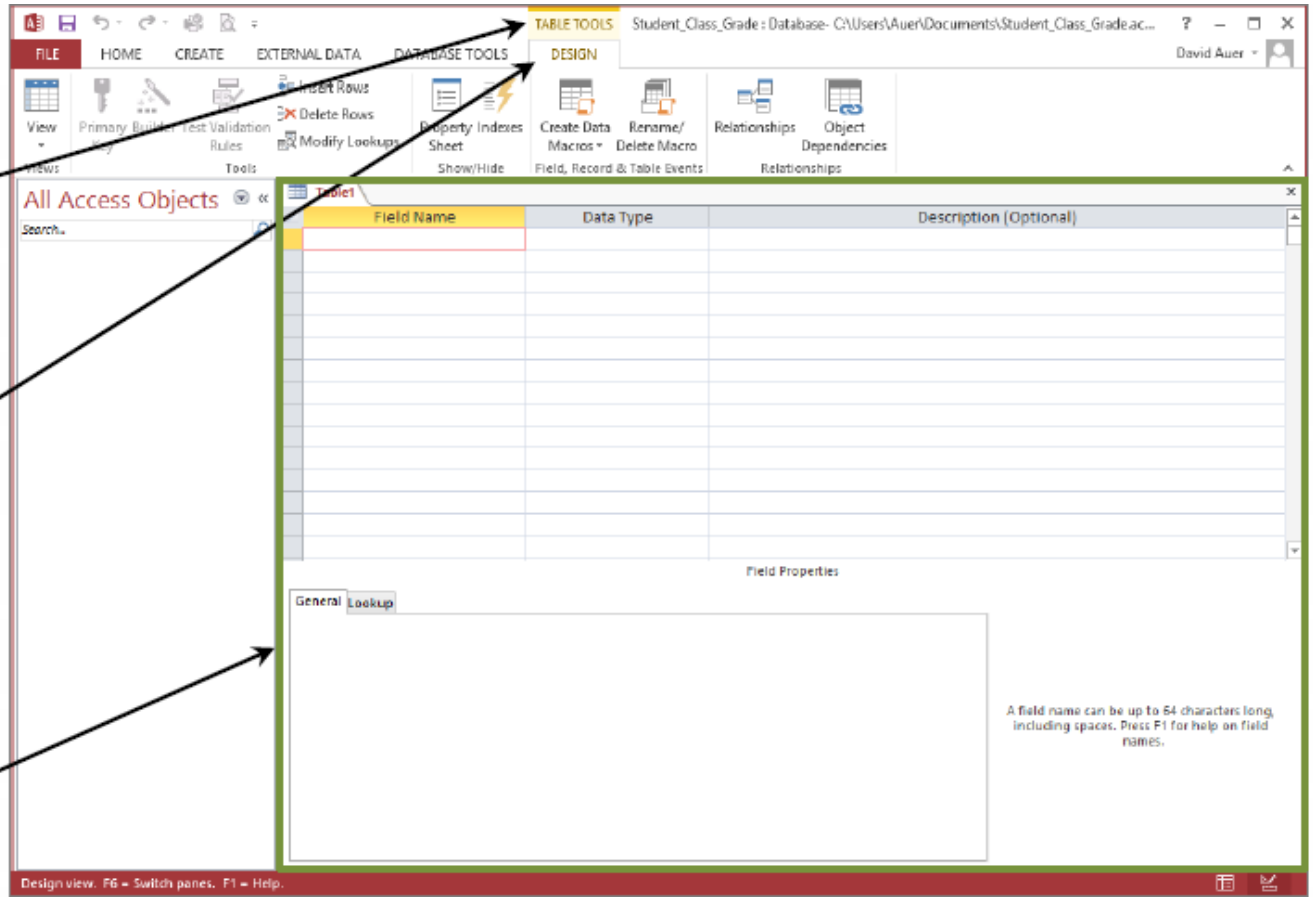


# Creating a Table II

The **TABLE TOOLS** contextual command tab is displayed along with the set of command tabs that comprise Table Tools

The **DESIGN** command tab and its command groups are displayed

The **Table1** tabbed document window in Design view

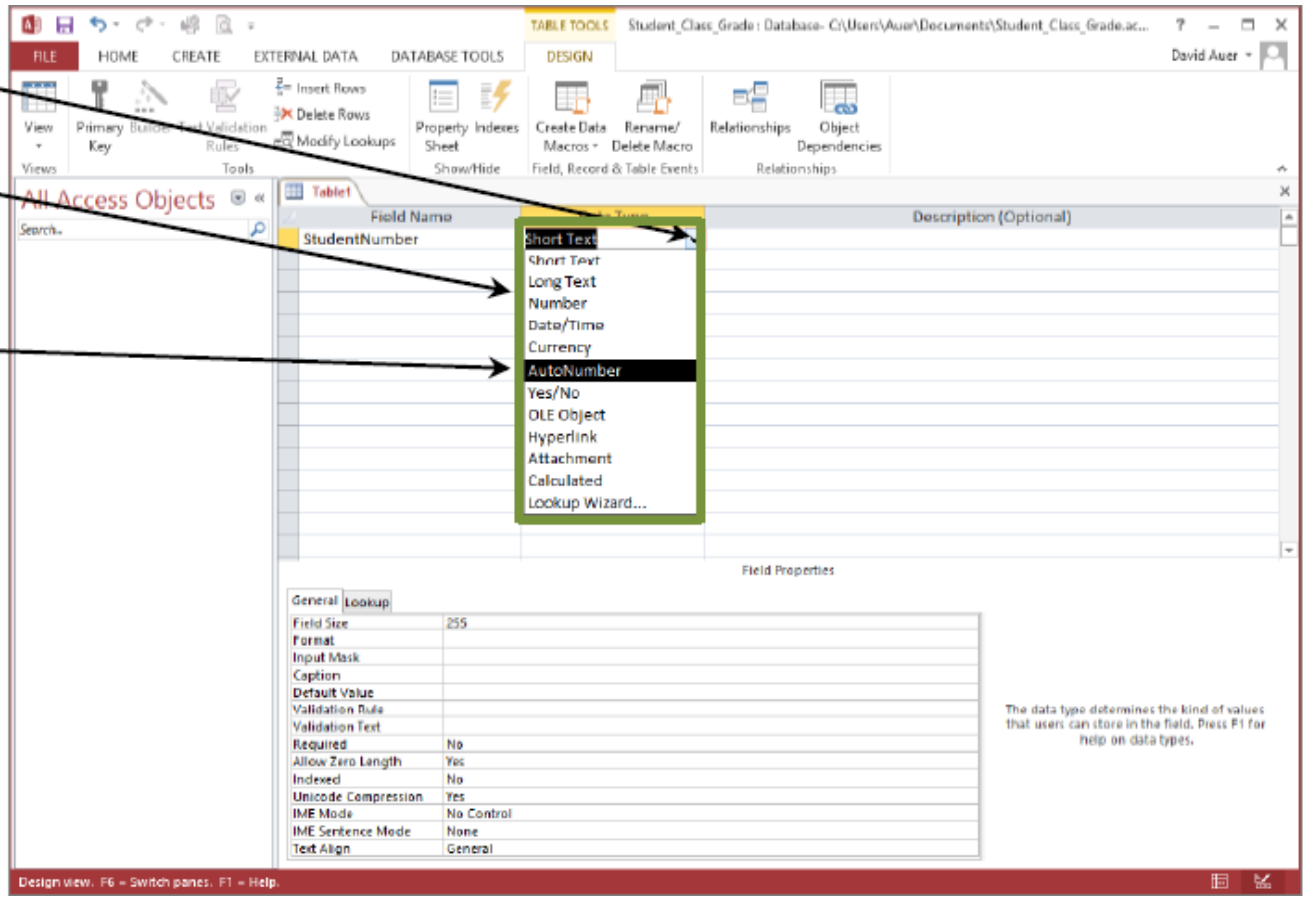


# Creating Columns (Fields) I

The **Data Type** drop-down list arrow

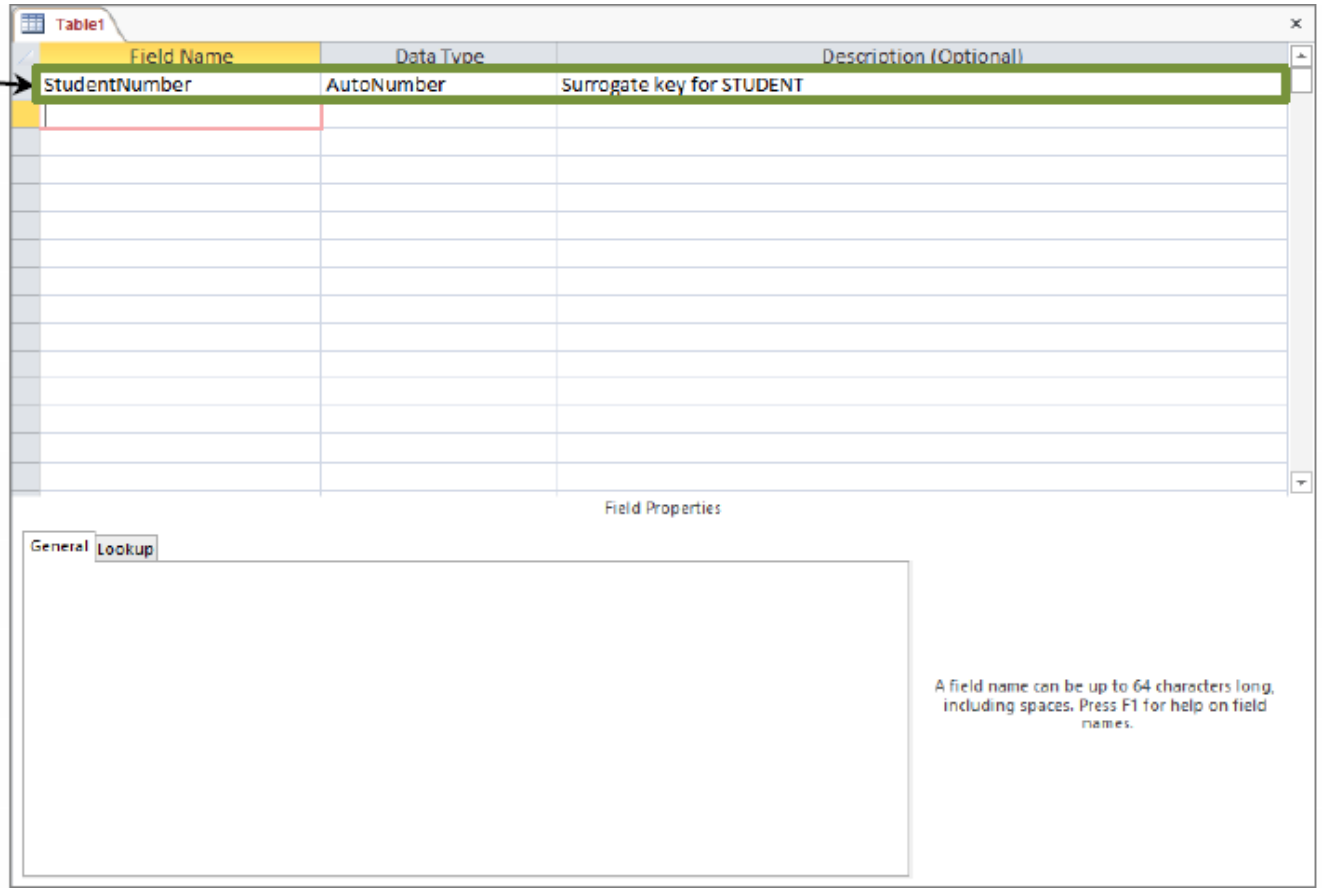
The **Data Type drop-down list**

Select **AutoNumber**



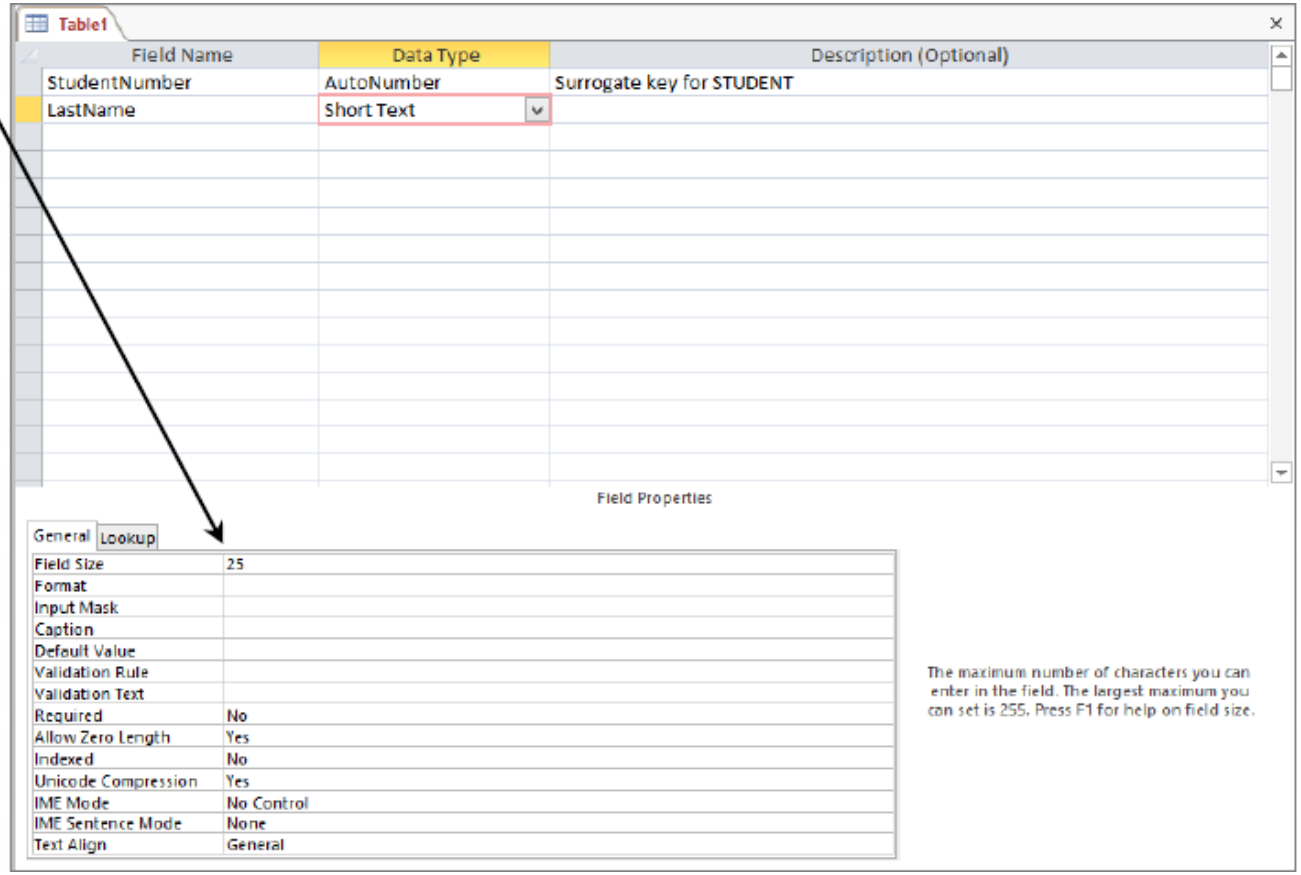
# Creating Columns (Fields) II

The completed **StudentNumber** column definition



# Creating Columns (Fields) III

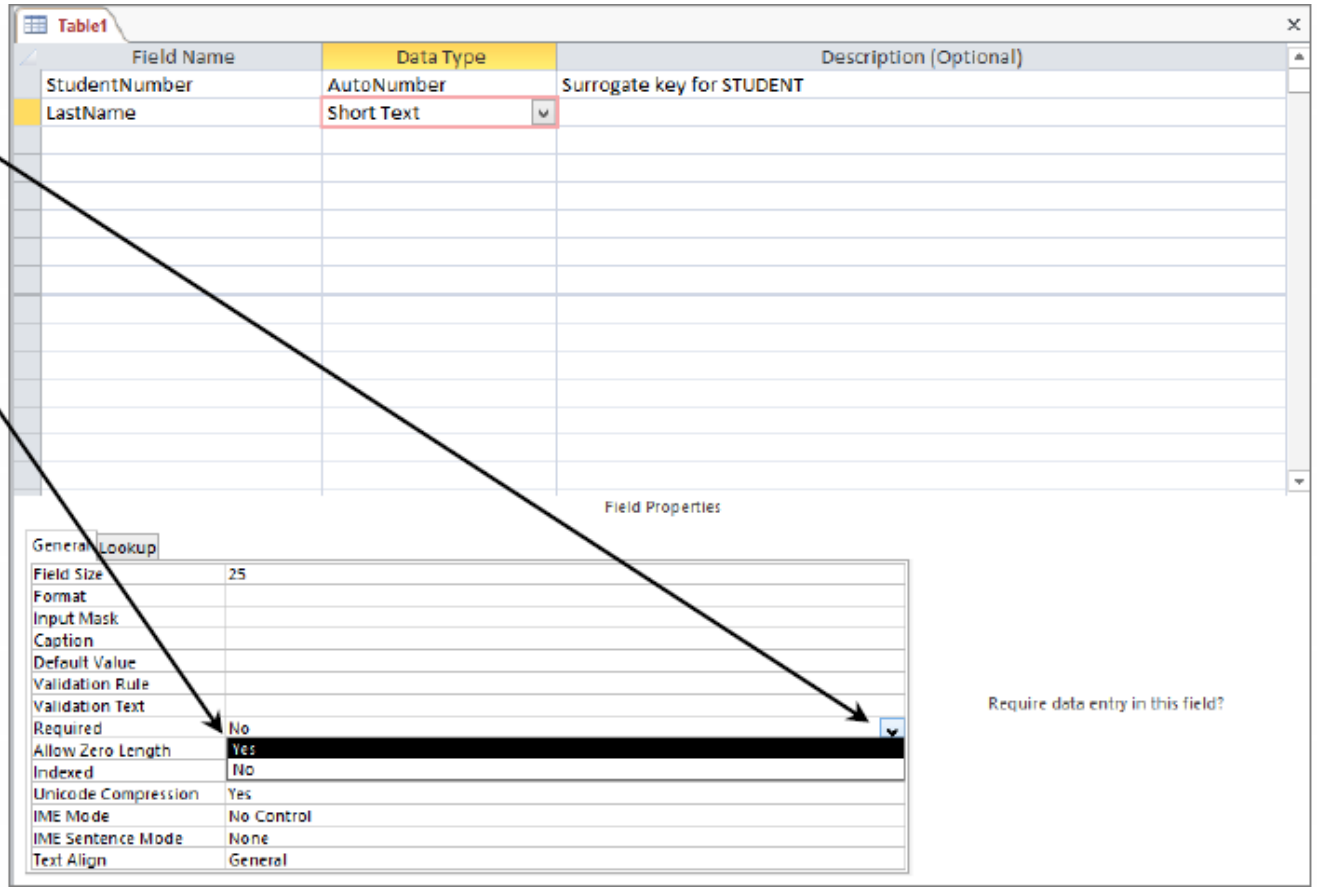
Edit this number to set the number of characters



# Creating Columns (Fields) IV

Click anywhere in the Required text box to display the **Required property** drop-down list arrow

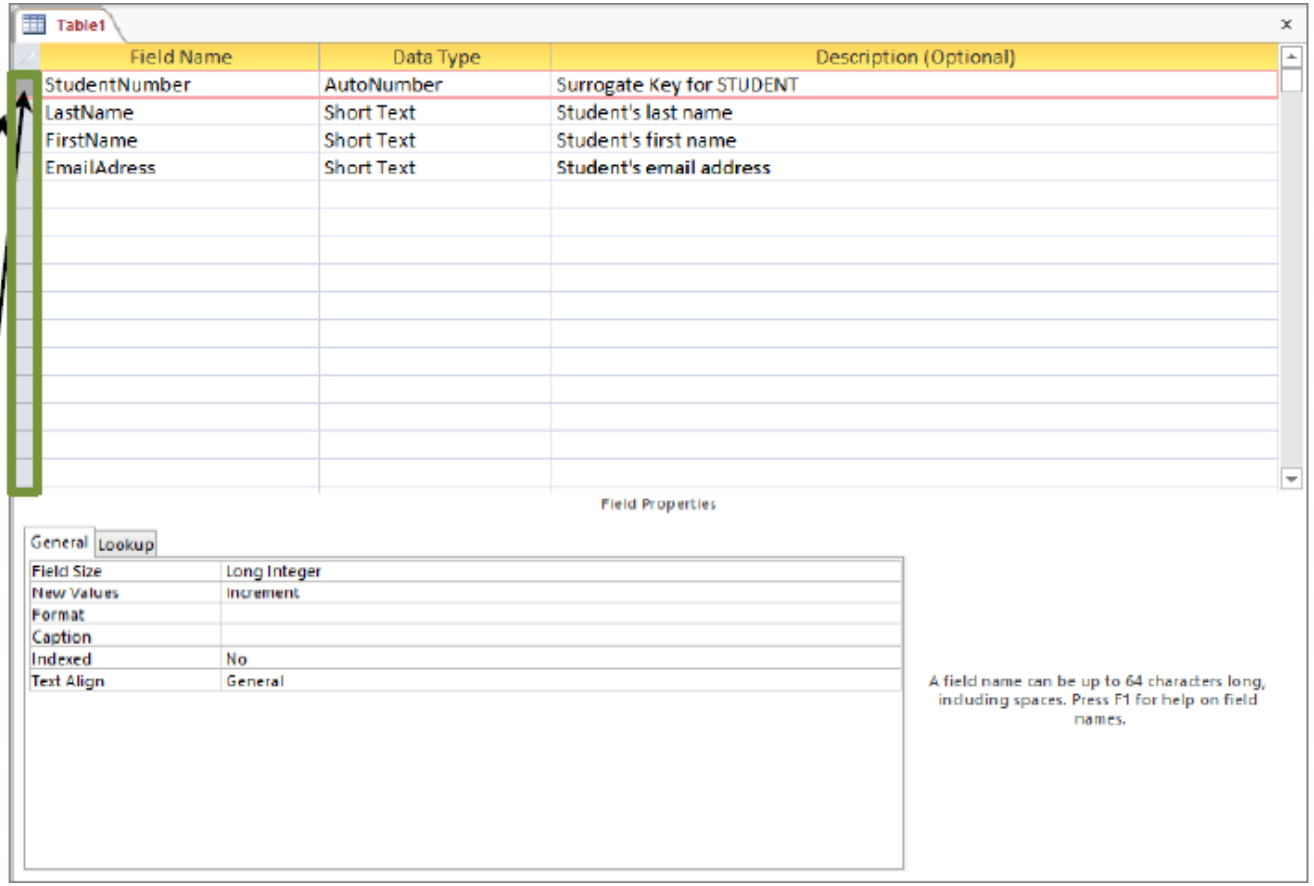
Select **Yes** from the Required property drop-down list



# Setting the Primary Key I

The **row selector column**—move the mouse pointer into this column to select a specific row

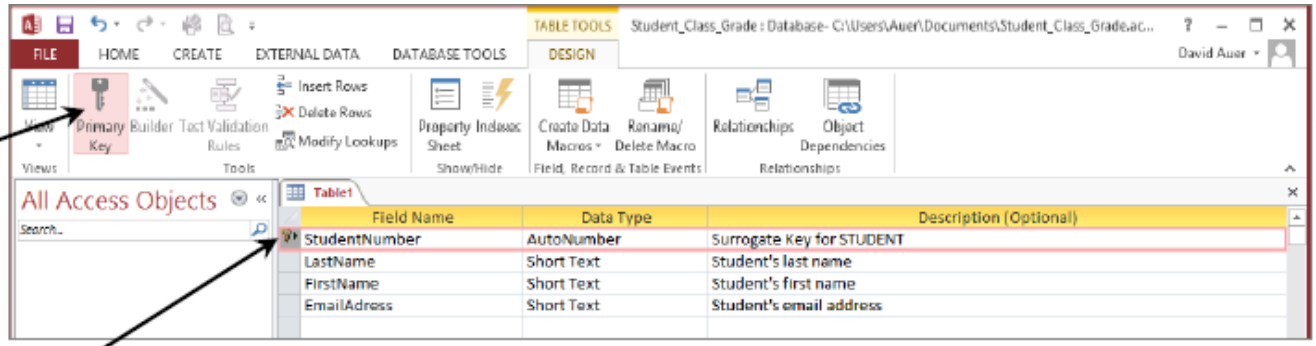
Move the mouse pointer here and click to select the **StudentNumber** row



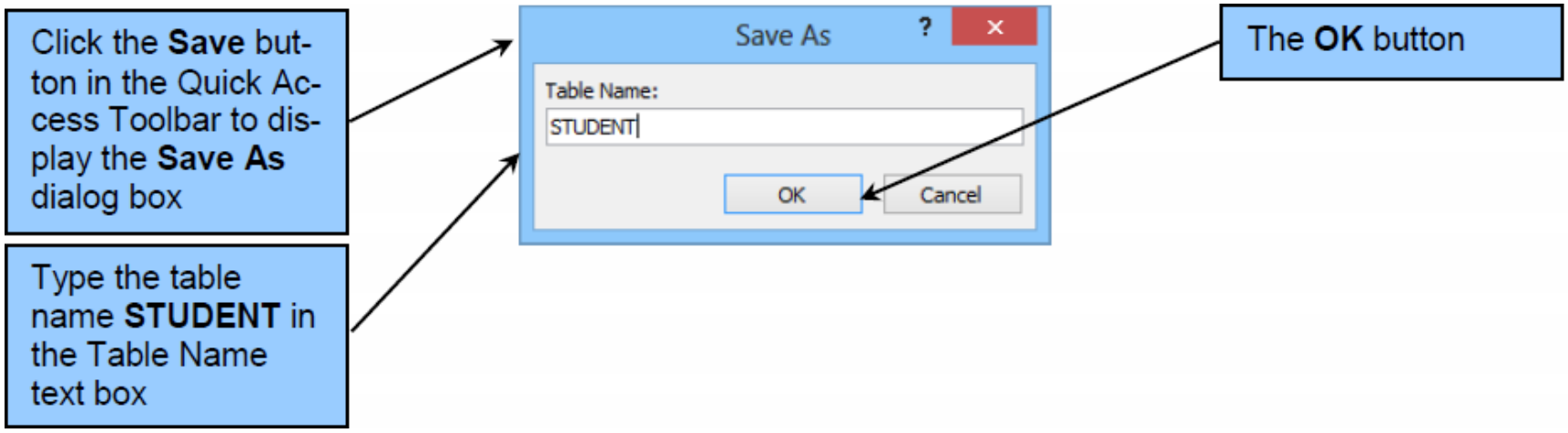
# Setting the Primary Key II

Click the **Primary Key** button in the Tools group of the Design tab to set StudentNumber as the primary key

A *key symbol* here indicates that StudentNumber is the primary key of the table



# Saving the Table Structure I

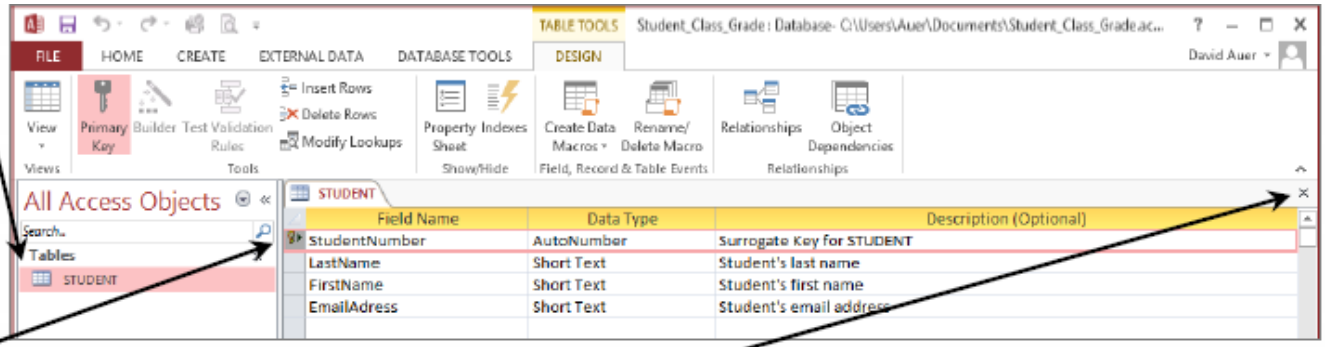


# Saving the Table Structure II

The table object *STUDENT* is displayed in the Navigation Pane

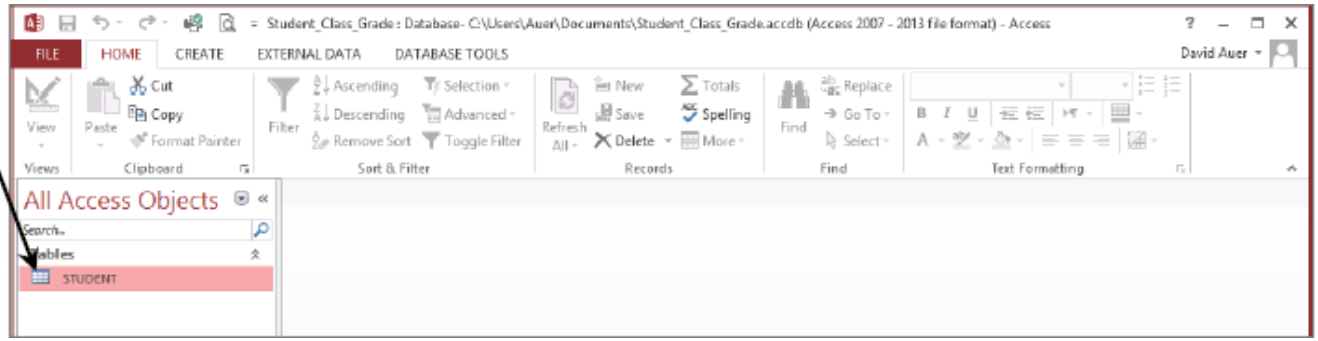
The table is now named *STUDENT*, and the table name now appears on the document tab

Click the **Close** button to close the CUSTOMER table



# Saving the Table Structure III

The table object *STUDENT* is displayed in the Navigation Pane



# Adding Data to Tables

- We can add data to a table by:
  - Using the datasheet view
  - Using a form

# STUDENT Data

| StudentNumber | LastName | FirstName | EmailAddress |
|---|---|---|---|
| 1 | Cooke | Sam | Sam.Cooke@OurU.edu |
| 2 | Lau | Marcia | Marcia.Lau@OurU.edu |
| 3 | Harris | Lou | Lou.Harris@OurU.edu |
| 4 | Greene | Grace | Grace.Greene@OurU.edu |

# CLASS Data

| ClassNumber | ClassName | Term | Section |
|---|---|---|---|
| 10 | CHEM 101 | 2014-Fall | 1 |
| 20 | CHEM 101 | 2014-Fall | 2 |
| 30 | CHEM 101 | 2015-Spring | 1 |
| 40 | ACCT 101 | 2014-Fall | 1 |
| 50 | ACCT 102 | 2015-Spring | 1 |

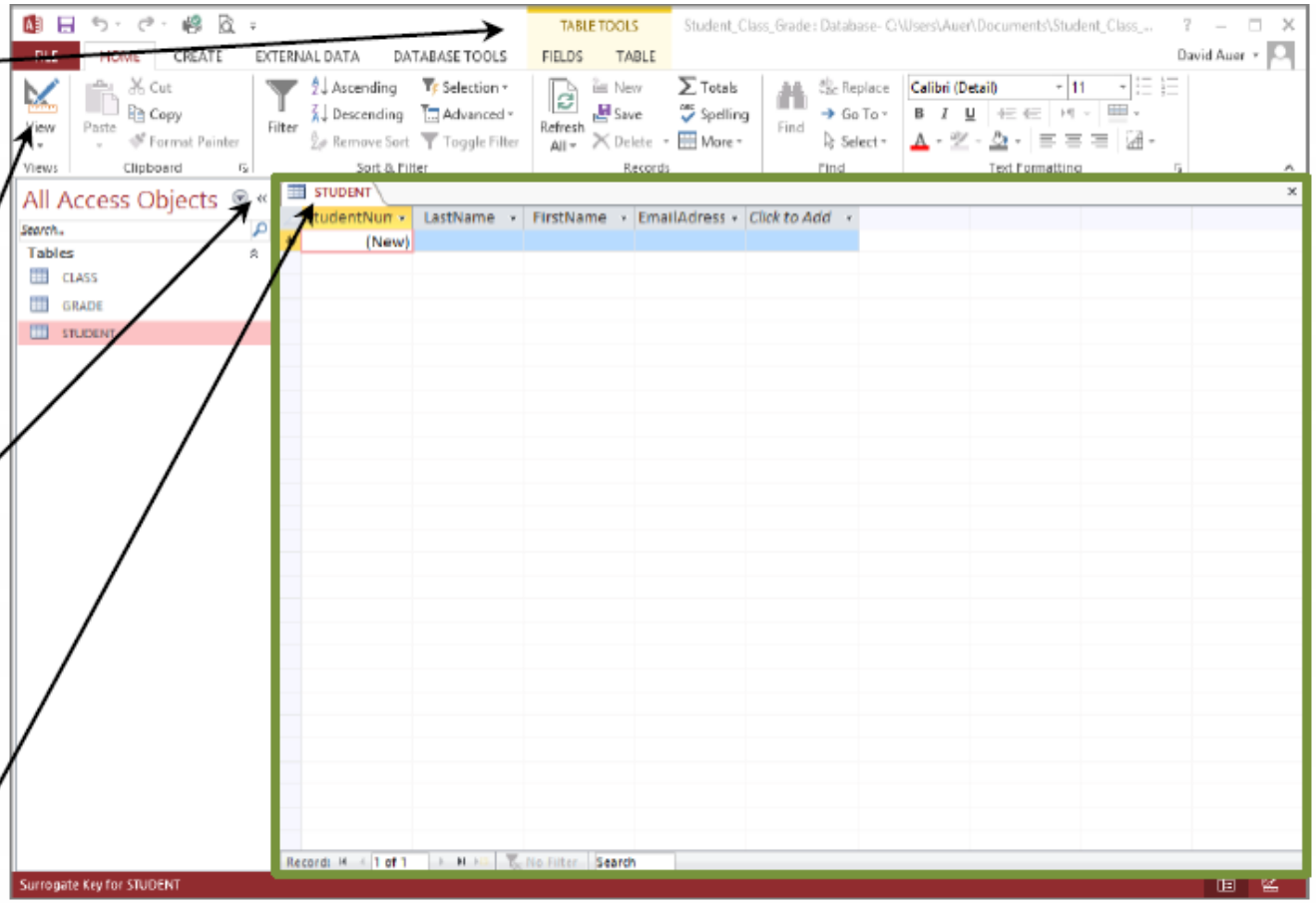
# Adding Data to Tables:
## Using the Datasheet View I

The **TABLE TOOLS** tab

If you need to switch between Datasheet view and Design view use the **Design View** button

The **Shutter Bar Open/Close** button

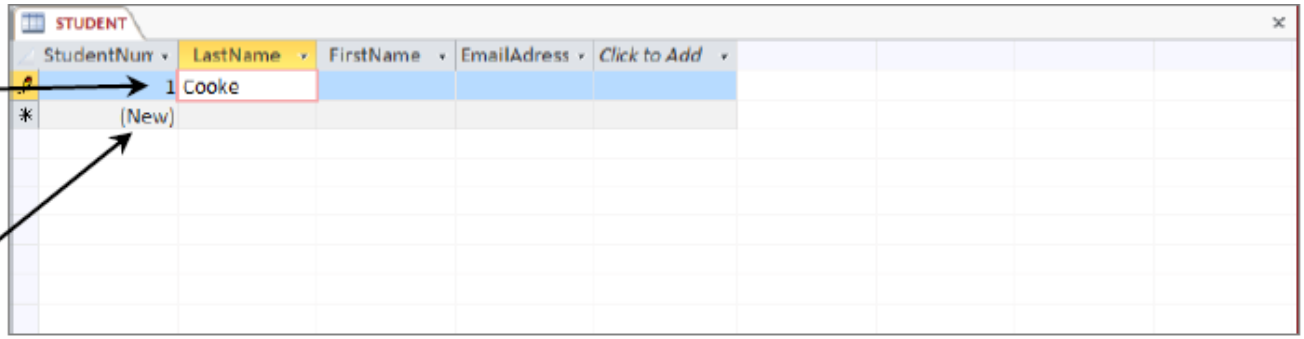
The **STUDENT** tabbed document window with the table in Datasheet view



# Adding Data to Tables:
## Using the Datasheet View II

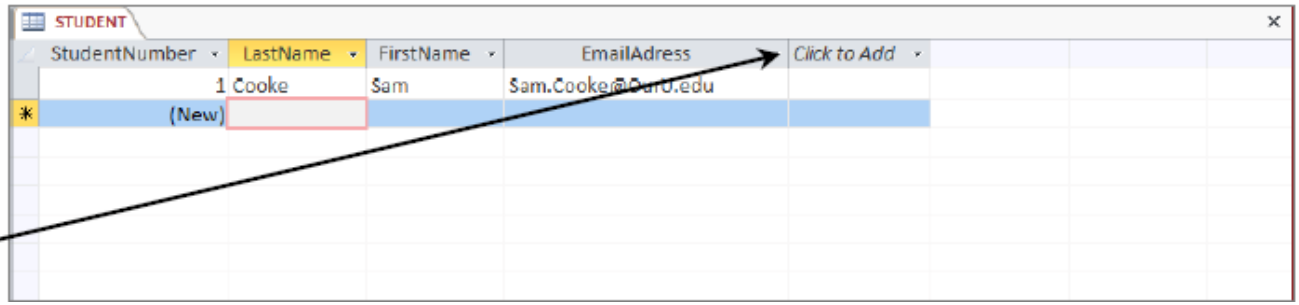
This row has been auto-numbered as StudentNumber *1*

A new, blank row is added to the datasheet



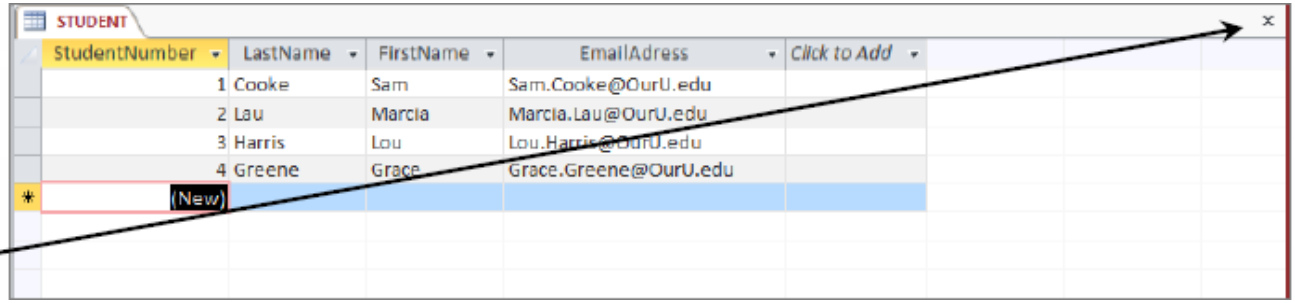
# Adding Data to Tables:
## Using the Datasheet View III

Column widths can be adjusted by using the mouse to drag the column border to the desired width



# Adding Data to Tables:
## Using the Datasheet View IV

Click the **Close** button to close the STUDENT datasheet

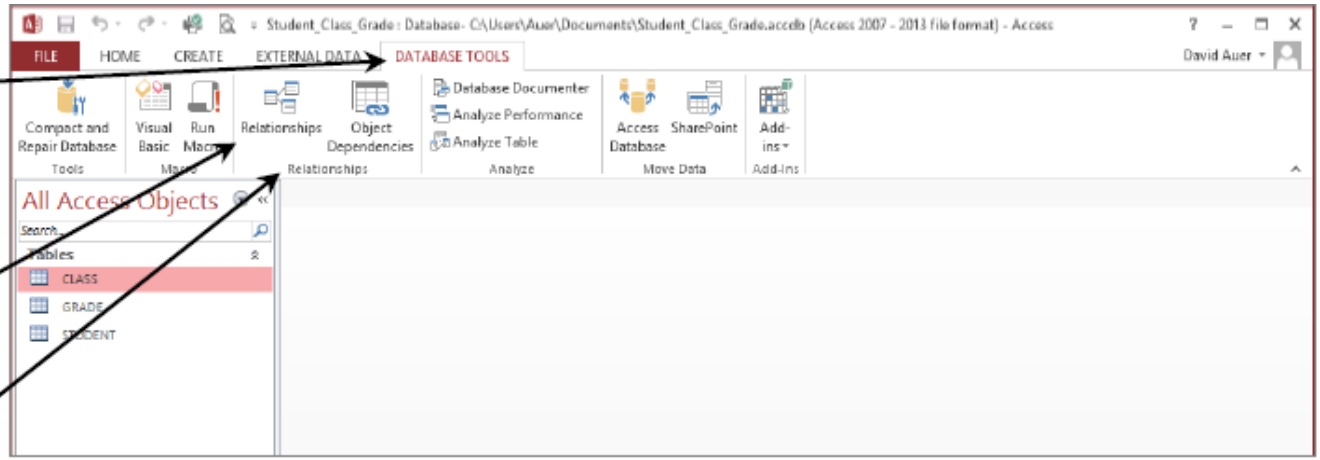


# Creating Relationships I

The **DATABASE TOOLS** command tab

The **Relationships** button

The **Relationships** command group



# Creating Relationships II

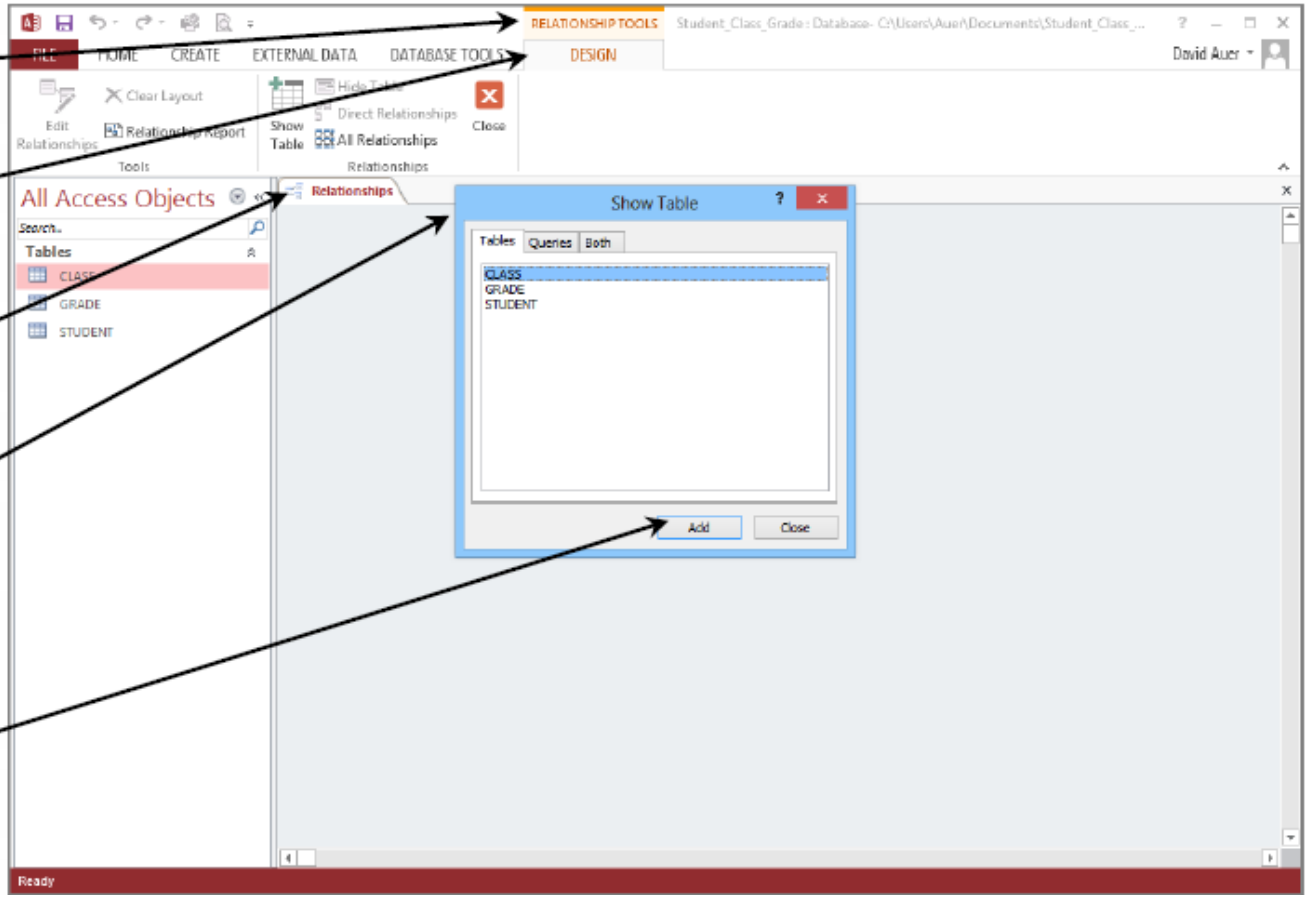
The **RELATIONSHIP TOOLS** tab

The **DESIGN** command tab

The **Relationships** tabbed document window

The **Show Table** dialog box

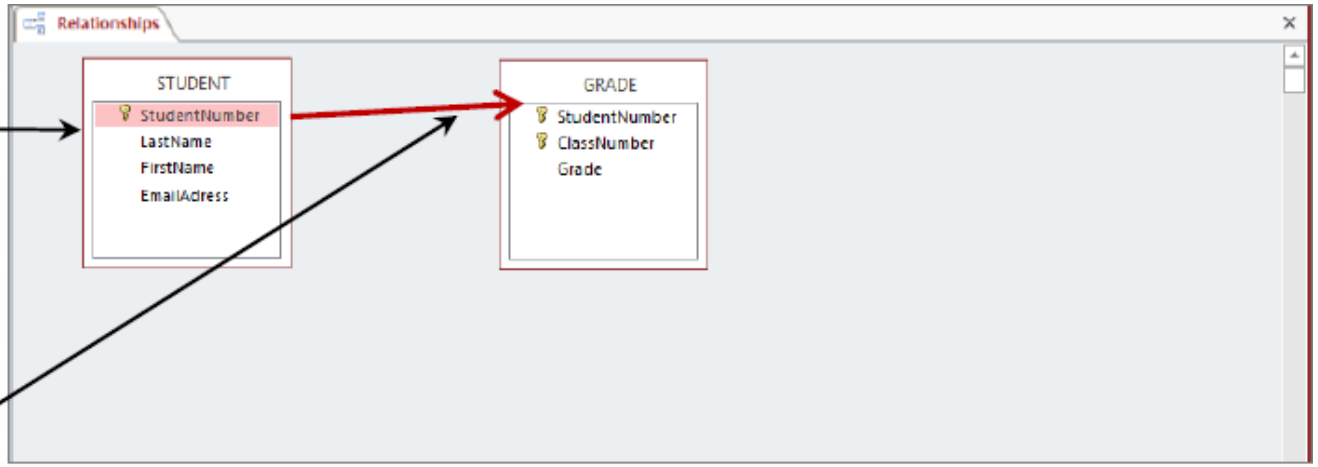
Select a table name and click the **Add** button to add the table to the Relationships window



# Creating Relationships III

The table objects have been rearranged into the arrangement shown here

Click, drag, and drop the **STUDENT StudentNumber field** onto the **GRADE StudentNumber field**

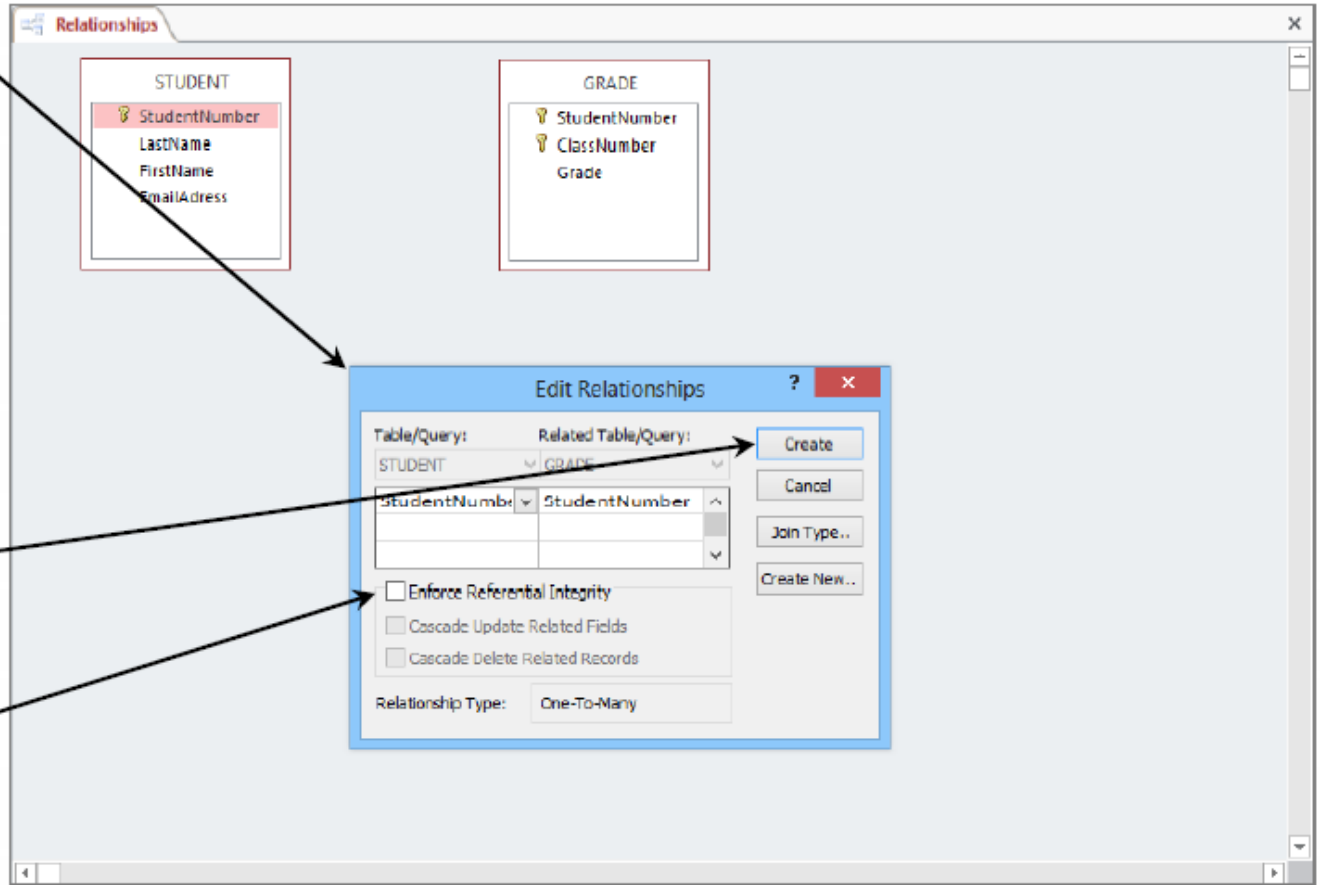


# Creating Relationships IV

The **Edit Relationships** dialog box

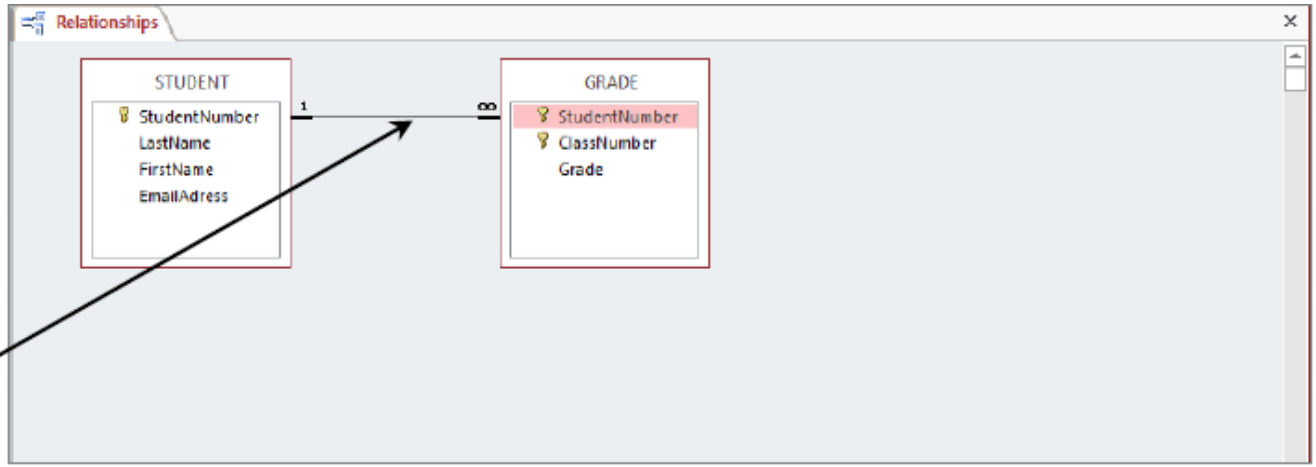
The **Create** button

Click the **Enforce Referential Integrity** check box and then click the **Create** button to create the relationship



# Creating Relationships V

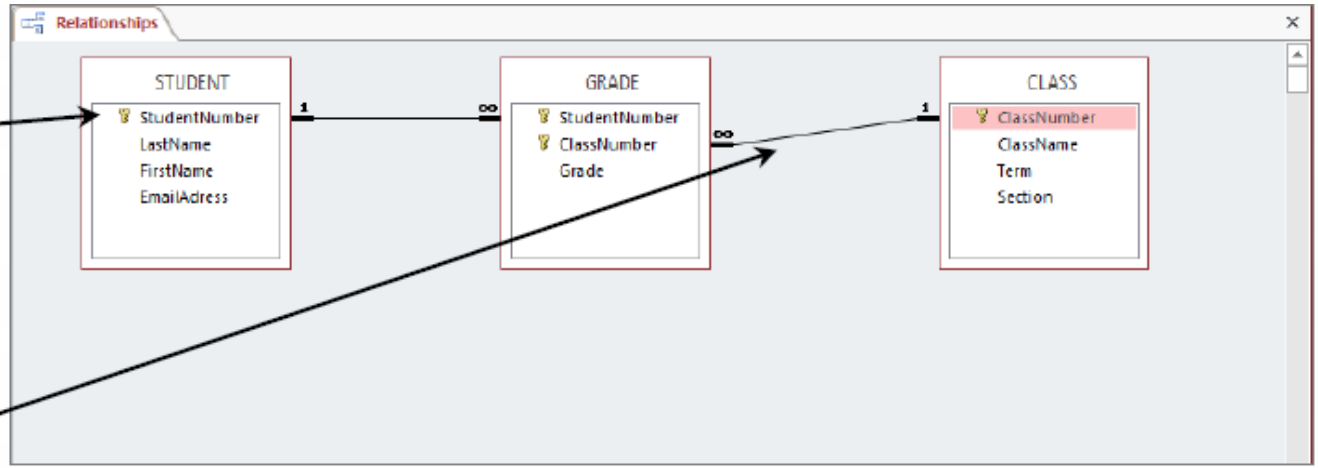
The new relationship now appears in the Relationships window diagram—note that the line connects the related fields



# Creating Relationships VI

The key symbols show the primary key in each table

The second relationship now appears in the Relationships window diagram—note that the line connects the related fields



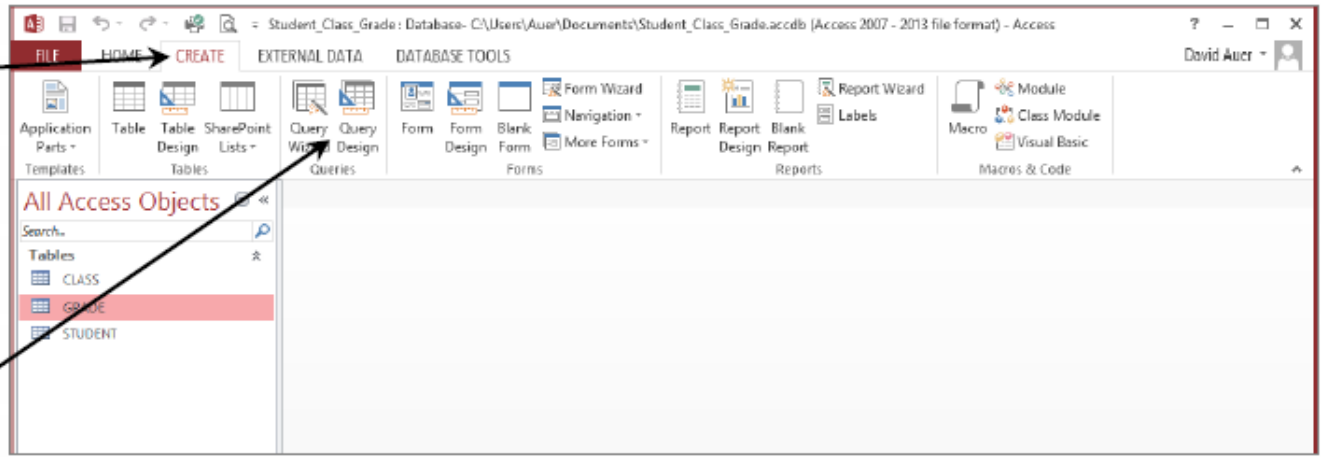
# GRADE Data

| StudentNumber | ClassNumber | Grade |
|---|---|---|
| 1 | 10 | 3.7 |
| 1 | 40 | 3.5 |
| 2 | 20 | 3.7 |
| 3 | 30 | 3.1 |
| 4 | 40 | 3.0 |
| 4 | 50 | 3.5 |

# Creating QBE Queries I

The **CREATE** command tab

The **Query Design** button



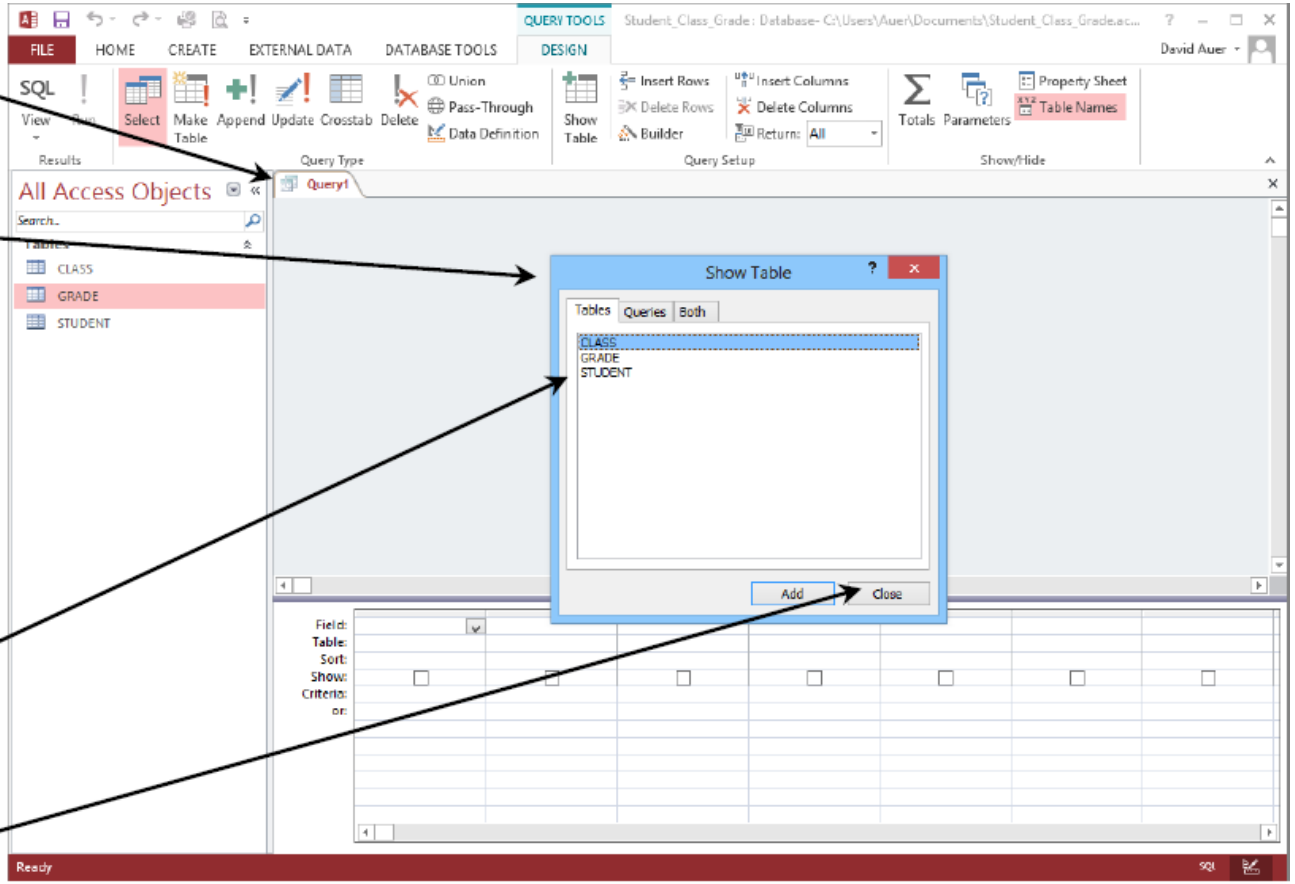
# Creating QBE Queries II

The **Query1** tabbed document window

The **Show Table** dialog box

Click a table name to select it and then click the **Add** button to add the table to the query

The **Close** button

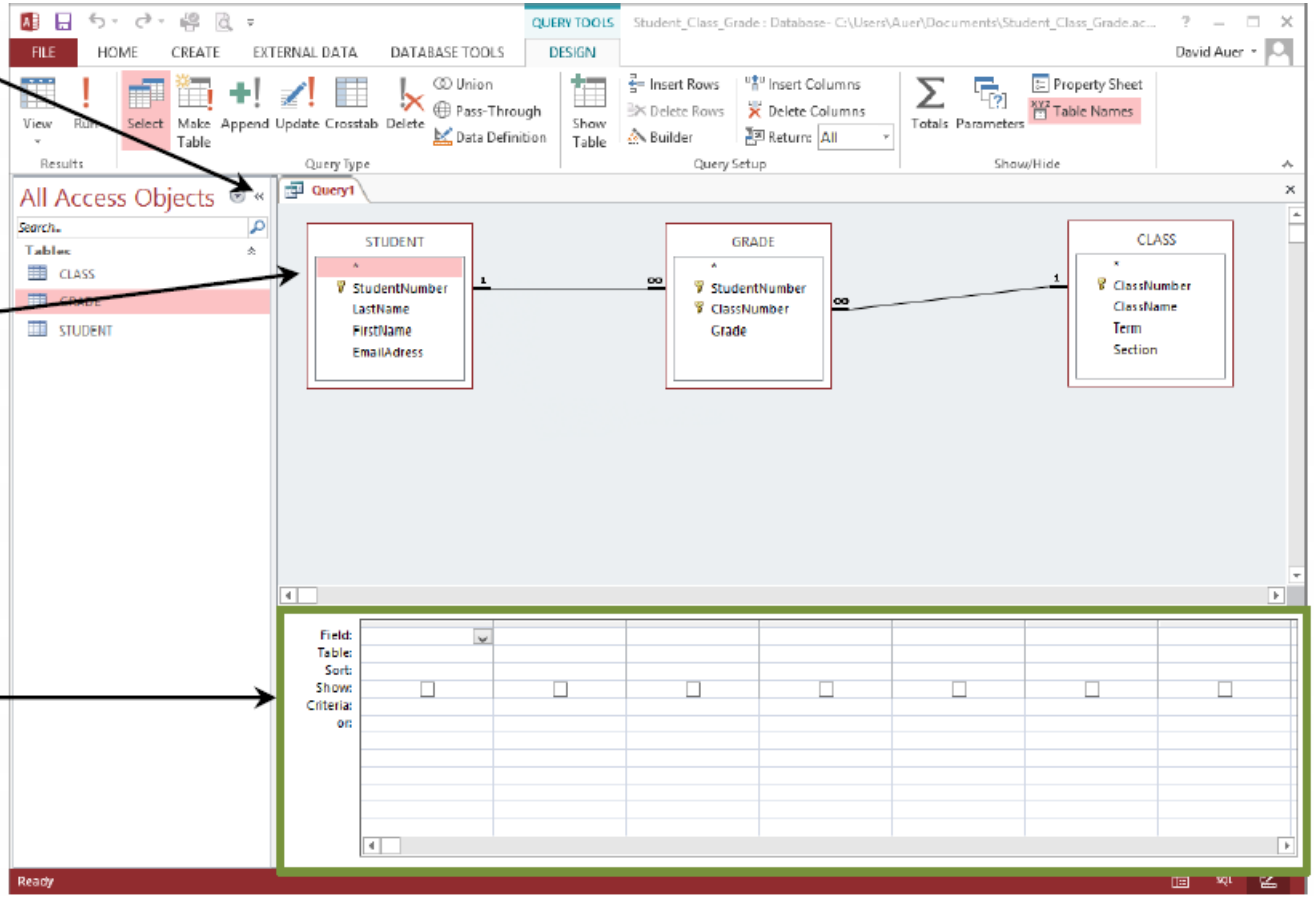


# Creating QBE Queries III

The **Shutter Bar Open/Close** button

Tables in the query appear in the top pane, together with a list of their columns (the *field list*) and an asterisk (*), meaning "all columns"

Columns in the query are called fields and appear in the bottom pane, together with related property values

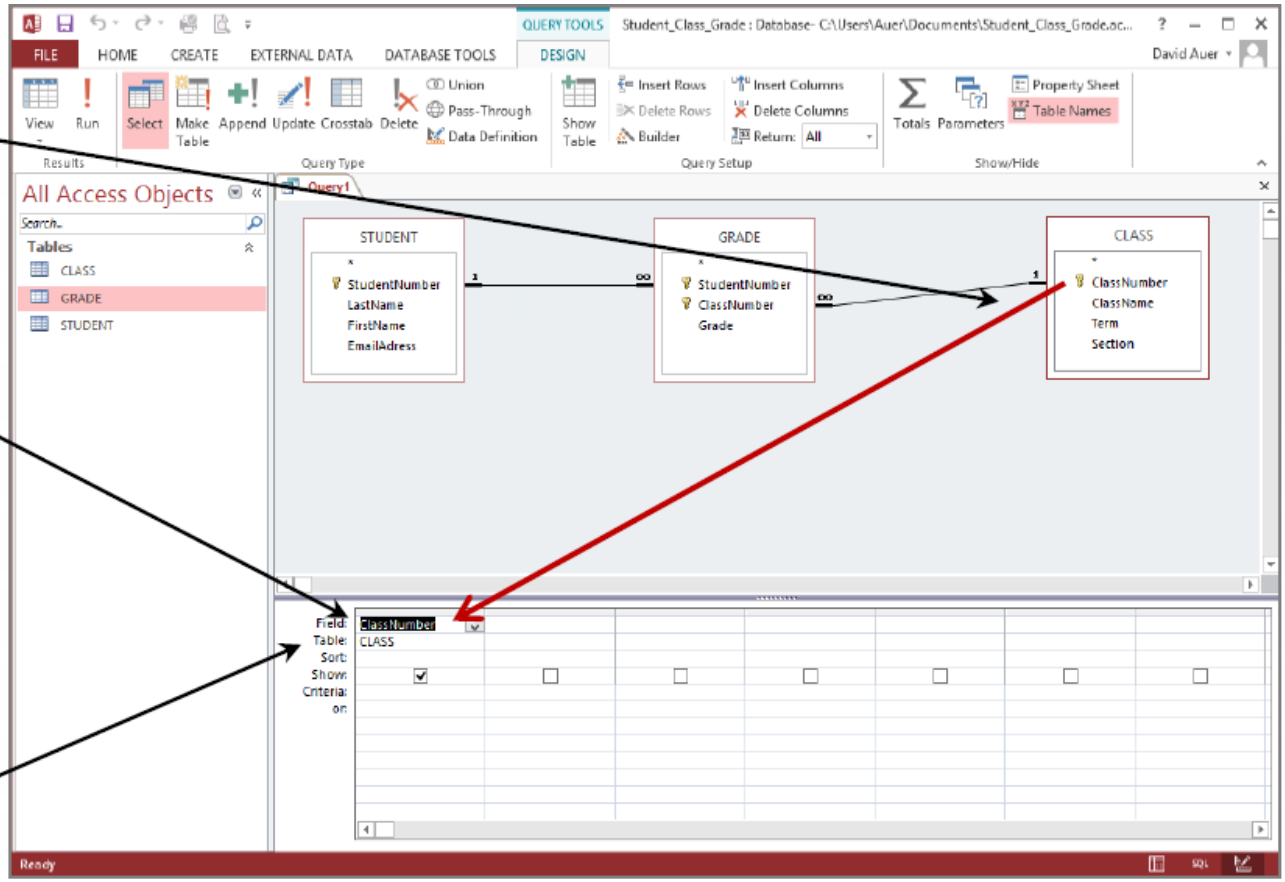


# Creating QBE Queries IV

To add a column to the query, click the column name and drag it to a cell in the Field: row in the lower pane

The ClassNumber field name is dropped here to add the **ClassNumber** field to the query

The table name is automatically added to the query to specify the source of the column–this is important if there is more than one table in the query with the same col-



# Creating QBE Queries V

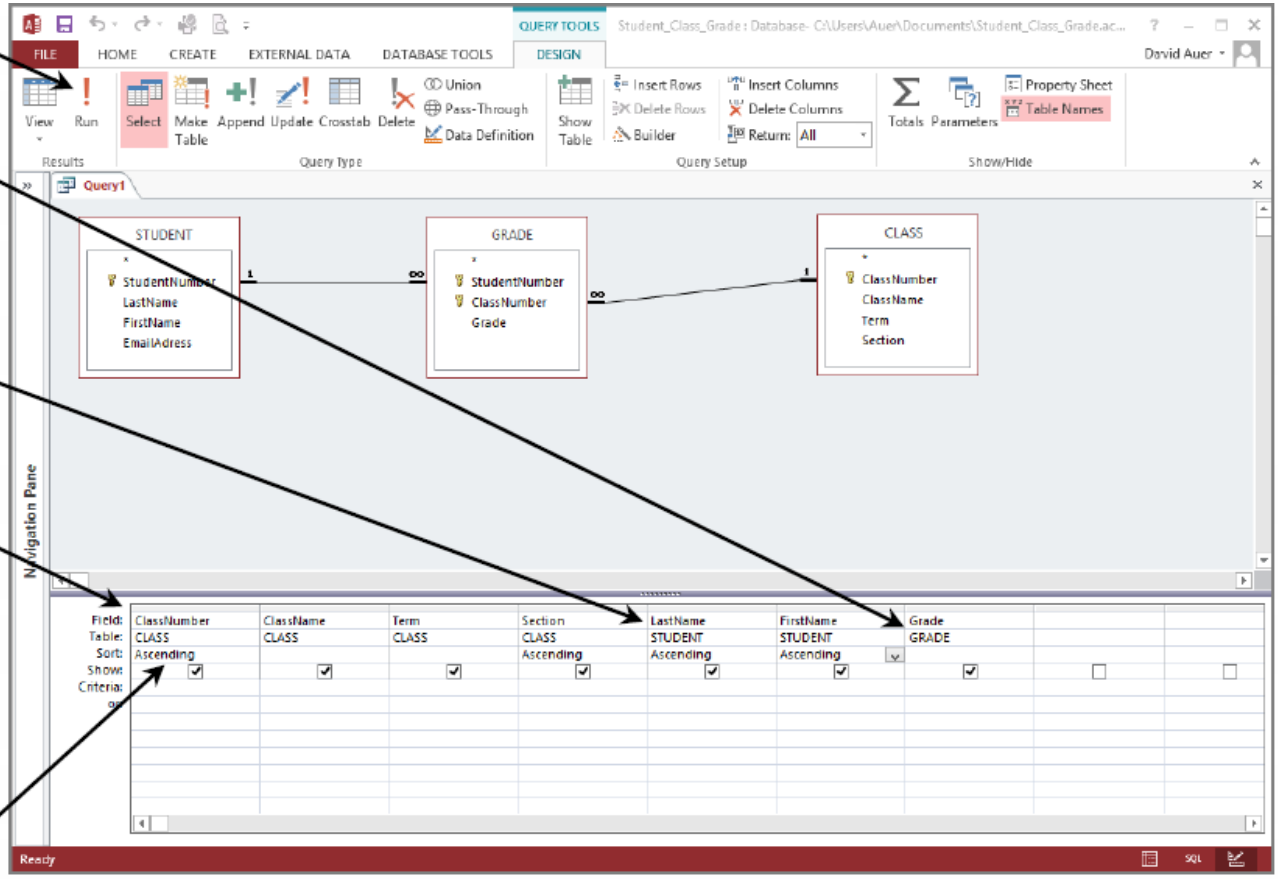
The **Run** button

From GRADE, the **Grade** column is in the query

From STUDENT, the **LastName** and **FirstName** columns are in the query

From CLASS, the **ClassNumber, ClassName, Term**, and **Section** columns are in the query

The results will be sorted by ClassNumber, Section, LastName and Firstname in ascending order

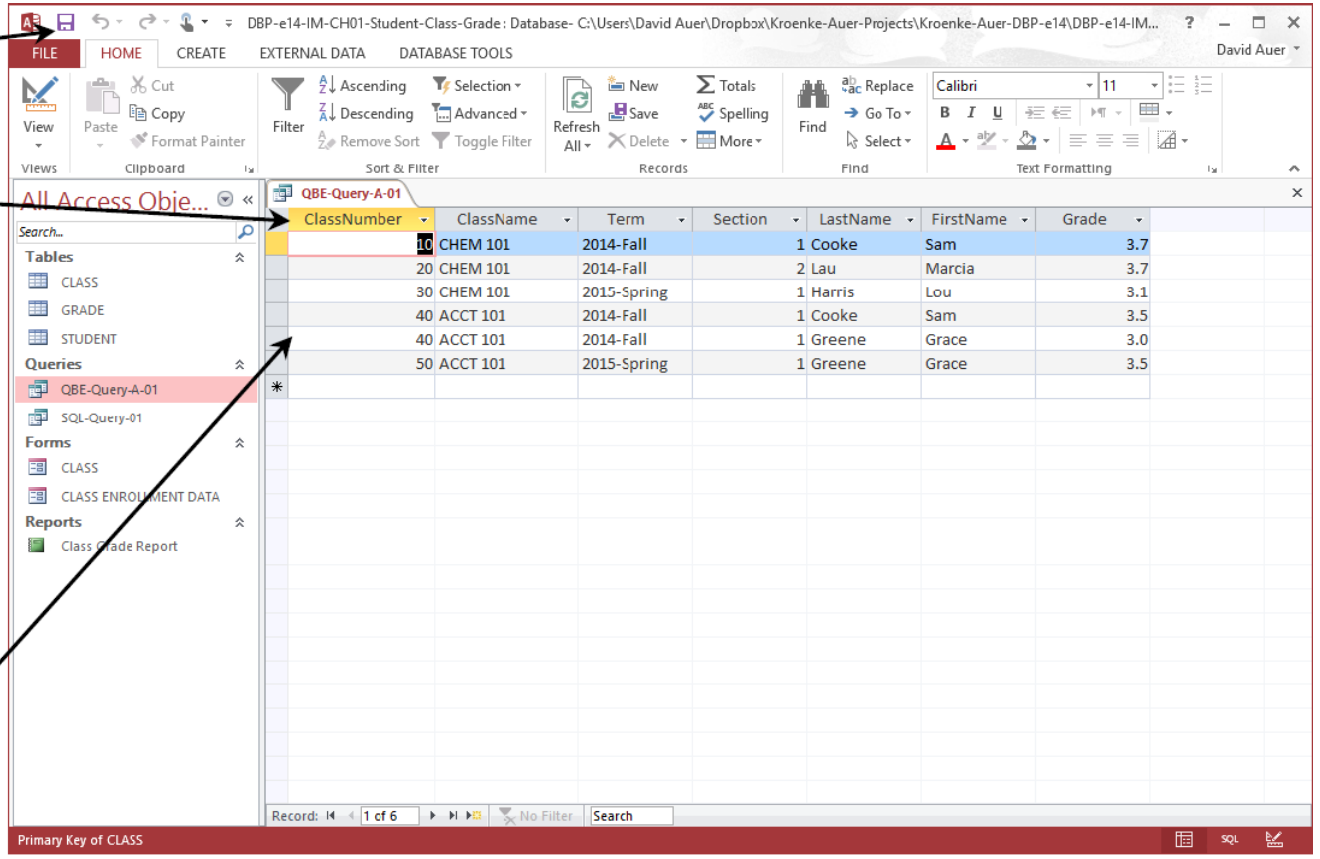


# Creating QBE Queries VI

The **Save** button

The results show the course grade for each student in each section of each class

The results are sorted by ClassNumber, Section, LastName, and FirstName in ascending order



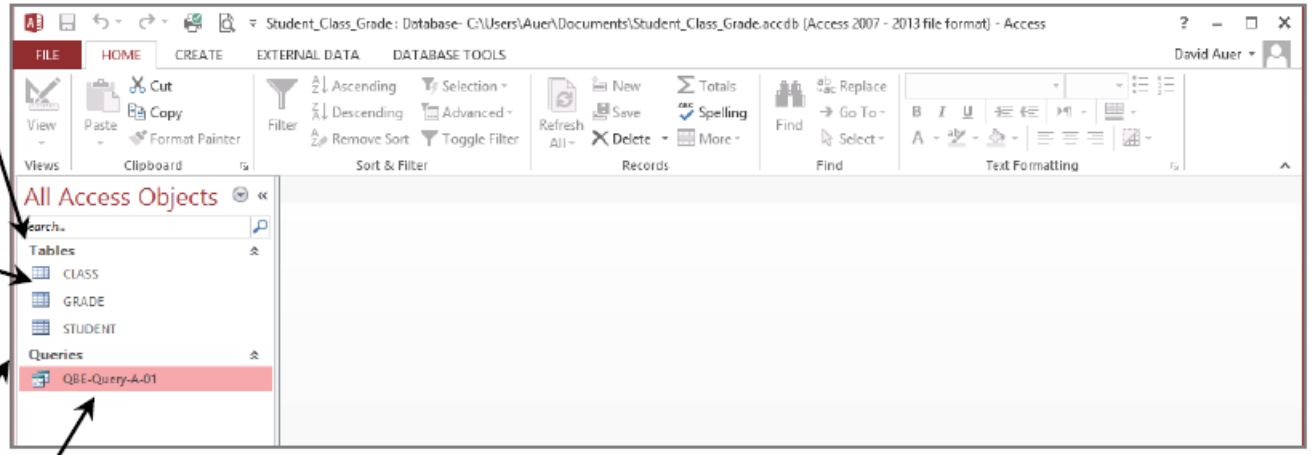
# Creating QBE Queries VII

The **Tables** section of the Navigation Pane

The **CLASS**, **GRADE** and **STUDENT** table objects

The **Queries** section of the Navigation Pane

The **QBE-Query-A-01** query object

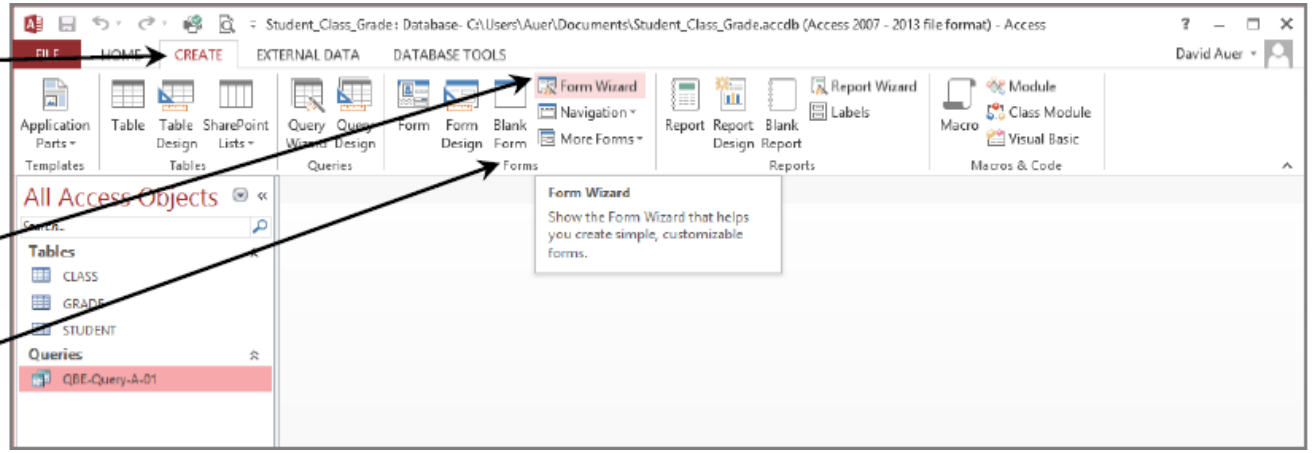


# Access 2013 Forms

The **CREATE** command tab

The **Form Wizard** button

The **Forms** command group

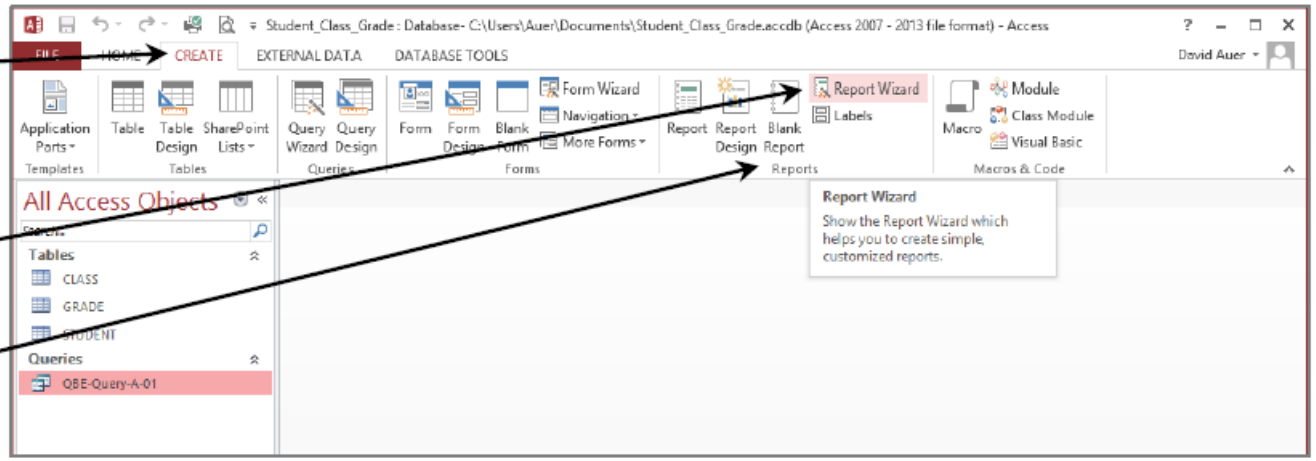


# Access 2013 Reports

The **CREATE** command tab

The **Report Wizard** button

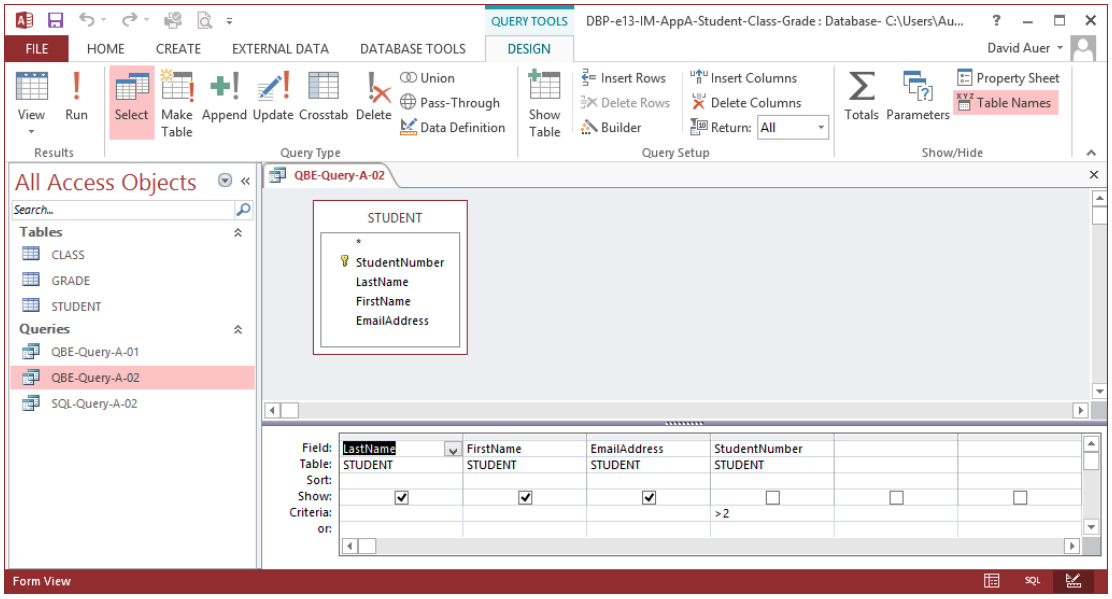
The **Reports** command group

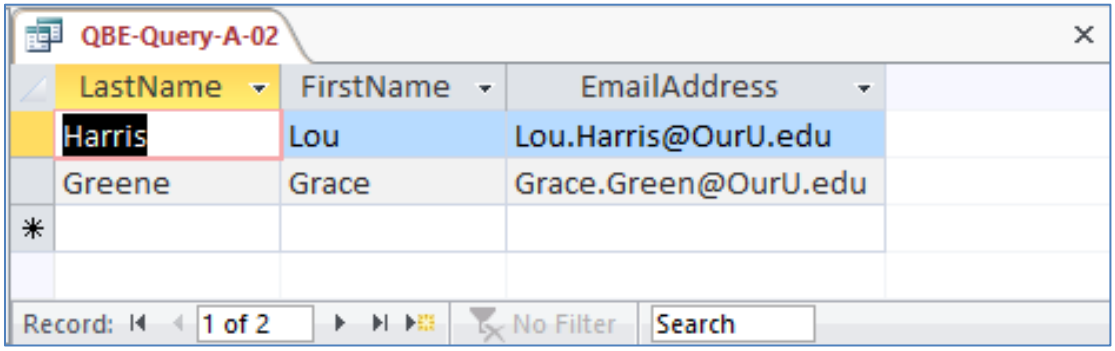


## PART 1 REVIEW QUESTIONS

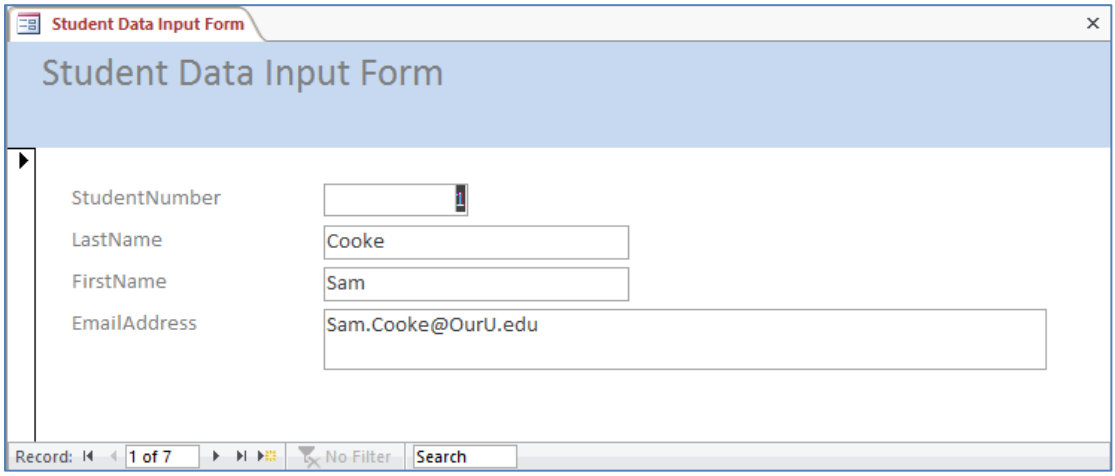
*A.1. Part 1 – Using the Student-Class-Grade database that you created answer the following:*

*A. Create and run an Access QBE query to duplicate the results in Figure 1-10. Save the query as QBE-Query-A-02.*



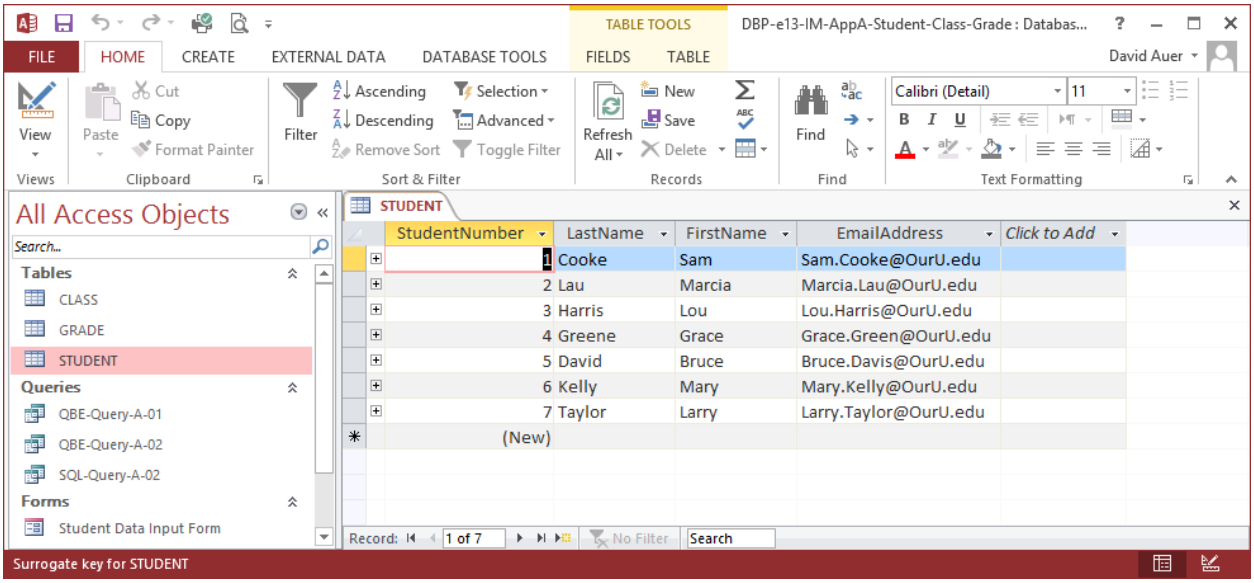



B. *Use the Form Wizard to create a data input form for the STUDENT table. Name the form* ***Student Data Input Form****. Using the student data shown in Figure A-49, add the new students to the STUDENT table.*

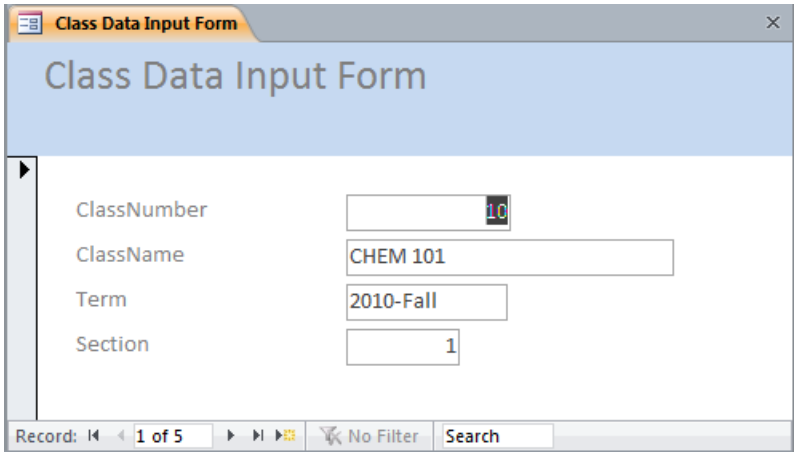



| StudentNumber | LastName | FirstName | EmailAddress |
|---|---|---|---|
| 5 | Davis | Bruce | Bruce.Davis@OurU.edu |
| 6 | Kelly | Mary | Mary.Kelly@OurU.edu |
| 7 | Taylor | Larry | Larry.Taylor@OurU.edu |

**Figure A-49 — Additional STUDENT Data**

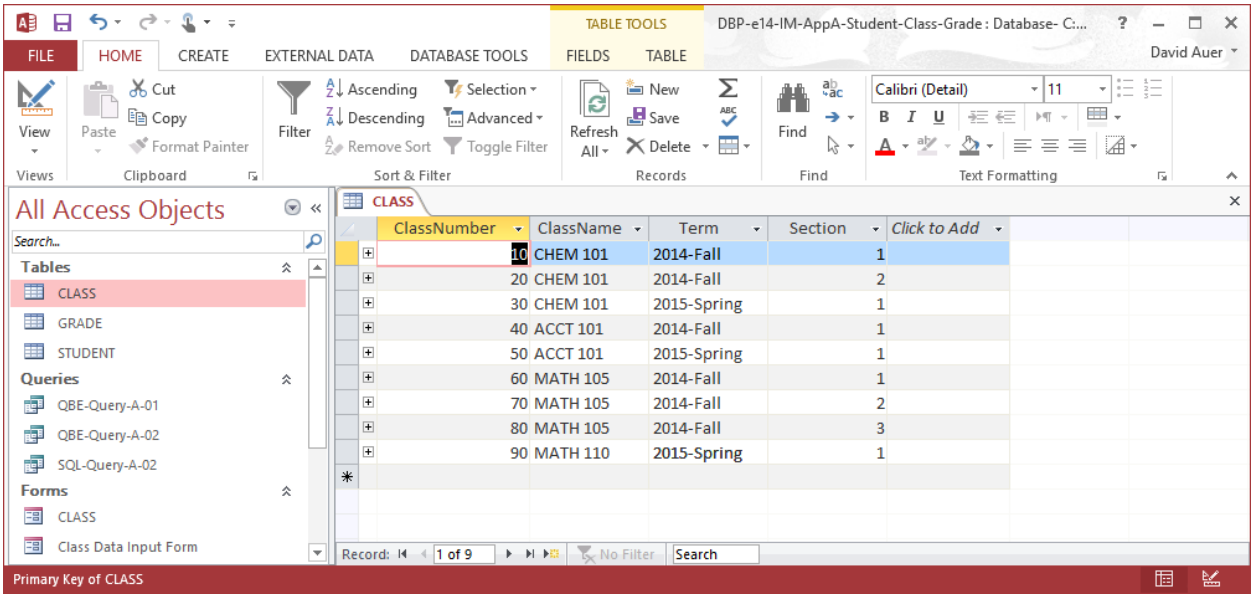


C. *Use the Form Wizard to create a data input form for the CLASS table. Name the form* ***Class Data Input Form****. Using the class data shown in Figure A-50, add the new classes to the CLASS table.*



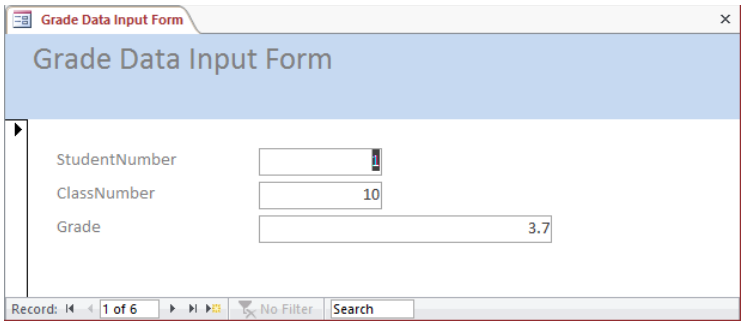

| ClassNumber | ClassName | Term | Section |
|---|---|---|---|
| 60 | MATH 105 | 2014-Fall | 1 |
| 70 | MATH 105 | 2014-Fall | 2 |
| 80 | MATH 105 | 2014-Fall | 3 |
| 90 | MATH 110 | 2014-Spring | 1 |

**Figure A-50 — Additional CLASS Data**



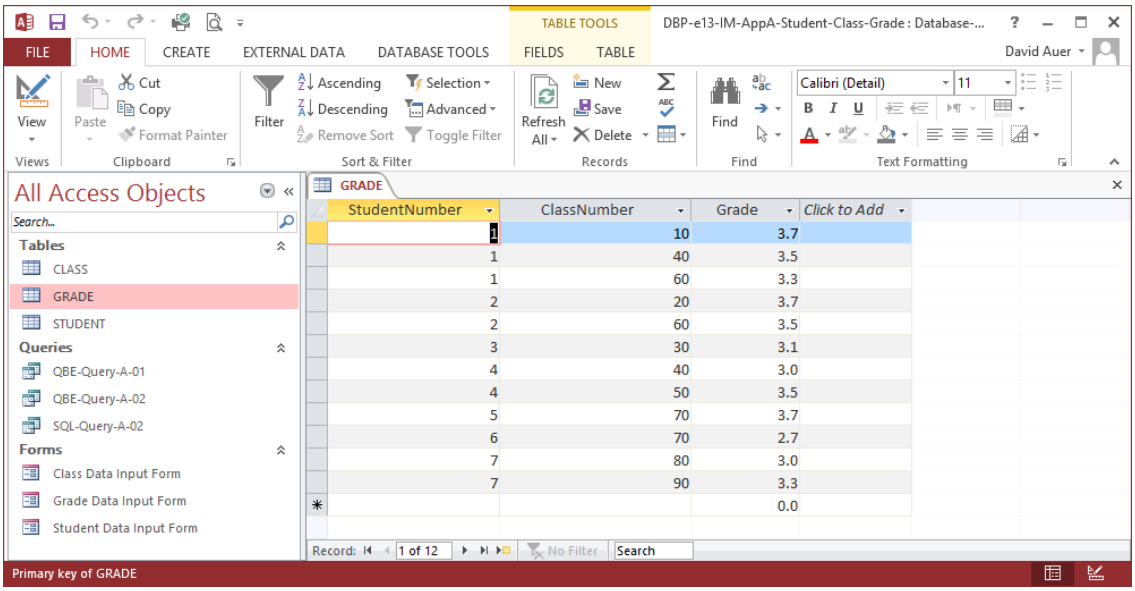
D. *Use the Form Wizard to create a data input form for the GRADE table. Name the form* ***Grade Data Input Form****. Using the grade data shown in Figure A-48, add the new grades to the GRADE table.*

.



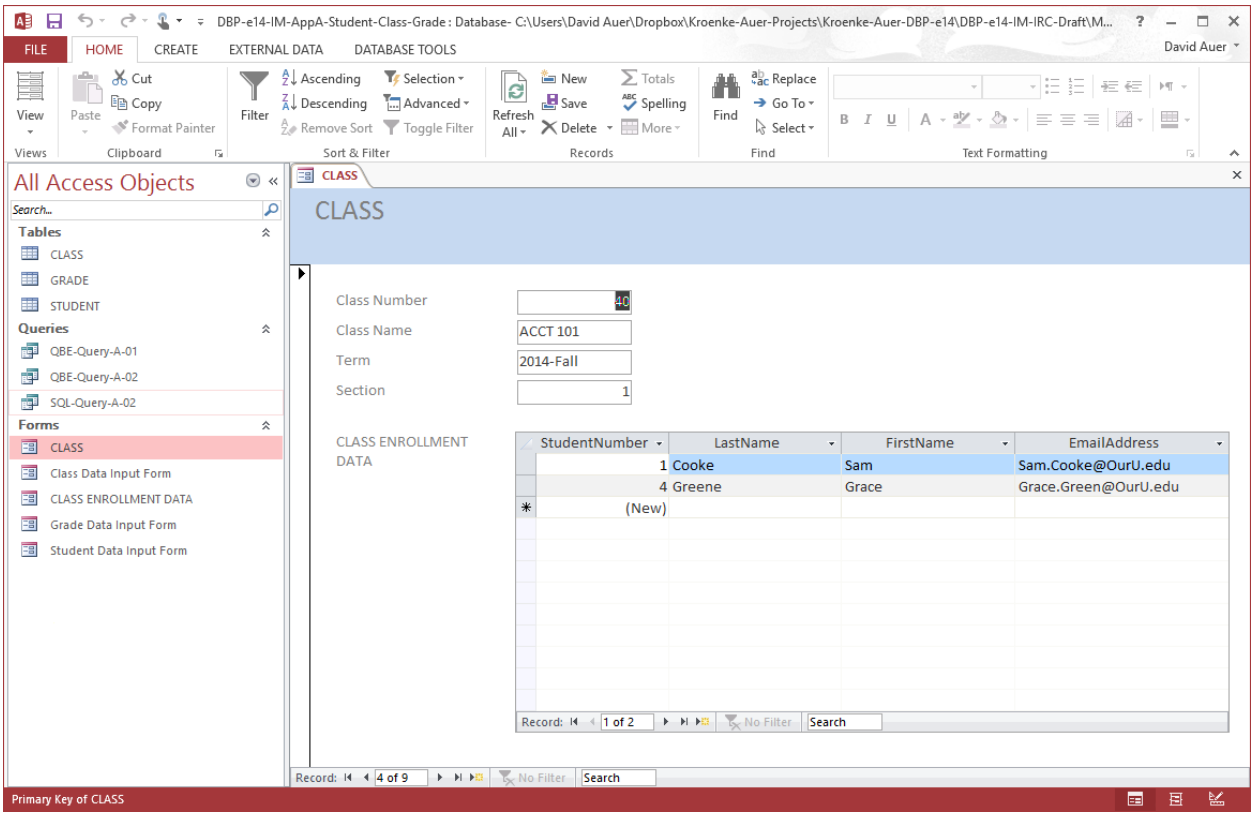

| StudentNumber | ClassNumber | Grade |
|---|---|---|
| 1 | 60 | 3.3 |
| 2 | 60 | 3.5 |
| 5 | 70 | 3.7 |
| 6 | 70 | 2.7 |
| 7 | 80 | 3.0 |
| 7 | 90 | 3.3 |

**Figure A-51 — Additional GRADE Data**

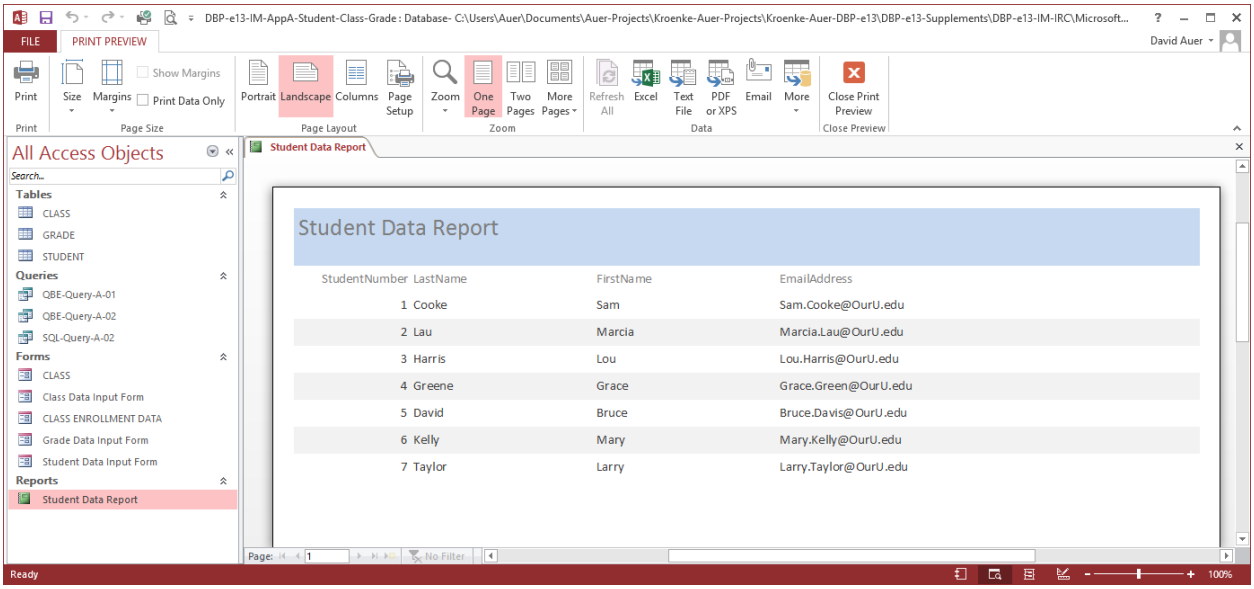


*E. Use the Form Wizard to duplicate the CLASS form in Figure 1-9. Note that this form uses more than one table.*

Formatting this form requires the use of Design View.

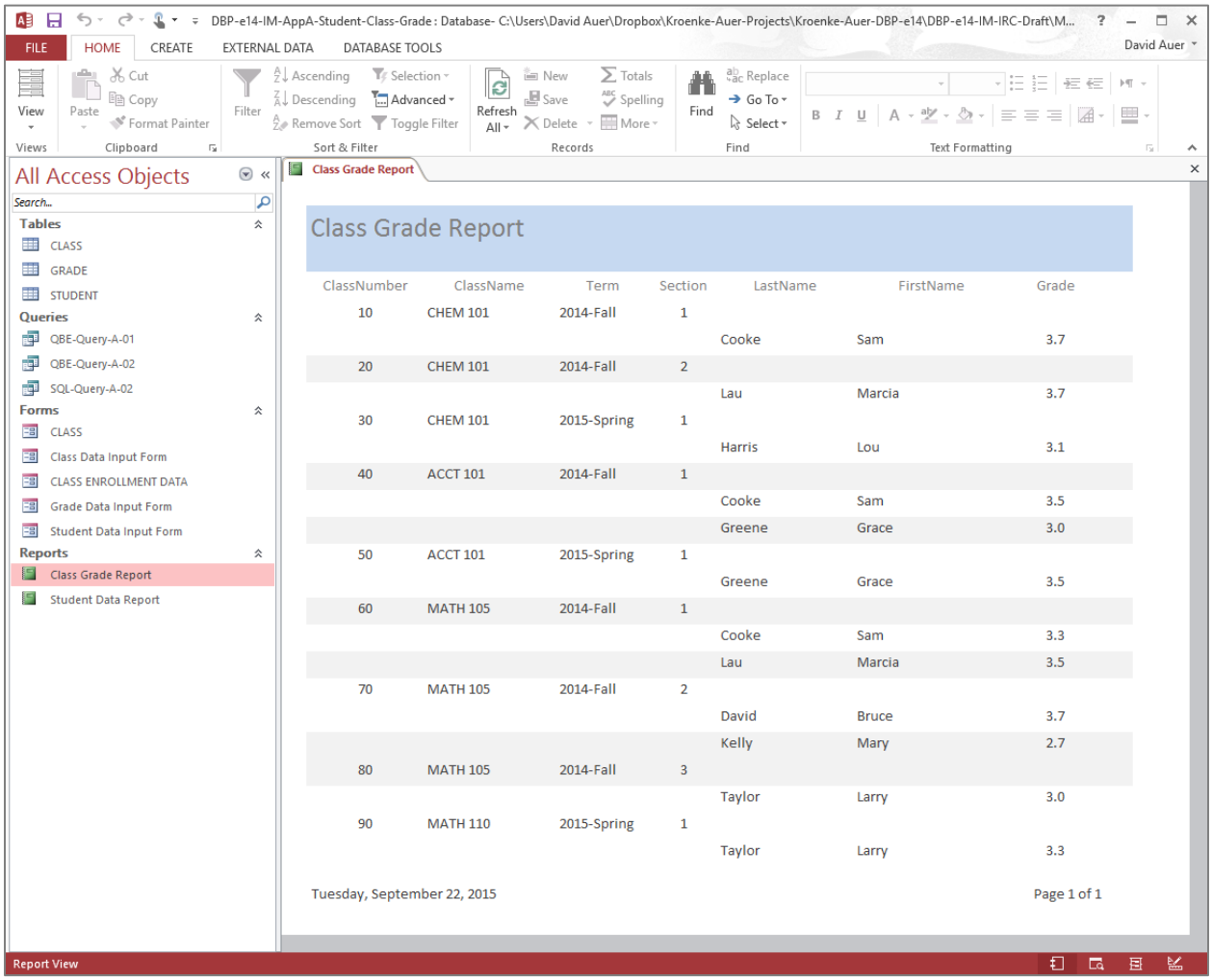


F. *Use the Report Wizard to create a report of the data in the STUDENT table. Name the report* ***Student Data Report****.*



G. *Use the Report Wizard and the CLASS, STUDENT and GRADE tables to duplicate the **Class Grade Report** shown in Figure 1-11. Note that your version of this report will display additional data because of the data you added to the database in steps B, C and D above.*

Formatting this report requires the use of Design View.



## PART 2 REVIEW QUESTIONS

*A.2. Part 2 of assignment you will create and submit a separate database. In this exercise, you will build the Cape Codd database used for the SQL examples in Chapter 2. The Access 2013 tables and relationships are shown in Figure 2-2.*

*A. Create a new Access 2013 database named Cape-Codd.accdb.*

*B. The column characteristics for the RETAIL_ORDER table are shown in Figure A-51. Create the RETAIL_ORDER table.*

**RETAIL_ORDER**

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| OrderNumber | Number | Primary Key | Yes | Long Integer |
| StoreNumber | Number | No | No | Long Integer |
| StoreZip | Text (9) | No | No | |
| OrderMonth | Text (12) | No | Yes | |
| OrderYear | Number | No | Yes | Integer |
| OrderTotal | Currency | No | No | |

**Figure A-52 — Column Characteristics for the Cape Codd RETAIL_ORDER Table**

*C. The column characteristics for the SKU_DATA table are shown in Figure A-53. Create the SKU_DATA table.*

**SKU_DATA**

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| SKU | Number | Primary Key | Yes | Long Integer |
| SKU_Description | Text (35) | No | Yes | |
| Department | Text (30) | No | Yes | |
| Buyer | Text (30) | No | No | |

**Figure A-53 — Column Characteristics for the Cape Codd SKU_DATA Table**

*D. The column characteristics for the ORDER_ITEM table are shown in Figure A-54. Create the ORDER_ITEM table.*

**ORDER_ITEM**

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| OrderNumber | Number | Primary Key, Foreign Key | Yes | Long Integer |
| SKU | Number | Primary Key, Foreign Key | Yes | Long Integer |
| Quantity | Number | No | Yes | Integer |
| Price | Currency | No | Yes | |
| ExtendedPrice | Currency | No | Yes | |

**Figure A-54 — Column Characteristics for the Cape Codd ORDER_ITEM Table**

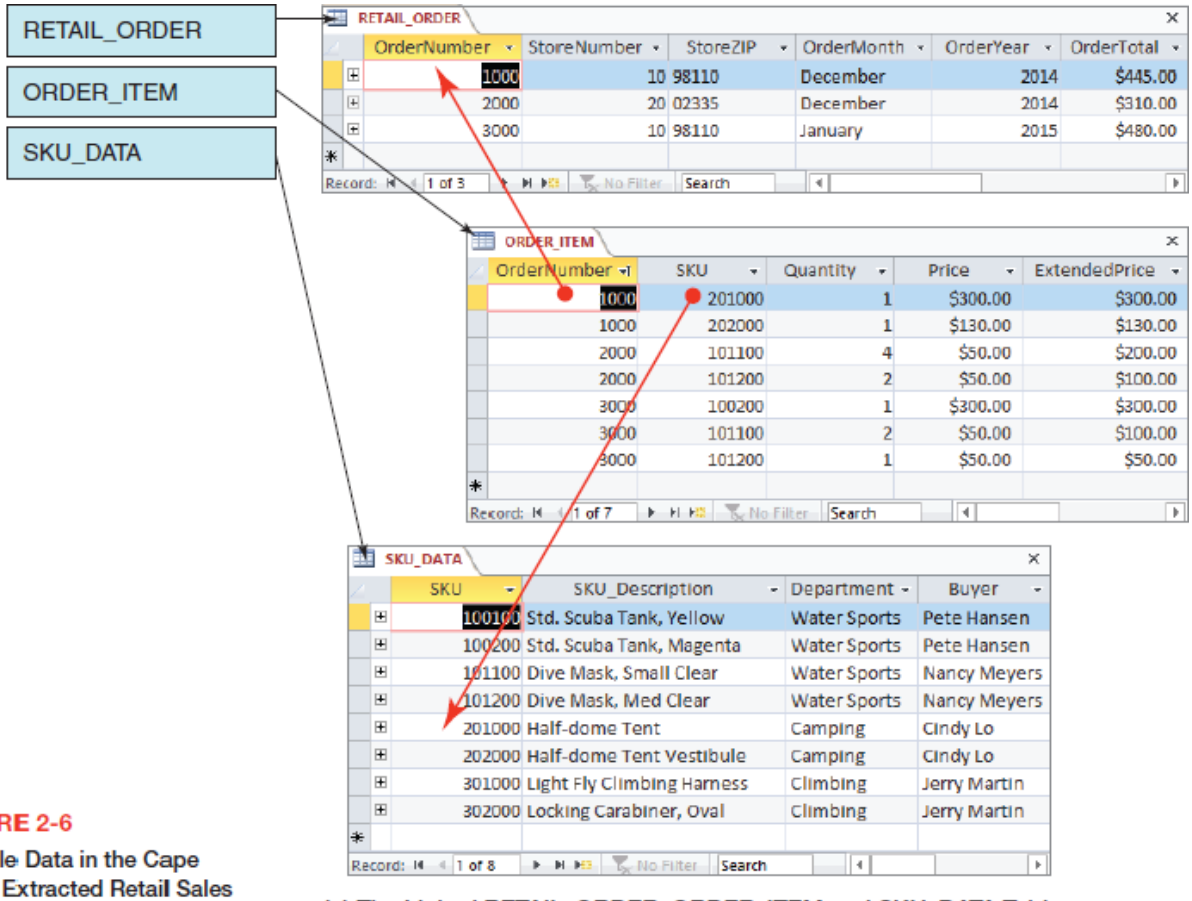



**FIGURE 2-6**
Sample Data in the Cape Codd Extracted Retail Sales Database

(a) The Linked RETAIL_ORDER, ORDER_ITEM and SKU_DATA Tables

*E. The data for the RETAIL_ORDER table are shown in Figure 2-6(a). Populate the RETAIL_ORDER table.*

*F. The data for the SKU_DATA table are shown in Figure 2-6(a). Populate the RETAIL_ORDER table.*

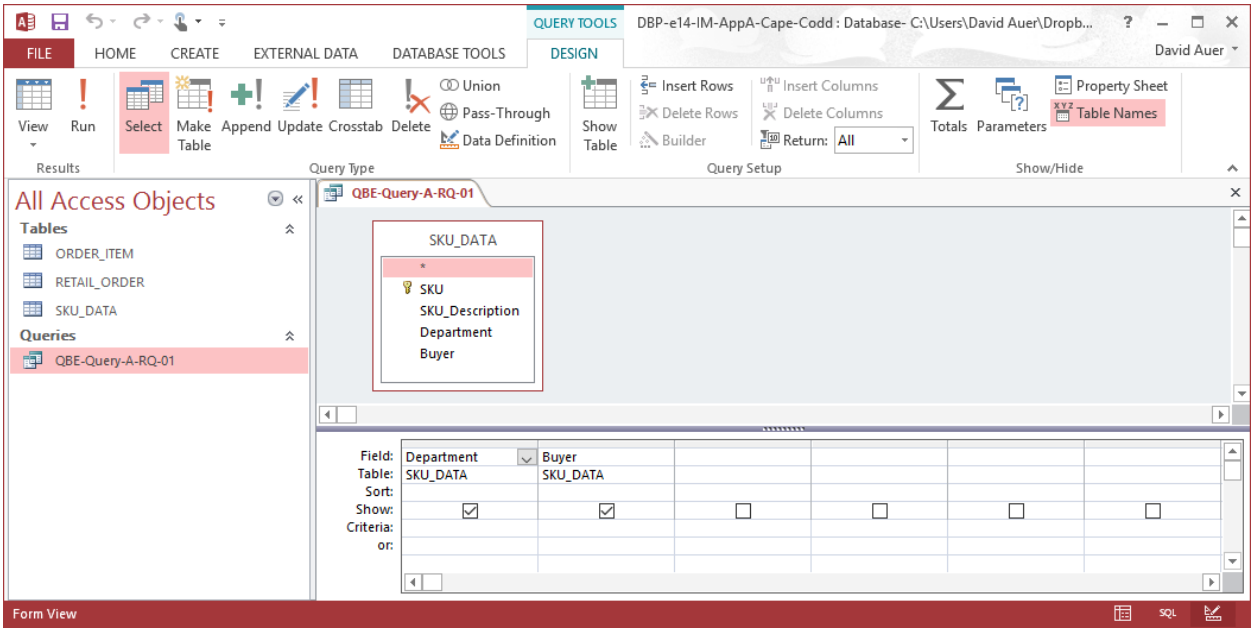
*G. Create the relationship between the RETAIL_ORDER and ORDER_ITEM tables. Be sure to enforce referential integrity.*

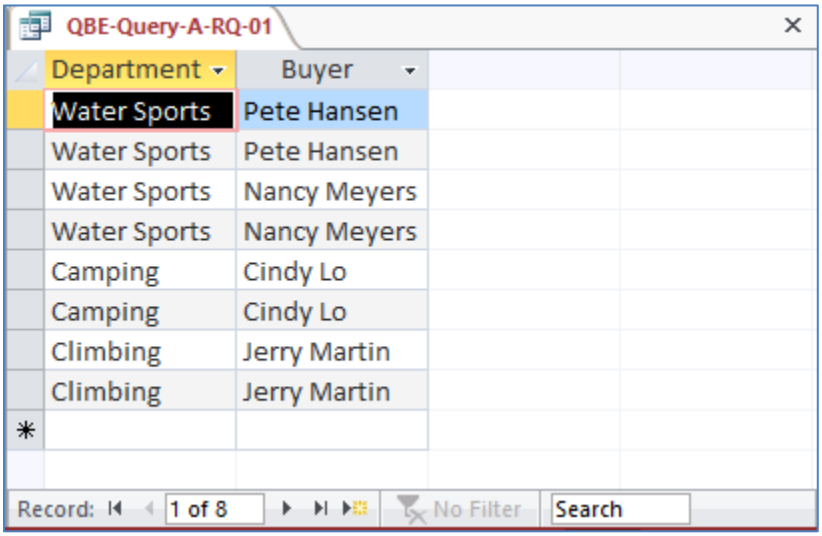
*H. Create the relationship between the SKU_DATA and ORDER_ITEM tables. Be sure to enforce referential integrity.*

*I. The data for the ORDER_ITEM table are shown in Figure 2-6(a). Populate the RETAIL_ORDER table.*

*J. Why did you enter the ORDER_ITEM data only after creating the relationships between the tables?*

K. *Create a QBE query to display Department and Buyer in the SKU_DATA table. Save the query as QBE-Query-A-RQ-01.*



L. *The column characteristics for the CATALOG_SKU_20## table are shown in Figure A-55. Using this data, create the CATALOG_SKU_2014 and CATALOG_SKU_2015 tables.*

**CATALOG_SKU_20##**

| Column Name | Type | Key | Required | Remarks |
|---|---|---|---|---|
| CatalogID | Number | Primary Key | Yes | Surrogate Key |
| SKU | Number | No | Yes | Integer |
| SKU_Description | Text (35) | No | Yes | |
| Department | Text (30) | No | Yes | |
| CatalogPage | Number | No | No | Integer |
| DateOnWebPage | Date | No | No | |

**Figure A-55 — Column Characteristics for the Cape Codd CATALOG_SKU_20## Table**

CATALOG_SKU_2014

CATALOG_SKU_2014

| CatalogID | SKU | SKU_Description | Department | CatalogPage | DateOnWebSite |
|---|---|---|---|---|---|
| 20140001 | 100100 | Std. Scuba Tank, Yellow | Water Sports | 23 | 1/1/2014 |
| 20140002 | 100300 | Std. Scuba Tank, Light Blue | Water Sports | 23 | 1/1/2014 |
| 20140003 | 100400 | Std. Scuba Tank, Dark Blue | Water Sports | | 8/1/2014 |
| 20140004 | 101100 | Dive Mask, Small Clear | Water Sports | 26 | 1/1/2014 |
| 20140005 | 101200 | Dive Mask, Med Clear | Water Sports | 26 | 1/1/2014 |
| 20140006 | 201000 | Half-dome Tent | Camping | 46 | 1/1/2014 |
| 20140007 | 202000 | Half-dome Tent Vestibule | Camping | 46 | 1/1/2014 |
| 20140008 | 301000 | Light Fly Climbing Harness | Climbing | 77 | 1/1/2014 |
| 20140009 | 302000 | Locking Carabiner, Oval | Climbing | 79 | 1/1/2014 |

Record: 1 of 9 No Filter Search

CATALOG_SKU_2015

CATALOG_SKU_2015

| CatalogID | SKU | SKU_Description | Department | CatalogPage | DateOnWebSite |
|---|---|---|---|---|---|
| 20150001 | 100100 | Std. Scuba Tank, Yellow | Water Sports | 23 | 1/1/2015 |
| 20150002 | 100200 | Std. Scuba Tank, Magenta | Water Sports | 23 | 1/1/2015 |
| 20150003 | 101100 | Dive Mask, Small Clear | Water Sports | 27 | 8/1/2015 |
| 20150004 | 101200 | Dive Mask, Med Clear | Water Sports | 27 | 1/1/2015 |
| 20150005 | 201000 | Half-dome Tent | Camping | 45 | 1/1/2015 |
| 20150006 | 202000 | Half-dome Tent Vestibule | Camping | 45 | 1/1/2015 |
| 20150007 | 203000 | Half-dome Tent Vestibule - Wide | Camping | | 4/1/2015 |
| 20150008 | 301000 | Light Fly Climbing Harness | Climbing | 76 | 1/1/2015 |
| 20150009 | 302000 | Locking Carabiner, Oval | Climbing | 78 | 1/1/2015 |

Record: 1 of 9 No Filter Search

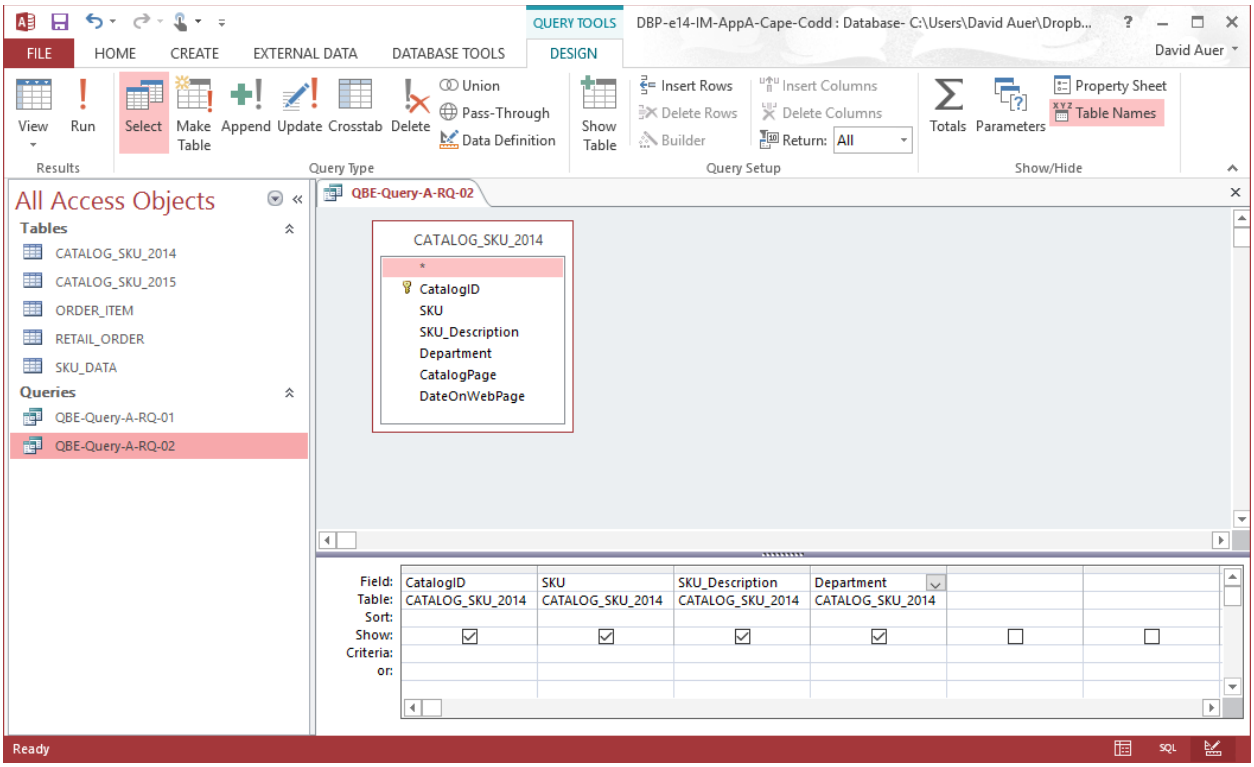
**FIGURE 2-6**
Sample Data in the Cape Codd Extracted Retail Sales Database

(b) The Non-Linked CATALOG_SKU_2014 and CATALOG_SKU_2015 Tables

M. *The data for the CATALOG_SKU_2014 table is shown in Figure 2-6(b). Populate the CATALOG_SKU_2014 table.*

N. *The data for the CATALOG_SKU_2015 table is shown in Figure 2-6(b). Populate the CATALOG_SKU_2015 table.*

O. *Create a QBE query to display CatalogID, SKU, SKU_Description, and Department from the CATALOG_SKU_2014 table. Save the query as* QBE-Query-A-RQ-02.




QBE-Query-A-RQ-02

| CatalogID | SKU | SKU_Description | Department |
|---|---|---|---|
| 2014001 | 100100 | Std. Scuba Tank, Yellow | Water Sports |
| 2014002 | 100300 | Std. Scuba Tank, Light Blue | Water Sports |
| 2014003 | 100400 | Std. Scuba Tank, Dark Blue | Water Sports |
| 2014004 | 101100 | Dive Mask, Small Clear | Water Sports |
| 2014005 | 101200 | Dive Mask, Med Clear | Water Sports |
| 2014006 | 201000 | Half-Dome Tent | Camping |
| 2014007 | 202000 | Half-Dome Tent Vestibule | Camping |
| 2014008 | 301000 | Light Fly Climbing Harness | Climbing |
| 2014009 | 302000 | Locking Carabiner, Oval | Climbing |
| 0 | 0 | | |

Record: 1 of 9 No Filter Search

P. *Create a QBE query to display CatalogID, SKU, SKU_Description, and Department from the CATALOG_SKU_2015 table. Save the query as* QBE-Query-A-RQ-03*.*