lab

9

Database Concepts Using Microsoft Access

Objectives:

Upon successful completion of Lab 9, you will be able to

- Understand fundamental concepts including database, table, record, field, field name, and primary key
- Understand the uses of simple data types including text, number, and date
- Create a table in Access using Design view
- Add records to a table using Datasheet view
- Find data using the Find feature
- Delete a record from a table
- Sort a table on one field

Resources required:

- A computer running Access 2007

Starter files:

- None

Prerequisite skills:

- General keyboarding skills
- Comfortable editing an Excel worksheet or another electronic spreadsheet application
- Ability to find files using Windows Explorer or Windows search feature
- Ability to open and save a file in a Windows application

NRC's Top Ten Skills, Concepts, and Capabilities:

- Skills
  - Use a database to access information
    - Use Access to store information in tables
    - Data types
    - Organizing data into tables
- Concepts
  - Structuring information
- Capabilities
  - Manage complexity
  - Navigate a collection

Lab Lesson

We deal with lists and tables of information every day. Often the lists are small and easy to manage. We might have a list of tasks to do today, a grocery list, or a few phone numbers of friends. When the number of items in a list grows it's no longer practical to write them on paper or work with them from memory. We can use word processing software, but that's really no better than writing the items on paper. If the list is fairly small, spreadsheet software can work quite well. However, once the list grows to hundreds or thousands of items, it should be managed using database software.

Database software, such as Access, is designed to be able to manage large lists with millions of entries. Lists are organized as tables of information. A database can consist of a single table or many tables of information. A sample of a table of information is shown in Figure 9.1.

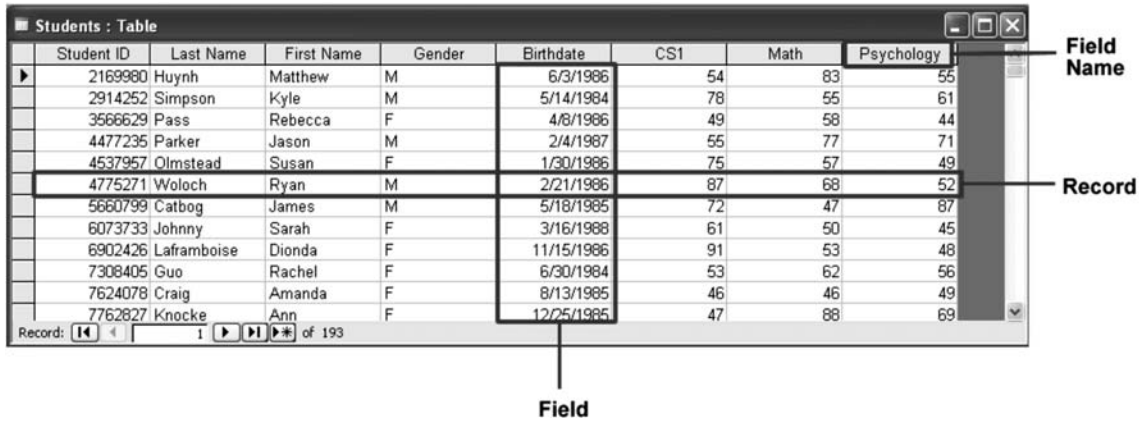

Figure 9.1 *Access table showing student data.*

As shown in Figure 9.1, a field is a column of information. All of the information in a field is the same type of information. For instance, all of the birthdates are dates. Fields in the table shown in Figure 9.1 include Student ID, Last Name, First Name, Gender, Birthdate, CS1, Math, and Psychology. Each field is identified by its field name.

A record is a row of information. Each record contains information about a particular entity. In this case, each record contains information about an individual student. Each student record includes a Student ID, Last Name, First Name, and so forth.

A database could contain many tables. The table in Figure 9.1 contains student grade records for three courses, CS1, Math, and Psychology. The database could also contain another table of student contact information, another table with faculty information, another table with course information, and so forth. In this lab, we will create a simple table, manage the records in the table, and use some techniques to find records as well.

Creating a Database Table

Let's create a table of student records using Access.

► Open Access.

The Access 2007 window should display a **Blank Database** button as shown in Figure 9.2.

► If the Access window does not display the **Blank Database** button, click the **Office** button and click the menu item **New** as shown in Figure 9.3.

► Click the **Blank Database** button, as shown in Figure 9.2.

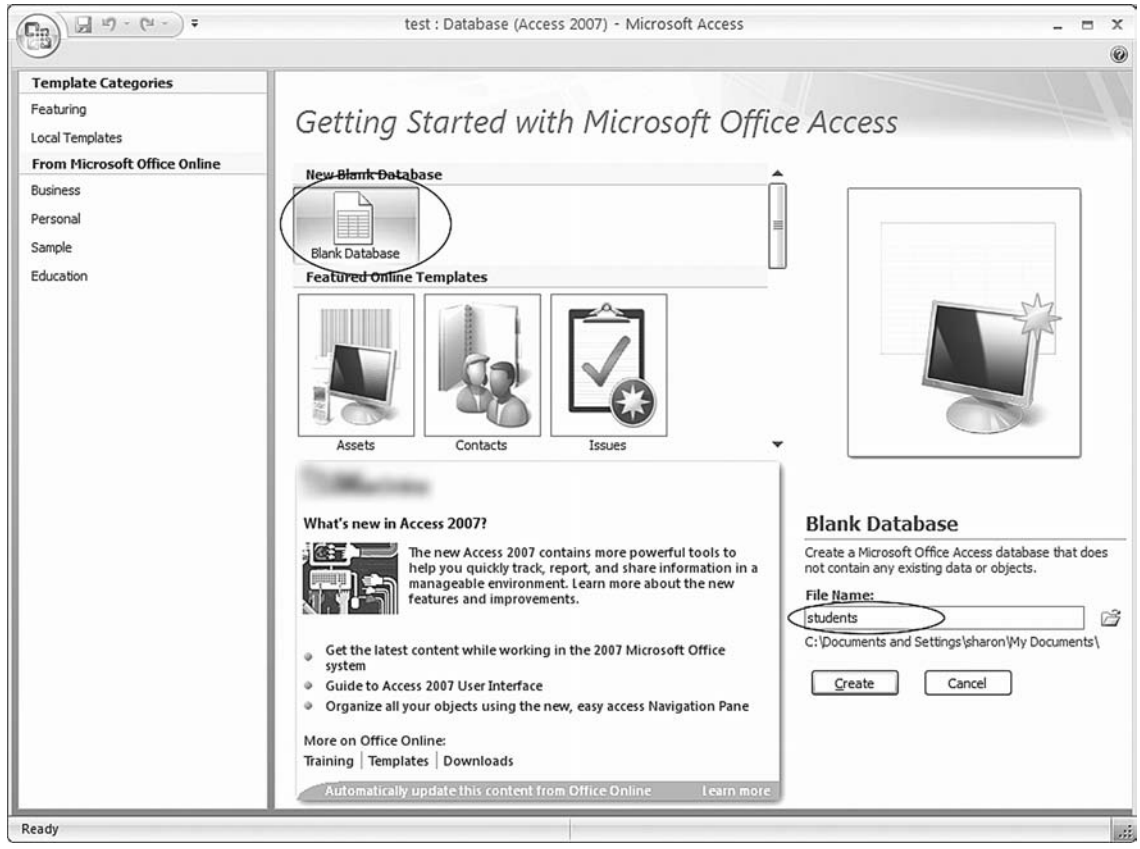

Figure 9.2 *Access Blank Database option.*

Access will display a text box for the name of the database file. This may seem odd, but as soon as you start to create a table, Access will save the table structure and the data you enter.

► In the **File name** box type: students, as shown in Figure 9.3.

Figure 9.3 *Office button and New menu option.*

By default, the database will be saved in the **Documents** folder.

► Click the **Create** button to create the blank database.

Access will display an empty table, as shown in Figure 9.4.

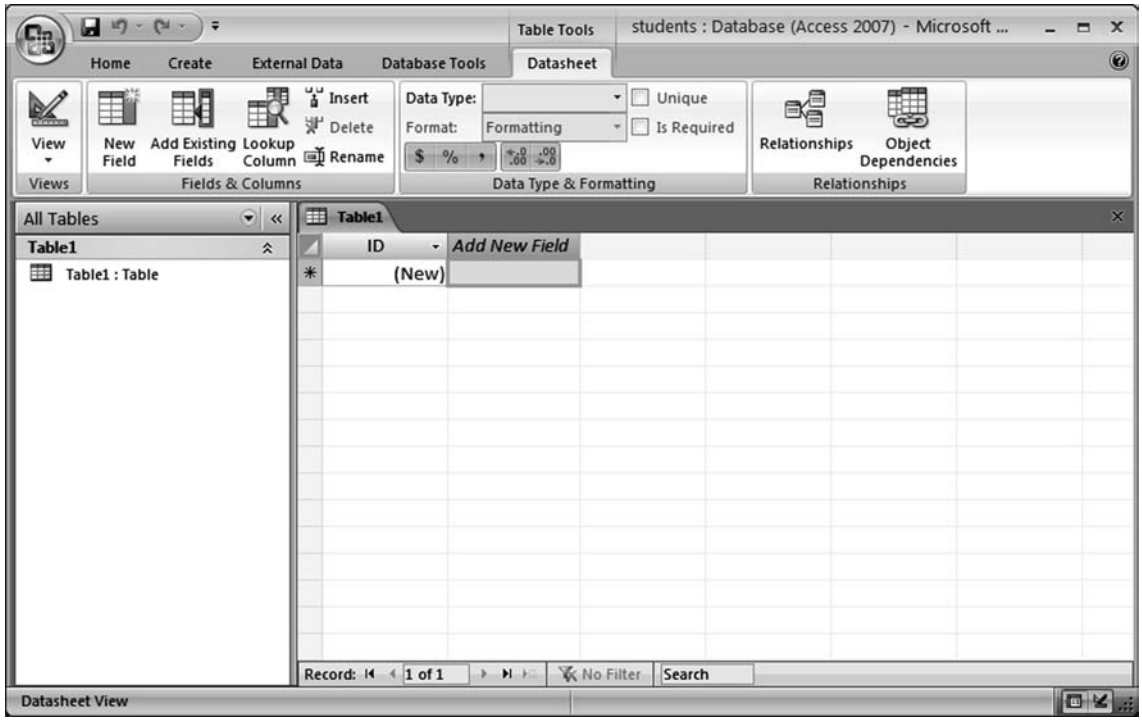

Figure 9.4 *Access window with empty table.*

There are several options available for creating a table. We will create our table in design view in order to define each field.

► Click the **View** button and click the option **Design View**, as shown in Figure 9.5.

The **Save As** dialog box will appear as shown in Figure 9.5.

► In the **Save As** dialog box type: grades

► Click the **OK** button to save the table.

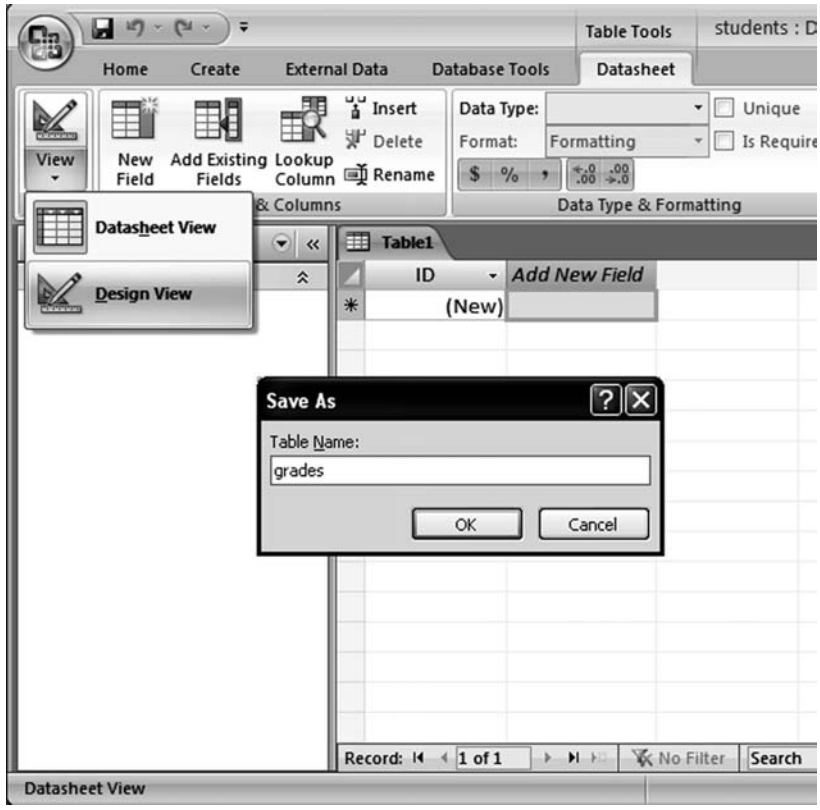

Figure 9.5 *Access View, Design View, and Save As dialog box.*

The **Design View** should be displayed and the flashing insertion point should be positioned in the first Field Name input area.

► Type: Student ID, as shown in Figure 9.6.

► Click on the drop-down arrow for the Data Type options as shown in Figure 9.6.

A drop-down menu will be revealed, as shown in Figure 9.6.

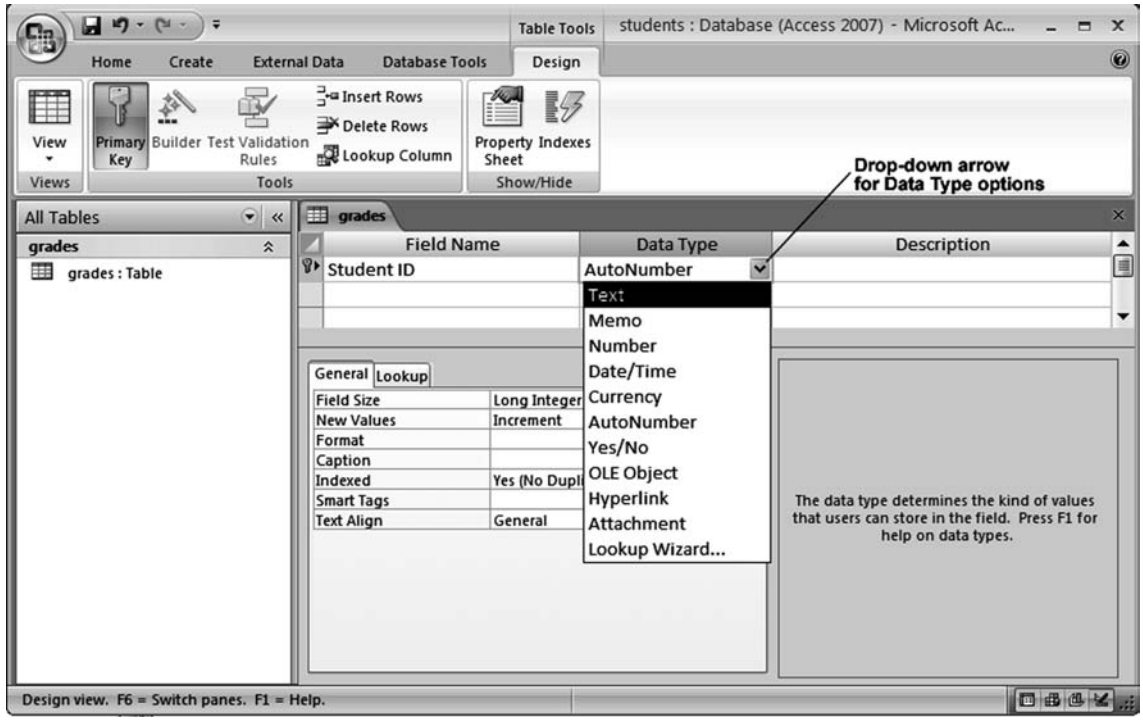

Figure 9.6 *Access Table using Design View creating Student ID field.*

Data Types

We will store the Student ID as a text field. As Figure 9.6 shows, there are a variety of data types available. Other database programs may have some of these data types and some additional data types, but the general concept is the same. A field will contain items that are all of the same type of data. For instance, a field of first names will contain text items and a field of birthdates will contain items that are all dates. Access supports the following data types.

Text: Use this data type for data that contains alphabetic characters or a combination of letters, numbers, and special characters. Examples include last name, street address, and phone number. It can also be used for data that contains only numbers, such as a credit card number or employee number when the number will not be used in mathematical calculations. The text data type stores up to 255 characters.

Memo: Use this data type for lengthy text data when the text data type is not suitable. The memo data type is suitable for a comment or description field and stores up to 63,999 characters.

Number: Use this data type for values that will be used for mathematical calculations.

Date/Time: Use this data type for dates and times.

Currency: Use this data type for values that represent money. The currency data type will prevent rounding errors of fractions of a cent.

AutoNumber: Use this data type to create index numbers for your records. The data in this field will automatically be inserted.

Yes/No: Use this data type when the data has only two possible values. The values could be yes/no, true/false or on/off.

We will keep these data types in mind when defining the fields. Let's define the Student ID field as a text field since we will not be using this data in mathematical calculations.

► Ensure that the text data type is selected as shown in Figure 9.6.

The default field size is 255 characters. We will change the field size to 10. Choosing the smallest appropriate field size will save storage space for the table. This also restricts the data entry to 10 characters, which minimizes data entry errors. The user will not be able to enter more than 10 characters.

► Click the **Field Size** box and change the value to 10, as shown in Figure 9.7.

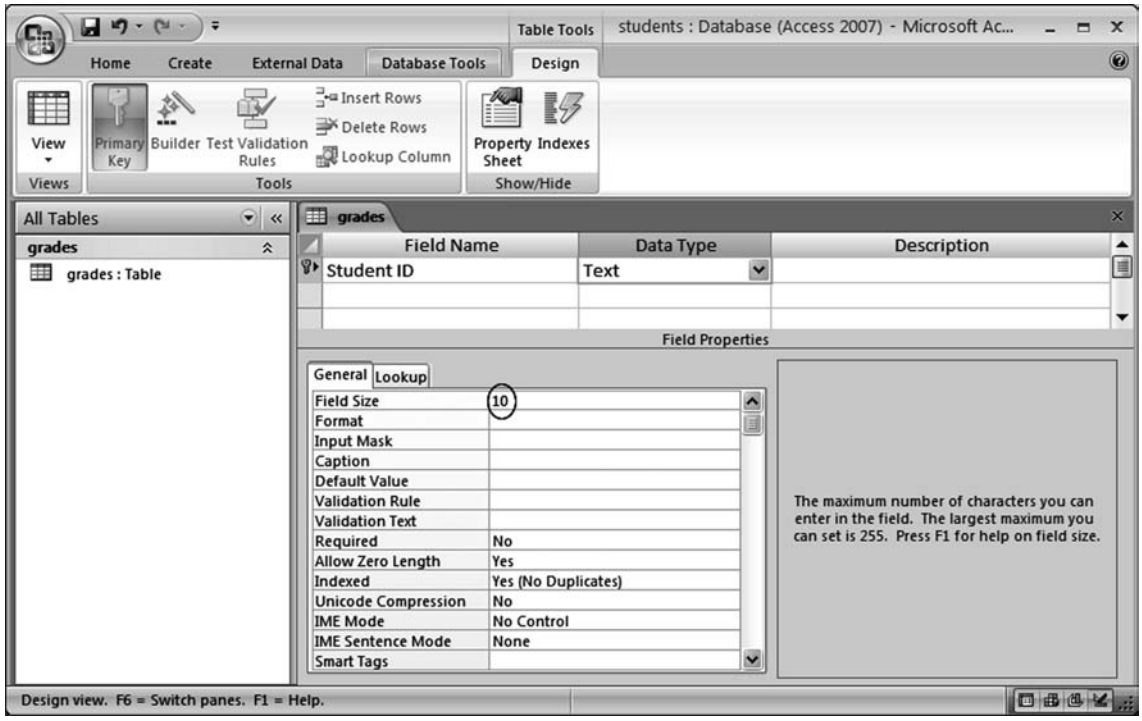

Figure 9.7 *Access table using Design View showing Student ID field with field size 10.*

Entering a description for the field is optional. If the field name describes the contents of the field clearly, it is not necessary to add further description.

Let's create fields for the students' names. We will separate the last name from the first name so that we can sort on either name and the separation is clear.

► Click the next **Field Name** box and type: Last Name, as shown in Figure 9.8.

► Click the **Data Type** box and click the Text option from the drop-down box, as shown in Figure 9.8.

► Click the **Field Size** box and edit the size as 20, as shown in Figure 9.8.

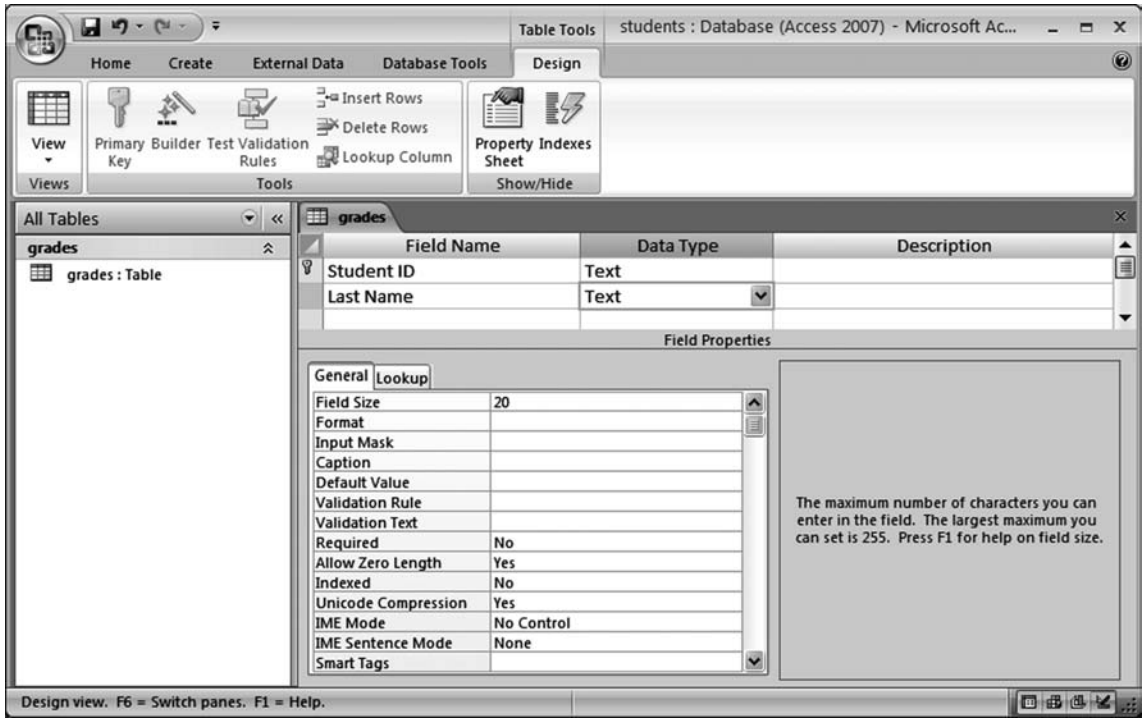

Figure 9.8 *Access table using Design View showing the Last Name field.*

Let's create the First Name field.

- Click the next **Field Name** box and type: First Name, as shown in Figure 9.9.
- Click the **Data Type** box and click the Text option from the drop-down box, as shown in Figure 9.9.
- Click the **Field Size** box and edit the size as 20, as shown in Figure 9.9.

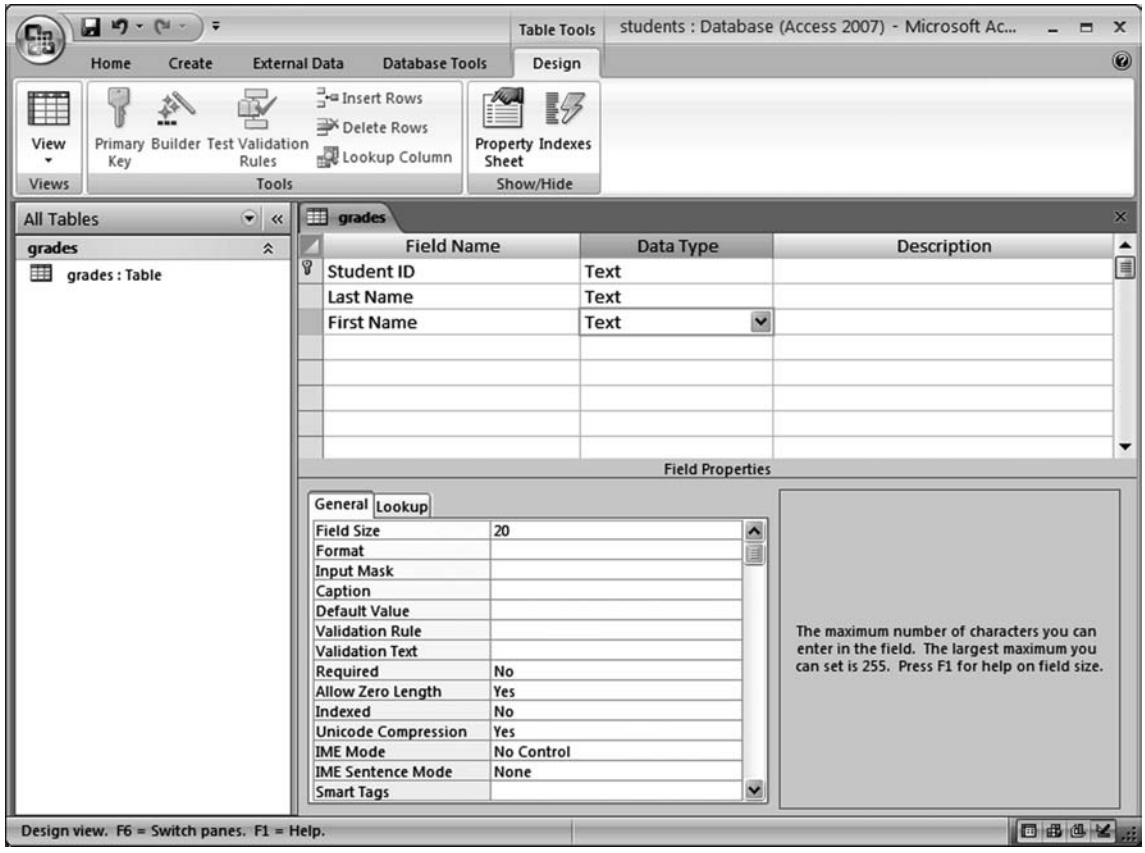

Figure 9.9 *Access table using Design View showing the First Name field.*

Let's add the Gender field.

► Click the next **Field Name** box and type: Gender, as shown in Figure 9.10.

► Click the **Data Type** box and click the Text option from the drop-down box, as shown in Figure 9.10.

In the case of Gender, we could have also used the Yes/No type and chosen True/False. Gender is often stored as True/False where Female is set as False and Male is set as True. Setting Female as False is easy to remember because Female and False both begin with the letter F.

► Click the **Field Size** box and edit the size as 1, as shown in Figure 9.10.

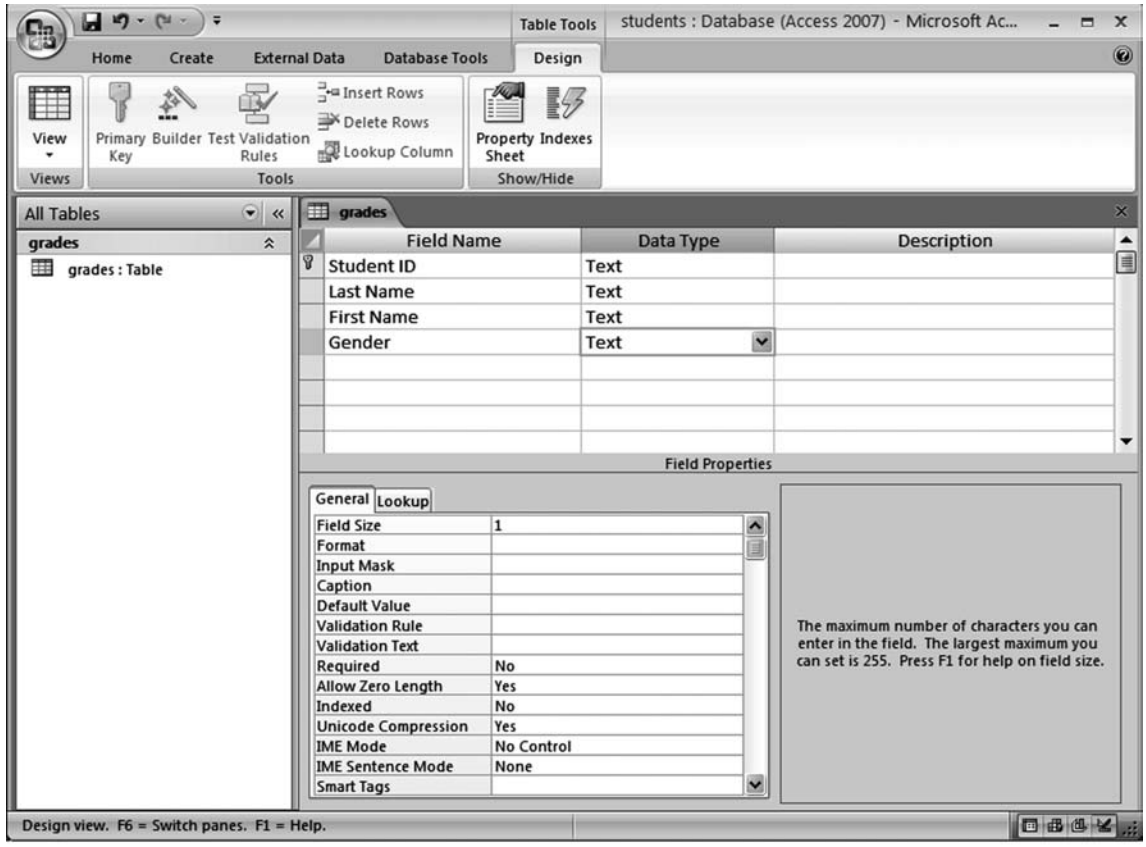

Figure 9.10 *Access table using Design View showing the Gender field.*

Let's create a field for birthdates.

► Click the next **Field Name** box and type: Birthdate, as shown in Figure 9.11.

► Click the **Data Type** box and click the **Date/Time** option from the drop-down box, as shown in Figure 9.11.

We do not need to set a field size since the Date/Time field has a preset size.

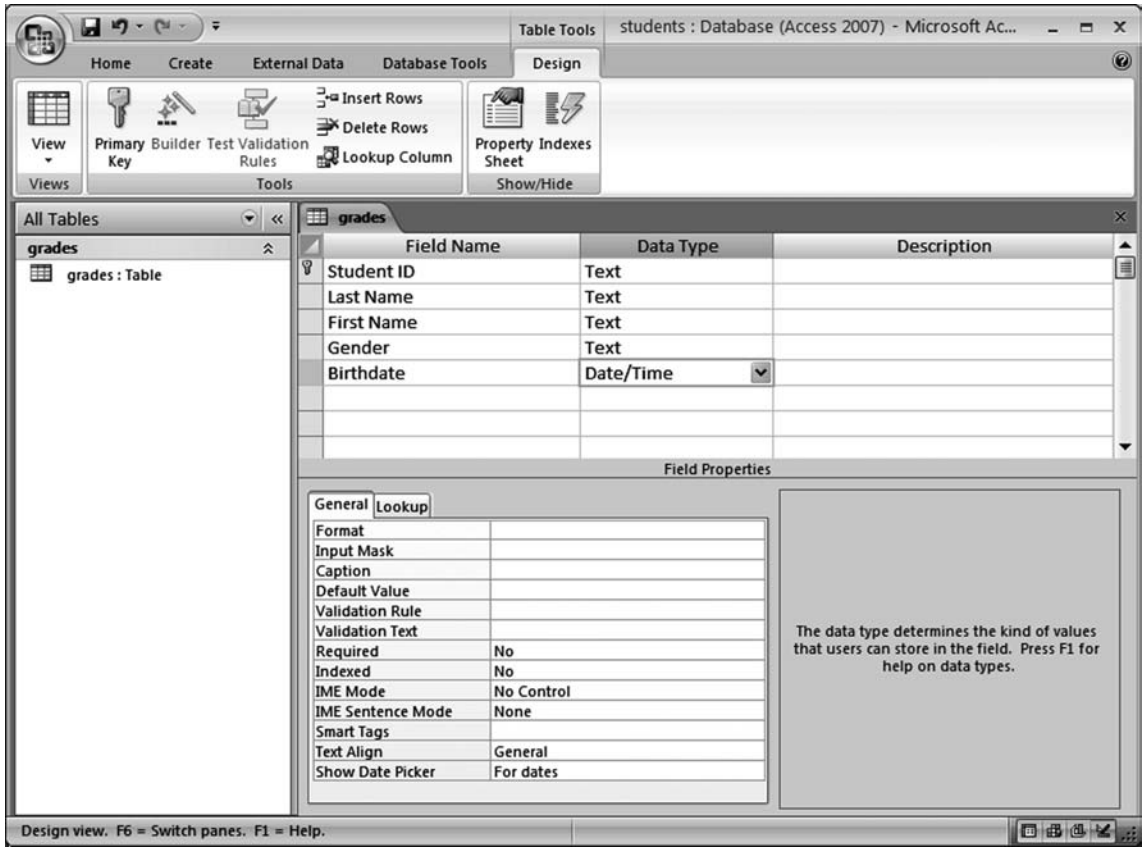

Figure 9.11 *Access table using Design View showing the Birthdate field.*

Let's create a numeric field for the grade for the History course.

► Click the next **Field Name** box and type: History Grade, as shown in Figure 9.12.

► Click the **Data Type** box and click the **Number** option from the drop-down box, as shown in Figure 9.12.

We do not need to set a field size for a numeric field.

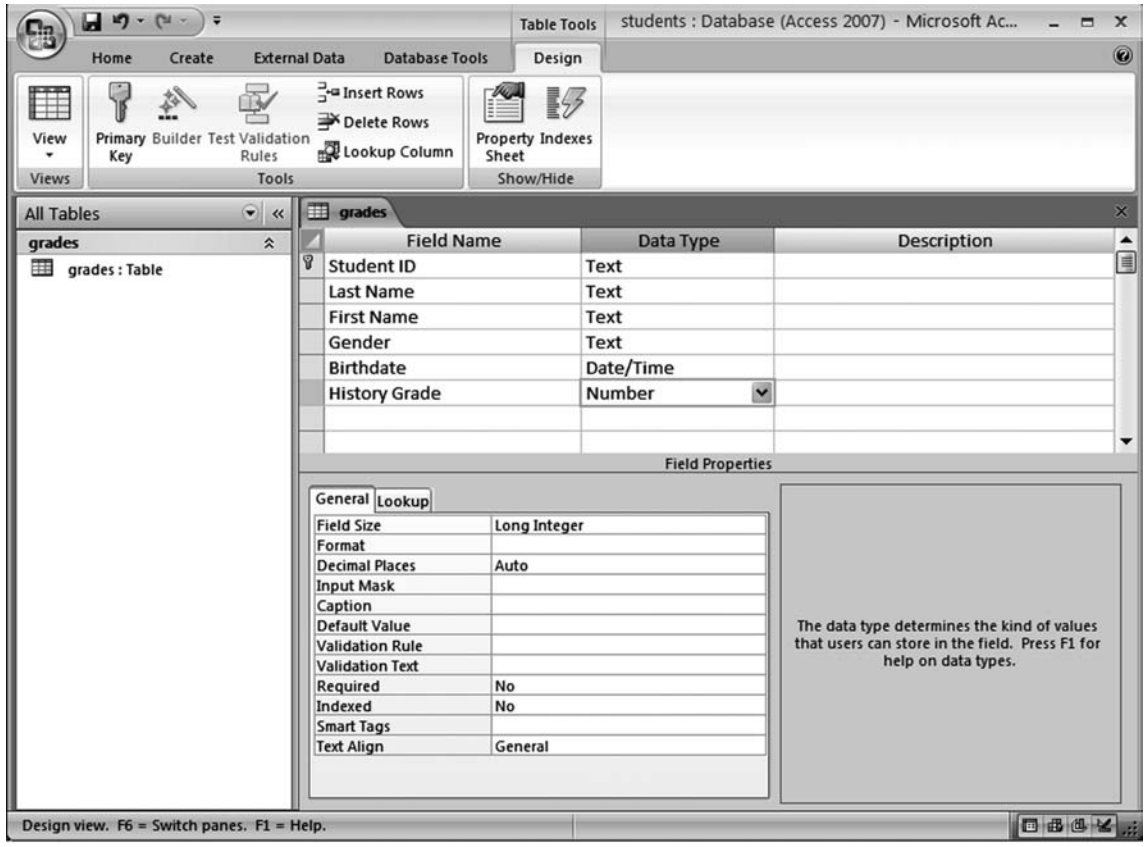

Figure 9.12 *Access table using Design View showing the History Grade field.*

You may have noticed the key symbol to the left of the Student ID field name, as shown in Figure 9.13.

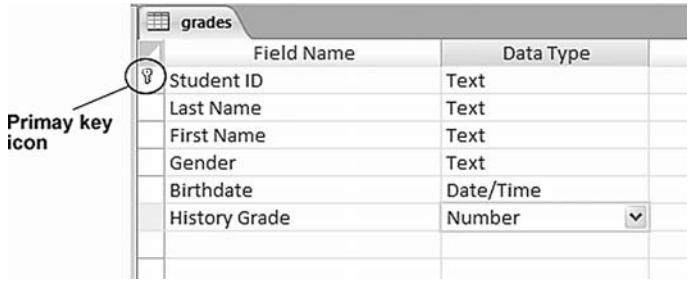

Figure 9.13 *Access grades table showing primary key icon.*

A **primary key** is a field that contains unique data so that there are no duplications. This field can be used to identify each record. In the case of the grades table, the Student ID field contains data items that would be unique. No two students would have the same Student ID. It is not necessary for a table to have a primary key. The primary key is used to link a table to other tables and is beyond the scope of this lab. For completeness, let's use the Student ID as the primary key for this table. As it happens, we entered the Student ID as the first field in the table and it was assumed to be the primary key.

► Scroll up to the Student ID field so that it is visible in the field name listing, if it is not already visible.

► Click the **Primary Key** button on the Ribbon toolbar to remove the primary key selection as shown in Figure 9.14.

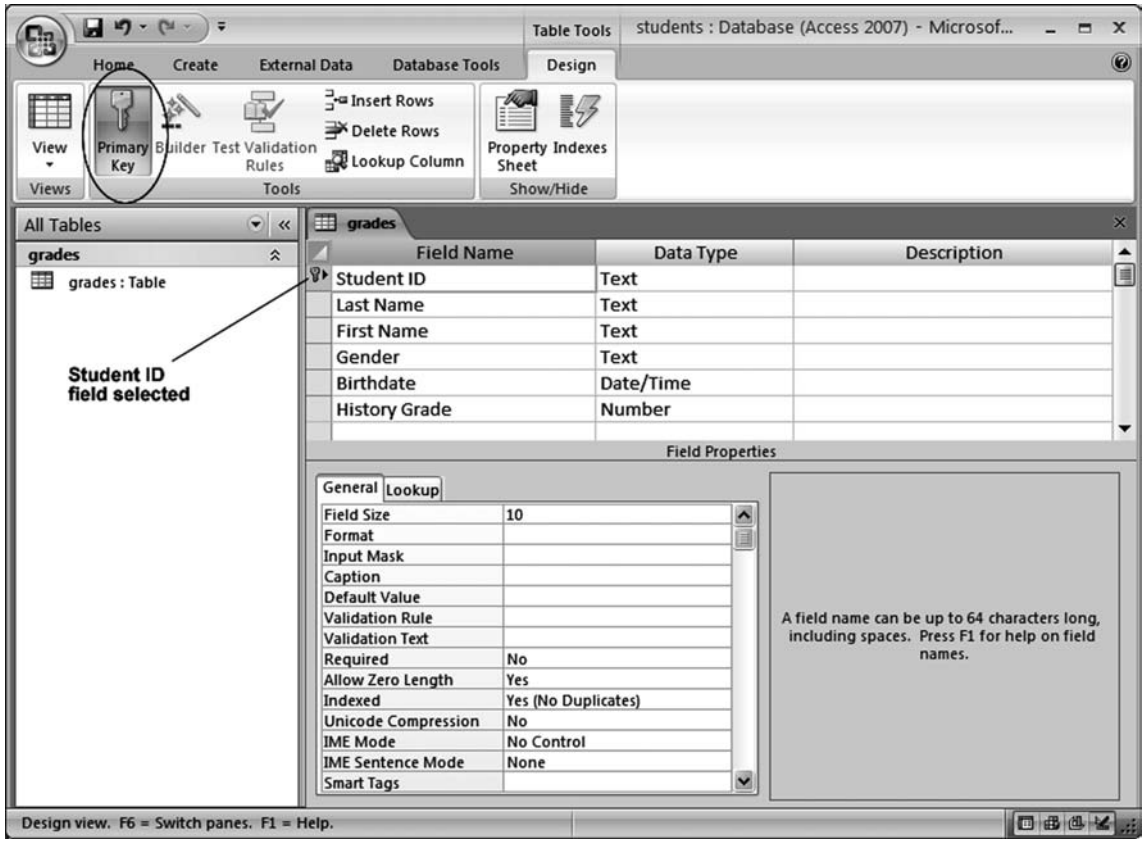

Figure 9.14 *Access setting the primary key.*

Notice that the primary key icon to the left of the Student ID field has disappeared.

► Click the **Primary Key** button to select the Student ID as the primary key again. You should see a key symbol appear to the left of the Student ID field name.

► Click the **Save** button to save the table.

Now that we've created the structure of the table, we can add records. To do this, we will switch from Design View to Datasheet View.

► Click the **View** button and select the Datasheet View menu option, as shown in Figure 9.15.

► Click the **Datasheet View** menu option, as shown in Figure 9.16.

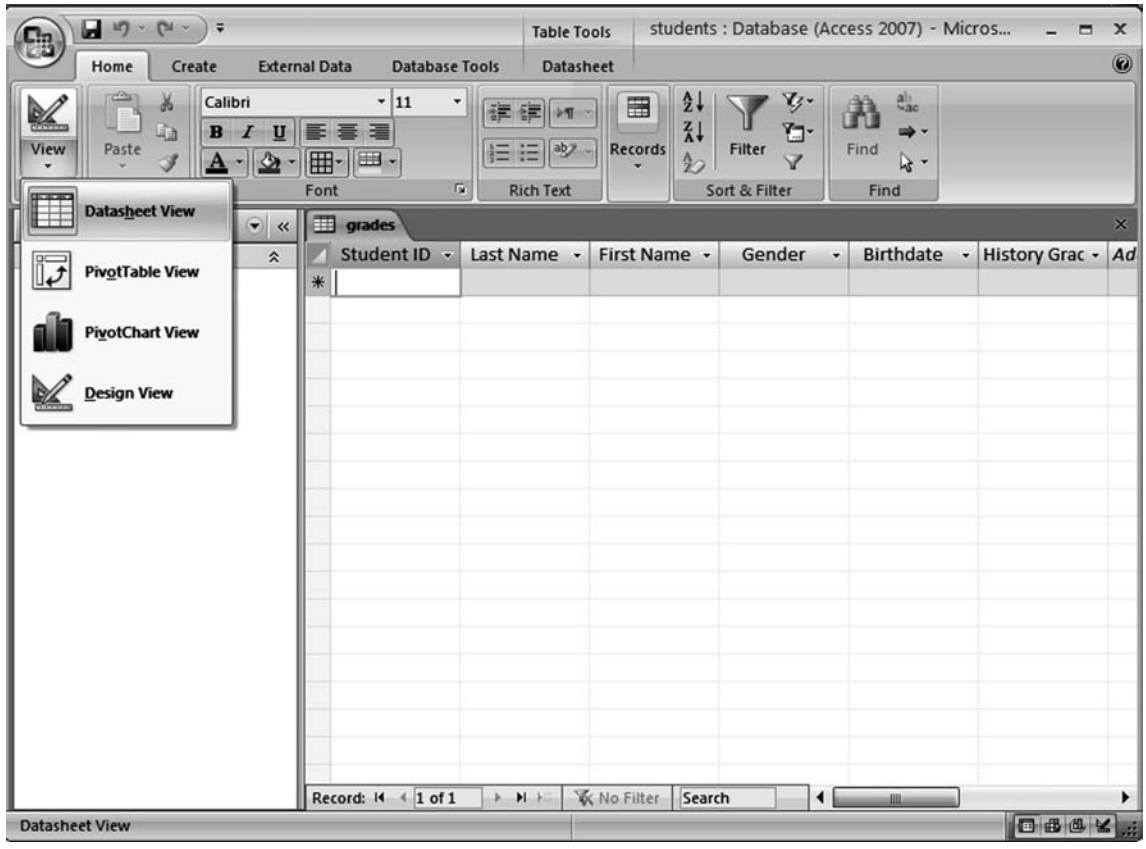

Figure 9.15 *Access View button with Datasheet View option highlighted.*

The grades table will be displayed, as shown in Figure 9.15.

Inserting Records

Entering data now is as easy as entering data into cells of a spreadsheet. The hard work was setting up the table!

Let's enter some sample data, as shown in Figure 9.16.

► Click each cell and enter the data, as shown in Figure 9.16. You can use the same basic editing skills as you would use to enter cell data in Excel or another spreadsheet package. After you enter the data for a cell, you can press the **Enter** key or the **Tab** key to move to the next cell.

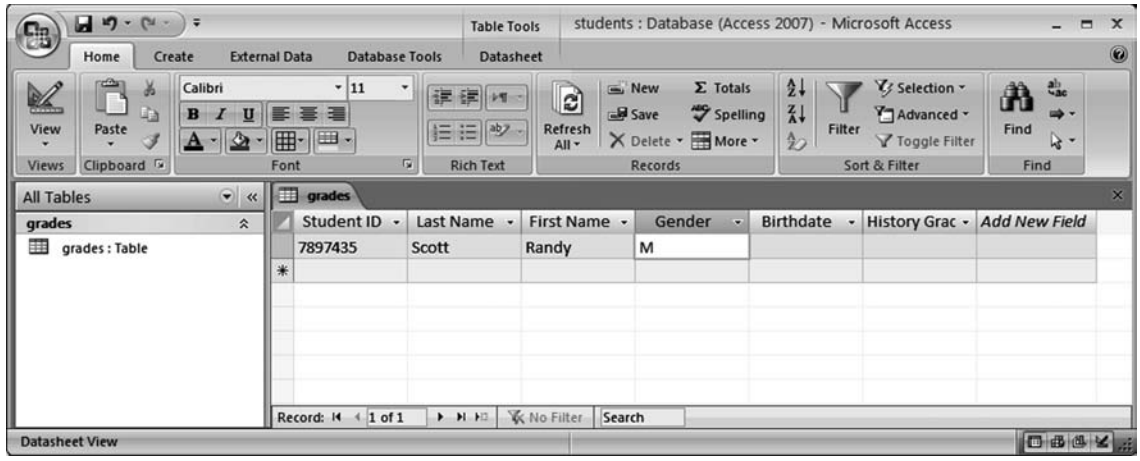

Figure 9.16 *Access data for the first record of the grades table.*

When it comes to entering dates, Access is smart about it. It does not allow you to enter invalid dates. For instance, you cannot enter a month greater than 12 or a day greater than the month will allow. Let's try entering an invalid date and see what happens.

► Click on the Birthdate cell for the first record.

Access is expecting dates of the format mm/dd/yyyy or dd/mm/yyyy depending on the configuration of your computer, where dd is the 2 digit date, mm is the 2 digit month, and yyyy is the 4 digit year.

► Type: 20/40/1980
► Press the **Enter** key.

Access will display an alert message indicating that there is an error in the date as shown in Figure 9.17. There sure is! The date entered represents the 20th day of the 40th month of 1980.

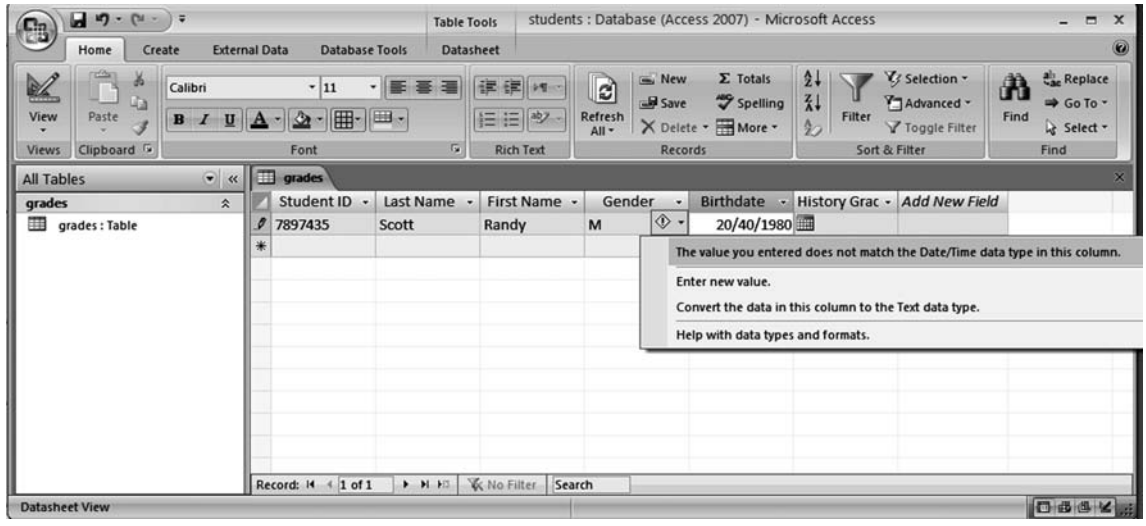

Figure 9.17 *Access date field with error.*

- Edit the Birthdate data to: 12/20/1980
- Press the **Enter** key.

Now Access does not display an error message and the History Grade cell is activated. If your system configuration requires dd/mm/yyyy, Access will correct the date.

Enter data for more records as shown in Figure 9.18.

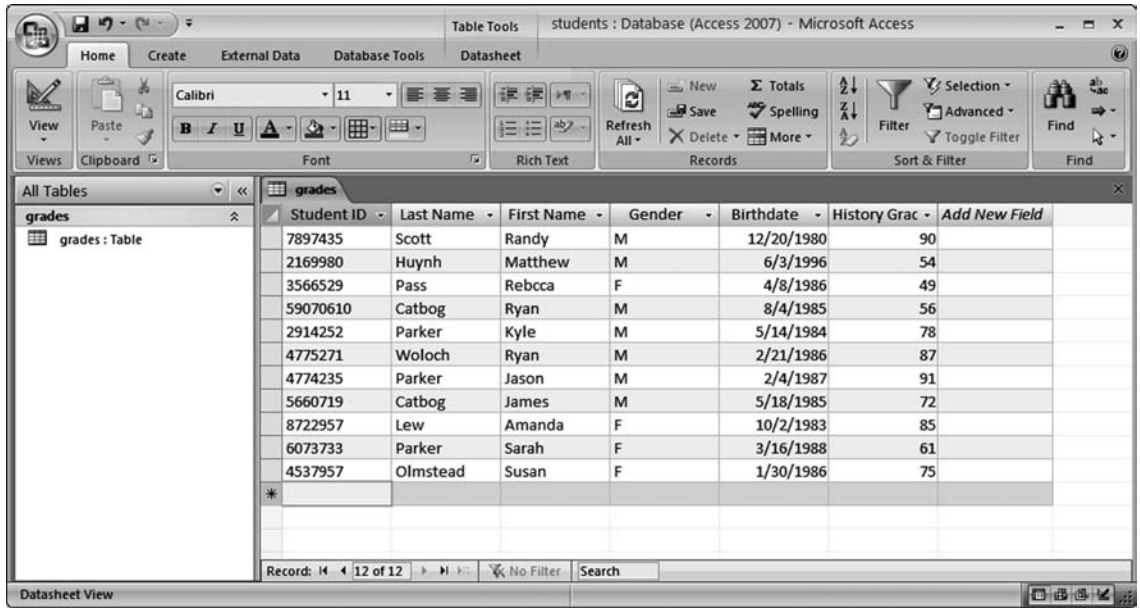

Figure 9.18 *Access grades table with data.*

Finding a Record

Although this table is small, let's use the Find feature to find a record. Let's find the record for Amanda Lew, searching on her first name.

- Click the **Find** button on the Ribbon toolbar. The **Find and Replace** dialog box will appear, similar to that shown in Figure 9.19.
- Click in the **Find What** box to activate it.
- Type: Amanda, as shown in Figure 9.20.
- Click the **Look In** drop-down menu.
- Select the **grades:Table** option, as shown in Figure 9.20.

Selecting the **grades:Table** option allows Access to search each piece of data in the grades table.

- Click the **Match** drop-down menu.
- Select the **Any Part of Field** option, as shown in Figure 9.20.

Although we are searching for the whole word "Amanda," we could type only part of the word and use the **Match** option for **Any Part of Field** to find the data as well.

Figure 9.19 *Access Find and Replace dialog box with information to find the record for Amanda Lew.*

- Click the **Find Next** button.
- Close the **Find and Replace** dialog box.

You should notice that the record containing Amanda as the First Name has been selected and the first name is highlighted. You can edit data by clicking on the data and using your editing skills to make changes.

Deleting Records

Let's delete the record for Amanda Lew. Essentially this means we will delete a row of data. You can click on any field in a record to select the record, and then delete it.

- Make sure that the record for Amanda Lew is selected.
- Click the **Delete** button drop-down arrow on the Ribbon toolbar as shown in Figure 9.20.

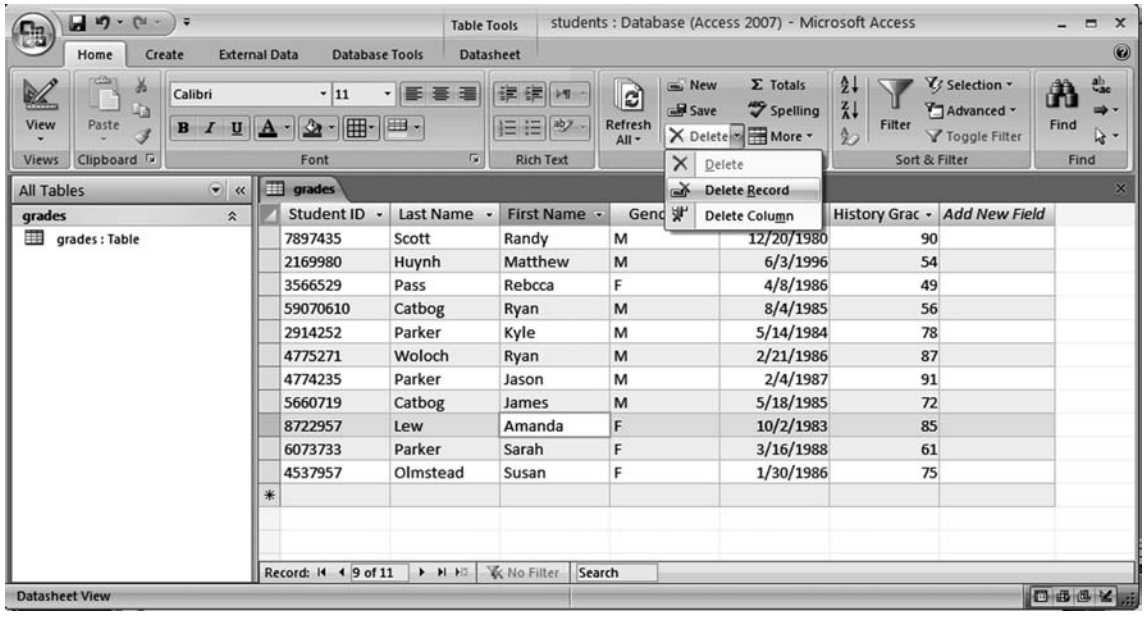

Figure 9.20 *Access delete drop-down menu.*

Access will display a warning box as shown in Figure 9.21.

► Click the menu option **Delete Record**

Figure 9.21 *Access delete record warning box.*

Since we are sure that we want to delete this record, we will click the **Yes** button. If you had selected a record by mistake and do not wish to delete it, you would click the **No** button.

► Click the **Yes** button to delete the record for Amanda Lew. You should notice that the record for Amanda Lew is deleted.

Sorting Records

We can perform some simple sorting on any field in the table. Let's sort the table on the Last Name field.

► Click the Last Name field heading to select the entire field, as shown in Figure 9.22.

► Click the drop-down arrow on the Last Name field heading to display the shortcut menu, as shown in Figure 9.22.

► Select the **Sort A to Z** menu option, as shown in Figure 9.22.

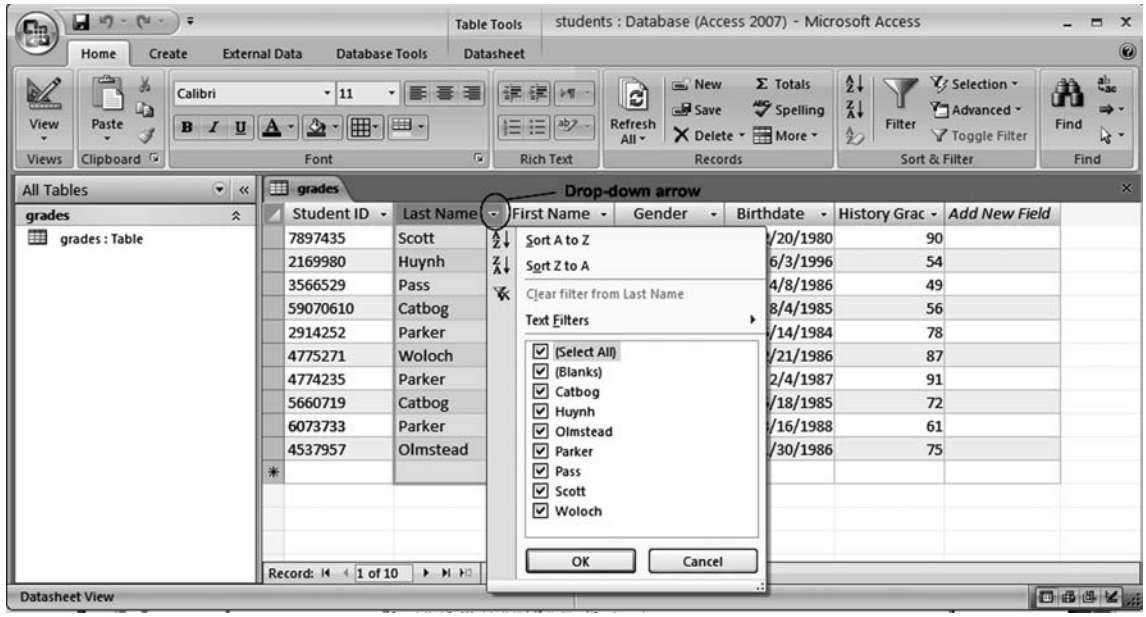

Figure 9.22 *Access grades table sorted on Last Name field.*

Using this method, you can sort the table on any field.

Review

This has been a busy lab! We have covered the following topics:

- Concepts including database, table, record, field, field name, and primary key
- Data types, including text, number, and date
- Creating a table in Design view
- Adding records to a table using Datasheet view
- Finding data using the Find feature
- Deleting a record from a table
- Sorting a table on one field

Exercises

Use the students file created in this lab to perform the following tasks.

1. Add the records shown in Figure 9.23 to the grades table.

Student ID	Last Name	First Name	Gender	Birthdate	History Grade
998623	D'Angelo	Lori	F	4/18/1984	63
992714	Richardson	Jeremy	M	9/18/1982	86
982741	Hampton	Sandra	F	2/2/1983	92

Figure 9.23 *Records to add to the students grades table.*

2. Find the record for Susan Olmstead by searching for data containing “olm”.
3. Sort the Birthdate field in ascending order.
4. Sort the History Grade field in descending order.
5. Create a new table called Faculty with the following fields.
   a. First Name: text field of 20 characters
   b. Last Name: text field of 20 characters
   c. Telephone: text field of 15 characters
   d. Gender: text field of 1 character
   e. Birthdate: date/time field

   Make sure there is no primary key selected, deleting the primary key icon from any fields that may have been set. It is not necessary to always have a primary key field.
6. Add a record for yourself in the Faculty table.
7. Add three of your friends as records in the Faculty table.