

# Creating a Database, Maintaining and Querying a Database, and Creating Forms and Reports

CMPTR3 Chapters 17, 18, and 19



## Learning Outcomes

- Understand database concepts
- Create a database
- Use Datasheet view
- Work with fields and properties in Design view
- Modify a table's structure
- Close and open objects and databases
- Create simple queries, forms, and reports
- Compact and repair a database

## Learning Outcomes

- Maintain database records
- Work with queries in Design view
- Sort and filter data
- Define table relationships
- Create a multitable query
- Add criteria to a query
- Create a copy of a query
- Add multiple criteria to queries
- Create a calculated field
- Use a property sheet
- Use functions in a query

## Learning Outcomes

- Create a form using the Form Wizard
- Modify a form's design in Layout view
- Find data using a form
- Create a form based on related tables
- Preview and print selected form records
- Create a report using the Report Wizard
- Modify a report's design in Layout view

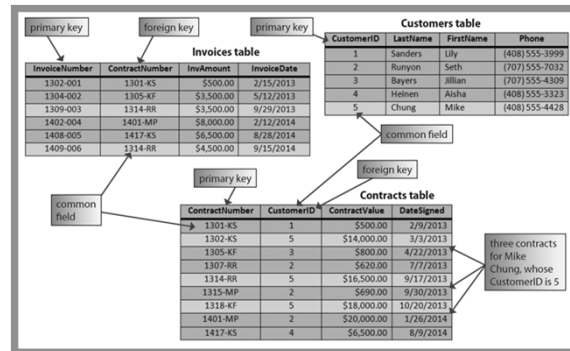
## Understanding Database Concepts

- **Microsoft Access**
  - Helps enter, maintain, and retrieve related data in a database
    - Database - Organized collection of related information
- Each piece of data in a database is stored in a **field**
  - The content of a field is the **field value**
- **Record**: All the fields in a table about a single person, place, object, event, or idea

## Understanding Database Concepts

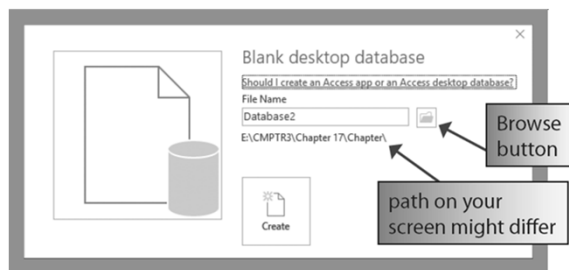
- **Relational database**: Contains more than one related table
- **Common field**: Appears in more than one table
- **Primary key**: Field, or a collection of fields, whose values uniquely identify each record in a table
  - When included in a different table, it is called a **foreign key**

## Understanding Database Concepts



## Creating a Database

- After creating or opening a database, the Navigation Pane appears along the left side of the Access window
  - Displays all of the tables, reports, and other objects in the database



## Using Datasheet View

- **Datasheet view:** Shows the table's contents as a datasheet
  - **Datasheet:** Displays the table's contents in rows and columns
  - Each field must be assigned a **data type**

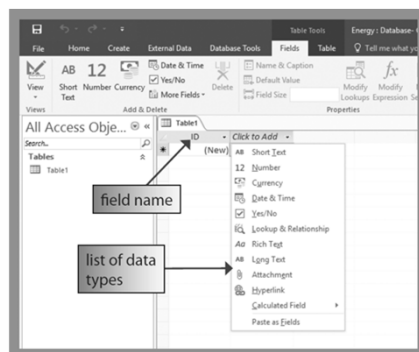
## Using Datasheet View

Data type	Description	Field size	Use for
Short Text	Letters, digits, spaces, and special characters	0 to 255 characters; default is 255	Names, addresses, descriptions, and numbers not used in calculations
Long Text	Letters, digits, spaces, and special characters	1 to 65,535 characters; exact size is determined by entry	Long comments and explanations
Number	Positive and negative numbers that can contain digits, a decimal point, commas, and a plus or minus sign	1 to 15 digits	Fields that will be used in calculations, except those involving money
Date/Time	Dates and times from January 1, 1900 to December 31, 9999	8 bytes	
Currency	Monetary values	Accurate to 15 digits on the left side of the decimal point and to 4 digits on the right side	
AutoNumber	Unique integer created by Access for every record; can be sequential or random numbering	9 digits	The primary key in any table
Yes/No	Values that are yes or no, on or off, and true or false	1 character	Fields that indicate the presence or absence of a condition, such as whether an invoice has been paid
Hyperlink	Text used as a hyperlink address	Up to 65,535 characters total	A link to a file or Web page, a location within a file or Web page, another field

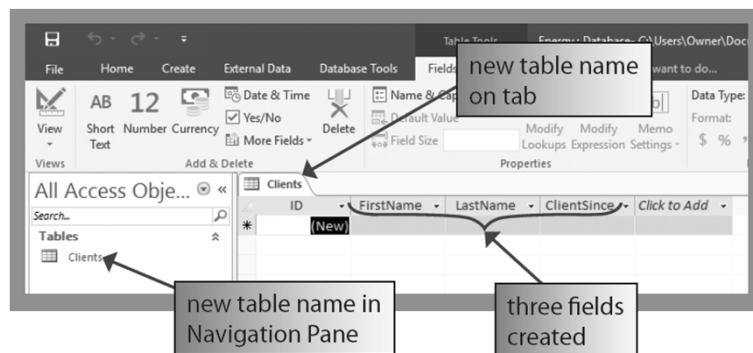
## Creating and Saving a Table and Entering Records

- Before creating a table in a datasheet view, one must create the empty table structure
  - Click the Save button on the Quick Access Toolbar to save the table
  - Access automatically saves changes to the active database when one modifies the database

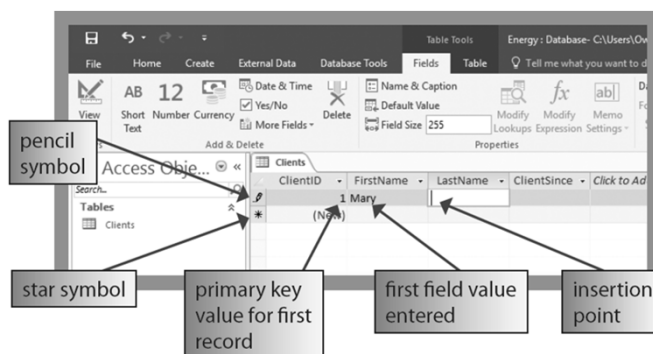
## Creating and Saving a Table and Entering Records



## Creating and Saving a Table and Entering Records



## Creating and Saving a Table and Entering Records



## Working with Fields and Properties in Design View

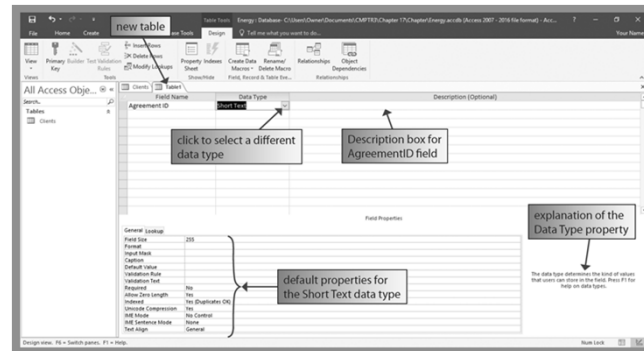
- **Property:** One characteristic or aspect of a field
  - Field name, data type, description, field size, format, decimal places, caption, and default value

## Changing Field Properties, Creating a Table, and Setting Properties in Design View

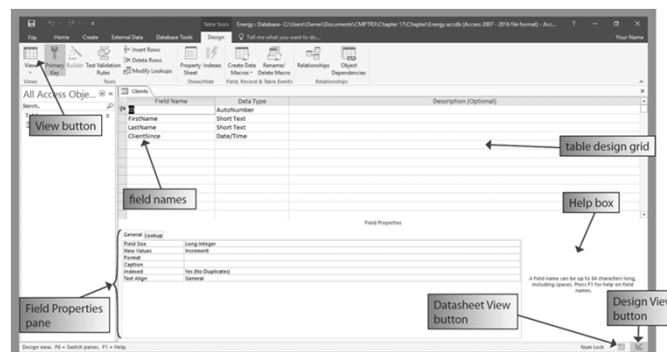
- Default property values can be modified by the user to suit the field's content or purpose
- Users can set additional properties for fields in Design view and create a table in Design view



## Changing Field Properties, Creating a Table, and Setting Properties in Design View



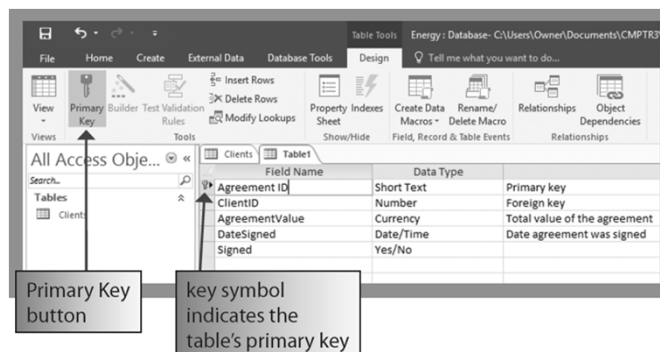
## Changing Field Properties, Creating a Table, and Setting Properties in Design View



## Specifying the Primary Key, Saving the Table Design, and Entering Records

- Save the table after designing it
  - To enter records into the new table, the user has to switch to Datasheet view
    - Users can use the Save button or are reminded by Access to save the table when switching to Datasheet view

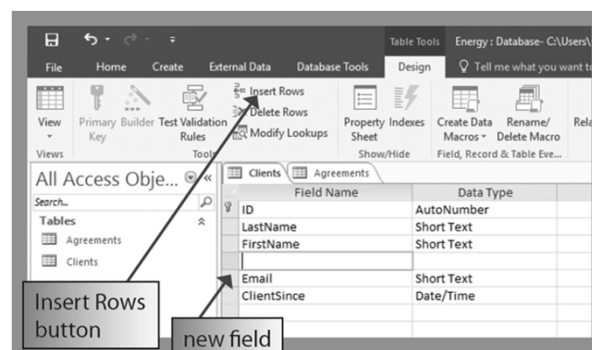
## Specifying the Primary Key, Saving the Table Design, and Entering Records



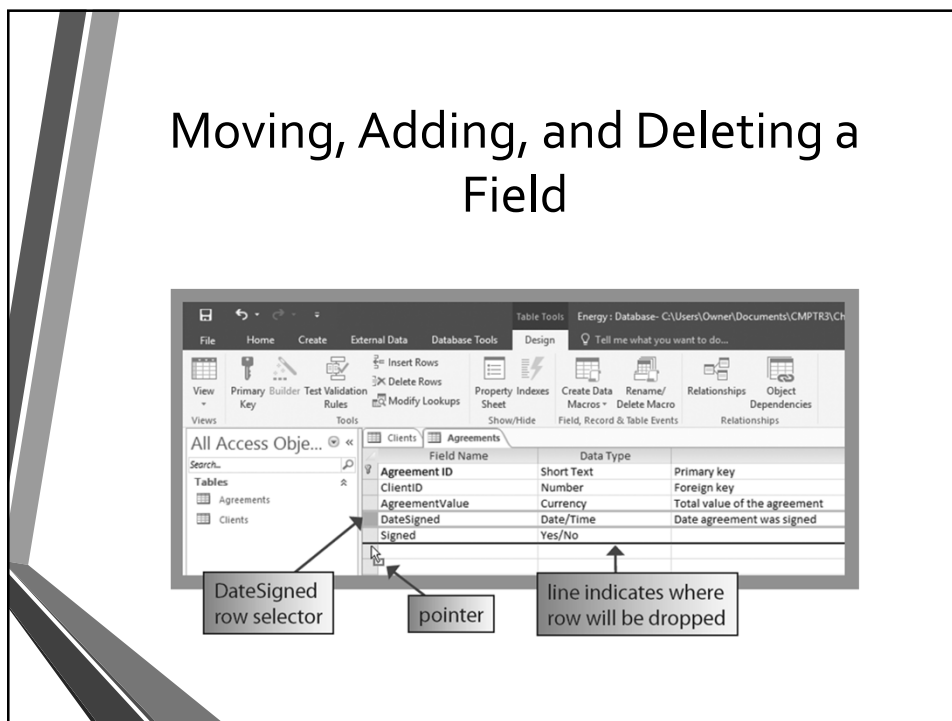
## Moving, Adding, and Deleting a Field

- Moving a field in Design view
  - Select the field and use the mouse to drag it to a new location in the grid
- Fields can be deleted individually or in a group in either Datasheet view or Design view

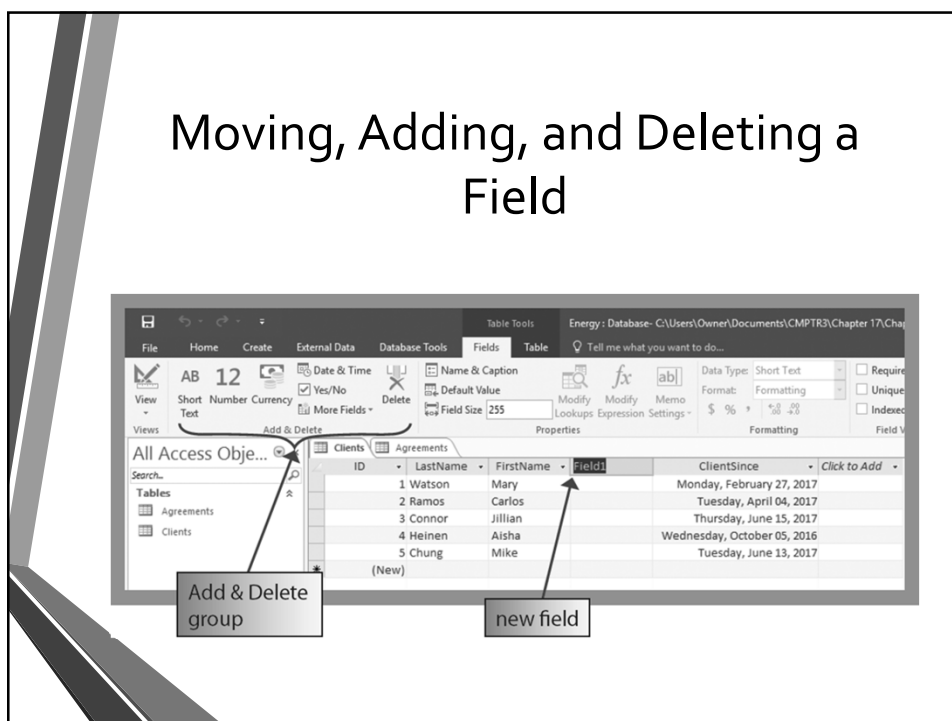
## Moving, Adding, and Deleting a Field



## Moving, Adding, and Deleting a Field



## Moving, Adding, and Deleting a Field



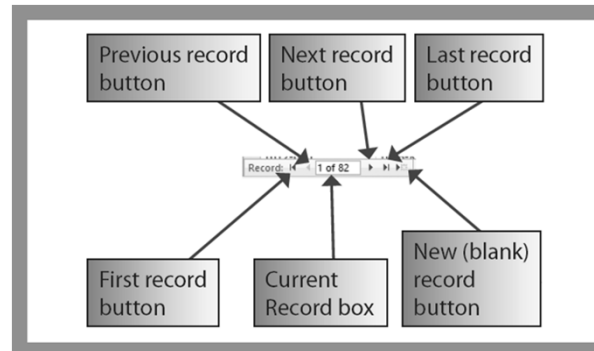
## Closing and Opening Objects and Databases

- To close a table, click the Close button in the upper-right corner of the pane
- Closing an open database without closing the Access program
  - Click the File tab to display Backstage view and then click Close in the Navigation Bar
- Opening an existing database from Backstage view
  - Click Open in the navigation bar, and then use the Open dialog box to navigate to and open the database

## Closing and Opening Objects and Databases

- Opening a table
  - Double-click the file name in the Navigation Pane
- Moving to a different field
  - Click in the field to make it active, or use the Tab key or the arrow keys

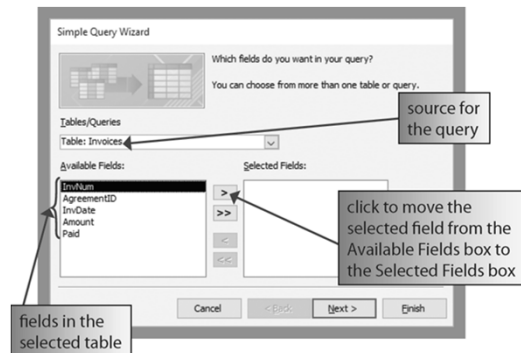
## Closing and Opening Objects and Databases



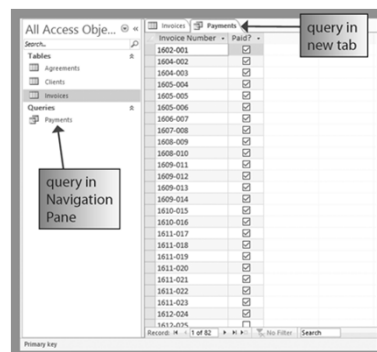
## Creating a Simple Query

- **Query:** Question about the data stored in a database
  - The Simple Query Wizard can be used to create a query based on the records and fields in a table
  - Query design is stored in the database

## Creating a Simple Query



## Creating a Simple Query



## Creating a Form and Entering Data

- **Form:** Allows one to enter, edit, and view records in a database
  - Created using the Form tool
  - When first created, it opens in **Layout view**
  - To enter data, switch from the Layout view to Form view

## Creating a Form and Entering Data

The screenshot shows the Microsoft Access interface with the 'Invoices' table selected. A new form is being created, displayed in 'Layout view'. The form has a 'new tab for form' and contains the following fields:

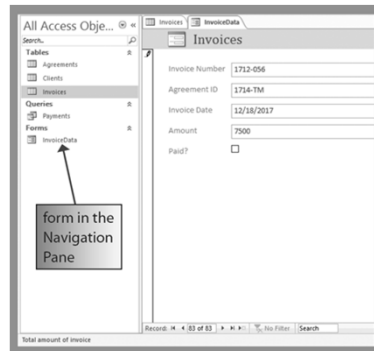
Field Name	Value
Invoice Number	1002-001
Agreement ID	1002-TM
Invoice Date	2/18/2018
Amount	\$2000.00
Paid?	<input type="checkbox"/>

Annotations in the image include:

- 'new tab for form' pointing to the form's tab.
- 'field values for the first record' pointing to the data entered in the form.
- 'your field value boxes might be a different width' pointing to the input boxes.
- 'first record' pointing to the first record in the table.
- 'form displayed in Layout view' pointing to the form's view.



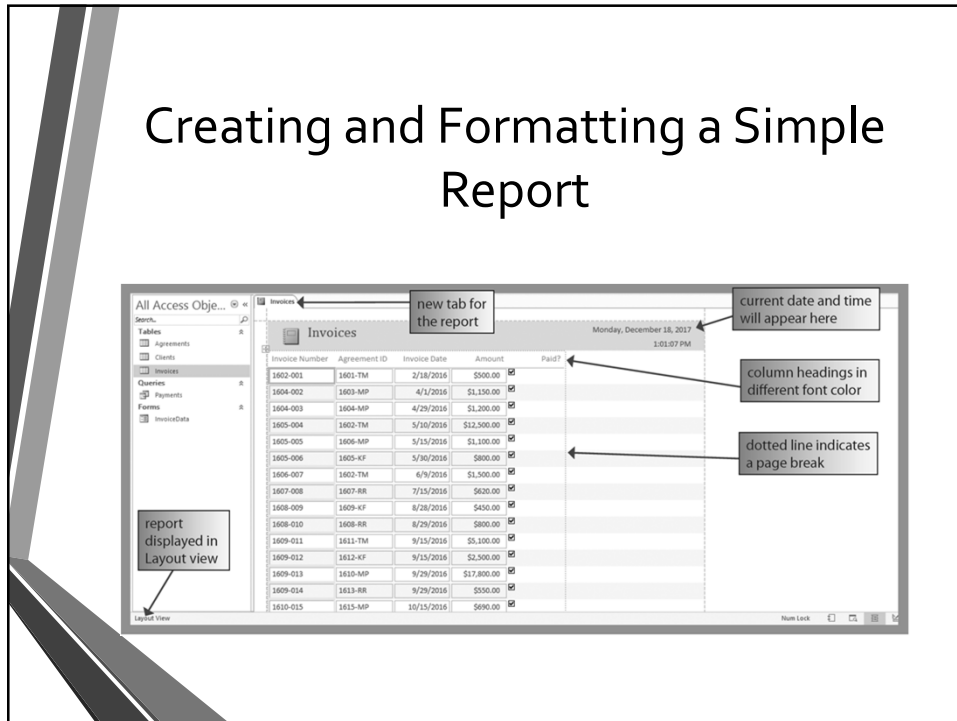
## Creating a Form and Entering Data



## Creating and Formatting a Simple Report

- The Report tool creates reports based on the fields from a selected table or query
  - To change the format of the report, use the Layout view
    - One can resize columns to fit within the page area and delete fields

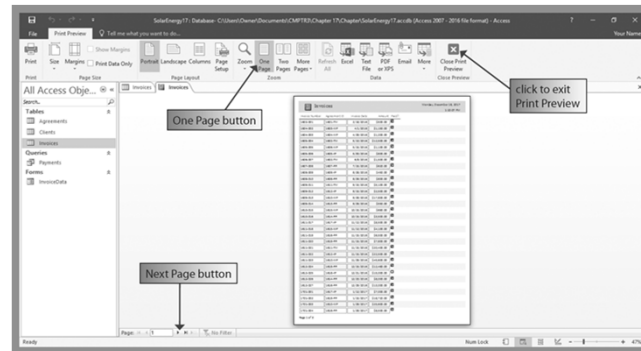
## Creating and Formatting a Simple Report



## Viewing and Printing a Report

- Use **Print Preview** to see how the report will look when it is printed
- Print settings can be changed in the Print dialog box by:
  - Clicking the Print button in the Print group on the Print Preview tab
  - Clicking Print on the Print tab in Backstage view

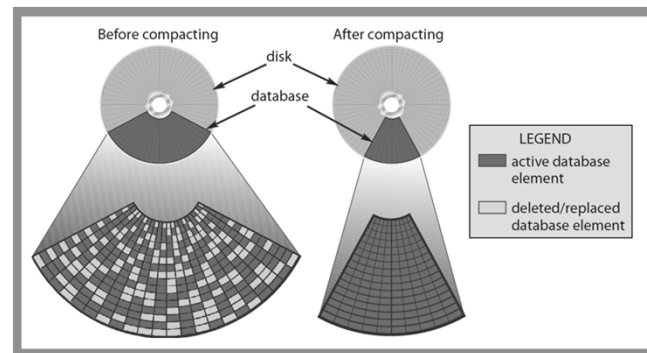
## Viewing and Printing a Report



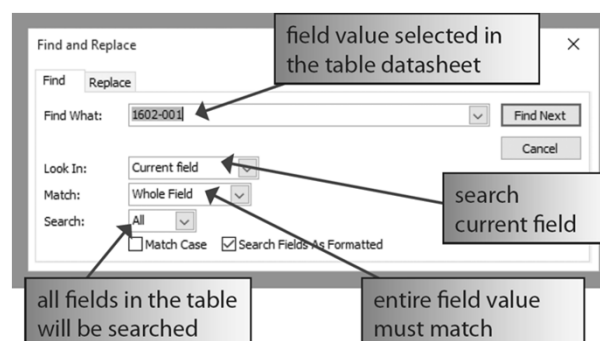
## Compacting and Repairing a Database

- **Compact:** Rearranging data and objects in a database to decrease its file size
- Use Compact & Repair Database option to fix damaged database

## Compacting and Repairing a Database



## Maintaining Database Records



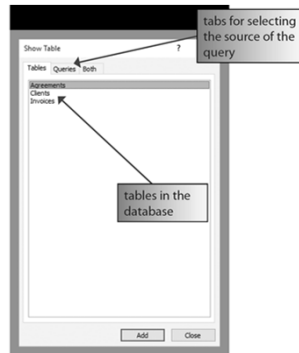
## Working with Queries in Design View

- **Query by example (QBE)**
  - Retrieves the information that precisely matches the example one provides of the information being requested

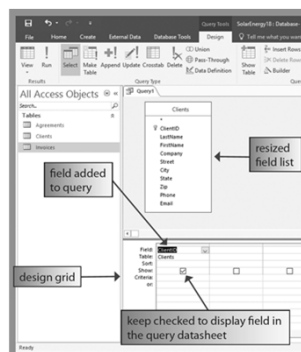
## Designing a Select Query

- **Select query:** Query where one specifies the field and records they want Access to select
- Click the query design button and the Show Table dialog box will open
  - Add the field lists of required tables and queries to the Query window
  - **Design grid:** Bottom portion of the Query window where one adds the fields and record-selection criteria for a query
  - **Recordsets** appear in a query data sheet

## Designing a Select Query



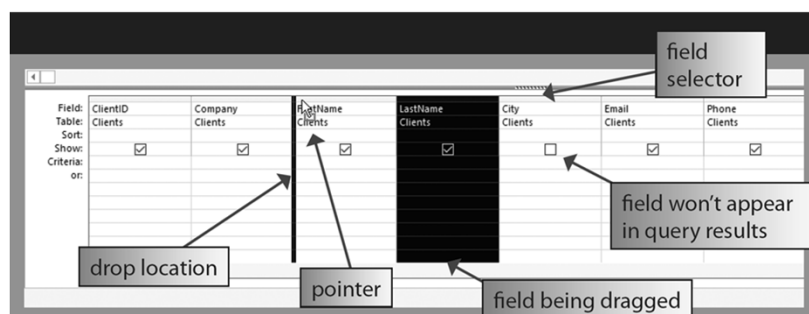
## Designing a Select Query



## Modifying a Query

- One can:
  - Hide a field or its values in the query results
  - Change the order in which the fields appear in the query results
    - Use the **field selector** to select an entire column and drag and drop the column in the desired location
  - Add fields to or remove fields from the query

## Modifying a Query

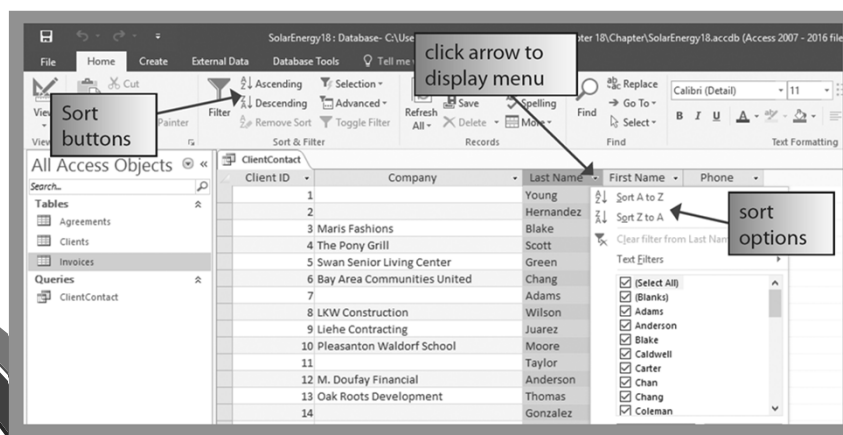


## Sorting and Filtering Data

- **Sorting:** Process of rearranging records in a specified order or sequence
  - **Sort field:** Determines the order of records
- **Filter:** Restrictions placed on the records to temporarily isolate a subset of the records

## Sorting Data

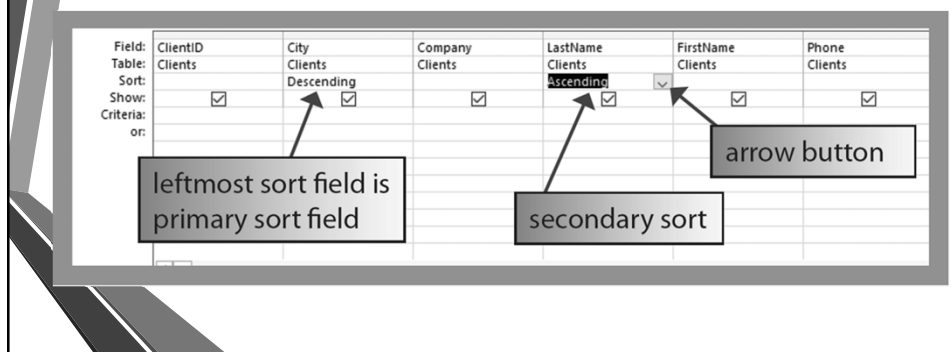
Menu that appears when you click  
a column heading arrow





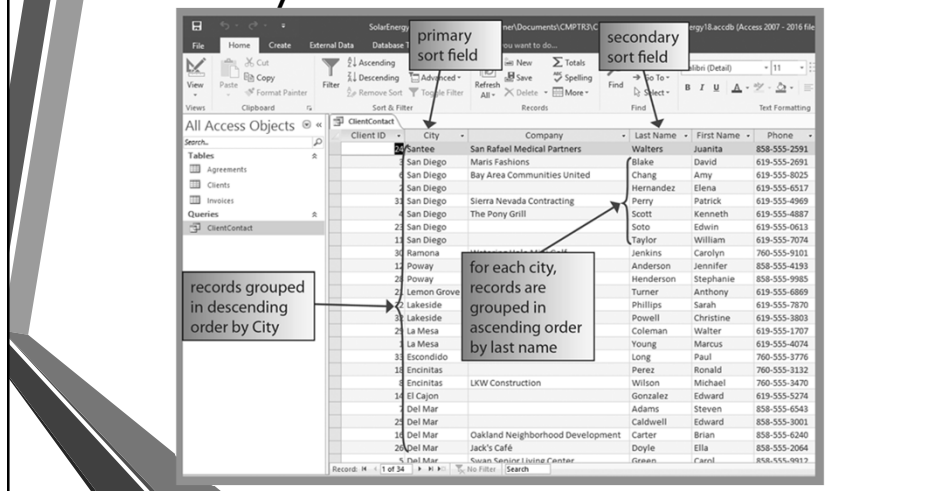
## Sorting Data

### Query with two sort fields



## Sorting Data

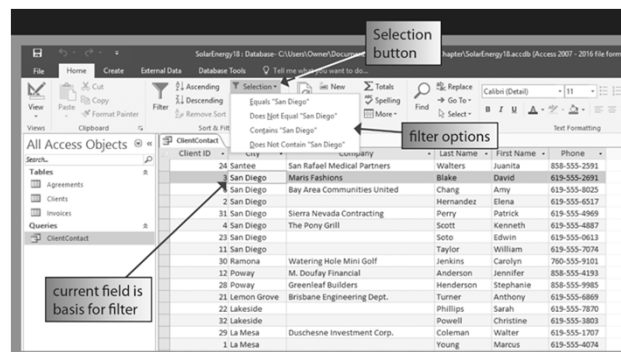
### Query datasheet sorted on two fields



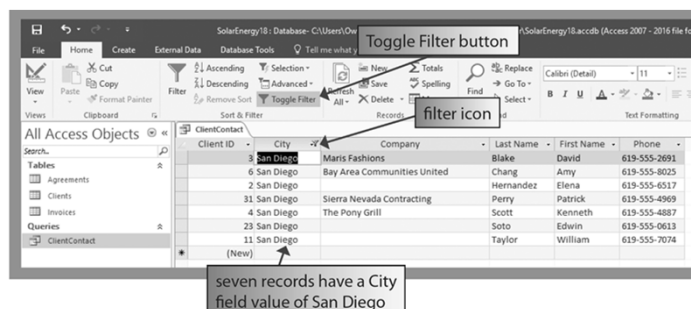
## Filtering Data

- Methods
  - Common filters
  - Filter by selection
  - Filter by form

## Filtering Data



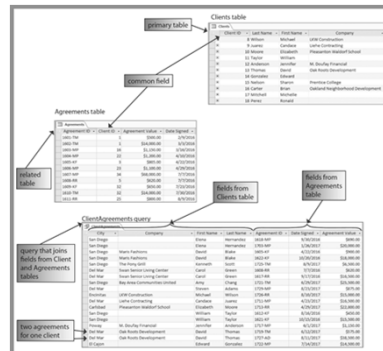
## Filtering Data



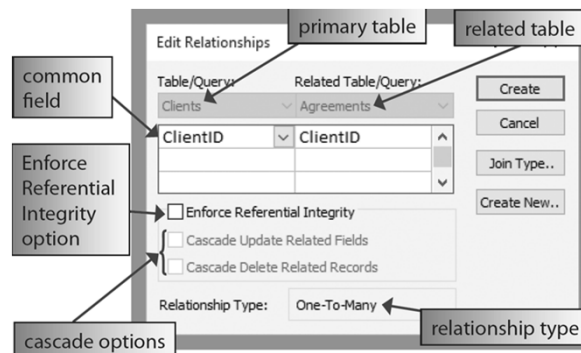
## Defining Table Relationships

- **One-to-many relationship**
  - **Primary table:** The “one” table in the relationship
  - **Related table:** The “many” table in a one-to-many relationship
- **Referential integrity**
  - Set of rules to maintain consistency between related tables when data in a database is updated

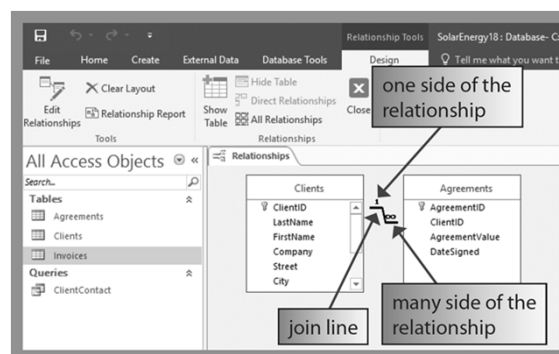
## One-to-Many Relationship and Query



## One-to-Many Relationships and Subdatasheet



## One-to-Many Relationships and Subdatasheet



## One-to-Many Relationships and Subdatasheet

expand icon

collapse icon

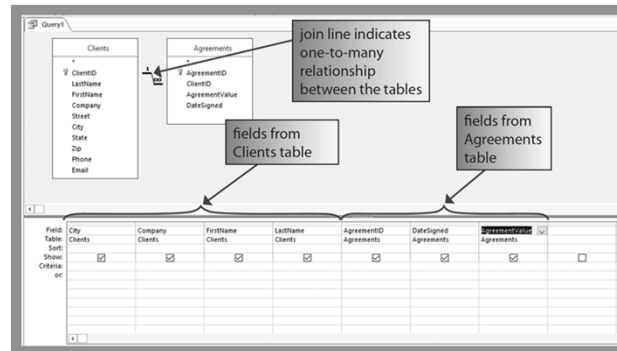
subdatasheet containing related records from the Agreements table

Client ID	Last Name	First Name	Company	Street	City	State	Zip	Phone	
1	Young	Marcus		4430 Marietta Street	La Mesa	CA	91942	619-555-4078	myoung@
2	Hernandez	Elena		4293 Haverford Road	San Diego	CA	92101	619-555-6317	ehernand
Agreement ID • Agreement Value • Date Signed • Click to Add •									
1618-MP									
1703-MP									
3	Blake	David	Maris Fashions	3144 Ringland Lane	San Diego	CA	92101	619-555-2691	swright1@
4	Scott	Kenneth	The Pony Grill	3118 Roosevelt Street	San Diego	CA	92101	619-555-4887	kscott@p
5	Green	Carol	Swan Senior Living Center	494 Friendship Lane	Del Mar	CA	92014	858-555-9912	cgreen@p

## Creating a Multitable Query

- **Multitable query:** Based on more than one table
- To create a multitable query, the tables require a common field

## Creating a Multitable Query



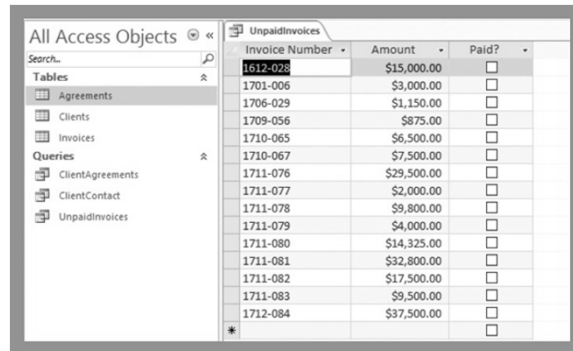
## Adding Criteria to a Query

- **Criteria:** Conditions for selecting records
- To add criteria to a query, create expressions to specify the conditions





## Adding Criteria to a Query



Invoice Number	Amount	Paid?
1612-028	\$15,000.00	<input type="checkbox"/>
1701-006	\$3,000.00	<input type="checkbox"/>
1706-029	\$1,150.00	<input type="checkbox"/>
1709-056	\$875.00	<input type="checkbox"/>
1710-065	\$6,500.00	<input type="checkbox"/>
1710-067	\$7,500.00	<input type="checkbox"/>
1711-076	\$29,500.00	<input type="checkbox"/>
1711-077	\$2,000.00	<input type="checkbox"/>
1711-078	\$9,800.00	<input type="checkbox"/>
1711-079	\$4,000.00	<input type="checkbox"/>
1711-080	\$14,325.00	<input type="checkbox"/>
1711-081	\$32,800.00	<input type="checkbox"/>
1711-082	\$17,500.00	<input type="checkbox"/>
1711-083	\$9,500.00	<input type="checkbox"/>
1712-084	\$37,500.00	<input type="checkbox"/>

## Creating a Copy of a Query

- Users can copy an existing query and rename it
  - Copy and paste the query in the Navigation Pane, or use the Save As command to save a copy of the query design

## Adding Multiple Criteria to Queries

- **And operator:** Used to select records only if all of the specified conditions are met
- **Or operator:** Used to select records if at least one of the specified conditions is met

## Using the 'And' and 'Or' Logical Operators

- **And logical operator**
  - User must specify all of the conditions in the same Criteria row of the design grid
  - Only records which meet all the conditions are displayed
- **Or logical operator**
  - To create a query, the user specifies each condition in a different Criteria row
  - Records that meet any of the conditions are displayed

## Using the 'And' and 'Or' Logical Operators

Field:	Company	First Name	Last Name	City	Agreement Value	Date Signed
Table:	Clients	Clients	Clients	Clients	Agreements	Agreements
Sort:						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:				'Del Mar'	>25000	
or:						

And logical operator; conditions entered in same row

## Using the 'And' and 'Or' Logical Operators

Field:	First Name	Last Name	Company	City	Agreement Value	Date Signed
Table:	Clients	Clients	Clients	Clients	Agreements	Agreements
Sort:						
Show:	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Criteria:					>10000	Between #1/1/2017* And #3/31/2017*
or:						

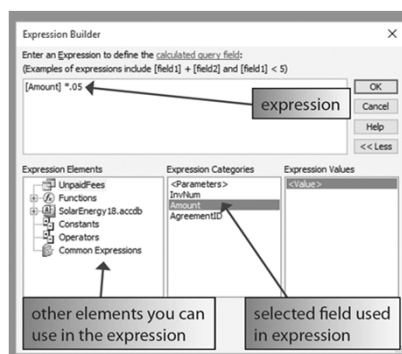
Or logical operator; conditions entered in different rows

pound signs surround date values

## Creating a Calculated Field

- **Calculated field:** Displays the results of a mathematical expression
  - Added to perform a calculation in a query
  - The expression can be entered into an expression builder

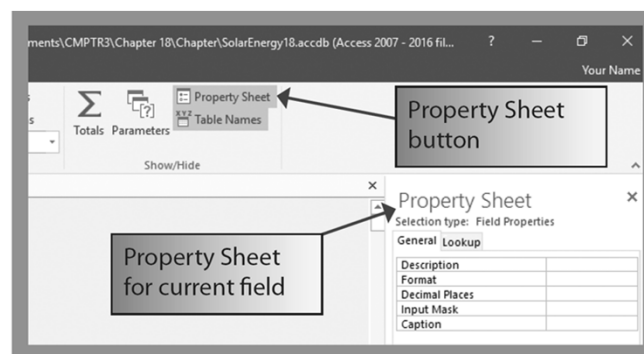
## Creating a Calculated Field



## Using a Property Sheet

- The Property Sheet can be used to adjust any of the field properties
  - Additional properties are available in this sheet

## Using a Property Sheet



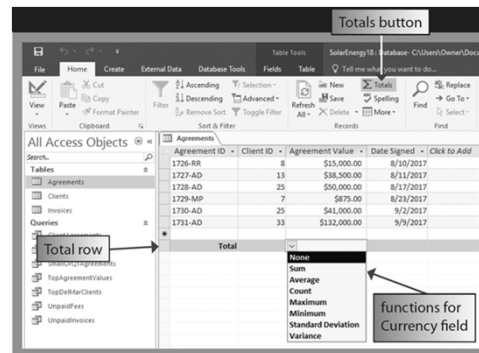
## Using Functions in a Query

Function	Determines
Average	Average of the field values for the selected records
Count	Number of records selected
Maximum	Highest field value for the selected records
Minimum	Lowest field value for the selected records
Sum	Total of the field values for the selected records

## Using the Total Row in a Datasheet

- A total row can be added at the bottom of the datasheet to perform a calculation using a function in a table or query datasheet
  - Choose one of the functions for a field and the results of the calculation will be displayed in the Total row for that field

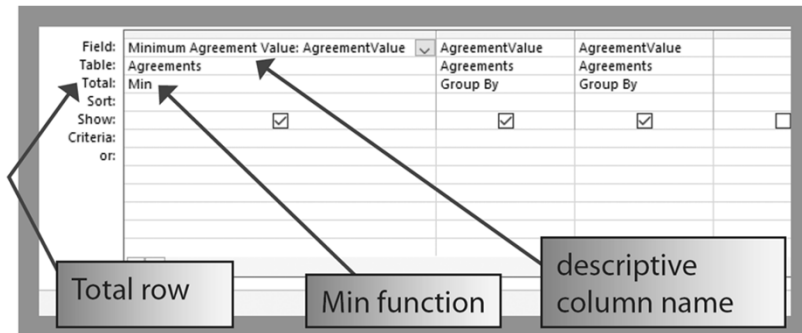
## Using the Total Row in a Datasheet



## Creating Queries with Functions

- Functions can operate on the records that meet a query's selection criteria
  - One can specify a function for a specific field and the appropriate operation applies to that field's values for the selected records
    - For each calculation one wants to perform on the same field, he/she needs to add the field to the design grid

## Creating Queries with Functions

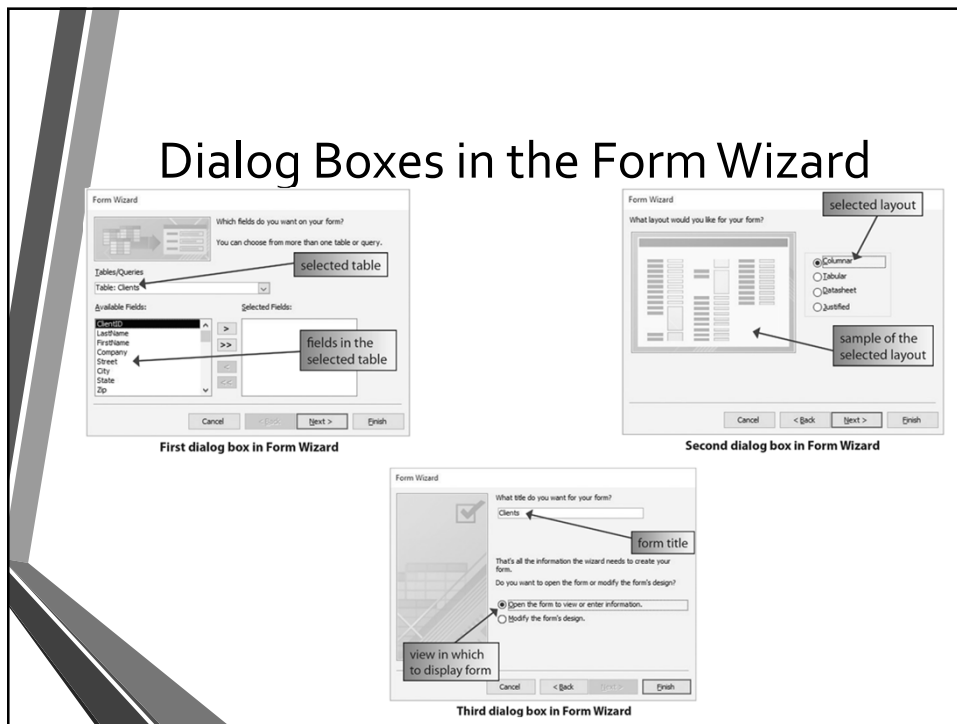


## Creating Calculations for Groups of Records

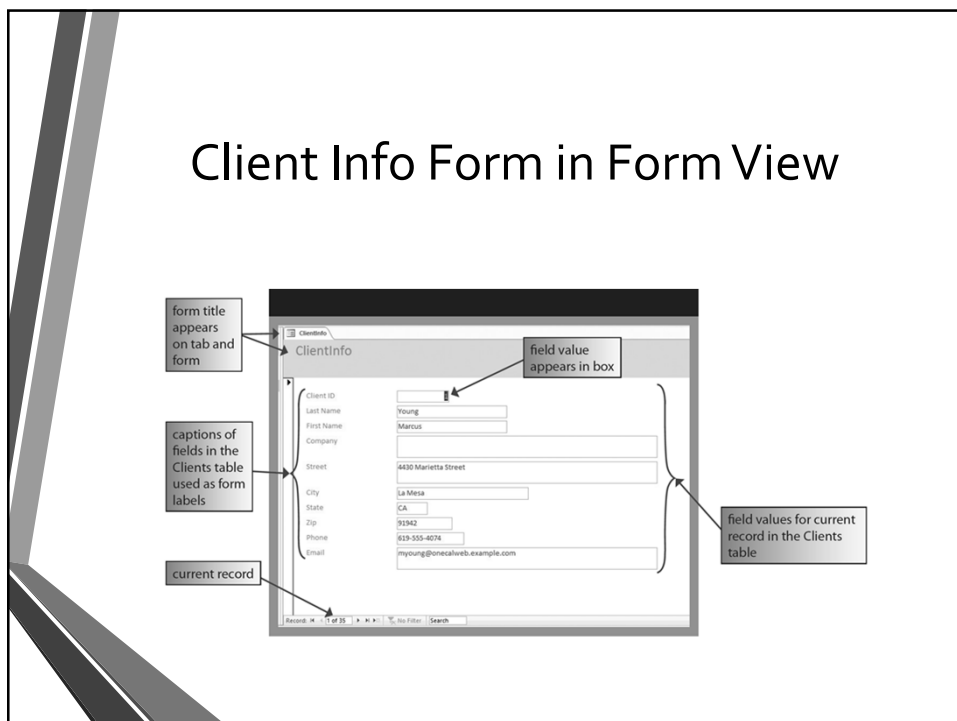
- Allows calculation of statistics for groups of records
- **Group by operator:** Divides the selected records into groups based on the values in the specified field



## Dialog Boxes in the Form Wizard



## Client Info Form in Form View



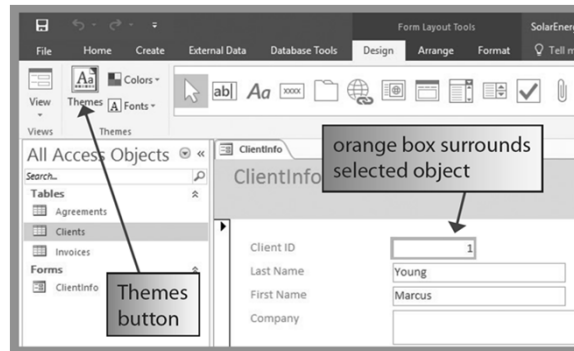
## Modifying a Form's Design in Layout View

- Modifications can be made to a form either in Layout view or Form view

## Applying a Theme to a Form and Changing its Title's Text and Appearance

- A theme can be applied to a form
  - Helps determine the design scheme for the colors and fonts used in the form
- Change the form title's text and appearance to make the form's purpose clearer
  - Use the options located in the Font group on the Form Layout Tools Format tab

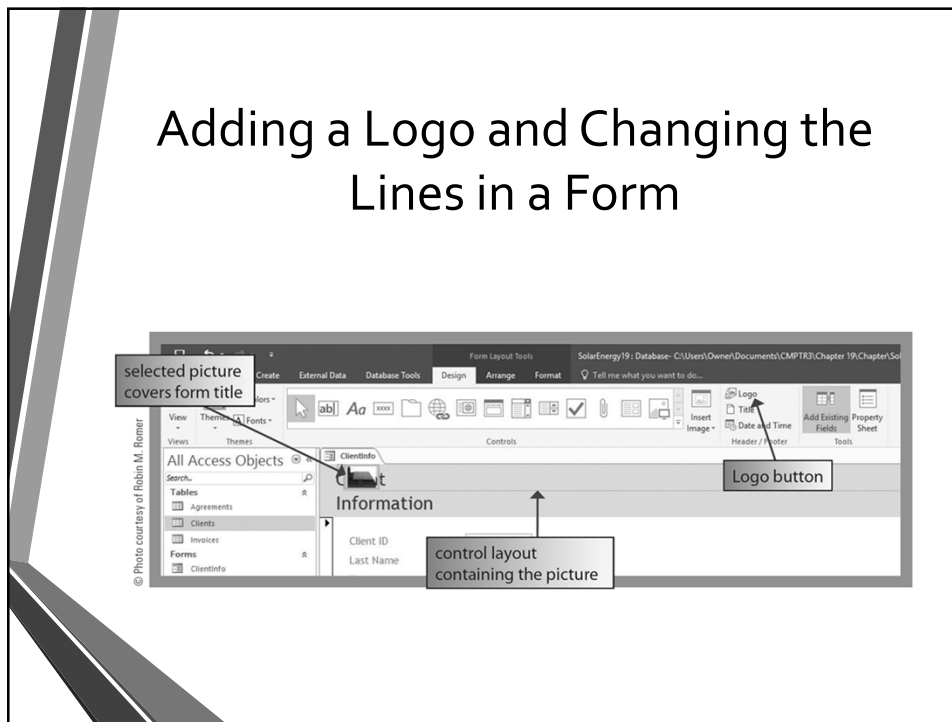
## Applying a Theme to a Form and Changing its Title's Text and Appearance



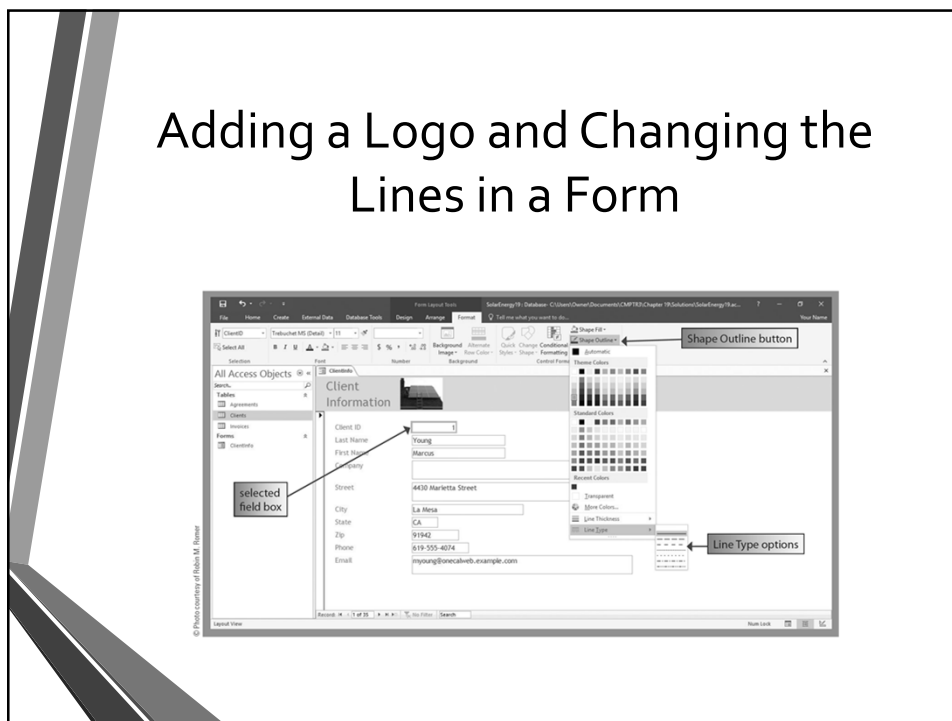
## Adding a Logo and Changing the Lines in a Form

- When a logo or other control is added to a form, it is placed in a control layout
  - **Control:** Item in a form, report, or a database object used to change the object's appearance
  - **Control layout:** Set of controls grouped together in a form or report, which is used to modify the set as a single control
- The Control Formatting group provides options for changing the thickness, type, and color of any line in a form

## Adding a Logo and Changing the Lines in a Form



## Adding a Logo and Changing the Lines in a Form



## Finding Data Using a Form

- Use the Find and Replace dialog box to search for data in a form

## Finding Data Using a Form

- One can search for a part of the value anywhere in a particular field
  - Change the option in the Match box to Any Part of Field in the Find and Replace dialog box
- **Wildcard character:** Placeholder used when:
  - A part of a value is known
  - One wants to match a certain pattern
- Data can be maintained using a form in Form view
  - Allows focusing on changes one at a time

## Finding Data Using a Form

Wildcard Character	Purpose	Example
*	Match any number of characters. It can be used as the first and/or last character in the character string.	th* finds the, that, this, therefore, and so on
?	Match any single alphabetic character.	a?t finds act, aft, ant, apt, and art
[]	Match any single character within the brackets.	a[fr]t finds aft and art but not act, ant, and apt
!	Match any character not within brackets.	a[!fr]t finds act, ant, and apt but not aft and art
-	Match any one of a range of characters. The range must be in ascending order (a to z, not z to a).	a[d-p]t finds aft, ant, and apt but not act and art
#	Match any single numeric character.	#72 finds 072, 172, 272, 372, and so on

## Finding Data Using a Form

Client ID is an AutoNumber field so the number will be added by Access

Client Information

Client ID  
Last Name  
First Name  
Company  
Street  
City  
State  
Zip  
Phone  
Email

Record: 1 of 26

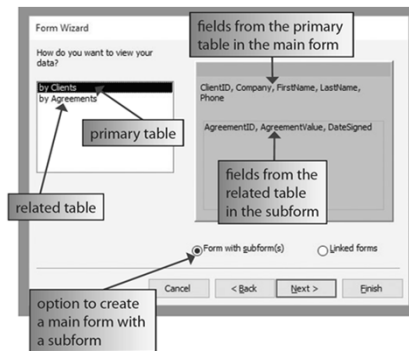
## Creating a Form Based on Related Tables

- When related tables are used in a form, the form includes a **main form** and a **subform**
  - The tables must have a defined relationship

## Creating a Form with Main and Subforms

- Choose the primary table and select the fields to include in the main form
- Choose the related table and select the fields to include in the sub form
- Use Form Wizard to create a form and a subform

## Creating a Form with Main and Subforms



## Modifying a Main Form and Subform in Layout View

- Similar to modifying a form based on one table
- Changes can be made in Layout view or Design view



## Modifying a Main Form and Subform in Layout View

Client Agreements ← edited form title

Client ID: [text box]  
 Company: [text box]  
 First Name: Marcus  
 Last Name: Young  
 Phone: 619-555-4074

Agreements

Agreement ID	Agreement Value	Date Signed
1803-TM	\$500.00	2/9/2018
1803-TM	\$14,000.00	3/7/2018

Record: 1 of 2 | No Filter | Search

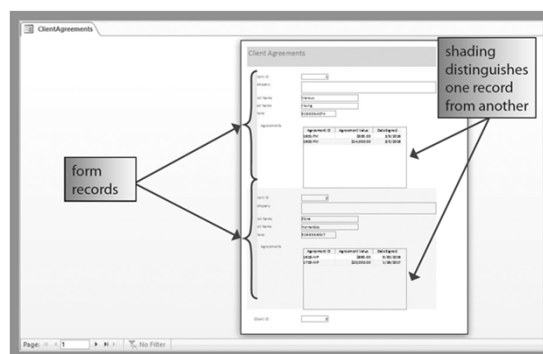
## Displaying Records in a Main Form and a Subform

- A form with a main form and a subform contains two sets of navigation buttons
  - Buttons at the bottom of the Form window select records from the primary table in the main form
  - Buttons at the bottom of the subform select records from the related table in the subform

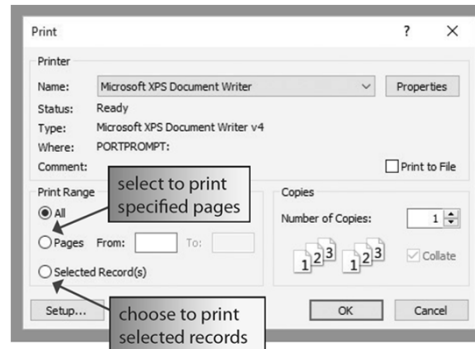
## Previewing and Printing Selected Form Records

- Access prints as many form records as it can fit on a printed page
  - Users can preview the form and choose to print all pages or a range of pages

## Previewing and Printing Selected Form Records



## Previewing and Printing Selected Form Records



## Creating a Report Using the Report Wizard

- Report Wizard guides a person through the process of creating a report

## Creating and Printing a Report

- Steps
  - Choose the table or query on which the report will be based on and select the fields to be included in the report
  - Choose whether to show the data grouped by table or ungrouped
  - Select the grouping levels to add to the report
  - Choose the sort order for the detail records
  - Decide on the layout of the report
  - Use Print Preview to check the overall layout before printing the report

## Close-up View of the Report

The screenshot shows a report window titled 'ClientsAndAgreements'. It displays data for two clients, each with their own set of agreements. The data is organized into sections for each client, with alternating light and dark gray shading used to distinguish between different client records and their respective agreement records. Arrows point from text boxes to these shaded areas, explaining the shading's purpose. Another arrow points to the 'DateSigned' column header, indicating the sort order.

Client ID	Company	First Name	Last Name	Date Signed	Agreement ID	Agreement Value	City	Email
1	Company	Marcus	Young	2/9/2016	1601-TM	\$500.00	San Diego	myoung@onecalweb.example.com
				3/3/2016	1602-TM	\$14,000.00		
2	Company	Elena	Hernandez	9/30/2016	1618-MP	\$690.00	San Diego	ehernandez@onecalweb.example.com
				1/26/2017	1703-MP	\$20,000.00		
3	Company						San Diego	swright@sauerbrockmars.example.com

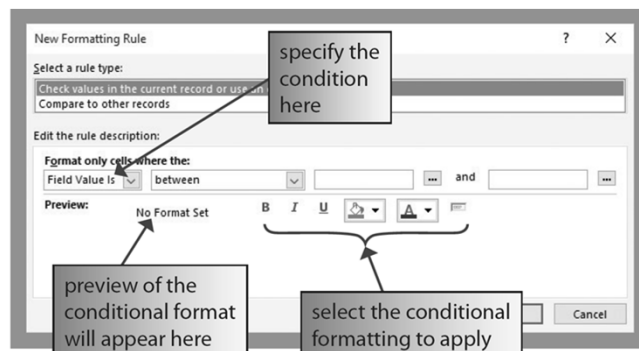
## Adding a Theme, and Resizing Fields and Field Values

- Themes can be chosen for a report from the Themes Gallery
  - Work in Layout view to resize and reposition labels and fields

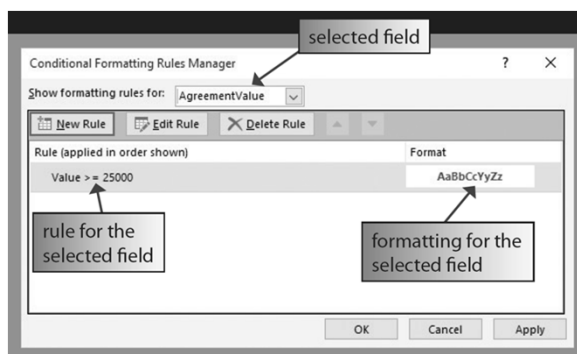
## Using Conditional Formatting and Printing a Report

- Special formatting is applied to field values that meet the condition or conditions set by the user
- Use the Print dialog box to specify whether to print an entire report or select pages

## Using Conditional Formatting and Printing a Report



## Using Conditional Formatting and Printing a Report



## Summary

- Access is used to enter data into databases, maintain databases, and retrieve data from databases
  - After studying this chapter, one should be able to:
    - Know database concepts
    - Create a database
    - Work in Datasheet view and Design view
    - Modify a table's structure
    - Create simple queries, forms, and reports
    - Open, close, compact, and repair databases

## Summary

- Maintaining a database involves adding, updating, and deleting records
  - After studying this chapter, one should be able to:
    - Work with queries in Design view
    - Sort and filter data
    - Define one-to-many relationships
    - Create copies of queries and multitable queries
    - Add single and multiple criteria to queries
    - Use a property sheet and use functions

