

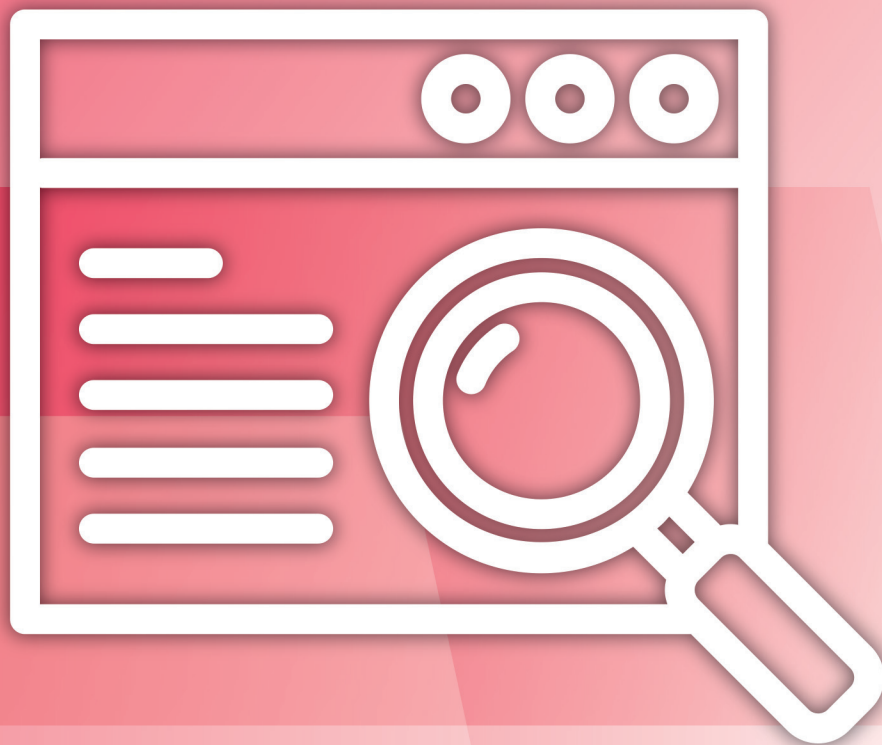
It! Series

*Lessons authored to work with
any version, any application.*

Third Edition

Databases

Hands-on Database Lessons for Workplace Readiness



B.E. PUBLISHING

The Development Team at B.E. Publishing

This Digital Review Sample contains only some of the content of the actual textbook.

This sample cannot be printed, copied or extracted in any manner. Use of this sample version in the classroom is strictly prohibited. Doing so is a violation of Federal Copyright Law.

This textbook is available for purchase at bepublishing.com or by calling Customer Service at 888-781-6921. A print sample copy may also be requested by calling Customer Service.

Thank you for previewing our resources.

B.E. Publishing

It! Series
3rd Edition

Databases

Hands-on Database Lessons for Workplace Readiness

The Development Team at B.E. Publishing



B.E. PUBLISHING

www.bepublishing.com

©2018 B.E. Publishing, Inc. All rights reserved.

For Evaluation Purposes Only

It! Series
3rd Edition

Databases

Hands-on Database Lessons for Workplace Readiness

It! Series, 3E: Databases

ISBN: 978-1-626893-05-4 (eText - School License)

ISBN: 978-1-626893-06-1 (eText - District License)

Copyright ©2018 by B.E. Publishing

All Rights Reserved. No part of this work covered by copyright hereon may be reproduced or used in any form or by any means—including but not limited to graphic, electronic, or mechanical, including photocopying, recording, taping, Web distribution, or information storage and retrieval systems—without the expressed written permission of the publisher.

Author

The Development Team at B.E. Publishing

Editor-in-Chief

Kathleen Hicks

Editors

Alissa Cafferky

John DeCarli

Michael Gecawich

Elizabeth Kraushar

Diane Silvia

Joy Tavano

Graphic Design

Fernando Botelho

Mark Drake

Permissions

To use materials from this text, please contact us:

B.E. Publishing, Inc.

P.O. Box 8558

Warwick, RI 02888

U.S.A.

Tel: 888.781.6921

Fax: 401.781.7608

Email: permissions@bepublishing.com

All references made to specific software applications and/or companies used within this book are registered trademarks of their respective companies.

PUBLISHED BY



B.E. PUBLISHING

For Evaluation Purposes Only

Table of Contents

Introduction	iii	Part 5: Creating Forms & Reports.....	74
Welcome to It! Series, 3E: Spreadsheets	iii	Lesson 26 Cars	74
Curriculum Guide	vii	Lesson 27 Entertainment Data Warehouse.....	77
Database Lessons	1	Lesson 28 Graduation Announcements.....	80
Part 1: Introduction to Databases	2	Lesson 29 Fundraisers.....	82
Part 2: Creating Tables Using Datasheet View.....	12	Lesson 30 National Parks.....	84
Lesson 1 Address Book.....	12	Lesson 31 TechieTs.com.....	86
Lesson 2 Coloring Book Sales	14		
Lesson 3 Address Book 2	17		
Lesson 4 Best Companies to Work For	19		
Lesson 5 Spectacular Stuff to Buy.....	22		
Lesson 6 Colleges.....	24		
Lesson 7 Favorite U.S. Roller Coasters.....	26		
Lesson 8 Soccer Team.....	28		
Lesson 9 Household Expenses	30		
Lesson 10 Address Book 3.....	32		
Lesson 11 Shopping Center.....	33		
Lesson 12 Bill Pay.....	35		
Lesson 13 Summer Reading	38		
Part 3: Creating Tables Using Design View	41		
Lesson 14 Sales at the School Store.....	41		
Lesson 15 Minimum Wage by State	43		
Lesson 16 Income	46		
Lesson 17 Concerts.....	49		
Lesson 18 Multiple Oscar Winners.....	52		
Lesson 19 Small Business Customers	55		
Lesson 20 College Majors and Careers	58		
Part 4: Working with Queries.....	61		
Lesson 21 Top Podcasts Chart	61		
Lesson 22 Winter Olympics and Paralympics.....	63		
Lesson 23 James Bond Movies	66		
Lesson 24 Cafeteria Menu Choices	69		
Lesson 25 Furniture Shopping	72		

Introduction

Welcome to It! Series, 3E: Databases

The **It! Series, 3E** is a comprehensive, skills-based program designed to help you use your computer applications skills to produce professional documents. With an emphasis on real-world scenarios and workplace readiness, the **It! Series, 3E** showcases a variety of practical uses for five key business computer applications: word processing, spreadsheets, presentations, desktop publishing, and databases.

It! Series, 3E: Databases will show you how to apply your database skills in your own lives. Across over 30 all-new lessons, you will explore the power of databases as you learn effective data organization and develop databases covering relevant topics like small business management and career exploration. From working with queries to creating forms and reports, **It! Series, 3E: Databases** will give you the tools you need to make databases work for you.



New Skills

These hands-on lessons are organized into a hierarchical skill-level format. With few exceptions, most of the lessons in this book build upon skills practiced in previous lessons.

Prerequisite Skills

This book is recommended for students in grades 9–12. It is expected that students have a basic working knowledge of using any version of Microsoft Access.

Materials Required

To use this textbook, students will need the following:

- Internet access
- Desktop or laptop computer
- Microsoft Access
- Printer (optional)

Software Note

The instructions for all lessons are written in a generic format so they can be applied to any version of Microsoft Access or equivalent database application.



Using the Companion Website

This textbook is designed to be used in conjunction with the Companion Website (www.MyCompanionSite.com). You may be required to download worksheets.

To download the necessary resources:

1. Go to www.MyCompanionSite.com.
2. Click on the **It! Series, 3E: Databases** thumbnail.
3. Download and open the appropriate files.

Instructor Login & Resources

Instructors have access to a password-accessible instructor resource section via the Companion Website.

Resources include:

- Lesson Answer Keys
- Lesson Grading Rubrics
- Review Worksheets, Assessments, and Answer Keys

My
CompanionSite.com



File Management

Files can be stored within folders on hard drives, network drives, external drives (e.g. USB sticks), or in the cloud (e.g. Google Drive). Before you begin to create files for each lesson, establish and name an appropriate folder—such as “Database Lessons”—for saving and storing all your files.



Understanding the Format of This Textbook

The lessons in this textbook have been organized into an easy-to-read, self-guided, visual format where you practice new skills and learn by doing. This textbook is divided into an introductory section and four additional parts, each containing a set of individual lessons that focus on working with different aspects of databases.

LESSON NUMBER

LESSON TITLE

OVERVIEW

LESSON SYNOPSIS

NEW SKILLS

INSTRUCTIONS

FIGURE

The screenshot shows a textbook page for Lesson 6, titled 'Colleges'. The page is divided into several sections: 'Overview', 'New Skills', 'Instructions', and 'Figure 6'. The 'Overview' section contains an introduction to databases and a lesson synopsis. The 'New Skills' section is titled 'Formatting Currency Fields'. The 'Instructions' section lists three steps for creating a database table. The 'Figure 6' section contains a table with 10 rows and 6 columns, listing the top 10 largest public universities in the U.S. by enrollment. The page number '24' is in the bottom left and '25' is in the bottom right.

Lesson 6 Working with Interactive Data Types **Lesson 6**

Colleges

Working with Interactive Data Types

Overview

Databases can store information in various forms. For example, sometimes you will need to display numbers as currency. This will result in a field formatted with two decimals, a thousands separator, and a \$ symbol to the left of the number. Currency formats are ideal when working with financial data.

New Skills

Formatting Currency Fields

Instructions

- Using Microsoft Access, create a new database file.
- Name and save the database file as **COLLEGES**.
- Set up the database table using the field names and data types provided below.

Database Structure	
Field Name	Data Type
Rank	Text or Short Text
College Name	Text or Short Text
Location	Text or Short Text
2015 Undergraduate Enrollment	Number
Tuition for State Residents	Currency
Website	Hyperlink

In this lesson, you will create a database to compare information about 10 of the largest public universities in the U.S. in terms of enrollment and tuition. You will also include links to the websites in the database.

LESSON SYNOPSIS

- Resave the table.
- Carefully proofread your work for accuracy.
- Print a copy of the table if required by your instructor.
- Save and close the database file.

Figure 6

ID	Rank	College Name	Location	2015 Undergraduate Enrollment	Tuition for State Residents	Website
1	1	University of Central Florida	Orlando, FL	52532	6368	www.ucf.edu
2	2	Texas A&M University	College Station, TX	47093	9180	www.tamu.edu
3	3	Ohio State University	Columbus, OH	44741	10037	www.osu.edu
4	4	Pennsylvania State University	University Park, PA	40541	17514	www.psu.edu
5	5	Arizona State University	Tempe, AZ	39968	10127	www.asu.edu
6	6	University of Texas at Austin	Austin, TX	39523	9830	www.utexas.edu
7	7	Michigan State University	East Lansing, MI	38786	13560	www.msu.edu
8	8	University of Minnesota	Minneapolis/St. Paul, MN	34351	13560	www.umn.edu
9	9	University of Florida	Gainesville, FL	33720	6313	www.ufl.edu
10	10	University of South Florida	Tampa, FL	31067	6410	www.usf.edu

24 Part 2: Creating Tables Using Datasheet View

Part 2: Creating Tables Using Datasheet View 25

Curriculum Guide

LESSON

NEW SKILLS

Databases

Part 1: Introduction to Databases

Part 2: Creating Tables Using Datasheet View

1	Address Book	<i>Creating Your First Database</i>	Creating a Blank Database • Naming and Saving a Database • Defining the Structure of a Database • Selecting Data Types • Naming and Creating Fields • Naming and Saving a Table • Adjusting Column Widths • Printing a Table • Closing a Database
2	Coloring Book Sales	<i>Working with Different Data Types</i>	Using New Data Types • Formatting a Date/Time Field • Formatting a Yes/No Field
3	Address Book 2	<i>Working with an Existing Database</i>	Opening an Existing Database • Renaming a Table • Adding New Fields
4	Best Companies to Work For	<i>Working with Interactive Data Types</i>	Using Hyperlinks • Adding a Lookup Value List
5	Spectacular Stuff to Buy	<i>Working with Numeric Data Types</i>	Formatting Number Fields • Increasing/Decreasing Decimal Places
6	Colleges	<i>Working with Interactive Data Types</i>	Formatting Currency Fields
7	Favorite U.S. Roller Coasters	<i>Changing Data Types and Formatting Fields</i>	Deleting Fields
8	Soccer Team	<i>Using Field Validation</i>	Creating a Field Validation Rule • Inserting Field Validation Text
9	Household Expenses	<i>Searching and Sorting Records</i>	Using Find and Replace • Sorting Ascending and Descending
10	Address Book 3	<i>Working with Text and Formats</i>	Applying Bold and Italics • Changing Font and Font Size • Changing Font Color • Changing Alignment
11	Shopping Center	<i>Managing Records</i>	Adding/Deleting Records in Datasheet View
12	Bill Pay	<i>Using Lookups from Tables</i>	Creating a Lookup Field from a Table
13	Summer Reading	<i>Practicing Using Datasheet View</i>	There are no new skills being introduced in this reinforcement lesson.

Part 3: Creating Tables Using Design View

14	Sales at the School Store	<i>Working in Design View</i>	Creating Tables Using Design View • Naming and Creating Fields in Design View
15	Minimum Wage by State	<i>Editing Field Properties</i>	Adding a Field Description • Setting a Field Size • Inserting/Deleting Fields • Using Input Masks
16	Income	<i>Exporting a Table</i>	Moving Fields • Exporting a Table from a Database
17	Concerts	<i>Applying Filters</i>	Applying a Selection Filter • Using Toggle Filter
18	Multiple Oscar Winners	<i>Editing Records</i>	Using Cut, Copy, and Paste
19	Small Business Customers	<i>Managing Table Relationships</i>	Using Multiple Tables • Changing the Primary Key • Managing Cascade Updates • Editing Relationships
20	College Majors and Careers	<i>Designing with Multiple Tables</i>	There are no new skills being introduced in this reinforcement lesson.

Curriculum Guide

LESSON

NEW SKILLS

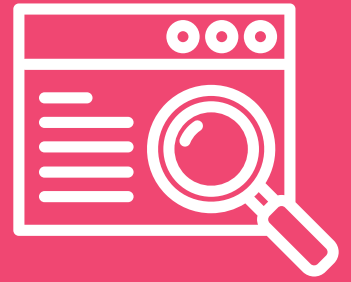
Part 4: Working with Queries

21	Top Podcasts Chart	<i>Using the Query Wizard</i>	Using the Query Wizard • Using the All Access Objects Drop-down
22	Winter Olympics and Paralympics	<i>Working with Queries</i>	Running a Query • Sorting Query Results
23	James Bond Movies	<i>Specifying Criteria in Query Design</i>	Using Query Design View • Using Criteria to Filter Records • Viewing Queries
24	Cafeteria Menu Choices	<i>Specifying Multiple Criteria in Query Design</i>	Using the AND Logical Operator • Using the OR Logical Operator
25	Furniture Shopping	<i>Using Numbers in Query Design</i>	Using the Between ... AND ... Logical Operator

Part 5: Creating Forms & Reports

26	Cars	<i>Creating a Form</i>	Using the Form Wizard
27	Entertainment Data Warehouse	<i>Creating a Report</i>	Using the External Data Wizard • Using Find Duplicates Query • Using the Report Wizard
28	Graduation Announcements	<i>Creating Mailing Labels</i>	Using the Label Wizard
29	Fundraisers	<i>Creating Charts</i>	Formatting a Pie Chart in a Report Form
30	National Parks	<i>Creating Column Charts</i>	Formatting a Column Chart in a Report Form
31	TechieTs.com	<i>Determining the Database Requirements for a Business</i>	Designing and Creating a Database Based on a Business's Requirements

Databases



Part 1 Introduction to Databases

Hands-on Lessons:

Part 2 Creating Tables Using Datasheet View Lessons 1 – 13

Part 3 Creating Tables Using Design View Lessons 14 – 20

Part 4 Working with Queries Lessons 21 – 25

Part 5 Creating Forms & Reports Lessons 26 – 31



What is a Database?

Every time you use Google to find something, chances are the search results you see on screen were retrieved from a database. A **database** is a collection of information (data) that is stored on a computer in an organized format so that the information can be easily accessed, managed, and updated.

Think of a database like an electronic filing cabinet. Although you may not realize it, you probably access multiple databases every day: the contacts in your cell phone, using a map app, or accessing iTunes to download a song. All of the information that you're accessing is stored using a database management system (DBMS). Just about every business and organization, large and small alike, use databases to manage and store information.

Why Learn Databases?

For any type of business or organization, databases are the primary tool for storing, managing, and analyzing information. Without databases, we wouldn't have search engines, phone directories, or even the ability to use a website to order a pizza. Whether serving the needs of large Internet search engines, like Google, or simply being used by your school to track students, classes, and grades, databases play a vital role in today's high tech world.

The amount of data that needs to be stored and managed is only increasing. Given the explosive growth of everything from smartphones or phablets, to wearable fitness trackers and GPS tracking devices, more and more data is being collected and shared. Understanding databases and the information and data they provide is an essential workplace skill to have.

Structure of a Database

A database is structured by storing and organizing interrelated information into one or more tables. Similar in format to a spreadsheet, a **table** uses columns and rows to store data in a **cell**, or the intersection of a column and row.

Tables contain a series of **records**. Each record contains data segments called **fields**. For example, a record for a business's customer might contain fields such as first name, last name, street address, city, state, and zip code. Each field within a database is required to have a data type. A **data type** is the term used to determine what format each field in the database structure is defined as. While there are a variety of data type format options, some of the most common are listed in the following table.

Common Data Types

Long and Short Text	Short text is used for storing non-numeric data that is brief, generally under 256 characters. Long text is used for longer segments of text, more than 256 characters.
Number	Number fields are used for storing numbers, and can be formatted in a variety of ways such as currency, percentages, or decimals.
Yes/No	The Yes/No data type is used to determine if the data in that field has “yes” or “no” answers. Yes/No is actually a special form of the Number data type, where only two numbers are used: 0 (for “no”) and 1 (for “yes”).
Date/Time	The Date/Time data type is used to display data in the form of a date, time, or both. Date/Time is also a special form of the Number data type.
Object	The Object data type is used for formatting fields that contain data that cannot be entered by a keyboard, such as an image or sound file.

To illustrate how data types are utilized in a database, let’s take a look (below) at how a database record would be structured to collect and organize data required for students in a high school.

Field Name	Data Type
Student ID #	Number
First Name	Text
Last Name	Text
Address	Text
City	Text
State	Text
Zip	Text
Phone	Number
Email	Text
Username	Text
Password	Text
Y.O.G.	Date/Time
Student Picture	Object
Gender	Text
Member of a Club	Yes/No

Database Tools

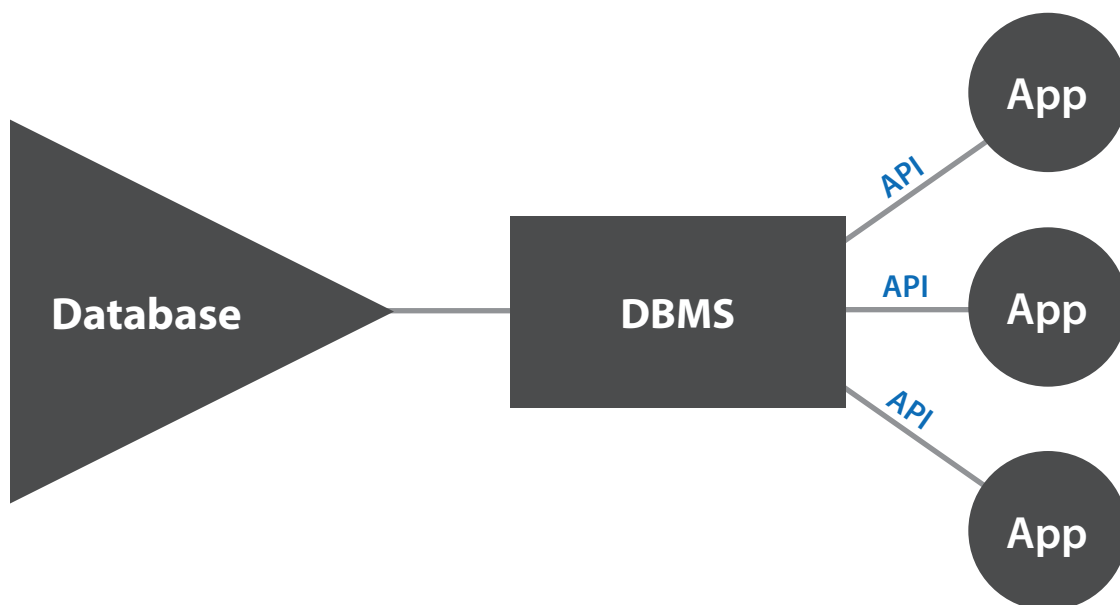
We all use different tools to find the information we want. From search engines to apps, today's technology allows us to find information quickly by using multiple sources. Behind all of these tools are databases that must be accurate, reliable, and managed.

Database Management Systems (DBMS)

The tool that manages all of that information is known as a database management system (DBMS). Used by just about every business and organization, a DBMS is a computer software application that enables users and applications to interact with a database to capture, store, retrieve, and analyze data. To be front-runners in their respective industries, businesses have come to rely on DBMS as a primary technology tool.

A good example of a technology that utilizes the power of a DBMS is a mobile phone. The software on your phone accesses the contacts database so that data records (your contacts) can be displayed, utilized, edited, or deleted. DBMS packages generally provide an interface to view and change the design of the database, create queries, and develop reports. To further explain what a DBMS is, let's take a look at a real-world example of how Apple's iTunes.com uses a database management system.

In order for songs to be viewed on screen and played for users, the iTunes application needs to access one or more databases. Back at Apple, the iTunes database is managed by a multitude of technical staff, using a dedicated DBMS. Some employees use the database application to add new records, in other words, new artists and their songs. Others manage these records by inputting more data, such as a song's genre.



Determining Database Software

There are two categories of database software:

Desktop database software is typically utilized by home users and small businesses. Examples include Microsoft Access, My Database, and FileMaker Pro.

Enterprise level database software is used by large companies and organizations that need to manage and share information across many platforms, among a large number of users, and across distant geographical locations, even worldwide. Examples include Oracle, Microsoft SQL Server, and IBM DB2.

Selecting Database Software

In order to determine what database software and system to use, businesses must define what their data requirements are. As a starting point, all businesses need to answer the following questions:

1. What type of information needs to be collected?
2. Will the data need to be accessed and shared by multiple users, and if so, by how many?
3. How many users can the database system accommodate at one time?
4. Will customers need to access the data?
5. Will data need to be served on a website? If so, does the database software support that technology?
6. Can the database software integrate with other business applications?

Working with Microsoft Access

To complete these hands-on lessons, you will need to use **Microsoft Access**, a DBMS application produced by Microsoft Corporation. MS Access is one of the most popular database applications. Commonly used by both businesses and individuals, MS Access enables users to create custom databases and contains a variety of tools to manage their data. Like most DBMS systems, MS Access comes equipped with a variety of features to access, format, and retrieve information, including:

- Creating visual forms for easy data entry
- Searching and browsing abilities
- Connecting to websites and external applications
- Queries
- Generating reports
- Sorting data
- Filtering data
- Importing and exporting data

Database Relationships

Relationships Between Tables

A database can be made up of one or many tables. When a database contains more than one table, often the tables will have identical fields, forming a table relationship. A relationship works by matching data in key columns, usually columns with the same name in both tables. The database relationships keep users from redundant data entry. To demonstrate the concept of table relationships, read the following scenario:

Libraries use databases to store information about books and publishers. Let's say the local library creates a database containing just one table called Book Titles which includes fields such as book title, date of publication, publisher's name, and publisher's phone number. In this one-table database, a redundancy would occur. Since many books have the same publisher, the publisher's name and phone number would need to be entered multiple times. A better solution would be for the library to create a separate table called Publisher Contact Information, which could include the publisher's name, address, city, state, zip code, as well as phone number. An identical field (the publisher's name, for example), shared by both of the tables (Book Titles and Publisher Contact Information) would create a table relationship. This relationship would make it *unnecessary* to enter the publisher's phone number in the Book Titles table.

Relationships Between Databases

A company may have one or many databases in their DBMS. When there is more than one database within a DBMS, they typically have pieces of data that are shared or related. Databases that are related to each other are referred to as **relational databases**. Browsing a website that sells technology equipment, for instance, may have a catalog database so that users can search for products, and a separate technical support database so that users can search for answers to technical support questions about a specific product. The website itself is not the database. However, as users are browsing and searching for products, the website is communicating with each database. While the two databases are separate, they have a relationship to each other—in this case, the product field.

Since a relational database is a collection of data organized as a set of related tables, its data can be accessed or reassembled in various ways without having to reorganize the database tables themselves. To illustrate relational databases, let's look at a popular college information website:

CollegeBoard.org is used by millions of potential college applicants to help find information about colleges. For example, let's say a high school student wanted to find which colleges offer physical therapy as a major and are located in warm climates. To find the answer, CollegeBoard.org first would look in its "college database" for institutions that offer physical therapy. Next, it would look in a "geographical location" database for a location with a warm climate. Then it would reference this location with the locations of its "physical therapy colleges." The records of colleges with warm climate locations would be returned as the answer.

Analyzing and Retrieving Data

Information isn't very useful if we don't do anything with it. Databases aren't just a great tool for storing information, they also make information useful. The process of studying information to make it useful is known as **data analysis**. The process of accessing data is known as data retrieval. Database software applications provide commands that allow data to be filtered and retrieved. While it may sound like a technical term only used by "business people," we all analyze data.

Asking the Right Questions to Find the Right Answers

Analyzing and retrieving data is essentially asking questions. In fact, a request for a specific answer, or list of records, from a database is called a **query**. From reading the sports statistics page, to tracking the progress of a diet, looking at data helps us make decisions based on the answers to questions we ask. How much weight have I lost this month? Do I need to adjust my diet? How are the players on my Fantasy Football team performing? Should I trade some players to improve my team?

To illustrate the importance of analyzing data, let's look at the following scenario:

Choosing what college to attend is one of the biggest decisions many of you will make. A decision of this magnitude requires a lot of thought. To help you make a well-informed choice, you can count on data analysis for some help. Using real data, you need to get the answers to these, and many other questions:

What is the school population?

What is the cost of tuition and room and board?

What is the ratio of females to males?

What are the minimum G.P.A. and S.A.T. requirements?

What are the job placement percentages for graduating students?

Where do you find the answers to these questions? A quick Google search might land you at a blog where you can read student reviews about the college you want to attend. But, who are these students? What blog is it? With more research, you might find that the links you clicked on were to sites authored by those who possess minimal or no credentials. After sifting through additional information, you realize that data provided by sites like Cappex.com and CollegeBoard.org offer much more reliable data on all aspects of attending college. Your decision becomes clearer as you ask questions and find answers—in other words, as you do data analysis.

How Businesses Use Data

Businesses regularly analyze data to help them make strategic decisions. For instance, let's say a national fast-food company is considering launching a new type of cheeseburger infused with barbecue sauce. Before making any decisions, they advertise the new burger in only a handful of stores. After the testing phase is completed, the company would then analyze the sales data to decide whether or not to market the new burger in all of its locations.

In a world flooded with information pouring in from the web, cell phones, and social media, we can't trust or believe everything we read or hear. When analyzing data, the same holds true. Imagine if you were asked to write a report titled "The Top Ten Athletes of All Time." In the report, you decide to include statistics on each athlete. When your teacher passes out the graded reports, you read the comment "Many of the statistics you included were inaccurate."

To avoid inaccurate or incomplete information, there are a series of simple principles to follow when conducting a data analysis.

- 1. Define your questions**

Before you begin the analysis, know the questions you're trying to answer and what you're trying to accomplish. What is it that you want the data (information) to tell you?

- 2. Identify and know your sources**

Where will you get the information from? Are the sources credible?

- 3. Collect the data**

With your questions and sources clearly defined, you can now gather all the data you will need to analyze.

- 4. Analyze the data**

Keep an unbiased opinion, study the data from several different angles.

- 5. Interpret the results**

Summarize and display the data.

Data Warehouses

How does the data we have today compare with the same set of data from this time last month, or last year? The concept of a data warehouse helps meet this need to compare different sources or periods of data.

Today, businesses are able to collect and store massive amounts of data from multiple and often unconnected sources. However, databases that store this information may not always be optimized for processing large amounts of data and the continuous retrieval of reports by employees, customers, and other information requests. The primary purpose of a **data warehouse** is to manage large amounts of stored data from multiple sources so it can be stored and accessed by a centralized system. A data warehouse essentially creates a copy of much of the data that is spread out across sources, and over time, allows businesses easy access to their data to make informed decisions.

Benefits of Data Warehouses

Organizations find data warehouses beneficial for a number of reasons:

1. A data warehouse helps an organization better see what data it is collecting, as well as what data it should or should not be collecting.
2. A data warehouse offers a centralized view of all data across a system, making it possible to see how clean, or consistent, the data is.
3. Once the data is consistent, an organization can work off of one clean version of their data for better analysis of accurate information.
4. With a data warehouse, “snapshots” can be taken of data over time, enabling an analysis of historical trends—this is known as data mining.

Data Mining

In the business world, data mining can help businesses predict certain behaviors about their customers and products, including:

- Characteristics of typical customers
- Predictions about customer loyalty
- Purchasing patterns—items or services that are likely to be purchased at the same time
- Warning indicators of fraudulent purchases
- Best features for interactive business websites
- Identifying customers to target for specific ad campaigns

By being aware of these predictions, companies can use them to focus their marketing efforts, make decisions about when to introduce a product to customers, as well as decide to focus on a particular type of customer for certain types of products.

To do this, a company needs to purchase and use **data mining** tools that generate this sort of predictive business information. Larger companies may decide to use dedicated data mining tools such as SAS Enterprise Miner from SAS or Oracle Advanced Analytics by Oracle. These tools are designed to analyze huge volumes of data and can be customized to work with the unique needs of larger companies. These tools are also capable of performing more advanced data mining techniques that require a significant amount of data preparation and computing power. Smaller businesses can also use data mining tools that are now offered with desktop databases such as Microsoft Access or even as a plug-in for Microsoft Excel.

Data mining does not use one single technique to produce predictive information. Some of the different techniques include:

1. **Clustering**

Used to group customer and/or products into pre-defined “clusters” based on their characteristics. The behavior of customers and products can then be predicted based on which cluster they’re in.

2. **Nearest Neighbor Classification**

The process of classifying business information based on how “near” or similar the information is to its “neighbor.” Defining the nearest neighbor is dependent on how a business views its customers and product relationships.

3. **Decision Trees**

Uses a series of questions to narrow down and segment the business information into a predictable result.

4. **Neural Network**

A highly accurate predictor of business behavior by using complex computer analysis.

Databases Are Powerful Tools for Using Information Successfully

A database literally puts information at your fingertips. The electronic storage of data records makes it easy and fast to search, retrieve, and organize information in countless ways. Managing information with a database enables users to identify how information relates to other information in ways not possible with paper or spreadsheets.

Databases save businesses time and money by making information easily accessible, efficiently analyzed, and used to make effective decisions.

Understanding database basics and having a familiarity working with database tools are skills valued by businesses across every field.

SOFTWARE NOTES

If you encounter a skill or feature that is not available in the software version you are using, use an equivalent feature or adjust your document accordingly.

It is important to note that all of the databases lessons are written in a generic format and in most cases, the skills required can be achieved using any version of Microsoft Access.

Part 1 Review

1. Visit www.MyCompanionSite.com.
2. Download and complete the **Databases Part 1 Review** worksheet.
3. Submit your completed worksheet to your instructor.

My
CompanionSite®



Address Book

Creating Your First Database

Overview

In this lesson, you will create your first database! The first step after you create the actual database file will be to create a database structure for the first table that will be added to the database. Once the structure is created for the table, you will use the table's Datasheet View to easily enter data into the database fields, similar to the way that data is entered into a spreadsheet.



In this lesson, you will create a new database and use it to store the data for a personal address book.

New Skills

Creating a Blank Database • Naming and Saving a Database • Defining the Structure of a Database • Selecting Data Types • Naming and Creating Fields • Naming and Saving a Table • Adjusting Column Widths • Printing a Table • Closing a Database

Instructions

1. If you have not done so already, create a folder on your storage drive (hard drive, network drive, web drive, etc.) where you will save all of your databases lessons.
2. Using Microsoft Access, create a new database file.
3. Name and save the database file as **ADDRESSES**.
4. Set up the database table using the field names and data types provided below.

NOTE: Most versions of Access include an ID field to the left of Field 1 in each database file. This is how the program assigns a unique number to each record in the database table.

Database Structure	
Field Name	Data Type
First Name	Text or Short Text
Last Name	Text or Short Text
School/Institution	Text or Short Text
Address Line 1	Text or Short Text
City	Text or Short Text
State	Text or Short Text
ZIP Code	Text or Short Text

5. Enter the data as shown in **Figure 1**.
6. Name and save the table as **FRIENDS**.
7. Adjust the column widths so that all data displays properly.
8. Resave the table.
9. Carefully proofread your work for accuracy.
10. Print a copy of the table if required by your instructor.
11. Save and close the database file.

Figure 1

ID	First Name	Last Name	School/Institution	Address Line 1	City	State	ZIP Code
1	Nancy	Brown	Argonne High	1421 Newhall St.	Argonne	WI	54511
2	Peter	Smith	Argonne High	874 Albany Ave.	Argonne	WI	54511
3	Arlene	Landers	Speedy Deli	776 East First St.	Argonne	WI	54511
4	Albert	Rosen	Argonne High	1111 North A St.	Argonne	WI	54511
5	Lily	Field	Speedy Deli	654 South Main St.	Argonne	WI	54511
6	Ahmet	Zehra	Argonne Public Library	12 Oak St.	Argonne	WI	54511
7	Thomas	Ogden	Argonne High	116 Hoover St.	Argonne	WI	54511
8	Nicole	Bell	Presto Pizza	1010 Lake St.	Argonne	WI	54511
9	Julie	Doubek	Argonne High	2734 Center St.	Argonne	WI	54511
10	Kurt	Gould	Argonne High	541 Cook St.	Argonne	WI	54511

Coloring Book Sales

Working with Different Data Types

Overview

The fields that make up a record in a database can be formatted in many ways. As a default, fields are structured as Short Text allowing the user to enter up to 255 characters of any kind. However, an important component of database design is consistency in the way data is entered. Specifying the data type of a field can help the user avoid switching formats in a field and making spelling mistakes. For example, if you are tracking the date on which orders are placed, using a consistent date format will ensure accurate queries and reports. Formatting a field as a Yes/No data type will force the selection of a checkbox when inputting data rather than having to type the word yes or no.

New Skills

Using New Data Types • Formatting a Date/Time Field • Formatting a Yes/No Field

Instructions

1. Using Microsoft Access, create a new database file.
2. Name and save the database file as **COLORING BOOKS**.



In this lesson, you will create a database that shows order information about some popular adult coloring books.

3. Set up the database table using the field names and data types provided.

Database Structure	
Field Name	Data Type
Order Date	Date/Time
Customer First Name	Text or Short Text
Customer Last Name	Text or Short Text
Book Name	Text or Short Text
Ship to Address	Text or Short Text
Ship to City	Text or Short Text
Ship to State	Text or Short Text
Ship to Zip Code	Text or Short Text
Payment Type	Text or Short Text
Coloring Club Member	Yes/No

4. Enter the data as shown in **Figure 2**.
5. Name and save the table as **CUSTOMER ORDERS**.
6. Adjust the column widths so that all data displays properly.
7. Resave the table.
8. Carefully proofread your work for accuracy.
9. Print a copy of the table if required by your instructor.
10. Save and close the database file.

Figure 2

ID	Order Date	Customer First Name	Customer Last Name	Book Name	Ship to Address	Ship to City	Ship to State	Ship to Zip Code	Payment Type	Coloring Club Member
1	7/18/2017	Kent	Barker	Autumn Beauty Grayscale Photo Coloring Book	71 Pilgrim Avenue	Melbourne	FL	32904	PAY PAL	<input type="checkbox"/>
2	7/18/2017	Ida	Lambert	Floral Mosaic	44 Shirley Avenue	Honolulu	HI	96815	PAY PAL	<input checked="" type="checkbox"/>
3	10/4/2017	Beverly	Clark	Abstract Fever	4 Goldfield Road	South Windsor	CT	06074	VISA	<input checked="" type="checkbox"/>
4	10/13/2017	Andrea	Young	A Medley of Mandalas	70 Bowman Street	West Chicago	IL	60185	AMAZON PAY	<input type="checkbox"/>
5	11/8/2017	Rebecca	Bell	The Still Life Coloring Book	463 Yukon Lane	Redondo Beach	CA	90278	PAY PAL	<input type="checkbox"/>
6	11/16/2017	Karen	Cooke	Poppin' Patterns	312 Harvey Street	Dracut	MA	01826	AMAZON PAY	<input checked="" type="checkbox"/>
7	11/29/2017	Todd	Patterson	Starry Shapes	8789 Shipley Street	Michigan City	IN	46360	VISA	<input type="checkbox"/>
8	12/21/2017	Marie	Perry	Just Color! Volume 2	43 Kent Street	Mahwah	NJ	07430	VISA	<input checked="" type="checkbox"/>
9	2/15/2018	Frank	Gray	Lazy Waves	895 Cypress Road	Roy	UT	84067	PAY PAL	<input type="checkbox"/>
10	3/1/2018	Anna	Morgan	For the LOVE of COLORING	7158 Prairie Street	Lockport	NY	14094	PAY PAL	<input type="checkbox"/>

Sales at the School Store

Working in Design View

Overview

It is clear to see that a database table is nothing more than a spreadsheet where each column is headed by a field name and each row contains a unique record. Viewing tables in Datasheet View, the default view of Access, is easy to follow and ideal for data entry of records. However, Access offers another view of your table—the Design View. Design View shows the field names and the data type for each of those fields, but not the data. Using Design View is ideal for setting up a database structure since it allows you to see field properties clearly and in more detail.



In this lesson, you will create a database structure in Design View and enter data about a sampling of items sold in the school store in Datasheet View.

New Skills

Creating Tables Using Design View • Naming and Creating Fields in Design View

Instructions

1. Using Microsoft Access, create a new database file.
2. Name and save the database file as **STORE**.
3. Create a new table in Design View.
4. Name and save the table as **STORE SALES**.
5. Set up the database table using the field names and data types provided below.

Database Structure	
Field Name	Data Type
Product Category	Text or Short Text
Product	Text or Short Text
Price	Currency
Units Sold	Number

6. In Datasheet View, enter the data as shown in **Figure 14**.
HINT: You will be prompted to save the table once again. Click Yes.

7. Adjust the column widths so that all data displays properly.
8. Resave the table.
9. Carefully proofread your work for accuracy.
10. Print a copy of the table if required by your instructor.
11. Save and close the database file.

Figure 14

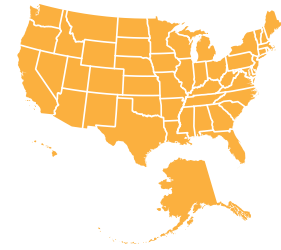
ID	Product Category	Product	Price	Units Sold
1	Clothing	Varsity Jacket	164.99	5
2	Supplies	Folders (25 Pack)	7.89	10
3	School Keepsakes	Class Ring	255.00	3
4	Miscellaneous	Backpack	21.44	2
5	Electronics	32 GB Flash Drive	12.97	15
6	Electronics	Graphing Calculator	124.33	1
7	Supplies	Black Pens (12-Pack)	9.00	5
8	School Keepsakes	Class Tag	288.00	1
9	Miscellaneous	Hand Sanitizer	2.97	10
10	Clothing	Hooded Sweatshirt	36.99	4
11	Electronics	Ear Buds	13.95	5
12	Miscellaneous	Adjustable Cap	20.39	2
13	Clothing	T-Shirt	19.99	6
14	Electronics	Bluetooth Headset	14.75	3
15	School Keepsakes	Water Bottle	16.95	5
16	Supplies	Colored Pencils (set of 24)	19.79	7
17	Miscellaneous	Tissues (3-Pack)	3.45	10
18	Clothing	Sweatpants	24.99	4
19	School Keepsakes	Senior Memory Book	23.50	4
20	Supplies	5-Subject Spiral Notebook (2-Pack)	5.67	12

Minimum Wage by State

Editing Field Properties

Overview

When designing your database structure, the decisions you make up front about the format of fields can greatly impact the consistency and integrity of your database. Users who input records once the database is designed will appreciate reminders about how to enter data, such as field descriptions asking to use all caps when keying state abbreviations. Input masks on a field can also assist in data entry. An input mask will ensure people enter data correctly by displaying a string of characters that provide placeholders for information. For example, input masks can guide a user to always enter dates in a day-month-year format.



In this lesson, you will create a database structure in Design View and enter data about the changes in minimum wage for 15 states.

New Skills

Adding a Field Description • Setting a Field Size • Inserting/Deleting Fields • Using Input Masks

Instructions

- Using Microsoft Access, create a new database file.
- Name and save the database file as **MINIMUM WAGE**.
- Create a new table in Design View.
- Name and save the table as **STATE MINIMUM WAGES**.
- Set up the database table using the field names and data types provided below.

Database Structure		
Field Name	Data Type	Description
STATE ABBREVIATION	Text or Short Text	Enter in all caps
2000 MINIMUM WAGE	Currency	
2014 MINIMUM WAGE	Currency	
2017 MINIMUM WAGE	Currency	
CURRENT WAGE EFFECTIVE DATE	Text or Short Text	Enter the date as DD-Month-YY; for example: 01-Jan-17

6. Change the Field Size of the STATE ABBREVIATION field to 2.
7. Apply the Medium Date input mask to the CURRENT WAGE EFFECTIVE DATE field.
8. Insert a row above CURRENT WAGE EFFECTIVE DATE and name the new field AMOUNT OF CHANGE. Change the data type to Currency.
9. Delete the row containing the 2000 MINIMUM WAGE field.
10. Resave the table.
11. In Datasheet View, enter the data as shown in **Figure 15**.
12. Adjust the column widths so that all data displays properly.
13. Resave the table.
14. Carefully proofread your work for accuracy.
15. Print a copy of the table if required by your instructor.
16. Save and close the database file.

Figure 15

ID	STATE ABBREVIATION	2014 MINIMUM WAGE	2017 MINIMUM WAGE	AMOUNT OF CHANGE	CURRENT WAGE EFFECTIVE DATE
1	AK	\$9.75	\$9.80	\$0.05	01-Jan-17
2	AZ	\$8.05	\$10.00	\$1.95	01-Jan-17
3	AR	\$8.00	\$8.50	\$0.50	01-Jan-17
4	CA	\$10.00	\$10.50	\$0.50	01-Jan-17
5	CT	\$9.60	\$10.10	\$0.50	01-Jan-17
6	DE	\$7.75	\$8.25	\$0.50	01-Jun-15
7	FL	\$8.05	\$8.10	\$0.05	01-Jan-17
8	HI	\$8.50	\$9.25	\$0.75	01-Jan-17
9	ME	\$7.50	\$9.00	\$1.50	01-Jan-17
10	MD	\$8.75	\$9.25	\$0.50	01-Jul-17
11	MI	\$8.50	\$8.90	\$0.40	01-Jan-17
12	MN	\$9.00	\$9.50	\$0.50	01-Aug-16
13	MO	\$7.65	\$7.70	\$0.05	01-Jan-17
14	MT	\$8.05	\$8.15	\$0.10	01-Jan-17
15	NE	\$8.00	\$9.00	\$1.00	01-Jan-16
16	NV	\$7.55	\$8.25	\$0.70	01-Jan-14
17	NJ	\$8.38	\$8.44	\$0.06	01-Jan-17
18	NY	\$9.00	\$9.70	\$0.70	31-Dec-16
19	OH	\$8.10	\$8.15	\$0.05	01-Jan-17
20	RI	\$9.00	\$9.60	\$0.60	01-Jan-16

Top Podcasts Chart

Using the Query Wizard

Overview

A key aspect of databases is the way in which data can be retrieved using what are called queries. Queries enable you to retrieve, filter, summarize, and perform calculations on data. When you create a simple query, you select which tables you want the data to come from and specify the fields from within those tables.

New Skills

Using the Query Wizard • Using the All Access Objects Drop-down



In this lesson, you will create a database that will be used to hold data about popular podcasts. You will also use that information to run a query using the Query Wizard.

Instructions

1. Using Microsoft Access, create a new database file.
2. Name and save the database file as **PODCASTS**.
3. Set up the database table using the field names and data types provided below.

Database Structure	
Field Name	Data Type
Podcast Title	Text or Short Text
Category	Text or Short Text
Producer	Text or Short Text

4. Enter the data as shown in **Figure 21**.
5. Name and save the table as **PODCASTS FOR TEENS**.
6. Adjust the column widths so that all data displays properly.
7. Sort the table in ascending order by Podcast Title.
8. Resave the table.
9. Using the Simple Query Wizard, create a query that shows the Podcast Title and Producer.
10. Save the query as **PODCAST PRODUCERS**.

11. Carefully proofread your work for accuracy.
12. Use the All Access Objects drop-down to show all objects. You should see the table and query you have created in this lesson.
13. Print a copy of the table and query if required by your instructor.
14. Save and close the database file.

Figure 21

ID	Podcast Title	Category	Producer
1	This American Life	Society & Culture	WBEZ
2	The Sporkful	Food	Stitcher
3	Radiolab	Natural Sciences	WNYC
4	All Songs Considered	Music	NPR
5	TED Radio Hour	Technology	NPR
6	The Moth	Performing Arts	The Moth
7	Stuff You Should Know	Society & Culture	HowStuffWorks
8	Math Mutation	Natural Sciences	Erik Seligman
9	Stuff You Missed in History Class	History	HowStuffWorks
10	Freakonomics Radio	Society & Culture	WNYC
11	Song Exploder	Music	Song Exploder
12	Note to Self	Technology	WNYC
13	Happier with Gretchen Rubin	Self-Help	The Onward Project
14	It's Been a Minute	Society & Culture	NPR
15	Science Friday	Science & Medicine	Science Friday

Cars

Creating a Form

Overview

One of the more beneficial uses of databases is the ability to create and use forms as a method of inputting data into the database as well as more easily viewing data records. Forms allow you to display data in a number of different form views, such as in columnar or tabular format among others. When you create a form, you select which tables or queries you want to use for the data in the form as well as the type of view for the form. Formatting of fields and the placement of fields on a form can also be modified. Also in this lesson, you will create a query that, in addition to showing and sorting data in selected fields, will use criteria to determine if a data record will be displayed in the result.



In this lesson, you will create a database that will be used to hold data about the top 20 best-selling cars for 2015 and use that information to create a report on the cars with the highest growth in sales from 2014 to 2015.

New Skills

Using the Form Wizard

Instructions

1. Using Microsoft Access, create a new database file.
2. Name and save the database file as **CARS**.
3. Set up the database table using the field names and data types provided below.

Database Structure	
Field Name	Data Type
Rank	Number
Best-Selling Car	Text or Short Text
2015 Sales	Number
2014 Sales	Number
% Change	Number

4. Name and save the table as **BEST-SELLING CARS**.

5. Change the Field Properties for the % Change field as follows:
 - a. Change the Field Size to Double.
 - b. Change the Format to Percent.
 - c. Change the Decimal Places to 1.
6. Enter the data as shown in **Figure 26**.
7. Adjust the column widths so that all data displays properly.
8. Carefully proofread your work for accuracy.
9. Resave and close the table.
10. Create a query using the **BEST-SELLING CARS** table to show only cars with a % Change greater than 0.
11. Save the query as **HIGHEST SALES CARS**.
12. Using the Form Wizard and the **HIGHEST SALES CARS** query, create a Columnar Form to show only the Rank, Best-Selling Car, and % Change fields.
13. Save the form as **GREATEST SALES GROWTH**.
14. Click on the record arrows at the bottom of the screen to scroll through the forms one-by-one.
15. Print a copy of the form page(s) if required by your instructor.
16. Save and close the database file.

Figure 26

ID	Rank	Best-Selling Car	2015 Sales	2014 Sales	% Change
1	1	Toyota Camry	326330	334978	-2.6
2	2	Honda Accord	264814	304382	-13
3	3	Honda Civic	249749	253430	-1.5
4	4	Toyota Corolla	278742	258805	7.7
5	5	Ford Fusion	231475	240585	-3.8
6	6	Nissan Altima	262424	256935	2.1
7	7	Hyundai Elantra	193962	176403	10
8	8	Nissan Versa	109832	110272	-0.4
9	9	Chevrolet Malibu	147161	148574	-1
10	10	Hyundai Sonata	157680	164934	-4.4
11	11	Subaru Outback	108419	97266	11.5
12	12	Nissan Sentra	154270	141216	9.2
13	13	Chevrolet Cruze	177970	208114	-14.5
14	14	Kia Soul	112683	115579	-2.5
15	15	Ford Focus	163864	176156	-7
16	16	Kia Optima	118301	122646	-3.5
17	17	Chrysler 200	147073	75142	95.7
18	18	Toyota Prius	89812	110455	-18.7
19	19	Ford Mustang	96225	59831	60.8
20	20	Chevrolet Impala	85466	107162	-20.2