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Introduction to Microsoft Access 2010

WHAT'S IN THIS CHAPTER?

- ▶ A short history of the Access product
- ▶ A discussion of when to use Access
- ▶ An introduction to Access 2010 and its main features
- ▶ A discussion of how to create each of the Access object types using the Access designers

Microsoft Office Access 2010 is the latest version of Microsoft Access, the world-class relational database management system (RDBMS) for the Microsoft Windows platform, designed for building small- to medium-scale database applications. Access 2010 provides a rich set of features and tools for designing, creating, storing, analyzing, and viewing data, as well as the capability to connect to a large variety of other data sources. Access combines ease-of-use features with software development capabilities to support a wide range of user skill sets. Access also provides a Primary Interop Assembly (PIA) to allow other development platforms, such as Microsoft Visual Studio .NET 2010, to manage data using an Access database or even incorporate Access functionality into an external application. Access 2010, simply put, is a database system that provides a wide variety of functionality and flexibility to build Windows-based applications.

If you're reading this book, you probably already know a good deal about Microsoft Office Access 2010 or a previous version. While this book presents the various aspects of programming Access applications using primarily VBA code, as well as a number of other methods, this chapter provides an overview of Access and discusses some of the basics. Although it's possible to create and administer a database application using only code, there are many tools for creating, designing, and editing database objects that do not require any code at all. If you've used

Access before and are familiar with the visual designers and other Access tools, you can easily skip ahead to the next chapter to begin learning about the new features included in Access 2010.

A BRIEF HISTORY OF ACCESS

Microsoft Access has been around for nearly 18 years. The first version, Microsoft Access 1.0, was released in November of 1992. Built on top of the Jet Database Engine, Access was designed to enable users to create and manipulate Jet-compatible database applications through a variety of visual designers and a scripting language called Access Basic. Access quickly became one of the most popular database development systems for Windows and the user base started growing rapidly.

With Microsoft Access 95, the fourth release, Access was adopted as a member of the Microsoft Office product line. This was the perfect move for the product because it allowed Access to integrate and leverage many great features shared among other Office applications, such as Spell Checking and the Format Painter. Access Basic was replaced with the integration of Visual Basic for Applications (VBA) across the Office applications to provide a common programming language for creating solutions using the core Office products.

By the time Access 2003 was released, there were over 100 million users based in over 80 countries around the world. Everyone from individual users to the United States government was using Access. Access 2003 included a number of feature enhancements, as well as new additions. XML support and data import and export were improved in a number of ways, and signed database projects and disabled mode were introduced for added security. The *Access 2003 VBA Programmer's Reference* (Wrox, 2004, ISBN 978-0-764-55903-7), the original Access programmer's reference in this series, focused on this version, the eighth release of Access.

Fast-forward to the present, and you have Microsoft Office Access 2010, the tenth full release of Access. Now shipping in over 40 languages, Access is used throughout the world on Windows systems everywhere. For this release, there is a large focus on enhancing ease-of-use, and you'll notice major changes from the 2007 version as soon as you boot the program. There are a number of new features added to the ACCDB file format in this release, as well as a number of new builders, a completely overhauled Macro Designer, and the new SharePoint Web Application features, all of which will be covered more in Chapter 2. After trying out Access 2010, I'm sure you'll see that Microsoft Office Access 2010 is the absolute best release of Access ever.

WHEN TO USE ACCESS

Some may ask whether Access is the end-all to database systems. The simple answer is, "No." Access is not the only database product on the market, nor is it the only database product available from Microsoft or for Windows. There are times you might want to use a different type of database system, such as Microsoft SQL Server. If you've used only Microsoft Access for your database needs, you might be wondering why you'd ever need another database system. It could be argued that Access can connect to so many different types of data sources that there's no need for other front-end products. Moreover, developers could make a case that an Access database is a perfect solution for data storage for an application developed outside of the Access client, such as a .NET application that stores data in a back-end Access database. Still, there may be several reasons to use other database products, and

the following sections discuss Access features, as well as other database system features, to help you choose which database system is best for your data storage needs.

Microsoft Office Access 2010

Microsoft Access is the perfect solution for single-user applications. Access provides many built-in features for quickly and easily building forms, reports, charts, and queries to view data. The user interface (UI) is designed to be simple and intuitive so that even novice users can accomplish their tasks. Developers have the ability to create macros and write VBA code to define application logic. Another key feature of an Access database that is often overlooked is the storage of all database objects in a single file, which makes the database easy to distribute to others. Access does not require that a server environment be running to work directly with the database file, and there are a number of different methods for connecting to and working with an Access database. And, although the maximum supported Access database size is 2GB that is usually ample space for almost any personal database.

Multipleuser applications are supported by Access, although there are a number of considerations you should be aware of. There are record-locking options that affect how data is accessed, and some operations require the database to be opened in exclusive mode, thus locking other users out of the application. The recommendation for multiuser Access applications is to create a distributable front-end database (for each user) that connects to a back-end database that stores the data. For example, a front-end application written in Visual Basic can take advantage of DAO or ADO to make calls to retrieve and modify data in the back-end Access database. This type of application, called a Client-Server application, works well in a single-user or multiuser environment, which is discussed more in Chapter 21, the chapter on Client-Server development. Even then, applications that have a large number of users or data transactions may encounter performance limitations in the ACE database engine. When the database application grows too large, Microsoft recommends moving the database to Microsoft SQL Server, which is specifically designed to handle larger loads.

SQL Server 2008 Express Edition

The Microsoft SQL Server 2008 Express Edition is a scaled-down version of SQL Server 2008. Microsoft provides this product for free and it can be distributed for free as one of many ways to integrate data with .NET applications. It is ideal as an embedded database for small desktop applications that call for a fully functional SQL Server database, but do not require a large number of users. SQL Server supports database triggers and stored procedures, which are database features not supported by the ACE database engine, although they can be used by Access in an Access Data Project (ADP) file. Also, Access can link to the tables in SQL Server Express, just as with full SQL Server. SQL Server Express is perfect for scenarios where a SQL database engine is needed, without a large number of user accounts.

However, database development using SQL Server Express requires a fair amount of knowledge and there is no built-in forms package. You would not be able to build a complete Windows database application using only SQL Server Express in the same way you could using Access. Probably the most common scenario for using SQL Server Express is when developing a front-end application using Microsoft .NET Framework technology, in a programming language such as C#, which

connects to the SQL Server database engine, which is used by the application to manage data. It is worth noting that a fully functioning front-end database application (complete with forms, reports, and charts) easily could be created in Access and connected to a back-end SQL database on a machine running any version of SQL Server 2008 to enjoy the benefits of the SQL Server database engine.

SQL Server 2008

Full Microsoft SQL Server 2008 is the perfect solution for large-scale database applications. Typically, applications that require a large number of users, many concurrent connections, great amounts of data storage, data transactions, direct data security, or that need routine database back-ups are ideal for SQL Server. SQL Server is one of the most robust and scalable database systems available for Windows. But, as with SQL Server Express, SQL Server will require a front-end application to be developed that will allow users to access the data stored in the SQL database. And, all of this power comes with an associated cost. SQL Server is not free; in fact, it is quite expensive! Additionally, creating database applications with SQL Server also requires in-depth knowledge of database design and how to work with SQL Server. Although not the best choice for a small, end-user database solution, Microsoft SQL Server is ideal for enterprise systems used for storing critical and sensitive business data.

How Do You Choose?

If you're not sure which type of database to create for your application, ask yourself the following questions:

- Will your database realistically grow beyond 2GB?
- Are there security concerns for the data stored and used by your application?
- Is the data in your application critical or irreplaceable?
- Does your application require a large number of simultaneous transactions at any given time?
- Does your database need to be accessed by a large number of users simultaneously?
- How will users work with the data from the database in the application?
- Will the database need to provide user-level security?

Even answering these questions won't provide a definitive answer as to which type of database you should use for any given application. Every application's data storage mechanism should be evaluated on a separate basis by gathering storage requirements and researching the application's purpose to determine which type of database management system to use. For example, if the application will need to store 1.5GB of data, will store confidential data, and will need to be accessed by thousands of users at any given time you might consider employing SQL Server. However, if an application requires less than 1GB of data, needs to accommodate 20 users with relatively low traffic, and must maintain low development and support costs Microsoft Office Access 2010 is the perfect choice.

ACCESS DATABASE BASICS

The majority of this book is devoted to discussing how to write VBA code for Access database applications; however, many of the features that Access 2010 provides do not require any code whatsoever. In fact, Access is specifically designed to make it easy to build database applications without knowing how to write a lick of code. Although almost any operation in an Access database application can be created by writing and executing code, often there are simpler methods that Access provides, such as the various designers and wizards built into Access. Knowing when it is best to use code and when to use other tools is critical to building cost-effective database solutions, and fortunately, Access 2010 makes this very easy to do!

Getting Started in Access 2010

As soon as you start Access 2010, you will see immediate changes when compared to previous versions. Instead of seeing the Getting Started screen from Access 2007 or a blank window, as in prior versions of Access, you are taken to the new Office 2010 Backstage. The Backstage enables the user to quickly open an existing database, create a new blank database, or even create a new database template. If the computer has an Internet connection and is online, links to Office online and its content are also present to help keep you connected to the latest resources available. You may also notice that the Office button from Access 2007 has been replaced by the File Ribbon tab. The File Ribbon tab exposes all of the Access functionality for working with the database save and load options, the Access Options dialog box for database and applications settings, as well as many of the database analysis tools that Access 2010 provides. The new Backstage feature is the new launching point for all Access database sessions and will be discussed throughout this book.

Access 2010 Database Templates

The Access team has continued to leverage its database template features added in Access 2007 and has created a brand new set of templates for Access 2010. Many of the previous database template applications have been updated and a new slew of templates has been created, many of which are SharePoint Web Applications that work with the new features of SharePoint 2010. New to Access 2010 and Office online are Access database templates that have been submitted by the community. This allows developers from all over the world to share their database applications as part of the Microsoft community. Database templates are a great starting point for building a database solution.

To create a new database using a template, click on the New tab on the left panel of Access 2010 Backstage (the File Ribbon tab). Then click the Sample Templates category to show the built-in templates, or simply select one of the templates from the Office.com templates. Once the template is selected, the preview pane on the right side of the Backstage window will show the template's metadata details. If the template is from Office Online, you will see a Download button; otherwise, you see the Create button. Figure 1-1 provides an illustration of the Backstage with the Northwind template selected.

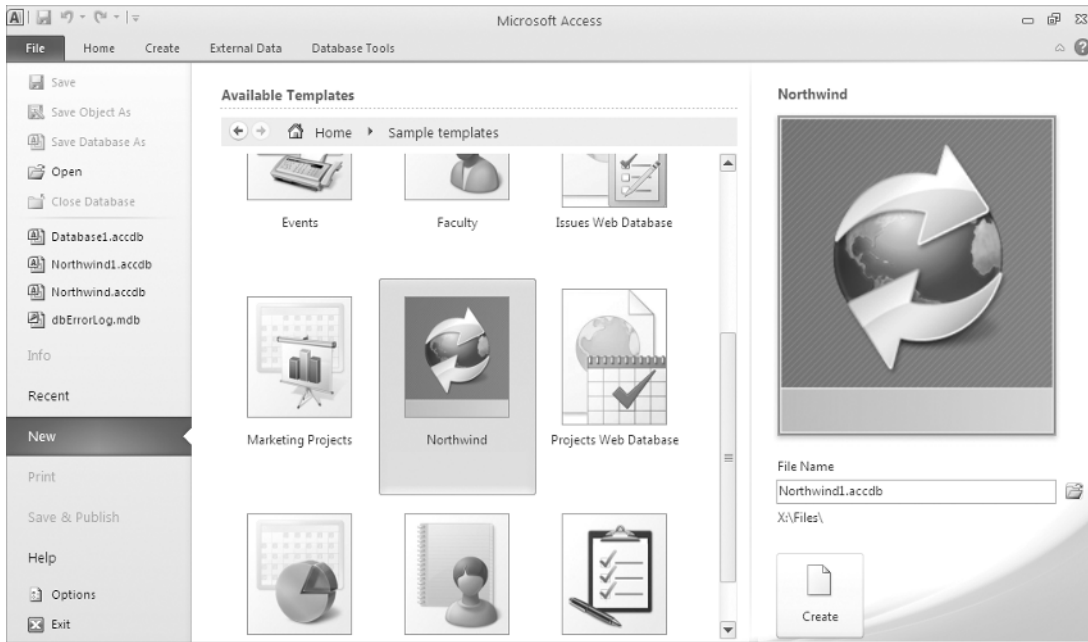


FIGURE 1-1

Clicking the Download or Create button will create a new database from the template—the Northwind template, in this example. Once you start the database creation process, you briefly see the Preparing Template dialog box and then the new database will be opened in the Access client window.

The Access Navigation Pane

Originally released in Access 2007, the Navigation Pane provides the user with the ability to see and open database objects. The Navigation Pane replaces its predecessor, the Database window, and provides a number of additional features not previously available. The Navigation Pane is found on the left side of the Access client window when a database is opened in a normal Access session. The Navigation Pane is the primary interface for working with database objects in Access 2010.

By default, when the Northwind database template is created, the Navigation Pane is collapsed. Click on the Navigation Pane to expand it and see the database objects contained in the Northwind database application. The Navigation Pane is highly customizable and provides a number of methods for grouping and filtering database objects. In the case of the Northwind database, a custom grouping, named Northwind Traders, has been created and is shown by that name at the top of the pane. Clicking the top of the pane displays the various object grouping options available in the database. If you choose the Object Type grouping option, the Navigation Pane will show all of the database objects, grouped by each object type, just as the Database window would have in versions of Access prior to 2007. If you are not familiar with the Navigation Pane, this view will be much more familiar and is comparable to the Database window.

The Access Ribbon

Introduced originally in Access 2007, the Access Ribbon is designed to be the primary interface for the majority of operations that Access 2010 provides. The Ribbon replaces the standard Windows style application menu bar and provides much more flexibility than its predecessor. The Ribbon is found at the top of the Access client window. The Access Ribbon is context driven, so certain Ribbons and functionality will only be available in certain modes. For example, the Access Form Design Tools Ribbon is only open when a form is open in Design View. Get to know the Ribbon well; it will be your primary method for working with the Access client functionality.

The Access Security Bar

The Access Security Bar was originally added in Access 2007 and is found directly below the Ribbon when a database is in disabled mode, which is the default mode for Access sessions. The Access Security Bar was added to provide a quick method to enable a database application to allow the execution of code, action queries, unsafe macros, and other operations that are deemed potentially dangerous. To enable a database application in Access 2010, simply click on the Enable Content button on the Access Security Bar.

ACCESS DATABASE OBJECTS

Now that you have a grasp of the basic components to the Access 2010 UI, it is good to have an overview of how to create database objects using the tools that Access 2010 provides. Access 2010 provides six basic object types: Tables, Queries, Forms, Reports, Macros, and Modules. These objects are used to build a database application and, if you are already familiar with Access, are most likely very familiar with each of these objects. Although any of these objects can be created by writing and executing code, often it is much simpler and faster to use the Access design tools to do so. The Create Ribbon is the primary location used for creating all of the major database objects, which will be discussed in this section.

Creating Tables

Tables are the backbone of any database. Tables store all of the data in an Access database application and designing them correctly the first time can save a lot of time and effort in the future, as any changes made to a table once it is already in use may also require substantial changes to all objects that depend on that table. Tables have columns, called Fields, and rows, called Records. The type of data you need to store in any given table field is dictated by its purpose in the application. For example, if you need to store the date on which some event occurred, you would use a Date/Time field data type. You could use a Text field type to store a date and there may be cases where that makes sense, but most of the time, the Date/Time type will be more beneficial because it enables you to leverage the comparison operations provided by the ACE (Access Connectivity Engine) database engine, which could not be done with the Text field type.

Creating tables through the Access 2010 UI is accomplished by choosing any of the options in the Tables group on the Create Ribbon. The Tables group contains three primary options for creating tables: a Table, a Table Design, and a SharePoint Lists option. The Table option opens a new table in the Table Layout designer. The Table Design option opens a new table in the standard Access Table

designer. And the SharePoint Lists option enables you to create a new SharePoint Linked-Table from a selection of common list types or by selecting from an existing SharePoint list. Clicking on any of these Ribbon options will create the new table in the currently open Access database and open it in the main Access window.

Access 2010 Field Types

Access 2010 supports eleven field data types for building database tables. The field types supported by the ACE 2010 database engine are: Attachment, AutoNumber, Calculated, Currency, Date/Time, Hyperlink, Memo, Number, OLE Object, Text, and Yes/No.

The Table Designer has one new option available for ACCDB fields in Access 2010. New to Access 2010 is the Calculated field type, which is very similar to a calculated field in a query. This type allows the value of a field to be calculated based on the function supplied when the field is created. Although this is shown as a new field type and technically is its own field type, the data types that are stored in the field are still the basic data types. In itself, the Calculated field is not a new type of data, just a new option for tables.

The Access Table Designer also shows the Lookup field option as a separate option in the field type list. However, Lookup fields are nothing more than a Number or Text field type that defines a key value in another table, so Lookup field types are also not a separate data type.

Access 2010 also supports Complex Data fields for many data types, which were originally introduced in the Access 2007 release. The complex data field option allows multiple values to be selected from a value list for a field in a record. For example, one might have a field that allows selecting a fruit type and it list several kinds of fruit: an Apple, an Orange, and a Banana. If the Allow Multiple Values option is selected for this field, then the user would be able to select several options, instead of just a single option, such as Apples and Orange, instead of just one or the other. The data stored in a Complex Data field can be manipulated as a set of data or as single values. Although not really a different data type, complex data fields allow the Access data types to be used in a different fashion than allowed traditionally.

The following table provides a brief description of each data type's purpose and whether it supports complex data.

DATA TYPE	DESCRIPTION
Attachment	A field type to store a collection of files for a given record. Stored as a complex data field, the complex scalar fields expose three pieces of data: File Name, File Data (the file itself), and the File Type. Files stored as attachments are stored in a hidden system table.
AutoNumber	Stored as a 4-byte integer that is assigned automatically when the record is created. Can be assigned as consecutive or random values. If the AutoNumber is a Replication ID, it is stored as a 16-byte GUID, instead of an integer.
Currency	Stored as an 8-byte number allowing a numeric range of: -922,337,203,685,477.5808 to 922,337,203,685,477.5807. The type is a fixed-point number, providing 15 digits to the left and 4 digits to the right of the decimal place for numeric precision.

DATA TYPE	DESCRIPTION
Date/Time	Stored as IEEE 8-byte, floating-point number allowing a date range of 1 January 100 to 31 December 9999. The Date/Time field may also include a time value range of: 0:00:00 to 23:59:59.
Hyperlink	A combination of text and numbers stored in a Memo field type to be used as a hyperlink address. The hyperlink can have four parts: Text to Display, Address, Sub Address, and Screen Tip.
Memo	Stores any number of characters up to the limit on the size of the database, 2GB. However, text box controls and the datasheet only allow adding or editing up to the first 63,999 characters stored in the field. You need to use code to work with more than 64,000 characters in a Memo field. Only the first 255 of these characters can be indexed or searched.
Number	Provides several numeric data types dictated by the Field Size property for this type. A number field can be either an integer or floating type numbers. Supported data types are Byte (1-byte integer), Integer (2-byte integer), Long (4-byte integer), Single (2-byte scaled floating point), Double (4-byte scaled floating point), Replication ID (16-byte GUID), and Decimal (12-byte scaled floating point). Number fields can be complex data fields.
OLE Object	Stores up to 1GB of OLE object data (such as a bitmap image, Word document, an Excel spreadsheet, or some other binary data) linked to or embedded in the field.
Text	Stores up to 255 characters of text, where the field length is dictated by the Field Size property for the field. The field can be indexed and is fully searchable. Text data type fields can be complex data fields.
Yes/No	Stores a 1-bit value of -1 or 0, but can also be formatted as Yes/No, On/Off, or True/False. The size of this data type is 1 byte.

Each data type has its own unique purposes, some of which overlap, so be sure to choose the data types wisely. For example, both Text and Memo field types store text characters. Because both types are searchable up to 256 characters and the memo field can hold much more than 256 characters, one might assume that all strings should be stored in Memo fields. However, if that implementation were the case, database users might encounter performance issues when running queries against large sets of Memo field data, which could be avoided by using a Text field type instead. Be sure to completely analyze the data needs before creating a table so that required data types can be planned for appropriately.

Creating Queries

Queries can be created by selecting either option in the Queries group on the Create Ribbon. Queries can be used for a wide variety of purposes such as filtering data based on selection criteria, calculating values, joining records stored in different tables, deleting records from a table, updating records based upon specific criteria, creating new tables, and much, much more. If you have prior

database development experience, you've probably had to write SQL statements and already know how complex they can be (and how difficult they can be to get correct). The Access Query Designer provides a graphical interface to help generate the correct SQL statement for many query types, often helping to reduce the complexity of creating accurate SQL statements. Access 2010 also continues to provide the Query Wizard, a tool specifically designed to walk the user through creating each of the pieces of the query in a step-by-step fashion. Switching any query to SQL View mode allows for direct modification of the SQL statement for the query. Access 2010 makes building queries extremely easy, whether you're using the Query Designer, using the Query Wizard, or writing the SQL statement from scratch.

Creating Forms

Forms are vital for allowing users to add, modify, and delete data in a database application. Access provides an extensive forms package and several designers for building robust Windows-style forms. The Create Ribbon provides the Forms group, which offers several options for creating new forms. There are 16 different options for creating various predefined form types, provided by Access to reduce development time by quickly creating common form types. It is important to remember that many options in the Forms group require that a database object be selected in the Navigation Pane, upon which the new form will be created when the option in the Ribbon is chosen. For example, selecting a query in the Navigation Pane and then clicking the Form button creates a new form based on that query. This rule applies for tables, queries, forms, and reports that are selected in the Navigation Pane. If you select any object that does not support the creation of one of the quick forms, such as a macro, many of the form options in the Ribbon will be disabled. It is important to note that any of the predefined form options can be created from any other form type by setting the correct set of form properties. Clicking on any of the form options on the Create Ribbon will create a new form and open it for editing in the Access window.

It should be noted that Access 2010 actually has two different form designers available. Originally introduced in the Access 2007 release, the Form Layout View mode designer allows the user to build the form while being able to see the actual data that will be shown in it. The original designer in Access 2010 is the classic Design View mode designer. Around since the beginning of Access, the Design View designer allows the user to build forms in a grid-based layout, where all of the sections of the form are broken up to show as separate parts. Both designers have their pros and cons, but you will probably find yourself using both to build forms in Access, depending on the specific task at hand.

Creating Reports

Reports are probably the most common way that users will view their data, and that's why it is one of the more robust features in Access. The Reports group of the Create Ribbon provides all of the options for creating reports through the Access UI. Much like forms, Access provides a number of different options for building predefined report types, many of which require an object to be selected in the Navigation Pane before the option is available. Clicking on any of these options will create a new report and open it in the main Access window.

Similar to forms, there are also two designers available for building reports in Access 2010: the classic Design View designer, and the newer Layout View designer. These designers operate in the same manner as they do with forms, but it is worth noting that the Layout View designer is extremely useful for reports because you can see the actual data that you are building the report for. The both Report designers provide two panes: the Grouping and Sorting pane, which greatly improves grouping, sorting, and filtering tasks in a report; and the Design Task pane, which provides the Property Sheet and the Field List. Finally, Access 2010 also provides two standard View modes for Reports: Report View and Print Preview modes. Report View is the default View mode for Reports and allows the user to interact directly with the data in the Report. Print Preview mode is a standard Windows Print Preview window that shows what the printed report will look like and provides options for actually printing the report. Reports in Access 2010 are extremely flexible and useful for any database application.

Creating Macros

The Access 2010 Create Ribbon provides only one option for creating macros, which is the Macro button. Clicking the Macro button option will create a new database-level Macro object and open it in the Access Macro Designer. Embedded macros can also be created via the Property Sheet. However, these macros live in the module for the host object and are not standalone database objects. Macros are often used as a simple alternative to writing VBA code to execute custom application functionality. Although Macros are discussed in depth in Chapter 4, this section will discuss a few of their basics.

Macros in Access are a set of one or more predefined actions that can be set to the events of objects to be executed when those events are triggered. One of the major new features of Access 2010 is that it provides a completely updated macros designer, as well as several new major features for macros. Macros come in two flavors: Safe and Unsafe. Safe macros can be executed when the database is in disabled mode, but unsafe macros cannot. Macros are extremely powerful because they are easy to create, can provide custom functionality just about anywhere in a database application, and provide a large number of common features. Chapter 4 of this book is devoted to discussing macros in Access 2010 and provides more in-depth information on the subject.

Creating Modules

Finally, the last database object type to discuss here, but certainly the most important database object type in terms of this book, is the Module object type. Modules provide storage for VBA code, which can be called in many places throughout a database application. There are three basic types of modules: Modules, class modules, and Form/report modules. While each of these module types has a slightly different purpose and design, they all provide basically the same functionality, which is a storage location for VBA code inside of the database file.

Modules and class modules are themselves individual database objects. Form/report modules are slightly different in that they are tied directly to the Form/Report that they live on. They are not shown as separate database objects in Access, although they are shown as separate modules in VBE (the Visual Basic Editor). Once any of these modules has been created, the user can begin writing VBA code within that module.

To create a new module in a database, simply click on any of the Module options on the Create Ribbon. The new module is created and VBE opens, with the module open for editing in the main window. A user can begin writing code and, when all changes have been completed, the Save button can be used to save the module to the database. In the case of Form/report modules, the module is created the first time the Code Builder or Macro Builder is invoked for a particular form or report. Any subsequent call to embedded code just re-uses that already created module. Regardless of the method chosen, creating modules in Access 2010 is a snap!

SUMMARY

This chapter discussed some of the basics of Microsoft Office Access 2010 and how to create database applications. You learned when it is appropriate to use an Access database to store your data and when it is appropriate to use other database systems. This chapter explored some of the benefits of using the designers to quickly build database objects without writing any code, as well as all of the major database objects that Access 2010 provides. And the Access 2010 UI makes it extremely easy to accomplish all of these database development tasks.

However, this book is about programming Access 2010 and you're probably wondering when you're going to write some code. Stay tuned — although Chapters 2 and 3 cover the new features of Access and upgrading to Access 2010 respectively, Chapter 4 kicks off the discussion of programming Access 2010 by discussing how to program macros. Chapter 5 and most of the subsequent chapters in this book discuss programming Access with VBA code to build high quality, robust database applications with the latest cutting-edge features available in Access 2010.