INTRODUCTION TO MICROSOFT ACCESS 2010 v. 2.0

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1 Introduction

This compendium contains an introduction to the most commonly used functionalities found in Microsoft Access 2010, from how to create a database and define referential integrity to how to create forms and reports. As an added bonus, most of the information in this compendium also applies to earlier versions of Microsoft Access.

It is strongly recommended that you read through (or at least look through) the entire compendium before you start working with it in front of a computer. There are many references back and forth in this compendium, and therefore you should find it quite helpful to have acquired an idea beforehand of what is coming in later chapters.

Any comments or feedback that you may have about this compendium are greatly appreciated. Send any such comments or feedback to the author at <u>nikos@dsv.su.se</u>.

The latest version of this compendium, all the files needed to complete the tutorial, relevant links and other information are available at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

1.1 Microsoft Access

Microsoft Access integrates a database management system and a rapid application development environment in the same package. It provides almost all basic relational database functionalities, and it extends this with facilities for rapid application development. Advanced development can also be done in Microsoft Access by using the also integrated Visual Basic environment.

Microsoft Access 2010 is included in the list of software offered by Microsoft within the MSDN Academic Alliance agreement. This means that any student at KTH/ICT or SU/DSV is entitled to one free licence for MS Access 2010. If you want to download Microsoft Access 2010 (or any other Microsoft software covered by Microsoft Dreamspark), go to https://msdn60.e-academy.com/kgth_ite/ or https://msdn60.e-academy.com/su_ids/.

From now on in this compendium we will refer to Microsoft Access 2010 as Access.

1.2 Prerequisites

This is a tutorial about Access, so the reader must already be familiar with conceptual modeling, relational database theory and some basic programming. Later in this compendium we will start working with a small case. We will skip to having a ready conceptual model, so we will assume that some conceptual modeling of our case was already done. The translation of the conceptual schema into a relational database schema will be shown, but not in any detail.

1.2.1 Literature

While working with this compendium it is recommended that you have some sort of reference literature on relational databases and SQL. Here are some recommended books:

- Connolly, Begg: Database Systems A Practical Approach to Design, Implementation and Management, Addison Wesley
- Elmasri, Navathe, *Fundamentals of Database Systems*, Addison-Wesley

There are many more books that will do just fine, but these two are mentioned here since they are the ones used for courses at SU/DSV and KTH/ICT.

1.3 Structure

This compendium has the following simple structure:

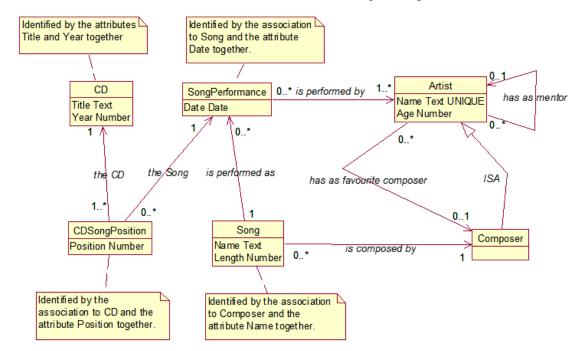
- 1. A short introduction (which you are reading right now)
- 2. A description of the case used throughout the compendium (chapter 2)
- 3. Creating a database for our case in Access (chapter 4)
 - a. Defining and creating the tables (section 4.1)
 - b. Defining relationships and referential integrity (section 4.2)
- 4. Querying the database (chapter 5)
 - a. Populating (putting some data in) the database so that we have something to query about (section 5.1)
 - b. Writing SQL statements to query the database (section 5.2)
 - c. Creating and using views (section 5.3)
- 5. Creating forms for input and for working with the data in the database (in a more user-friendly way) (chapter 6)
- 6. Creating reports for presenting data from the database (chapter 7)
- 7. Creating macros to do things that can't be done with just queries, forms and reports (chapter 8)
- 8. Finally there are some more tips and links to more information (chapters 9, 10 and 11)

2 The Case

The case used in this compendium has been specifically designed in order to be both small and cover all the things to be discussed in the chapters to follow. The same case will be used for all the exercises in the rest of the compendium.

The system we are going to build will manage the following information:

- There are many artists, and for each of them we know their name and age. No two artists have the same name.
- Some of the artists are also composers.
- Composers compose songs. A composer never composes two songs with the same name.
- For each composed song we know its name and length (in seconds).
- Each song can be performed on particular dates. Each song performance can involve many different artists. The same song cannot be performed twice on the same date.
- A particular performance of a song can be included on a CD. A CD can contain many different songs performed by different artists.
- For each CD we know the order of the songs.
- Each CD has a title and a year (when it was released). No two CDs released the same year have the same title.
- A CD can only contain songs performed the same year or earlier (for obvious reasons).
- Many artists have a mentor, who is another artist. The mentor must be older than the artist.
- An artist can have a favorite composer.



The information above has been modeled into the following conceptual model:

Figure 1 Conceptual model of the case

The arrows on the conceptual model are only there to help read the associations, for example "A song is composed by a composer" instead of "A composer is composed by a song". The only two things not modeled are the facts that "A CD can only contain songs performed the same year or earlier" and that "The mentor must be older than the artist". These will be handled as business rules, and we will see how we can add such restrictions in our database system later.

Before we can implement our database, the conceptual model has to be translated into a logical relational database schema. In this schema we will still not specify any Access specific information. We will specify primary keys, foreign keys, data types, and other restrictions.

The following figure shows the logical database schema created from the conceptual model. Primary keys are shown as <u>underlined columns</u>, while an asterisk (*) indicates columns that constitute foreign keys. The columns CD.Title, Song.Name and Artist.Name are of data type STRING (or VARCHAR). The columns CD.ID, CD.Year, Artist.Age, Song.ID and Song.Length are of data type INTEGER. The column SongPerfrormance.Date is of data type DATE. All foreign key columns are automatically of the same data type as the referenced columns. Remember that keys can be composite, i.e. consist of more than one column, and that there can be several foreign keys in a table, possibly even sharing some column(s).

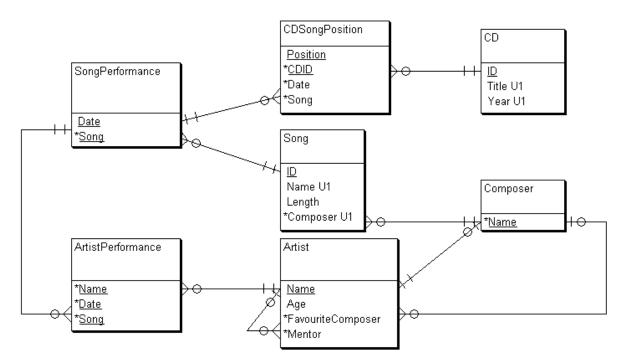


Figure 2 Logical relational database schema of the case

The schema of Figure 2 can also be shown in the following textual notation. The advantage of this textual notation is that the foreign keys are specified explicitly and there is no room for confusion.

Tables (primary keys are <u>underlined</u>):

Artist (<u>Name</u>, Age, FavouriteComposer, Mentor) Composer (<u>Name</u>) Song (<u>ID</u>, Name, Length, Composer) SongPerformance (<u>Date, Song</u>) ArtistPerformance (<u>Name, Date, Song</u>) CD (<u>ID</u>, Title, Year) CDSongPosition (<u>Position, CDID</u>, Date, Song)

It is also possible to include the data types in this notation. The table Artist could be written instead as follows: Artist (Name STRING, Age INTEGER, FavouriteComposer STRING, Mentor STRING)

Foreign keys (foreign key on the left, referenced primary (or alternate) key on the right):

Artist.FavouriteComposer << Composer.Name Artist.Mentor << Artist.Name Composer.Name << Artist.Name Song.Composer << Composer.Name SongPerformance.Song << Song.ID ArtistPerformance.Name << Artist.Name ArtistPerformance.(Date, Song) << SongPerformance.(Date, Song) CDSongPosition.CDID << CD.ID CDSongPosition.(Date, Song) << SongPerformance.(Date, Song) SU/DSV KTH/ICT/SCS

The first row says that the column FavouriteComposer of the table Artist is a foreign key to the column Name of the table Composer. For composite keys there is no difference: The last row, for example, says that the columns Date and Song of the table CDSongPosition constitute together a foreign key to the primary key of the table SongPerformance, namely the columns Date and Song.

Other constraints: UNIQUE (CD.Title, CD.Year) UNIQUE (Song.Name, Song.Composer)

In the next chapter we will see how we can create an Access database based on the relational database schema that we acquired earlier.

Our case also includes the following information needs and user interface:

- 1. Show all CD titles produced in 1999!
- 2. Show all songs in a particular CD!
- 3. Which CDs include songs written by Jerry Goldsmith?
- 4. Which song has been performed the most times?
- 5. How many distinct songs has each artist performed in?
- 6. Which artist has performed in at least one song of each CD?
- 7. Which artist has performed in at least one song of each composer?
- 8. Which songs has each composer composed?
- 9. A form for registering a new CD in the database.
- 10. A form for registering a new Artist in the database.
- 11. A form for registering song performances and artists performing them.
- 12. A report that shows the content of each CD (back cover style).
- 13. A report that shows information about each CD including which artists and composers that are related to the CD.
- 14. A report that shows for each composer the songs that they have composed and which performances of them exist and in which CDs these performances are included.

3 The Access Environment

As we mentioned in section 1.1, Access is both a database management system and an application development environment. Access uses the basic philosophy of the other products in Microsoft Office, which means that a database (and accompanying application) is stored in a file (similar to Word, Excel and PowerPoint). Access files use the extension "accdb". Creating such a file is the equivalent to creating a database (done in other products with the SQL command CREATE DATABASE).

Starting Access without opening a particular file shows a welcome menu for creating a new file (a new database):

A B O O O O O O O O O O O O O O O O O O									
 Save Save Object As Save Database As Save as Adobe PDF Open 	Available Ten	Home	A					Blank database	
 Close Database db1.mdb 	Blank database Office.com T	Blank web database	Recent templates	Sample templates	My templates		+		
 book.accdb cardb_model.mdb kurs.mdb info 									
Recent	Assets	Contacts	Education	Finance	Inventory	Issues & Tasks	Non-Profit		
Print Save & Publish	Personal	Projects	Sales & Marketing	Samples	Time & Billing	Small Business		File Name Database.accdb D:\	
Help									
🔀 Exit								Create	

On the left side of the window there is the main menu and under "New" we have the Blank database template (and some other templates) which will create a new file. The file name can be specified on the right side before pressing "Create".

Once a new database has been created, Access will automatically suggest that we create a table:

A		Table Tools Database : Data	base (Access 2007 - 2010) - Microsoft Acce	
File Home Create Exte	rnal Data Database Tools Acrobat	Fields Table		~ 🕐
	Date & Time Yes/No More Fields * ete	Modify Modify Memo Lookups Expression Settings - Properties	Format:	equired Inique Validation Field Validation
All Access Objects 💿 <	Table1			×
Search	▲ ID			
Tables	* (New)			
	Record: M < 1 of 1 > >> X No Fil	ter Search		
Datasheet View				Num Lock 🔳 🕍

On the top of the window we have the menu (File, Home, Create, etc.). Each option has its own toolbar and options will be active or inactive based on the current selection. The menu and corresponding toolbars is called "Ribbon". On the left side we have the object browser. Objects are not to be confused with objects in object-oriented programming. In Access we have six types of objects: Tables, Queries (views), Forms, Reports, Macros and Modules. All objects of these types will be shown in the object browser. The object browser is the control center of our database and is also known as the "Navigation Pane". From here we can open any table, query or other object in order to use it or modify it. The main area of the window (to the right of the object browser) is where we work with any objects we may open.

3.1 Configuration

Access and the current database can be configured from File > Options. Some interesting settings are available under Current Database and under Object Designers.

3.2 SQL

Access is a relational database management system and thus supports SQL. But Access seems to encourage users to use wizards and graphical tools, so SQL is not really up, front and center. In order to write and execute SQL, we have to first create a query and then switch to the SQL view. A query can be created from Create > Query Design. Access will immediately suggest that we add tables to a graphical design of our query:



After ignoring the "Show Table" pop-up window, we will have the option of switching to the SQL view either by pressing "SQL" on the ribbon (under Design) or by right-clicking on the query's tab selector and selecting "SQL View":

File Home Create Exte	rnal Data 🛛 Data b		at Design				× ?
SQL View Run Results	nd Update Crosstab Query Type	Delete Control	Show	Delete Rows	날 Insert Columns 산 Delete Columns 뗖 Return: All tup	Totals Parameter	Property Sheet
All Access Objects (C) (K) [search]	D e						×
	•						
	Field: Table: Sort: Show: Criteria: or: 4						

Querys can be saved as database objects and each query can contain one SQL statement (SELECT, UPDATE, INSERT, DELETE, CREATE TABLE, etc). Saving SELECT statements as queries is equivalent to creating views using CREATE VIEW, which is not supported in Access.

4 Creating A Database

Given the relational database schema created in chapter 2, we will now create a database in Access. We will start by creating the tables, defining their columns, data types and primary keys, and alternate keys if any. When all the tables are in place we will move on to establishing the relationships between tables, i.e. the foreign key relationships.

Before we can start creating tables though, we have to create a database. A database in Access is a file with the extension "accdb". Note that, with the exception of Access 2007, the previous versions use a different format and the extension "mdb".

Start Access from the start menu and create a blank database as described in the previous chapter. Place the new file at a suitable location. You can always move the file later if you want.

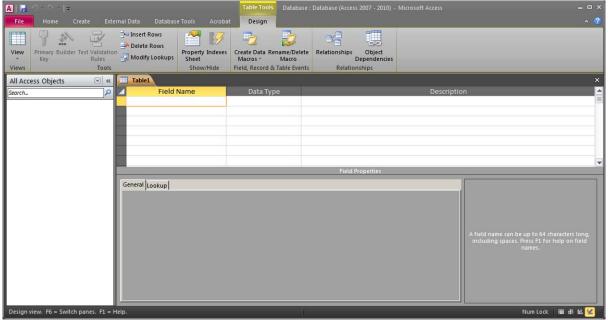
Access starts by suggesting that a new table be created. Close the new table without saving.

4.1 Creating Tables

There are many ways to create tables in Access, but we will only look at two of them. The first way is using a special design view where we can specify the names of the columns, the data types, primary keys and other field restrictions (for example NOT NULL, alternate keys, unique fields, etc.). The second way that we will look at, is specifying a DDL statement (i.e. a CREATE TABLE statement) for each table and then simply running the DDL statements.

4.1.1 Design

To create a table in design view, select Create > Table Design from the menu. This will open a new tab in the main area of the Access window:



In this window we can specify the structure of a new table. We start by specifying the columns of the table Artist. The columns that we have in this table are Name, Age, FavouriteComposer, and Mentor. They are all strings except from the column Age. So we can fill in the fields in the table design tab:

A		atabase : Database (Access 2007 - 2010) -	Microsoft Access	= = ×
File Home Create External Data Database				^ ?
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All Access Objects 💿 « 🔳 Table1				×
Search P Field N	ame Data Type		Description	
Name	Text			
Age	Number			
FavouriteCompo	ser Text			
Mentor	Text			
		Field Properties		1. CO.
Countly 1				
General Lookup	50			
Field Size	50		_ _	
Input Mask				
Caption				
Default Value				
Validation Rule			A field name can be up	to 64 characters long,
Validation Text			including spaces. Pres	
Required	No		nan	nes.
Allow Zero Length	Yes			
Indexed	No			
Unicode Compression				
IME Mode IME Sentence Mode	No Control None			
Smart Tags	None			
Design view. F6 = Switch panes. F1 = Help.			Nu	ım Lock 🛛 🔠 🏭 🔛
		1		

The word "Name" is a reserved word in Access, so a warning may appear when naming a column "Name". We can ignore the warning and continue. When using column names that are reserved words, we may have to enclose the column names within "[" and "]" in SQL and in other contexts where Access may otherwise get confused.

Access has a data type called Text, which is equivalent to String, and a data type Number, which can be used as an integer.

For each column (called "field" in Access) of the table we can specify more details. The Field Properties shown in the lower half of the tab belong to the field that is selected in the upper half. The active field is highlighted with a different color. So in the image above the field properties shown apply to the field Name.

The available field properties depend on the data type of the selected field. For example a Text field has a property Field Size. If you want to see help on a particular field property, simply place the cursor on that field property. The text to the right will give you a short explanation of that field property. In the image below, the cursor has been placed in the first field property (Field Size) (and the ribbon and the object browser have been minimized):

	. • • • • =			Table Tools	Database : Database (Access 2007 - 2010)	- Microsoft Access 🛛 🗕 🗖
File	Home Create	External Da	ta Database Tools			
»	Table1					
	Field Nam	ie	Data Type		Description	
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	Age	1	Number			
- 17	FavouriteCompose	r 1	Гext			
- 17	Mentor	1	Text			
16						
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Navigation Pane	Field Size Format	50			A	
Nav	Input Mask Caption Default Value Validation Rule Validation Rule Validation Text Required Allow Zero Length Indexed Unicode Compression IME Mode	No Yes No Yes No Control				The maximum number of characters you can enter in the field. The largest maximum you can set is 255. Press F1 for help on field size.
Nav	Caption Default Value Validation Rule Validation Text Required Allow Zero Length Indexed Unicode Compression	Yes No Yes				enter in the field. The largest maximum you

A field of data type Number has different properties:

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**	Table1							×
	Field N	lame	Data Type			Description		
	Name		Text					
	Age		Number					
1	FavouriteCompo	oser	Text					
	Mentor		Text					
1								-
	-							
2	- 16		10	22	Field Pro	operties		
Pa	General Lookup							
Navigation Pane	Field Size	Long Intege						
ati	Format	Long Intege						
ig	Decimal Places	Auto						
Nav	Input Mask							
	Caption						The size and type of numbers to enter in the	
	Default Value						field. The most common settings are Double	
	Validation Rule						and Long Integer. If this field will be joined to	
	Validation Text						an AutoNumber field in a many-to-one relationship, this setting must be Long Intege	
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	Indexed	No						
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	TEXT Alight	General				24		
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Desig	n view. F6 = Switch pa	nes. F1 = Help.					Num Lock 🛛 🎟 🛍 😫	2
								_

A Number field has also a property Field Size, but here we can only select one of the available choices:

A 1	• <mark>•</mark> 2• °∎* ≠				Table Tools	Database : Database (Access 2007 - 2010)	- Microsoft Access 🛛 🗕 🗖	
File	Home Creat	e External D	ata Database Tools	Acrobat B	Design			
	Table1							×
	Field N	2010/2012	Data Type			Description		
	Name		Text					=
	Age		Number					
	FavouriteCompo		Text					
	Mentor		Text					
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2	116		(2)	W.	Field P	roperties	1	
Navigation Pane	General Lookup Field Size Format Decimal Places Input Mask Caption Default Value Validation Rule Validation Text Required Indexed Smart Tags Text Align	Long Intege Byte Integer Single Double Replication Decimal No No General	er				The size and type of numbers to enter in the field. The most common settings are Double and Long Integer. If this field will be gioined to an AutoNumber field in a many-to-one relationship, this setting must be Long Integer.	
Desig	n view. F6 = Switch par	nes, F1 = Help.			IK		Num Lock 🛙 i 🖩 🛍 🕍	

Now that we have specified all the columns of the table, we can also specify the primary key for the table. We can simple select the field that we want to use as primary key and press the Primary Key button on the ribbon (under Design). The selected field will then be marked with a key symbol (on the left of the field name) to indicate that it has been selected as primary key:

A File	Home Create	External			Acrobat	Table Tools Design		Database (Acces	s 2007 - 2010) -	Microsoft	Access – 🗆
View	Primary Builder Test V Key	ž 🚽	= Insert Rows • Delete Rows • Modify Lookups	Property In Sheet		Create Data Re Macros *	Macro		Object Dependencies		
Views		Tools		Show/H	lide	Field, Record &	Table Events	Relatio	inships		
»	Table1										;
	Field Nan	ne	Data Ty	pe					Descriptio	on	
	😢 Name		Text								
	Age		Number								
	FavouriteCompose	r	Text								
	Mentor		Text								
Navigation Pane	General Lookup			_		_	Field Properti	25	_		
gat	Field Size	50								_	
avi	Format Input Mask										
Z	Caption										
	Default Value										
	Validation Rule Validation Text	· · · · ·								_	A field name can be up to 64 characters long, including spaces. Press F1 for help on field
	Required	No								_	names.
	Allow Zero Length	Yes									
	Indexed	Yes (No Du	iplicates)								
	Unicode Compression IME Mode	Yes No Contro	1								
	IME Sentence Mode	None									
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When specifying each field's data type, we can also specify whether this field should accept NULL. By setting the property Required to Yes, we specify the field as NOT NULL. The column Name is set as primary key, so it is implicitly NOT NULL. The column Age on the other hand must be explicitly set as Required. The remaining columns should allow NULL according to our model.

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We can specify the table name now by either trying to save the table or trying to close the table design. To save the table press Ctrl-S or select File > Save from the menu, or right-click on the table tab selector and select Save. Access will ask you to specify the name of the new table:



Specify the table name (Artist) and press OK.

The table name is now visible in the tab selector and the table has appeared in the object browser: (under "Tables"):

Il Access Objects	🔍 « 🛄 Artist					
arch	P A Fiel	d Name	Data Type		Description	
ables	Name		Text			
	Age		Number			
Artist	FavouriteCon	noser	Text			
	Mentor		Text			
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	And the second sec		11	Field Properties		
	Field Size Format Input Mask Caption Default Value Validation Rule	50			A field name can be up including spaces. Pres	
	Validation Text Required	No			nam	
	Allow Zero Lengt					
	Indexed		Ouplicates)			
	Unicode Compres					
	IME Mode	No Cont	rol			
	IME Sentence Mo	de None				

Now, let's create the table Song. This table has a surrogate primary key called ID. We decided previously to let this be an integer field. Access provides a data type AutoNumber, which can be quite useful in this case. An AutoNumber column is managed by Access. Whenever a new row is added, Access calculates a new unique value for this column. An AutoNumber is actually a Long Integer so this is important to remember when we later create foreign key columns that must refer to AutoNumbers. We can create the table Song according to the following screenshot:

🗛 😹 🧐 🔹 🗠 📲		Table Tools		ft Access 🛛 🗕 🗆 🗙
File Home Create Exte				
All Access Objects 💿 «	Artist Table1			×
Search	Field Name	Data Type		scription
Tables	1D	AutoNumber	Surrogate primary key column	
Artist	Name	Text	The name of the song	
	Length	Number	The length of the song in seconds	
	Composer	Text	Foresign key to the table Composer,	that indicates the composer of this song
		10	Field Properties	▼
	1		Field Properties	
	General Lookup			
	Field Size Long Inte	ger		
	New Values Incremen	t		
	Format			
	Caption Indexed Yes (No D	(unlicates)		
	Smart Tags	upireacesj		A field name can be up to 64 characters long,
	Text Align General			including spaces. Press F1 for help on field
				names.
Design view. F6 = Switch panes. F1 = F	Help.			Num Lock 🛛 🏛 🖽 🔛 🚽

As you can see in the image above, it is also possible to write comments for each field. This can be useful, especially when the name of a field is not very intuitive, but generally, we should strive to have informative field names. When you have defined all four columns, their data types and the primary key, you can save the table and close the table design window.

We have now two tables in our database window:

	Q • • • =	-	Database : Datat	oase (Access 2007 - 20	10) - Microsoft Access	_ = ×
File	Home	Create	External Data	Database Tools	Acrobat	× 🕐
All Acce	ss Objects	\odot	*			
Search			Q			
Tables			*			
An III	tist					
So 🛄	ng					
Tables Art So						
Ready				1		Num Lock

Now let's create a table with a composite primary key. SongPerformance is such a table.

Once again we start by selecting "Create" and "Table Design". We define the columns of our table and their data types as we did before. The column Date can be defined to be of data type Date/Time. We can then define in the field property "Format" that this field should be a "Short Date". We should now have the following:

A 🔙 🤊 - 🗠	- ∥≂					Table Tools	Database		ccess 2007 - 2010) - Microsoft Access	= ¤ ×
File Hor	ne Create	Exte	rnal Data	Database To	ols Acroba	t Design				
All Access Obj	ects (• *	Table1							×
Search		2		Field Nar	ne	Data Typ	e		Description	
Tables		*	Date			Date/Time	Т	The date of t	his performance	
Artist		~	Song			Number	F	oreign key t	to the song performed	
Song										-
							Field Prop	perties		11122
			General	ookun						
			Format	o o nap [Short Date					
			Input Ma	sk						
			Caption							
			Default V Validation							
			Validation						A field name can be up to 64 characte	ers long
			Required		No				including spaces. Press F1 for help of	
			Indexed		No				names.	
			IME Mode		No Control					
			IME Sente Smart Tag	nce Mode	None					
			Text Align		General					
			Show Dat		For dates					
	C 11 1	-								N. 41 100
Design view. F6	= Switch panes.	FI = f	telp.						Num Lock 🔳	# 🗉 🔛 👘

The only thing missing now is the primary key. In order to define a composite primary key, we must select all the primary key columns and then press the primary key button on the ribbon. We can do this by holding down the Ctrl-key and clicking on the square on the left of the relevant fields.

A 1 2 B -		Table Tools	Database : Database (Access	s 2007 - 2010) - Microsoft Access	= = ×
File Home Create	External Data Database Too	ls Acrobat Design			
View Primary Builder Test	Validation Rules Modify Lookups	B JD perty Indexes eet Show/Hide Field, Record &	Macro	Object Dependencies nships	
All Access Objects	😪 « 🔲 Table1				×
Search	Field Nam	e Data Typ	e	Description	
Tables	Date	Date/Time	The date of this	performance	
Artist	Song	Number	Foreign key to th	e song performed	
Song					
	General Lookup Field Size Format Decimal Places Input Mask Caption Default Value Validation Rule Validation Rule Validation Text Required Indexed Smart Tags Text Align	Long Integer Auto No No General	Field Properties	A field name of	an be up to 64 characters long, sces. Press F1 for help on field names.
Design view. F6 = Switch pane	es. F1 = Help.				Num Lock 🛛 🗃 🏦 🛍 🔀 📑

When all primary key columns have been highlighted, we can press the primary key button to indicate that all these columns together constitute the table's primary key. A primary key symbol will be shown next to each of the fields:

A]	ernal Data Database Tools Acro		se : Database (Access 2007 - 2010) - Mi	crosoft Access 🗕 🗆 X 🖍 💡
View Primary Builder Test Validatio Key Tools	A Insert Rows Delete Rows Modify Lookups Sheet Show/Hide		Dependencies	
All Access Objects 💿 «	Table1			×
Search	Field Name	Data Type Date/Time	The date of this performance	Description
Tables Artist Song	Song		Foreign key to the song perform	ed
Song Song			Field Properties	
	General Lookup Field Size Long Integ Format Decimal Places Decimal Places Auto Input Mask Caption Caption Default Value Validation Rule Validation Text Required No Indexed No Smart Tags Text Align	er		A field name can be up to 64 characters long, including spaces. Press F1 for help on field names.
Design view. F6 = Switch panes. F1 =	Help.			Num Lock 🛛 🗃 🖶 🔛 🔒

4.1.2 DDL

Another way to create a table in Access is by writing a CREATE TABLE statement and then executing it.

We can for example create the table CD with the following statement:

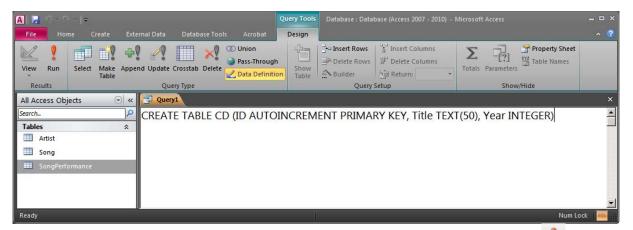
CREATE TABLE CD (ID AUTOINCREMENT PRIMARY KEY, Title TEXT(50), Year INTEGER)

AUTOINCREMENT is equivalent to the AutoNumber that we used in the design view in the previous section.

TEXT(50) is a text field that is up to 50 characters long.

INTEGER is equivalent to a Number field of type Long Integer.

The only thing we need now is a Query object which we can use to execute SQL (as we saw in section 3.2). Once we have a Query object in SQL view we can write our CREATE TABLE statement:



You can now either execute the statement directly by pressing the Run button (1) on the toolbar, or save the statement as a query object in order to execute it later. Press the Run

button to execute the statement. A new table (CD) will immediately appear in the object browser:

▲ 🔙 🧐 • ೧ • -		Query Tools	Database : Data	base (Access 2007 - 2010) -	Microsoft Access		×
File Home Create External Data	a Database Tools Acrobat	Design					
View Run Select Make Append Updat	te Crosstab Delete	Show	Delete Rows	법 Insert Columns 것 ^나 Delete Columns 실패 Return: *	Totals Parameters	Property Sheet	
Results Q	Query Type		Query	Setup	Show	v/Hide	
All Access Objects							×
Tables &	ATE TABLE CD (ID AUTO)	INCREIVI		KT KET, HUE TEA	(50), fear in	ILGEN)	
Song SongPerformance							
Ready						Num Lo	vck 🔐

By right-clicking on the new table and selecting "Design View", we can examine the table and possibly make changes:

A] 🛃 🧐 → 🔍 → 🚽 File Home Create Exter	nal Data Database	: Tools Acroba		Database (Access 2007 - 2010) - Mi	icrosoft Access	
View Views Views	Insert Rows	Property Indexes Sheet Show/Hide	Create Data Rename/Delete Macros * Macro Field, Record & Table Events	Relationships Object Dependencies Relationships		
All Access Objects 💿 🔍	🗗 Query1 🛄 CD					,
Search P	Field N	Name	Data Type		Descript	
Tables	ID ID		AutoNumber			
Artist	Title		Text			
CD CD	Year		Number			
Song						
SongPerformance				Field Properties		
	General Lookup					
	Field Size	Long Integer	r (
	New Values Format	Increment				
	Caption					
	Indexed	Yes (No Dupl	icates)			
	Smart Tags					
	Text Align	General				including spaces. Press F1 for help on field names.
esign view. F6 = Switch panes. F1 = H	elp.					Num Lock 🛛 🗃 🕮 🕍

By repeating the same steps we can create the table ArtistPerformance with the following SQL statement:

CREATE TABLE ArtistPerformance (Name TEXT(50), [Date] DATE, Song INTEGER, PRIMARY KEY (Name, [Date], Song))

Observe that the word "Date" is a reserved word in Access. In order to indicate that we want to have a column with that name, we must enclose the column name within "[" and "]".

After running this CREATE TABLE statement, we can examine our new table in the design view:

Antice Primary Builder Test Validation Property Indexes	<mark>, </mark>			Table Tools Database				
Primary Rey Builder Test Validation Rules Poperty Indexes Sheet Property Indexes Sheet Create Data Rename/Delet Macros ** Macro Field, Record & Table Events Relationships Object Dependencies Relationships Access Objects Access Objects Actist Song Song Song Song SongPerformance General Lookup Feidd Roame Actist Actist Actist Song Song SongPerformance Field Roame Song Song SongPerformance SongPerforman	File Home Create Exte	rnal Data 🛛 Database	Tools Acrob	at Design				
Access Objects Access Objects Access Objects Access Objects Access Objects Access Objects Access Object Access Object Access Object Access Object Access Object A	ew Primary Builder Test Validation Key Rules		Property Indexes Sheet	Create Data Rename/Delete Macros + Macro	Relationships	Object ependencies		
Field Name Data Type Description biles a Text Artist Date Date/Time Artist Song Number CD Song Number Song Field Properties General Lookup Format Input Mask Input Mask Caption Default Value Validation Text Required No Induced IME Mode No Control IME Mo		Query1 CD			The second second			
Artist Artist Artist Artist Artist Song Number Song Number Song Song Number Field Properties CO Song General Lookup Format Field Properties General Lookup Format Caption Capt							Descrip	
Artist ArtistPetformance CD Song Song SongPetformance General Lookup Format Caption Ca	Llas A	Name		Text				
ArtistPerformance Song Number CD Song Field Properties SongPerformance General Lookup Format Format Input Mask Caption Caption Default Value Potenties Validation Rule Validation Rule A field name can be up to 64 characters Ion including spaces. Press F1 for help on field names. MME Mode No Indexed No Indexed No Indexed Ion Control IME Mode No Control Immes. Indexes Show Date Picker For dates Ion date. Ion date.	2011/0	Pate Date		Date/Time				
AtistPerformance Field Properties Song Field Properties SongPerformance General Lookup Format Input Mask Captrion Default Value Validation Rule Validation Rule Validation Text Required No Inducted IME Mode No Control IME Sentence Mode None Smart Tags Formal Show Date Picker For dates		Song		Number				
Song Field Properties SongPerformance General Lookup Format Input Mask Caption Caption Default Value Validation Rule Validation Rule Validation Rule Validation Rule No Indexed No Indexed No IME Mode No Control IME Sentence Mode No Smart Tags General Show Date Picker For dates	ArtistPerformance							
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Format Input Mask Input Mask Input Mask Caption Input Mask Default Value Validation Rule Validation Text Indexed No Indexed Indexed No IME Mode No Control IME Sentence Mode None Smart Tags Text Align General Show Date Picker								
Input Mask	SongPerformance							
Caption			-					
Default Value								
Validation Rule A field name can be up to 64 characters ion including spaces. Press F1 for help on field names. Validation Text A field name can be up to 64 characters ion including spaces. Press F1 for help on field names. Indexed No INE Mode No Control IME Sentence Mode None Smart Tags Seneral Show Date Picker For dates								
Required No Indexed No IME Mode No Control IME Sentence Mode None Smart Tags Text Align Show Date Picker For dates								
Required No Indexed No Indexed No IME Mode No Control IME Sentence Mode None Smart Tags Text Align Show Date Picker For dates		Validation Text					1	A field name can be up to 64 characters long
Indexed No names. IME Mode No Control names. IME Sentence Mode None Smart Tags Text Align Show Date Picker For dates		Required	No					including spaces. Press F1 for help on field
IME Sentence Mode None Smart Tags Text Align General Show Date Picker For dates		Indexed	No				1	names.
Smart Tags Text Align General Show Date Picker For dates		IME Mode	No Control					
Text Align General Show Date Picker For dates		IME Sentence Mode	None				1	
Show Date Picker For dates		Smart Tags					1	
		Text Align	General					
		Show Date Picker	For dates					
								Num Lock 画 部 仙 🎚

We may for example choose "Short Date" as the format of the column Date, since this was not specified in the CREATE TABLE statement.

4.1.3 Defining Other Restrictions

Just defining the columns of a table and its primary key is most of the times not enough. There are often other restrictions that have to be specified. For example we may want to define that the columns Title and Year in the table CD should not be left empty (cannot contain the value null). We may even want to restrict the value of the column Year to a specific interval, for example between 1980 and 2050. Simple rules like these can be defined in the table design view. Let's fix the table CD to include the restrictions mentioned above.

Open the table CD in the table design view. Now activate the field Title to show its field properties:

le Home Create External Data	Database Tools	Acroba	t Design				
📔 🦞 🔊 📴 📴 Inse	rt Rows ete Rows dify Lookups	erty Indexes	Create Data Rename/Delet Macros + Macro Field, Record & Table Even	De	Object pendencies hips		
Access Objects 💿 « 🔲 CD							
ch 👂 🔼	Field Name		Data Type			escript	
bles a ID			AutoNumber				
Title	,		Text				
Artist			Number				
ArtistPerformance			i diniber				
CD							
Song		-		Field Proper	ties		
SongPerformance Genera	Lookup						
Field S		50					
Forma							
Input	Mask						
Captio							
	It Value						
	tion Rule					_	
	tion Text					- 1	including spaces. Press F1 for help on field names.
Requir		No				_	
		Yes				- 1	
Indexe		No				- 1	
Unico		No No Control				- 1	
		No Control				-	
Smart		NOTIC				-	

As we said earlier, we want to make sure that there is always a value in this column. The property Required can take care of that. Change the property value to Yes.

(i) You can shift property values quickly by simply double clicking on them. Double click on Yes to turn it into a No, and vice versa.

Now activate the field Year and do the same as for Title, i.e. set its Required property to Yes. For the column Year we also want to restrict the possible values. For this we can use the property Validation Rule. Activate the property (by placing the cursor there) and then you will see a little button on the right side of the property:

A 🛃 🤊 • O - =			: Database (Access 2007 - 2010) - Microsoft Acce	
File Home Create Exter Image: Second Se	mal Data Database Tools	Macros * Macro	Dependencies	^ ?
All Access Objects 💿 «				×
Search	Field Name ID Title Year	Data Type AutoNumber Text Number		iption
Song			Field Properties	
SongPerformance	General Lookup Field Size Lon- Format Decimal Places Auto Input Mask Caption Default Value Validation Rule Validation Rule Validation Text Required Yes Indexed No Smart Tags Text Align Gen		<u></u>	An expression that limits the values that can be entered in the field. Press FI for help on validation rules.
Design view. F6 = Switch panes. F1 = H	elp.			Num Lock 🏢 🏥 🛍 屋

Press it and a new window will appear. This is the Expression Builder that allows us to create small logical/mathematical formulas:

Expression Builder		×
Enter an Expression to validate the		
(Examples of expressions include [fi	eld1] + [field2] and [field1] <	S)
Expression Elements Functions Constants Operators	Expression <u>C</u> ategories	Expression <u>V</u> alues

Under Operators we can find what we need, namely Between:

Expression Builder			×
Enter an Expression to <u>validate</u> the contract of the contract		< 5)	
			OK Cancel <u>H</u> elp << Less
Expression Elements Functions Constants Operators	Expression <u>C</u> ategories Logical String	Expression Valu = >= And Between Eqv Imp In Like Mod Not	es

Double click on Between to add it into your formula and then substitute the two «Expr» with the appropriate values:

Expression Builder			×
Enter an <u>Expression</u> to <u>validate</u> th (Examples of expressions include		< 5)	
Between 1980 And 2050			OK Cancel Help < Less
Expression Elements	Expression <u>C</u> ategories 		

(i) It is of course possible to write your expression directly, without having to find the keywords in the menus.

Now press OK and the newly created expression will appear as the field property value:

]] 📃 🌍 + ि → - File Home Create Exter	nal Data Database ⁻	Tools Acroba		Database (Access 2007 - 2010) - Mio	rosoft Access	
Views	Grading Hook Hook Hook Hook Hook Hook Hook Hoo	Property Indexes Sheet Show/Hide	Create Data Rename/Delete Macros 7 Macro Field, Record & Table Events	Relationships Object Dependencies Relationships		
All Access Objects 💿 🔍	CD CD					
Search P	Field National Fie	ame	Data Type		Descript	tion
Tables ô	🖁 ID		AutoNumber			
Artist	Title		Text			
Sugar States and States	Year		Number			
ArtistPerformance						
E CD						
Song				Field Properties		
	General Lookup				1	
SongPerformance	Field Size	Long Integer				
	Format	Long Integer				
	Decimal Places	Auto				
	Input Mask					
	Caption					
	Default Value					An expression that limits the values that can
	Validation Rule Validation Text	Between 198	0 And 2050			be entered in the field. Press F1 for help on validation rules.
	Required	Yes				
	Indexed	No				
	Smart Tags					
	Text Align	General				
esign view. F6 = Switch panes. F1 = H	elp.					Num Lock 🛛 🗰 🏭 🛍

(i) It is of course also possible to write the expression directly in the field property without opening the Expression Builder

When a user enters a value, Access will always check if it is correct in respect to the validation rule. If the value breaks the rule, then an error message will be signaled to the user. Access has a default message, but also allows us to specify what message should be displayed. We can specify a better message in the property Validation Text:

A		Table Tools Database	: Database (Access 2007 - 2010) -	Microsoft Access	_ 🗆 :	×
File Home Create External Data Databa		at Design				?
View Views Kov State St	Property Indexes Sheet Show/Hide	Create Data Rename/Delete Macros + Macro Field, Record & Table Events	Dependencies			
All Access Objects 💿 « 🔲 🚥					>	ĸ
Search P I Field	Name	Data Type		Descrip	tion	
Tables â ID		AutoNumber				=
Artist		Text				
Year		Number				
ArtistPerformance						
CD CD						¥
Song			Field Properties			
SongPerformance General Lookup						
Field Size	Long Integer	tion -				
Format						
Decimal Places	Auto					
Input Mask Caption						
Default Value						
Validation Rule	Between 198	0 Apd 2050			enter a value prohibited by the validation rule.	
Validation Text		ar must be between 1980 and	2050.			
Required	Yes					
Indexed	No					
Smart Tags						
Text Align	General					
Design view. F6 = Switch panes. F1 = Help.					Num Lock i 🌆 🗊 🛍 🔽	1

You can now create the rest of the tables with any of the two techniques described in this chapter. You can also add the appropriate restrictions on columns of all the tables (like specifying that Song.Length must be greater than zero and that Artist.Age must be between 1 and 200). In order to create composite alternate keys (two or more columns that together don't allow duplicates) you will need to create an index as described in section 9.9. The next section assumes that all the tables have been created. A ready database with all the tables created exists at http://coursematerial.nikosdimitrakas.com/access/.

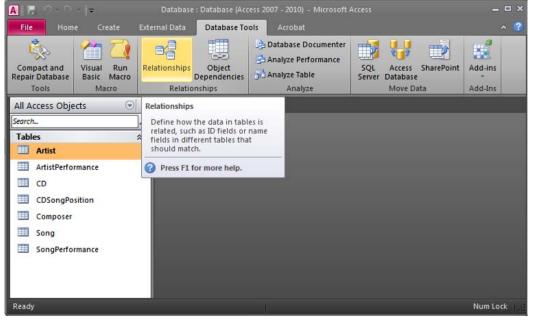
If you choose not to create the tables yourself, then download the database that contains them before continuing to the next section.

4.2 Working With Relationships

All the tables are now created, but they are not in any way related to each other. There is no referential integrity specified, and no foreign key rules either.

In Access, relationships between tables can be created graphically with a simple drag-anddrop principle. Relationships in Access are more than just foreign key relationships. They are also used by the system when working with wizards for creating forms and reports; more about this in later chapters. In this section we will focus on defining referential integrity and referential actions. The five subsections that follow describe the most common types of relationships that we can have in a relational database.

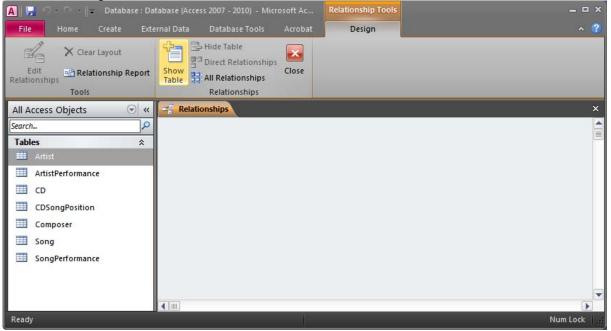
In order to create table relationships in Access we must use the Relationships window. This can be invoked from the ribbon under "Database Tools":



When you open the Relationships button for the first time, Access will automatically open the Relationships tab and show the Show Table dialog:

Show Ta	ble				? ×
Tables	Queries	Both			
CD CDSor Compo Song	erformanc IgPosition Iser erformance				
				<u>A</u> dd	<u>C</u> lose

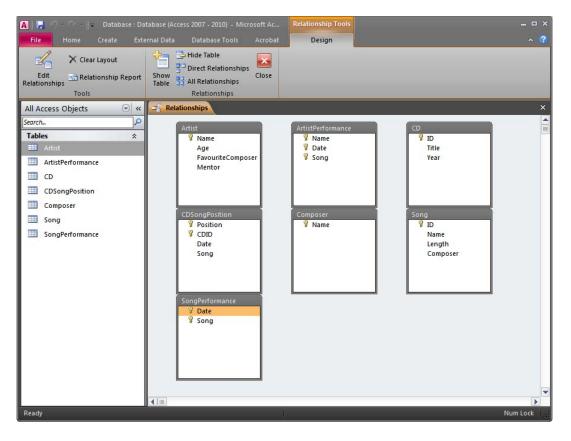
This dialog can also be invoked later by pressing the Show Table button on the ribbon while the Relationships tab is active:



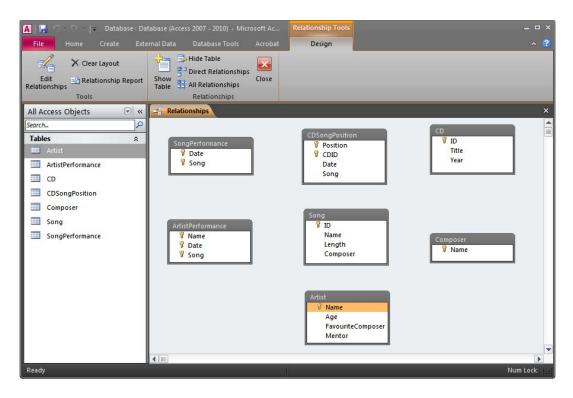
This dialog allows us to choose which tables to show on the Relationships tab. The relationships view in Access is like a diagram that shows graphically all the relationships between the different tables; not unlike the graphical relational schema shown in chapter 2. Highlight the first table in the list, hold down Shift and click on the last table name on the list to highlight them all:

Show Table	? ×
Tables Queries Both	
Artist ArtistPerformance CD CDSongPosition Composer	
Song SongPerformance	
Add	<u>C</u> lose

Press Add to add them to the diagram and press Close to return to the relationships diagram:



We can now resize and move the tables as needed. We can for example put them in the same way as they were in the graphical database schema in chapter 2:



(i) Observe that the tables shown here are just graphical representations of the tables in our database. Deleting a table here does not delete the table from the database, just from the relationships diagram.

We are now ready to create relationships.

4.2.1 Simple Foreign Keys

The first type of relationship, and probably the most common one, is when we have one column in one table that is a foreign key to another table (with a one-column primary key¹). For example the column Composer in the table Song is a foreign key to the primary key of the table Composer. In order to define this relationship, we have to select the primary key column and drag and drop it on the foreign key column². So, just drag the column Name of the table Composer to the column Composer of the table Song. The Edit Relationships dialog will then appear:

¹ Or alternate key

² Dragging and dropping the foreign key onto the primary key will also have the same effect if the multiplicity is one-to-many.

Edit Relationships	? ×
Table/Query: Related T Composer Song Name Compose	able/Query: Create Cancel Cancel Join Type
Enforce Referential Integrity	Create New
Cascade Update Related Fie	lds
Cascade <u>D</u> elete Related Rec	ords
Relationship Type: One-To-N	1any

This dialog suggests a relationship based on the columns that we dragged and dropped. The foreign key is automatically placed on the right side and the referenced primary key on the left side. If we want the database to check that the values of the foreign key exist as values of the referenced primary key, then we should check the Enforce Referential Integrity check box. There are some rare cases that we would not want referential integrity, but in this compendium we will always have referential integrity for all relationships we create. Any relationship created without referential integrity would not formally be a foreign key relationship.

When we activate the referential integrity, a selection of referential actions becomes available:

Edit Relationships	<u>?</u> ×
Table/Query: Related Table/Query: Composer Song	<u>C</u> reate
Name Composer	join Type
Enforce Referential Integrity Cascade Update Related Fields Cascade Delete Related Records	Create <u>N</u> ew
Relationship Type: One-To-Many	

The two choices correspond to "ON UPDATE CASCADE" and "ON DELETE CASCADE" of standard SQL. Setting these options depends on the behavior we want our database to exhibit. In this case we could say that the first one is appropriate while the second one is not. This means that we want the value of the column Song.Composer to be changed whenever the value of the column Composer.Name is changed, but we do not want to delete all the songs of a composer every time a composer is deleted (or there is an attempt to delete a composer). Instead the system will restrict deletion of composers that have composed at least one song. Should we want to remove a composer, we would have to remove all of their songs first.

The Edit Relationships dialog shows us, as a bonus, what the relationship type is for the selected tables and columns. This is derived by the definition of the columns (whether they are candidate keys, unique, etc). If the Relationship type is not as you intended it to be then

the tables have not been defined correctly. In this case One-To-Many is just fine. One composer can compose many songs and one song has to be composed by one composer.

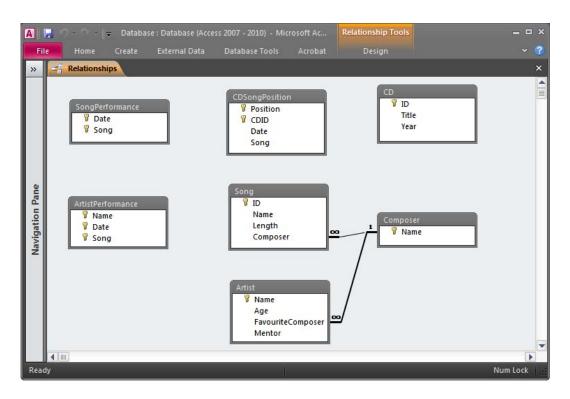
When we are done specifying the relationship, we press Create and then Access will show the new relationship graphically:

A		_ = ×
Fil	e Home Create External Data Database Tools Acrobat Design	× 🕐
*	Relationships	×
	SongPerformance	
Navigation Pane	ArtistPerformance Vame Date Song Song Composer Composer Name Length Composer	
Navigation Pane	Artist Vame Age FavouriteComposer Mentor	
Read		Num Lock

The same way, we can create the relationship between Artist and Composer (the artist's favorite composer):

Edit Relationships		? X
Table/Query:	Related Table/Query:	<u>C</u> reate Cancel
Name	FavouriteCompos	Join Type
Cascade Update	Related Fields	Create <u>N</u> ew
Cascade <u>D</u> elete	One-To-Many	

and then:



(i) Should we want to edit an already existing relationship, we can simply double-click on it and the Edit Relationships dialog we show up.

4.2.2 ISA Inheritance

ISA relationships are also quite common. An ISA relationship is not different from any other relationship in relational databases. The implied inheritance is not managed automatically and the relationship is nothing more than a simple One-To-One relationship. When defining an ISA relationship in Access (and any other relational database), it is important to define the relationship in the right direction. In our case we have an ISA relationship that says that a composer is an artist. It would be wrong to create a relationship that says instead, that an artist is a composer, since this would require that all artists must be composers. It is therefore important to create the relationship from the general to the specific, i.e. from the artist to the composer. We can create this relationship by dragging the primary key of the table Artist and dropping it onto the primary key of the table Composer (that also serves as foreign key). Access will then detect that there is already a relationship between these tables and will ask us if we want to edit the old relationship or create a new one:



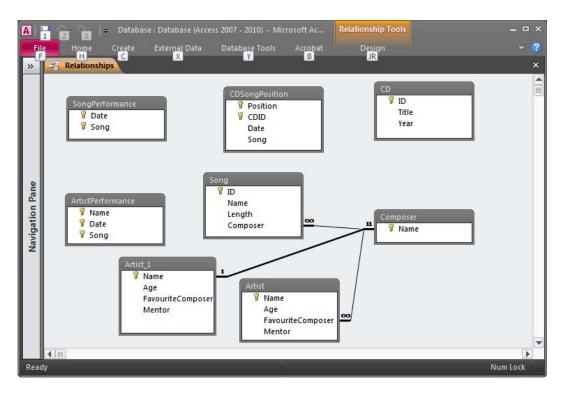
We, of course, want to create a new relationship and answer therefore No. The Edit Relationships dialog will then suggest the following relationship:

Edit Relationships			<u>? ×</u>
Table/Query:	<u>R</u> elated Table/Query: Composer Name	-	<u>C</u> reate Cancel
		-	<u>J</u> oin Type
Enforce Referent	ial Integrity		Create <u>N</u> ew
🔲 🗖 Cascade Update	Related Fields		
Cascade <u>D</u> elete P	Related Records		
Relationship Type:	One-To-One		

We can see that the table Artist is on the left side (at this stage, when creating relationships, always double check that the tables are placed correctly left-to-right), which indicates that it is the master table of this relationship, i.e. a composer cannot be created unless there is a corresponding Artist. The Relationship Type is detected to be One-To-One, which is exactly what we expected it to be. We must not forget to activate the referential integrity and also choose the appropriate referential actions. In this case both of them seem reasonable, so we check both boxes:

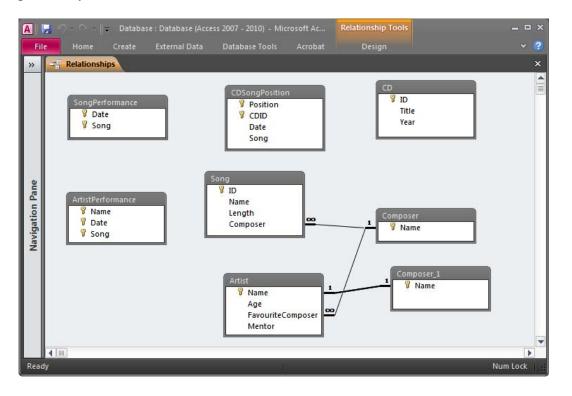
Edit Relationships	? ×
Table/Query: Related Table/Query: Artist Composer	<u>C</u> reate Cancel
Name <u>v</u> Name	<u>J</u> oin Type
Enforce Referential Integrity Cascade Update Related Fields Cascade Delete Related Records	Create <u>N</u> ew
Relationship Type: One-To-One	

We create the relationship and return to the relationships diagram:



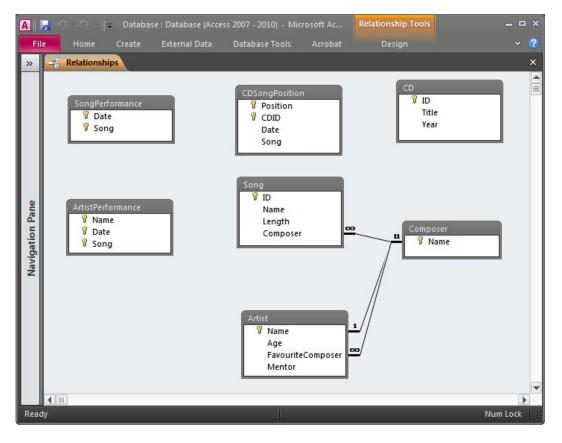
We can now see a strange new table Artist_1 in our diagram. It is nothing to worry about. This is simply a second graphical representation of the table Artist in the relationships view and not an additional table in the database. Access created this automatically because the tables Artist and Composer already had a relationship. In this way we can distinguish between the two relationships.

It is also possible to create two graphical representations of the table Composer instead. Even though the diagram looks a little different, the relationship is identical to the one we created previously:



SU/DSV
KTH/ICT/SCS

If we don't want to see the same table twice we can simply move the two graphical representations of the same table to the same position (so that the one hides the other):



Artist_1 is now behind Artist, or Composer_1 is behind Composer.

4.2.3 Composite Foreign Keys

Tables sometimes have composite primary keys (and perhaps also composite alternate keys). When such tables need to be referred to then the foreign key needs also be composite. In our case we have such an example with the table SongPerformance. SongPerformance has a composite primary key (columns Date and Song). The table ArtistPerformance has a foreign key to the table SongPerformance (columns Date and Song). The procedure of creating this relationship is not different than before. Highlight the referenced primary key (use the Control-key to select all the columns of the primary key) and drag and drop it onto the table that contains the foreign key. The Edit Relationship dialog will open, but this time the columns of the related table are not automatically filled in:

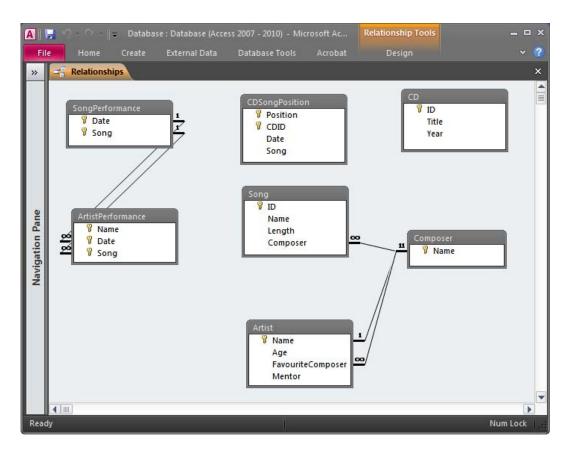
Edit Relationships			? X
Table/Query:	<u>R</u> elated Table/Query: ArtistPerformance	~	<u>C</u> reate
Date Song			Join Type
Enforce Referential Integrity			Create <u>N</u> ew
Cascade Update Related Fields			
Cascade <u>D</u> elete F	Related Records		
Relationship Type:	One-To-Many		

Select the correct columns by using the drop-down list or simply write the column names:

Edit Relationships		? ×
Table/Query: SongPerformance	Related Table/Query: ArtistPerformance	<u>C</u> reate
Date	Date 🔺	Cancer
Song	<u> </u>	<u>J</u> oin Type
	Name 💌	
Enforce Referent	_{ia} Date	Create New
Cascade Update	Song	
Cascade <u>D</u> elete R		
Relationship Type:	One-To-Many]

Then activate the referential integrity and create the new relationship.

The relationship is now visible in the relationships diagram:



Since there are two columns that are linked, Access draws two lines for the same relationship. This can be confusing, but both lines together indicate one and the same relationship. If they were two different relationships, then Access would have created a new graphical representation of one of the two tables as it did in the previous section.

4.2.4 Multiple Relationships Between The Same Two Tables

As we saw in section 4.2.2, when we create more than one relationship between the same two tables, Access will automatically add a new graphical representation of one of the two tables in the relationships diagram. This is to help us distinguish between the two relationships. This is especially useful when we have overlapping foreign keys and generally composite keys.

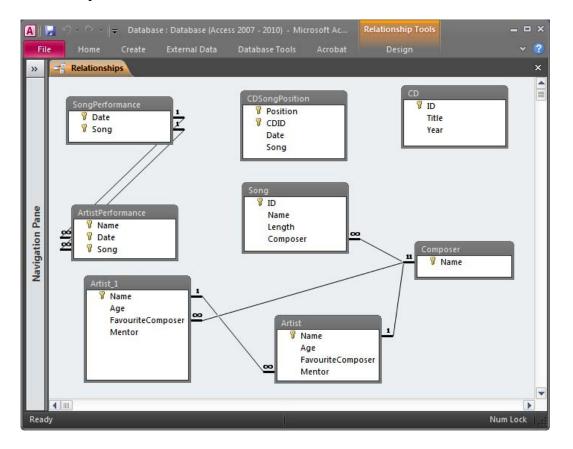
4.2.5 Recursive Relationships

In some cases a table may need to refer to itself. In our case we have the table Artist that has a column Mentor. This column is intended to point out another Artist who is this artist's mentor. It is not a problem to define this relationship in Access. In order to do this we need to have two graphical representations of the table Artist in our diagram. In our case there is already a second graphical representation of the table Artist (that was created when we created the ISA relationship between Artist and Composer in section 4.2.2). If there isn't one, we can create one by opening the Show Table dialog (from the Design toolbar on the ribbon or by right/clicking on the diagram area).

Drag and drop the referenced primary key column (Name) from the one graphical representation of the table Artist to the foreign key column (Mentor) in the other graphical representation of the same table (probably labeled Artist_1). The Edit Relationship dialog will then show up:

Edit Relationships			? ×
Table/Query:	Related Table/Query:	 <	<u>C</u> reate Cancel Join Type
Enforce Referential Integrity			Create New
🗖 Cascade Update Related Fields			
Cascade Delete Related Records			
Relationship Type:	One-To-Many		

The suggested relationship is as we expected: One artist has one mentor and the same artist can be the mentor of many artists. We activate the referential integrity and create the relationship:



In this case it is probably preferable to let both Artist and Artist_1 be visible. If we place Artist_1 behind Artist then we will not be able to see the new relationship.

We have now looked at all the types of relationships that are common in relational databases and how to create them in Access. Complete the database with the rest of the relationships (they are all defined in chapter 2). A version of the database including all the relationships is available at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

5 Querying A Database - Working With Data

In this chapter we will look at how to work with queries in Access. We will look at different ways of querying the database, but before we do that we have to populate, i.e. prepare, the database with data. With no data there is no way to verify that our queries work. It is not only important to have data in the database. It is equally important to have both enough, and varying data. It is important that the data in the database can represent all possible classes of cases that can occur. For example it is important to have an artist with no performance, an artist with just one performance, an artist with many performances of the same song, an artist with many performances in different years and so on. In order to achieve this kind of variation we need to have at least 5-10 rows in the strong entity tables³ (for example: Artist, Composer, CD), 10-20 rows in tables that reference those tables (for example: Song), and 20+ rows in the tables that reference more than one strong entity table directly or indirectly (for example: CDSongPosition, SongPerformance, ArtistPerformance). In general, the weaker the table, the more variation can occur in it.

In the next section we will look at some ways for adding data into the database.

5.1 Preparing The Database With Data

In this section we will look at three ways of adding data in an Access database. The data inserted into the tables in this section are just a fraction of what we should have in order to fulfill the requirements described above.

Since it would be a time consuming process to input all the data, a database with data has been prepared and is available at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

The following subsections describe three basic ways of adding data to an Access database.

5.1.1 Using SQL

For those that dislike the graphical facilities provided in Access, there is the possibility of writing SQL statements to add data to the database tables. For example we could write the following INSERT statement in order to add a new Artist in our database:

INSERT INTO Artist (Name, Age) VALUES ('Jerry Goldsmith', 75)

In order to run this in Access we have to create a new query and then go to the SQL mode (as we saw in section 3.2): Create a new query in design mode, close the Show Table dialog and press the SQL button the toolbar. We can now add our SQL statement in the text area:

³ By strong entity tables, we mean here strong entities as described in, for instance, Database Systems. They are tables whose data is not dependent on the existence of data in other tables. Kind of like parent tables.

A . A . A . A . A . A . A . A . A . A .	me Create Extr	ernal Data Database Tool		Show	Database - after	: Database (Access 2007 - 20 날 Insert Columns 날 Delete Columns	010) - Microsoft Acce	SS Property Shee Table Names	×
Results	iects 🔍 «	Query Type	Z Data Definition	Table	Query	A CONTRACTOR OF A CONTRACT	Show	/Hide	×
Search Tables Artist ArtistPerfe	<u>م</u> * *	INSERT INTO Arti	st (Name, Ag	je) VAL	JES ('Jerry (Goldsmith', 75)			<u> </u>
CD CDSongP Ready	osition				1			Num Lock	

By simply clicking the Run button () on the toolbar the INSERT statement will be executed and a new row will be inserted in the table Artist (as long as the data does not contradict any integrity rules). Depending on the Access settings, Access may ask you to confirm the insertion:

Microsoft	Access X
	You are about to append 1 row(s).
	Once you click Yes, you can't use the Undo command to reverse the changes. Are you sure you want to append the selected rows?
	Yes No

If it does, simply press Yes.

The new row is now in the table. If we try to execute the same INSERT statement again the database will detect the value 'Jerry Goldsmith' already exists and will inform us that the primary key rule of this table prohibits the insertion of the new row:

Microsof	it Access X
	Microsoft Access can't append all the records in the append query.
<u> </u>	Microsoft Access set 0 field(s) to Null due to a type conversion failure, and it didn't add 1 record(s) to the table due to key violations, 0 record(s) due to lock violations, and 0 record(s) due to validation rule violations. Do you want to run the action query anyway? To ignore the error(s) and run the query, click Yes. For an explanation of the causes of the violations, click Help.
	<u>Yes</u> <u>N</u> o <u>H</u> elp
	Was this information helpful?

(Pressing Yes or No in this case will not make any difference, but the sensible answer is No)

We can also try to add another Artist with an illegal Age value (say 300). We write the following SQL statement:

INSERT INTO Artist (Name, Age) VALUES ('Vangelis', 300)

If we run this query, then Access will tell us that there was a validation rule violation. Sadly (and strangely) Access will not show us the specific text message in this mode. The error message looks like this:



The message that we defined: ("No way. The age must be between 1 and 200"), is not shown when we work in the SQL mode, but it will show up when working in the other modes described in the two following sections.

5.1.2 Using Datasheets

A more common way to work with table data in Access is working with datasheets. A datasheet looks just like an Excel sheet, but each column is a column of the table and each row is a row in the table. Let's continue adding artists in our table Artist. Open the table Artist by double clicking on it in the object browser (or right click and choose "Open"). The table Artist will open in the datasheet mode:

A 🛃 🕥 • 🔿 • =	Table Tools Database - after chapter 5 : Database (Access 2007 - 2010) - Microso - - >
File Home Create Ext	ernal Data Database Tools Acrobat Fields Table 🔷 🧖
View Paste Format Painter	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
	Artist
All Access Objects	
Tables ★ ■ Artist	^B Jerry Goldsmith 75
ArtistPerformance	
🛄 СD	
CDSongPosition	
Composer	
song	
SongPerformance	Record: IN (1 of 1) N N K No Filter Search
The name of the artist	Record: N Lor1 アガア W No Filter Seaton Num Lock 回番組 社

We can see now that a row is already in the table. It is the row we added earlier with the INSERT statement.

This view provides also other user-friendly features:

- > On the top of the datasheet we can see the names of the columns.
- On the bottom we can see a navigator (Record: M < 1 of 1 > M > M) which shows us the total number of records in the table, the number of the current record and also allows us to move to other records or create a new one (the > button).
- On the status bar we can see the comment about the active filed of the table. Place the cursor to the field Age and the status bar will change.
- In this mode Access will also recommend the default value for fields that have a default. Numerical fields have by default the default value 0. If this is not appropriate, it can be changed in the table design view (see section 4.1.1).
- ➤ In this mode we have the possibility to sort and filter the rows of the table. There are options for this under Home on the ribbon.
- It is also possible to add new columns to the table, but this should be avoided and done through the design view instead. To deactivate this option uncheck File > Options > Current Database > Enable design changes for tables in Datasheet view.

Let's now add a new row in the table. Simply place the cursor on the last row (the one with the star on the left) and type in the appropriate values at each cell:

A D	atat	bas	e - after chaj	pter 5	: Database	: (Access 200	7 - 201	LO) - Microsoft Acce	:55		_ = ×
>>]	Artist								×
			Na	me	. ·	Age		Favourite⊽	Mentor ~	Click to Add	∇
Pane		ŧ	Jerry G	old	smith		75				
	9	Ŧ	Vangel	is							
Navigation	*		-								
Na											
	Re	co	rd: I4 4 2 c	of 2	• • • •	K No F	ilter	Search			
The	nam	e o	f the artist							Num Lock 🛛 🛅	1 曲 但 노

and then

A D	-	ase - after chapter 5 : Database	(Access 2007 - 201	l0) - Microsoft Acce	55		_ = ×
>>		Artist					×
	4	Name ⊽	Age 🔹	Favouritı⊽	Mentor ~	Click to Add 🔻	
Pane		Jerry Goldsmith	75				
tion		• Vangelis	61				
Navigation	*						
Na			7				
	-	cord: I4 4 2 of 2 I II	K No Filter	Search			
The	age o	of the artist (number of years)				Num Lock 🔳 💼	: Щ. М

We can now try to add a new artist with an invalid age (300 as before):

name v rry Goldsmith	Age 75	Print and the second se	Mentor 🔻	Click to Add 🔻	>
and the second se	75	5			
1.					
angelis	61				
anni	300				
	We No Filter	Capreb			Ē
	anni	anni 300 4 4 3 of 3 + H + K No Filter	anni 300	anni 300	anni 300

The moment we try to leave the cell, Access will try to validate the value and will show the appropriate error message:



We can now change the value to the correct one (50).

(i) It is important to know that the new row is not stored in the table until we move out of it. We can move to the next row or to any old row in order to force Access to store the newly created row.

5.1.3 Using Forms

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Another way to feed data into the database is by using forms. Creating forms can be from extremely simple to extremely advanced, depending on the functionality of the form. Chapter 6 discusses forms in detail so we are not going to create any form in this section. Below you can see an example of a form that can be used to input values in the table Artist:

A		⊖ - ⊙ - ↓ Database - aft	er chapter 5 : Dat	abase (Access 20	007 - 2010) - Microsoft Acce	ss = 🗆 X
Fil	e	Home Create Exte	rnal Data Da	atabase Tools	Acrobat	× 🕐
>>	-8	Artist				×
		🔚 Artist				
Pane	•	Name				
tion Pa		Age				
Navigation		FavouriteComposer				
		Mentor				
	Rec	ord: I4 4 4 of 4 🕨 🕨	K No Filter	Search		
The	name	of the artist			Num Lo	ock 🔳 🗉 🔛 🛒

We will see how to create this form in sections 6.1 and 6.2. The forms created in chapter 6 can be quite useful for inputting data in the database. Working with forms can actually save a lot of time, especially when the table we are filling in has many foreign keys.

In this section (section 5.1) we looked at different ways of putting data in the database. We barely created any rows in this section, and as we mentioned earlier it is important to have a database with enough data before we can start querying it. The rest of the sections of this chapter are about querying the database, so for that purpose there is a ready-made database with bunch be downloaded of data. It can from а http://coursematerial.nikosdimitrakas.com/access/. The data in this database has been created through both forms and datasheets, but all the forms have been removed so that the database is exactly as it was before, except from the data in the tables.

5.2 Writing SQL

With our database now populated with data, we can run some queries, and get some meaningful answers. In this section we will just create a couple of simple SQL SELECT statements and run them in Access. If we look back at chapter 2, we can see that one of the information needs defined is: "Show all CD titles produced in 1999!"

This can easily be solved with the following SELECT statement:

SELECT title FROM CD WHERE year=1999

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We can now execute this SQL statement by creating a new query in design view and then switching to the SQL mode (as we did in section 4.1.2). We can insert our SQL statement in the text area and we are ready to receive the result:

A Database - after : Database (Access	2007 - 2010) - Microsoft Access	_ = ×
All Access Objects 💿 🔍	Query1	×
Search	SELECT title	<u> </u>
Tables Artist ArtistPerformance	FROM CD WHERE year=1999	
CD CDSongPosition Composer		<u> </u>
Ready		Num Lock 🛛 🗃 🏥 🛍 🚾 🔛

There are three ways to show the result. We can press the Run button on the ribbon (), we can press the View button () on the ribbon, or we can right click on the query name and choose "Datasheet View". They will all switch to a datasheet view that presents the result:

A Database - after : Datab	ase (Access	2007 - 2010) - Microsoft Access	_ = ×
All Access Objects	 ✓ 	Query1	×
Search	Q	title 🔹	
Tables Artist ArtistPerformance CD CDSongPosition Composer	*	Summer Hits The Ultimate Yanni Collection * Record: H	
Ready			Num Lock 🛛 🛅 👪 🛍 squ 🕍 🛒

We can from this view return to the SQL edit mode by clicking the SQL View button on the ribbon or by right clicking on the query name and selecting "SQL View".

We can even save this query if we want. We can either press the Save button (\square) above the ribbon, we can right click on the query name and choose "Save" or we can just close the query tab and let Access ask us whether to save or not. In any case Access will ask for a name for the new query:

Save As		<u>? ×</u>
Query <u>N</u> ame:		
Query1		
	ОК	Cancel

We can call it something intuitive; for example "CDs from 1999" (and press OK). The new query object is now available in object browser:

A F - ? + ? + ∓	Database - after	: Database (Access 2007 - 2010)	- Microsoft Access	= = ×
File Home Create Ex	ternal Data Database Tools	Acrobat		× 🕐
All Access Objects 💿 «	A A A A A A A A A A			
Search				
Tables				
Artist				
ArtistPerformance				
🛄 ср				
CDSongPosition				
Composer				
Song				
SongPerformance				
Queries *				
CDs from 1999				
Ready				Num Lock

- (i) If you want to edit the SQL statement of the query, right click on it in the object browser and press the "Design View" and Access will open the query automatically in the SQL editing mode.
- (i) If you want to see the result of the query, double click on it in the object browser and Access will automatically run the query and show the result.
- (i) Queries in Access are what other products call views.

5.3 Reusing Queries

In the case description in chapter 2, there was also the following information need: "Which CDs include songs written by Jerry Goldsmith?"

This can be done with the following SQL statement:

SELECT DISTINCT title FROM CD, CDSongPosition cdsp, SongPerformance sp, Song s WHERE CD.ID = cdsp.CDID AND cdsp.Song = sp.Song AND cdsp.Date = sp.Date AND sp.Song = s.ID AND s.Composer = 'Jerry Goldsmith'

But let's assume either that this is too big and confusing, or that a part of it is very commonly used. We can therefore create a view of one part of the query and then use this view in order to create the final result. Let's say that we often need to know the composer of the song performances. It can therefore be good to create a view that can give as this information without having to join Song and SongPerformance every time. We could easily create this view in standard SQL (which does not work in Access):

CREATE VIEW SongPerformanceComposer AS SELECT sp.Song AS Song, sp.Date AS Date, s.Composer AS Composer FROM SongPerformance sp, Song s WHERE sp.Song = s.ID

Then we could write a simpler SELECT statement in order to produce the final result. We can in this statement's FROM clause include the view we created earlier:

SELECT DISTINCT title FROM CD, CDSongPosition cdsp, SongPerformanceComposer spc WHERE CD.ID = cdsp.CDID AND cdsp.Song = spc.Song AND cdsp.Date = spc.Date AND spc.Composer = 'Jerry Goldsmith'

In Access, creating a view is the same as creating a query. A query is a view. So we can create a query for the following SQL statement and save it as "SongPerformanceComposer". This query would be the equivalent to the view that the CREATE VIEW statement earlier creates.

SELECT sp.Song AS Song, sp.Date AS [Date], s.Composer AS Composer FROM SongPerformance sp, Song s WHERE sp.Song = s.ID

The query is now visible in the object browser:



We can also open it and see the result:

All Access Objects 💿 <	SongPerformance	Composer	
Search	Song •	Date ▼ Composer ▼	
Tables	1	2003-04-15 Danny Elfman	
Artist	2	2004-02-05 Danny Elfman	
ArtistPerformance	3	2001-01-05 Danny Elfman	
СО	5	2002-05-09 Danny Elfman	
CDSongPosition	6	2001-05-09 Jerry Goldsmith	
Composer	6	1998-04-16 Jerry Goldsmith	
Song	7	1999-05-08 Jerry Goldsmith	
SongPerformance	8	2000-05-07 Jerry Goldsmith	
CDs from 1999	9	2000-04-04 Jerry Goldsmith	
SongPerformanceComposer	9	2002-04-28 Jerry Goldsmith	
	10	1999-05-08 Vangelis	
	10	2001-08-09 Vangelis	
	10	2004-01-07 Vangelis	
	11	2002-07-07 Vangelis	
	12	2003-08-08 Vangelis	

We can now create a new query (in the usual way) for the following SQL statement, which uses the other query in order to produce the final result:

SELECT DISTINCT Title FROM CD, CDSongPosition cdsp, SongPerformanceComposer spc WHERE CD.ID = cdsp.CDID AND cdsp.Song = spc.Song AND cdsp.Date = spc.Date AND spc.Composer = 'Jerry Goldsmith'

In the FROM clause of the statement we have now an object that is not a table. Instead, it is a query.

We can now run our latest query and receive the result:

A 🚽 🖓 - ભે - =	Database - after : Database (Access 2007 - 2010) - Microsoft Access	= = ×
File Home Create Extern	nal Data Database Tools Acrobat	× ?
All Access Objects 💿 🔍	Duery1	×
Search	title •	
Tables > Queries \$ Image: CDs from 1999 Image: CDs from 1999 Image: SongPerformanceComposer Image: CDs from 1999	Summer Hits Record: I4 ← 1 of 1 → M → K No Filter Search	
Ready		Ⅲ 册 包, sqt 社

We can save this query as "CDs With Jerry Goldsmith".

A database including all the progress so far is available to download at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

6 Forms

Forms can be used both for adding and editing data, as well as for browsing and presenting data. In section 5.1 and especially in subsection 5.1.3, we discussed entering data in the database and also doing it with forms. An example of a form was shown there, but we did not see how we could create it. In this chapter we will see how to create forms. We will look at some common types of forms, from the simplest possible to more complex master-detail forms.

6.1 Simple Forms

By simple form, we mean a form that only has simple input fields for adding data to a particular table. Such forms should only be used with tables that have no foreign keys, since then all the columns of the table can be filled in by the user and the values are independent of any values in other tables. In our case description in chapter 2, we had the following user interface need: "*A form for registering a new CD in the database*". The table CD is independent of all other tables. No column of the table CD depends on values of other tables. We can therefore create a simple form for this table.

Under the Create option in the ribbon, there is an option "Form". This will create a simple form for the object selected in the object browser. Select the table CD in the object browser

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and press Create > Form. Access will create a new (unsaved) form with one field for each column in the table. Access has also created a subform based on the foreign key relationship that CD has to CDSongPosition:

Image:	Form Layout Tools Database - after chapter 6 : Database (Access 2007 - 2010) - Microsoft Access nal Data Database Tools Acrobat Design Arrange Format	× ^ ?
Views Themes	abl Aa a a a a a a a a a a a a a a a a a a	
All Access Objects 💿 «	x 🕰 🕰	
Search. JP Tables * ArtistPerformance * CODSongPosition * Composer Song SongPerformance * Queries * CDs With Jerry Goldsmith * SongPerformanceComposer	CD D 1 To 1 Title Yarni Greatest Hits Year 2002 I 1999-04-05 21 2 2000-08-17 22 3 2001-05-31 25 4 1998-11-08 26 5 1998-04-08 32 Record: H 1 of7 > > > Ventimer	For all tables Fields available for this view: ID Title Year
Layout View	Record: M (1 of 9) N) K No Filter Search	Num Lock 🖩 📴 🛬 🖉

On the right side we have the Field List and the ribbon has automatically switched to Design. The Field List shows the columns that are available in the table selected as the source of the form. In this case it is the table CD. On the ribbon we have the option to show the Property Sheet instead of the Field List. The Property Sheet shows all the properties of the selected form object:

File Home Create External Data	Database Tools	Acrobat	Design Arrange	Format		Logo		_	_
iew Themes A Fonts - A ab A	Aa 🔤 📄	Q. 💽		V	Insert Image *	Title	Add Existing Fields		
iews Themes		0	Controls			Header / Footer	Tools		
ll Access Objects 💿 « 📑 CD								× Property Sheet	
arch								Selection type: Text	
ables	CD							ID	•
								Format Data Ev	ent Other All
T	2 1							Name	
								Control Source	ID
🗄 CD Ti	itle Yan	ni Greatest Hi	ts					Format	
CDSongPosition								Decimal Places Visible	Auto
Composer Ye	ear 200	2						Text Format	Plain Text
Song								Datasheet Caption	
	Position ~	Date 🕤	Song 🔽					 Show Date Picker Width 	For dates 19.982cm
SongPerformance		NAMES OF TAXABLE PARTY.						Height	0.688 cm
ueries *	1	1999-04-03						Тор	0,608cm
CDs from 1999	2	2000-08-17	7 22					Left	2,989cm
CDs With Jerry Goldsmith	2	2001-05-3	25					Back Style Back Color	Normal Background 1
SongPerformanceComposer	100							Border Style	Solid
- songrettomancecomposer	4	1998-11-08	3 26					Border Width	Hairline
	5	1998-04-08	3 32					Border Color Special Effect	Background 1, Dark
								Scroll Bars	None
Re	ecord: H 4 1 of 7	•н• Ж	No Filter Search					Font Name	Palatino Linotype (C
								Font Size	11 Left

On the ribbon we have a set of controls. These are objects that can be added to a form. Every control has specific properties. Some controls are meant to be linked to database columns so that the data in the database can be visualized in a specific way in the form. For example, an Image control can be used to display an image stored in the database.

A form can be viewed in three different ways: Form View, Design View and Layout View. The Form View is for when the form is being used. The Design View and the Layout View are used to create the form, add controls, configure them, layout them, etc. The Design View and the Layout View are very similar, but in Layout View, live data from the tables is used to show what the form will look like. The ribbon has three tabs that together constitute the "Form Design Tools". There is the Design tab with all the controls and some general options for configuring forms, there is the Arrange tab which is used to manage the layout of the controls on the form, and there is the Format tab that is used to select fonts and colors.

All automatically generated forms offer basic browsing functionality with a record navigator and a record selector, as well as the possibility to edit existing records or add new records.

The created form looks like this in Form View and we may edit any field:

File Home Create Ext Image: Second seco	Filter	Database Ascending Descending Remove Sort Sort & Filt	🎸 Selecti 🍊 Advan 🏹 Toggle	iced - Refra	sh X Delete Record	∑ Totals ^{©C} Spelling → More → ds	Find ab ab ab ab ab ab ab ab ab ab	D TO Y	▼ := := := • _3• • == == == t Formatting	
All Access Objects 💿 🔍	CD									
Search		CD								
Tables	8									
Artist		ID	1							
ArtistPerformance		10	-		<i></i>					
CD CD		Title	Yanni	Greatest Hi	ts					
CDSongPosition		Year	2002							
Composer		IedI	2002							
Song		Position	n ⊽	Date 🔻	Song ⊽					A
SongPerformance			2012	999-04-05	a diama					=
Queries *		_	1357 1257							
CDs With Jerry Goldsmith		-		000-08-17						
SongPerformanceComposer			3 2	001-05-31	1 25					
SongPerformanceComposer			4 1	998-11-08	3 26					
			5 1	998-04-08	3 32					
		Record: H 4	of 7	• H 👪 📡	No Filter S	arch				
	· ·									
		I4 4 1 of 9	• • •	K No Filte					 	

When a record is being edited, Access marks this with a little pencil symbol (\checkmark) on the left.

We can also add a new CD by creating a new record (by pressing the **button** at the bottom):

A	Database - after chapter 6 : Database (Access 2007 - 2010) – Microsoft Access	= = ×
	ternal Data Database Tools Acrobat	^ ?
Cut Copy	Y 2↓ Ascending V Selection * Image: Selection * Image: Selection * X↓ Descending Y Advanced * Image: Selection * Image: Selection * Image: Selection * X↓ Descending Y Advanced * Image: Selection * Image: Selection * Image: Selection * X↓ Descending Y Advanced * Image: Selection * Image: Selection * Image: Selection *	
View Paste	Filter A_{A} besterioling A_{A} value A_{A} and	-
Views Clipboard 5	Sort & Filter Records Find Text Formatting	ā
All Access Objects 💿 «		×
Search	CD CD	
Tables	· · · · · · · · · · · · · · · · · · ·	
ArtistPerformance	ID (New)	
CD	Title	
CDSongPosition	Ane	
Composer	Year	
Song	✓ Position [¬] Date [¬] Song [¬]	<u> </u>
SongPerformance	*	
Queries CDs from 1999		
CDs With Jerry Goldsmith		
SongPerformanceComposer		
	Record: H (1 of 1) H / K No Filter Search	
The title of the CD	Record: H 10 of 10 H K No Filter Search Num Lock	
Contraction and Contraction of the Contraction of t		

The ID field is automatically set by Access, so we only need to fill in the Title and the Year:

A 🖯 🖓 - 🔍 - 📼		
File Home Create External Data Database Tools		
All Access Objects 💿 « 🖃 CD		×
Search		
Tables		
ID 10		
ArtistPerformance		
	g Willy Style	
CDSongPosition		
	102	_
Bong Position	Date Song	
SongPerformance		
Queries *		_
CDs from 1999		
CDs With Jerry Goldsmith		
SongPerformanceComposer		
Record: 14 4 1 of 1	► N > K No Filter Search	- 1
Record: M 1 or J	t Part Who Filter Scott	
Record: 14 4 10 of 10 +	N No Filter Search	
The year that the CD was produced. Must be between 1980 and 2050	Num Lock [3 3 2

We can see that even in this view, Access shows the comment for the activated field in the status bar of the window.

We can also try to add another row but with an invalid Year value (say 1850):

A		
File Home Create External Data Database Too		
All Access Objects 💿 « 🖃 CD		
Search		
Tables A		
III Artist	1	
ArtistPerformance		
	Aozart's Party Hits	
CDSongPosition		
	850	
Song		
SongPerformance	Date Cong	
Queries 🏦		
CDs from 1999		
CDs With Jerry Goldsmith		
SongPerformanceComposer		
Record: I4 4 1 of	1 > N > K No Filter Search	
Record: H 1 of	L / N / W HO FILCE SCOLU	
Record: 14 4 11 of 11	N 🛌 🛣 No Filter Search	
The year that the CD was produced. Must be between 1980 and 2050		Lock 🔲 🗉 🔛

The moment we try to move the cursor out of the Year field, Access will detect the violation and show the specified Validation Text:



We can cancel the new record by simply pressing the Escape key (twice) after we press OK at the pop-up message dialog. The record will return to each original blank state:

🖪 🔚 10 - 10 - 11+		
File Home Create External Data Database Too		
All Access Objects 💿 « 🖃 🚥		
Search P CD		
Tables A		
III Artist	New)	
ArtistPerformance		
CD Title		
CDSongPosition		
Song	▽ Date ▽ Song ▽	
SongPerformance		
Queries CDs from 1999		
CDs With Jerry Goldsmith		
SongPerformanceComposer		
- songi enomeneeemposei		
Record: 14 4 1 of	1 + N + K No Filter Search	
	N 🎫 🕅 No Filter Search	New Look R N
The year that the CD was produced. Must be between 1980 and 205		Num Lock 🔲 🗟 🕍

If we don't like the layout of this automatically generated form, we have the possibility to switch to the Design View and change it. To switch to the Design View, press the Design View button on the right side of the status bar or select Design View from the ribbon on the Home tab. In the Design View (or in the Layout View) we move around the controls, add or remove controls, configure their format, etc. We could for example remove the grid showing all the CDSongPositions and change the width of the fields.

🗛 🚂 🧐 🔹 🖓 🚽 👳		Form Design Tools	Database - after chapter 6 : Databa	
File Home Create Exte	ernal Data Database Tools Acrobat	Design Arrange Format		
Views Themes	ab Aa 🚥 🗋 🧕 💽	Title Timage + Header / Foot	There's order	
All Access Objects 💿 «				erty Sheet X
Search	• • • • 1 • 1 • • 2 • • • 3 • 1 • 4 • • • 5 • •	• 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 •	11 · · · 12 · · · 13 · · · · 14 · Form	tion type: Form
Tables Artist	Form Header		Form	at Data Event Other All
ArtistPerformance	CD CD		Capt	the state of the s
🛄 CD	<u>-</u>		Allo	w Form View Yes
CDSongPosition	ID ID			w Datasheet Vie No w PivotTable Vie No
Composer	Title			w PivotChart Vit No w Layout View Yes
Song Song	Title Title			ure Type Embedded
SongPerformance	· Year Year		Pictu	ure (none) ure Tiling No
Queries				ure Alignment Center
CDs from 1999			Pictu	ure Size Mode Clip
CDs With Jerry Goldsmith	Form Footer		Wid	th 10,698 cm o Center No
SongPerformanceComposer	-		Auto	Resize Yes
			Bar	o Screen Yes der Style Sizable 🗸
Design View				Num Lock 🔰 🖬 📓 🕍 📑

There are two basic ways of changing the design of the form and the form controls: Through the ribbon and through the Property Sheet. When a form object (a control or a section of the form) is selected, the Property Sheet will show all the relevant properties and their current values. Most values can be changed and the Property Sheet will offer all applicable options. The same applies to the options provided directly on the ribbon. For example the Font property shows the font in use and offers a list of possible fonts to choose from.

After playing around for a bit, the form may look like this:

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Fil	e				~ 🤇	
*	-3	CD			×	k
		CD Mar	nager Form			
۵						
n Pan		ID	1			
Navigation Pane		Title	Yanni Greatest Hits			
Nav		Year	2002			
	Reco	ord: I4 4 1 of 10	H K No Filter Search			
Surro	ogate	key for the CD tabl	e Num	Lock	*	

A form can be saved at any time, but Access will ask if we try to close an unsaved form. We save our form as "CD Simple Form". The form will now be available in the object browser under Forms:



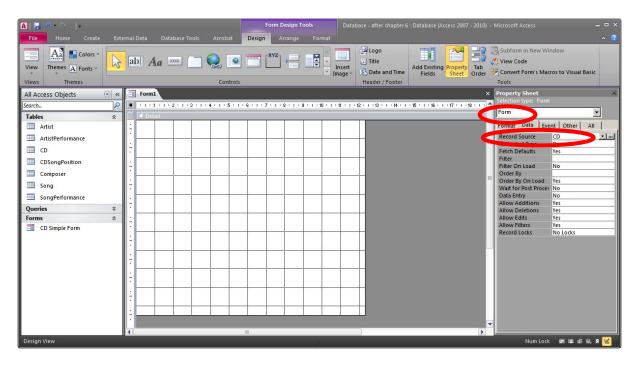
We can also create a form without using Access' AutoForms. We can create an empty form in Design View and then manually add all the components we want. Create a new empty form by selecting Create > Form Design from the ribbon. An empty form will appear and it is now up to us to design it:

<mark> </mark> () → () → ↓ File Home Create E:	ternal Data Database Tools Acrobat Design Arrange Format	Microsoft Access		-
/iew Themes A Fonts *	ab Aa a Galance Control of the sector of the	📑 Subform in New Wi 党 View Code 🏂 Convert Form's Mac		
fiews Themes	Controls Header / Footer	Tools		-
All Access Objects 💿 <		Property Sheet Selection type: Form		
earch ×	🔳 🔳 · · · 1 · · · 2 · · · 3 · · · 4 · · · 5 · · · 6 · · · 7 · · · 8 · · · 3 · · · 10 · · · · 11 · · · · 12 · · · 13 · · · 14 · · · 15 · · · 16 · · · 17 · · · 18 · · · ·			
Tables 🕆	✓ Detail	Form	*	
Artist		Format Data Eve	ent Other All	E
		Caption		1
		Default View	Single Form	-
CD		Allow Form View	Yes	-
CDSongPosition		Allow Datasheet Vie	Yes	_
		Allow PivotTable Vie		_
Composer		Allow PivotChart Vie		_
Song		Allow Layout View	Yes	_
		Picture Type Picture	Embedded (none)	-
SongPerformance		Picture Tiling	(none) No	-
ueries ×		Picture Alignment	Center	-
orms 🌣		Picture Size Mode	Clip	-
CD Simple Form		Width	12,335cm	1
CD Simple Form		Auto Center	No	
		Auto Resize	Yes	
		Fit to Screen	Yes	_
		Border Style	Sizable	
		Record Selectors	Yes	_
		Navigation Buttons	Yes	-
		Navigation Caption Dividing Lines	No	-
		Scroll Bars	Both	-
		Control Box	Yes	-
		Close Button	Yes	-
		Min Max Buttons	Both Enabled	-
		Moveable	No	_
		Split Form Size	Auto	_
		Contraction of the local division of the loc		

The first thing we have to do is to specify the table that is going to be the data source for this form (i.e. the table that contains the columns and data that will appear in the form). We can do this in the Property Sheet. Select the table CD as the Record Source for the form. The

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property Record Source is available under Data (and under All) when the Property Sheet shows the properties of the form:



When a Record Source has been selected the Field List becomes available. The Field List shows the columns of the selected Record Source and we can drag and drop them into the form. This will create a label and a text field (Text Box) for the selected column of the table. Drag and drop the fields Title and Year onto the free area of the form so that it looks something like this:

A 🖓 🖌 🔍 🔸 🖓 🖛	Form Design Tools Database - after chapter 6 : Database (Access 2007 - 2010) - Microsoft Access -	- = x
File Home Create	External Data Database Tools Acrobat Design Arrange Format	
T Themes A Ponts +	ab Aa Image: Image: <td< th=""><th></th></td<>	
Views Themes	Controls Header / Footer Tools	
Search	Image: Source of the second	X
Artist Artist CD CDSongPosition CDSongPosition Composer Song SongPerformance Queries	* * <th>-</th>	-
CD Simple Form	*	- 1
Design View	Num Lock 語 頭 道 此 3	≝ .:

The column ID is not visible in the form, but it exists of course in the table. Since the column ID is an Autonumber, Access will take care of the values for new rows automatically.

Now activate the Title Text Box and look at the Property Sheet under Data:

A 🔚 🤊 • O • =	Form Design Tools Database - after chapter 6 : Database (Acc	cess 2007 - 2010) - Microsoft Access 🗕 🗖 🗙
File Home Create Ext Image: Second se	ernal Data Database Tools Acrobat Design Arrange Format abl Aa Acrobat Design Arrange Format abl Aa Image Image Image Itelestor Itelestor <t< th=""><th>Subform in New Window</th></t<>	Subform in New Window
All Access Objects 💿 🔍		X Property Sheet X Selection type: Text Box
Search	- + + + + + + + + + + + + + + + + + + +	Title
Artist ArtistPerformance CD CDSongPosition Composer Song SongPerformance	Title Title Vear Vear	Format Data Event Other All Control Source Title Text Format Plain Text Input Mask Default Value Validation Rule Validation Text Fitter Lookup Database Default Enabled Yes Locked No Smart Tags
Queries × Forms *		
CD Simple Form Design View		🎽 Num Lock - 國 國 盛 極, 종 🔀 ,

The value of the property Control Source is Title. This means that this Text Box is linked to the column Title of the form's Record Source (the table CD). This means that whatever we see or type in this field is stored in the Title column of the current row of the table CD.

We may also improve the layout of the form by choosing an appropriate layout from the Arrange tab of the ribbon.

Switch to the Form View to see and use the form:

A 🗑 🕐 · 🗠 · 🖛	Database -	after chapter 6 : Database (Access 200	7 - 2010) - Microsoft Access	×
File Home Create Exte	ernal Data Database Tools Acrob	at		^ ?
	↓ Ascending ↓ Selection * ↓ Descending ↓ Advanced * ↓ Descending ↓ Advanced * ↓ Remove Sort ↓ Toggle Filter		N Select	 ▼ 三 三 第 章 Ⅲ・ Ⅲ・ I Ⅱ A・ジ・G・ ■ 章 署 Ⅲ・ Ⅲ・
Views Clipboard G	Sort & Filter	Records	Find	Text Formatting
All Access Objects 💿 «	Form1			×
Search			1	
Tables *	Title Yanni Gre	atest Hits		
Artist ArtistPerformance	Year 2002]	
CD CDSongPosition				
Composer				
SongPerformance				
Queries ×				
Forms CD Simple Form	Record: H 4 1 of 10 + H + K	No Filter Search		
The title of the CD				Num Lock 🛛 🗃 🗃 🛍 🗃 🔛 📑

We can now save this form as "CD Designed Simple Form".

6.2 Lookups

In this section we will see how we can create forms for tables that have one or more foreign keys. The main difference from the forms created in the previous chapter is that some of the columns of the table may not accept just any value. The value of a foreign key column is dependent on the values that exist in the referenced table.

We can start with a form that was required in the case in chapter 2: "A form for registering a new Artist in the database". The table Artist has two foreign keys. One of them (FavouriteComposer) references the primary key of the table Composer, while the other (Mentor) references the primary key of the table Artist. Our form should therefore provide a

possibility of selecting one of the existing composers as the favourite composer and one of the existing artists as the mentor.

We can either create a form from scratch (as we did in the previous section), or we can let Access create a standard form for us and then modify it. In this example we will do the latter.

Select the table Artist in the object browser and select Create > Form from the ribbon:

A B B B B B B B B B B B B B B B B B B B	nal Data Database Tools A	Form Layout Tools	Database - after chapter 6 : Dat	labase (Access 2007 - 20	110) - Microsoft Access				×
View Themes A Fonts -	abi Aa 🔤 🚞 🍕	Controls	B San - Insert - Insert - Image -	- Inte Ad	d Existing Froperty Fields Tools				
The second s	Artist	sennen		HEIGH / FOOLER	10015	×	Property Sheet		*
Segrich.									
Tables 8	Artist						Name		
III Artist	· ·						Format Data Ex	ent Other	All
ArtistPerformance	Name	Bill Bradley					Control Source	Name	
							Text Format Input Mask	Plain Text	
CDSongPosition	Age	56					Default Value		
Composer	FavouriteComposer	Yanni					Validation Rule Validation Text		
Song	Contraction Contraction						Filter Lookup	Database Def	ault
	Mentor	Tony Barrett				1	Enabled	Yes	
	1						Smart Tags	140	
Queries ¥ Forms a									
CD Designed Simple Form									
CD Simple Form									
	Record: H (1 of 14 + H +	K No Filter Search							
Layout View			11					Num Lock	an 🔝 🗠 👘

Access has created one Text Box per column in the table. If we try to use this form, we must specify the values of every column manually. This is of course not practical because we need to remember exactly which values are available in the referenced primary keys to maintain referential integrity.

	⊙ • ⊙ • =	Database - after chapter 6 : Database (Access 2007 - 2010) - Microsoft Access 🗕	. - x
File	Home Create Ext	rternal Data Database Tools Acrobat	
View Views	Paste Clipboard	¹ / ₂ Ascending ¹ / ₂ Selection ¹ / ₂ Advanced ¹ / ₂ Moresending ¹ / ₂ Advanced ¹ / ₂ Save ¹ /	
All Acce	ess Objects 💿 🔍 «	Attal	×
Search Tables	م *	- Artist	
Ar	tist tistPerformance	Name	ĺ.
ш с		Age	
	DSongPosition omposer	FavouriteComposer	
	ong ongPerformance	Mentor	
Querie Forms			
	D Designed Simple Form D Simple Form		
		Record: H 4 15 of 15 + H + K No Filter Search	
Refernce	to an artist that is the mentor	r of this one. Num Lock 📴 🗷	¥

The first two Text Boxes are fine because it is up to the user to write the name and age of the artist. The third and fourth, though, are not so good. They require that the user knows exactly which composers and artists there are in the system and requires that the user doesn't make any spelling mistakes. We will therefore switch them to Combo Boxes. To do this we need to switch to the Design View and then remove the Text Boxes, and add Combo Boxes (from the ribbon). There is also an option to change a Text Box to a Combo Box (by right-clicking on the Text Box, but then we will need to configure the Combo Box manually. By adding a new Combo Box from the ribbon, a wizard will assist us in the configuration. First remove the two Text Boxes (and their associated Labels):

A 📮 🤊 • 🔿 • I=	Form Design Tools Database - after chapter 6 : Database (Access 2007 - 2010) - N	Microsoft Access 🛛 🗕 🗖
File Home Create Ext	rrnal Data Database Tools Acrobat <mark>Design</mark> Arrange Format	
View Themes A Fonts *	ab Aa 🚥 🌑 🧶 💽 📅 🔭 📄 🖬 🔪 🖓 ab Aa Eisting Program	perty Tab 72
Views Themes	Controls Header / Footer	Tools
All Access Objects 💿 <	I Artist	Property Sheet
Search	🔳 · · · · 1 · · 1 · · 2 · · · 3 · · · 4 · · · 5 · · · 6 · · · 7 · · · 8 · · · 8 · · · 1 · 0 · · · · 11 · · · · 12 · · · · 13 · · · · · 14 · · · · · 15 · · · · 16 · · · · 17 · · · · 18 · · · · ·	Selection type: Form
Tables Artist	Artist	Format Data Event Other All
ArtistPerformance		Record Source Artist
Ср		Recordset Type Dynaset Fetch Defaults Yes
CDSongPosition	Name Name	Filter
Composer		Filter On Load No Order By
Song	Age	Order By On Load Yes
SongPerformance		Wait for Post Proces No Data Entry No
Oueries ×		Allow Additions Yes
Forms ô		Allow Deletions Yes Allow Edits Yes
CD Designed Simple Form		Allow Filters Yes
CD Simple Form	l ♥ Form Foater	Record Locks No Locks
	τ I I I I I I I I I I I I I I I I I I I	
Design View		Num Lock 🛛 🖬 📓 🕍

The dotted lines that remain are part of the selected layout. The default layout is a Stacked layout where all the Labels are on the left and all the Text Boxes are on the right and they all have the same width and spacing. When we add a new control, we may add it in the existing layout by dropping it at the right place.

We can now add two Combo Boxes: one for the column FavouriteComposer and one for the column Mentor. To do this we need to locate the Combo Box control under Design on the ribbon. When adding complicated controls, Access will provide a wizard for configuring the new control, but only if the option "Use Control Wizards" is selected:

A					1	Form Design	Tools	Database -					
File Home Create					Design	Arrange							
View Themes A Fonts * Views Themes			××× (``)	Q. [Insert	Jogo Title Date and Time Header / Footer	Add Existing Fields	Property Sheet	Order 🥙 Convert Form's Macros to Visual Basic Tools	
/ millecess objects		ontrol Default										Field List	×
	- and	Control <u>W</u> izard	dis					+ 12 + 1	·13 · 1 · 14 · 1 · 15 · 1	· 16 · 1 · 17 · 1	10	P Show all tables	
Tables	Active	eX Controls										Fields available for this view: Name	
Artist		((- =)	Artist									Age	. II
ArtistPerformance		✓ Detail	1					1 1			- 1	FavouriteComposer	
E CD												Mentor	- II
CDSongPosition	- 1	Nam	10	Name									- II
Composer	1	Age		Age				_		-			- II
Song		0-			-					-			- II
SongPerformance	- 2												- II
Queries	* 1												- II
	*			-	_			_		-			- II
CD Designed Simple Form	-												- II
CD Simple Form										_			- II
	1.1												- II
			1 1	1 1	IIII		1 1						- 1
Design View											1201	Num Lock 🖬 🕏	

Now, we are ready to add our first Combo Box onto the form. Press the Combo Box button (\blacksquare). Move the mouse to the place on the form where you want to place the new Combo Box (the mouse cursor will change to indicate that you are about to add a new Combo Box). The position is probably not so important, since we can add it to the existing layout later. As soon as we have clicked to create the new Combo Box, the Combo Box Wizard will appear:

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Combo Box Wizard						
	This wizard creates a combo box, which displays a list of values you can choose from. How do you want your combo box to get its values?					
	• I want the combo box to get the values from another table or query.					
	C I will type in the $\underline{v}alues$ that I want.					
	C Find a record on my form based on the value I selected in my combo box.					
	Cancel < Back Next > Einish					

There are three alternatives, but the first one is what we want in this case. We want to fill the Combo Box with values of a table. Select the first alternative and press Next.

The wizard will now ask us to select which table or query we want to use. We want to use this Combo Box to let the user select an existing composer as the new artist's favourite composer. We choose therefore the table Composer:

Combo Box Wizard	
	Which table or query should provide the values for your combo box? Table: Artist Table: ArtistPerformance Table: CDSongPosition Table: COsngPosition Table: Song Table: Song Table: Song Table: SongPerformance View © Tables © Queries © Both
	Cancel < <u>B</u> ack <u>N</u> ext > Enish

We can now press Next again and the wizard will ask us to select which columns of the table Composer that we want to include in the combo box. There is only one column, so there is not so much to think about. Just add the column Name to the selected fields:

Combo Box Wizard	
	Which fields of Composer contain the values you want included in your combo box? The fields you select become columns in your combo box.
Available Fields:	Selected Fields:
	Name < <
	Cancel < Back Next > Finish

Press Next and the wizard will ask us to choose how the items of the combo box should be ordered. We can, for example, order the composers alphabetically:

Combo Box Wizard								
What sort order do you want for the items in your list box?								
You can sort records by up to four field	ls, in either ascending or descending order.							
1 Name	Ascending							
2	Ascending							
	Ascentiang							
3	Ascending							
4	A second as							
	Ascending							
·								
Canc	el < Back Next > Finish							

Press next and Access will display the available values in the defined order:

Combo Box Wizard									
How wide would you like the columns in your combo box?									
To adjust the width of a column, drag its right edge to the width you want, or double-dick the right edge of the column heading to get the best fit.									
Name									
Danny Elfman									
Jerry Goldsmith									
Vangelis									
Will Smith									
Yanni									
	Cancel	< <u>B</u> ack	<u>N</u> ext >	Einish					

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Here we can also modify the width of the column(s) of the Combo Box. This looks fine so we move on to the next step. This is where we finally connect our Combo Box to the table of the form. Here we can instruct Access to place the selected value of the Combo Box in a particular field of the table Artist. As we said earlier this Combo Box will help us choose the favourite composer, so the selected value should be stored in the column FavouriteComposer of the table Artist:

Combo Box Wizard	
	Microsoft Access can store the selected value from your combo box in your database, or remember the value so you can use it later to perform a task. When you select a value in your combo box, what do you want Microsoft Access to do? © <u>Remember the value for later use.</u> © <u>Store that value in this field:</u> <u>FavouriteComposer</u>
	Cancel < <u>B</u> ack <u>N</u> ext > <u>F</u> inish

We can now move on to the final step of the wizard where we just need to define the text of the Label of the new Combo Box:

Combo Box Wizard	
	What label would you like for your combo box?
	Favourite Composer Those are all the answers the wizard needs to create your combo box.
	Cancel < <u>B</u> ack <u>N</u> ext > <u>F</u> inish

We can now press Finish and look at the form:

N S Sternal D File Home Create External D		Form Design Tools Acrobat Design Arrange Format	Database - after chapter 6 : Databas	e (Access 2007 - 2010) - Microsoft Access 🗕 🕻
	Aa 🚥 🗋 (🥺 💽 🎫 💴 🕂	Image - 🔂 Date and Time	Add Existing Frieds Sheet Order Convert Form's Macros to Visual Basic
Views Themes		Controls	Header / Footer	Tools X Field List
	Artist			
	1	4 • 1 • 5 • 1 • 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1	-11 - 1 - 12 - 1 - 13 - 1 - 14 - 1 - 15 - 1 - 16	Fields available for this view:
Tables	Name	Name		Name
Artist 1				Age
ArtistPerformance	Age	Age		FavouriteComposer Mentor
CDSongPosition	Favourite Con	PGFavouriteCom -		
Composer -				
Song 4				
SongPerformance				
Queries ×				
Forms * 6				
CD Designed Simple Form				
CD Simple Form 7 -				
line and the second	🗲 Form Footer			
Design View				Num Lock 🖬 🕱

We can see the Label on the left and the Combo Box on the right. They were not placed exactly where we wanted, so we can drag and drop the Combo Box into the existing layout. The Label will follow automatically:

A 🗐 🖌 🔍 - 🛛 -									Form D	esign 1	ools		Datab	ase - af	ter chap	ter 6 : Da	atabase	e (Access 2	007 - 2	010) -	Micro	soft Access			-	□ ×
File Home Create Ext			Datab			Acrob	at	Design	A	rrange		mat														
· · · · · · ·	ab	Aa	XX0	∝ [] (XYZ	-		1		nsert age -		e :e and Ti	me	dd Existin Fields	g Prop Sh	erty	Tab Order	Subform in View Code			ual Basic	
Views Themes	110	_	_				Contro	ls					_		Heade	er / Foot	er	_				Tools				
All Access Objects 💿 «		Artist																			eld Lis					×
Search		11111	1 • 2	• 1 • 3	. 1 + 4	111	5 • 1 • 1	6 + 1 +	7 • 1 •	8 • 1 •	9 * 1 * 1	0 + 1 + 1	11 + 1 + 1	2 • 1 • 1	13 • 1 • 14	• 1 • 15	· i · 16	· · · 17 ·	1 18	4	🦻 Sh	ow all tables				
Tables *	1:					_	1			1										F		ailable for this v	riew:			
Artist	1 i -	N	ame				Name	2		_	-			_		- 1					Nam	e				
ArtistPerformance	121	A.	10				1 70												5			uriteComposer				
II CD	2 -	Aş	ze				Age	í	1	1	1	1	r -	1	i i	- 1	1	-			Men					
		Fa	vou	rite C	ompo	ser	Favou	riteC	ompo	ser								-								
	3																									
Composer Composer	17						122223	22222			191919	22222			2222		2222	and 📃		=						- 1
Song	111									<u> </u>																
SongPerformance	E.																									- 8
Queries ¥	1						1		1																	- 11
Forms 🏾 🕆	hinh	🗲 Form F	ooter	0			1	1		1	1		1	1		-										- 8
E CD Designed Simple Form	1.1																									- 8
CD Simple Form																				-						- 8
	4						100	5																		_
Design View																							N	um Lock	un S	K

We can now add one more Combo Box for the column Mentor. The process is exactly the same, but this time we select the table Artist, we store the value in the column Mentor, and we can also set the Label to "Mentor". Here is the form with both Combo Boxes in place:

A		Form Design Tools		
File Home Create External Data		Design Arrange Format		
View Themes A Fonts - Views Themes		1 T XYZ P I I I		
All Access Objects 💿 « 🖃 Artist			×	
Tables Image: Constraint of the second sec	iame Na sge Ag avourite Composer Far Ientpr Ma	ime		Image: Show all tables Fields available for this view: Name Age FavouriteComposer Mentor
CD Designed Simple Form		10		
Design View				Num Lock 🖬 🗟 🔛

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We can now switch to the Form View and see how our form works. Browse through the records. Notice that any change you make here is immediately stored in the table (as soon as you leave the current record). So if you want to add a new record, you must first move to a new record and then input the new values. Otherwise you will be changing an existing record in the table. We can at this point also save our new form as "Artist":

	⊙ • ○ • •	Database - after chapter 6 : Database (Access 2007 - 2010) - Microsoft Access	_ = ×
File	Home Create E		
Views	Cut Copy Paste Clipboard	Y Ascending Selection Σ Totals Abscending Advanced → Save Spelling Ascending Ascending → Save Sort& Find Select * Find Text Formatting □	
All Acce	ess Objects 💿	🦟 🗉 Artist	×
Search		Artist	
Tables		*	
Ar Ar		Name	
Ar 🛄	rtistPerformance		
🔲 🛄 ct	D	Age	
🔳 ct	DSongPosition	Favourite Composer	
🛄 ca	omposer		
🛄 So	ong	Mentor	
🛄 So	ongPerformance		
Querie	s ¥	*	
Forms		*	
	rtist		
E CI	D Designed Simple Form		
E CI	D Simple Form	Record: H 4 15 of 15 > H > K No Filter Search	
The nam	e of the artist	Num Loc	k 🔲 🗉 🔛 🔡

(i) Queries and tables may not have the same name, but a form can without problem have the same name as a table or query.

We will modify this form a little bit later to add the business rule restriction: "The mentor must be older than the artist". We will do this in section 9.15.

What we saw above is a very simple case where the primary key of the referenced table was what the user saw in each Combo Box. But there is also the possibility that a foreign key references a surrogate key that is not so useful for the user to see in a combo box. This can be illustrated with another form required in our case: *A form for registering song performances and artists performing them.*

We can start by making a form for only the first half of the sentence above: A form for registering song performances. In this case the form will be able to register a new row in the table SongPerformance. This table has a foreign key (column Song) that references the primary key of the table Song (column ID). But it would be useless for a user to see a bunch of ID values in a combo box. We will therefore show in the combo box the name and the composer of the song, and let Access link the ID values.

We start by creating a new form for the table SongPerformance. We can use an AutoForm to get a form quickly. We can then remove the Song Text Box so that we can add a combo box instead. Our form should now look like this (before adding the Combo Box):

A 🗟 🖉 • 🗠 • 🖛	Form Layout Tools Database - after chapter 6 : Database (Access 2007 -	2010) - Microsoft Access 📃 🗖 🗙
File Home Create	External Data Database Tools Acrobat Design Arrange Format	
View Themes A Fonts *	Timage → B ¹ / ₂ Date and Time	Add Existing Property Fields Sheet
Views Themes	Controls Header / Footer	Tools
All Access Objects	Construction of the second sec	× Property Sheet × Selection type: Section
Search	SongPerformance	Detail
Tables		
Artist	Date 1989-04-03	Format Data Event Other All
ArtistPerformance	19090100	
CD CD		
CDSongPosition		
Composer		
song		
SongPerformance		
Queries ×		
Forms *		
Artist		
CD Designed Simple Form		
CD Simple Form	Record: H 🔞 1 of 54 🕨 H 🍋 🌾 No Filter Search	
Layout View		Num Lock 🛛 🖬 🔛 😒

We can now add a Combo Box under the Date field and go through the wizard.

First we say that we want to look up the values in a table:

Combo Box Wizard	
	This wizard creates a combo box, which displays a list of values you can choose from. How do you want your combo box to get its values?
	query. C I will type in the values that I want.
	 Find a record on my form based on the value I selected in my
	combo box.
	Cancel < Back Next > Finish

Then we specify the table Song as the value provider:

Combo Box Wizard	
	Which table or query should provide the values for your combo box?
	Table: Artist Table: ArtistPerformance Table: CD Table: CDSongPosition Table: Composer Table: Song Table: SongPerformance
	View © <u>T</u> ables O Queries O B <u>o</u> th
	Cancel < <u>B</u> ack <u>N</u> ext > ⊟nish

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Next we have to say which fields we want to include in our combo box. It is important to take both the columns that we want to show to the user, and the columns that are referenced by the foreign key. This means that we have to take the columns Name, Composer and ID:

Combo Box Wizard	
	Which fields of Song contain the values you want included in your combo box? The fields you select become columns in your combo box.
Available Fields:	Selected Fields:
Length	ID Name Composer <
	Cancel < <u>B</u> ack <u>N</u> ext > Einish

Next we can decide the order. For example by name and then by composer (when more songs have the same name):

Combo Box Wizard				
What sort order do you want for the items in your list box?				
You can sort records by up to four fields, in either ascending or descending order.				
1 Name Ascending				
2 Composer Ascending				
3 Ascending				
4 Ascending				
Cancel < Back Next > Finish				

The next step now provides an extra possibility, namely to hide the primary key column. If we unhide the primary key then all three columns will be visible in the combo box.

ID Name Composer 3 Flashback Danny Elfman 5 Memories Danny Elfman 4 Sad Room Danny Elfman 1 Storytime Danny Elfman 2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith 6 First Flight Jerry Goldsmith	o adjust the width of a column, drag its right edge to the width you want, or double-click the right dge of the column heading to get the best fit.				
3 Flashback Danny Elfman 5 Memories Danny Elfman 4 Sad Room Danny Elfman 1 Storytime Danny Elfman 2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith					
5 Memories Danny Elfman 4 Sad Room Danny Elfman 1 Storytime Danny Elfman 2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith					
4 Sad Room Danny Elfman 1 Storytime Danny Elfman 2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith					
1 Storytime Danny Elfman 2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith					
2 Vera's World Danny Elfman 9 FireWorks Jerry Goldsmith	4				
9 FireWorks Jerry Goldsmith	1				
6 First Flight Jerry Goldsmith	-				
		×	í		
8 The Attack Jerry Goldsmith	8	The Attack	Jerry Goldsmith		

We can also rearrange the order and width of the columns if necessary. But we leave the ID column first and hidden, because the wizard may get confused otherwise:

Combo Box Wizard How wide would you like the columns in your combo box? To adjust the width of a column, drag its right edge to the width you want, or double-click the right edge of the column heading to get the best fit. If Hide key column (recommended) Name Composer					
Name	Composer				
A Love For Life	Yanni				
Almost A Whisper	Yanni				
Before I Go	Yanni				
Chariots Of Fire	Vangelis				
Conquest Of Paradise	Vangelis				
Dare To Dream	Yanni				
Desire	Yanni				
	Cancel	< <u>B</u> ack	<u>N</u> ext >	Einish	

Since the ID column is a surrogate key for the table Song, it is best to hide it from the user. Even though the column ID is not visible to the user, Access can still place the ID value in the applicable column of the table SongPerformance. Choose therefore to store the value of the Combo Box in the column Song (which is the foreign key). Access will automatically place the ID value of the selected song in the column Song of the current row of the table SongPerformance.

Combo Box Wizard	
	Microsoft Access can store the selected value from your combo box in your database, or remember the value so you can use it later to perform a task. When you select a value in your combo box, what do you want Microsoft Access to do? © <u>Remember the value for later use.</u> © <u>S</u> tore that value in this field: <u>Song</u> <u> </u>
	Cancel < <u>B</u> ack <u>N</u> ext > <u>F</u> inish

Press next to specify the label for the new combo box:



Press Finish to return to the form design view where we can modify the position and size of our new combo box and label:

A 🔒 🤊 • 🔿 - I=		Form Design Tools	Database - after chapter 6 : Database (Access	2007 - 2010) - Microsoft Access	
File Home Create Exte		Design Arrange Format			
The A Ponts	abl Aa 🚥 📄 🥺 💽		Timage + 5 Date and Time	dd Existing Property Tab Fields Sheet Order 22 (Subform in New Window View Code Convert Form's Macros to Visual Basic
Views Themes		Controls	Header / Footer	× Property Sheet	pols
All Access Objects				Selection type: Label	^
		. 6 . 1 . 7 . 1 . 8 . 1 . 9 . 1 . 10 . 1 .	11 • 1 • 12 • 1 • 13 • 1 • 14 • 1 • 15 • 1 • 16 • 1 • 17	Auto_Header0	
Tables Artist				Format Data Event	t Other All
ArtistPerformance	SongPerform	ance		Smart Tags	
CD CD	• Detail				
CDSongPosition	- Date Date				
Composer					
🔳 Song 🔳	Song Song		<u>-</u> _		
SongPerformance	Form Footer				
Queries ×	-				
Forms	•				
Artist	-				
CD Designed Simple Form				-	
🔲 CD Simple Form 🔍	4			•	
Design View					Num Lock 🛛 🖬 🗟 🕍

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We can now switch to the Form View and browse through the records to see how the Combo Box works:

	Database - after chapter 6 : Database (Access 2	2007 - 2010) - Microsoft Access	- ¤ ×
File Home Create External Data Database Tools Acroba			
View Clipboard G Sort & Filter	New Σ Totals Base Save Refresh X Delete * All * X Delete *	$\begin{array}{c c} & & & \\ \Rightarrow & \text{Go To } \\ \Rightarrow & \text{So To } \\ \downarrow \\ \downarrow & \text{Select } \\ \text{ind} & & & & \\ \hline \end{array} \begin{array}{c c} & & & \\ \blacksquare & \underline{I} & \underline{U} & A + ab 2 + O_{H} + ab \\ \hline & & & & \\ \blacksquare & & & & \\ \hline & & & & \\ \hline & & & & \\ \hline \end{array}$	
All Access Objects 💿 « 🔄 SongPerformance			×
Search	nance		
Tables A			
Artist Artist Date 1989-04-03			
CDSongPosition Song Chariots Of	Fire	·	
Composer			
Song			
SongPerformance			
Queries ×			
Forms 🏦			
Artist			
CD Designed Simple Form			
CD Simple Form Record: H 1 of 54 + H + K	No Filter Search		
The date of this performance			Num Lock 🔲 🛙 🕍

Access has also automatically added a little icon next to the Text Box for the Date column. This icon allows us to choose a date from a special pop-up calendar. Access added this because the column was defined to be a Short Date. This so called "Date Picker" can be configured through the property "Show Date Picker".

Sadly Access only shows the first visible column when the combo box is closed, while it shows all visible columns when the combo box is open:

A 🖓 🖓 🖓 🖓 🖓 🖡	Da	atabase - after chapter 6 : Databas	e (Access 2007 - 2010) -	Microsoft Access	_ = ×
File Home Create External Data Datab	ase Tools Acrobat				* 😮
View Pacte Copy	ort V Toggle Filter	efresh All + Records	Find Bind Find B		
All Access Objects 💿 « 🔄 SongPerforma	nce SongPerforman	nce			×
Search	ongPerforma	ince			
Artist Date	1989-04-03				
CD Song	Chariots Of Fire	e			
CDSongPosition	Chariots Of Fire	e Vangelis			
Composer	Conquest Of Pa	ar Vangelis			
Song Song	Dare To Dream				
SongPerformance	Desire	Yanni			
Queries ×	Dial Out	Vangelis			
Forms Artist	Eternity FireWorks	Vangelis Jerry Goldsmith			
CD Designed Simple Form	First Approach First Flight				
Record: 1 of		Yanni			
Form View	Flashback	Danny Elfman		Num Lo	ck 🔲 🖩 坐 🚲

There are some ways to fix this. One simple solution is to transform the Combo Box to a List Box. This can easily be achieved be right-clicking on the Combo Box control (while in Design View) and selecting Change To \rightarrow List Box. Access will then transform the Combo Box into a List Box while preserving all other settings of the control. If you open the form now it should look much better:

A	? • ∾ • =				Database - after cha	pter 6 : Databa	se (Access 20	007 - 2010)	- Microsoft Access		_ = ×
File	Home Create Exte	ernal Data	Database	Tools Acrobat							
View Views	Paste Clipboard	Eilter	Descending	Selection * Advanced * V Toggle Filter er	Refresh All + Delete Record	∑ Totals ♥ Spelling ■ More =	Find	ac Replace → Go To → → Select → nd	- ・ 」 :: :: : 使 禄 ×ī ・ B I U A ・ *ジ ・ ③ ・ 証 書 温 Ⅲ・ Ⅲ・ Text Formatting 。		
All Acc	ess Objects 💿 🔍	-s Son	ngPerformance	SongPerfor	mance						×
Search	₽ ×		😑 Sor	ngPerform	nance						
1000	rtistPerformance	1	Date	1989-04-03							
Cuerie Forms Cuerie	DSongPosition omposer ong ongPerformance	ŝ	Song								
		Record:	H 4 1 of 54) н н 😽 🕅 Қ I	lo Filter Search						_
Form Vi	ew									Num Lock	

It is also possible to keep the combo box style and make sure that both the composer's name and song's name show. This can be done by specifying a query as the source of the Combo Box, which is described partly in section 6.4 and in section 9.7.

The width of the individual columns inside the List Box or Combo Box is configured in the property Column Widths. The properties Column Count, Column Widths, Row Source, Control Source and Bound Column must of course not contradict each other.

We can save our form as "SongPerformance". We have now 4 forms:



This technique of using Combo Boxes or List Boxes is quite useful, but it has some limitations. The main problem is that it cannot manage composite keys. For example, if we were to try to make an ArtistPerformance form with a Combo Box for selecting a SongPerformance then we would reach a dead-end because there is no way to tell Access to link both the column Date and the column Song. There are several ways to work around this problem. One way is by using a master-detail form (presented in the next section), another is to use a macro (presented in chapter 8).

6.3 Master-Detail Constructs

Sometimes it is useful to create forms that contain other forms. The content of the subform is then dependent on the current row of the main form. This kind of structure is very common and not at all difficult to create. The form Access created automatically in section 6.1 used such a construct.

In our case in chapter 2 we had the following information need: *Show all songs in a particular CD*. We could of course solve this as an SQL statement, but we could also create a form for this. Access has a form wizard that can produce a master-detail form structure for this kind of scenarios. We will look at the wizard way first, and then we will look at how we can make the same structure manually.

From the Create tab of the ribbon, choose "Form Wizard". The Form Wizard will then appear to guide us through the process of defining our form:

Form Wizard	
	Which fields do you want on your form?
	You can choose from more than one table or query.
<u>T</u> ables/Queries	
Table: Artist	<u>·</u>
<u>A</u> vailable Fields:	Selected Fields:
Name Age FavouriteComposer Mentor	> >> < <<
Ca	ncel < Back Next > Einish

In this first step we must specify which columns that we are interested in having in the form. In our case we want to see the CD's title and year and the song names with their composer's name and the performance date. We shall show the songs in the correct order (as they appear on the CD). We must therefore specify in the wizard that we want to include these columns. We can start by selecting the table CD and then adding the columns Title and Year:

Form Wizard	
	Which fields do you want on your form? You can choose from more than one table or query.
<u>T</u> ables/Queries	
Table: CD	1
<u>A</u> vailable Fields:	Selected Fields:
ID	> Title Year < <
Ca	ncel < Back Next > Finish

Then we can select the table Song and add the columns Name and Composer:

Form Wizard							
	Which fields do you want on your form? You can choose from more than one table or query.						
<u>T</u> ables/Queries							
Table: Song	<u>·</u>						
<u>A</u> vailable Fields:	Selected Fields:						
ID Length	> Year Title Name Composer						
Ca	ncel < Back Next > Finish						

And we can also add the columns position and date from the table CDSongPosition:

Form Wizard						
	Which fields do you want on your form? You can choose from more than one table or query.					
Tables/Queries						
Table: CDSongPosition	<u> </u>					
<u>A</u> vailable Fields:	Selected Fields:					
CDID Song	 Year Title Name Composer Position Date 					
Ca	ncel < Back. Next > Einish					

We can press Next, and Access will give us some suggestions of how to organize the selected columns. This is done based on the relationships that we have defined in our database (in section 4.2). The alternative that fits our needs is the first one ("by CD") and we want to realize this as "Form with subforms":

Form Wizard	
Form Wizard How do you want to view your data? by CD by CDSongPosition by Song	Year, Title Name, Composer, Position, Date
Cancel	© Form with gubform(s) ○ Linked forms < Back

If Access does not suggest the structure we want, we can still achieve it, but it will have to be done manually as we will see later in this section. In the next step we can define the layout of the subform. Any of the two choices will do fine, but let's take Datasheet:

Form Wizard What layout would you like for your subform?	
	C Iabular C Datasheet
Cancel	< Back Next > Finish

Finally we can define the names of the forms. We can call them "CD master" and "CD songs detail". We can also let Access open the form directly after we press Finish:

Form Wizard	
	What titles do you want for your forms? Form: CD master Subform: CD songs detail
	 That's all the information the wizard needs to create your form. Do you want to open the form or modify the form's design? Open the form to view or enter information. ○ Modify the form's design.
	Cancel < <u>B</u> ack <u>N</u> ext > Einish

We can now improve the layout if necessary. The form created by the wizard may look like this:

A	Databa nal Data Database Tools Acrobal	se - after chapter 6 : Database (Acces:	s 2007 - 2010) - Microsoft Access		= = ×
A Cut	↓ Ascending ♥ Selection * ↓ Descending ▲ Advanced * ↓ Remove Sort ✓ Toggle Filter Sort & Filter Sort & Filter	New Σ Totals Save Spelling Refresh Delete ~ More ~ All ~ Records More ~	Har Replace ⇒ Go To × Solect × Find	 ◆ 三 三 使 達 州 ◆ A - ジ - ③ - 重 吾 吾 田 - 里 - Text Formatting 	
All Access Objects 💿 <	CD master				×
Search₽ Tables Artist	CD master				
ArtistPerformance CD CDSongPosition	Year	2002			
Composer		ni Greatest Hits			
Song Song SongPerformance	CD songs detail	Almost A Whisper			
Queries × Forms * Artist		Before I Go First Touch Highland	Yanni Yanni Yanni		
CD Designed Simple Form		Paths On Water True Nature	Yanni Yanni		
CD Simple Form CD Songs detail		Within Attraction	Yanni		
SongPerformance		Record: 14 🔸 1 of 7 🔹 🕨 🌬	😵 No Filter Search		
The title of the CD	Record: 14 🔸 1 of 10 🕨 H 🍋 🌾 I	lo Filter Search		Num Lock	e s ±

We can quickly go to the Design View to resize the subform, and change and move the Label, etc. The subform is actually just another form control of the main form. Access also allows us to edit the subform directly here, but we can also open the subform separately if we want. The subform is now bigger and with better column widths so the layout is improved:

A 📓 🖓 • 🔍 • 🖙		Form Tools Database - after chap	ter 6 : Database (Acces	: 2007 - 2010) - Microsoft Acces	
File Home Create Extern		Acrobat Datasheet			
* * Field	ting Property Background s Sheet Color * F	Alternate Conditional Row Color - Formatting Formatting			
	-B CD master				
Search	CD Manag	ar Farm			
Tables 🌼	CD Manage				
Artist	*				
ArtistPerformance	Year	2002			
III CD	(mm) ()				
	Title	Yanni Greatest Hits			
	Songs	Positior Name	- Composer	Performed	
Composer	Congo	Almost A Whisper	Yanni	1999-04-05	
Song		2 Before I Go	Yanni	2000-08-17	
SongPerformance		3 First Touch	Yanni	2001-05-31	
Queries ×		4 Highland	Yanni	1998-11-08	
Forms 🏾 🕆		6 Paths On Water	Yanni	2001-01-24	
🖴 Artist		5 True Nature	Yanni	1998-04-08	
CD Designed Simple Form		7 Within Attraction	Yanni	2001-11-10	
CD master		*			
CD Simple Form					
CD songs detail					
		Record: I4 + 1 of 7 + H + K No Fil	ter Search		
	Record: H 4 1 of 10 + +	K No Filter Search			
The position of this song on the CD (start	ing with 1)				Num Lock 🛛 🗐 🗟 🔛

We can see here that there are two sets of record navigation buttons. The lower one is for browsing CDs, while the other one is for moving among songs.

This kind of form has some limitations as well. For example we cannot add or change the songs of a CD. This is because not all the required fields are available on the form. But we can use the form for adding new CDs in the table CD:

A 🔜 🤊 • 🗠 - =	Datab	ase - after chapter 6 : Database (Access :	2007 - 2010) - Microsoft Access		_ = ×
File Home Create Exte	ernal Data Database Tools Acrob	at			× ?
Views Clipboard	Filter 2 Ascending 2 Selection →	New Σ Totals a Save Spelling Refresh X Delete * All * X Delete * Records	B Z Find Select + Find B	→ → 三 三 詳 譜 <u>U</u> A - *2 - △ → 新 著 著 Ⅲ Text Formatting	and the second se
All Access Objects 💿 «	CD master				×
Search	CD Manager Fo	orm			
Tables Artist	.8				
ArtistPerformance	Year 20	04			
🛄 ср	Title	d Classics			
CDSongPosition					
Composer 🛄	Songs 🔺	Name 🚽	Composer		
Song					
SongPerformance					
Queries × Forms &					
Artist					
CD Designed Simple Form					
🗐 CD master					
CD Simple Form					
CD songs detail		cord: H 4 1 of 1 + H + KN	lo Filter Search		
SongPerformance	Ke		Search Search		
	Record: 14 4 11 of 11 + H +	No Filter Search			
The title of the CD					Num Lock 🛛 📼 👻 🛒

Adding songs in this CD requires that we add rows in the table CDSongPosition, and to do that we have to identify a particular SongPerformance, and this form has not been designed to do this.

Creating the same form manually (no wizard) can be a little more time consuming, but can help you in understanding how the master form and the detail form are connected. Since the subform in this case is a form based on a query we will look at this example in the next section. In this section we will look at a simpler case of a master-detail form structure. In our case in chapter 2 we asked the following: *Which songs has each composer composed?* This can of course be solved as a query, but we will try to make a form with a subform. The main form will allow us to browse through the composers in our database, while the subform will show the songs composed by the selected composer. We can start by making two forms (independent of each other) and then connecting them.

The first form is a very simple form for the table Composer. You can create this by selecting the table Composer in the object browser and press Create > Form on the ribbon. Save it as "Composer master".

The second form is also a simple form for the table Song. You can create this as a Datasheet form by selecting the table in the object browser and then pressing Create > More Forms > DataSheet on the ribbon. Save this form as "Composer Song detail". This form looks just like when opening the table:

🚺 🔜 19 - 19 - 17			Form Too	Database -	after chapter 6 : Database (Access 2007 - 201	10) - Microsoft Access	_ 0 >
File Home Creat		ernal Data Dat	abase Tools Acrobat Datashe	et			× ?
Views Themes A Fonts -	Add E	1000 C	Background Color * Row Color * Formatting Formatting				
All Access Objects	• «	Composer n	aster 🔄 Composer Song detail				×
Search	Q	ID ID	 Name 		🗢 Composer 👻		
Tables	â ^	1	Storytime	300	Danny Elfman		
Artist		2	Vera's World	220	Danny Elfman		
2000 C		3	Flashback	169	Danny Elfman		1
ArtistPerformance		4	Sad Room	201	Danny Elfman		
CD CD		5	Memories	185	Danny Elfman		
CDSongPosition		6	First Flight	230	Jerry Goldsmith		
Composer		7	The Bridge	349	Jerry Goldsmith		
		8	The Attack	319	Jerry Goldsmith		
song Song	-	9	FireWorks	511	Jerry Goldsmith		
SongPerformance		10	Conquest Of Paradise	304	Vangelis		
Queries	*	11	Dial Out	302	Vangelis		
Forms	*	12	Eternity	118	Vangelis		
Artist		13	First Approach	294	Vangelis		
and a second second second second		14	Chariots Of Fire	199	Vangelis		
CD Designed Simple For	orm	15	Rotations Logic	189	Vangelis		
CD master		16	Memories	334	Vangelis		
CD Simple Form		17	Message	412	Vangelis		
CD songs detail		18	The Tao Of Love	160	Vangelis		
CD songs detail	-	Record: H 4 1					
Surrogate primary key columr							Num Lock 🛛 🛅 🔛

Compare it to the table:

A		□ × ^ ?
View Paste Clipboard Sector		
All Access Objects Search	ID ▼ Name ▼ Length ▼ Composer ▼	
Tables *	Storytime 300 Danny Elfman	
Artist	B 2 Vera's World 220 Danny Elfman	-
ArtistPerformance	B 3 Flashback 169 Danny Elfman	
🔲 СР	4 Sad Room 201 Danny Elfman	-
CDSongPosition	B 5 Memories 185 Danny Elfman	
Composer	6 First Flight 230 Jerry Goldsmith	
🛄 Song 🗏		
SongPerformance	The blage by boldshill	
Queries ¥	o me Attack	
Forms Artist	of the works of the beny coldshift	
	To conquest of Paradise 504 varigens	
CD Designed Simple Form CD master	11 Dial Out 302 Vangelis	
	Eternity 118 Vangelis	
	13 First Approach 294 Vangelis	-
CD songs detail	Record: 14 4 1 of 37 + H + KNO Filter Search	
Surrogate primary key column	Num Lock 💷 🛱 🛍	¥

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Now that we have both forms ready and saved, we can see how we can combine them. To do this we have to open the master form in design mode. It is the master form that will contain the detail form. Select the master form and open it in design mode:

<mark>▲</mark> 📮 - ♡ - ○ -	Form Design Tools Datab	ase - after chapter 6 : Database (Access 2007 - 20	110) - Microsoft Access 🛛 🗕 🗆 🗙
File Home Create External Data Database Tools Acrobat	Design Arrange Format		~ 😗
View Themes & Fonts -	xyz Inset Image *	Image: Specific system Image: Specific system Image: Specific system	der 😤 Convert Form's Macros to Visual Basic
Views Themes Controls		Header / Footer	Tools
All Access Objects			×
	• 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 • 11 • 1 • 1	2 • 1 • 13 • 1 • 14 • 1 • 15 • 1 • 16 • 1 • 17 • 1 • 18 •	i • 19 • i • 20 • i • 21 • i • 22 • i • 23 • i • 24 • i • 25 •
Tables & Form Header			
CDSongPosition			
Song SongPerformance			
Queries × Forms ×			
Artist CD Designed Simple Form .			
CD Designed Simple Form CD master CD Simple Form			
CD songs detail	MF -		
Design View			Num Lock 🛛 🖬 📓 🕍 🛒

We can see that there is not so much space, so we have to make more space. Use the mouse to expand the "Detail" part of this form:

	ernal Data Database Tools Acrobat Design Arrange Format
View Themes A Fonts *	abl Aa a a a a a a a a a a a a a a a a a a
Views Themes	Controls Header / Footer Tools
All Access Objects 💿 «	Composer master ×
Search	
Tables *	From Header
Artist	
ArtistPerformance	
CD CD	
CDSongPosition	Name
Composer	
Song	
SongPerformance	
Queries ×	
Forms	
E Artist	
CD Designed Simple Form	
EII CD master	
CD Simple Form	Form Footer
🗐 CD songs detail	
Design View	Num Lock 🖬 🖲 📶
Design view	

We have now enough space to add our subform. On the ribbon there is a special form control named Subform/Subreport. Make sure that the "Use Control Wizards" option is pressed and click to activate the Subform/Subreport button (E). Now click on the form at the place you want to have the subform. The Subform Wizard will then appear:

SU/DSV KTH/ICT/SCS

SubForm Wizard					
	You can use an existing form to create your subform or subreport, or create your own using tables and/or queries. What data would you like to use for your subform or subreport?				
	 Use existing <u>Tables and Queries</u> Use an <u>existing form</u> 				
	Artist CD Designed Simple Form CD master CD Simple Form CD songs detail Composer Song detail SongPerformance				
	Cancel < Back Next > Einish				

In the first step we are asked to select either a table or query, or an existing form. If we select a table or query then the wizard will create a form for that table or query. Since we have already created a form we can select that instead:

SubForm Wizard					
NORMAN DODDODDODD	You can use an existing form to create your subform or subreport, or create your own using tables and/or queries.				
	What data would you like to use for your subform or subreport?				
	C Use existing <u>T</u> ables and Queries				
	• Use an existing form				
	Artist CD Designed Simple Form CD master CD Simple Form CD songs detail Composer Song detail SongPerformance				
	Cancel < Back Next > Finish				

In the next step we can select the option "Show Song for each record in Composer using Name" (which for some strange reason appears twice):

SubForm Wizard					
HARANA SUSSESSESSESSESSESSESSESSESSESSESSESSESS	Would you like to define which fields link your main form to this subform yourself, or choose from the list below?				
	© Ohoose from a list. O Define my own.				
	Show Song for each record in Composer using Name Show Song for each record in Composer using Name None				
	Show Song for each record in Composer using Name				
	Cancel < Back Next > Einish				

(i) The options available here are based on the relationships between tables that we defined in section 4.2. If the option you were expecting is not available here it is most probably because that relationship has not been defined.

The final step of the wizard asks us to define the name of the subform. This name is also the text of the label created next to the subform. We can therefore give it the name "Composed songs":

SubForm Wizard	What name would you like for your subform or subreport?	
	Composed son'ss Those are all the answers the wizard needs to create your subform or subreport.	
	Cancel < Back Mext > Finish	

We press Finish and our subform is now linked. We can also see how the linking is done, by examining the properties of the subform in the property sheet. Select the subform component and look under "Data":

A	ternal Data Database Tools Acrobat Design Arrange Format	2010) - Microsoft Access 🛛 🗕 🗆 🗙
Themes A Fonts +	Add Existing Property Fields	Image: Subform in New Window Image: Subform in New Window <td< th=""></td<>
Views Themes	Controls Header / Footer	Tools
All Access Objects 💿		X Property Sheet X Selection type: Subform/Subreport
Search	0	Composed songs
Tables *		Format Data Event Other All
	Composer	Source Object Composer Song detail
	🖉 🖉 Detail	Link Master Fields Name
CD CD		Link Child Fields Composer Filter On Empty Mas Yes
CDSongPosition	Name Name	Enabled Yes
Composer		Locked No
song	Composed spras	
SongPerformance	· · · · · · · · · · · · · · · · · · ·	
Queries ¥	🖉 🗲 Detail	-
Forms 🌣		
Artist		
CD Designed Simple Form	Name Name	
CD master		
CD Simple Form	Length Length	
ED songs detail		
Design View		Num Lock 🖬 🗟 🔀

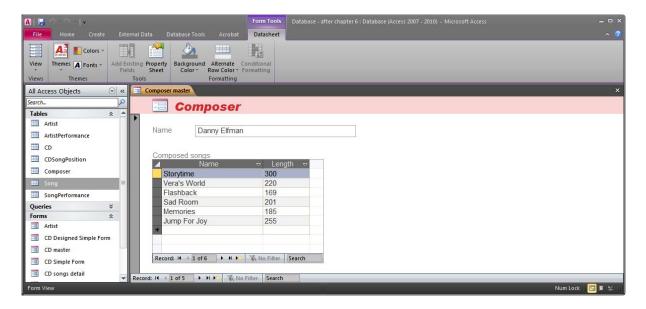
The Link Child Fields property specifies the fields of the subform to be linked (in this case the field Composer). The Link Master Fields specifies the fields of the main form to be linked (in this case the field Name). This means that every time the value of the field Name of the main form is changed, the subform will be refreshed to only show records that have the same value in the field Composer.

(i) If the two forms are linked with two or more columns, then they must all be specified in the Link Child Fields and Link Master Fields properties in the same order and separated by semicolon (;).

We can now view our form:

View Paste Format Painter Views Clipboard in Sort & F All Access Objects Or Componentset	V Selection * Advanced * V Toggle Filter Iter Reco	spelling • • • More •	Find And Replace ⇒ Go To ~ Find	▲ ・ まこに 従 伊・・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・ ・
View Paste J Copy Views Clipboard is Sort & F All Access Objects · · · · · · · · · · · · · · · · · · ·	Advanced * Toggle Filter Refresh All * Delete Reco	Spelling	Find Go To *	B I ∐ A - ♥ - ③ - 臣 吾 君 ⊞ - 型 -
Search P				
Tables *	omposer			
Artist Name	Danny Elfman			
CDSongPosition	songs		h v Compos	er ⊽
Composer 1	Storytime	300	Danny Elfma	
Song 🗏 2	Vera's World	220	Danny Elfma	
SongPerformance 3	Flashback	169	Danny Elfma	in
Juarier X	Sad Room	201	Danny Elfma	an
5	Memories	185	Danny Elfma	
37	Jump For Joy	255	Danny Elfma	
CD Designed Simple Form			Composer m	naster
Record: H	1 of 6 🕨 🕨 🕅 🕅 K No Filter	Search		
CD master				
CD Simple Form				
CD songs detail	► H ► K No Filter Search			

One thing that we can fix here is removing the ID column and the Composer column from the subform. The ID column is not interesting for the user, and the Composer column is always the same as the name of the current composer (in the master form). Here is the final version:



This form can actually be used for adding both composers and songs (but a composer has to already be an existing artist). There is one problem though. There is a bug in Access and the form gets confused just because the column Name in composer is called "Name". The word "Name" is a special keyword, so when the subform refers to a field called Name Access gets confused. The only way to fix this is by changing the name of the column to something else (for example CName). Close the forms (save if necessary), open the table Composer in design view and change the column Name to CName:

AI 🛃 🖓 - 🏷 - I 🗸		Table Tools Datab	ase - after chapter 6 : Database (Acces	s 2007 - 2010) - Microsoft Access		= ¤ ×
File Home Create Exter		bat Design				
View Views Views Views Views Views	Modify Lookups	es Create Data Rename/De Macros + Macro Field, Record & Table Eve	Dependencies			
All Access Objects 💿 🔍	Composer				Property Sheet	×
Search	Field Name	Data Type	Descript		Selection type: Table General	Properties
CD 🔺	CName CName	Text	The name of the composer. Us	ed also as a reference to t		
CDSongPosition					Read Only When Di Subdatasheet Expar	
					Subdatasheet Heigh	
Composer						Left-to-Right
E Song		Field	Properties		Description Default View	Datasheet
SongPerformance					Validation Rule	Datasheet
Queries ×	General Lookup Field Size 50		Test I		Validation Text	
Forms 🌣	Format		_		Filter Order By	
Artist	Input Mask				Subdatasheet Name	[Auto]
CD Designed Simple Form	Caption Default Value				Link Child Fields	
CD master	Validation Rule		A field name car	n be up to 64 characters long,	Link Master Fields Filter On Load	No
	Validation Text			es. Press F1 for help on field		Yes
CD Simple Form	Required No Allow Zero Length Yes			names.		
🗄 CD songs detail	Indexed Yes (No Du	(plicates)				
🔲 Composer master	Unicode Compression Yes					
Composer Song detail	IME Mode No Contro IME Sentence Mode None	1				
SongPerformance	Smart Tags					
Design view. F6 = Switch panes. F1 = H	ielp.				de la companya de la	Num Lock 🛛 🗃 🖷 🛍 🔛

Access will update all references to the column, so the form should now work fine. Try adding a new song ("More Joy" – 239 seconds) for Danny Elfman:

A 🗜 🔹		nal Data Database Tools Acrobat	Form Tools Dat	tabase - after chapter 6 : Database (Access 200	17 - 2010) - Microsoft Access	X
	Table SharePoint Design Lists * Tables	t Query Query Wizard Design Queries	More Forms *	Report Blank Design Report Reports	Macro & Class Module Macro Visual Basic Macros & Code	
All Access Objects		Composer master				×
Search CD CDSongPosition Composer	م ۱	CName Danny Elfman				
Song Song	ce 🛛	Composed songs	✓ Length	•		
Queries Forms	*	Storytime Vera's World	300 220			
Artist CD Designed Sir CD master CD Simple Form CD songs detail Composer master Composer Song	nple Form and the second secon	Flashback Sad Room Memories Jump For Joy More Joy Record: H (7 of 7) H H	200 169 201 185 255 239 ▼ No Filter Searce	T Ch		
SongPerformant		Record: 14 4 1 of 5 + H + K No	Filter			Num Lock 🛛 🔲 🕱 💥 💡

6.4 Forms Based On Queries

So far we have only created forms that are based on tables (except from the one that we created with the Form Wizard). But it can also be necessary to create forms that are based on queries. We can either let the Form Wizard create the form query or we can create the query ourselves in advance. This is what we are going to do here. We will create and save a query, and then we will create a form that is based on that query. As we mentioned previously, we will create the same structure we created in the beginning of section 6.3, but this time we will do it manually.

What we want to have is a form that allows us to browse through the rows in the table CD, and then in a subform we want to see the songs included in the selected CD. The main form will therefore be based on the table CD (nothing strange about that). The subform has to have a source that contains all the information we want to show and all the columns needed to make the connection to the current row the main form. So we need the columns Name and Composer from the table Song and then we also need the column CDID from the table CDSong position. We can do this with one of the following two SQL statements:

The first version is what you may be more used to:

```
SELECT CDSongPosition.CDID, Song.Name, Song.Composer
FROM Song, SongPerformance, CDSongPosition
WHERE SongPerformance.Song = CDSongPosition.Song
AND SongPerformance.Date = CDSongPosition.Date
AND Song.ID = SongPerformance.Song
```

The second version is what Access generates when this is done through the Form Wizard:

SELECT CDSongPosition.CDID, Song.Name, Song.Composer FROM Song INNER JOIN (SongPerformance INNER JOIN CDSongPosition ON (SongPerformance.Song = CDSongPosition.Song) AND (SongPerformance.Date = CDSongPosition.Date)) ON Song.ID = SongPerformance.Song

You can use whichever you like best. Create a new query, switch to the SQL mode, write the SQL statement and save the query as "CD songs".

We can now use this query to create a form. Create a Form for the table CD and a Datasheet Form for the query CD songs. Save the forms as "CD master 2" and "CD songs detail 2" respectively. The two forms are now available in the object browser:

A 🗟 🖓 - 🔍 - 🖙	🛛 📕 🖓 - 🔿 - 📲 - Database - after chapter 6 : Database (Access 2007 - 2010) - Microsoft Access					
File Home Create Ext						
Application Parts × Templates Table SharePoi Design Lists × Tables	int Query Query Wizard Design Queries	Form Wizard Form Form Blank Design Form Forms + Forms	Report Wizard Report Report Blank Design Report Reports	Macro & Class Module Macro Visual Basic Macros & Code		
All Access Objects 💿 «						
Search						
CD Songs						
CDs With Jerry Goldsmith						
SongPerformanceComposer						
Forms *						
🖼 Artist						
CD Designed Simple Form						
📧 CD master						
CD master 2						
CD Simple Form						
CD songs detail						
CD songs detail 2						
Composer master						
Composer Song detail						
SongPerformance						
Ready					Num Lock	

We can also open them individually and see that they work and adjust their layout if necessary:

A		Database - after chapter 6 :	Database (Access 2007 - 2010) - Microsoft Acc	ess		= = ×
File Home Create Exter						
Application Parts * Templates Tables	t Query Query Wizard Design Queries	Form Vizard Form Design Blank Forms Forms	Report Report Blank Design Report Reports	Macro & Module Macro Visual Basic Macros & Code		
All Access Objects 💿 🔍	CD master 2	CD songs detail 2				×
Search P	-= C	D				
CDs from 1999	ID	۵				
SongPerformanceComposer	Title	Yanni Greatest Hits				
Forms Artist	Year	2002				
CD Designed Simple Form						
ED master 2						
CD Simple Form						
CD songs detail						
CD songs detail 2						
Composer master						
Composer Song detail						
SongPerformance	Record: H 🔸 1 of 1	0 🕨 🕨 隊 No Filter Search				
Surrogate key for the CD table					Num Lock	🖻 🖲 🖂 🔡

A 🔒 🗠 + 🗠 + +		Form Tool:	Database - after chapter 6 : Database (Access .	1007 - 2010) - Microsoft Access	>
	nal Data Databas				^ (
View Themes A Fonts - Add Exis	ting Property Backg	ground Alternate Conditional			
views Themes	ls Sheet Col Tools	lor * Row Color * Formatting Formatting			
		CD songs detail 2			;
Search	CDID -	Name 🗸	Composer 👻		
CD Songs		st Flight	Jerry Goldsmith		
CDs from 1999	2 Co		Vangelis		
ter the second second second second second			Vangelis		
CDs With Jerry Goldsmith			Yanni		
SongPerformanceComposer	3 Be	fore I Go	Yanni		
Forms *	2 Ch	nariots Of Fire	Vangelis		
	2 Ro	tations Logic	Vangelis		
CD Designed Simple Form	2 Ro	otations Logic	Vangelis		
	2 Me	emories	Vangelis		
CD master	3 Me	essage	Vangelis		
ED master 2	3 Me	essage	Vangelis		
CD Simple Form	2 Th	e Tao Of Love	Vangelis		
CD songs detail	3 Th	e Tao Of Love	Vangelis		
	1 Air	nost A Whisper	Yanni		
😑 CD songs detail 2			Yanni		
🖼 Composer master	1 Be	fore I Go	Yanni		
Composer Song detail	1 Fin	st Touch	Yanni		
	1 Hic Record: H 4 1 of 27		Yanni		
Reference to the CD				Num Lock	•

We can also see that they have some unnecessary fields. The ID and CDID fields are not relevant for showing. We need them for linking the two forms, but not for showing to the user. Edit the forms to remove them.

We can now do the linking. This time we will try to do it without the SubForm Wizard. We can start by opening the form "CD master 2" in the design mode. Make some space for the subform, but don't add a subform yet. Before adding a subform, make sure to turn off the Control Wizards. We do that by pressing the Use Control Wizards button (on the ribbon) so that it is not active. We can now add a subform to our form. The wizard will not appear and we will just have an unbound subform component:

Microsoft Access - [CD master 2 : Form]	
Ele Edit View Insert Format Tools Window Help	Type a question for help 👻 🗕 🗗 🗙
= - 🛃 🤮 🖕 🔉 💫 🛠 🏈 🧐 📚 = 賝 😻 🎇 😭 🛄 🔚 - @ 🥊	
	2 • · · · · ·
······································	
Form Header Detail	
Title Year Dhild8 Title Unbound	Toolbe 🔻 × Acc abl 🎬 P 💿 🗹
- 3	
5 - 6 L Form Footer	
	F
Design View	NUM //

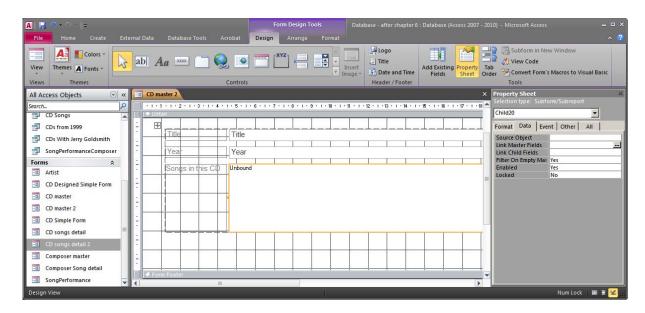
We can start by fixing the subform's label to "Songs in this CD" and fixing the layout. We can do this directly on the form:

A	rnal Data Database Tools Acrobat	Form Design Tools Design Arrange Format	Database - after chapter 6 : Databa	ise (Access 2007 - 2010) - Microsoft Access	= = × ^ ?
View Themes A Fonts *	abl Aa 🚥 🗋 🧕 💽		sert age + S Date and Time Add Ex Fiel	isting Property Tab	
Views Themes	Controls		Header / Footer	Tools	
All Access Objects 💿 «	CD master 2				
Search	• 1 • 1 • 1 • 2 • 1 • 3 • 1 • 4 • 1 • 5 • 1	• 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 •	11 · · · 12 · · · 13 · · · 14 · · · 15 · · ·	16 • • • 17 • • • 18 • • • 19 • • • 20 • • • 21 • • • 22 • • • 2	23 · 1 · 24 · 1 · 25 · 📥
CD Songs	_ ◆ Detail	1 1 1 1			
CDs from 1999	1				
CDs With Jerry Goldsmith	Title Title				
SongPerformanceComposer	- Year Year				
Forms A					
E Artist	Songs in this CD Unbour	d			
CD Designed Simple Form	-				
-B CD master					
CD master 2	7				
CD Simple Form					1
	1				
CD songs detail 2	·				
Composer master	÷				
Composer Song detail	🖉 Form Footer				╎──┤──╢
SongPerformance		11			•
Design View				Num L	ock 🖬 🗄 🕍

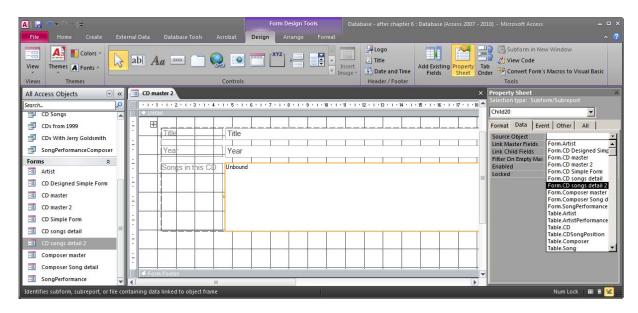
Or of course we can use the property sheet and edit the property Caption:

A] 🛃 🌍 + O → = File Home Create Exte	nal Data Database Tools Acrobat Design Arrange Format	- 2010) - Microsoft Access	s = • · ·
View Themes A Fonts *	Add Existing Property Fields Sheet	Tab Order Convert Form	ew Window 's Macros to Visual Basic
Views Themes	Controls Header / Footer	Tools	
All Access Objects 💿 «	CD master 2	× Property Sheet	\$
Search		Selection type: Labe	
CD Songs	C I Detail	Label21	. 💌
CDs from 1999		Format Data Eve	ent Other All
The month of the second second second			
CDs With Jerry Goldsmith		Caption	Songs in this CD
SongPerformanceComposer	· Year	Visible Width	Yes 3,28cm
		Height	3,6cm
Forms	Songs in this C() Unbound	Тор	2,46cm
🔳 Artist		Left	1,217 cm
CD Designed Simple Form		Back Style	Transparent
		Back Color	Background 1
🖽 CD master		Border Style	Transparent
CD master 2		Border Width	Hairline
CD Simple Form		Border Color Special Effect	Text 1, Lighter 50% Flat
CD Simple Form		Font Name	Arial (Detail)
🔲 CD songs detail		Font Size	11
CD songs detail 2		Text Align	Left
		Font Weight	Normal
Composer master		Font Underline	No
Composer Song detail		Font Italic	No
	🖉 🗲 Form Footer	Fore Color	Text 1, Lighter 50%
SongPerformance		Line Spacing	0cm 💌
Displayed caption of object			Num Lock 🛛 🖬 🗟 🔛

Now, select the unbound subform component and look at its properties (under Data):



We have three properties than need to be specified before the form "CD songs detail 2" has been linked as the subform. The first one is the property Source Object. In this property we can specify which form should be used as the subform. We can simply select the "CD songs detail 2" from the drop down list:



Next we must define the fields that should be used to link the main form to the subform. The Link Child Fields property must be set to the name of the column in the subform that should be linked, i.e. CDID. The Link Master Fields property must similarly be set to ID. We can do this manually or we could press the little ellipsis (....) to open the Subform Field Linker:

😑 Subfor	n Field Linker		×
Master Fie	lds: Child Fields:		ок
			Cancel
ľ	_, _,	ŝ	uggest
Result:	Show CD Songs for each record in CD using ID		

Either way the properties should look like this:

A		Form Design Tools Date	base - after chapter 6 : Database (Access 2007 - 2	2010) - Microsoft Access 🛛 🗕 🗆 🗙
File Home Create External I		Design Arrange Format		
Views Themes	D A.a 🚥 📄 🥺 💽 Controls	Tinsert	Add Existing Property	Good Subform in New Window Good Subform in New Window Wiew Code Solution Subform Subf
All Access Objects 💿 « 🔳	CD master 2		*	
Search	+ 1 + 1 + 1 + 2 + 1 + 3 + 1 + 4 + 1 + 5 + 1	• 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 • 11 • 1	12 • 1 • 13 • 1 • 14 • 1 • 15 • 1 • 16 • 1 • 17 • 1 • 18	
CD Songs	🗢 Detail			Child20
CDs from 1999	⊕			Format Data Event Other All
CDs With Jerry Goldsmith	Title			Source Object CD songs detail 2
SongPerformanceComposer	Year Year			Link Master Fields ID
Forms *				Filter On Empty Mas Yes
- Artist	Songs in this CD	1 • 1 • 1 • 2 • 1 • 3 • 1 • 4 • 1 • 5 • 1 • 6 •	· 7 · I · 8 · I · 9 · I · 10 · I · 11 · I · 12 · I ·	Enabled Yes Locked No
CD Designed Simple Form		Detail		
CD master				
CD master 2		<u>.</u> (1		
CD Simple Form		Name Name		
🔄 CD songs detail				
🖽 CD songs detail 2				
Composer master				
🔳 Composer Song detail				
SongPerformance	Form Footer			
Field name(s) in main form or report			P	Num Lock 🛛 🗟 📓 🔛

We can now try our form:

A 💭 🖓 - 🔍 - I =	Form Tools Databa	se - after chapter 6 : Database (Access 2007 - 2010) - Mi	icrosoft Access 🗕 🗆 🗙
File Home Create External Data Database Tools Acr	obat Datasheet		
📰 🗛 🖬 Colors - 📰 🚰 🔬 💷	ES .		
View Themes Fonts + Add Existing Property Background Altern Fields Sheet Color + Row Co	ate Conditional lor * Formatting		
Views Themes Tools Format			
All Access Objects 💿 « 🖃 CD master 2			×
CD Songs			
🔁 CDs from 1999			
Dr CDs With Jerry Goldsmith	Yanni Greatest Hits		
SongPerformanceComposer Year	2002		
Forms *			
Artist Songs in this CD	▲ Name		
CD Designed Simple Form	Almost A Whisper Before I Go	Yanni Yanni	
CD master	First Touch	Yanni	
CD master 2	Highland	Yanni	
	Paths On Water	Yanni	
CD Simple Form	True Nature	Yanni	
🔳 CD songs detail	Within Attraction	Yanni	
E CD songs detail 2			
Composer master			
🔳 Composer Song detail	Record: I I I I I I I I I I I I I I I I I I I	K No Filter Search	
SongPerformance	K No Filter Search		
Form View	an an an		Num Lock 💼 🗷 🕍

It works just like the one we created with the wizard in the previous section.

6.5 Non-Data Forms

Forms can also be used for menus and navigation in a bigger application. We can for example make a form that has two buttons: One for opening the form created in section 6.4 and one for opening the form created in section 6.2. This form is different from the ones we created in previous sections in that it does not have a record source. All the other forms had a record source, i.e. a table or a query from where the form retrieved data (and also saved data to). The form we will create now will not have any link to data. We can start by creating a blank form in design mode (by selecting Create > Blank Form on the ribbon). We can then add a Button control to this form (available on the ribbon under Design). The Command Button Wizard will pop up as soon as we add a button on our form (provided that Control Wizards are activated):

Command Button Wizard			
Sample:	What action do you want to happen when the button is pressed? Different actions are available for each category.		
	<u>C</u> ategories:	Actions:	
	Record Navigation Record Operations Form Operations Report Operations Application Miscellaneous	Find Next Find Record Go To First Record Go To Last Record Go To Next Record Go To Previous Record	
Γ	Cancel < Back	Next > Finish	

In this wizard we can select an action and a layout (from a predefined list of functions and layouts) for our new button. We want a "Form Operation" to open another form:

What action do you want to hap pressed? Different actions are available for <u>C</u> ategories: Record Navigation Record Operations Form Operations Report Operations Application Miscellaneous	
Cancel < Back	Next > Enish
	pressed? Different actions are available for Categories: Record Navigation Record Operations Form Operations Report Operations Application Miscellaneous

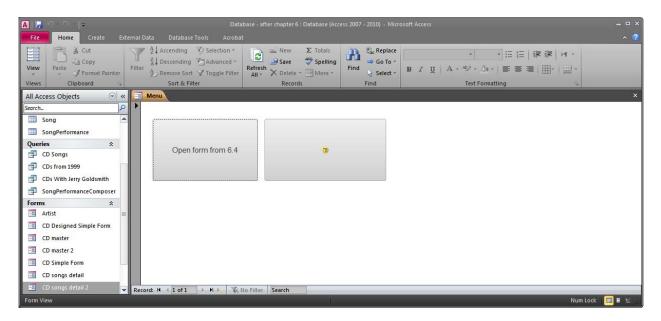
The wizard will then ask us to specify the form to be opened:

Command Button Wizard	
Sample:	What form would you like the command button to open?
	Artist CD Designed Simple Form CD master CD master 2 CD Simple Form CD songs detail CD songs detail 2 Composer master
	Cancel < Back Next > Finish

The rest of the steps are mostly about layout and giving your button a name and can also be skipped by selecting Finish.

We can now add a second button for the second form.

The default layout of the buttons is just a little icon, but this can be changed either in the wizard or later in the property sheet. The properties Picture, Caption, and ControlTip Text are relevant to this. See if you can make the form look like this:



A database with all the forms that we created in this chapter is available at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

7 Reports

Reports are very similar to forms, but they are more static. You can think of a report as something that would be a preview of a printout. Creating reports is similar to creating forms. A report can be based on a table or query and we can have subreports, just like with forms. In the sections that follow, we will look at some examples of reports. Since we already worked a lot with forms, we will not go into the same level of detail in this chapter.

7.1 Simple Reports

A report can be created by selecting Create > Report on the ribbon. The table or query that is selected in the object browser when we press Create > Report will become the record source of the report. As with forms, reports can be created in other ways (as blank reports or with the help of a wizard). In this section we will just look at the simplest type which is a report based on one table.

We can select the table Artist in the object browser and press Create > Report on the ribbon. The new report will look like this:

A		- after chapter 7 : Database (Ac	cess 2007 - 2010) - Micro	soft Access	= = ×
View Clipboard	Ascending Selection * Ascending Advanced *	New Σ Totals Image: Solution Spelling Solution More ~ Records	in alborn Replace in a Go To → in a Select → Find	 ・ ※ 注 注 读 读 対 ・ B I U A - *ジ - ⑤ + 野 吾 君 田・ 田・ Text Formatting 	
All Access Objects 💿 « [Artist				×
Search					
Tables Artist	Artist			den 5 september 2012 12:40:31	
ArtistPerformance	Name	Age Fa	avouriteComposer	Mentor	
CD	Bill Bradley	56 Ya	anni	Tony Barrett	
CDSongPosition	Cate Archer	45		David Foreman	
Song	Danny Elfman	51 Ya	anni	Jerry Goldsmith	
SongPerformance	David Foreman	55 Je	erry Goldsmith		
Queries *	Jenny Judd	35 Je	erry Goldsmith		
D Songs	Jerry Goldsmith	75			
CDs from 1999	Keith Winfield	45 Va	angelis	Tia Mintze	
CDs With Jerry Goldsmith	Kenny Greene	55 Ya	anni	David Foreman	
SongPerformanceComposer	Mich Bud	44 Va	angelis	Jerry Goldsmith	
Artist	Tia Mintze	61	0		
CD Designed Simple Form	Tony Barrett		anni	Keith Winfield	
CD master	Vangelis	61 Je	erry Goldsmith	Jerry Goldsmith	
CD master 2	Will Smith	36		Keith Winfield	
CD Simple Form	Yanni		erry Goldsmith		
CD songs detail					
CD songs detail 2		14		Page 1 of 1	
Composer master		101		Tage For F	
The name of the artist				Num Lock	■ ■ ±

We can save this as "List of Artists". The report can also be viewed in Design View and in Layout View. These views can be used to modify the report and all the report controls on it.

Access can make many different types of simple reports. It can for example make mailing labels. Just select the Create > Labels (with the table Artist selected in the object browser):

Label Wizard			
	This wizard creates standa What label size would you		5.
	Product number:	Dimensions:	Number across:
	C2156 C2180 C2244 C2245 C2353 Unit of Measure	52 mm x 70 mm 21 mm x 15 mm 72 mm x 72 mm 72 mm x 72 mm 10 mm x 166 mm 110 mm x 146 mm Label T C She	2 3 2 1 1 ype eet feed C Continuous
	Tites has more fortunes.		
	Filter by manufacturer:	Avery	<u> </u>
	Customize	🗖 Sho	w custom label sizes
	Cance	el < <u>B</u> ack	Next > Einish

Answer the questions of the wizard and Access will create the report. It can look something like this:

A 🗐 🧏 🖓 - 🏷 - I -		tabase (Access 2007 - 2010) - M		
File Print Preview Acrobat				
Print Size Margins Print Data Only Portrait Landscape Colum		wo More Refresh Excel	Text PDF E-mail More Close Prin	
	ns Page Zoom One Th Setup + Page Pa	wo More Refresh Excel ges Pages * All	File or XPS	
Print Page Size Page Layout	Zoom		Data Close Prev	ew
All Access Objects 💿 « 🔚 Labels Artist				
Search				
CDs With Jerry Goldsmith				
SongPerformanceComposer				
Forms A				
E Artist				
CD Designed Simple Form				
CD master	Bill Bradley	Cate Archer	Danny Elfman	
CD master 2	56	45	51	
CD Simple Form	00	40		
CD songs detail				
CD songs detail 2				
Composer master	David Foreman	Jenny Judd	Jerry Goldsmith	
Composer Song detail	55	35	75	
-B Menu				
SongPerformance				
Reports 🌣				
Labels Artist	Keith Winfield	Kenny Greene	Mich Bud	
List of Artists	K No Filter			`
Ready	2002		Num Lock 🛛 🕮	🛃 B 🖌 100% 🗢 🔹 🗗 🔂

7.2 Reports That Combine Many Tables

We can also make reports that combine many tables. This is exactly the same as it was for forms. In our case in chapter 2 we had the following need: A report that shows the content of each CD (back cover style).

To do this we need the tables CD, CDSongPosition and Song. The table SongPerformance is also needed for the connection between Song and CDSongPosistion, but we have nothing to show from it.

We can start by selecting to make a new report with a wizard. The wizard will ask us to add all the relevant fields. We can add CD.Title, CDSongPosition.Position, Song.Name, Song.Length and Song.Composer:

Report Wizard	
	Which fields do you want on your report? You can choose from more than one table or query.
<u>T</u> ables/Queries	
Table: Song	<u> </u>
<u>A</u> vailable Fields:	Selected Fields:
D	Title Position Name Length Composer
Ca	ncel < Back Next > Einish

Next, we have to choose the structure of our report. This is similar to what we did in the Form Wizard in section 6.3. We can select the option "by CD"⁴:

Report Wizard	
How do you want to view your data? by CD by CDSongPosition by Song	Title Position, Name, Length, Composer
Cancel	< <u>B</u> ack <u>N</u> ext > <u>F</u> inish

We don't need any more grouping level so we move on to sorting. The important thing is that the songs appear in the correct order, so we can sort them by Position:

 $^{^4}$ The wizard actually creates grouping levels and sorts the data accordingly. In section 7.4 we will see how we can do this manually.

Report Wizard	Report Wizard							
What sort order and summary information do you want for detail records?								
	You can sort records by up to four fields, in ei ascending or descending order.	ther						
	1 Position Asce	ending						
	2 Asce	ending						
	3 - Asce	ending						
	4 Asce	ending						
	Summary Options							
Car	ancel < Back Next > E	inish						

On this window we also have the option to create summary information. We can use this to add a total of seconds per CD in our form. Press the Summary Options... button to see the available options. Choose the Sum of Length and the option Detail and Summary:

Summary Options	_	
	alues would you like calculated?	OK Cancel Show © Detail and Summary © Summary Only Calculate Decent of total for sums

The next step is about layout, so choose something that you like. Finally give a name to the report to be generated; for example "CD back cover". Press Finish and Access will generate the report:

File Print Preview Acrobat	Database - a	fter chapter 7 : Database (Access 2007 - 2010) - Microso	off Access	– = × ~ ?
Print Size Margins Print Data Only P	Portrait Landscape Columns Page Page Layout	om One Two More Page Pages Pages Zoom	POF E-mail More y rXPS v bata Close Print Preview	
All Access Objects 💿 « 🚺 CD t	back cover			×
Search				1
🗗 CD Songs				
CDs from 1999	CD back cover			
CDs With Jerry Goldsmith	CD Dack COVER			
SongPerformanceComposer				
Forms *	Title	Position Name	Length Composer	
Artist	Yanni Greatest Hits	4	005 X	
CD Designed Simple Form		1 Almost A Whisper	235 Yanni	
CD master		2 Before I Go	256 Yanni	
CD master 2		3 First Touch	288 Yanni	
CD Simple Form		4 Highland	494 Yanni	
CD songs detail		5 True Nature	300 Yanni	
🖽 CD songs detail 2		6 Paths On Water	232 Yanni	
Composer master		7 Within Attraction	303 Yanni	
Composer Song detail	Summarv for 'ID' = 1 (7 deta	ail records)		
📑 Menu	Sum		2108	
SongPerformance	Best Of Vangelis			
Reports		1 Conquest Of Paradise	304 Vangelis	
CD back cover		2 Before I Go	256 Yanni	-
Labels Artist 🗸 Page: 14	🔺 1 🕨 🕨 🕅 🕅 🖌 No Filter	٠ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ ـ	in the second	×
Ready			Num Lock 🛛 🕮 🖼 🕍 100%	•••

We can see that the wizard has generated all the things we wanted, but there are some things we may want to change or remove. We can do that in design view. We can for example remove the "Summary for 'ID' = ...". We may also want to remove some of the field labels. We can start by doing that. Our report can now look like this:

A	? - ∾ - =			Database - a	ifter chapter 7 : Databas	e (Access 2007 - 2010) -	Microsoft Access				_ = ×
File	Print Preview Acrobat										
	Show Marg				0			🕒 👪			
Print	Size Margins Print Data (Only Portrait La	ndscape Co	olumns Page Zo Setup	oom One Two N ▼ Page Pages Pa	fore Refresh Excel ges * All	Text PDF File or XPS	E-mail More	Close Print Preview		
Print	Page Size		Page Layo	ut	Zoom		Data		Close Preview		
All Acce	ss Objects 💿 «	CD back cover									
Search	Q										-
j c) Songs										
🗗 cc	Ds from 1999	Ya	anni G	reatest Hits							
🗗 ca	os With Jerry Goldsmith				8						
So	ngPerformanceComposer	Po	sition Na			Length	Composer				
Forms	*			most A Whisper		235	Yanni				
🔳 An	tist			efore I Go		256	Yanni				
🔳 CC	Designed Simple Form			rst Touch ghland		288 494	Yanni Yanni			- 60	
🔳 CC) master			gniand ue Nature		300	Yanni				
🗐 (C) master 2		-	ths On Water		232	Yanni				
) Simple Form			ithin Attraction		303	Yanni				
) songs detail										
) songs detail 2	Tot	tal secon	ds: 2108							
-	omposer master										
	omposer Song detail	Be	est Of	Vangelis							
	enu	0.000	sition Na	a a se de la la de la de la com		1 secold	C				
So	ngPerformance	PO				Length	Composer				
Report				onquest Of Para	dise	304	Vangelis				
) back cover			efore I Go		256 189	Yanni				
E La	bels Artist	Page: 14 4 1		tations Logic		189	Vangelis	101-5			
Ready		rage: 1		W NO Filter					lum Lock 🔰 🔳 🗔	¥ ⊻ 100% ⊖	• •
						10 C					

There is one more thing that we might want to change. We might want every CD to appear on a new page. We switch back to the design view and select the ID Header. In the property sheet we can now set the property "Force New Page" to "Before Section":

A]	Report Design Tools Design Arrange Format Page S		Dase (Access 2007 - 2010) - Microsoft Access 🛛 🗕 🗙 🔦 🥐
Views Themes A Fonts - Group 13-Hide Details Views Themes A Fonts - Group 13-Hide Details	Controls	Page Title Numbers 5: Date and Time Header / Footer	ting Property Tab
All Access Objects 💿 « 🔚 CD back cover			× Property Sheet ×
Search P	• • • 7 • • • 8 • • • 9 • • • 10 • • • 11 • • • 12	2 * 1 * 13 * 1 * 14 * 1 * 15 * 1 * 16 * 1 * 17 * 1 * 1	
CD Songs			
CDs from 1999			Format Data Event Other All
CDs With Jerry Goldsmith			Visible Yes Height 1,6cm
SongPerformanceComposer	Length	Composer	Back Color Text Light Alternate Back Colo No Color
Forms *	Length		Special Effect Flat
Artist Position Name	Length	Composer	Auto Height No Can Grow No
E CD Designed Simple Form			Can Shrink No
CD master			Display When Always Keep Together Yes
CD master 2 Total seconds: =Sum([Length])			Repeat Section
CD Simple Form			Force wew Page Before Section
CD songs detail			
CD songs detail 2		="Page " & [Page] & " of "	& [i
🖼 Composer master			
Composer Song detail			
Menu Menu			
SongPerformance			
Reports *			
CD back cover			
🖾 Labels Artist			
Where do you want the section to start printing?			Num Lock 🛛 🖼 🗟 🔀 🛒

We can now look at our report and browse between the pages:

A 🗟 🖓 - 🔍 - I -		Database - a	ifter chapter 7 : Database (Acce	ss 2007 - 2010) -	Microsoft Access			= = ×
File Print Preview Acrobat								
		ce Columns Page Setup	One Two More Pages Pages v	Refresh Excel	Text PDF E-mail M File or XPS Data	tore Close Print Preview Close Preview		
17	ack cover	layout	2001		butu	close richew		×
Search								-
TCD Songs							- I.	
🗊 CDs from 1999	Sumn	ner Hits						
CDs With Jerry Goldsmith	Position	Name		Length	Composer			
SongPerformanceComposer Forms	1	First Flight		230	Jerry Goldsmith			
Forms Artist	2	First Approach		294	Vangelis			
CD Designed Simple Form	3	Before I Go		256	Yanni			
	4	Message		412	Vangelis			
CD master	5	The Tao Of Love		160	Vangelis			
CD master 2	6	Highland		494	Yanni			
CD Simple Form	7	True Nature		300	Yanni			
CD songs detail	8	Message		412	Vangelis			
🔳 CD songs detail 2	9	Men In Black		248	Will Smith			
Composer master	T ()	. 0000						
Composer Song detail	l otal se	conds: 2806						
Ta Menu								
SongPerformance								
Reports *								
CD back cover								
🖾 Labels Artist 🔍 Page: 14	4 B •	N No Filter	4		II	T.		×
Ready		A ROTAL	1			Num Lock 🛛 🗐 🖻 😒	100% 🗢	• •

7.3 Reports Based On Queries

Making a report that is based on a query instead of a table is no different than making a report with a table. The wizard in the previous section actually generated a query for the report. The query was:

```
SELECT CD.Title, CDSongPosition.Position, Song.Name, Song.Length,
Song.Composer, CD.ID FROM (Song INNER JOIN SongPerformance ON
Song.ID=SongPerformance.Song) INNER JOIN (CD INNER JOIN CDSongPosition
ON CD.ID=CDSongPosition.CDID) ON
```

(SongPerformance.Date=CDSongPosition.Date) AND (SongPerformance.Song=CDSongPosition.Song);

The query can be accessed in the report properties under Data. To see the entire SQL statement, right click on it and select Zoom:

A		Report Design Tools	Database - after chapter 7 :	: Database (Access 2007 - 2010) - Micros	oft Access 🗕 🗆 🗙
File Home Create		Design Arrange Format Page Se			^ (3
View Themes A Fonts * Views Themes	Croup i Hide Details Group i Hide Details Grouping & Totals	Controls	Page Numbers Date and Time Header / Footer	dd Evicting Property Tab	m in New Window. ode t Macros to Visual Basic
All Access Objects	🕑 « 🔚 CD back cover		×	Property Sheet	×
Search		1 • 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 • 11 • 1 • 12	· i · 13 · i · 14 · i · 15 · i · 16 · i 📥	Selection type: Report	
Tables	Keport Header Fage Header				<u> </u>
Queries Forms	* * Page Header * * *			Format Data Event Other All), [CDSonaPosition -]]
Reports	* I Title			Filter	Build
CD back cover	Position Name	Length	Composer	Filter On Load No Order By	Q <u>Z</u> oom
Labels Artist	✓ Detail			Order By On Load Yes Allow Filters Yes	🛛 🔏 Cut 🔤
List of Artists	Position Name	Length	Composer	Allow Filters Yes	🐚 Сору
	ID Footer Total seconds: =Sum([Le # Page Footer =	ngth])	="Page " & [Page]		Baste
Database object or SQL stateme	nt that form or report is based on			Nur	nLock 🛛 🖼 🛋 🗷 🔛

And a new window will appear with the query. Table names and column name are inside [] which ensures the query works even if table names or column names use special characters or reserved words:

😨 Zoom		x
SELECT [CD]. [Title], [CDSongPosition]. [Position], [Song]. [Name], [Song]. [Length], [Song]. [Composer], [CD]. [ID] FROM (Song INNER JOIN	-	ОК
SongPerformance ON [Song]. [ID] =[SongPerformance]. [Song]) INNER JOIN (CD INNER JOIN CDSongPosition ON [CD]. [ID] =[CDSongPosition]. [CDID]) ON ([SongPerformance]. [Song] =[CDSongPosition]. [Song]) AND		Cancel
([SongPerformance].[Date] =[CDSongPosition].[Date]);		
	•	Eont

If we had this query as a stored query (a view) in our database, we could then just write the name of the query object in the Record Source property.

7.4 Grouping And Sorting

In section 7.2, we let the wizard take care of the grouping and sorting in our report. But it is also possible to specify the grouping and sorting manually. To illustrate this we can create a query and then make a report in design view (no wizards) based on that query. We can try to satisfy the following need that was in our case: "A report that shows for each composer the songs that they have composed and which performances of them exist and in which CDs these performances are included".

We can first create a query that gathers all the necessary data:

SU/DSV	Introduction to MS Access 2010	October 2012
KTH/ICT/SCS	v 2.0	nikos dimitrakas

SELECT Composer.CName, Song.Name, SongPerformance.Date, CD.Title, CD.Year FROM CD, Composer, Song, SongPerformance, CDSongPosition WHERE Composer.CName = Song.Composer AND Song.ID = SongPerformance.Song AND SongPerformance.Song = CDSongPosition.Song AND SongPerformance.Date = CDSongPosition.Date AND CD.ID = CDSongPosition.CDID

Save the query as "Composed Songs Info".

The result of this query looks like this:

A		nal Data Database Tools	Database - after chapter 7 : Da Acrobat	atabase (Access 2007 - 2010)	- Microsoft Access		> ^ ?
View Paste Format F Views Clipboard	Painter F	2 Ascending V Sel X Descending Add X Remove Sort Y Tog Sort & Filter	vanced *	pelling Go To	- Calibri + 14	 □ 注 注 注 注 H × 重 吾 理 Ⅲ × □ × ting 	
All Access Objects		Composed Songs Info					×
Search	Q	CName -	Name •	Date 🔹	Title -	Year -	-
Tables	×	Yanni	Almost A Whisper	1999-04-05 Yan	ni Greatest Hits	2002	
Queries Forms	*	Vangelis	Conquest Of Paradise	2001-08-09 Best	Of Vangelis	2001	
Reports	*	Jerry Goldsmith	First Flight	1998-04-16 Sum	mer Hits	1998	
CD back cover		Yanni	Until The Last Moment	1999-05-15 The	Ultimate Yanni Collection	1999	
Labels Artist		Yanni	Before I Go	2000-08-17 Yan	ni Greatest Hits	2002	
List of Artists		Yanni	Before I Go	1989-04-03 Best	Of Vangelis	2001	
		Vangelis	First Approach	1998-04-02 Sum	mer Hits	1998	
		Yanni	Almost A Whisper	1999-04-05 The	Ultimate Yanni Collection	1999	
		Yanni	First Touch	2001-05-31 Yan	ni Greatest Hits	2002	
		Vangelis	Rotations Logic	1999-04-08 Best	Of Vangelis	2001	
		Yanni	Before I Go	1989-04-03 Sum	mer Hits	1998	
		Yanni	True Nature	1998-04-08 The	Ultimate Yanni Collection	1999	
		Yanni	Highland	1998-11-08 Yan	ni Greatest Hits	2002	
		Vangelis	Rotations Logic	2001-05-17 Best	Of Vangelis	2001	
		Vangelis	Message	1995-08-14 Sum	mer Hits	1998	
		Yanni	Until The Last Moment	1999-05-15 The	Ultimate Yanni Collection	1999	
		Yanni	True Nature	1998-04-08 Yan	ni Greatest Hits	2002	
		Vangolis	The Tao Of Love	1001 05 11 Roct	Of Vangolis	2001	
Ready		Record: I4 4 20 of 27 + +	K No Filter Search			Num Lock	TEL SOL M

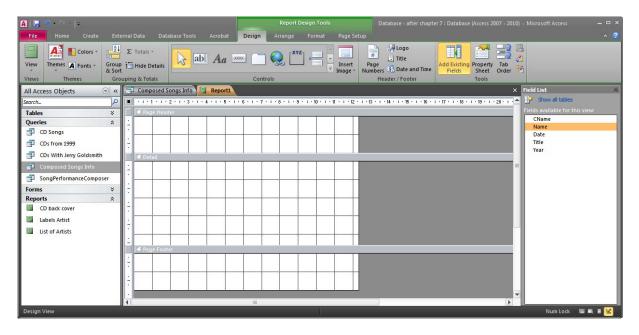
As we can see the same composer appears many times, and the same song may have been performed many times and each performance may be included in many different CDs. It can therefore be good to add some grouping levels in our report so that the same information doesn't appear over and over again.

We can start by creating a report in design view based on the new query. Press Create > Report Design on the ribbon and a new blank report will appear:

A 🛃 🧐 - 🗠 - - File Home Create Exte	rnal Data Database Tools Acrobat Design Arrange Format Page Setup	stabase (Access 2007 - 2010) - Microsoft Access 🛛 🗕 P 🔺
View Themes A Fonts + Group & Sort	i Hide Details Ala Ala Add E	Since Coder 27 Tools
All Access Objects 💿 <	Composed Songs Info	
Search P	🔳 • • • 1 • 1 • • 2 • • • 3 • • • 4 • • • 5 • • • 6 • • • 7 • • • 8 • • • 9 • • • 10 • • • 11 • • • 12 • • • 13 • • • • 14 • • • 15 • • • • 16 • • • • 17	Selection type: Report
Tables ¥	🖌 Page Header	
Queries		Format Data Event Other All
CD Songs		Record Source
CDs from 1999		Filter On Load No
Ds With Jerry Goldsmith	🗲 Detail	Order By Order By On Load Yes
🚰 Composed Songs Info		Allow Filters Yes
SongPerformanceComposer		
Forms ¥		
Reports *		
CD back cover		
Labels Artist		
List of Artists		
	Page Footer	
Design View		P Num Lock 🛙 🖾 🗟 🔀

The new report has no Record Source specified and has by default a Page Header, a Detail, and a Page footer.

We can start by selecting our stored query as the Record Source. The columns of the query are now available in the Field List:



No fields have been placed anywhere on the report yet. Before we add any fields, we can open the Sorting and Grouping dialog by either pressing the Sorting and Grouping button on the ribbon (under Design) or by right-clicking anywhere on the report and selecting "Sorting and Grouping". Either way the "Group, Sort, and Total" pane will come up:

A 🛛 🔹 🔍 🗸 🖓 🗸 🖓 🗤	Report Design Tools Database - after chapter 7 : Database (Access 2007 - 2010)	- Microsoft Access 🛛 🗕 🗆 🗙
View View	Letral Data Database Tools Acrobat Design Arrange Format Page Setup X Totals * Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Image Header / Footer Tools Tools Tools	3
All Access Objects		Field List ×
Tables # Tables # Queries # CD Songs CD Strom 1999 CDs With Jerry Goldsmith Composed Songs Into SongPerformanceComposer Forms # Reports # CD back cover Labels Artists Ust of Artists	Image: Page Footer	Fields available for this view: CName Name Date Title Year
	Group, Sort, and Total ×	
Design View		Num Lock 🛛 🖾 🖬 📓 🕍 🚊

Here we can define the three grouping levels that are relevant in our case. First we group by composer, then we group by song, and then we group by song performance. For a composer we have the column CName, for the song we have the column Name, and for the Performance we have the column Date. We can also specify whether we want a group header or a group footer, whether to sort in ascending or descending order and how to handle page breaks. If all group levels have a group header and no group footer (which is the default) the report should look like this:

A 🚽 🔍 • 🖓 •	Report Design Tools Database - after chapter 7 : Database (Access 2007 - 2010	
File Home Create Exter	nal Data Database Tools Acrobat <mark>Design</mark> Arrange Format Page Setup	× 3
View Themes A Fonts - Group & Sort	Index Details Image Image Intele Page Page <th>a 2 3</th>	a 2 3
	ping & Totals Controls Header / Footer Tools	
All Access Objects 💿 «		Field List ×
Search	🔳 + 1 + 1 + 1 + 2 + 1 + 3 + 1 + 4 + 1 + 5 + 1 + 6 + 1 + 7 + 1 + 8 + 1 + 9 + 1 + 10 + 1 + 11 + 1 + 12 + 1 + 12 + 1 + 14 + 1 + 15 + 1 + 16 + 1 + 17 + 1 + 18 + 1 + 19 + 1 + 20 + 1 + 10 + 1 + 10 + 1 + 10 + 1 + 10 + 1 + 1	
Tables ¥		Fields available for this view:
Queries *		CName Name
D Songs		Date
CDs from 1999	I ◆ CName Header	Title
CDs With Jerry Goldsmith		Year
🔁 Composed Songs Info	I ≪ Name Header	
SongPerformanceComposer		
Forms ×		
Reports *	Set Date Header	
CD back cover		1
Labels Artist	🗲 Detail	
List of Artists		
	✓ Page Footer	
		2
		1
	Group, Sort, and Total X	4
	Group on Chame	
	Group on Date 🔻 from oldest to newest 🔻 , More 🕨 🕹 🗇 🗙	
	[li≡ Add a group 2↓ Add a sort	
	- Add d gloup - Add d sole	
Design View		Num Lock 🛛 🖬 🗃 📓 🔛

Our report now has many levels. We can now place the appropriate fields on each level (drag and drop from the Field List). We can also adjust the fields' size, colour, etc. We can also add necessary labels. The report could now look like this:

N 👷 🧌 • O • 🗣	Report Design Tools Database - afte	r chapter 7 : Database (Access 2007 - 2010) - Microsoft Access 🗕 🗖 🕽
File Home Create Exte	nal Data Database Tools Acrobat Design Arrange Format Page Setup	~ (
View Themes A Fonts Group & Sort		→ Logo → Title ers ⊕ Date and Time Haddr /Footback Haddr /Footback → Convert Report's Macros to Visual Basic Tools
All Access Objects	Composed Songs Info	× Property Sheet
Search.		Selection type: Report
Tables ¥	☐ I	Report
Queries *	CName Header	Format Data Event Other All
D Songs CD Songs	CName Composed songs	Record Source Composed Songs Info <u>-1</u> -
CDs With Jerry Goldsmith	▼ Name Header	Filter On Load No Order By
Composed Songs Info	Performed at	Order By On Load Yes Allow Filters Yes
Forms ×	Date Header	
Reports *	Date	
CD back cover	Included in the following CDs:	
Labels Artist	Title	
List of Artists	- Tear Tear	
	() ()	
Design View		Num Lock 🛛 🖼 🖬 🔛

We can now switch to the Report View and see if we are satisfied:

A 🗔 🖓 - 🗠 - 🖙					
File Home Create Exte					
+ + Format Painter	Image: Transmission of the second	re ♥ Spelling lete * ∰ More * Find ♀ Go To * Select *	в <i>I</i> <u>U</u> А + № +	A COMMENT DEPENDENCE OF	
		Pind	Text Formatting	×	
Search					
Tables ¥	Hone Cests External Data Database Tools Acobat A				
	Composed songs			=	
Ds from 1999					
CDs With Jerry Goldsmith					
Composed Songs Info		IS.			
SongPerformanceComposer					
	Vangelis				
	Performed at:				
	2001-04-19				
	Included in the following CD	'S:			
		2001			
	Performed at:				
	2001-08-09				
	Included in the following CD	IS:			
	Best Of Vangelis	2001			
Report View	First Approach			Numlock 🗐 🖬 🗎	
Report view				Num Lock	

It looks fine, but maybe it would be better to change page for each new composer. We can switch back to the design view, select the CName Header and change its property Force New Page to Before Section:

A	Report Design Tools	Database - after chapter 7 : Database (Access 2007	- 2010) - Microsoft Access 📃 🗖 🗙
File Home Create External Data Database Tools Acrobat	Design Arrange Format Page Setup		
File Hom: Ceckt External Data Database Tools Acrobat Design Arrange Format Page Setup View Temes: Colors: Color: Colo			
	Control 2		
Search	• 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 • 11 • 1 • 12 • 1 •	•13 • 1 • 14 • 1 • 15 • 1 • 16 • 1 • 17 • 1 • 18 • 1 • 19 • 1 •	
			Format Data Event Other All
Composed songs Compos	Year		Height 1.321cm Bark Color Text 2. Lighter 40% Alternate Bark Colo No Color Special Effect Flat Auto Height No Can Shrink Yes Display When Aways Keep Together Yes Repeat Section No Force New Page Bcfore Section x
Where do you want the section to start printing?		, i i i i i i i i i i i i i i i i i i i	Num Lock 🕮 🛋 🗟 🔛

Our report is now better, but we can notice that if one composer doesn't fit on one page, the page break can be anywhere (for example after the label "Performed at:"). We can instruct Access to make better choices on page breaks by going back to the Sorting and Grouping and selecting the option "keep whole group together on one page" (for example at the song level):

A		Report Design Tools	Database - after chapter 7 : Datab	ase (Access 2007 - 2010)	- Microsoft Access 📃 🗖 🗙
File Home Create External Dat	sta Database Tools Acrobat Design	Arrange Format Page Se			
View Themes Fonts + Group ing & Views Themes Grouping &	ide Details	trols	Page Numbers 5 Date and Time Header / Footer	ing Property Tab	a Subreport in New Window View Code ² Convert Report's Macros to Visual Basic Tools
All Access Objects 💿 « 💷 C	Composed Songs Info 🔚 Report1			×	Property Sheet X
Search P	1 • 1 • 1 • 2 • 1 • 3 • 1 • 4 • 1 • 5 • 1 • 6 • 1 • 7	· · · 8 · · · 9 · · · 10 · · · 11 · · · 12	· · · 13 · · · 14 · · · 15 · · · 16 · · · 17 · · · 1	3 · 1 · 19 · 1 · 20 · 1 · 📥	Selection type: Section
	Page Header				
Queries ^	CName Header				Format Data Event Other All
CD Songs	Composed songs				Visible Yes Height 1,3cm Back Color Text 2, Lighter 80%
🗇 CDs With Jerry Goldsmith	Name Header				Alternate Back Colo No Color Special Effect Flat
🗊 Composed Songs Info	Performed at	— · · · · ·			Auto Height No
SongPerformanceComposer					Can Grow Yes Can Shrink Yes
Forms × Reports *	Date Header	'Ds:			Display When Always Keep Together Yes Repeat Section No
CD back cover	2 Detail				Force New Page None
Labels Artist	Page Footer	Year			New Row Or Col None
1				-	
4				Þ	
	p, Sort, and Total			×	
	Group on CName				
	Group on Name V with A on top V, by entir		e dick to add, with a header section 🔻 ,		
	✓ without a footer section ▼ , keep whole gro Group on Date	oup together on one page 🔹 , Less ┥			
				_	
Design View				<u> </u>	Num Lock 🛙 🖩 🕱 🔛

This will make sure that if a song doesn't fit on a page it will not start on that page. So now we have the following effect:

A 📮 🔿 · O · I=	Database - after chapter 7 : Database (Access 2007 - 2010) - Microsoft Access	- • ×
File Print Preview Acrobat		
Print Size Margins Print Data Only Portrait Landscape Columns Print Page Size Page Layout	Page Zoom One Two More Refresh Text PDF Email Refresh Page Zoom One Two More Refresh Text PDF Email Close Print Page Zoom Zoom Data Close Print Close Print Close Print	
All Access Objects 💿 « 🔤 Composed Songs Info		×
Search		-
Cos String 1999 Cos With Jerry Goldsmith Composed Songs Info SongPerformanceComposer	Vithin Attraction Performed at: 2001-11-10 Included in the following CDs: Yanni Greatest Hits 2002	
Forms × Reports * CD back cover Labels Artist List of Artists Page: H 4 5 Report	No Filter	■ 2 = ± 10% ○ ■ ○

When a composer's songs are spread over more than one page, we can only see the composer name on the first page. To fix this we can select the CName Header and change its property Repeat Section to Yes.

N 🔜 🧌 • 🔿 • 🖙	Report Design Tools Database - after chapter 7 : Database (Access 2007 - 2010) - Micros	oft Access 📃 🗖
File Home Create Exte	nal Data Database Tools Acrobat Design Arrange Format Page Setup	
& Soft	Σ Totals - Totals - Thide Details ping & Totals Controls Con	ib an
All Access Objects 💿 «	Composed Songs Info Report Commons	× Property Sheet
Search		Selection type: Section
Tables ×	l ♥ Page Header	GroupHeader0
Queries x	CName Header	Format Data Event Other All
 CD Songs CDs from 1999 CDs With Jerry Goldsmith 	Composed songs	Visible Yes Height 1,321cm Back Color Text 2, Lighter 40% Alternate Back Colo No Color Special Effect Flat
Composed Songs Info		 Auto Height No
SongPerformanceComposer	Group, Sort, and Total	Can Grow Yes
Forms ¥ Reports ×	Group on Chame ▼ with A on top ▼ , More ►	Display When Always Keep Together Yes
CD back cover	Group on Name	Repeat Section Ves
Labels Artist	Group on Date	Force New Page Before Section New Row Or Col None
List of Artists	^l l≡ Add a group 21 Add a sort	
epeat this section at the top of each pa	are.	Num Lock 📓 🖬 🗃

This will make sure that the composer's name appears on every page about this composer:



Save the report as "Song Performances on CDs by Composer".

7.5 Subreports

Similarly to the way we created forms with subforms in section 6.3, we can create reports with subreports. This possibility can be especially useful when our report contains many aspects of one concept. As an example we will create a report that shows the different artists and the different composers for every CD. We can also define the report to include the number of songs and total length of each CD. Each CD will be shown on a new page. Here is how a page of the report should look like:

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Title	Summer Hits			
Year	1998			
Number of songs	9			
Length in seconds	2806			
Composers Artists				
Jerry Goldsmith			Bill Bradley	
Vangelis			Cate Archer	
Will Smith			Danny Elfman	
Yanni			David Foreman	
			Jenny Judd	
			Jerry Goldsmith	
			Keith Winfield	
			Kenny Greene	
			Mich Bud	
			Tia Mintze	
			Tony Barrett	
			Will Smith	

In order to achieve this we must create one main report and then place in it two subreports; one for the composers and one for the artists.

Each of the reports must have a source (a table or a query). In this case we need to have three queries since the data is spread over several tables. The queries must contain one or more columns that can be used to connect the corresponding reports. This linking column will in this case be the id of the CD. We can create the following three queries in advance so that we can use them later when creating the reports:

Query for main report (CD info for Report): SELECT CD.ID, CD.Title, CD.Year, COUNT(*) AS songcount, SUM(Length) AS cdlength FROM CD, CDSongPosition, Song WHERE CD.ID=CDSongPosition.CDID AND SONG.ID=CDSongPosition.Song GROUP BY CD.ID, CD.Title, CD.Year

Query for composer subreport (CD composers for Report): SELECT DISTINCT CDSongPosition.CDID, Song.Composer FROM Song, SongPerformance, CDSongPosition WHERE SongPerformance.Song=CDSongPosition.Song AND SongPerformance.Date=CDSongPosition.Date AND Song.ID=SongPerformance.Song

Query for artist subreport (CD artists for Report): SELECT DISTINCT CDSongPosition.CDID, ArtistPerformance.Name FROM SongPerformance, ArtistPerformance, CDSongPosition WHERE SongPerformance.Song=ArtistPerformance.Song AND SongPerformance.Date=ArtistPerformance.Date AND SongPerformance.Song=CDSongPosition.Song AND SongPerformance.Date=CDSongPosition.Date

With these queries created, we can start creating the reports. The three queries have been given the names within the parentheses.

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KTH/ICT/SCS	

We can, of course, create the three reports independently and link them later, but here we will create the subreports from within the main report. This means that we have to start with the main report. Select the query for the main report in the object browser and press Create > Form on the ribbon. A standard report will be created:

File Home Create Exte	rnal Data Database		yout Tools Format Page Set		er chapter 7 : Database	e (Access 2007 - 2010) -	Microsoft Access		
View Themes A Fonts Group & Sont	-	abi Aa 🔤 🗋 <table-cell></table-cell>	•		Page Numbers S Date a Header / Foot	and Time Fields	Sheet		
ll Access Objects 💿 🔍	CD info for Report					×	Property Sheet	107 -	
earch) info for Report		d	en 15 september 2		Selection type: Repo Report Format Data Eve	<u>.</u>	
CD artists for Report		Title	Year	songcount	16:2 cdlength	20:03	Record Source	CD info for Report	<u></u>
CD composers for Report	ID	nue		songcount			Caption Pop Up	No	
CD info for Report	1	Yanni Greatest Hits	2002	7	2108		Modal	No	
	2	Best Of Vangelis	2001	7	1631		Default View	Report View	
	· · · · · · · · · · · · · · · · · · ·							Yes	
CDs from 1999	3	Summer Hits	1998	9	2806		Allow Layout View Picture Type	Yes Embedded	
CDs With Jerry Goldsmith	7	The Ultimate Yanni Collection	1999	4	1445	1	Picture	(none)	
Composed Songs Info			1				Picture Tiling	No	
	4						Picture Alignment	Center	
SongPerformanceComposer		Pa	age 1 of 1				Picture Size Mode	Clip	
orms ×			gerer				Width Auto Center	19,709 cm No	
eports *							Auto Center Auto Resize	Yes	
CD back cover							Fit to Page	Yes	
							Border Style	Sizable	
Labels Artist						-	Scroll Bars	Both	
yout View			Ţ			<u>.</u>		Num Lock	in n 📴 -

Make the necessary modifications to the layout and it could look like this:

N 👷 🧐 • O • I =	Report Design Tools Database - after chapter 7 : Database (Acce	ess 2007 - 2010) - N	vlicrosoft Access	
File Home Create External D	ata Database Tools Acrobat <mark>Design</mark> Arrange Format Page Setup			
View Themes A Fonts - Group Themes A Fonts - δ Sort - Sort - So	tide Details		Property Sheet Order Covert Report's Macros to N	Visual Basic
Views Themes Grouping			Tools	
All Access Objects 💿 «	CD info for Report		Property Sheet Selection type: Report	
Search 🔎 🔳		· · · 20 · · · 21	and a second	
Tables ×			Report	
Queries *		1	Format Data Event Other All	
CD artists for Report	≪ Detail		Record Source CD info for Report	×
	Title		Caption	
CD composers for Report			Pop Up No	
TCD info for Report	Year Year		Modal No	
T CD Songs			Default View Report View Allow Report View Yes	
	Number of songs songcount		Allow Layout View Yes	
CDs from 1999			Picture Type Embedded	
CDs With Jerry Goldsmith	Length in seconds collength		Picture (none)	
Composed Songs Info			Picture Tiling No	
			Picture Alignment Center	
SongPerformanceComposer			Picture Size Mode Clip Width 19,709cm	
Forms ¥			Auto Center No	
Reports *			Auto Resize Yes	
CD back cover			Fit to Page Yes	
	🗳 Page Footer		Border Style Sizable	
Labels Artist	🗲 Report Footer		Scroll Bars Both	
List of Artists	II		Control Box Yes	
Design View			Num Lock I	

Now make some space to put the subreports (also in the detail part of the report). Click on the subform/subreport button on the ribbon (under Design) to select it. Then click on the report to create a subreport. Alternatively, drag and drop the relevant query from the object browser onto the report (in Design View). The SubReport Wizard should appear. If you dragged and dropped the query onto the report, the first to steps will be skipped.

SubReport Wizard			
	You can use an existing form to create your subform or subreport, or create your own using tables and/or queries. What data would you like to use for your subform or subreport?		
	Use existing <u>Tables</u> and Queries O Use an <u>existing</u> report or form		
	CD back cover Report Labels Artist Report List of Artists Report Song Performances on CDs b Report Artist Form CD Designed Simple Form Form CD master Form CD master 2 Form		
	Cancel < Back Next > Finish		

As we decided earlier we will create the subreports based on the queries that we created in advance. Select "Use existing Tables and Queries" and press Next. Now select the relevant query and the relevant columns:

Which fields would you like to include on the subform or subreport?
You can choose fields from more than one table and/or query.
Tables/Queries
Table: Artist
Available Fields: Selected Fields:
Name
Age FavouriteComposer >>1
FavouriteComposer >> Mentor
<
<<
Cancel < Back Next > Finish
Cancel < Back Next > Finish

At the next step the wizard suggests possible ways to link the subreport to the main report. The only suggestion is the one we intended to use:

SubReport Wizard	
NEW YOR STORES	Would you like to define which fields link your main form to this subform yourself, or choose from the list below?
	⑦ Choose from a list. ○ Define my own.
	Show CD composers for Report for each record in CD info for Report None
	Show CD composers for Report for each record in CD info for Report using ID
	Cancel < Back Next > Einish

Alternatively, we can define it ourselves:

SubReport Wizard			
	Would you like to define which fields link your main form to this subform yourself, or choose from the list below?		
	Form/report fields:	Subform/subreport fields:	
	Show CD composers for Reportusing ID Cancel	t for each record in CD info for Report <u>N</u> ext > <u>Finish</u>	

Either way the result will be the same.

At the last step of the wizard we can define a name for the subreport (which will show up as a normal report in the object browser.

SubReport Wizard	
	What name would you like for your subform or subreport? CD composers subreport Those are all the answers the wizard needs to create your subform or subreport.
	Cancel < Back Next > Finish

We can now repeat the process for the second subreport. We can of course also edit the layout of the subreports. Our report should now contain two subreports that are both linked to the main report using the id of the CD. This is also visible in the Property Sheet:

A 💂 🦷 • 🔿 - 📼			
File Home Create External Data Database Tools Acrobat	Design Arrange Format Page Setup		
View Themes A Fonts - View Themas A Fonts -	controls	Title Page Numbers 50 Date and Time Header / Footer	Poperty Tab Sheet Orde Convert Report's Macros to Visual Basic Tools
All Access Objects 💿 « 🔄 CD Info		>	Property Sheet X
Search P Tables x @ Report Header @ Report Header @ Contists for Report © Composers for Report © Costing for Songs © Costing for Songs <td< th=""><th>t t Artists</th><th></th><th>Section type : Subform/Subreport CD composers subreport Formal Data Venet Other All Source Object Report.CD composers subreport Non Matter Hell Baptr.CD composers subreport Refer On Empty Mar Yes Enabled</th></td<>	t t Artists		Section type : Subform/Subreport CD composers subreport Formal Data Venet Other All Source Object Report.CD composers subreport Non Matter Hell Baptr.CD composers subreport Refer On Empty Mar Yes Enabled
Design View			Num Lock 🕮 🛋 🕱 🔀

So if you want to link two reports without using the wizard, you can open the Property Sheet and set the appropriate properties.

Finally, we can define that we only want one CD per page. To do this we specify that there should be a page break before each CD (i.e. each Detail block):

N 📮 ∽ ~ ∩ - I = File Home Create External	Data Database Tools Acrobat Design Arrange Format Page Setup	atabase (Access 2007 - 2010) - Microsoft Access 📃 🗆 7
	Hide Details	Logo Title Date and Time Add Existing Fields Add Existing Fields Fields Add Existing Fields
All Access Objects Access Objects All Access Objects Access Objects All Access Access Objects All Access Objects All Access	It It It It 2 + 1 + 3 + 1 + 4 + 1 + 5 + 1 + 6 + 1 + 7 + 1 + 6 + 1 + 5 + 1 + 10 + 1 + 10 + 1 + 10 + 10	Property She Section
Forms Reports Coartists subreport CD artists subreport CD ack cover CD composers subreport Labels Artist Conter dongowant the section to oat an unit		Num Lock 🔤 🕷 🛢 🔀

8 Macros

Macros can be used in order to do something a little more complicated, but not that complicated that it would require writing code. A macro can for example execute a query, activate or refresh a form or form component, etc.

In this chapter we will look at a very simple macro that refreshes a Combo Box when another Combo Box has changed value. What we want to do is to have two Combo Boxes, one for composers and one for songs. We want the song Combo Box to be inactive until we have selected a composer, and then activate it and let it contain only the songs composed by the selected composer. This can be combined with other stuff to make a form for, for example, registering new song performances. We will only look at the macro related parts though.

Create a blank form in Design View. Place a Combo Box based on the table Composer on the form. Now place a second Combo Box on the form, this one getting its values from the table Song. It is enough to include the column Name from the table Song. We have now a form that looks like this:

] 📙 🧐 • ° - ∓	Form Desig	n Tools Database - after chapter 8 : Database (Access 2007 - 2010) - Microsoft Access 🗕 🗖 🖓
File Home Create	External Data Database Tools Acrobat Design Arran	ge Format 🔨
View Themes A Fonts *	Controls	Insert Jack Property Header / Footer Header / Footer Tools
All Access Objects	« Fig. Form1	× Property Sheet
earch		Salaction type: Form
		Form
Tables Queries	× ✓ Detail × ·	Format Data Event Other All
Forms	× Composer Unbound -	Caption
Reports		Default View Single Form
•		Allow Form View Yes
	Song Unbound	Allow Datasheet Vie No
		Allow PivotTable Vie No
		Allow PivotChart Vic No
		Allow Layout View Yes Picture Type Embedded
		Picture (none)
		Picture Tiling No
	4	Dicture Alignment Center
Design View		Num Lock 🖬 🛙 🔛

We can switch to the Form View and see that all the composers and all the song are visible.

We can switch back to Design View. We can start by deactivating the second Combo Box. We can deactivate it by setting its property Enabled to No:

A	Form Design Tools	Database - after chapter 8 : Dat	abase (Access 2007 - 20	010) - Microsoft Access 🛛 🗕 🗖 🗙
File Home Create External Data Database Tools Acrobat	Design Arrange Format			
View Themes A Fonts * Controls	Insert	Title Date and Time Header / Footer	Property Sheet Order	Subform in New Window View Code Convert Form's Macros to Visual Basic Tools
All Access Objects 💿 « 📴 Form1			Property Sheet	×
Search ,0 - + + + + + + + + + + + + + + + + + + +	• 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1 •	11 + + + 12 + + + 13 + + + + 14 + + + + *	Selection type: Comb	
Queries > Forms > Reports > Borig Unbound			Control Source Row Source Row Source Type Bound Column Limit To List Allow Value List Edir List Items Edit Form	Yes
Enable control in Form view?				Num Lock 🛛 🖬 🔣

The Combo Box will still be visible, but the user won't be able to use it until we activate it:

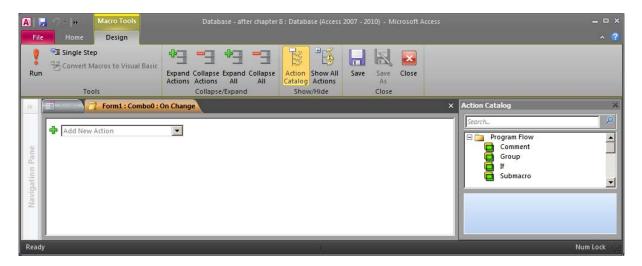


We can now see how we can activate it when the first Combo Box has been changed. We look at the properties of the first Combo Box (the one with the composers). Under Event we can find the property (event) On Change. Activate the property and click on the ellipsis to show the Choose Builder dialog:

Choose Builder	<u>? ×</u>
Macro Builder	
Expression Builder Code Builder	
<u> </u>	
ОК	Cancel

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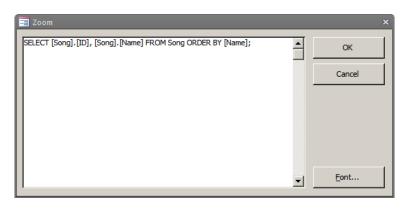
We can select between the Expression Builder (which we can also use to create validation rules as we saw in chapter 4), the Macro Builder, and the Code Builder (where we can write Visual Basic code). Highlight the Macro Builder and press OK. Access will create a new macro and show it in Design View:



Here we can define a bunch of actions that should occur when this macro is run. We can select any of the many predefined actions, and then, dependent on the selected action, specify the applicable properties. In order to activate our Combo Box we need to set its Enabled property to Yes (or true). So the action that can help us do that, is the action SetProperty. Select this action and its properties will become available:



The properties we need to specify for this action are: The name of the control whose property we want to change (in this case Combo2), the name of the property (in this case Enabled), and the new value for the property (in this case true). Access will provide suggestions when possible. We can save and close the macro and try the form. As soon as we select a value in the first ComboBox, the second one becomes active. However, the songs in the second combo box are still not filtered based on the selected composer. To do that, we need to alter some properties of the second Combo Box. Under Data there is a property Row Source. We can zoom into it and edit the automatically generated SQL statement (right click and select Zoom...). We can now see the Zoom window where we can edit our SQL statement:



The SQL statement as it is now has no connection to the current value of the first Combo Box. We can add this as a condition in the WHERE clause. The full SQL statement should be changed to the following:

SELECT Song.ID, Song.Name FROM Song WHERE Song.Composer = Combo1 ORDER BY Song.Name

Combo1 is the name of the first Combo Box. Both these names can be changed to other more intuitive names in the Property Sheet. Instead of Combo1, we could write Forms!Form1!Combo1 which would be the qualified name of the Combo Box control. But since this query will only be used in the context of this form, Combo1 is enough. If we later change the name of the control or the form, we will have to change the query manually, as Access will not automatically update it. It is therefore good practice to specify the names of components and objects before starting referring to them.

We have now instructed the second Combo Box to select value from the table Song where the composer is the composer currently selected in the first Combo Box. Let's try out our form!

Well, the first time we selected a composer the list of songs got updated, but when we choose another composer then the list of songs remained unchanged. This is where our macro comes in handy. We can go back to the property On Change of the first Combo Box and then go back to the macro editor by clicking on ellipsis next to the property. We can now add a second action to our macro. This time we want to refresh a component, so we can use the action Requery for this. The action Requery has only one property. This property must be set to the name of the form control whose Row Source is to be refreshed (in our case Combo2):

A	📮 🌖 🛪 🐘 Macro Tools Database - after chapter 8 : Database (Access 2007 - 2010) - Microsoft Access						
File	Home Design				× 🕐		
Run	역 Single Step 양 Convert Macros to Visual Basic Tools	Expand Collapse Expand Collapse Actions Actions All All Collapse/Expand		Save Save Close As Close			
>>	Form1 : Combo1 : C	On Change			×		
n Pane	SetProperty Control Name Combo2 Property Enabled Value true						
Navigation	Control Name Combo2				<u> </u>		
Nar	Add New Action	•					
Ready					Num Lock		

We can now save the macro and return to our form. We can now try our form again and we will conclude that it works as we want it to.

We can now save our form, perhaps giving it a better name like "Songs based on composer".

A version with the database with everything created so far is available, as usual, at <u>http://coursematerial.nikosdimitrakas.com/access/</u>.

9 Other Useful Tips

The tips presented in this chapter can be useful in many situations. There are many things in Access that can be useful, but not that easy to know how to do them. The following tips cover things that many find useful when working with Access.

9.1 Tip 1 - Lookups For Tables

When inserting values to a table using the datasheet mode, it can be useful to have a Combo Box that helps us select a value for foreign keys. This is similar to what we did when we created forms, but it can also be done without having a form. What we have to do is to define in the Table Design View where Access should look up values for a particular column. We could for example do this for the table SongPerformance, so that we can select the song like this:

A	Table Tools Database - after chapter 9 : Database (Access 2007 - 2010) - Microsoft Access	– ¤ × ^ ?
View Paste Format Painter		×
All Access Objects	SongPerformance Date Song 2004-01-07 10 2004-02-05 2 2004-02-04 30 2 Vera's World 3 Flashback 4 Sad Room 5 Memories 6 First Flight 7 The Bridge 8 The Attack	
Ready	Record: H 4 55 of 55 > H > K No Filter Search Num Lock	.

In order to do this we must look at the lookup properties of the column Song in the Table SongPerformance. We have to set the Display Control property and then the Source Row, Bound Column and Column Count properties (perhaps even Column Widths and List Rows):

A	Table Tools Databa	Table Tools Database - after chapter 9 : Database (Access 2007 - 2010) - Microsoft Access				×		
File Home Create Exte		bat Design						
Views Views Tools	Hisert Rows	Create Data Rename/Dele Macros + Macro Field, Record & Table Ever	. D	Object ependencies ships				
All Access Objects 💿 «	SongPerformance				×	Property Sheet		×
Search	Field Name	Data Type Date/Time	The date of this p	Description erformance		Selection type: Table General	Properties	
Tables Artist Artist ArtistPerformance CD CD CDSonaPosition	Song		Foreign key to the			Read Only When Di Subdatasheet Expar Subdatasheet Heigl Orientation Description Default View	No	
		Field Properties			Validation Rule Validation Text			
Song SongPerformance		Combo Box				Filter Order By Subdatasheet Name Link Child Fields	[Auto]	
Queries ¥	Bound Column 1					Link Master Fields		
Forms ¥ Reports ¥	Column Count 2 Column Heads No Column Widths 1 cm;5cm List Rows 8 List Width Auto Limt To List No Allow Multiple Values No Allow Multiple Values No List Rems Edit Form Show Only Row Source ¹ No	No Ion;5cm 8 Auto No No No No		The type of control to use to display this field on forms.		Filter On Load Order By On Load	No Yes	
Design view. F6 = Switch panes. F1 = H	lelp.						Num Lock	iii iii 🛍 🔛

The Bound Column value tells Access which column from the table Song that should be linked to the column Song. The Column Count tells Access how many columns from the table Song that should be displayed in the combo box.

9.2 Tip 2 - Viewing Subtables

Another way to speed up data input and viewing without making forms, reports or queries, is by browsing the data in tree structures. We can for example open the table Composer and then see the songs composed by each composer and the performances of each song. This would look like this:

A	Data Database Tools Acrobat	Table Tools Database	after chapter 9 : Datab	ase (Access 2007 - 2	2010) - Microsoft Acce	\$\$	
View Paste Copy Filte Clipboard All Access Objects © «			Find trind	Arial (Detail) B I <u>U</u> <u>A</u>	× 14 · Ì ⋮≣ • ^{aby} · <u>A</u> × I ≣ Text Formatting	: [:] (# (# (# (# (# (# (# (# (# (# (# (# (#	_
Search	CName Danny Elfman Jerry Goldsmith Vangelis Will Smith		9 <u>th</u> ⊽ 302				
*	36 Men In BI 1998-11-14 1999-10-04 2002-05-12 * (New) Yanni ord: 4 ≤1 of 2 → N →		248				Num Lock 📧 🗗 66

To do this we can click on the little plus-sign (+) next to the name of a composer. When we open the table it looks just like this:

A ↓ O · O · ↓ = File Home Create Ex	ternal Data Database Tools Acrobat Fields Table
View Clipboard G	$\begin{array}{c c c c c c c c c c c c c c c c c c c $
All Access Objects Search	
Tables Rest Image: Artist Artist Image: ArtistPerformance Image: ArtistPerformance Image: CD CD Image: CD Image: ArtistPerformance Image: CD CD Image: CD	Banny Elfman Jerry Goldsmith Vangelis Will Smith Yanni Yanni
Queries ¥	
Forms ¥ The name of the composer. Used also	🔽 Record: K 🖣 4 of 5 💿 F H 🛌 🥳 No Filter Search as a reference to the artist that is this composer. Num Lock 🔟 番 値 🗄

When we press on any of the plus-signs next to the composer names, Access will automatically open a tree based on the relationships that this table has. If there are many relationships, then Access will ask us to choose which one we want to use:

Insert Subdatasheet	<u>?</u> ×
Tables Queries Both	
Artist ArtistPerformance CD CDSongPosition Composer Song SongPerformance	
Link Child Fields:	•
Link Master Fields:	•
	OK Cancel

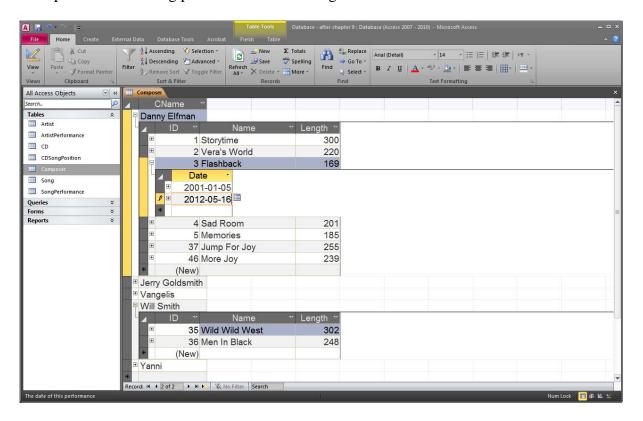
By just clicking on the table Song, Access will suggest the columns used for this connection:

Insert Subdatash	eet		? ×
Tables Queries	Both		1
Artist ArtistPerformand CD CDSongPosition Composer	e		
Song			
SongPerformanc	e		
Link Child Fields:	Composer		•
Link Master Fields:	CName		•
		ОК	Cancel

The songs of the selected composer will now be visible:

A] 🔛 🖓 - 🔍 - I .	Table Tools Database - after chapter 9 : Database (Access 2007 - 2010) - Microsoft Access	>
File Home Create Exte		^ 6
Views Clipboard		
All Access Objects 💿 🔍	E Composer	>
Search 🔎		
Tables * Artist ArtistPerformance CD CD CDsongPosition Composer Song Song SongPerformance	B Danny Elfman B Jerry Goldsmith Vangelis Will Smith ID Name ID Name B 35 Wild West 36 Men In Black 248	
Queries ¥	* (New)	
Forms × Reports ×	Yanni Record: M 4 4 of 5 > > > > K No Filter Search	
The name of the composer. Used also a	a reference to the artist that is this composer. Num Lock 🔟 #	<u>نا</u> ي

We can do the same thing to go deeper into the structure, and see for example song performances. In this structure we can also insert new rows (on any level/table). We can for example add a new song performance of the song Flashback:



If we want to close a tree structure and then select a different subtable we must place the cursor on the relevant level and then select, on the ribbon, Home > Records > More > Subdatasheet > Remove. If this option is unavailable, the subdatasheet can be configured in the Property Sheet while the table is in Design View.

When working with subdatasheets, Access will automatically hide the columns that are visible in the upper level (in the example above, the foreign key column Song in the table SongPerformance is hidden). If a column is hidden but we still want to see it, then we can

unhide it by opening the Unhide Columns dialog from the Home > Records > More menu on the ribbon. The Unhide Columns dialog should appear and we can select what we want to see:

Unhide Columns	<u>? ×</u>
Column:	
Date	
Song	
	Close

9.3 Tip 3 - Sorting And Filtering

When we are looking at the contents of a table, or the result of a query, it can be interesting to do some quick sorting or filtering (which of course can also be done in the query). There are many options for filtering and sorting in Access on the ribbon under Home in the Sort & Filter group. By simply pressing the Filter button while a particular column is selected, a filter pop-up menu will appear:

File Home Create External	Ascending V Selection → Accending Advanced → Acress Advanced → Acress Advanced → Acress Advanced → All →	Detabase - after chapter 9 : Database (Access 2007 - 2010) - Microsoft Access
Views Clipboard G	Sort & Filter	Records Find Text Formatting 12
	CD Songs CDID V Name	Composer -
		composer
Tables Artist	3 First Flight	Jerry Goldsmith
ArtistPerformance	2 Conquest Of Paradise	24 Sort A to Z
	3 First Approach	Ž↓ Sgrt Z to A
CDSongPosition	2 Before I Go	K Clear filter from Composer
	3 Before I Go	Text <u>Filters</u>
Song	2 Chariots Of Fire	✓ [Select All] ✓ [Blanks]
SongPerformance	2 Rotations Logic	✓ (Blanks) ✓ Jerry Goldsmith
Queries *	2 Rotations Logic	✓ Vangelis
CD artists for Report	2 Memories	☑ Will Smith ☑ Yanni
D composers for Report	3 Message	
CD info for Report	3 Message	
CD Songs	2 The Tao Of Love	
CDs from 1999	3 The Tao Of Love	OK Cancel
CDs With Jerry Goldsmith	1 Almost A Whisper	
Composed Songs Info	7 Almost A Whisper	Yanni
SongPerformanceComposer	1 Before I Go	Yanni
Forms ×	1 First Tauch	Versel
	cord: H + 1 of 27 + H + 🔆 No Filter S	Num Lock 🛅 🗄 🛍 🕫

There are also buttons for sorting that will sort the table (or query result) on the active column. Note, that sorting settings may become permanent if we save the changes to the design of the query or table. The sorting can then be removed by selecting Home > Remove Sort.

9.4 Tip 4 - SQL Parameters

A quite cool feature in Access is the possibility to specify parameters in queries. Access will then ask the user to provide the values of the parameters when the query is executed. For example we may want to see which songs are composed by a specific composer, but we don't want to hardcode a particular composer's name in our query. We can write a SELECT statement like this:

```
SELECT Name, Length
FROM Song
WHERE Composer = [Which composer?]
```

We can save this query as "Songs with parameterized composer" and then try to execute it. Access will immediately detect that there is a parameter and ask the user for a value:

Enter Parameter Valu	e ? X
Which composer?	
OK	Cancel

We can type "Will Smith" and see the result:

-	and the second second				antina 🗂	-
	<u>? - ^ - </u> =	Database - after chapter		icrosoft Access		
File	Home Create Ex					
View Views	Paste Clipboard ♀	↓↓ Ascending ↓ Selection * ↓↓ Descending ↓ Advanced * Filter ↓ Remove Sort ↓ Toggle Filter Sort & Filter Sort & Filter	Refresh All + ≻ Delete + Records	Find the select of the select	Arial (Detail) * 14 * 注言 B I 道 注言 ▶ ▶ ▲ * ◎ > ▶ ■ ▲ * ◎ > ▶ ■ Text Formatting □ □	
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Tables	*	Wild Wild West	302			
Queries		Men In Black	248			
Forms	*	Well III Didck	240			
Reports	5 *	Record: 14 - 1 of 2 + H + K	No Filter Search			
Ready					Num Lock 🛛 🛅 👪 🛍 sqt. 🕍	

Anything that is not a column, table, query or other database object is considered a parameter. Access will try to match any name to column, table, etc in the current scope, then it will move to the next scope and the user will be the final scope.

(i) The same principle can be used to connect the value of a form component to a query (as we did in chapter 8).

9.5 Tip 5 - Nesting SELECT Statements – COUNT(DISTINCT)

In Access it is possible to have nested SELECT statements in the FROM clause. Generally, we would then like to write the code straightforward like this:

SELECT Name, Age FROM (SELECT * FROM Artist WHERE Age>40) AS newtable WHERE Age<60

However, in some cases this notation, i.e. using normal parentheses, may not work (depending on the number of nested levels or the operations performed on each level). In order to get around this problem we may have to use the following notation:

SELECT Name, Age FROM [SELECT * FROM Artist WHERE Age>40]. AS newtable WHERE Age<60

The nested SELECT statement is now placed within "[" and "]" followed by a full stop (.).

For the above SQL statement it is not necessary to have a nested SELECT. It is only used as an example.

One particular situation when we may need to use a nested SELECT statement is when we want to do a COUNT(DISTINCT). As this is not supported in the current version of Access, we must first have a nested SELECT DISTINCT in order to later (in the outer SELECT) do a normal COUNT(). Here is an example:

We would like to know how many artists that are featured in each CD. We would normally do this using a COUNT(DISTINCT), in accordance with standard SQL, like this:

SELECT CD.ID, CD.Title, COUNT(DISTINCT ap.Name) AS ArtistAmount FROM CD, CDSongPosition sp, ArtistPerformance ap WHERE CD.ID = sp.CDID AND sp.Date = ap.Date AND sp.Song = ap.Song GROUP BY CD.ID, CD.Title

This statement is correct, but not supported by Access. In order to achieve the same thing in Access, we would have to split the statement into two, according to this:

SELECT ID, Title, COUNT(Name) AS ArtistAmount FROM (SELECT DISTINCT CD.ID, CD.Title, ap.Name FROM CD, CDSongPosition sp, ArtistPerformance ap WHERE CD.ID = sp.CDID AND sp.Date = ap.Date AND sp.Song = ap.Song) AS innertable GROUP BY ID, Title

9.6 Tip 6 - Application Start-Up

When we create an Access application with many forms it is often so that we want a particular form to automatically open at start up. We may also want to control which menus that should be available in the Access window (so that the users don't get access to the database other than through forms). All of this can be arranged in the Access Options under Current Database:

Access Options		<u>? ×</u>
General	Options for the current database.	<u> </u>
Datasheet	Application Options	
Object Designers	Application <u>T</u> itle: Tutorial Database	
Proofing	Application Icon: Browse	
Language	Use as Form and Report Icon	
Client Settings	Display Form: Menu 🔽	
Customize Ribbon	Web Display Form: (none)	
Quick Access Toolbar	Document Window Options	
Add-ins	 ○ <u>O</u>verlapping Windows ⊙ Tabbed Documents 	
Trust Center	✓ Display Document Tabs	
indit center	Use Access Special Keys ()	
	 <u>Compact on Close</u> Remove personal information from file properties on save 	
	Use Windows-themed Controls on Forms	
	✓ Enable Layout View	
	Enable design changes for tables in <u>D</u> atasheet view	
	Check for truncated number fields Picture Property Storage Format	
	Preserve source image format (smaller file size)	
	C Convert all picture data to bitmaps (compatible with Access 2003 and earlier)	
	Navigation	
	Display Navigation Pane	
	Navigation Options	
	Ribbon and Toolbar Options	
	Ribbon Name: 💌 Shortcut Menu Bar: (default) 💌	
	Allow Full Menus Allow Default Shortcut Menus	
	Name AutoCorrect Options	
	Track name <u>AutoCorrect</u> info	
	Perform name <u>A</u> utoCorrect Log name AutoCorrect changes	-1
		OK Cancel

If we choose to hide or deactivate certain options and menus and then open the database file, we will no longer have access to the options. To bypass these startup settings, we must press and hold the shift button while opening the database file. Then we can open the options and reconfigure the settings.

9.7 Tip 7 - Concatenating Columns

When we work with forms, it can sometimes be useful to have one column instead of many. We can in such cases concatenate columns in the SELECT clause of our SQL statement. We can for example write the following SELECT statement:

SELECT Name & ' – ' & Age AS ArtistInfo FROM Artist The result would be just one column:

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earch.	ArtistInfo				
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Queries ¥ Forms ×	Cate Archer – 45				
Reports ¥	Danny Elfman – 51				
	David Foreman – 55				
	Jenny Judd – 35				
	Jerry Goldsmith – 75				
	Keith Winfield – 45				
	Kenny Greene - 55				
	Mich Bud – 44				
	Tia Mintze – 61				
	Tony Barrett – 30				
	Vangelis – 61				
	Will Smith – 36				
	Yanni – 50				
	Taini - 50				
	Record: H < 1 of 14 + H + K No Filter	Search			
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(i) This is actually nothing specific for Access. This is included in standard SQL. The actual keyword or symbol used for concatenation may vary from product to product.

9.8 Tip 8 - Using Forms To Find Records

A combo box can be used in a form as a search field for finding a record. The form will automatically move to the first record that matches the value of the combo box. To add such functionality, add a combo box to your form and select the appropriate choice in the wizard.

9.9 Tip 9 - Keys And Indexes

When designing a table it is possible to define primary keys and other rules. But it is also possible to do this in the Indexes window. In this window we can also see other keys and indexes that Access has created. These may be created due to table relationships or orderings that we have applied to the table. For example the indexes of the table Song may look like this (open the Indexes window by pressing the Indexes button on the ribbon under Design while in Table Design View):

📝 Indexes: Song 🛛 🗙								
	Index Name		ame	Sort Order				
	AltKey1	Name		Ascending				
		Composer		Ascending				
	ID	ID		Ascending				
8	PrimaryKey	ID		Ascending				
	SongName Nar			Ascending				
		Index	Proper	rties				
P	rimary No							
Unique Yes		The	The name for this index. Each index can use up					
Ignore Nulls No				to 10 fields.				

Here we can add our own indexes and keys. For example we can add the alternate key (shown above as AltKey1) for the table Song. This is a composite key that combines the column Composer and the column Name, that is to say, a composer may not compose two songs with the same name. To add a new index, we must specify an Index Name and then the fields

(columns) that are included in this index. The first row specifies the index name and the first field in the index, as well as the sort order. Any field in a row without an Index Name immediately under that, will also belong to that index definition. We must also define the appropriate property values for our new index (in this case Unique Yes):

If we try to add a new song with a combination of Composer and Name that already exists, the database will stop us:

Tutorial D	Jatabase 🔀
<u> </u>	The changes you requested to the table were not successful because they would create duplicate values in the index, primary key, or relationship. Change the data in the field or fields that contain duplicate data, remove the index, or redefine the index to permit duplicate entries and try again.
	OK Help
	Was this information helpful?

(i) If you experience that a table behaves strangely, then check that there are no unwanted indexes. Note that Access creates non-unique indexes automatically for fields with certain names, such as id or name.

9.10 Tip 10 - Multiple Subforms

We saw how we can create forms with subforms in sections 6.3 and 6.4. But sometimes we may want to have a multiple subform structure. This kind of structure is not different to make than when we have a single subform. That is, there is no difference when making them manually, but the wizard cannot manage this kind of forms. The following form is a single form based on the table Artist with three subforms. One that shows the artists that have the current artist as mentor, one that shows the composers that this artist has performed songs of, and one that shows the CDs that this artist has performed in:

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All Access Objects 💿 «	Tip 10 Artist	×
Search P Tables *	Name Age FavouriteComposer Mentor	<u></u>
ArtistPerformance	David Foreman 55 Jerry Goldsmith	
CDSongPosition Composer		· Year ↓
Song SongPerformance	Cate Archer Danny Elfman Best Of Vangelis Kenny Greene Jerry Goldsmith Summer Hits Vangelis Yanni Greatest Hits Yanni Greatest Hits	2001 = 1998 2002
Queries × Forms ×	Will Smith	
Reports ¥	Record: I4 < 1 of 2 > >> > > > > > > > > > > > > > > > >	Search
	Record: H 4 4 of 14 > N > K No Filter Search	
The name of the artist		Num Lock 📧 🖬 🔛

We may want to have more than two levels of forms, i.e. subforms in subforms. This is possible to achieve and really no different from just working with two levels.

9.11 Tip 11 - Division In Access

In Access division works with both NOT EXISTS and NOT IN. In our case we had two examples of information needs that require a division. Here are three possible solutions for the need "Which artist has performed in at least one song of each composer?":

The double NOT EXISTS variant:

```
SELECT Artist.Name

FROM Artist

WHERE NOT EXISTS (SELECT *

FROM Composer

WHERE NOT EXISTS (SELECT *

FROM ArtistPerformance ap, SongPerformance sp, Song s

WHERE s.ID=sp.Song

AND sp.Date = ap.Date

AND sp.Song = ap.Song

AND ap.Name = Artist.Name

AND s.Composer = Composer.CName));
```

The NOT EXISTS – NOT IN variant:

```
SELECT Artist.Name

FROM Artist

WHERE NOT EXISTS (SELECT *

FROM Composer

WHERE CName NOT IN (SELECT Composer

FROM ArtistPerformance ap, SongPerformance sp, Song s

WHERE s.ID=sp.Song

AND sp.Date = ap.Date

AND sp.Song = ap.Song

AND ap.Name = Artist.Name));
```

And the hard way:

SELECT innertable.Name FROM [SELECT DISTINCT a.Name, Composer FROM Artist a, Song s, SongPerformance sp, ArtistPerformance ap WHERE s.ID=sp.Song AND sp.Date = ap.Date AND sp.Song = ap.Song AND ap.Name = a.Name]. AS innertable GROUP BY innertable.Name HAVING COUNT(innertable.Composer) = (SELECT Count(*) FROM Composer);

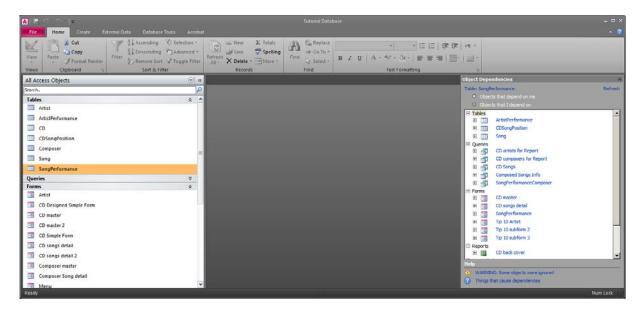
The nested table in the FROM clause is required because Access does not support COUNT(DISTINCT *column*) that is specified in standard SQL.

All three variants are equivalent and their result is a list of the five artists that have performed songs of all composers:

Image: Solution of the second of the seco		Tutorial Database	_ = ×
Bill Bradley SongPerformanceComposer Songs with parameterized composer Tip 11 Division at 1 Tip 11 Division at 2 Tip 11 Division at 3	Weight with the second seco	Image: New Σ Totals Image: Save Φ Spelling Refresh X Delete + Image: New All + X D	^ 2
Image: Composed Songs Info Image: Composed Songs Info Image: SongPerformanceComposer Image: Cate Archer Image: Songs with parameterized composer Image: Cate Archer Image: Tip 11 Division at 1 Image: Cate Archer Image: Tip 11 Division at 2 Image: Cate Archer Image: Tip 11 Division at 3 Image: Cate Archer	All Access Objects	< 🗊 Tip 11 Division alt 1 📑 Tip 11 Division alt 2 📑 Tip 11 Division alt 3	×
With Records in a point of a search	Composed Songs Into SongPerformanceComposer Songs with parameterized composer Tip 11 Division alt 1 Tip 11 Division alt 2	Bill Bradley Cate Archer Danny Elfman David Foreman	

9.12 Tip 12 - Object Dependencies

Another interesting feature of Access is the possibility to see all dependencies between objects. This can be useful when we want to delete an object. We can look at its dependences and then decide if it is okay to remove it or not. Let's say for example that we would want to see if the table SongPerformance has any dependencies. We can highlight the table in the Object browser and select Object Dependencies from the ribbon under Database Tools. We can now see all the dependencies of the table:



We can see that there are other tables, queries, forms and reports that depend on this table. We can also switch to see what this table depends on by selecting "Objects that I depend on" instead of "Objects that depend on me".

9.13 Tip 13 - Copying Objects Between Databases

When working in groups, it is often so that some queries, forms, and reports are developed by one person in one database (.accdb or .mdb file), while others are in a separate database. At the end the goal is to have all the database objects in one file. This is not a problem when working in Access. We can copy and paste objects between databases. We must first open the database that contains the object to be copied, copy it, open (in the same Access Window) the other database and paste. It is also possible to just do a drag and drop (or copy-paste) between two databases open in different Access windows. When copying forms and reports, make sure that all the queries, macros, etc. are also available in the target database; otherwise the form or report will not function properly.

9.14 Tip 14 - Handling NULL

Sometimes it is necessary to return something where there is NULL in the database. For example we may not want to just have an empty field in a form or report when an artist doesn't have a mentor. The function NZ (in other products called COALESCE) can help us with that. In the following SQL statement we tell Access to return a specific value whenever the value of the column Mentor is null:

SELECT Artist.Name, NZ(Artist.Mentor, "Self-inspired") as Mentor FROM Artist;

The result would look like this:

Image: Second			> ^ (?
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Search	Name	Mentor ▽	
Tables	Bill Bradley	Tony Barrett	
Queries CD artists for Report	Cate Archer	David Foreman	
CD composers for Report	Danny Elfman	Jerry Goldsmith	
CD info for Report	David Foreman	Self-inspired	
CD Songs	Jenny Judd	Self-inspired	
CDs from 1999	Jerry Goldsmith	Self-inspired	
CDs With Jerry Goldsmith	Keith Winfield	Tia Mintze	
Composed Songs Info	Kenny Greene	David Foreman	
SongPerformanceComposer	Mich Bud	Jerry Goldsmith	
Songs with parameterized composer	Tia Mintze	Self-inspired	
Tip 11 Division alt 1	Tony Barrett	Keith Winfield	
Tip 11 Division alt 2	Vangelis	Jerry Goldsmith	
Tip 11 Division alt 3	Will Smith	Keith Winfield	
Tip 14 NZ	Yanni	Self-inspired	
TIP 5 COUNT DISTINCT	*		
Tip 7 Artistinfo as one column	Record: H 4 1 of 14 + H +	K No Filter Search	

9.15 Tip 15 - Business Rules

It is considered a good idea by many, perhaps most, database theorists and practitioners to always model business rules as close to the database as possible. Some simple rules were already included in our database in section 4.1.3. Using the Validation Rule property for columns is not always possible though. Some rules are too complex to be expressed there. The next level is adding the business rules as validation rules in forms. This way, the user interface will restrict the user from making an invalid choice. We already saw a few ways of controlling the available data in forms in chapter 6 (for example by look-up Combo Boxes and query based forms) and in chapter 8 (by macros). In this section we will look at a very useful function, namely DLookUp. This function can be used to look up a value in another table or query. We can now modify the form we created in section 6.2 so that we can restrict the user from choosing a mentor that is not older than the artist. Remember the form?

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Parts - Desig	le SharePoint	Query Query Wizard Design Queries	Blank Form Wizard Mavigation * Form More Forms *	Report Report Blank Design Report Reports	Class Module Macro Visual Basic Macros & Code	
All Access Objects		Artist				
Search	P	Artist				
Tables	*	> Thus				
Artist		Name	Bill Bradley			
ArtistPerformance						
CD CD		Age	56			
CDSongPosition		Favourite Composer	Yanni		-	
Composer						
Song		Mentor	Tony Barrett		*	
SongPerformance						
Queries	*					
Forms	*					
Artist						
CD Designed Simple	Form					
CD Simple Form		Record: H 4 1 of 14 + H +	K No Filter Search			
The name of the artist			1			Num Lock 🔲 🖩 🕍

We can now add a validation rule for the Mentor combo box. We switch to the Design View and look at the properties of the Combo Box. The property we want to change is the Validation Rule (and maybe also the Validation Text so that we can give a custom error message to the user).

The property Validation Rule can have the following value:

[Age]<DLookUp("Age";"Artist";"MentorCombo=Name")

This checks that the Age of the current artist is smaller than the Age of the Artist whose Name is equal to the current artist's Mentor. MentorCombo is the name of the Combo Box control.

We can also add an error message so the properties will look like this:

Image Image Sheet Order Convert Macros to Visual Basic Views Themes Controls Header / Footer Tools	A 🛃 O O I I		Tutor rnal Data	rial Database Database	Tools A	robat		Form Design		nat									-
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Serch.	Views Theme	es					Cor	ntrols						Heade	er/F	ooter	The second second	Tools	
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B Artist CD Designed Simple Form CD master CD master CD Domster 2 CD Simple Form CD Simple Form CD Simple Form CD Simple Form CD sogs detail CD consol detail CD consol detail CD consol detail CD songs detail 2 CD consol detail CD songs detail 2 CD songs detail 3 CD songs detail 4 CD songs detail 2 CD songs detail 2 CD songs detail 3 CD songs detail 4 CD songs detail 4<			Contrast -													MentorCombo		-	
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E Songs based on composer ■ Tip 10 Artist Smart Tags	SongPerforman	nce													11				
	Songs based on	n composer	1.00	orm Footer				J L	1	1 1		1					2		
	Tip 10 Artist														-				
Message displayed when data doesn't satisfy ValidationRule property Num Lock 📷 💈	-					_	111	_	_		_	_	_						40 80 800 800 800

Try the form now! Will Smith, for example, who is young, will not be allowed to be the Mentor of Jerry Goldsmith, who is older:



Another way to achieve this restriction would be to make the Row Source of the Combo Box dependent on the value of the column Age. Perhaps deactivate the mentor Combo Box until a value has been entered in the age Text Box. This could be similar to what we did in chapter 8.

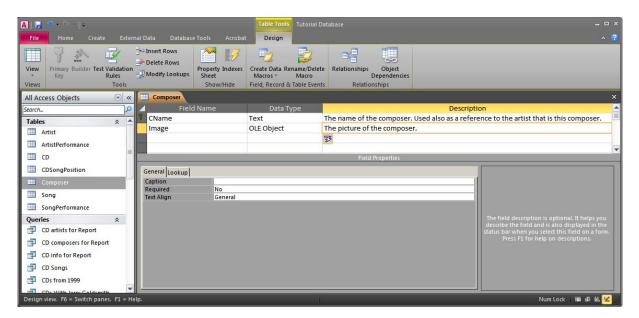
9.16 Tip 16 - Set Operators

Access does not support all set operators. In fact, the only one supported is the UNION operator. Intersection and difference must therefore be implemented by combining other operators like OR, AND, EXISTS, IN, NOT, etc.

9.17 Tip 17 - Multimedia

The database that we have seen so far uses only simple data types, i.e. text, numbers and dates. But Access supports other, more complex, types as well. For example we can store images and sounds in an Access database. Apart from storing multimedia in the database, Access also offers us the possibility to show and use the multimedia data in forms and reports.

In this section we will have a look at how to both store an image in the database, and show it in a form. To do this we will modify the table composer and add a field for the composer's image. To do this we simply open the table in design mode and create a new field of type OLE Object:



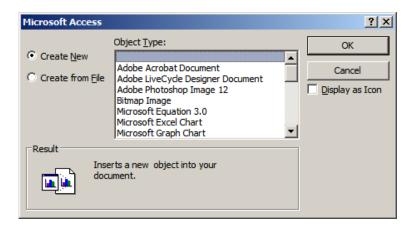
If we now open the table (after saving it), we will see that there is a field called Image, but we cannot edit it directly:

A	Tutorial Database –	о х
File Home Create Ex		
Views Clipboard		
All Access Objects 💿	🦟 🖽 Composer	×
Search	P CName 🐨 Image 🔨	
Tables Rest Artist ArtistPerformance CD CD CDSongPosition Composer Song SongPerformance	Danny Elfman Jerry Goldsmith Vangelis Will Smith Yanni Yanni	
Queries * CD artists for Report CD composers for Report CD LD info for Report CD Songs CD CDs from 1999 CD Songs	▼ Record: M 4 1 of 5 → N → X No Filter Search	
Ready	▼ Record: N 《 1 or 5 》 H > KC No Filter Search Num Lock III 詳 組	۲.,

What we can do is right-click on a cell where we want to place an picture (a picture file) and select "Insert Object...":

Cut	Tutorial Database arnal Data Database Tools Acrobal ↓ Ascending Selection ~ ↓ Descending Advanced ~ ↓ Remove Sort ↓ Toggle Filter Sort & Filter	Table Tools Fields Table ■ New Σ Totals ■ Save ♥ Spelling Refresh All - × Delete - More - Records	Find Correct Trind	Arial (Detail) ▼14 ▼ 田田 課 課 B I 型 ▲ * ジ - 金 + ■ 要 著 田・ Text Formatting	
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Queries * CD artists for Report * CD composers for Report * CD info for Report * CD Songs *	Record: H 4 1 of 5 > H > V	Insert Object		Num Lock	國 赤 伝 ×

We will then see this dialog where we will choose "Create from File"



Microsoft Access		<u>? ×</u>
C Create <u>N</u> ew C Create from <u>Fi</u> le	Fil <u>e</u> : D:\ Erowse	OK Cancel Display as Icon
obje may	erts the contents of the file as an ect into your document so that you activate it using the application ch created it.	

Simply point to the file:

A Browse			×
G v li → Computer → Data (D:) → MS Access → pictures	- [Search pictures	2
Organize 🔻 New folder			2
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Documents			
J Music			
New Library			
Pictures			
Videos			
B nikos dimitrakas			
r Computer			
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👝 Data (D:)			
File <u>n</u> ame: dannyelfman.jpg	Tools	All Files (*.*)	▼ Cancel
			//

Press OK:

Microsoft Access		<u>? ×</u>
C Create <u>N</u> ew	File: HTML Document D:\MS Access\pictures\dannyelfman.jpg Browse	Cancel
obje may	rts the contents of the file as an ct into your document so that you activate it using the application h created it.	

And then press OK again!

In the table view we can now see that there is a value in that cell:

File Home Create Ex					
Views Clipboard G		ed + 🖉 🥔 Save 🗳 Spelling	Find the select → Find the se	Arial (Detail) ▼ 14 ▼ 1日 1日 B I II ▲ × ³⁰ × ▲ ●	
All Access Objects 📀	« Composer				
iearch	🔎 🖌 🛛 CName 🗸	Image -			
Tables * Artist ArtistPerformance CD CD CDSongPosition Composer Song SongPerformance	 P Danny Elfman Jerry Goldsmith Vangelis Will Smith Yanni 	Package			
Queries 2 CD artists for Report CD composers for Report CD info for Report CD Songs CD From 1999					

Note that if the value is "Package" then the picture may not be displayed correctly in forms and reports. The value should be instead, "Bitmap Image" for a bmp file or for example "Microsoft Photo Editor 3.0 Photo" for jpg or gif files. If we insert an image file and the value is just "Package", this indicates that there is no support in Access for that file type. If we get the value "Package" when inserting a jpg or gif file, then we probably need to install Microsoft Photo Editor, which is included in earlier versions of Microsoft Office (for example Office XP). When the pictures have been identified correctly by Access, the table should look like this:

A 🔛 🤊	- 0 -	Ŧ		Com	nposer	- Microso	ft Access	0		Table	Tools									-	. 🗆 x
File		Create	Ext			Datab															
Application Parts * Templates		Table Design Table:		int		Query Design eries	Form	Form Design	Blank Form Form	Naviga	ition =		Report Design			Macro	💸 Module 😤 Class Mod 🕙 Visual Ba: Macros & Code				
All Access	Objects		•	<		CNa	me				age			Click	to Add 🔻						
Tables			¥			anny E	lfman	16			Bit	tmap I	mage								
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Forms	_		×	- 88				u i													
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				*	⊞ Ya	anni					M	SPhot	oEd.3								
A picture of	this comp	ioser.		R	ecord:	l4 1 o	f 5 🕨	H Þ	K No	Filter	earch					_		Num	Lock	<mark>111</mark> - 111 - 111	1 2 .::

We can repeat the process for all composers that we want to store their picture in our database.

Another possibility is to use the data type Attachment. In that case the column Image will be able to contain the image files as attachments. This data type is supposed to be more flexible than OLE Object and uses storage more efficiently. However, it is not available in older versions of Access. We can remove the Image column and create it again with the data type Attachment:

🗛 🚼 💁 - 🔍 🚽 File Home Create Extern	nal Data Database Tools Acrobal	Table Tools Design	Tutorial Database		× ^ ?
View Primary Builder Test Validation	Delete Rows Modify Lookups Show/Hide	Create Data Rename/Dele Macros * Macro Field, Record & Table Ever	Dependencies		
All Access Objects 💿 🔍	Composer				×
Search P	Field Name	Data Type		Description	· · · · · · · · · · · · · · · · · · ·
Tables	CName Image	Text Attachment	The name of the composer. Used The picture of the composer.	also as a reference to the artist that is t	his composer.
Artist	iniage	Attachment	The picture of the composer.		
ArtistPerformance					
III CD	-		Field Propert	ties	
CDSongPosition	General Lookup				
Composer	Seneral Lookup]			1	
Song					
SongPerformance					
Queries ¥					The field description is optional. It helps you
Forms ¥					describe the field and is also displayed in the status bar when you select this field on a form.
Reports ¥					Press F1 for help on descriptions.
Design view. F6 = Switch panes. F1 = He	lp.				Num Lock 🛛 🕮 🛍 🕍 🛛

Adding data in the column Image is similar to when we had OLE Object as data type. We start by opening the table and the new column will show how many attachments each row has:

🚺 🔜 - 2 - 2 - 1 =		Table Tools Tutorial			_ = ×
File Home Create Exte					^ ?
	Ascending ♥ Selection * Ascending ♥ Advanced * Filter ★ Remove Sort ♥ Toggle Filter Sort & Filter Sort & Filter	Image: New Σ Totals Image: Save Spelling Refresh All + X Delete + Image: Records More +	Image: Bind the second sec	Ariat (Detail) ▼14 ▼ 注 注 ↓ 課 注 ▶ B I U ▲ * 型 * ▲ * 型 * ↓ 臣 書 理 ↓ 田 * ↓ 田 * Text Formatting □	
All Access Objects		Records	Find	Text rormaturing	×
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Tables 🏦 Artist		0(0) 0(0)			
ArtistPerformance	■ Vangelis	0(o) 0(o)			
CDSongPosition		0(o) 0(o)			
Song SongPerformance					
Queries ¥					
Forms × Reports ×	Record: H 4 1 of 5 > H > 1	No Filter Search			
Ready	Records in 1 or 5	active ac	I.	Num L	ock 🔟 🖽 🛍 坐 .

We can now right-click on a particular cell and and choose Manage Attachments. The Attachments dialog will appear where we can add and remove attachments:

Attachments	×
Attachments (Double-click to open)	
	<u>A</u> dd
	<u>R</u> emove
	Open
	Save As
	Sa <u>v</u> e All
ОК	Cancel

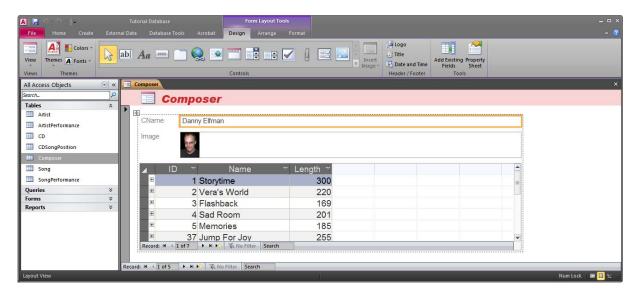
We can add the appropriate file as an attachment:



We can repeat this until all the rows have one attachment.

We can now make a quick form that will allow us to browse the composers with their pictures. We can create a new form in Design View based on the table Composer:

This will create a blank form, which will be connected to the table Composer. By default the created form will have a subform with the composed songs and the image will be too small:



We can modify the layout:

A		Tutorial Database		_ = ×
File Home Create Exter	ial Data Database Tools Acrobat			× 🕐
Views Clipboard		E Totals 9 Spelling More - Find Find Find Find	 ・ ○ 汪 [律 諱 バ・ I <u>u</u> A · ジ · ③ · 臣 吾 君 田・ 豊 · Text Formatting is 	
All Access Objects 💿 «	Composer			×
Search P Tables & Image: ArtistPerformance CO Image: CDSongPosition Image: CDSongPosition Image: CDSongPosition Image: CDSongPosition	Danny Elfman			
	Record: H 4 1 of 5 + H + K No Filter Search			
The name of the composer. Used also as	reference to the artist that is this composer.	T		Num Lock 🔲 🛢 🔛

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The component that shows the image is an Image control that is associated to the column Image (through its property Control Source). It can also be configured to zoom or stretch the picture (property "Picture Size Mode").

9.17.1 Storage Outside The Database

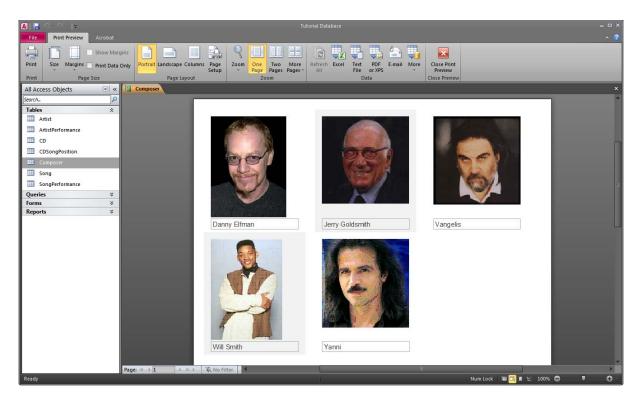
If the ways of embedding images into the database described earlier are not suitable to our needs, storing the images in the file system and storing the filenames in the database could be an option. In such case, the database will not have control of the images, so if an image (or a folder) is moved or renamed, the database will not find the image (or images). We could try this solution by adding a column to the table Composer:

View Primary Builder Test Validation Rules Property Indexes Sheet Prop] ⊒ • ○ • -		Table Tools Tu	orial Database	- 8
View Pimary Builder Test Validation Property Indees New Property Indees Create Data Rename/Detet Relationships All Access Objects Image Attachment The name of the composer. Search. Image Attachment The name of the composer. Image Attachment The file and is also displayd in the picture of the composer. Image Attachment The file and is also displayd in the picture of the composer. Image Composer Image Ceneral Lookup Image Attachment Image A	File Home Create Ex	ternal Data 🛛 Database Tools 🔹 A	crobat Design		
Field Name Data Type Description Tables * Field Name Text The name of the composer. Used also as a reference to the artist that is this composer. Artist Artist Image Attachment The pitture of the composer. Artist Image Attachment The pitture of the composer. Image Attachment The pitture of the composer. Image URL Text The filename of the pitture. Image Composer Image Composer Image Composer Song Song Image Composer Input Mask Composer Image Composer Image Composer Image Co	View Primary Builder Test Validati Key Rules	Delete Rows on Modify Lookups Property Ind Sheet	dexes Create Data Rename/Dele Macros + Macro	e Relationships Object Dependencies	
Tables Artist Artist Artist ArtistPerformance CO CosngPosition CosngPosition General Lookup Field Size Song Performance Queries Validation Text New York Validation Text New York New York New York Song Performance Queries Validation Text New York New York <	All Access Objects 💿	« Composer			
atories × image Attachment The picture of the composer. imageURL Text The filename of the picture. imageURL image	earch	🔎 🔟 🛛 Field Name	Data Type	Description	La construction de la construction
Artist Image Attachment The picture of the composer. ArtistPerformance ImageURL Text The filename of the picture. C O ImageURL Text The filename of the picture. C O ImageURL Text The filename of the picture. C OSongPosition ImageURL Text The filename of the picture. C Composer ImageURL Text The filename of the picture. SongPerformance General Lookup ImageURL ImageURL Validation Rule ImageURL ImageURL ImageURL ME Mode No ImageURL ImageURL ImageURL No ImageURL ImageURL ImageURL No ImageURL ImageURL ImageURL No	Cabler	CName	Text	The name of the composer. Used also as a reference to	the artist that is this composer.
ArtistPerformance ImageURL Text The filename of the picture. CDSongPosition ImageURL Text The filename of the picture. CDSongPosition ImageURL ImageURL ImageURL Song ImageURL ImageURL ImageURL SongPerformance General [Lookup] ImageURL ImageURL Iput Mask ImageURL ImageURL ImageURL			Attachment	The picture of the composer.	
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CD Field Properties COpongPosition Field Size Composer Song SongPerformance Format ueries Validation Rule Validation Rule Validation Rule Validation Rule Validation Ret Required No Allow Zero Length Yes ME Mode No Control IME Mode No Control IME Sentence Mode No Smart Tags Val	ArtistPerformance				
CDSongPosition Composer Song SongPerformance ueries Validation Rule No Indexed No Unicode Compression Yes IME Mode No Control IME Sentence Mode Smart Tags	CD			M / Annual	
General Lookup Field Size 30 Song Input Mask Caption Caption Orms Validation Rule Validation Rule Caption Reports Validation Rule Indexed No Indexed No IME Mode No Control IME Mode No Images Validation	CDCDHis			Field Properties	
Field Size 30 Song Format SongPerformance Input Mask Caption Caption orms V Validation Rule Caption Validation Text Caption Required No Allow Zero Length Yes Index do No Control Mt Sentence Mode No con		General Lookup			
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Caption Caption Outsuit Value Default Value Validation Rule The field description is optional. It helps yo Validation Rule Validation Rule Validation Rule No Required No Allow Zero Length Yes Indexed No Unicode Compression Yes IME Mode No Control IME Sentence Mode No Smart Tags Validations	Song				-
Caption Caption Queries Default Value porms Validation Rule Validation Rule Maile Validation Rule No Unicode Compression Yes IME Mode No Mide Sentence Mode None Smart Tags Validation	Con Profession	Input Mask			
validation Rule Validation Rule The field description is optional. It helps you eports validation Text Required No Allow Zero Length Yes Indexed No Unicode Compression Yes Indexed No IME Mode No Control IME Sentence Mode No Smart Tags Validation Validation Text Validation Text					
eports v Validation Fault Validation Text Required No Validation Text Required No Allow Zero Length Yes Indexed No Unicode Compression Yes Unicode Control INE Sentence Mode None Smart Tags v Validation Text					The field description is optional. It beins you
Required No Allow Zero Length Yes Indexed No Unicode Compression Yes IME Sentence Mode None Smart Tags V	orms				describe the field and is also displayed in the
Allow Zero Length Yes Indexed No Unicode Compression Yes Index No Control IME Mode No Control IME Schetnere Mode None Smart Tags V	eports 🗧				
Indexed No Unicode Compression Yes Unicode Control UME Sentence Mode None Smart Tags					Press F1 for help on descriptions.
IME Mode No Control IME Sentence Mode None Smart Tags					
IME Sentence Mode None View No					
Smart Tags					
		Smart Tags			
	esign view. F6 = Switch panes. F1 =				Num Lock i 🗃 🖽 🛍 🔛

We can now update the content of the table:

A 📮 🤊 • O • =	Tutorial Database	Table Tools	= ¤ ×
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View Paste	Image: Selection of the	≥ New Σ Totals → Separate → Go To+ → G	
Views Clipboard 5		Records Find Text Formatting 👊	
All Access Objects 💿	« Composer		×
Search	P CName 🔹	⁰ ImageURL ▼	
Tables	Danny Elfman	0(1) dannyelfman.jpg	
Artist	■ Jerry Goldsmith	(1) jerrygoldsmith.jpg	
ArtistPerformance		0(1) vangelis.bmp	
CD CD	Will Smith	(1) willsmith.jpg	
CDSongPosition	Tenni	(1) yanni.bmp	
Composer Song		ווויס)	
SongPerformance	▼ Record: I4 4 6 of 6 → H → 🕅 🕅	lo Filter Search	
Ready		Num Lock	🛅 🖷 🛍 🖂 🔒

If we now create a form or report and want to show the images, we will need to have a component that can load the image from the file system, given a filename. The Image control can do exactly that. We can create a form that looks like this (in Print Preview):



In Design View we have a report that has the table Composer as Record Source and an Image control that has a Control Source that is a filename. We take the value of the column ImageURL and append it to the full path to the directory:

A	Tutorial Data	base	Report Design Tools					×
File Home Create			Design Arrange Format					
Views Themes Colors *	Group i Hide Details & Sort Grouping & Totals	abl Aa 🗵	Controls	* Tinsert Image *	Page Numbers 5. Date and Time Header / Footer	Add Existing Proper Fields Sheet	rty Tab an	ual Basic
All Access Objects	🐨 « 🔚 Composer					< Property Sheet		×
Search	P	+ 2 + 1 + 3 + 1 + 4 + 1 + 5 +	1 • 6 • 1 • 7 • 1 • 8 • 1 • 9 • 1 • 10 • 1	· 11 · 1 · 12 · 1 · 1	3 · i · 14 · i · 15 · i · 16 · i · 17			
Tables	🛠 🛛 🗸 Report H					Image29		
Artist	Vertail					the second se	Event Other All	
ArtistPerformance						Control Source	="d:\MS Access\pictures\"+[ImageURL]	<u></u>
CD CD	-							
CDSongPosition	: 1							
Composer						.		
Song								
SongPerformance								
Queries	* 7							
Forms	* <u>:</u>							
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			17	1	Þ	×		
Design View	11.34			1			Num Lock 1	a 🛋 a 🔛

The Control source is the concatenation of "d:\MS Access\pictures" and the value of the column ImageURL. If the directory or file does not exist, Access will simply display nothing.

9.18 Tip 18 - Compacting And Repairing A Database

Databases built in Access are stored in one single file. This file can for different reasons become unnecessarily big or sometimes inconsistent. One reason why a file can grow in size is the use of multimedia. All the multimedia content that we add to the database will be stored inside the database file. Removing values and multimedia objects from the database may not automatically mean that the file becomes smaller. Working with different versions of Access can also be a cause of inconsistencies in the database. If you have reasons to believe that there is something strange with your database, you can always use the Compact and Repair Database tool in Access (found under Database Tools on the ribbon).

9.19 Tip 19 - Linking External Data

In certain cases, it may be useful to use Access together with some other database manager. This could be the case when the entire database is implemented in another database manager and you want to use Access to build a user interface. You may also want to combine data from several databases build in different systems. This can easily be achieved with Access and ODBC (Open DataBase Connectivity).

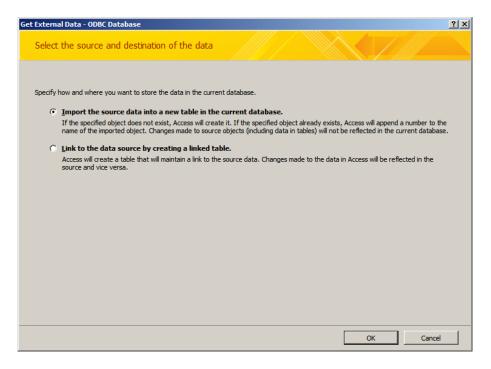
An ODBC database can be any database for which there is an ODBC driver. There are ODBC drivers for most database management systems. In this section we will work with a test database in MySQL. The process is the same for any database manager though. We will work with a database called testdb. This database has two tables: person and car, where a car is owned by a person. The database tables are created according to the following SQL statements:

CREATE TABLE Person (name VARCHAR(20) NOT NULL PRIMARY KEY, birthdate DATE, salary REAL)

CREATE TABLE Car (carID VARCHAR(10) NOT NULL PRIMARY KEY, color VARCHAR(12) NOT NULL, owner VARCHAR(20) NOT NULL, FOREIGN KEY (owner) REFERENCES Person(name))

We will assume that the tables have been created and populated.

In the "External Data" tab on the ribbon, press "ODBC Database". The "Get External Data" dialog will appear:



We can now choose whether to import data or link to some other database. We would like to link to the database described earlier through ODBC. This requires that the database has an ODBC alias. The next section describes how to create an ODBC alias.

9.19.1 Creating An ODBC Alias

In order to link a database we must have an ODBC alias. This is basically a name we can use to refer to the original database without knowing what that database is called or what database manager it is implemented in. We can create an ODBC alias (also known as DSN – Data Source Name) either in advance, or while trying to link or import data in Access. To do this in advance, we must open the ODBC manager (ODBC Data Source Administrator). We can open the ODBC manager directly by executing the command "odbcad32.exe" or by locating the corresponding icon in the Windows Control Panel. When we open the ODBC manager it looks something like this:

🌄 ODBC Data Source Administrator	×
User DSN System DSN File DSN Drivers Tracing Connection	Pooling About
<u>U</u> ser Data Sources:	
Name Driver	A <u>d</u> d
	Remove
	<u>C</u> onfigure
An ODBC User data source stores information about how to the indicated data provider. A User data source is only vis and can only be used on the current machine.	
OK Cancel Apply	Help

There are several tabs here, but the interesting ones are the first two. The System DSN tab contains any DSNs created to be available to all the users of the computer, while the User DSN contains DSNs that are available only to the current user. As long as you use the same Windows account there won't be any difference.

We can press Add... And a Wizard will appear to help us create a new DSN. We can start by selecting the appropriate driver:

Create New Data Source			×
	Select a driver for which you want to set u		1
	Name	Version	
	IBM DB2 ODBC DRIVER	10.01.00.872	
011 0	IBM DB2 ODBC DRIVER - DB2COPY1	10.01.00.872	
	MySQL ODBC 5.1 Driver	5.01.08.00	
	Oracle in OraDb11g_home1	11.02.00.01	
	SQL Server	6.01.7601.17514	
	SQL Server Native Client 11.0	2011.110.2100.0	
		•	
	< <u>B</u> ack Finish	Cancel	

Press Finish, and the Wizard will initiate another wizard specific to the selected driver:

MySQL Connector/ODBC	Data Source Configuration
MySQL	
Connector/OD	вс
Connection Parameter	ers
Data Source Name:	
Description:	
TCP/IP Server:	Port: 3306
O Named Pipe:	
User:	
Password:	
Database:	
Deteta 1	
Details >>	OK <u>C</u> ancel <u>H</u> elp

We select the correct database and give it a name, and also specify the server details:

MySQL Connector/ODBC I	Data Source Configuration
Mysqu. Connector/ODB	c 🔤
Connection Parameter	s
Data Source Name:	testdb
Description:	test DB for link to Access
• TCP/IP Server:	localhost Port: 3306
C Named Pipe:	
User:	root
Password:	•••••
Database:	testdb <u>T</u> est
Details >>	OK <u>C</u> ancel <u>H</u> elp

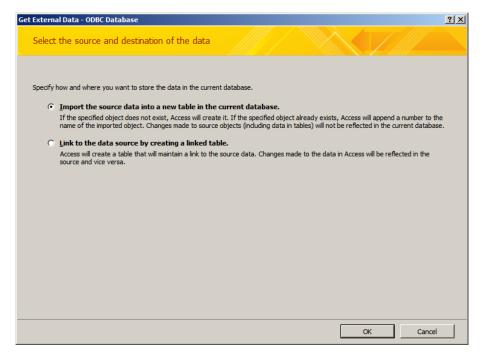
Press OK, and the new DSN is ready:

🐻 ODBC Data Source Administrator	X
User DSN System DSN File DSN Drivers Tracing Connection	Pooling About
User Data Sources:	
Name Driver	A <u>d</u> d
testdb MySQL ODBC 5.1 Driver	Remove
	Configure
An ODBC User data source stores information about how t	
the indicated data provider. A User data source is only vis and can only be used on the current machine.	sible to you,
OK Cancel Apply	
OK Cancel Apply	Help

We can press the Configure... button to see the configuration and change it if necessary.

9.19.2 Linking To The MySQL Tables From Access

Now that the ODBC DSN is ready, we can link our two tables (from MySQL to Access). Back in Access, we have the "Get External Data" dialog:



We select "Link to the data by creating a linked table", and press OK. Access will show a new dialog allowing us to select an existing ODBC DSN (or create a new one):

lect Data Source				[
File Data Source Machine Data	Source			
Data Source Name testdb	Type	Description	ink to Access	
	030		n 10 7 10 00 30	
				<u>N</u> ew
A Machine Data Source is spec "User" data sources are spec sources can be used by all us	ific to a us	er on this mad	hine. "Syste	m" data
"User" data sources are spec	ific to a us	er on this mad	hine. "Syste	m" data

We can select the correct DSN and press OK. A new dialog appears showing all the available tables (and views):

Link Tables	? ×
Tables	
car person	ОК
	Cancel
	Select <u>A</u> ll
	Deselect All
	Save password

We can select the ones we want to link (both of them) and press OK. The linked tables are now visible in the Object browser (with a special icon indicating that they are linked tables). We can also open them and see their data:

Al 🗸 🤈 - ۹ - I+			Table Tools	ODBC2 : Database (#	Access 2007 - 2010) -	Microsoft Access		= ¤ ×
Saved Linked Table Excel Access Data	rnal Data Databa Text File DBC stabase More *	se Tools Acrobat	File or XPS	E-mail	Create Manage E-mail Replies	_	_	^ ?
Import & Link			Export		Collect Data			
All Access Objects 💿 «	person			1			-	×
Search	NAME *	BIRTHDATE 🔻	SALARY 🔻					
Tables *	Jane	1978-05-16	5600					
* 🕥 car	John	1989-12-14	5000					
* person	Lane	1975-08-17	4900					
	Ray	1991-06-24	4900					
	*							
				_				
Datasheet View	Record: H 4 1 of 4	🕨 🕨 👫 🐺 No F	ilter Search		_		Norm	1
Datasheet view							Num	i Lock 🔳 🖩 🛍 🔛

If we try to design a linked table, we will not be allowed to change anything:

Microsoft	t Access
	Table 'person' is a linked table whose design can't be modified. If you want to add or remove fields or change their properties or data types, you must do so in the source database.
	Was this information helpful?

Press yes to see the table definition:

A 🗧 🖓 - 🖓 - 🕞	Table Tools ODBC2 :	Database (Access 2007 - 2010) - Microsoft Access 🛛 🗧 🗆 🗙
File Home Create External Data Database Too	ols Acrobat Design	
View Primary Builder Test Validation Modify Lookups Pro	perty Indexes tet Show/Hide	Dependencies
All Access Objects 💿 « 🔲 person		×
Search P Z Field Nam		Description
Tables	Text Date/Time Number	
		Field Properties
General Lookup Field Size Format Input Mask Caption Default Value Validation Rule Validation Text Required Allow Zero Length Indexed Unicode Compression Unicode Compression UNIC Mode INEE Sentence Mode Simart Tags	20 Yes Yes (No Duplicates) No No Control None	This property cannot be modified in linked tables.
Design view. F6 = Switch panes. F1 = Help.		Num Lock 画 善 也 🔀 🐖

We can see that Access has retrieved all the details about the columns including data types, primary keys, NOT NULL restrictions, etc.

9.19.3 Working With Linked Tables

We can now open the table person, and modify some data (add two rows):

Views Clipboard G	Filter	ng V Selection * ing Advanced * Sort V Toggle Filter & Filter	12	E Totals ¹⁹ Spelling More *	Calibri 18 I U	+ 14 ▲ + = = = → Text Form		
All Access Objects 💿 🔹	person							
earch	NAME	🕇 BIRTHDATE 👻	SALARY 🔻					
Tables *	Jane	1978-05-16	5600					
tar car	John	1989-12-14	5000					
* 🕘 person	Lane	1975-08-17	4900					
	Ray	1991-06-24	4900					
	Mary	1975-09-04	6800					
	Morgan	1972-09-07	6400					
	*							
		_						

If we now ask MySQL to show the content of the table person we will see that the two new rows are there:

矛 MySQL Query Browser - Connection: root@localhost:	3306 / testdb					
<u>File E</u> dit View Query Script <u>T</u> ools <u>W</u> indow <u>H</u> elp						
CONTRACTOR) 🔘 🙆	Explain 🕜 Compare		LECT FROM	WHERE GROUP	
C Resultset 1						Schemata Bookmarks History
SQL Query Area						2
* 1 SELECT * FROM person p;						 information_schema mysql performance_schema test testdb car person
7 NAME	BIRTHDATE	SALARY				
▶ Jane	1978-05-16	5600				
John	1989-12-14	5000				
Lane	1975-08-17	4900				
Mary	1975-09-04	6800				Syntax Functions Params Trx
Morgan	1972-09-07	6400				🛅 Data Definition Statements
Ray	1991-06-24	4900				🚞 Data Manipulation Statements
						MySQL Utility Statements MySQL Transactional and Locking Database Administration Statements Replication Statements SQL Syntax for Prepared Statements
6 rows fetched in 0,0009s (0,0004s)	🖌 Edit 🗸 Ap	ply Changes 🗙 Discard	Changes 📕	First 🕨 Las	: 👂 Search	
1: 24						

All the data is stored in the MySQL database. Access uses and modifies the data, but nothing is stored in Access.

When linking tables, foreign key rules are not imported to Access. But they are still maintained in the linked database. This means that if we try to add a car with an owner that does not exist, it will be MySQL that complains about it, and not Access.

We can try to insert the following car:

N 🛃 🔍 ▼ O → I = File Home Create Exte						= = > ^ (?
View Views Clipboard	Filter	ng V Selection + ing Advanced + Sort V Toggle Filte & Filter	Refrech	Go To 🗸	Calibri ▼14 ▼日日 課課 H ▼ B I 単 ▲ * ジ・金・目 毎 第 目田* 田・ Text Formatting 。	
All Access Objects 💿 «	🛄 person 🛄	car				Y
Search P	A CARID	- COLOR -	OWNER *			
Tables 🏾 🕆	ABC123	blue	Jane			
*🕑 car	BCD234	red	John			
* erson	DEF345	blue	John			
	FGI678	black	Ray			
	ERE121	green	Fay			
	*					
Datasheet View	Record: I4 4 5 of	5 • • • •	K No Filter Search	N		Num Lock 🔳 🖷 🛍 🔛

The moment we try to insert this new row, MySQL will send an error that Access kindly shows:

Microsoft	Access	×
<u> </u>	ODBCinsert on a linked table 'car' failed. [MySQL][ODBC 5.1 Driver][mysqld-5.5.11]Cannot add or update a child row: a foreign key constraint fails ('testdb', 'car', CONSTRAINT 'car_jbfk_1' FOREIGN KEY ('OWNER') REFERENCES 'person' ('NAME')) (#1452	2)
	Was this information helpful2	

As you can see from the message, Access has no idea what the problem is. It just knows that there was an error.

When working with linked tables, it can, however, be useful to also link the tables in Access. This will enable the wizards to identify relationships to be used when automatically building queries, forms and reports. This kind of linking will not have any effect on referential integrity. It is only useful for the Access wizards. We can add the linked tables in the relationships window and link them:

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Try to create a query using the Simple Query Wizard with both tables. Access will automatically use the relationship in order to make a JOIN condition:

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		WNER, person.NAME, person erson.[NAME] = car.[OWNER]		KY =

Try the same without the relationship and you will receive the following message:

Simple Qu	ery Wizard	1
<u> </u>	You have chosen fields from these tables: car, person; One or more of the tables ion't related to the others. Click OK to edit system relationships. You'll need to restart the wizard. Click Cancel to return to the wizard and remove some fields.	
	Cancel	

So if we want to use the Access wizards efficiently, we will have to define all the relationships between the linked tables.

9.20 Tip 20 - Working With Dates And Times

Access, as well as all other database management systems, offers special data types for working with dates and times. In Access there is a data type called Date/Time, which can be configured for different formats of just the date, just the time or both date and time. In the database created in chapter 4, we used this data type to represent the date of a specific song performance.

Dates and times can be used for many operations. We can calculate the difference between dates or times in years, days, hours, etc. In order to do things like that, we must be able to convert the date or time value to the appropriate value. Access offers several functions that can be used for such purposes. Date and time representations are dependent on the regional settings of your Windows, and possibly the installation language of Access. You may therefore experience that your system does not behave exactly as described in this section. The configuration used while composing this section is based on an English version of Windows and Access with regional settings set to Swedish.

The function **DatePart** is a very useful function that makes it possible to retrieve only one part of a date or time:

DatePart("yyyy", "2003-2-15") returns the year: 2003 DatePart("m", "2003-2-15") returns the month: 2 DatePart("d", "2003-2-15") returns the day of the month: 15 DatePart("y", "2003-2-15") returns the day of the year: 46 DatePart("w", "2003-2-15") returns the day of the week: 7 DatePart("ww", "2003-2-15") returns the day of the year: 7 DatePart("ww", "2003-2-15") returns the week of the year: 7 DatePart("h", "14:23:47") returns the hour: 14 DatePart("s", "14:23:47") returns the second: 47

The function **DateDiff** can be used to retrieve the difference between two date/time values. You can choose to retrieve the difference in years, months, weeks, days, hours, etc.: DateDiff("h","14:23:47", "19:21:33") returns the difference in hours (ignoring the minutes): 5 DateDiff("n","14:23:47", "19:21:33") returns the difference in minutes: 298 DateDiff("s","14:23:47", "19:21:33") returns the difference in seconds: 17866 DateDiff("yyyy", "1999-2-13","2003-10-4") returns the difference in years: 4 DateDiff("m", "1999-2-13","2003-10-4") returns the difference in months: 56 DateDiff("d", "1999-2-13","2003-10-4") returns the difference in days: 1694 DateDiff("w", "1999-2-13","2003-10-4") returns the difference in weeks: 242

If the first date/time value is greater than the second, then the result will be negative: DateDiff("n", "19:21:33","14:23:47") : -298

The function **DateAdd** can be used to manipulate a date/time value. The function can be used to add (or subtract) years, months, hours, etc.:

DateAdd("yyyy", 5,"2003-10-4") adds 5 years to the specified date. Returns 2008-10-04 DateAdd("m", 5,"2003-10-4") adds 5 months to the specified date. Returns 2004-03-04 DateAdd("d", 5,"2003-10-4") adds 5 days to the specified date. Returns 2003-10-09 DateAdd("h", 5,"11:00") adds 5 hours to the specified time. Returns 16:00:00 DateAdd("h", -5,"11:00") adds -5 hours to the specified time. Returns 06:00:00

It is of course possible to combine several functions:

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DateAdd("h", 5, DateAdd("n", 20, DateAdd("d", 5,"2003-10-4"))) Adds 5 hours, 20 minutes and 5 days to the specified date. Returns 2003-10-09 05:20:00

The functions Year(value), Month(value), Day(value), Hour(value), Minute(value), Second(value) and Weekday(value), return the year, month, day, hour, minute, second and weekday of the specified parameter. The parameter must of course be a valid date/time value.

The function **Now()** returns the current timestamp (time and date), the function **Date()** returns the current date and the function **Time()** returns the current time. Note: use Date() or Time(), if you only need the date or time respectively, but not both. Using Now() might create unexpected results in some cases when doing comparisons.

The function **DateSerial** can be used to create a new date. This function requires that you specify the year, month and day:

DateSerial(2004, 10, 12) creates and returns the following date: 2004-10-12

There is an equivalent function **TimeSerial** for time values.

There is also a possibility to create date/time values from string representations of dates and times. This is in most cases not necessary though, since Access accepts the string representation directly. However, it can still be useful to mention this possibility. For this, there are two functions **DateValue** and **TimeValue**:

TimeValue("4:35:17 PM") returns a new time value: 16:35:17 TimeValue("14:12") returns a new time value: 14:12:00 DateValue("2004-12-13") returns a new date value: 2004-12-13 DateValue("12/13/2004") returns a new date value: 2004-12-13

The two can be combined: DateValue("12/13/2004") + TimeValue("4:35:17 PM") returns 2004-12-13 16:35:17

The expression above would be equal to this one: TimeValue("12/13/2004 4:35:17 PM") + DateValue("12/13/2004 4:35:17 PM")

If you just try to use DateValue("12/13/2004 4:35:17 PM"), then the time part will be ignored. The result would only contain the date part: 2004-12-13

The functions **MonthName** and **WeekdayName** can be used to retrieve the name of the specified month and weekday as a string:

MonthName(Month("2003-12-14")) returns: December, december, diciembre etc. based on your regional settings.

WeekdayName(Weekday("2003-12-14")) returns: Monday, måndag, lunes etc. based on your regional settings.

All of the functions described in this section can of course be combined with each other and with other functions and SQL operators. You can for example write a query to retrieve the number of songs performed per month during 2002:

SELECT MonthName(Month(date)), COUNT(*) AS Songs FROM songperformance WHERE Year(Date) = 2002 GROUP BY MonthName(Month(date))

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Another more direct way to use dates in SQL in Access is to use square brackets around the string representation of the date as follows. Here is the same query as above, but with the WHERE condition defined in an alternative way:

```
SELECT MonthName(Month(date)), COUNT(*) AS Songs
FROM songperformance
WHERE Date BETWEEN #2002-01-01# AND #2002-12-31#
GROUP BY MonthName(Month(date));
```

10 Other Resources

In the sections that follow, there are some references to interesting web sites and books about Access. Not all of them are for Access 2010, but most of the information applies to most versions of Access.

10.1 Web Sites

There are many good websites with information about Access. Just use a search engine to find a page relative to a specific Access issue.

The MSDN site is one of the best resources on the Internet for developers using any Microsoft product or technology. The main site can be reached at <u>http://msdn.microsoft.com/</u> from where one can search for Access. This is the official site for Access.

10.2 Books

There are hundreds of books about the different Microsoft Access versions out there and you will probably do fine with most of them. The different versions don't have so many differences (not in the basic functionality anyway), so a book about Access 2007 will do fine when working with any version from Access 2007 to Access 2010. Access 97 - Access 2003 have a different user interface, but most functionality remains the same.

It is not at all necessary to have a book. The resources in the Access help and on the Internet should be more than enough.

11 Epilogue

This covers the most commonly used functionality of Access. I would like to encourage you all to play around with Access. This is the best way to learn all the tricks. It is also important that you are not afraid to try to combine techniques covered in different chapters. You can for example combine something that we discussed in the chapter about forms with something that was first introduced when we were working with reports and also combine that with a macro.

I hope you have enjoyed this tutorial. Please give me feedback!

The Author

nikos dimitrakas