Microsoft® Access 2003
I: Overview and Tables

A Workshop for San Diego State University Faculty and Staff

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Microsoft Access I: Overview and Tables

INTRODUCTION

A database stores information. This information is stored in tables and is organized by fields and records. An example of a database is an address book. The categories in the address book are the fields in the table (name, address, phone number, etc.). Each entry in the address book is a record.

An address book may have tabs for each letter of the alphabet so that you can find the person you are looking for quickly and easily. A database can be searched or queried to find the data required. Because data is generally retrieved via a query, the data itself does not need to be entered in any particular order.

The type of database described above is called a flat file database. It resembles a single sheet of paper with all the information on it.

Microsoft Access is a relational database. This type of database has a much more complex design, which, in turn, offers much more functionality and power. The downside is that an effective relational database needs to be designed properly.

Why is Access a good Desktop Database?

Why choose Access over a package such as Paradox or Oracle?

First it is important to clarify the 'class' that Access falls into. Access is a desktop database package. It is not designed to compete with systems such as Oracle or SQL Server - full database servers - whose engines are superior in terms of speed and multi-user capabilities. However, Access can and does make a good front-end package to these systems.

Against other desktop database packages Access has one huge advantage. It is likely that you are running Windows as your operating system and using Microsoft Office as your application base. Access integrates well with these packages, and data transfer between Access and the other Office components is relatively easy. In addition, against the other desktop databases Access is both rich in features and powerful. Access 97 probably puts Access above any other desktop database you can buy.

In addition, Access has a user-base of millions and therefore there are a lot of add-ons and other third party software available.

Finally, almost any user can use Access. Beginners can learn to use the wizards and the easy-to-understand interface while

developers can push it to its limits and do some extraordinary things with it. It is a system for everyone created with a mixed user-level in mind.

FLAT DATABASE VS RELATIONAL DATABASE

Flat Database

A flat-file database is one in which all the data is contained in a single table. If a single record is made for each student, then the database might look like this:

Student	Address	City	State	Grades
Sue Storm	22 Slum Circle	San Jose	CA	CS 101 = A, HIS 251 = C, GGY 120 = B, ENG 101 = A
Juan Garcia	14 Easy Street	Los Angeles	CA	POL 101 = D, ENG 101 = C

The problem here is that the various records have different kinds of data in the Grades field. In any database table, EACH record must have exactly the SAME fields with the same amount and type of data in each.

Here's another approach:

Student	Address	City	State	Course	Term	Grade
Sue Storm	22 Slum Circle	San Jose	CA	CS 101	Spring 1999	A
Sue Storm	22 Slum Circle	San Jose	CA	HIS 251	Fall 1998	C
Sue Storm	22 Slum Circle	San Jose	CA	ENG 101	Fall 1998	A

Now each individual course grade is a separate entity, and the table is correctly formed. However, the same data item is stored many different times in the database. This wastes space (much more than in the example above, since SDSU keeps lots of data on each student, plus data on each course).

What if Sue Storm changes her address, or her name? The database management program must go through the entire database and change many records. If this fails (perhaps because data about Sue is kept in multiple tables), the data becomes inconsistent and serious problems result.

Relational Databases

The solution to this dilemma is to maintain a database with multiple entities:

Each student is an entity;
Each course is an entity;

Each grade is a relationship between a student and a course.

Therefore, three tables will be built.

The student table:

ID	Student	Address	City	State
351098771	Sue Storm	22 Slum Circle	San Jose	CA
997003356	Juan Garcia	14 Easy Street	Los Angeles	CA

Note that the student ID number has been added as a key field – that is, a field which is guaranteed to be different for each record. We look up records using the key field rather than the student name.

The course table:

Course ID	Prefix	Course no.	Term	Instructor
21-112	CS	101	Spring 1999	Everett
30-212	HIS	251	Fall 1998	Smith
41-982	ENG	101	Fall 1998	Hemingway
02-341	POL	101	Spring 1998	Aristotle

The Course ID number has been added as a unique key field for the course table.

The grade table:

Student	Course ID	Grade
351098771	21-112	A
351098771	30-212	C
997003356	02-341	D

A relational database saves typing, reduces the potential for errors, reduces the size of a database and makes for much more flexible data management.

DESIGNING A DATABASE

Before you use Microsoft Access to actually build the tables, forms, and other objects that will make up your database, it is important to take time to design your database. A good database design is the keystone to creating a database that does what you want it to do effectively, accurately, and efficiently.

Steps in Designing a Database

To design a database work through each of the following steps:

1. Determine the purpose of the database.
2. Determine the tables needed in the database.
3. Determine the fields needed in the tables.
4. Identify all fields with unique values.
5. Determine the relationships between tables.
6. Refine the design.
7. Add data and create reports, queries and forms.

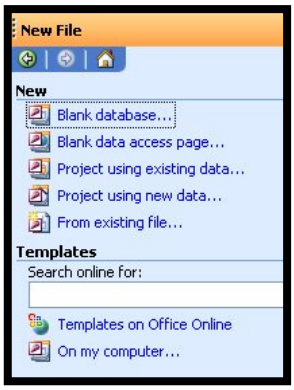
Opening Access

1. From the **Start** menu click **Programs**, then click **Microsoft Access.**
2.
3. Access will open and on the right of the screen the Task Pane will appear
   displaying the following options:

   To create a new database, either select **Create a new file…..**

   - To open an exiting database, either double-click on an existing database
     listed in the window under O**pen**, or select **More** to display the Open
     dialog box.

Creating a new Database



To create a new database:

1. Start **Access**
2. Choose **Create a new file…**
3. When the **New File** window appears click the **Blank database…**option
4. When the **File New** Database window opens, give the database a name and navigate to the location where you want the database to reside.

5. Click the **Create** button to create this database.

The Access Desktop and the Database Window

The Database window, is a special window that allows you easy access to a variety of objects such as tables, queries, forms and reports.

TABLES

An Access database consists of a collection of tables. Once you have created the database, you must create each of the tables within it.

To create a table, you describe the structure of the table by defining the fields within the table. For each field you indicate the following: field name, data type, description, and properties. For a list of Data types see Appendix B.

Field Name Rules

The rules for field names are:

1. Names can be up to 64 character in length.

2. Names can contain letters, digits, and spaces, as well as most punctuation symbols.

3. Names cannot contain periods, exclamation points (!), or square brackets.

4. The same name cannot be used for two different fields in the same table.

Primary Key

You also assign a Primary Key to a field or fields. A primary key is one or more fields whose value or values uniquely identify each record in a table. In a relationship, a primary key is used to refer to specific records in one table from another table.

The Table Design View Window

When creating a table you need to define each field by specifying the required details in the Table Design View Window. To do so, make entries in the Field Name, Data Type, and Description columns. Enter additional information in the Field Properties box in the lower portion of the Table window. As you define fields, the row selector indicates the field you currently are describing.

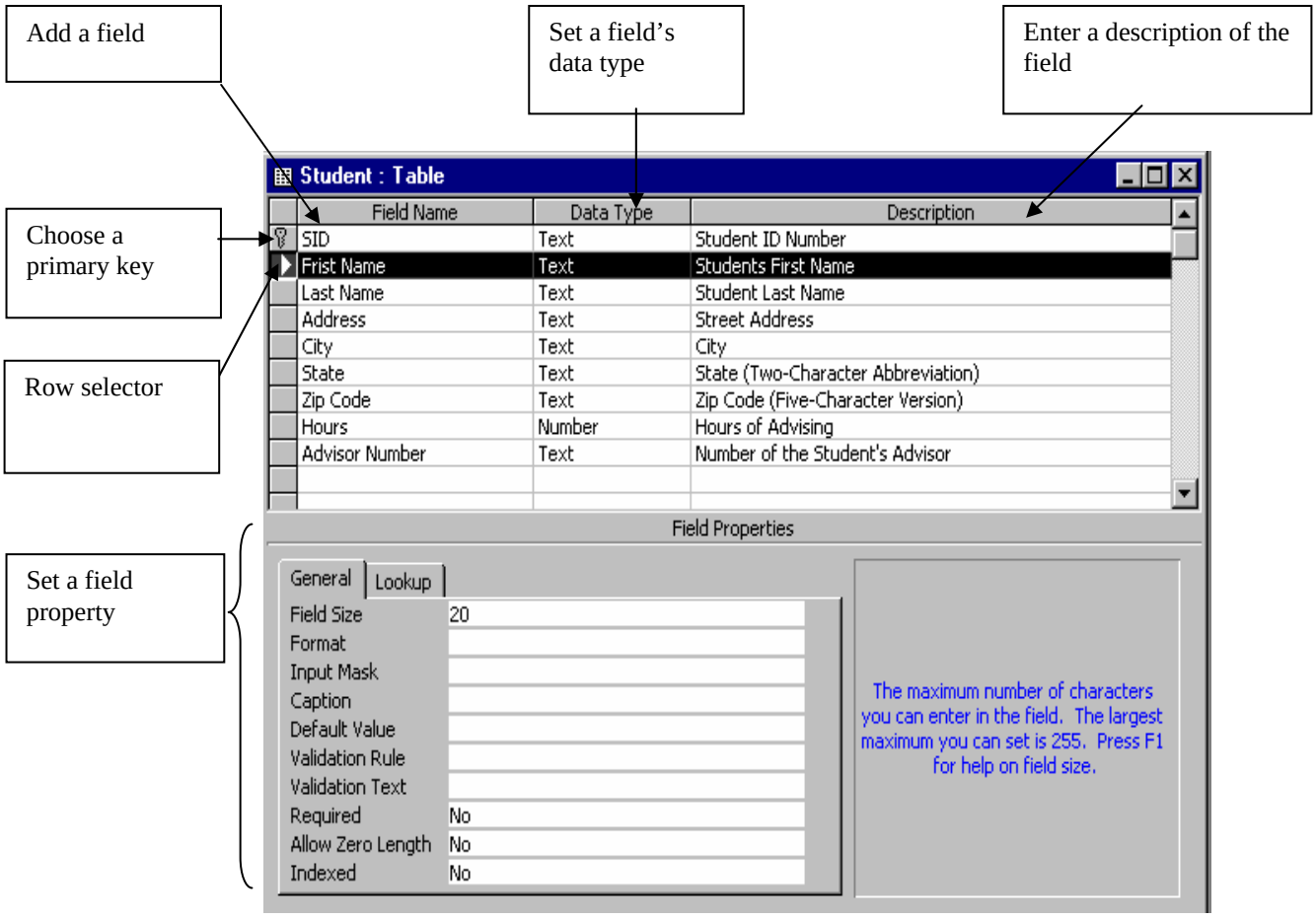


TABLE CREATION

Microsoft Access provides two ways to create a table. You can create a blank (empty) table for entering your own data, or you can create a table using existing data from another source.

Create a Table using the Table Wizard

To use the Wizard to create a Table:

1. Click the **Tables** tab, and then click New.
2. Double-click **Table Wizard**.
3. Follow the directions in the Table Wizard dialog boxes.

Create a Table From Scratch Using Design View

To use the Design View to create a Table:

1. Click the **Tables** tab, and then click **New**.
2. Double-click **Design View**.
3. Define each of the fields in your table.
4. Click in the **Field Name** column and type the name for the field.
5. In the **Data Type** column, keep the default (Text); or click in the **Data Type** column, click the arrow, and select the data type you want. (For a list of Data types see Appendix A.)
6. In the **Description** column, type a description of the information this field will contain.
7. Define a primary key field before saving your table.

When you are ready to save your table, click the **Save** button on the toolbar, and then type a name for the table.

Import Data from a Microsoft Excel Spreadsheet

You can import data from a Microsoft Excel spreadsheet. The data in the spreadsheet must be arranged in an appropriate tabular format. Before you proceed, make sure that the spreadsheet has the same type of data in each field (column) and the same fields in every row. You can import all the data from a spreadsheet, or just the data from a named range of cells.

1. To import a spreadsheet, on the File menu, point **to Get External Data**, and then click **Import**.
2. In the Import dialog box, in the Files Of Type box, select **Microsoft Excel**.

3. Click the arrow to the right of the Look In box, select the drive and folder where the spreadsheet file is located, and then double-click its icon.

4. Follow the directions in the Import Spreadsheet Wizard dialog boxes.

➔Note If importing a spreadsheet takes an unexpectedly long time, it might be because many errors are occurring. To cancel importing, press **CTRL+BREAK**.

FIELD PROPERTIES

Each field has a set of properties that you use to customize how a field's data is stored, handled, or displayed. For example, you can control the maximum number of characters that can be entered into a Text field by setting its **FieldSize** property. You set a field's properties by displaying a table in Design view, selecting the field in the upper portion of the window, and then selecting the desired property in the lower portion of the window.

The properties that are available for each field are determined by the data type you select for the field.

➔Tip When you create a bound control on a form or report by dragging a field from the field list, Microsoft Access copies certain properties from that field to the control. This way you can be sure that you have consistent settings whenever you add fields to a form or report.

Input Masks

An input mask is used in fields to format data and to provide some control over what values can be entered.

An input mask consists of literal characters (such as spaces, dots, dashes, and parentheses) that separate blanks to fill in. The Input Mask property setting consists of literal characters along with special characters that determine the kind of value that can be entered into the blank in that position.

Input masks are primarily used in Text and Date/Time fields, but can also be used in Number or Currency fields.

By clicking on the ellipsis next to the **Input Mask** text box in the **Field Properties** area, an Input Mask Wizard is displayed. The wizard provides preset settings to be used upon selection.

You can also enter your own input masks. (For Input Mask Definitions and Examples see Appendix B.)

Validating Data Entry

Validation rules can be used to control the values entered into a field. Validation text is a message that you want displayed when the rule is broken. Use the Design View to input these settings.

To add a validation rule in the field properties area, type the validation rule, or click the **Build** button to create the validation rule using the Expression Builder.

Following are some examples of validation rules along with the validation text:

ValidationRule Setting	ValidationText Setting
< >	Please enter a nonzero value.
0 Or >100	Value must be either 0 or over 100.
Like "K???"	value must be four characters beginning with the letter K.
<#1/1/96	Enter a date before 1996.
>=#1/1/97# And <#1/1/98	Date must be in 1997.

If you set a validation rule in a field that contains data, Microsoft Access will ask if you want to apply the new rule to existing data when you save the table.

APPENDIX A
Examples of Field Types in Tables

Data Type	Use For	Size
Text	Text or combinations of text and numbers, such as addresses. Also numbers that do not require calculations, such as phone numbers, part numbers, or postal codes.	Up to 255 characters. Microsoft Access only stores the characters entered in a field; it does not store space characters for unused positions in a Text field. To control the maximum number of characters that can be entered, set the FieldSize property
Memo	Lengthy text and numbers, such as notes or descriptions.	Up to 64,000 characters.
Number	Numeric data to be used for mathematical calculations, except calculations involving money (use Currency type). Set the FieldSize property to define the specific Number type.	1, 2, 4, or 8 bytes. 16 bytes for Replication ID (GUID) only.
Date/Time	Dates and times.	8 bytes.
Currency	Currency values. Use the Currency data type to prevent rounding off during calculations. Accurate to 15 digits to the left of the decimal point and 4 digits to the right.	8 bytes
AutoNumber	Unique sequential (incrementing by 1) or random numbers automatically inserted when a record is added.	4 bytes. 16 bytes for Replication ID (GUID) only.
Yes/No	Fields that will contain only one of two values, such as Yes/No, True/False, On/Off.	1 bit

Note: Number, Date/Time, Currency, and Yes/No data types provide predefined display formats. Set the Format property to choose from the formats available for each data type.

APPENDIX B
Input Mask Definitions and Examples

Input mask definition	Examples of values
(000) 000-0000	(206) 555-0248
(999) 999-9999!	(206) 555-0248 ( ) 555-0248
(000) AAA-AAAA	(206) 555-TELE
#999	-20 2000
>L????L?000L0	GREENGR339M3 MAY R 452B7
>L0L 0L0	T2F 8M4
00000-9999	98115- 98115-3007
>L<?????????????	Maria Pierre
ISBN 0-&&&&&&&&&-0	ISBN 1-55615-507-7 ISBN 0-13-964262-5
>LL00000-0000	DB51392-0493

The input mask definition can contain up to three sections separated by semicolons; for example, (999) 000-0000!;0;" ".

Section	Meaning
First	The input mask itself.
Second	Determines whether to store the literal display characters.0 = store literal characters with the value entered1 or leave blank = store only characters entered in blanks
Third	Character that is displayed for blanks in the input mask. You can use any character; type " " (double quotation marks, space, double quotation marks) to display a space. If you leave this section blank, the underscore (_) is used.

Microsoft Access interprets characters in the first part of the InputMask property definition as shown in the following table.

Character	Description
0	Digit (0 through 9, entry required; plus [+] and minus [-] signs not allowed).
9	Digit or space (entry not required; plus and minus signs not allowed).
#	Digit or space (entry not required; blank positions converted to spaces, plus and minus signs allowed).

Character	Description
L	Letter (A through Z, entry required).
?	Letter (A through Z, entry optional).
A	Letter or digit (entry required).
a	Letter or digit (entry optional).
&	Any character or a space (entry required).
C	Any character or a space (entry optional).
. , : ; - /	Decimal placeholder and thousands, date, and time separators. (The actual character used depends on the regional settings specified by double clicking Regional Settings in the Windows Control Panel.)
<	Causes all characters that follow to be converted to lowercase.
>	Causes all characters that follow to be converted to uppercase.
!	Causes the input mask to display from right to left, rather than from left to right. Characters typed into the mask always fill it from left to right. You can include the exclamation point anywhere in the input mask.
\	Causes the character that follows to be displayed as a literal character. Used to display any of the characters listed in this table as literal characters (for example, \A is displayed as just A).
Password	Setting the InputMask property to the word Password creates a password entry text box. Any character typed in the text box is stored as the character but is displayed as an asterisk (*).