

Database: SQL, ADO and RDS
Table: **Employee**

	Number	Name	Department	Salary	Location
	23603	JONES, A.	413	1100	NEW JERSEY
	24568	KERWIN, R.	413	2000	NEW JERSEY
A record {	34589	LARSON, P.	642	1800	LOS ANGELES
	35761	MYERS, B.	611	1400	ORLANDO
	47132	NEUMANN, C.	413	9000	NEW JERSEY
	78321	STEPHENS, T.	611	8500	ORLANDO

Primary key A column

Fig. 25.1 Relational database structure.

Department	Location
413	NEW JERSEY
611	ORLANDO
642	LOS ANGELES

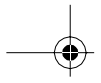
Fig. 25.2 A result set formed by selecting data from a table.

Field	Description
AuthorID	An integer representing the author's ID number in the database. This is the primary key field for this table.
FirstName	A string representing the author's first name.
LastName	A string representing the author's last name.
YearBorn	A string representing the author's year of birth.

Fig. 25.3 Authors table from Books.mdb.

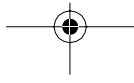
AuthorID	FirstName	LastName	YearBorn
1	Harvey	Deitel	1946
2	Paul	Deitel	1968
3	Tem	Nieto	1969

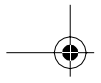
Fig. 25.4 Data from the **Authors** table of **Books.mdb**.



Field	Description
PublisherID	An integer representing the publisher's ID number in the database. This is the primary key field for this table.
PublisherName	A string representing the abbreviated name for the publisher.

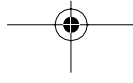
Fig. 25.5 Publishers table from Books.mdb.

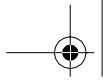




<i>PublisherID</i>	<i>PublisherName</i>
1	Prentice Hall
2	Prentice Hall PTR

Fig. 25.6 Data from the **Publishers** table of **Books.mdb**.





Field	Description
ISBN	A string representing the ISBN number for a book.
AuthorID	An integer representing the author's ID number, which allows the database to connect each book to a specific author. The ID number in this field must also appear in the Authors table.

Fig. 25.7 **AuthorISBN** table from **Books.mdb**.

ISBN	AuthorID	ISBN	AuthorID
0-13-010671-2	1	<i>(continued from bottom left of this table)</i>	
0-13-010671-2	2	0-13-020522-2	3
0-13-020522-2	1	0-13-082714-2	1
0-13-020522-2	2	0-13-082714-2	2
<i>(continued on top right of this table)</i>		0-13-082925-0	1
<i>(continued from previous page)</i>		<i>(continued from bottom left of this table)</i>	
0-13-082925-0	2	0-13-565912-4	2
0-13-082927-7	1	0-13-565912-4	3
0-13-082927-7	2	0-13-899394-7	1
0-13-082928-5	1	0-13-899394-7	2
0-13-082928-5	2	0-13-904947-9	1
0-13-082928-5	3	0-13-904947-9	2
0-13-083054-2	1	0-13-904947-9	3
0-13-083054-2	2	0-13-013249-7	1
0-13-083055-0	1	0-13-013249-7	2
0-13-083055-0	2	0-13-085609-6	1
0-13-118043-6	1	0-13-085609-6	2
0-13-118043-6	2	0-13-085609-6	3
0-13-226119-7	1	0-13-016143-8	1
0-13-226119-7	2	0-13-016143-8	2
0-13-271974-6	1	0-13-016143-8	3
0-13-271974-6	2	0-13-015870-4	1
0-13-456955-5	1	0-13-015870-4	2
0-13-456955-5	2	0-13-015870-4	3
0-13-456955-5	3	0-13-012507-5	1
0-13-528910-6	1	0-13-012507-5	2
0-13-528910-6	2	0-13-085248-1	1
0-13-565912-4	1	0-13-085248-1	2
<i>(continued on top right of this table)</i>			

Fig. 25.8 Data from the AuthorISBN table of Books.mdb .

Field	Description
ISBN	A string representing the ISBN number of the book.
Title	A string representing the title of the book.
EditionNumber	A string representing the edition number of the book.
YearPublished	A string representing the year in which the book was published.
Description	A string representing the description of the book.
PublisherID	An integer representing the publisher's ID number. This value must correspond to an ID number in the Publishers table.

Fig. 25.9 **Titles** table from **Books.mdb**.

<i>ISBN</i>	<i>Title</i>	<i>Edition Number</i>	<i>Year Published</i>	<i>Publisher ID</i>
0-13-226119-7	C How to Program	2	1994	1
0-13-528910-6	C++ How to Program	2	1997	1
0-13-899394-7	Java How to Program	2	1997	1
0-13-012507-5	Java How to Program	3	1999	1
0-13-456955-5	Visual Basic 6 How to Program	1	1998	1
0-13-016143-8	Internet and World Wide Web How to Program	1	1999	1
0-13-013249-7	Getting Started with Visual C++ 6 with an Introduction to MFC	1	1999	1
0-13-565912-4	C++ How to Program Instructor's Manual with Solutions Disk	2	1998	1
0-13-904947-9	Java How to Program Instructor's Manual with Solution Disk	2	1997	1
0-13-020522-2	Visual Basic 6 How to Program Instructor's Manual with Solution Disk	1	1999	1
0-13-015870-4	Internet and World Wide Web How to Program Instructor's Manual with Solutions Disk	1	1999	1
0-13-082925-0	The Complete C++ Training Course	2	1998	2
0-13-082927-7	The Complete Java Training Course	2	1997	2
0-13-082928-5	The Complete Visual Basic 6 Training Course	1	1999	2
0-13-085248-1	The Complete Java Training Course	3	1999	2
0-13-085609-6	The Internet and World Wide Web How to Program Complete Training Course	1	1999	2
0-13-082714-2	C++ How to Program 2/e and Getting Started with Visual C++ 5.0 Tutorial	2	1998	1
0-13-010671-2	Java How to Program 2/e and Getting Started with Visual J++ 1.1 Tutorial	2	1998	1
0-13-083054-2	The Complete C++ Training Course 2/e and Getting Started with Visual C++ 5.0 Tutorial	2	1998	1

Fig. 25.10 Data from the **Titles** table of **Books.mdb** (part 1 of 2).

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For use only by instructors in classes for which *Java How to Program, Third Edition* is the required textbook.

<i>ISBN</i>	<i>Title</i>	<i>Edition Number</i>	<i>Year Published</i>	<i>Publisher ID</i>
0-13-083055-0	The Complete Java Training Course 2/e and Getting Started with Visual J++ 1.1 Tutorial	2	1998	1
0-13-118043-6	C How to Program	1	1992	1
0-13-271974-6	Java Multimedia Cyber Classroom	1	1996	2

Fig. 25.10 Data from the **Titles** table of **Books.mdb** (part 2 of 2).

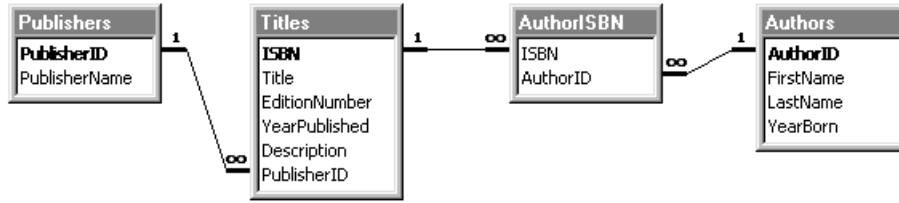


Fig. 25.11 Table relationships in **Books.mdb**.

SQL keyword	Description
SELECT	Select (retrieve) fields from one or more tables.
FROM	Tables from which to get fields. Required in every SELECT .
WHERE	Criteria for selection that determine the rows to be retrieved.
ORDER BY	Criteria for ordering (sorting) of records.
INSERT INTO	Insert values into one or more tables. [<i>Note:</i> Some databases do not require the SQL keyword INTO .]
UPDATE	Update existing data in one or more tables.

Fig. 25.12 SQL query keywords.

AuthorID	LastName
1	Deitel
2	Deitel
3	Nieto

Fig. 25.13 AuthorID and LastName from the Authors table.

AuthorID	FirstName	LastName	YearBorn
2	Paul	Deitel	1968
3	Tem	Nieto	1969

Fig. 25.14 Authors born after 1960 from the **Authors** table.

AuthorID	FirstName	LastName	YearBorn
1	Harvey	Deitel	1946
2	Paul	Deitel	1968

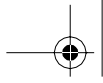
Fig. 25.15 Authors whose last names start with **d** from the **Authors** table.

AuthorID	FirstName	LastName	YearBorn
3	Tem	Nieto	1969

Fig. 25.16 Authors from the **Authors** table whose last names contain **i** as the second letter.

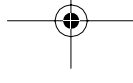
AuthorID	FirstName	LastName	YearBorn
2	Paul	Deitel	1968
1	Harvey	Deitel	1946
3	Tem	Nieto	1969

Fig. 25.17 Authors from the **Authors** table in ascending order by **LastName**.



AuthorID	FirstName	LastName	YearBorn
3	Tem	Nieto	1969
2	Paul	Deitel	1968
1	Harvey	Deitel	1946

Fig. 25.18 Authors from the **Authors** table in descending order by **LastName**.



AuthorID	FirstName	LastName	YearBorn
1	Harvey	Deitel	1946
2	Paul	Deitel	1968
3	Tem	Nieto	1969

Fig. 25.19 Authors from the **Authors** table in ascending order by **LastName** and by **FirstName**.

ISBN	Title	Edition Number	Year Published	Publisher ID
0-13-118043-6	C How to Program	1	1992	1
0-13-226119-7	C How to Program	2	1994	1
0-13-528910-6	C++ How to Program	2	1997	1
0-13-016143-8	Internet and World Wide Web How to Program	1	1999	1
0-13-012507-5	Java How to Program	3	1999	1
0-13-899394-7	Java How to Program	2	1997	1
0-13-456955-5	Visual Basic 6 How to Program	1	1998	1

Fig. 25.20 Books from the **Titles** table whose titles end with **How to Program** in ascending order by **Title**.

FirstName	LastName	ISBN	FirstName	LastName	ISBN
Harvey	Deitel	0-13-013249-7	<i>(continued from bottom left of this table)</i>		
Harvey	Deitel	0-13-271974-6	Harvey	Deitel	0-13-010671-2
Harvey	Deitel	0-13-528910-6	Harvey	Deitel	0-13-118043-6
Harvey	Deitel	0-13-083055-0	Paul	Deitel	0-13-082928-5
Harvey	Deitel	0-13-565912-4	Paul	Deitel	0-13-082925-0
Harvey	Deitel	0-13-083054-2	Paul	Deitel	0-13-020522-2
Harvey	Deitel	0-13-899394-7	Paul	Deitel	0-13-904947-9
Harvey	Deitel	0-13-904947-9	Paul	Deitel	0-13-012507-5
Harvey	Deitel	0-13-226119-7	Paul	Deitel	0-13-015870-4
Harvey	Deitel	0-13-082928-5	Paul	Deitel	0-13-016143-8
Harvey	Deitel	0-13-456955-5	Paul	Deitel	0-13-085609-6
Harvey	Deitel	0-13-015870-4	Paul	Deitel	0-13-013249-7
Harvey	Deitel	0-13-085609-6	Paul	Deitel	0-13-226119-7
Harvey	Deitel	0-13-085248-1	Paul	Deitel	0-13-899394-7
Harvey	Deitel	0-13-082925-0	Paul	Deitel	0-13-565912-4
Harvey	Deitel	0-13-016143-8	Paul	Deitel	0-13-528910-6
Harvey	Deitel	0-13-082714-2	Paul	Deitel	0-13-085248-1
<i>(continued on top right of this table)</i>			<i>(continued on next page)</i>		
<i>(continued from previous page)</i>			<i>(continued from bottom left of this table)</i>		
Harvey	Deitel	0-13-082927-7	Paul	Deitel	0-13-456955-5
Harvey	Deitel	0-13-012507-5	Paul	Deitel	0-13-271974-6
Harvey	Deitel	0-13-020522-2	Tem	Nieto	0-13-082928-5
Paul	Deitel	0-13-118043-6	Tem	Nieto	0-13-565912-4
Paul	Deitel	0-13-010671-2	Tem	Nieto	0-13-456955-5
Paul	Deitel	0-13-083055-0	Tem	Nieto	0-13-085609-6
Paul	Deitel	0-13-082927-7	Tem	Nieto	0-13-016143-8
Paul	Deitel	0-13-083054-2	Tem	Nieto	0-13-020522-2
Paul	Deitel	0-13-082714-2	Tem	Nieto	0-13-015870-4
<i>(continued on top right of this table)</i>			Tem	Nieto	0-13-904947-9

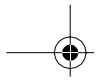
Fig. 25.21 Authors and the ISBN numbers for the books they have written in ascending order by **LastName** and **FirstName** .

```
1 SELECT Titles.Title, Titles.ISBN, Authors.FirstName,  
2     Authors.LastName, Titles.YearPublished,  
3     Publishers.PublisherName  
4 FROM  
5     ( Publishers INNER JOIN Titles  
6       ON Publishers.PublisherID = Titles.PublisherID )  
7 INNER JOIN  
8     ( Authors INNER JOIN AuthorISBN  
9       ON Authors.AuthorID = AuthorISBN.AuthorID )  
10 ON Titles.ISBN = AuthorISBN.ISBN  
11 ORDER BY Titles.Title
```

Fig. 25.22 The **TitleAuthor** query from the **Books.mdb** database.

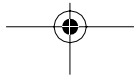
Title	ISBN	First Name	Last Name	Year Published	Publisher Name
C How to Program	0-13-226119-7	Paul	Deitel	1994	Prentice Hall
C How to Program	0-13-118043-6	Paul	Deitel	1992	Prentice Hall
C How to Program	0-13-118043-6	Harvey	Deitel	1992	Prentice Hall
C How to Program	0-13-226119-7	Harvey	Deitel	1994	Prentice Hall
C++ How to Program	0-13-528910-6	Harvey	Deitel	1997	Prentice Hall
C++ How to Program	0-13-528910-6	Paul	Deitel	1997	Prentice Hall
...					
Internet and World Wide Web How to Program	0-13-016143-8	Paul	Deitel	1999	Prentice Hall
Internet and World Wide Web How to Program	0-13-016143-8	Harvey	Deitel	1999	Prentice Hall
Internet and World Wide Web How to Program	0-13-016143-8	Tem	Nieto	1999	Prentice Hall
...					
Java How to Program	0-13-012507-5	Harvey	Deitel	1999	Prentice Hall
Java How to Program	0-13-899394-7	Paul	Deitel	1997	Prentice Hall
Java How to Program	0-13-899394-7	Harvey	Deitel	1997	Prentice Hall
Java How to Program	0-13-012507-5	Paul	Deitel	1999	Prentice Hall
...					
Visual Basic 6 How to Program	0-13-456955-5	Harvey	Deitel	1998	Prentice Hall
Visual Basic 6 How to Program	0-13-456955-5	Paul	Deitel	1998	Prentice Hall
Visual Basic 6 How to Program	0-13-456955-5	Tem	Nieto	1998	Prentice Hall

Fig. 25.23 A portion of the query results from the **TitleAuthor** query.



AuthorID	FirstName	LastName	YearBorn
1	Harvey	Deitel	1946
2	Paul	Deitel	1968
3	Tem	Nieto	1969
4	Sue	Smith	1960

Fig. 25.24 Authors table after an **INSERT INTO** operation to add a record.



AuthorID	FirstName	LastName	YearBorn
1	Harvey	Deitel	1946
2	Paul	Deitel	1969
3	Tem	Nieto	1969
4	Sue	Smith	1960

Fig. 25.25 Authors table after an UPDATE operation to modify a record.

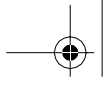
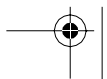
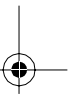
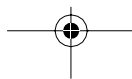
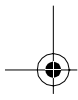
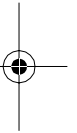
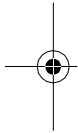


Fig. 25.26 ODBC Data Sources (32bit) control panel icon.



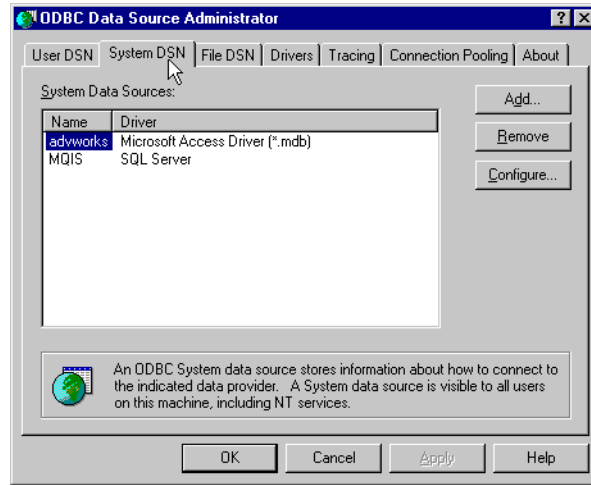


Fig. 25.27 ODBC Data Source Administrator dialog.

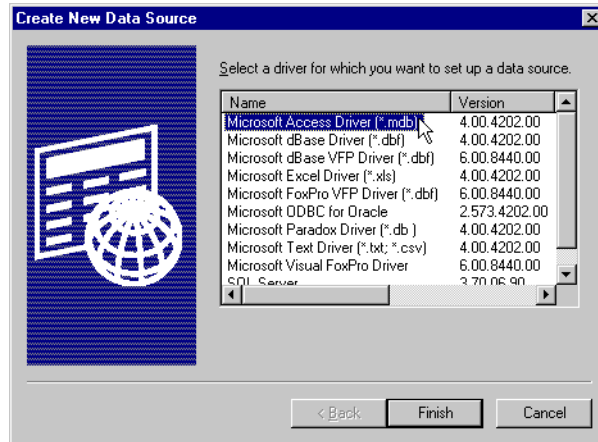


Fig. 25.28 Create New Data Source dialog.

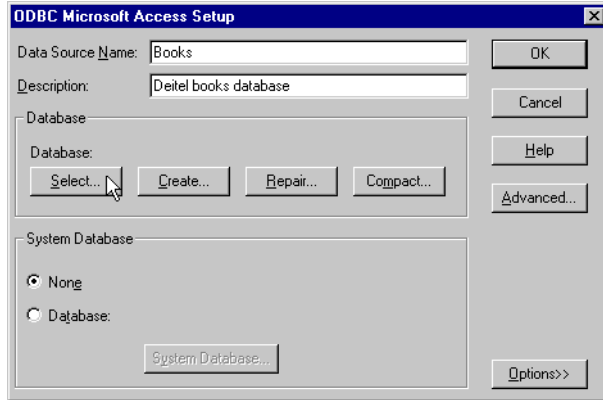


Fig. 25.29 ODBC Microsoft Access Setup dialog.

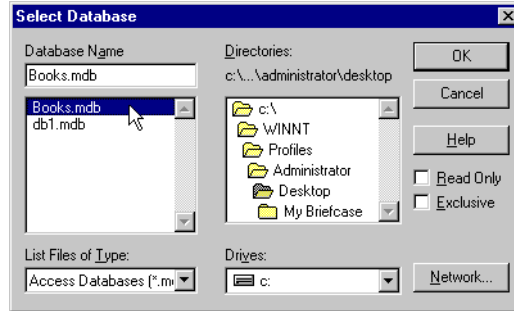


Fig. 25.30 Select Database dialog.

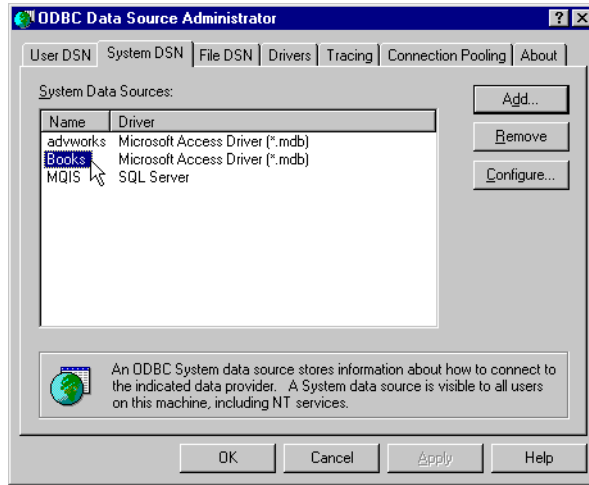


Fig. 25.31 ODBC Data Source Administrator dialog showing successful registration.

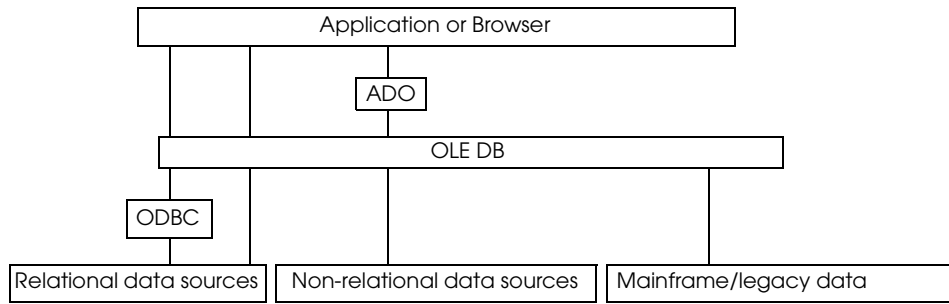


Fig. 25.32 Microsoft's UDA architecture.

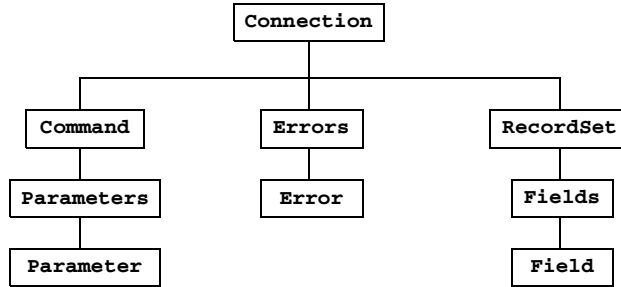


Fig. 25.33 A portion of the ADO object model.

Object/Collection	Description
Connection object	The connection to the data source.
Command object	Contains the query that will interact with the database (the <i>data source</i>) to manipulate data.
Parameter object	Contains information needed by a Command object to query the data source.
Parameters collection	Contains one or more Parameter objects.
Error object	Created when an error occurs while accessing data.
Errors collection	Contains one or more Error objects.
Recordset object	Contains zero or more records that match the database query. Collectively this group of records is called a <i>recordset</i> .
Field object	Contains the value (and other attributes) of one data source field.
Fields collection	Contains one or more Field objects.

Fig. 25.34 ADO object and collection types.

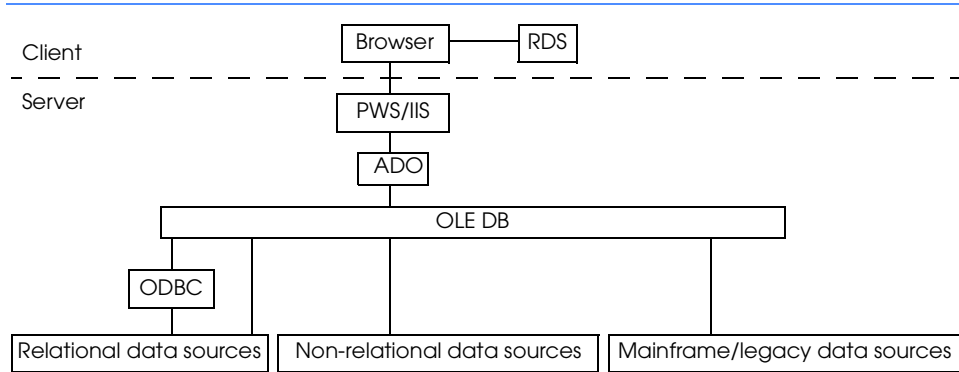


Fig. 25.35 RDS architecture.

Property	Description
Connect	The data source name (DSN) of a Web server's database.
Sql	The actual query to execute against the database.
Server	Indicates the Web server to which the RDS.Datacontrol connects.
Recordset	The actual recordset downloaded from the Web server.

Fig. 25.36 Some **RDS.Datacontrol** properties.

Method	Description
Refresh	Executes a query against the database. Also forces any records that have not been uploaded to the server to upload.
SubmitChanges	Sends updated records to the Web server.
CancelUpdate	Cancels all records that were updated (but not sent to the server) and reverts them back to their original values.

Fig. 25.37 Some `RDS.Datacontrol` methods.

```

1  <!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
2  <HTML>
3  <!--Fig. 25.38: rds.html -->
4
5  <!--Creates an instance of the RDS.Datacontrol-->
6  <OBJECT CLASSID = "clsid:BD96C556-65A3-11D0-983A-00C04FC29E33"
7         ID = deitelDC WIDTH = 0 HEIGHT = 0>
8  </OBJECT>
9
10 <SCRIPT LANGUAGE = VBScript>
11 <!--
12 Option Explicit
13
14 <!-- Microsoft predefined constants -->
15 Const adcReadyStateLoaded = 2
16 Const adcReadyStateInteractive = 3
17 Const adcReadyStateComplete = 4
18
19 Dim state
20
21 Public Sub window_OnLoad()
22     ' Set the state machine at the first state
23     StatusText.Value = "Click Find."
24     state = 0
25 End Sub
26
27 Public Sub deitelDC_OnReadyStateChange()
28     If state = 1 Then
29         Select Case deitelDC.ReadyState
30             ' Just started downloading, there is no
31             ' data to look at.
32             Case adcReadyStateLoaded
33                 StatusText.Value = "Downloading..."
34
35             ' Partially downloaded the data,
36             ' there is more to come.
37             Case adcReadyStateInteractive
38                 StatusText.Value = "Still downloading..."
39
40             ' Completely downloaded the data,
41             ' there's no more coming.
42             Case adcReadyStateComplete
43
44                 ' Fill in the fields for updating
45                 ' Get ISBN field to prove we got the right one
46                 FoundISBN.Value = deitelDC.Recordset( "ISBN" )
47
48                 ' The title we want to modify
49                 FoundTitle.Value = deitelDC.Recordset( "Title" )
50
51                 ' OK for updating. Everything worked.

```

Fig. 25.38 Updating a remote database using RDS (part 1 of 7).

```

52         StatusText.Value = "Finished downloading."
53         state = 2
54     End Select
55
56     ElseIf state = 2 Then
57
58         Select Case deitelDC.ReadyState
59             ' Started uploading, there is no data sent.
60             Case adcReadyStateLoaded
61                 ' OK for updating. Everything worked.
62                 StatusText.Value = "Uploading..."
63
64             ' Partially uploaded the data, there is more to send.
65             Case adcReadyStateInteractive
66                 ' OK for updating. Everything worked.
67                 StatusText.value = "Still Uploading..."
68
69             ' Completely downloaded the data,
70             ' there is no more coming.
71             ' Goto readystate = complete if it works
72             Case adcReadyStateComplete
73                 ' OK for updating. Everything worked.
74                 StatusText.value = "Finished updating."
75                 state = 0
76         End Select
77     End If
78 End Sub
79
80 Public Sub Find_OnClick()
81     ' Validate the input values. Never assume valid
82     ' data is in the text boxes.
83
84     ' Server.Value will be used to designate the
85     ' server with the database
86     If Server.Value = "" Then
87         Call MsgBox( "Please specify a web server. " & _
88             "Suggest: http://xxx.xxx.xxx.xxx" )
89
90     ' ISBN.Value is the record we want to search for
91     ElseIf ISBN.value = "" Then
92         Call MsgBox( "Please specify an ISBN to examine. " & _
93             "Suggest: 0-13-226119-7" )
94
95     ' All data is probably valid so begin the data download.
96     Else
97         ' Request the data from.
98         deitelDC.Server = Server.Value
99
100        ' Set the SQL query.
101        deitelDC.SQL = "SELECT ISBN, " & _
102            "Title FROM Titles WHERE ISBN = '" & ISBN.Value & "'"
103
104        ' Set the DSN to fetch the data.
105        deitelDC.Connect = "DSN=Books;"

```

Fig. 25.38 Updating a remote database using RDS (part 2 of 7).


```

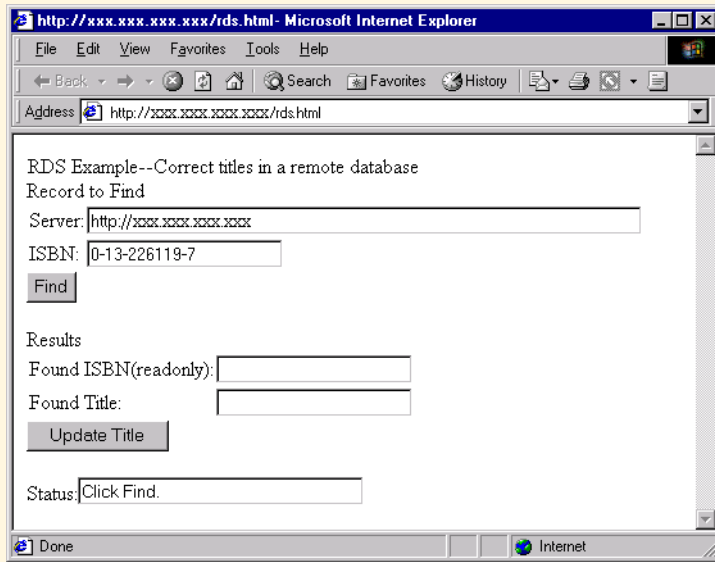
106
107     ' Tell the server to begin sending the data to us.
108     Call deitelDC.Refresh()
109     state = 1
110 End If
111 End Sub
112
113 Public Sub Update_OnClick()
114     ' If everything worked above, we can change
115     ' the record in the database
116     If state = 2 Then
117         ' We are only updating this field in the database.
118         ' so we fetch the value from the text box and set it to go
119         ' back to the server for update
120         deitelDC.Recordset( "Title" ) = FoundTitle.Value
121
122
123
124
125         ' Save these changes
126         Call deitelDC.SubmitChanges()
127
128         ' Refresh after submit operation
129         Call deitelDC.Refresh()
130     End If
131 End Sub
132 -->
133 </SCRIPT>
134
135 <HEAD>
136 <META NAME = VI60_defaultClientScript CONTENT = VBScript>
137 </HEAD>
138
139 <BODY>
140 RDS Example--Correct titles in a remote database<BR>
141 Record to Find<BR>
142 <TABLE BORDER = "0" CELLPADDING = "0">
143 <TR>
144 <TD>Server:</TD>
145 <TD><INPUT ID= server NAME= server VALUE= "http://xxx.xxx.xxx.xxx"
146         TYPE = "text" SIZE = 60></TD>
147 </TR>
148 <TR>
149 <TD>ISBN:</TD>
150 <TD><INPUT ID = ISBN NAME = ISBN VALUE = "0-13-226119-7"
151         TYPE = "text"></TD>
152 </TR>
153 </TABLE>
154 <INPUT TYPE = "button" ID = "Find" NAME = "Find" VALUE= "Find"><BR>
155 <BR>
156 Results<BR>
157 <TABLE BORDER = "0" CELLPADDING = "0">
158 <TR>
159 <TD>Found ISBN( readonly ):</TD>

```

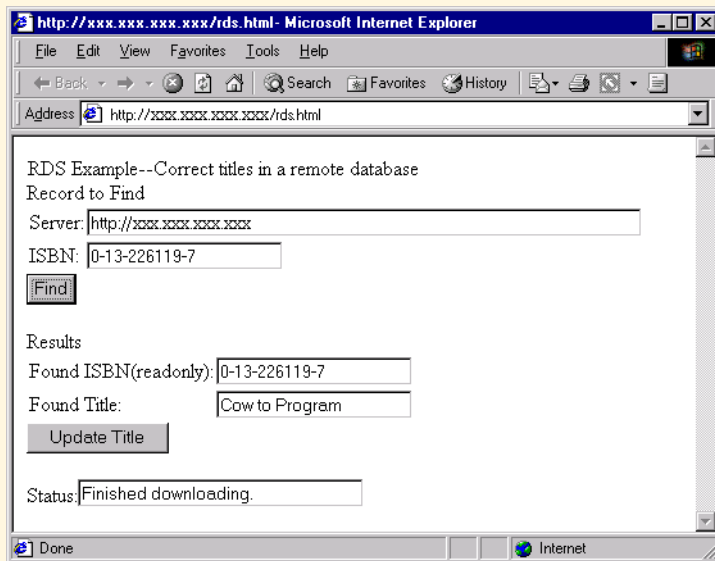
Fig. 25.38 Updating a remote database using RDS (part 3 of 7).

```
160 <TD><INPUT ID = FoundISBN READONLY NAME = FoundISBN TYPE = "text">
161 </TD>
162 </TR>
163 <TR>
164 <TD>Found Title:</TD>
165 <TD><INPUT ID = FoundTitle NAME = FoundTitle TYPE = "text"></TD>
166 </TR>
167 </TABLE>
168 <INPUT TYPE = "button" ID = "Update" NAME = "Update"
169       VALUE = "Update Title"><BR>
170 <BR>
171 Status:<INPUT TYPE = "text" ID = "StatusText" NAME = "StatusText"
172       SIZE = 30 READONLY VALUE = "Click Find."><BR>
173 </BODY>
174 </HTML>
```

Fig. 25.38 Updating a remote database using RDS (part 4 of 7).

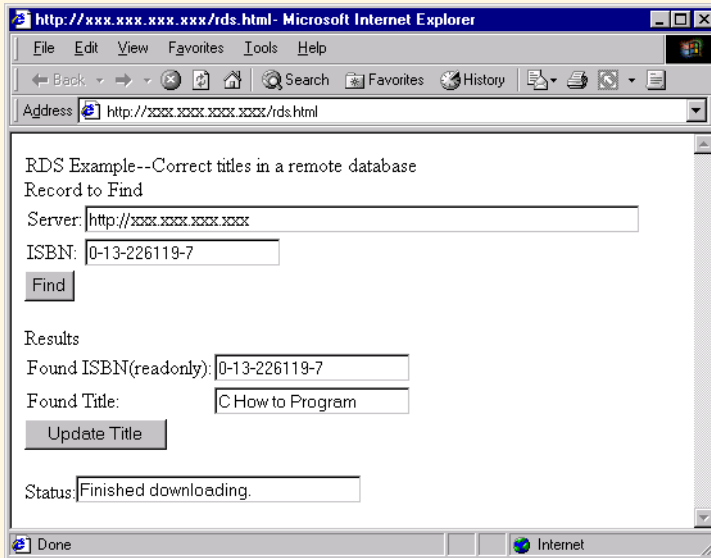


The page is loaded.

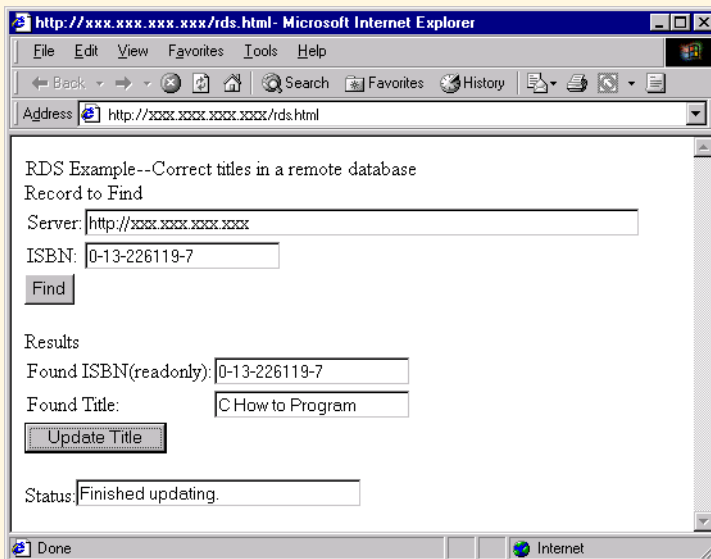


The user has clicked the **Find** button which results in the **Found ISBN** and **Found Title** fields being populated.

Fig. 25.38 Updating a remote database using RDS (part 5 of 7).



User has edited the **Found Title** field.



User has clicked **Update Title**.

Fig. 25.38 Updating a remote database using RDS (part 6 of 7).

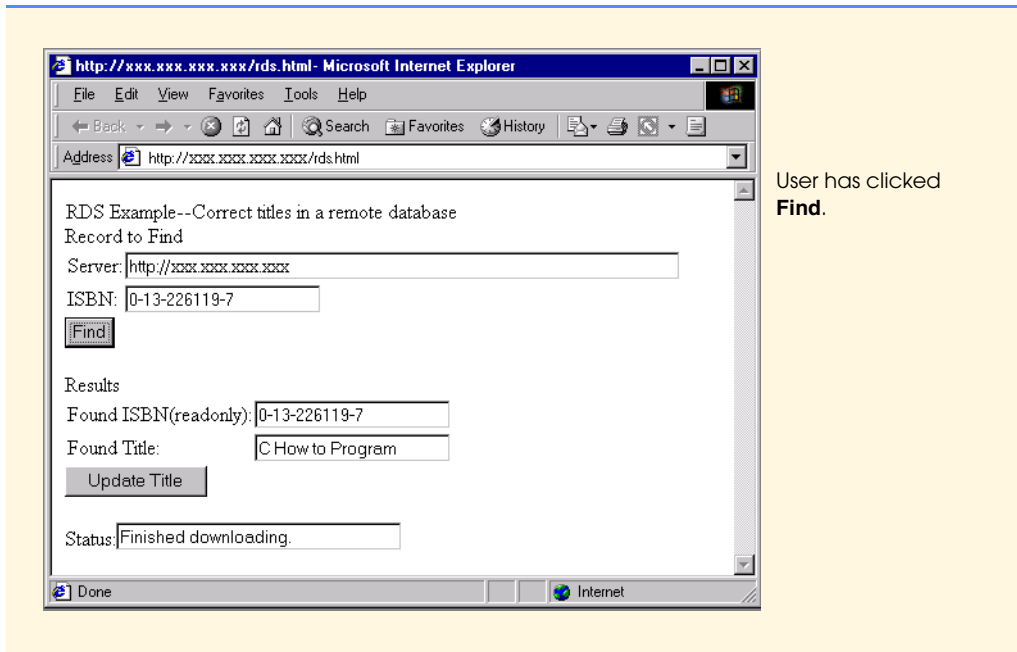
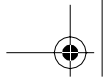


Fig. 25.38 Updating a remote database using RDS (part 7 of 7).



State	Description
adcReadyStateLoaded	The recordset does not contain any data because the query has not completed executing.
adcReadyStateInteractive	Some records in the recordset are available, but others are still being downloaded (or uploaded).
adcReadyStateComplete	All recordset records are available. The download (or upload) is complete.

Fig. 25.39 Constants representing several **RDS.Datacontrol** states.

