Database Development
OpenOffice.org & OOBasic

This is, for the time being, an informal guide on database development using OpenOffice.org & OpenOffice Basic (OOBasic).

Currently, I have discussed the Statement, ResultSet, and RowSet Services.

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Database Programming Using OOBasic

Statement Service

Contents

As mentioned in the introduction, a Statement is one of the methods we can use to connect to a database with the OOo API. A Statement is a way of directly communicating with the database using SQL commands. Whenever a result is returned, it will be stored in a *ResultSet* object—this will be discussed later in the next chapter. The Statement Service can be used to do virtually anything you can do with the GUI such as adding, dropping, updating tables; inserting, deleting, updating records, etc.

The basic steps needed to connect to a database (more specifically, an object in a database) are as follows:

1. Obtain a connection object.
2. From the connection object, create a statement object
3. Depending on your particular need, call the respective execute method.
4. Perform some action with the result—if the statement returns a result.

Let us begin by looking at a quick example:

Listing 1

```
1  Sub Example1
2    REM SIMPLE CONNECTION
3    Dim Context
4    Dim DB
5    Dim Conn
6    Dim Stmt
7    Dim Result
8    Dim strSQL As String
9    REM create database context
10   Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
11   REM get the database
12   DB=Context.getByName("DB1")
13   REM stablish connection to database
14   Conn=DB.getConnection("","")
15   REM create a statement service object
16   Stmt=Conn.createStatement()
17   REM create an SQL command
18   strSQL="SELECT *FROM  EMPLOYEES"
19   REM finally, execute and store results in ResultSet Object
20   Result=Stmt.executeQuery(strSQL)
21   While Result.next()
22     REM for now, let us just use the getString() method to get the
23     REM columns.  Note that they are being accessed by index
24     MsgBox  Result.getString(2) & " " & Result.getString(3) _
25     & "  " &     _  Result.getString(4) & " " & Result.getInt(5)
26   Wend
27   Conn.close()
28 End Sub
```

Line 8 introduces the *DatabaseContext*. As we can see from the usage in line 9, the DatabaseContext is a container for databases/data sources in OOo. If the database is not registered in OOo, you may still access it by using the *getByName(...)* method of the DatabaseContext service; instead of passing the

database name as parameter, pass the entire path of where the file is located . If you are connecting directly via a particular driver, a different method of establishing a connection may be utilized. In the next few chapters, we are only going to discuss database connections that are registered in OOo—other means of connecting will be discussed later.

> **Note**
> It is of most importance to keep in mind that the DatabaseContext is a singleton—meaning that there is only one instance running. If you dispose of the DatabaseContext, you will not be able to retrieve until OOo is restarted; usually closing or disposing of the DatabaseContext will crash OOo.

In line 10 we actually open the connection via the database object. Note that in this example, we called *getConnection(...)* method with two empty strings. If your database is password protected, this is where the username and password can be specified. Having established a connection to the desired database, we can now create a Statement object by calling the *createStatement()* method of the database object—see line 12. We are now ready to create any desired SQL command and execute it. In our example, we are going to be doing a simple SELECT. Before calling an execute method, you must decide which method is required based on the type of command created. The *executeQuery()* method is used for the SELECT command, and *executeUpdate()* for UPDATE, DELETE, INSERT, CREATE, DROP, ALTER, and GRANT.

In our example above, the *executeQuery()* was utilized as we were doing a SELECT command. This is the final step, and we are now ready to process the result (if there is a result). When a result is returned, it will be returned in the form of a *ResultSet* object. The ResultSet object, being complex, will be discussed in more detail in the next chapter.

Manipulating Data

We are going to be working with a database named DB1 and, for the moment a table named EMPLOYEES. See image 1 for table definition. Note that all names (table and columns) are in upper case. When generating SQL commands, it is necessary to quote all names that are not in upper case alphabetic characters.

As you might have noticed, everything is the same in regards to preparing a connection up to the point of generating the desired SQL command/statements. In the following sections we are going to see basic data manipulation command individually.

Inserting Data

In this example, we will see a basic INSERT INTO statement. Since we are inserting plain text data, no special handling is required. However, this is not always the case when other data types are being inserted.

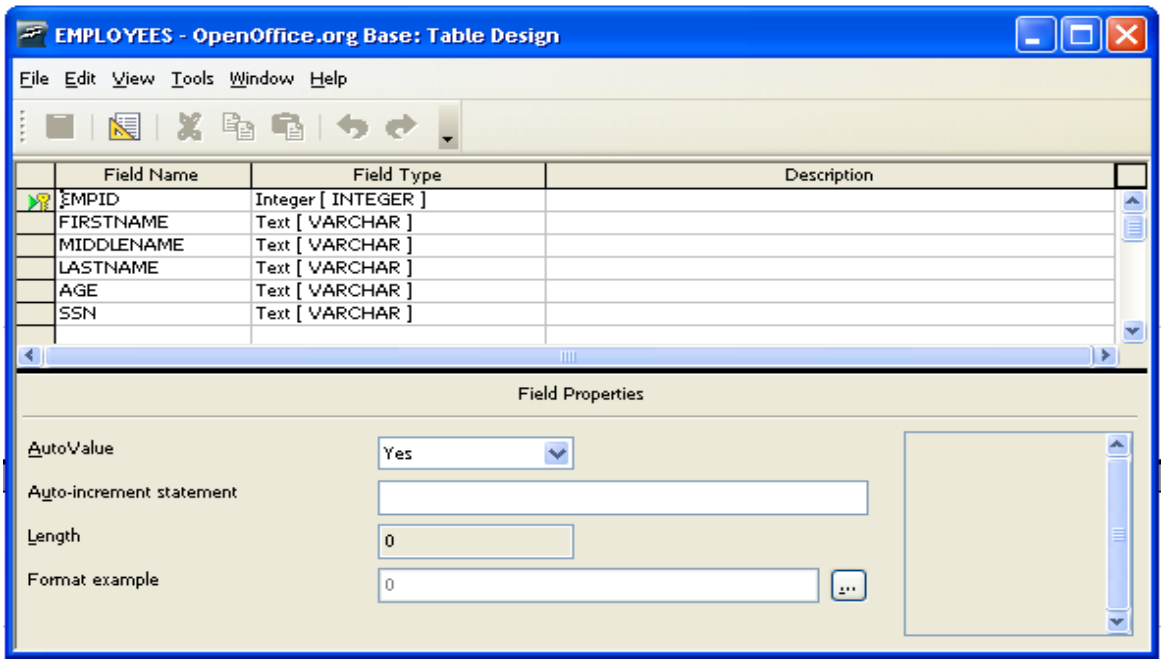


Illustration 1: EMPLOYEES Table Design

Listing 2

```
1   Sub Example2
2     REM INSERT RECORDS INTO DATABASE TABLE
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim Result
8     Dim strSQL As String
9     Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
10    DB=Context.getByName("DB1")
11    Conn=DB.getConnection("","")
12
13    Stmt=Conn.createStatement()
14    strSQL="INSERT INTO _
15    EMPLOYEES(FIRSTNAME,MIDDLENAME,LASTNAME,AGE,SSN) _
16    VALUES('Hubert','','Farnsworth','164','511-11-1111')"
17    Stmt.executeUpdate(strSQL)
18
19    Conn.close()
20  End Sub
```

The new code is introduced starting on line 14. As you can see, all the preparation is the same up to this point—compared to the previous example. Additionally, since all of our names (table and columns) are upper case, there is no need to quote them. If you do not plan ahead or forget, this will become a nightmare, though later I will offer methods to lessen the work required to quote names. As of OpenOffice.org 2.0.2, I have not had problems with case sensitivity, but if you are connecting to external databases, this may be an issue.

Image 2 shows the table where the data was inserted. Note that the EMPID field was not included in our SQL statement, but it has been entered into the table automatically. This has been true of all database packages with which I have worked.

A word of caution with auto-incrementing fields: When doing database programming, it is often necessary to do batch inserts or updates. If you are inserting into a table with an auto-incrementing field , be careful not to end up with duplicate keys (for unique or primary keys). For example: consider that you have a table with an auto-incrementing field, and the sequence at this point is 1000. If you are inserting data from another table for which that field already has a value, and you programmatically insert data into that field, the field will not be incremented. The next time that data is inserted, and the field is not inserted, the auto-increment mechanism will kick in again. Therefore make sure that the values entered do not conflict with the auto-increment sequence value. A sequence can be reset with:

```
ALTER TABLE ALTER COLUMN <COLUMN_NAME> RESTART WITH <NEW_VALUE>
```

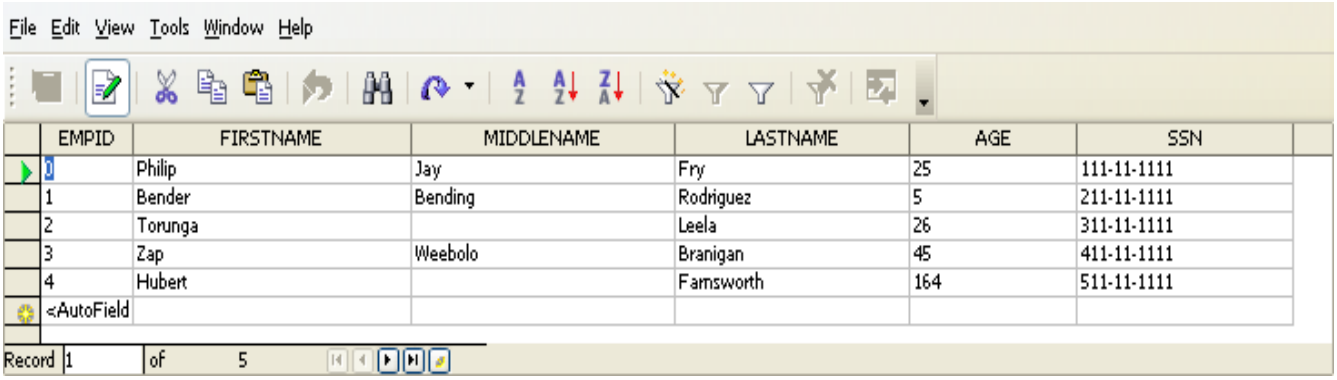


Illustration 2: EMPLOYEES Table With data

Thus far, we have only seen the simplest possible example in regards to inserting records into a table. In the following example, we are going to see a slightly more complex demonstration showing that once you create a Statement, you may reuse it as many times as you want. This is due to the fact that when the statement object is created, no specification was given as to the command to be executed. Rather, it is a generic object that will execute any valid/supported SQL statement.

In the following example, we are going to read a file, and insert the content into the database. For this example, I have made a copy of our existing *EMPLOYEES* table (structure only). Additionally, the file has been specifically prepared for this example, and thus no special parsing is required (this is a simple coma separated file with " as text delimeter. Once again, you may note that nothing new has been introduced in *Listing 3* until line 24 where the SQL statement is generated. In our previous example, the statement was hard coded. In this example, however, the statement is being generated dynamically from the data that was read from our prepared file. After the statement is generated, we simply call the *executeUpdate(...)* method of the statement object just as before, with the exemption that we are going to be re-using it for each iteration of our loop.

Image 3 shows the updated table.

Listing 3

```
1   Sub Example3
```

```
2     REM INSERT RECORDS INTO DATABASE TABLE
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim Result
8     Dim strSQL As String
9     Dim strValues As String
10    Dim iFile As Integer
11    Dim path As String
12
13    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
14    DB=Context.getByName("DB1")
15    Conn=DB.getConnection("","")
16
17    Stmt=Conn.createStatement()
18    iFile=FreeFile
19    path="C:\Documents and Settings\Programming\OOo\Database _
20      Development\"
21    Open path & "employees.txt" For Input As #iFile
22    While Not( EOF(iFile) )
23          Line Input #iFile,strValues
24          strSQL="INSERT INTO EMPLOYEES2 _
25             (FIRSTNAME,MIDDLENAME,LASTNAME,AGE,SSN)   _
26              VALUES(" & strValues & ")"
27          'MsgBox strSQL
28          Stmt.executeUpdate(strSQL)
20    Wend
30    Close #iFile
31    Conn.close()
32 End Sub
```

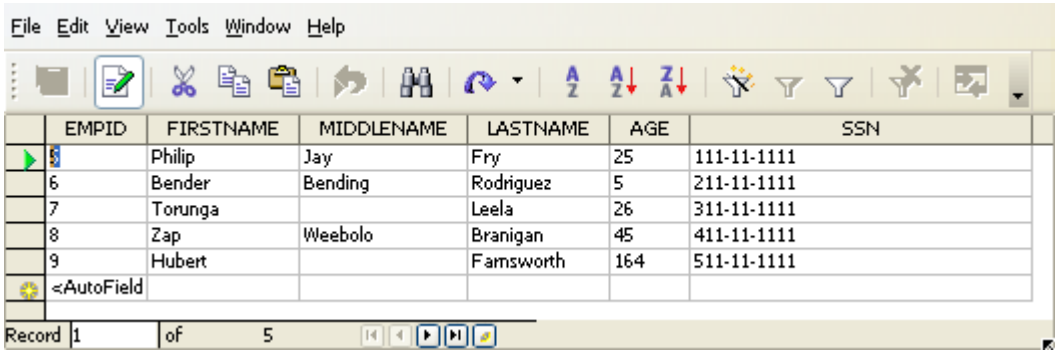


Illustration 3: Record Updates

In database programming, it is very often necessary to insert data into tables or modify existing tables based on data contained in a file. The above example is a brief introduction—batch modification of data will be covered in more detail in later chapters.

Updating Records

Updating records using the Statements Service is just as easy as inserting (as will be deleting). Once again, the only difference is the SQL statement generated—this would of course be an UPDATE rather than INSERT INTO.

After inserting the records into the EMPLOYEES table, I noticed the following typographical errors. First, Leela's first name is *Turanga* and not *Torunga*. Second, it is *Zapp Brannigan* not *Zap Branigan*. Listing 4 show the code that makes the required updates to the database. For simplicity, the SQL statements have been put into an array, as this will allow us to easily cycle through the array and execute the updates by using the *executeUpdate(...)* of the statement service.

Listing 4

```
1   Sub Example4
2     REM UPDATE RECORDS/FIELDS
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim Result
8     Dim strSQL As String
9
10    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
11    DB=Context.getByName("DB1")
12    Conn=DB.getConnection("","")
13
14    Stmt=Conn.createStatement()
15    updates=Array("UPDATE EMPLOYEES SET MIDDLENAME='N/A' WHERE _
16       MIDDLENAME IS NULL", _
17    "UPDATE EMPLOYEES SET FIRSTNAME='Zapp',LASTNAME='Brannigan' _
18      WHERE EMPID=3", _
19    "UPDATE EMPLOYEES SET FIRSTNAME='Turanga' WHERE EMPID=2")
20
21    For I=0 To UBound(updates)
22          Stmt.executeUpdate(updates(I))
23          'MsgBox updates(I)
24    Next I
25    Conn.close()
26  End Sub
```

As you might have noted, it is quite important to include the WHERE clause when updating a database using SQL (rather than through a GUI).

Deleting Records

The last topic in the basic SQL commands is the DELETE command. I mentioned above to use caution when updating a database programmatically, as you may end up updating an entire table if you fail to use a proper WHERE clause. The DELETE command can be more detrimental if not used with the proper WHERE clause, as you will delete the entire table. Code listing 5 shows the code to delete records from a table using the Statement Service.

Listing 5

```
1   Sub Example7
2     REM DELETE RECORDS
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim Result
8     Dim strSQL As String
9
10    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
11    DB=Context.getByName("DB1")
12    Conn=DB.getConnection("","")
13
14    Stmt=Conn.createStatement()
15    strSQL="DELETE FROM EMPLOYEES2 WHERE EMPID IN(10,14)"
16    Stmt.executeUpdate(strSQL)
17    Conn.close()
18  End Sub
```

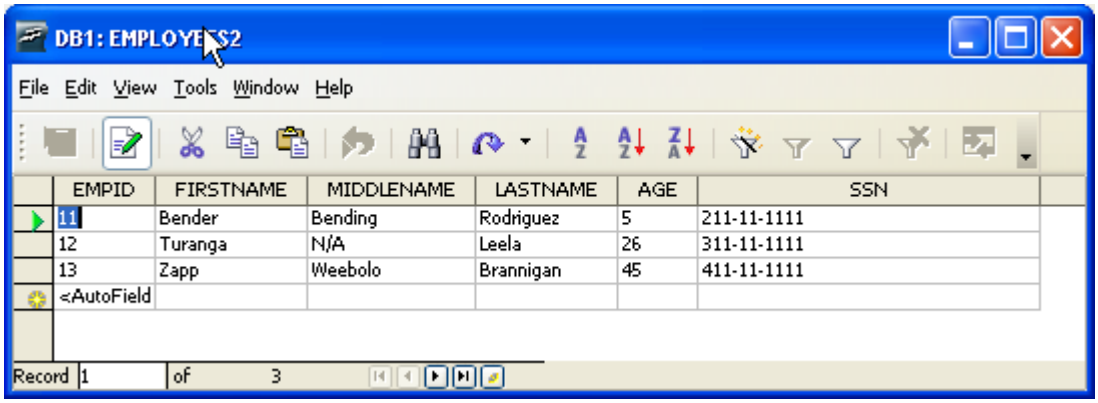


Illustration 4: Table after record deletion

As you can see in illustration 4, the records with EMPID 10 and 14 have been removed from the table.

Prepared Statements

Earlier I mentioned that the Statement service is quite flexible, and that it allows reuseability as the *createStatement* object is generic because it does not require any SQL command specification at the time the object is created. However, this flexibility comes at a cost. If you have not yet seen this pattern, you will soon learn that software, much like everything else, is a series of compromises. If you want flexibility, you may sacrifice speed or efficiency, and vice versa. That which you trade for the sake of something else is up to you; but more importantly is determined by your needs.

A *PreparedStatement* is similar to the statement object we have been using; however, a *PreparedStatement* requires that the SQL command be specified at the time the object is created. This has advantages and disadvantages.

Advantage-the advantage of using a PreparedStatement is that once it is created it is compiled, and therefore increases the speed for subsequent uses. In the examples we have seen in the previous pages this would be irrelevant, as the tables we are working with are quite small. However, in large tables, and in particular, when the data resides in a server across a network, speed may be preferred over flexibility.

Disadvantage—the disadvantage with a PreparedStatement object is that once it is created, it may not be reused for something else. If you want to use a PreparedStatement to query a table, store the result somewhere, and the update a second table, two objects would have to be created. Additionally, creating a PreparedStatement requires more complexity than a regular *Statement*.

Personally, I do not find the disadvantages a big enough factor to discourage use, in particular when their execution speed is useful.

Creating a PreparedStatement

The PreparedStatement object is created via the connection object, much as the Statement object, by using the *prepareStatement(...)* method. The parameter required is the SQL statement to be executed. Before creating the PreparedStatement object, you must plan how you want to create it; namely, with or without parameters. If you need to create a PreparedStatement with parameters, all parameters must be indicated with a question mark (?). If no parameters are required, simply create the SQL statement and call the respective execute method (executeQuery, executeUpdate, etc).

Parameters may be required when generating an SQL statement and the values for the WHERE clause or VALUES(...) in an INSERT INTO statement are not known.

Let us look at quick example:

Listing 6

```
1  Sub Example8
2     REM QUERY TABLE USING PreparedStatement
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim Result
8     Dim strSQL As String
9     Dim strDump As String
10
11    'CREATE A DATABASE CONTEXT OBJECT
```

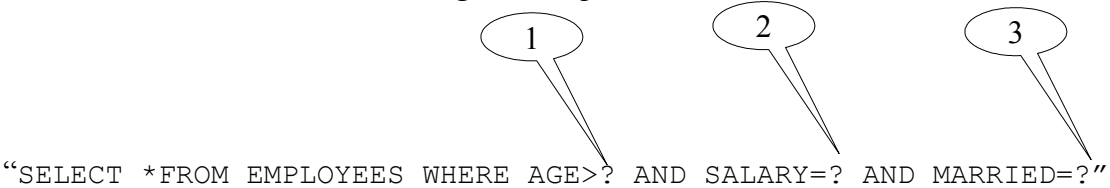
```
12    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
13    'GET DATABASE BY NAME
14    DB=Context.getByName("DB1")
15    'ESTABLISH CONNECTION TO DATABASE
16    Conn=DB.getConnection("","")
17    'CREATE A PREPAREDSTATEMENT OBJECT
18    Stmt=Conn.prepareStatement("SELECT *FROM EMPLOYEES WHERE EMPID=?")
19    'SUPPLY PARAMETER VALUES
20    Stmt.setInt(1,0)
21    'FINALLY, EXECUTE THE STATEMENT
22    'SAME RULES APPLY IN SELECTING THE PROPER EXECUTION METHOD AS _
23     ' WITH  REGULAR STATEMENTS
24    Result= Stmt.executeQuery()
25    strDump=""
26    'NOW LET'S CYCLE THROUGH THE RESULT SET
27    While Result.next()
28          strDump=strDump  & Result.getString(2) &  " " & _
29            Result.getString(4) & chr(10)
30    Wend
31    'NOTE THAT THERE IS ONLY ONE RECORD--AS WE PASSED EMPID=0
32    MsgBox strDump
33
34    Conn.close()
35  End Sub
```

The code of interest begins on line 18 where we create the PreparedStatement by calling the *prepareStatement*(...) method. In our case, we are creating our PreparedStatement with one parameter. Therefore, the SQL statements contains one question mark (?)--`...EMPID=?...`

The next step, of course, is to supply the statement with the values for all parameters indicated. In line 20, we supply our statement with the desired EMPID value using the *setInt(...)* method. Generally you can use the *setString(...)* for most basic data types, but you may end up corrupting your data by not using the property setXXX(...) method. You will find a setXXX(...) method for every data type in the Java language.

Every setXXX(...) method requires at least two parameters. The first is the index corresponding to the desired parameter, and the second is the actual data you wish to supply. For special or more advanced methods such as setBinaryStream, a third parameter is required to specify the length. Illustration 5 shows how to identify the correct index for a desired parameter in an SQL statement. Table 1 shows the setXXX() methods that can be utilized to supply values to a prepared statement object.

Illustration 5: Parameter Indexing in a Prepared Statement



Let us look at a more complex example. In an earlier example, we saw how we could insert records into a table from data contained in a text file. Let us now perform the same task using a PreparedStatement.

Listing 7

```
1  Sub Example9
2     REM INSERT RECORDS FROM FILE USING PREPARED STATEMENT
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim strSQL As String
8     Dim strBuff As String
9     Dim iFileName As String
10    Dim iFileNumber As Integer
11    Dim I As Integer
12
13    'CREATE A DATABASE CONTEXT OBJECT
14    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
15    'GET DATABASE BY NAME
16    DB=Context.getByName("DB1")
17    'ESTABLISH CONNECTION TO DATABASE
18    Conn=DB.getConnection("","")
19    'CREATE A PREPAREDSTATEMENT OBJECT
20    strSQL="INSERT INTO _
21         EMPLOYEES2(FIRSTNAME,MIDDLENAME,LASTNAME,AGE,SSN)_
22        VALUES(?,?,?,?,?)"
23    Stmt=Conn.prepareStatement(strSQL)
24
25    'GET NEXT FILE NUMBER AVAILABLE
26    iFileNumber=FreeFile
27    'ESPEFICY FILE/PATH
28    iFileName="C:\Documents and Settings\Programming\OOo\Database _
29         Development\employees.txt"
30    Open iFileName for Input As #iFileNumber
31    'READ FILE
32    While NOT( EOF(iFileNumber) )
34          'READ 5 ITEMS AT A TIME--FIVE COLUMNS
35          For I=0 To 4
36                Input #iFileNumber,strBuff
37                'WE DON'T NEED SINGLE QUOTE ANYMORE--REMOVIE IT
38                strBuff=Mid(strBuff,2,Len(strBuff)-2)
39                'PROVIDE VALUE FOR ITH COLUMN
40                Stmt.setString(I+1,strBuff)
41          Next I
42          'EXECUTE THE STATEMENT
43          Stmt.executeUpdate()
44    Wend
45
46    Conn.close()
47    Close #iFileNumber
48  End Sub
```

We start to create our SQL statement on line 20. Note that the only difference so far from what we have seen before is the VALUE(...) clause; instead of the actual value, we have a question mark (?) for each value to be entered. The PreparedStatement is created on line 23. Now, the next task is to supply values to the statement. We are going to accomplish this by reading a text file—this is the same file we used in the previous example using a *Statement* object. Lines 32 to 44 contain the `While` Loop that reads the file and supplies the values to our PreparedStatement. Note however, that on line 35 we have another loop. This `For` loop allows us to easily supply the values. In our example, this is possible since all the values being read are of the same type—`VARCHAR`. If however, we had various data types, it would be a more complex task.

Also note that, in this example, we are reading the file differently from the previous example. First, on the original example we read one whole line at a time. This was possible since we were generating the entire content of the `VALUES(..)` portion of the SQL statement—which is basically the same as a whole line in the file. In this example, however, we are not interested in the whole line, as we need the individual fields to insert into the PreparedStatement using the respective setXXX(...) method one at a time. One way of accomplishing this is to use a `For` loop and cycle through five iterations—supplying the I^{th} value to the PreparedStatement in each iteration. Again, this would not be possible, or at least advisable if we were reading data with varying data types. The second difference between this example and the previous in which we inserted the data from this file into the EMPLOYEES2 table is that, since we are doing a textual generation of the SQL statement. Therefore, it was necessary to have the values quoted. In this example however, we are passing values to a function. It is not necessary to have the values quoted. You may note that on line 38, the single quotes are removed from each value read.

Table 1: setXXX Methods for Prepared Statement

setArray	(parameterIndex as long, x as object)
setBinaryStream	(parameterIndex as long, x as object, length as long)
setBlob	(parameterIndex as long, x as object)
setBoolean	(parameterIndex as long, x as boolean)
setByte	(parameterIndex as long, x as byte)
setBytes	(parameterIndex as long, x as []byte)
setCharacterStream	(parameterIndex as long, x as object, length as long)
setClob	(parameterIndex as long, x as object)
setDate	(parameterIndex as long, x as struct)
setDouble	(parameterIndex as long, x as double)
setFloat	(parameterIndex as long, x as single)
setInt	(parameterIndex as long, x as long)
setLong	(parameterIndex as long, x as hyper)
setNull	(parameterIndex as long, sqlType as long)
setObject	(parameterIndex as long, x as variant)
setObjectWithInfo	(parameterIndex as long, x as variant, targetSqlType as long, scale as long)
setRef	(parameterIndex as long, x as object)
setShort	(parameterIndex as long, x as integer)
setString	(parameterIndex as long, x as string)
setTime	(parameterIndex as long, x as struct)
setTimestamp	(parameterIndex as long, x as struct)

Supplying values using the respective setXXX() method can become a bit cumbersome—if you are supplying more than string data types. However, this can be alleviated by creating your own sub-routine. Code listing 8 shows a simple routine to call the respective setXXX() method to supply values to a preparedStatement.

Listing 8

```
1  Sub setXXX(prepStmt,val , parindex As Long, DataType As String)
2     REM set the value for the object (prepared statemnt)
3     Select Case DataType
4           Case "Array": prepStmt.setArray(parindex,val)
5           Case "Blob": prepStmt.setBlob(parindex,val)
6           Case "Boolean": prepStmt.setBoolean(parindex,val)
7           Case "Byte": prepStmt.setByte(parindex,val)
8           Case "Bytes": prepStmt.setBytes(parindex,val)
9           Case "Clob": prepStmt.setClob(parindex,val)
10          Case "Date": prepStmt.setDate(parindex,val)
```

```
11          Case "Double": prepStmt.setDouble(parindex,val)
12          Case "Float": prepStmt.setFloat(parindex,val)
13          Case "Int": prepStmt.setInt(parindex,val)
14          Case "Long": prepStmt.setLong(parindex,val)
15          Case "Null": prepStmt.setNull(parindex,val)
16          Case "Object": prepStmt.setObject(parindex,val)
17          Case "Ref": prepStmt.setRef(parindex,val)
18          Case "Short": prepStmt.setShort(parindex,val)
19          Case "String": prepStmt.setString(parindex,val)
20          Case "Time": prepStmt.setTime(parindex,val)
21          Case "Timestamp": prepStmt.setTimestamp(parindex,val)
22          Case Else: prepStmt.setString(parindex,val)
23     End Select
24  End Sub
```

The first parameter is the preparedStatement object—remember that parameters are passed *by reference* in OOoBasic by default. The second parameter is the actual value being supplied, followed by the parameter index and finally the data type. As you can see, the rest is a simple `Select Case` statement. Code listing 9 demonstrates how to utilized our newly defined setXXX(..) method.

Listing 9

```
1   Sub Example10
2     REM INSERT RECORDS FROM FILE USING PREPARED STATEMENT
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim strSQL As String
8     Dim strBuff As String
9
10    'CREATE A DATABASE CONTEXT OBJECT
11    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
12
13    'GET DATABASE BY NAME
14    DB=Context.getByName("DB1")
15    'STABLISH CONNECTION TO DATABASE
16    Conn=DB.getConnection("","")

17    'CREATE A PREPAREDSTATEMENT OBJECT
18    strSQL="INSERT INTO EMPLOYEES(FIRSTNAME,LASTNAME,AGE,SSN) _
19        VALUES(?,?,?,?)"
20    Stmt=Conn.prepareStatement(strSQL)
22    'NOW, CALL setXXX(..) subroutine to supply values to our
23    'Prepared statement
24    setXXX(Stmt,"Amy",1,"String")
25    setXXX(Stmt,"Wong",2,"String")
26    setXXX(Stmt,22,3,"Int")
27    setXXX(Stmt,"121-11-1111",4,"String")
28    'EXECUTE THE STATEMENT
29    Stmt.executeUpdate()
30    Conn.close()
31
32  End Sub
```

While this example works, it does not easy the workload. As you can see, we still to one function call per column, which is what we would have done by directly calling the respective setXXX() method on the `Stmt` object. However, having established that our routine does in fact work, let us look at a more productive example.

Listing 10

```
1  Sub Example11
2     REM INSERT RECORDS FROM FILE USING PREPARED STATEMENT/setXXX(..)
3     Dim Context
4     Dim DB
5     Dim Conn
6     Dim Stmt
7     Dim strSQL As String
8     Dim strBuff As String
9     Dim iFileName As String
10    Dim iFileNumber As Integer
11    Dim DataTypes
12    Dim I As Integer
13
14    'CREATE A DATABASE CONTEXT OBJECT
15    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
16    'GET DATABASE BY NAME
17    DB=Context.getByName("DB1")
18    'STABLISH CONNECTION TO DATABASE
19    Conn=DB.getConnection("","")
20
21    'CREATE A PREPAREDSTATEMENT OBJECT
22    strSQL="INSERT INTO _
22     EMPLOYEES2(FIRSTNAME,MIDDLENAME,LASTNAME,AGE,SSN,DOB, _
23       SALARY,MARRIED) VALUES(?,?,?,?,?,?,?,?)"
24    Stmt=Conn.prepareStatement(strSQL)
25    'GET NEXT FILE NUMBER AVAILABLE
26    iFileNumber=FreeFile
27    'SPEFICY FILE/PATH
28    iFileName="C:\Documents and Settings\Programming\OOo\Database _
29    Development\employees.txt"
30    Open iFileName for Input As #iFileNumber
31    'ARRAY TO SPECIFY THE DATA TYPE FOR EACH COLUMN READ
32    DataTypes=Array("String","String","String","Int","String", _
33                        "String","Float","Boolean")
34    'READ FILE
35    While NOT( EOF(iFileNumber) )
36          'READ 8 ITEMS AT A TIME--FIVE COLUMNS
37          For I=0 To 7
38                Input #iFileNumber,strBuff
39                'PROVIDE VALUE FOR ITH COLUMN
40                setXXX(Stmt,strBuff,I+1,DataTypes(I))
41          Next I
42          'EXECUTE THE STATEMENT
43          Stmt.executeUpdate()
44    Wend
45
```

```
46    Conn.close()
47    Close #iFileNumber
48  End Sub
```

Note that this example is quite similar to listing 7. The only difference is that we are using the proper setXXX() method—which is necessary as we are now importing/inserting several more fields of varying types. Illustration 6 shows our second table (EMPLOYEES2) after the routine was executed. Data types such as Binary Streams require special handling; therefore, our setXXX() routine does not support them. On line 32 we defined an array that specifies the data type for each column; this will allow us to easily retrieve the desired type for each column. Our own setXXX() method is called to supply the values. Note that while the array is 0 based (as defined here), the columns in the preparedStatement are 1 based.

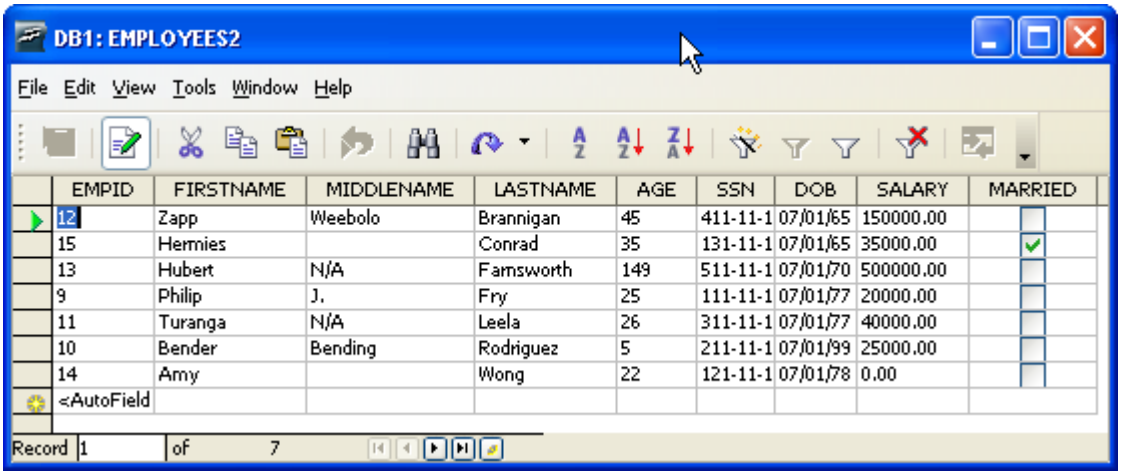


Illustration 6: EMPLOYEES2 Table after code execution

A Closer Look at the OOo API

Up to now, we have seen examples on database access and manipulation using the OOo API. However, we haven not seen all the methods or properties for the services or objects utilized. As it is quite advantageous, if not crucial, to have a more thorough knowledge of the API or libraries being utilized. We are not going to take a closer look at the properties and methods for the objects and services previously discussed.

DatabaseContext

Earlier, we briefly discussed the DatabaseContext as being a container that hold databases or data sources in OOo. Note that it is not necessary to have a database registered in OOo to be able to access it—though it makes the process simpler. Looking at the properties table as well as the methods table, we can see the *ElementNames* property and the *createEnumaration, getElementNames, getByName,*

hasByName,hasElements methods respectivelly. Enumeration as well as name access support are common methods found in container objects.

Table 2: Properties for the DatabaseContext Service

Property	**Data Type**
ImplementationName	string
SupportedServiceNames	[]string
ElementType	type
ElementNames	[]string
Types	[]type
ImplementationId	[]byte
Dbg_Methods	string
Dbg_Properties	string
Dbg_SupportedInterfaces	string

Properties of interest in table 1 are greater ElementNames, Dbg_Methods, Dbg_Properties, and Dbg_SupportedInterfaces. As the name suggests, ElementNames contains a string array with the names of all registered databases. The Dbg_* properties return a string containing the methods, properties, and supported interfaces respectively—such as these tables.

Table 3 lists the methods for the DatabaseContext. Let us first look at the `createEnumaration`() method. Listing 11 creates an enumeration object, and gets the name of each database registered in OOo.

Listing 11

```
1  Sub Example12
2     on error resume next
3     REM EXAMINE THE DATABASECONTEXT SERVICE
4     Dim Context
5     'CREATE A DATABASE CONTEXT OBJECT
6     Context=CreateUnoService("com.sun.star.sdb.DatabaseContext"
7     oEnum=context.createEnumeration()
8     Do While oEnum.hasMoreElements()
9           item=oEnum.nextElement()
10          print item.name
11    Loop
12  End Sub
```

When creating an new database in OOo, you will be asked to register the database. If you choose not to registered it, or later change your mind about having registered it, all hope is not lost. Database registration can be managed by going to **Tools->Options**. The OOo options dialog will open. Select *OpenOffice.org Base->Databases* to view the registration options—see illustration 7.

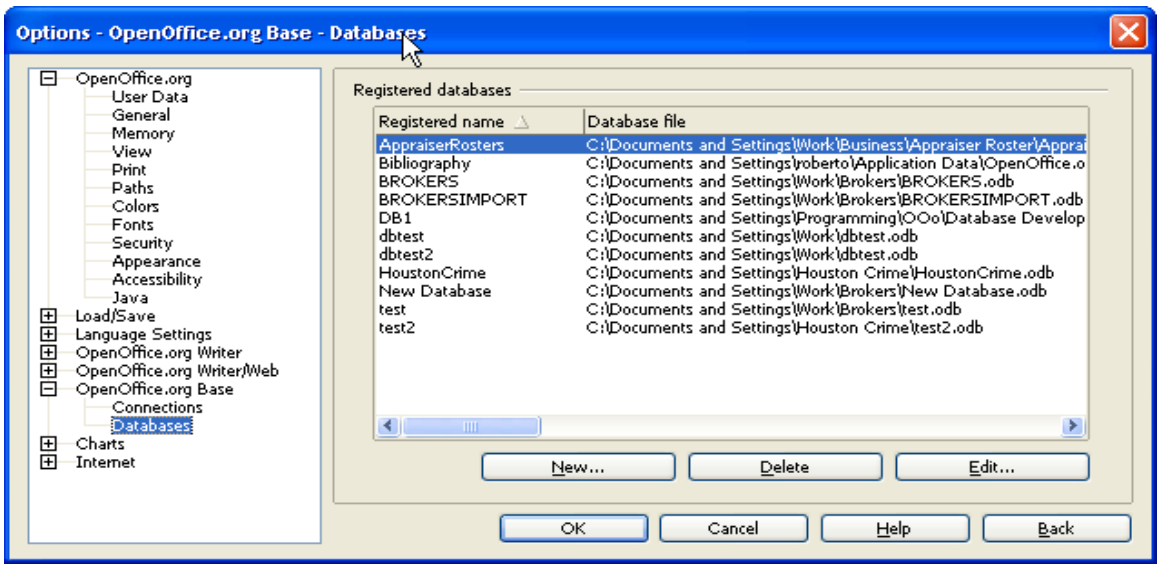


Illustration 7: Database Registration

To register a new database, simply click on the button labeled *New...* and enter information as required--see illustration 8. To unregister a database click on the button labeled *Delete*—you will be asked to confirm your choice to delete the registration. The registration information can be modified by clicking on the button labeled *Edit...*--note that the edit dialog is similar to the dialog to add a new

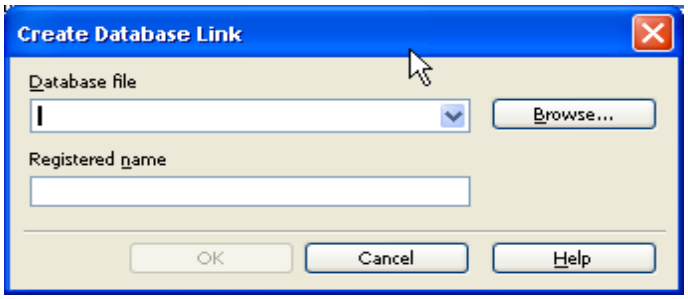


Illustration 8: Add New Database Registration

registration as seen on illustration 8.

Table 3: Methods for the DatabaseContext Service

Method	Parameters	Return Type
acquire	( )	
addContainerListener	(xListener as object)	
addEventListener	(xListener as object)	
createEnumeration	( )	
createInstance	( )	object
createInstanceWithArguments	(aArguments as []variant)	object
dispose	( )	
disposing	(Source as struct)	
getByName	(aName as string)	variant
getElementNames	( )	[]string
getElementType	( )	type
getImplementationId	( )	[]byte
getImplementationName	( )	string
getRegisteredObject	(Name as string)	object
getSomething	(aIdentifier as []byte)	hyper
getSupportedServiceNames	( )	[]string
getTypes	( )	[]type
hasByName	(aName as string)	boolean
hasElements	( )	boolean
queryAdapter	( )	object
queryInterface	(aType as type)	variant
registerObject	(Name as string, Object as object)	
release	( )	
removeContainerListener	(xListener as object)	
removeEventListener	(aListener as object)	
revokeObject	(Name as string)	
supportsService	(ServiceName as string)	boolean

Turning our attention to table 3 (DatabaseContext Methods) we can see the forbidden fruit of database programming with the OOo API—namely the *dispose()* method of the DatabaseContext service. Calling this method will, require that you restart OOo to regain use of the DatabaseContext. Restarting OOo will be facilitated by the same process since, at least in my tests, disposing of the

DatabaseContext will crash OOo.

DataSource Object

A DataSource object is returned by the DatabaseContext by calling methods such as *getByName(...)* or through enumeration access. From the previous examples, and as implied by the name, we can see that the DataSource objects is what gives access to the database.

Table 4: DataSource Object Methods

Method	Parameters	Return Value
queryInterface	(aType as type)	variant
acquire	( )	
release	( )	
dispose	( )	
addEventListener	(xListener as object)	
removeEventListener	(aListener as object)	
getTypes	( )	[]type
getImplementationId	( )	[]byte
queryAdapter	( )	object
setFastPropertyValue	(nHandle as long, aValue as variant)	
getFastPropertyValue	(nHandle as long)	variant
getPropertySetInfo	( )	object
setPropertyValue	(aPropertyName as string, aValue as variant)	
getPropertyValue	(PropertyName as string)	variant
addPropertyChangeListener	(aPropertyName as string, xListener as object)	
removePropertyChangeListener	(aPropertyName as string, aListener as object)	
addVetoableChangeListener	(PropertyName as string, aListener as object)	
removeVetoableChangeListener	(PropertyName as string, aListener as object)	
getPropertySetInfo	( )	object
setPropertyValues	(aPropertyNames as []string, aValues as []variant)	
getPropertyValues	(aPropertyNames as []string)	[]variant
addPropertiesChangeListener	(aPropertyNames as []string, xListener as object)	

removePropertiesChangeListener	(xListener as object)	
firePropertiesChangeEvent	(aPropertyNames as []string, xListener as object)	
getImplementationName	( )	string
supportsService	(ServiceName as string)	boolean
getSupportedServiceNames	( )	[]string
getConnection	(user as string, password as string)	object
setLoginTimeout	(seconds as long)	
getLoginTimeout	( )	long
getBookmarks	( )	object
getQueryDefinitions	( )	object
connectWithCompletion	(handler as object)	object
disposing	(Source as struct)	
elementInserted	(Event as struct)	
elementRemoved	(Event as struct)	
elementReplaced	(Event as struct)	
getIsolatedConnectionWithCompletion	(handler as object)	object
getIsolatedConnection	(user as string, password as string)	object
getTables	( )	object
flush	( )	
addFlushListener	(l as object)	
removeFlushListener	(l as object)	
flushed	(rEvent as struct)	

Table 5: Database Object Properties

Property	**Data Type**
Info	[]struct
IsPasswordRequired	boolean
IsReadOnly	boolean
LayoutInformation	[]struct
Name	string
NumberFormatsSupplier	object
Password	string
SuppressVersionColumns	boolean
TableFilter	[]string
TableTypeFilter	[]string
URL	string
User	string
Types	[]type
ImplementationId	[]byte
PropertySetInfo	object
ImplementationName	string
SupportedServiceNames	[]string
LoginTimeout	long
Bookmarks	object
QueryDefinitions	object
Tables	object
DatabaseDocument	object
Dbg_Methods	string
Dbg_Properties	string
Dbg_SupportedInterfaces	string

Let us look at the tables and query definitions. Note that there are methods as well as properties to obtain tables and query definitions. Listing 12 shows how to access the Tables as well as query definitions via the methods and properties, respectively.

Listing 12

```
Sub Example13
   'EXPLORE DataSource Object
   Dim Context
   Dim DB
   Dim Conn
   Dim Tables
   Dim oEnum
   Dim oItem

   'create db context
   Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
   'get datasource/database object from context
   DB=Context.getByName("DB1") '

   'get the tables from the database
   Tables=DB.getTables()

   'Perform Enumration Access
   oEnum=Tables.createEnumeration()
   'write to file for easier view of entire output
   Open PATH & "debug_dump.txt" For Output AS #100
   Print #100,"[TABLES]"
   Print #100,"Enumration Access for Tables object [db.getTables()]"
   'loop through enumeratioin
   While oEnum.hasMoreElements()
        'get next element
        oItem=oEnum.nextElement()
        Print #100,"  " & oItem.Name
   Wend
   Print #100,"Array access through Tables object-- db.getTables()"
   For I=0 To Tables.Count-1
        oItem=Tables(I)
        Print #100,"  " & oItem.Name
   Next I
   Print #100,"Array/Index Access through Tables Property [db.Tables]"
   'XRay Tables
   For I=0 To DB.Tables.Count-1
        oItem=DB.Tables(I)
        Print #100,"  " & oItem.Name
   Next I
   Print #100,"[QUERY DEFINITIONS]"
   Queries=Db.getQueryDefinitions()
   Print #100,"Enumeration Access of Query Definitions"
   oEnum=DB.QueryDefinitions.createEnumeration()
   While oEnum.hasMoreElements()
        oItem=oEnum.nextElement()
        Print #100,"  " & oItem.Name
   Wend
   Print #100,"Index Accesss Of Query Defs-db.getQueryDefinitions()"
   For I=0 To Queries.Count-1
        oItem=Queries(I) 'can also use oItgem=Queries.getByIndex(I)
        Print #100,"  " & oItem.Name
   Next I
   Print #100,"Index Access of Query Defs.--db.QueryDefinitions _
```

```
55                  property"
56   For I=0 To DB.QueryDefinitions.Count-1
57        oItem=DB.QueryDefinitions(I)
58        Print #100,"  " & oItem.name
59   Next I
60   Close #100
61  End Sub
```

Looking at the code we can see that the code to obtain the tables and query definitions is essentially the same. The reason for this is that both the properties as well as the methods to obtain the tables and query definitions, as well as other objects in the database, are of type *com.sun.star.sdb.ODefinitionContainer.*

> [The *ODefinitionContainer]* describes a container which provides access to database related definitions like commands, forms, and reports.
> The container supports access to its elements by the elements name or by the elements position.
> Simple enumeration must be supported as well.
> To reflect the changes with the underlying database, a refresh mechanism needs to be supported.
>
> **--OOo Developer's Guide**

The output for the code above is as follows:

```
[TABLES]
Enumration Access for Tables object [db.getTables()]
  EMPLOYEES
  EMPLOYEES2
  Table1
Array access through Tables object obtained from db.getTables()
  EMPLOYEES
  EMPLOYEES2
  Table1
Array/Index Access through Tables Property [db.Tables]
  EMPLOYEES
  EMPLOYEES2
  Table1
[QUERY DEFINITIONS]
Enumeration Access of Query Definitions
  Query1
  SENIORCITIZENS
Index Accesss Of Query Defs-db.getQueryDefinitions() method
  Query1
  SENIORCITIZENS
Index Access of Query Defs.--db.QueryDefinitions property
  Query1
  SENIORCITIZENS
```

It is due to the ODefenitionContainer object that we are able to access the database objects by enumeration by way of the *createEnumaration()* method; by name using the *getByName(...)* method; and by index position using *object(index)* or *object.getByIndex(index)*.

The Connection Object

> "[A connection] represents a connection (session) with a specific database. Within the context

of a Connection, SQL statements are executed and results are returned.
A Connection's database is able to provide information describing its tables, its supported SQL grammar, its stored procedures, and the capabilities of this connection. This information is obtained with the XDatabaseMetaData::getMetaData() method. “

--OOo Developer's Guide

In our examples, we created a DatabaseContext, from which we obtained a database (using the *getByName(...)* method), and then established a connection to the database by using the *getConnection(...)* method of the DataSource object. Let us now look at a few more details of the connection object.

Table 6: Methods for the Connection

Method Name	**Parameters**	**Return Type**
queryInterface	(aType as type)	variant
acquire	( )	
release	( )	
close	( )	
createStatement	( )	object
prepareStatement	(sql as string)	object
prepareCall	(sql as string)	object
nativeSQL	(sql as string)	string
setAutoCommit	(autoCommit as boolean)	
getAutoCommit	( )	boolean
commit	( )	
rollback	( )	
isClosed	( )	boolean
getMetaData	( )	object
setReadOnly	(readOnly as boolean)	
isReadOnly	( )	boolean
setCatalog	(catalog as string)	
getCatalog	( )	string
setTransactionIsolation	(level as long)	
getTransactionIsolation	( )	long
getTypeMap	( )	object
setTypeMap	(typeMap as object)	
getTypes	( )	[]type
getImplementationId	( )	[]byte

queryAdapter	( )	object
dispose	( )	
addEventListener	(xListener as object)	
removeEventListener	(aListener as object)	
getImplementationName	( )	string
supportsService	(ServiceName as string)	boolean
getSupportedServiceNames	( )	[]string
getSomething	(aIdentifier as []byte)	hyper
getParent	( )	object
setParent	(Parent as object)	
createInstance	(aServiceSpecifier as string)	object
createInstanceWithArguments	(ServiceSpecifier as string, Arguments as []variant)	object
getAvailableServiceNames	( )	[]string
prepareCommand	(command as string, commandType as long)	object
getQueries	( )	object
createQueryComposer	( )	object
getWarnings	( )	variant
clearWarnings	( )	
getTables	( )	object
getUsers	( )	object
getViews	( )	object
flush	( )	
addFlushListener	(l as object)	
removeFlushListener	(l as object)	

Table 7: Properties for the Connection

Property Name	**Type**
AutoCommit	boolean
MetaData	object
Catalog	string
TransactionIsolation	long

TypeMap	object
ReadOnly	boolean
Types	[]type
ImplementationId	[]byte
ImplementationName	string
SupportedServiceNames	[]string
Parent	object
AvailableServiceNames	[]string
Queries	object
Warnings	variant
Tables	object
Users	object
Views	object
Dbg_Methods	string
Dbg_Properties	string
Dbg_SupportedInterfaces	string

Looking at the methods and properties tables we can see that some of the properties and methods for the connection are the same as those seen for the DataSource Object—in particular those involved with obtaining database objects such as tables, queries, views, etc. Additionally, they can be accessed in the same way as with the datasource object—by name, index, and enumeration.

The *MetaData* property and the *getMetaData*(...) method have the datasource metadata. The metadata object contains a wealth of information regarding the connection's database such settings andcapabilities. Table 8 shows a few examples of the items/information found in the metadata object. Being that the metadata object is quiet lengthy, it will not be discussed thoroughly in its entirety in this chapter. For a full description refer to **Appendix A**

Table 8: Some Metadata Methods

Method Name	Description
getDatabaseProductName	returns the name of the database product
storesUpperCaseIdentifiers	Does the database treat mixed case unquoted SQL identifiers as case insensitive and store them in upper case?
getIdentifierQuoteString	What's the string used to quote SQL identifiers? This returns a space " " if identifier quoting is not supported.
supportsCoreSQLGrammar	true , if the database supports ODBC Core SQL grammar, otherwise false .
getMaxTableNameLength	return the maximum length of a table name
getDefaultTransactionIsolation	return the database default transaction isolation level. The values are defined in TransactionIsolation

While the properties and methods found in the tables presented in the previous pages are not generally utilized on day-to-day database programming, it is good practice to have a reference.

The ResultSet Service

Introduction

In the previous section (The Statement Service), we briefly looked at the *ResultSet Service*. As can be seen in the previous examples, the ResultSet Service provided access to the data source. In addition to allowing us to utilize the *result* of a *Statement Service*, a result set also allows the updating of data. Let us look at our first example in the *Statement Service* section, but shift our attention to the *result* of the Statement—The *ResultSet Service.*

Listing 1

```
1 Sub Example1
2     Dim Context
3     Dim DB
4     Dim Conn
5     Dim Stmt
6     Dim Result
7     Dim strSQL As String
8
9     Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
10    DB=Context.getByName("DB1")
11    Conn=DB.getConnection("","")
12    Stmt=Conn.createStatement()
13
14    strSQL="SELECT *FROM  " & chr(34) & "EMPLOYEES" & chr(34)
```

```
15    Result=Stmt.executeQuery(strSQL)
16
17    While Result.next
18          MsgBox     Result.getString(2) & " " & Result.getString(3) & _
19                        "  " & Result.getString(4) & " " _
20                         & Result.getInt(5)
21    Wend
22    Conn.close()
23  End Sub
```

On line 15 we can obtained the ResultSet Service from the Statement. The first thing to note about the ResultSet Service is line 17—`Result.next`. The *next* method moves the cursor one row from its current position. Once in the loop, we use the `getString(...)` and `getInt(...)` methods to get the data from the current row. These methods are similar to the setXXX(...) methods we saw in the *PreparedStatement* section earlier. However, instead of setting the data, they retrieve it from the ResultSet. Much like the generic setXXX(...) method created for the PreparedStatement, we can create a generic method to fetch the data.

Unlike the setXXX(...) methods which take two parameters, the getXXX(...) methods take only one parameter; this is the column index whose data we are trying to retrieve. The first column has index of 1, the second 2, and so forth.

A Closer Look

Let us now take a closer look at the *ResultSet Service.* There are three basic functions that can be performed with a data base result.

1. Navigate through result
2. Fetch data from current row
3. Manipulate Data—insert data or update current row data.

There are of course, other actions that can be taken, such as inspecting meta data, but this chapter is focused on data retrieval and manipulation. Each of these functions/actions listed above have, of course, specific methods that carry them out.

Navigating Through a Result Set

There is really nothing that can be done with the result, until some sort of navigation action is taken. In listing 1, this is done by invoking the *next* method of the result set. There are, of course, more methods to allow navigation or perform functions related to navigation. These methods are described below:

> **next—**moves the cursor to the next row. Initially, the result set cursor will be located before the first row, if *next* is called after the result set is obtained, the cursor will be moved to the first row. If the call to *next* is successful, it will return true, false otherwise. Note that this method can be used to test if the result set contains rows.
>
> Example:
>
> ```
> If not Result.next Then
> ```

```
        MsgBox "no records"
    Else
        MsgBox "records found"
    End If
```

It is this that allows our while loop (line 17 of listing 1) to break when the end of the result set is found. Calling *next* after the the last row has no effect.

previous—Moves the cursor to the previous row. Returns boolean, indicating success/failure.

isBeforeFirst—Returns a boolean, indicating whether or not the cursor is located before the first row.

isAfterLast—Returns a boolean, indicating whether or not the cursor is located after the last row.

isFirst—Returns boolean, indicating whether or not the cursor is located on the first row.

isLast—Returns boolean, indicating whether or not the cursor is located on the last row.

beforeFirst—Moves the cursor before the first row (the front of the result set).

afterLast—Moves the cursor after the last row (end of result set).

first—Moves the cursor to the first row. This will have the same result as *next* if called right after the result set is obtained. Additionally, it returns a boolean, indicating whether or not it succeeded. Therefore, it could also be used to test if the result set has rows.

last—Moves the cursor to the last row. This also returns a boolean, indicating whether or not it was successful.

absolute(long row)--Moves the cursor to the row index specified by *row*.

relative(long rows)**—**Moves the cursor a relative number of rows as specified by the *rows.*

getRow—Returns the index for the current row. The first row index is 1, the second 2, and so on. If there are no rows, *getRow* will return zero, even if next is called. This can be used as another test for an empty result set.

Listing 2

```
1  Sub Example2
2     Dim Context
3     Dim DB
4     Dim Conn
5     Dim Stmt
6     Dim Result
7     Dim strSQL As String
8
9     Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
10    DB=Context.getByName("DB1")
```

```
11    Conn=DB.getConnection("","")
12    Stmt=Conn.createStatement()
13    strSQL="SELECT *FROM  EMPLOYEES WHERE EMPID>0"
14    Result=Stmt.executeQuery(strSQL)
15    Dumper(PATH,DUMPERFILE,"isBeforeFirst:=" & Result.isBeforeFirst())
16    Dumper(PATH,DUMPERFILE,"GET ROW BEFORE FIRST .next:=" & _
17               Result.getRow())
18    while Result.next
19         Dumper(PATH,DUMPERFILE,"   GET ROW...IN WHILE :=" & _
20          Result.getRow())
21    Wend
22    Dumper(PATH,DUMPERFILE,"AFTER WHILE:=" & Result.getRow())
23    Result.next
24    Dumper(PATH,DUMPERFILE,".next AFTER WHILE:=" & Result.getRow())
25    Dumper(PATH,DUMPERFILE,"isAfterLastt:=" & Result.isAfterLast())
26    shell("c:\windows\notepad.exe " & PATH & DUMPERFILE,1) 'OPEN FILE
27    Conn.close()
28  End Sub
```

Code Listing 2 shows the result of *getRow* after successive *next* calls.

Note: the function *Dumper(...)* is a simple function I wrote that writes a string to a file. This makes is easier to see results—especially when the results are long. Line 26 calls the *shell(...)* function to open the file in notepad

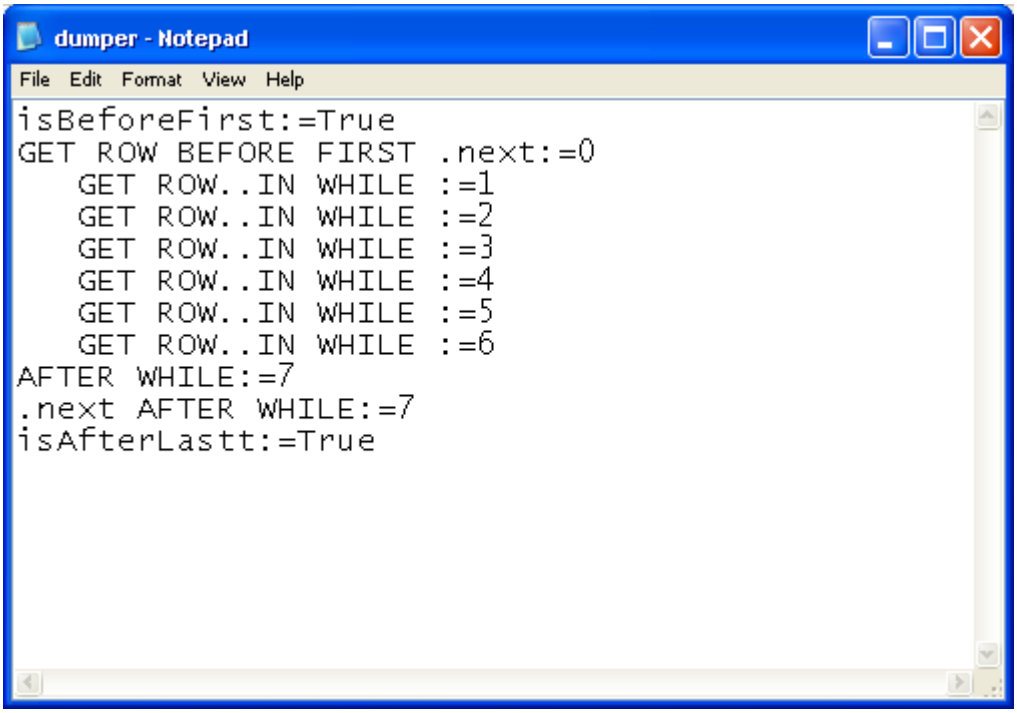


Illustration 9: Result of Successive .next Calls

Illustration 1 shows the output for our function. Note that *getRow* returns 0 when called prior to calling *next* . Once we entered the *While* loop, the corresponding row indexes are returned. When *next* was called after the loop, it still returns 7. This is due to the fact that, as explained above, *next* will have no effect if it is unable to move to the next row—having reached the end of the result set, it was unable to move the cursor, and thus the row index remained at 7.

You may also note that, before the first call to *next*, *isBeforeFirst* returned true, and when *isAfterLast* was called after the while loop, it returned true.

For those visual oriented, let us now look at listing 1 graphically.

First, let us look at the entire result set, represented here by the first four columns of the EMPLOYEES table. Let the arrow represent the cursor. Before the first call to the next, the cursor is before the first row—isBeforeFirst returns true, and getRow(...) returns 0.

	EMPID	FIRSTNAME	MIDDLENAME	LASTNAME
	0	Philip	J.	Fry
	1	Bender	Bending	Rodriguez
	2	Turanga	N/A	Leela
	3	Zapp	Weebolo	Brannigan
	4	Hubert	N/A	Farnsworth
	8	Hermies		Conrad
	11	Amy		Wong

Illustration 10: EMPLOYEES Table Representing Result Set

After the first iteration of the *While* loop, the cursor is moved to the first row, getRow(...) returns 1.

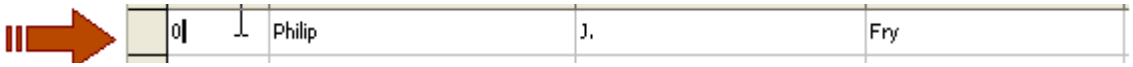


Illustration 11: First Iteration of While Loop

After the second iteration, the cursor moves to the second row, getRow(...) returns 2.

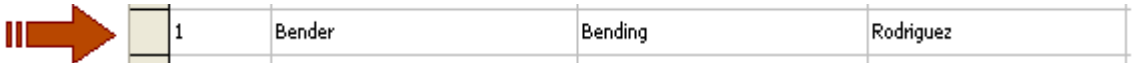


Illustration 12: Second Iteration of While Loop

And, as you might expect, after Successive iterations, the cursor moves, until it reaches the last row, row 7.

Illustration 13: Last Iteration

When row 7 is reached (the end), the *while* loop calls *next* again, however, having reached the end, it returns false, and the loop breaks. At this point the cursor is located after the last row, and *isAfterLast* returns true. Note that, after the *while* loop, another call is made to the *next* method. However, the row remains 7.

Illustration 14: Last Call to next method. Cursor is After The Last Row

ResultSetType

To use navigation methods other than *next* it is first necessary to set the proper *ResultSetType*. This is one of the properties of the *Statement Service* which specifies what type of ResultSet to create. *ResultSetType* specifies different scroll capabilities for a *ResultSet*. It is a member of the constants group in the SDBC Module (com.sun.star.sdbc); these values can be assigned via the SDBC module, or simply by passing the numeric value—see table .

Name	Numeric Value	Description
FORWARD_ONLY	1003	Allows record set to be moved forward only. In my tests, it goes further to limit navigation methods to the *next* method.
SCROLL_INSENSITIVE	1004	Can scroll in any direction, but does not reflect changes made by others.
SCROLL_SENSITIVE	1005	Can scroll in any direction, AND reflects changes made by others.

Table 9: ResultSetType Value

Usability:

```
Stmt.ResultSetType=com.sun.star.sdbc.ResultSetType.SCROLL_INSENSITIVE
```

or

```
Stmt.ResultSetType=1004
```

Note that it is easier to type 1004 than the full name/path, but it may be easier to remember what *SCROLL_INSENSITIVE* mean. It is entirely up to you which method you use.

Once the desired SCROLL_* is specified, the rest of the navigation options may be used (*absolute(..), relative(..)*). Please note that attempts to move past the end of a result set, or before the start does not produce an error—no action will be taken. However, either the *isBeforeFirst* or *isAfterLast* flags will be set. Attempting to fetch data when the result set has either of these flags set to true will result in an error. See illustration 7.

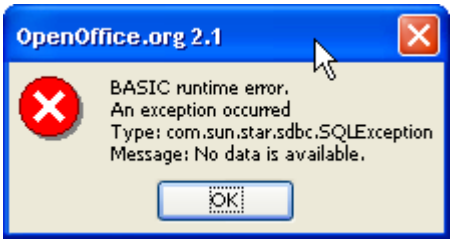


Illustration 15: Result Set is before first or after last

Fetching Data from a Row

Having beaten result set navigation to death (at least the *next* method), we can move on to fetching the data from the current row. As seen in listing 1, we can fetch data by calling the respective getXXX(...) method. Table 1 shows the getXXX(...) methods. No description has been provided here as their function is self explanatory by their names.

Method Name
getString
getBoolean
getByte
getShort
getInt
getLong
getFloat
getDouble
getBytes
getDate
getTime
getTimestamp
getBinaryStream
getCharacterStream

getObject
getRef
getBlob
getClob
getArray

Again, they all take one parameter which is the column index.

When working with a table/view that has a large number of columns, it may not be as easy to remember the index for a particular column. Consider that the table or view has 20 fields (often this can be solved by simply breaking up to the table), and we are interested in the column by the name "HIREDATE." We could open the table definition and count the columns to get the corresponding column index. If the SELECT statement only included a small subset of the columns, the index could also be obtained from the SELECT statement in your SQL string passed (if using the *Statement* or *PreparedStatement* services). However, it might be easier to refer to the fields by name. This can be accomplished by using the *findColumn(...)* method of the *ResultSet*. The *findColumn(...)* method takes a string corresponding to the name for the column of interest, and returns the column index. This can be passed to the appropriate getXXX(...) method. Let us look at an example.

Listing 3

```
1 Sub Example3
2     Dim Context
3     Dim DB
4     Dim Conn
5     Dim Stmt
6     Dim Result
7     Dim strSQL As String
8     Dim strTmp As String
9     Dim colIndex As Integer
10
11
12    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
13    DB=Context.getByName("DB1")
14    Conn=DB.getConnection("","")
15    Stmt=Conn.createStatement()
16
17    strSQL="SELECT *FROM  EMPLOYEES"
18    Result=Stmt.executeQuery(strSQL)
19
20    while Result.next
21          colIndex=Result.findColumn("EMPID") 'GET EMPID COL INDEX
22          strTmp=Result.getInt(colIndex) & ","
23          colIndex=Result.findColumn("FIRSTNAME") 'FIRSTNAME COL INDEX
24          strTmp=strTmp & Result.getString(colIndex)  & ","
25          colIndex=Result.findColumn("AGE") 'AGE COL INDEX
26          strTmp=strTmp & Result.getString(colIndex)
27          Dumper(PATH,DUMPERFILE,strTmp) 'DUMP REC TO FILE
```

```
28    Wend
29     shell("c:\windows\notepad.exe " & PATH & DUMPERFILE,1) 'OPEN FILE
30    Conn.close()
31 End Sub
```

Listing 3 is similar to listing 1, with the exception that it uses the *findColumn(...)* method, rather than passing the column index manually. On line 21 we obtain the column index for EMPID, and pass it to the *getInt(...)* method on line 22. This is repeated for the other two columns of interest. Note that we could have done the following:

```
Result.getInt( Result.findColumn("EMPID") )
```

This would reduce the number of lines in our code. However, I personally prefer two obtain the index separately, and then pass it to the respective getXXX(...) method as it makes the code more readable; but this is a matter of personal preference.

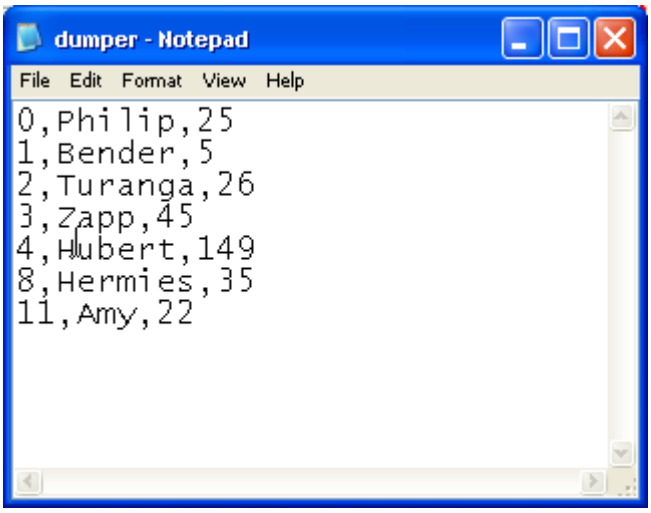


Illustration 16: Output of Listing 3

In Practice

All three examples above have produced the desired result. More appropriately, the code provided here is the final code that provided the desired result as suitable for the demonstration. In our listing above, there are two actions that could lead to the same error; fortunately this is an error that can be easily identified once the *SQLException* is thrown. If the name passed to the *findColumn(...)* method is not a valid column name, or if the index passed to the respective setXXX(...) method is invalid, an SQLException will be thrown. Illustration 8 shows error messages after calling `Result.findColumn("EMPIDD")` --extra 'D' added to 'EMPID'. Illustration 9 shows error message after calling `Result.getInd(1000)` --1000 being greater than the number of columns in our table.

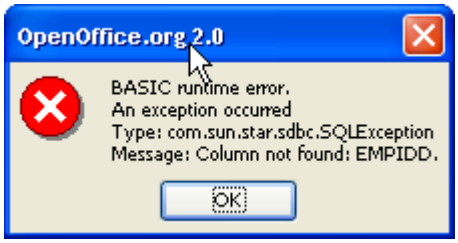


Illustration 18: SQLException thrown by the findColumn Method

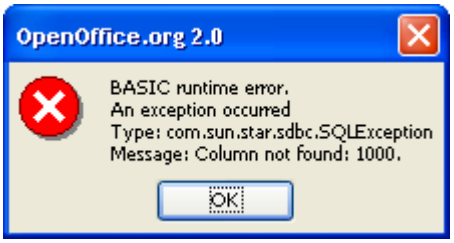


Illustration 17: SQLException thrown by the getInt Method

Another possible error is caused by calling the wrong getXXX(...) method. While calling *getString(...)* for an integer is fine, as integer will get casted to string; calling *getInt(...)* on a string will produce the following error. Most types can be obtained by using the *getString(...)* method; but as mentioned on the previous section (Statement Service), this could lead to data corruption.

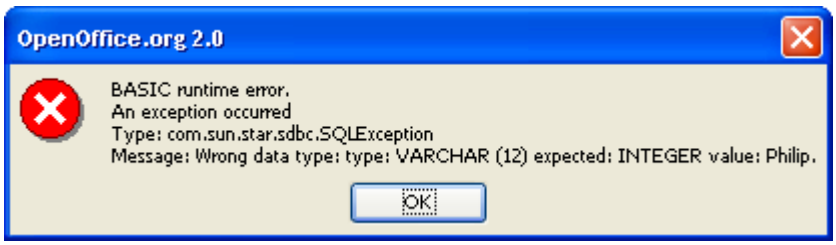


Illustration 19: SQLException thrown by calling wrong setXXX method

More on Columns

So far, we have seen a few ways to work with the columns in a result set. Many more column features can be obtained via the *Columns* property of a result set.

Some useful properties of the *Columns Service* are:

ElementNames—String array containing the column names.

Count—Integer indicating the number of columns.

Some useful methods for the *Columns Service*

createEnumeration—Create enumeration of columns in result set.

findColumn—this works the same as we saw above; it returns the column index for the named column passed.

getByIndex—Get column by index. This is different from *findColumn* in that it returns a column object rather than the index to the column.

getByName—Get column by name. Same as *getByIndex*, but takes column name rather than index.

hasElements—Returns boolean indicating whether or not there are columns.

getCount—Returns integer indicating number of columns; same as *Count* property.

hasByName—Returns boolean indicating if there is a column with specified name.

Earlier we saw that to get a column from the result set we can do so by calling *result.getXXX(columnIndex),* where *columnIndex* is a *long* from 1 to *n,* and *n* is the number of columns. In short, we could say that it is 1 based. For whatever reason, index access for the *Columns Service* is zero (0) based; and thus *result.Columns.getByIndex(0)* points to the first column. This also means that when iterating over the columns collection, the last iteration is the *result.Columns.Count-1* iteration. Attempting to iterate up to the *result.Columns.Count* position will result in an IndexOutOfBoundsException—see illustration 11.

Illustration 20: IndexOutOfBounds Exception

DataColumn Service

As you might have guessed, the *Columns Service* being a collection of columns, each item in the columns collections is a *DataColumn Service*. Tables 1 shows some properties for the DataColumn Service.

Property Name	Description
DisplaySize	Maximum number of characters that can be displayed
Label	Column title to be used for displays
Name	Column Name
Precision	Columns number of decimal digits
Type	Column type-integer
TypeName	Column type-string

Table 10: Some Properties for the DataColumn Service

There is a property for each data type (e.g. Int, Double, etc)--this can be used to get the value for the column. I have not included a table for the methods or properties, as there is one property and respective method for every data type—methods begin with get, or update (at least the ones that are relevant to this discussion of the DataColumn Service). When obtaining the column value, using the method or the property for the necessary data type is up to you.

Examples: *column.getInt(), column.Int, column.updateInt(intVal)*

> **NOTE:** These are not to be confused with the *get, update* methods of the result set. Since these methods are being called on the *DataColumn Service* directly (the column), there is no need to pass a column index. The *get* methods requires no parameters. The *update* method would require one parameter—the value to to which the column will updated. Another point to note (at least in my tests) is that using a method that gets a numeric value on a column with non-numeric value will return 0 (e.g. column.Int on a column containing a string).

Let us now look at a more complex example utilizing some of these *Column Service* methods. The goal is to:

1. Create a generic getXXX(...) method,
2. Use the *Column*s *Service* to get the data type for the column, and pass it to our getXXX(...) method which fetches the correct data type,
3. And finally, to do a print of the result set including column headings. Note that we are doing a simple printout. For a more elegant table dump, it would be best to write the result to a OOWrite document, as we could use the *Write* table feature.

Listing 5

```
1 Sub Example4
2     Dim Context
3     Dim DB
4     Dim Conn
5     Dim Stmt
6     Dim Result
7     Dim strSQL As String
8     Dim strTmp As String
9     Dim colIndex As Integer
10
11    Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
12    DB=Context.getByName("DB1")
13    Conn=DB.getConnection("","")
14    Stmt=Conn.createStatement()
```

```
15    strSQL="SELECT EMPID,FIRSTNAME,LASTNAME,AGE FROM  EMPLOYEES"
16    Result=Stmt.executeQuery(strSQL)
17    REM PRINT COLUMN HEADING
18    strTmp=""
19    For I=0 To Result.Columns.Count-1
20          col=Result.Columns.getByIndex(I)
21          colLabel=padString(col.Name,col.DisplaySize)
22          strTmp=strTmp & colLabel
23    Next I
24    Dumper(PATH,DUMPERFILE,strTmp)
25    'NOW GET DATA
26    while Result.next
27          strTmp=""
28          For I=0 To Result.Columns.Count-1 'CYCLE THROUGH COLUMNS
29                col=Result.Columns.getByIndex(I)
30                tmp=getXXX(col)
31                'DATE NEEDS TO BE CONVERTED TO STRING FROM PIECES
32                If col.TypeName="DATE" Then '
33                      tmp=tmp.Month & "/" & tmp.Day & "/" & tmp.Year
34                End If
35                strTmp=strTmp & padString(tmp & " ",col.DisplaySize)
36          Next I
37          Dumper(PATH,DUMPERFILE,strTmp)
38    Wend
39     shell("c:\windows\notepad.exe " & PATH & DUMPERFILE,1) 'OPEN FILE
40    Conn.close()
41 End Sub
```

Lines 19 to 23 display the column headings for the result set. Note that we are iterating from 0 to *Result.Columns.Count-1*. On line 20, we obtain the Ith Column Service in the Columns Collection. For this demonstration, there are two properties of the column in which we are interested, namely DisplaySize and Name (we could have also used the Label property).

To get the data, we are going to use two loops. One to iterate over the rows, and a second to iterate over the columns. On line 32, we check to see if this column is a date. Given that the getXXX method returns the respective data type, the client must make sure to handle it properly—for complex data types. In this case, the *Month, Day,* and *Year* properties of the date object were concatenated to form a string representing a date of the form MONTH/DAY/YEAR. Note that this listing uses a function called *padString(...)*. This is a simple function that returns the string padded to fill the specified width; this will make sure that the columns are properly aligned. Illustration 12 shows the output of listing 5

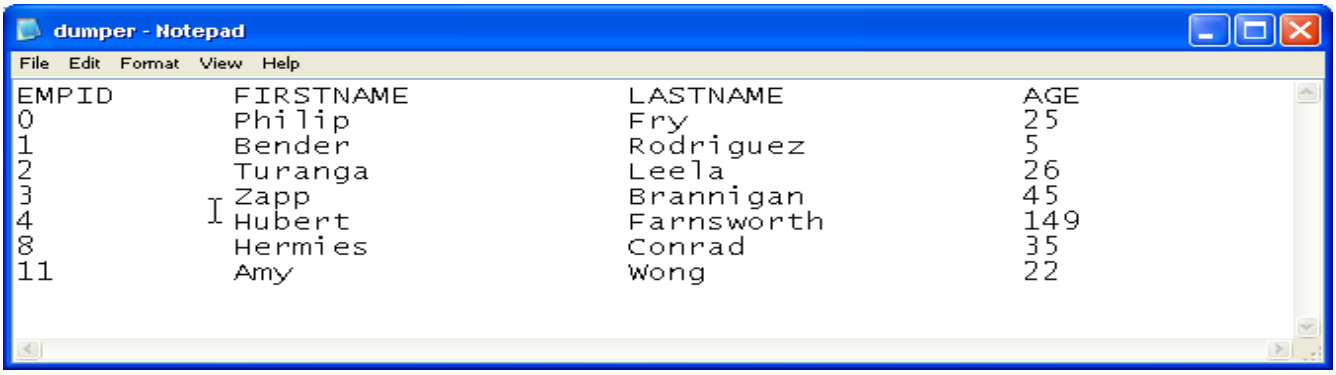


Illustration 21: Output of Listing 5

Listing 6

```
1 Function getXXX(col)
2     REM col is a column object/serivce.
3     REM SELECT CASE gets property that corresponds to datatype passed
4     Dim ret
5     Dim DataType As String
6     DataType=col.TypeName
7
8     Select Case DataType
9           Case "ARRAY": ret=col.Array
10          Case "BLOB": ret=col.Blob
11          Case "BOOLEAN": ret=col.Boolean
12          Case "BYTE": ret=col.Byte
13          Case "BYTES": ret=col.Bytes
14          Case "BLOB": ret=col.Clob
15          Case "DATE": ret=col.Date
16          Case "DOUBLE": ret=col.Double
17          Case "INTEGER": ret=col.Int
18          Case "LONG": ret=col.Long
19          Case "DECIMAL": ret=col.Double
20          Case "NULL": ret=col.Null
21          Case "OBJECT": ret=col.Object
22          Case "REF": ret=col.Ref
23          Case "SHORT": ret=col.Short
24          Case "VARCHAR": ret=col.String
25          Case "TIME": ret=col.Time
26          Case "TIMESTAMP": ret=col.TimeStamp
27          Case Else: ret=col.String 'GIVE STRING A TRY
28    End Select
29    getXXX=ret
30 End Function
```

Listing 6 show the getXXX method. Much like the setXXX method we created on the previous section, it is quite simple.

In the example above, the goal is to get the column value, and convert it to string for display purposes. Individual needs my be different. It would be that the data is being retrieved for computation purposes, or to insert into another table. In which case, there is no need to convert to string, necessarily, for complex data types such as date. The getXXX method can be modified to accommodate individual

needs, or not used at all—it is all dependent upon the individual needs/requirements and if the *return* of utilizing such code/methodology is cost effective. As this code (getXXX Method) can be added to a library, there should not be much coding overhead for each individual use.

Enumeration Access

Before moving on to the next section, let us take a quick look at Enumeration Access for the Columns Service. Listing 7 shows how to print the column names, as in example 5, but uses Enumeration Access rather than Index Access. Since the rest of the code is the same, we are only going to look at the enumeration portion of the code.

Listing 7

```
17 REM previous code omitted
18 oEnum=Result.Columns.createEnumeration()
19 strTmp=""
20 'PRINT COLUMN HEADINGS
21 While oEnum.hasMoreElements()
22    col=oEnum.nextElement() REM GET NEXT ENUMERATION ELEMENT
23    colLabel=padString(col.Name,col.DisplaySize)
24    strTmp=strTmp & colLabel
25 Wend
26 Dumper(PATH,DUMPERFILE,strTmp)
27 REM remainder of code omitted
```

The enumeration object is created on line 18 using the *createEnumeration*() method of the *Columns Service*. The *nextElement()* in the enumeration is of course a column, therefore the rest of the code is the same as on the previous example. Refer to the **Enumeration Access** section for more detail on Enumeration Access. Illustration shows the output of listing 7. Note the output is exactly the same as listing 5—The column heading portion of the code anyways.

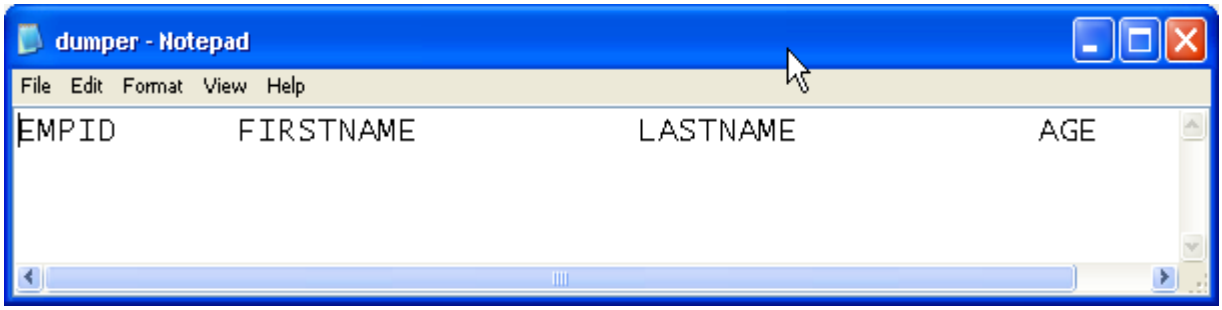


Illustration 22: Column Print with Enumeration Access

Manipulating Data Sources

The last topic of discussion for this section shall be on manipulating a data source with the *ResultSet Service*. This will include:

1. Updating records
2. Inserting records
3. deleting records

Before a result set can be updated/modified, the *ResultSetConcurrency* property must be set. However, there appears to be a bug which does not allow this property to be updated. I will leave this section open in case this bug is fixed in the future.

All hope is not lost, however. There is another alternative to perform this action. This will be covered in the next section—*RowSets*

The RowSet Service

Introduction

A *RowSet Service* is essentially a combination of the *Statement* and *ResultSet* services. The primary difference is in configuration. In the previous sections, when working with statements and result sets, the following actions were necessary:

1. Create a database context service (*context=createUnoService("com.sun.star.sdb.DatabaseContext"*).
2. Obtain a DataSource service from context (*db=context.getByName(..)*).
3. Obtain a Connection service from the DataSource (*conn=db.getConnection(..)*) .
4. And finally obtain a Statement Service from the connection (*Stmt=Conn.createStatement(..)*).
5. Execute the statement and obtain result set service (if one is produced).

The configuration steps for the row set service are fairly similar. However, instead of creating separate objects for each service, only one object is created—the row set service. Everything else is specified via the properties of the row set.

Let us begin with a quick example.

Listing 1

```
1 Sub Example1
2     Dim rsEmployees As Object
3     Dim I As Integer
4     Dim strTmp As String
5     Dim col As Object
6     Dim colLabel As String
7
8     rsEmployees=createUnoService( "com.sun.star.sdb.RowSet" )
9     With rsEmployees
10          .DataSourceName="DB1"
11          .CommandType=com.sun.star.sdb.CommandType.COMMAND
12          .Command="SELECT EMPID, FIRSTNAME,MIDDLENAME,LASTNAME FROM _
13                    EMPLOYEES"
14    End With
15    rsEmployees.execute()
16    REM PRINT COLUMN HEADINGS
17    strTmp=""
18    FOR I=0 To rsEmployees.Columns.Count-1
19          col=rsEmployees.Columns.getByIndex(I)
20          colLabel=padString(col.Name,col.DisplaySize)
21          strTmp=strTmp  & colLabel
22    Next I
23    Dumper(PATH,DUMPERFILE,strTmp)
24    While rsEmployees.next
25          strTmp=""
```

```
26         FOR I=0 To rsEmployees.Columns.Count-1
27              col=rsEmployees.Columns.getByIndex(I)
28              tmp=getXXX(col)
29              strTmp=strTmp & padString(tmp & " ",col.DisplaySize)
30         Next I
31         Dumper(PATH,DUMPERFILE,strTmp) REM DUMP ROW
32    Wend
33    shell("c:\windows\notepad.exe " & PATH & DUMPERFILE,1) 'OPEN FILE
34 End Sub
```

The *RowSet Service* is created on line 8. The configuration can bee seen on lines 9 to 14, and finally the *execute* method is called on line 15. Note that everything after line 16 is the same as the listing 5 on the *ResultSet* section. This should be no mystery being that, as previously mentioned, the row set service combines both the statement and result set services. Let us now look at some properties and methods of the row set.

Some RowSet Service Properties

ActiveConnection. This is the connection created by a DataSource (named or URL). In the example above, the *ActiveConnection* would be a *Connection Service* to the data source named by "DB1." Remember that a connection is, an open channel of communication with a data source. If the program statement *Print rsEmployees.ActiveConnection.Parent.Name* was inserted after line 15 in listing 1 above, the output would be:

file:///C:/Documents%20and%20Settings/Programming/OOo/Database%20Development/DB1.odb

This of course would be the same output if the same program statement was called on a connection service as defined below:

```
Context=CreateUnoService("com.sun.star.sdb.DatabaseContext")
DB=Context.getByName("DB1")
Conn=DB.getConnection("","")
Print Conn.Parent.Name
```

This means that we can utilize the active connection of a row set, and to other work with it. Consider the following code, if inserted after line 15 of listing 1:

```
Conn=rsEmployees.ActiveConnection
Stmt=Conn.createStatement()
Stmt.executeUpdate("UPDATE TABLE2 SET FIRSTNAME='Flanders' WHERE _
                    EMPID=20014")
```

Note that we saved all the overhead of creating a context service as well as a data source service.

DataSourceName. This is the name of the desired data source—can be a name (such as line 10 of listing 1) or the URL where the data source is located.

CommandType. The command type to be executed. The *CommandType* is a member of the constants

group in the *SDB* module. To access it by name, the name must be preceded by *com.sun.star.sdb.CommandType.* However, the numeric value can also be utilized.

Examples:

```
1. CommandType=com.sun.star.sdb.CommandType.TABLE
2. CommandType=0
```

Name	Numeric Value	Description
TABLE	0	The command contains a table name
QUERY	1	The command contains a query object name
COMMAND	2	This is any valid SQL Statement.

Table 11: CommandType Options

Note that the statement service is limited to SQL statements, and cannot access Query Components/Objects. Additionally, if we are interested in the entire table, there is no need for a SELECT statement. Passing the table name alone (e.g. *EMPLOYEES)* is sufficient.

Command. This is the actual command. If the command type is TABLE (0) or QUERY(1), the command type would be the name for the respective object. If the command type is a COMMAND (2), then the command would be a valid SQL statement. It is important to note that an SQL statement will be valid in respect to the specific driver being utilized. For example, the valid SQL Statement to create a user differs between an OOBase native database and PostgreSQL.

Columns. Columns service. This is the same column service we saw on the previous section on the result set.

HavingClause. Having Clause for row set.

GroupBy. Additional Group By for row set.

Order. Additional sort.

RowCount. The number of rows in the row set (result). Note: Rowcount will not have the correct count unless the *last* and *first* methods are called before.

There are other properties dealing with updates and inserts. These will be discussed later in the respective sections. For a full listing of all the properties, use the **Xray Tool.** Additionally, the Dbg_Methods, Dbg_Properties, and Dbg_SuportedInserfaces properties can be utilized to obtain the respective lists. These properties are present in most services.

As the row set service combines both the statement and result set service, most of the methods and properties are the same—a combination of both of said services.

Again, as we saw on listing 1, accessing the result of a row set is exactly the same as the result set; in particular, the *setXXX,getXXX,* and *updateXXX* methods.

Updating a RowSet

To perform updates using the Row Set Service, let us create a new table—see figure 15 for table definition. I have chosen to create a new table, where making updates using the row set makes more sense, or at least is more practical.

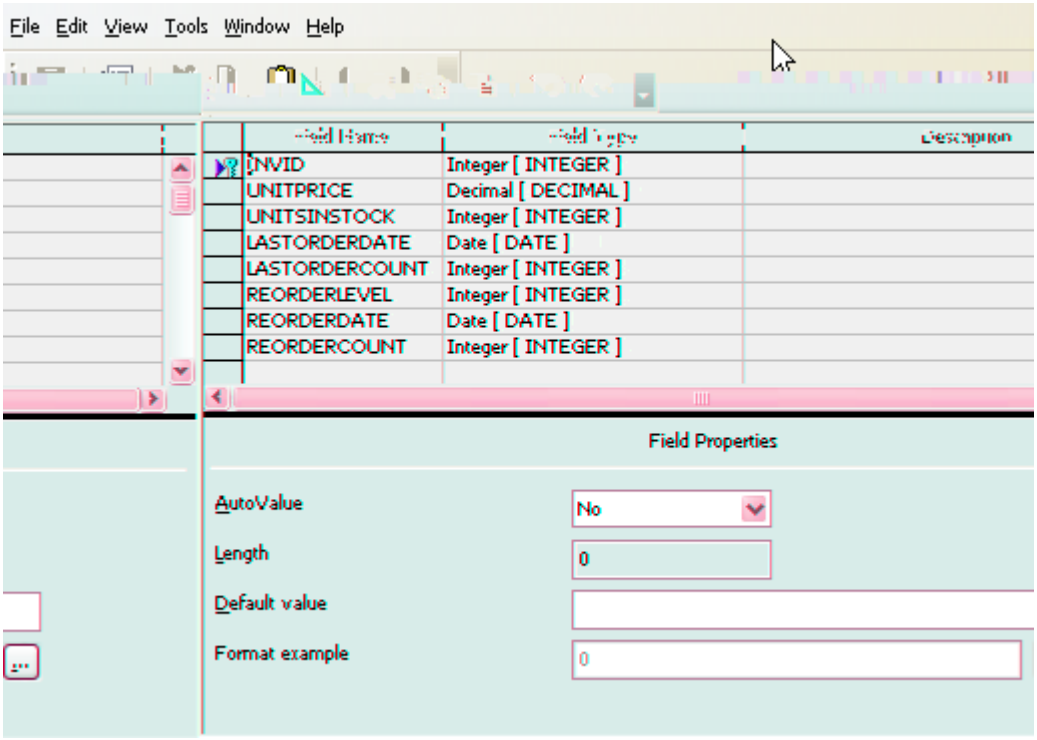


Illustration 23: Inventory Table Definition

First, I must disclose that I have not given an inventory system much thought, so this may be a poor example. However, for the purpose of demonstrating the record updating features of the Row Set Service, it should do just fine. Illustration 16 shows some sample data for our inventory table. Consider that we want to change the price of an item based on some condition. This could, of course be achieved using an SQL UPDATE statement. However, if complex calculations or logic are required, a different language may be preferred.

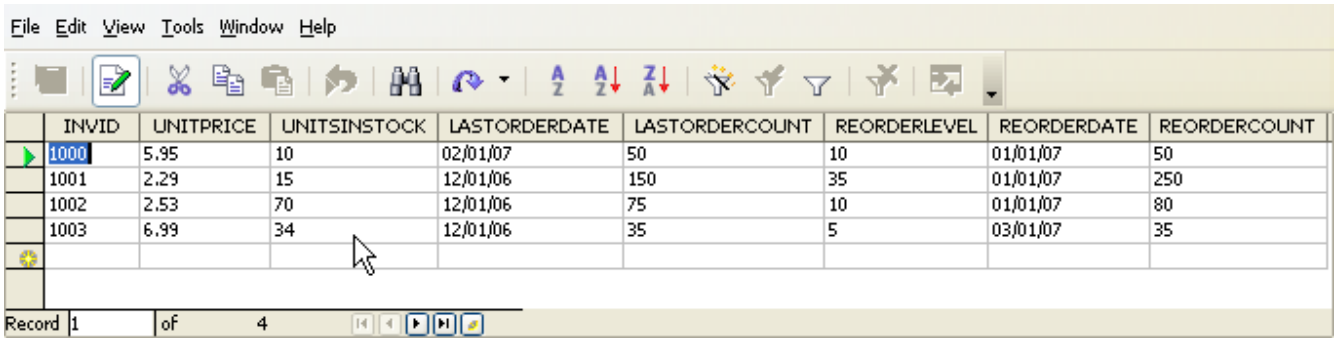


Illustration 24: Contents of Inventory Table Before Updates

For our first example, let us consider that the price of an item that is not selling needs to be marked down. If the units in stock is not much less than the amount of last ordered, this indicates that the item is not selling. Therefore, we can select such items and mark the price down. Generally, it is best to write as little code as possible, and use as much of available features from what ever feature is being utilized. In this case, we *could* get the entire inventory table, and do an *if* statement on every row to check for items with low sales. But we can just as well pass down some of the work to the SQL Engine and limit the records to those of interest; in this example, those with 5 sales or less. For each of those items, the price is marked down by 10%--see code listing 2.

Listing 2

```
1 Sub Example2
2     REM ROW UPDATES
3     Dim rsInventory As Object
4     Dim col As Object
5     Dim priceChange As Double
6     Dim currPrice As Double
7
8     rsInventory=createUnoService( "com.sun.star.sdb.RowSet" )
9     With rsInventory
10          .DataSourceName="DB1"
11          .CommandType=com.sun.star.sdb.CommandType.COMMAND
12          .Command="SELECT UNITPRICE FROM INVENTORY WHERE _
13                    (LASTORDERCOUNT-UNITSINSTOCK)<=5" 'NOT SELLING
14          .execute()
15    End With
16
17    priceChange = -0.1 '10% reduction in price for slow sellers
18    While rsInventory.next
19          col=rsInventory.Columns.getByName("UNITPRICE")
20          currPrice=getXXX(col)
21          'SINCE WE HAVE THE COLUMN, MAKE UPDATE HERE, _
22          'RATHER THAN FROM rstInventory
23          col.updateDouble(currPrice+currPrice*priceChange)
24          rsInventory.updateRow()
25    Wend
26  End Sub
```

The SQL command on line 12 makes sure that only items with 5 sales or less are retrieved. The amount to mark down is specified on line 17. At this point we are ready to iterate over the low selling items, and perform the mark up. Line 19 gets the column, and 20 uses our generic getXXX(..) method to get the column value. And finally, the column value is updated on line 23. A point to note here is that we utilized the updateXXX(..) method of the column service, rather than the updateXXX(..) method of the result set service. The following code would have worked just as fine:

```
rsInventory.updateDouble(2,currPrice+currPrice*priceChange)
```

However, the column index must be passed. Since we already went through the trouble of getting the column service, why not use it to perform the update. The following alternative solution would have worked as well:

```
currPrice=rsInventory.getDouble(2)
rsInventory.updateDouble(2,currPrice+currPrice*priceChange)
```

Remember that while the RowSet Service is being utilized, all the Result Set Service method and properties we saw earlier are still available. Instead of passing the 2 in the example above, the following could have been done:

```
colIndex=rsInventory.findColumn("UNITPRICE")
currPrice=rsInventory.getDouble(colIndex)
rsInventory.updateDouble(colIndex,currPrice+currPrice*priceChange)
```

As you can see, there are many options. Whichever you use is entirely up to you. However, consistency may be recommend for better code readability. For example, it may get confusing if the column service was utilized to get the current unit price, but the result set service was utilized to make the column update. The final step on listing 2 to perform the row updates is to call the *.updateRow()* method of the result set service (line 24). This must always be the last function call in the update process. The update buffer will be lost if the *.updateRow()* method is not called.

Illustration 17 shows the inventory table after the update was performed. Note that items 1002 and 1003 had less than five sales since the last order, and the unit price has been reduced by 10%. All of this could have been performed by one SQL Update Statement:

```
UPDATE INVENTORY SET UNITPRICE=UNITPRICE-(UNITPRICE*0.1) WHERE
(LASTORDERCOUNT-UNITSINSTOCK)<=5
```

However, consider that you do not want to change the price by 10%, but by some function of the days elapsed since the last order date as well as the number of sales. Or what if you want to increase the price because the items are in high demand—based on the number of sales since the last order date. An SQL Statement for such updates may start to get complex.

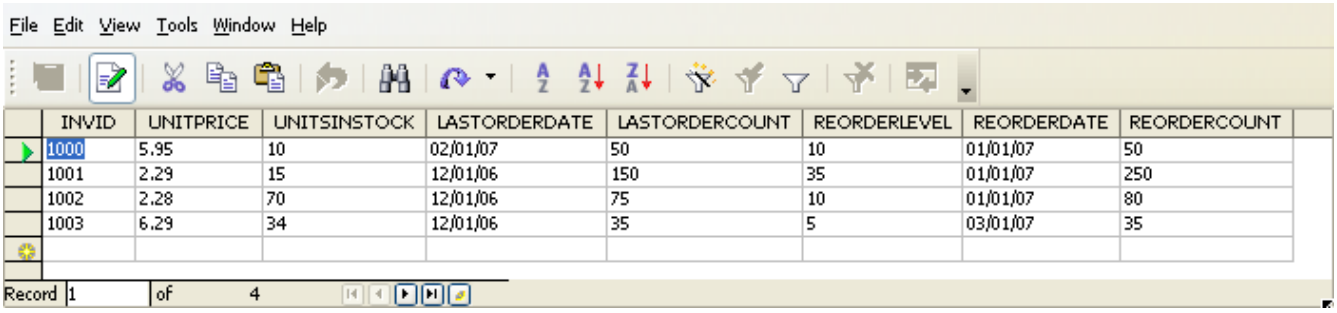


Illustration 25: Inventory Table After Price Mark Down

Much like our generic getXXX(...) and setXXX(...) functions, we can create a generic updateXXX(...) function.

> **Note:** I have had many difficulties working with dates—imagine that, a computer programmer with date problems. While there is a setDate(..) and an updateDate(...) method, they have not worked for me. However, using setString(..) and updateString(..) have done the trick.
>
> Another quirk I have noted is that all the columns must be selected from the source/command. In the example on listing 2, we really only need the UNITPRICE column, so it may make sense to only select that one:

```
SELECT UNITPRICE FROM INVENTORY  WHERE (LASTORDERCOUNT-
UNITSINSTOCK)<=5
```

However, this generates the following error when trying to perform the row updates:

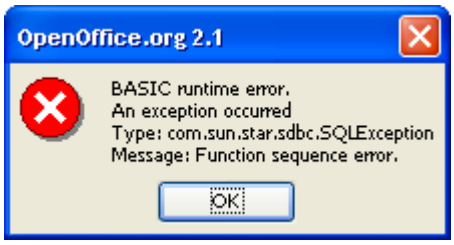


Illustration 26: Row Update Error

I do not know if this is an error or intended behavior. This same exception is thrown when performing inserts and not all the columns are set—as well see in the next section.

Listing 3 shows a generic updateXXX(..) function to perform column updates. Note that the updates are being performed directly on the column service.

Listing 3

```
1 Function updateColXXX(col As Object,colVal As Variant)
2     REM col is a column object/Service.
3     REM SELECT CASE gets property that corresponds to datatype passed
4
5     Select Case col.TypeName
6           Case "BOOLEAN": col.updateBoolean(colVal)
7           Case "BYTE": col.UpdateByte(colVal)
8           Case "BYTES": col.updateBytes(colVal)
9           Case "DATE":  col.updateString(colVal)
10          Case "DOUBLE": col.updateDouble(colVal)
11          Case "INTEGER": col.updateInt(colVal)
12          Case "LONG": col.updateLong(colVal)
13          Case "NULL": col.updateNull(colVal)
14          Case "SHORT": col.updateShort(colVal)
15          Case "VARCHAR": col.updateString(colVal)
16          Case "TIME": col.updateString(colVal)
17          Case "TIMESTAMP": col.updateString(colVal)
18          Case Else: col.updateString(colVal) 'GIVE STRING A TRY
19    End Select
20 End Function
```

This could be modified to perform the updates via the result set service. However, the index would have to be obtained first, then passed to the updateXXX(..) function. The function would then have to somehow obtain the data type—either take it as a parameter or get it from the meta data or column service with the given column index.

Inserting Records

When manipulating data on a table using the GUI, we move the cursor to the desired row and then column. Then enter the desired data. These are the same steps taken when performing a row update programmatically—as seen on the previous section. When inserting a new record, we first move to the insert row, and then insert the desired data. Again, the same steps are performed when inserting a new record programmatically.

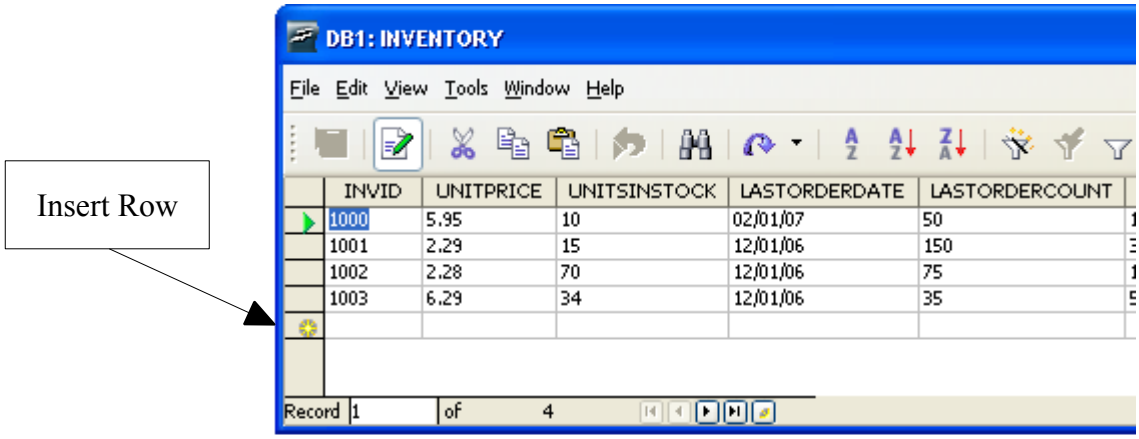


Illustration 27: Table Insert Row

Listing 4 shows a quick example on how to insert a row.

Listing 4

```
1  Sub Example3
2      Dim rsCities As Object
3      Dim NewCities() As String
4      Dim I As Integer
5      rsCities=createUnoService("com.sun.star.sdb.RowSet")
6      With rsCities
7            .DataSourceName="DB1"
8            .CommandType=com.sun.star.sdb.CommandType.TABLE
9            .Command="CITIES"
10           .IgnoreResult=True 'NOT INTERESTED IN RESULT
11           .execute()
12     End With
13     NewCities=Array("Cut And_
14             Shoot","Branson","Paris","Rome","Lovelady","Pflugerville")
15     F1or I=0 To UBound(NewCities)
16           With rsCities
17                 .moveToInsertRow()
18                 .updateString(2,NewCities(I))
19                 .insertRow()
20           End With
21     Next I
22 End Sub
```

Line 10 has *IgnoreResult=True.* Since we only need the table to insert records, there is no need for the result (the table data); only the connection to the table/data source is required. In the *for* loop, the first step is to move to the insert/new record row using the *moveToInsertRow()*--this is synonymous with moving the cursor to the new record row on the GUI. And much like inserting a record on the GUI, the next step is to insert the data in to each respective column. The final step is to commit the insert by calling the *insertRow()* method. Before the *insertRow()* method is called, the *updateXXX(..)* methods insert the column data in to the insert buffer. If the cursor is moved out of the insert row before calling the *insertRow()* method, all the column data in the insert buffer will be lost.

While this section may appear short, all the basics have been covered. The only think to keep in mind is that the appropriate updateXXX(..) method must be called (same as in updating a row, setting the values in a prepared statement, or fetching column data from a result set. Much like inserting records using the Statement Service, primary keys must be included whenever they are NOT auto-incrementing.

Another point to note is that in this chapters we have only covered inserting, updating, and fetching basic types. Performing these functions for complex data types may require additional coding (e.g. Binary data).

Deleting Records

The last topic on the Row Set Service is deleting a row. This is quite simple, and shall be a brief section.

Listing 5

```
1 Sub Example4
2     Dim rs As Object
3     rs=CreateUnoService("com.sun.star.sdb.RowSet")
4     With rs
5           .DataSourceName="DB1"
6           .CommandType=com.sun.star.sdb.CommandType.TABLE
7           .Command="CITIES"
8           .execute()
9     End With
10    While rs.next()
11          rs.deleteRow()
12    Wend
13 End Sub
```

As you can see, performing this action is as simple as calling the *deleteRow()* method. This of course deletes the current row (the current row must NOT be the insert row). The complexity may arrive in the decision of what rows to delete. In the the example above, the entire table is wiped out. This may not be the desired effect, however, so much care must be taken when performing delete function. If the decision is simple (e.g. DELETE FROM INVENTORY WHERE UNITCOUNT=0) the command can be included in the *Command* attribute. But if decision is complex, I would suggest using OOBasic code. For example if the condition to select the rows targeted for deletion is something along the lines of:

$$A > e^{-j*\Theta} \wedge B < \sum_{i=0}^{n} i + \pi^2$$

it may be best to use something long the lines of OOBasic (I would actually prefer python or C++ for such computations, but OOBasic is more readily available in OpenOffice.Org).

This wraps up the basic topics involving the result set. Time permitting, I shall attempt to create some case studies in which these topics are put to practical use.