

# Advantage Database Server® and Visual FoxPro

## A Getting Started Guide

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## INTRODUCTION

Sybase Advantage Database Server is the only relational database product available which is actively enhancing how developers can work with Visual FoxPro based data (DBF tables and CDX indexes). Advantage can play a key and enabling role in modernizing Visual FoxPro applications into the next decade.

This getting started guide describes the benefits and scenarios of using Advantage with Visual FoxPro or for using Advantage to help migrate to products such as .NET or other technologies. Using Advantage allows you to connect to existing Visual FoxPro DBF applications without having to convert the DBF data (upsized) into a relational database.

Advantage is a high-performance, low-maintenance, database server that allows easy creation of client-server and web-based applications. Advantage is unique among other database offerings because it provides both ISAM table-based and SQL based data access (like Visual FoxPro), with optional support for using one or more DBF file based tables within a database.

There is a long history of Advantage supporting FoxPro DBF tables and IDX/CDX indexes, including support for Visual FoxPro 9.0 DBF tables and CDX indexes. In the early days (1990s), one Advantage client was a 16-bit CA-Clipper RDD (replaceable data driver) that supported an early FoxPro DBF file format. Over the years and many new versions later (current version 10.x), Advantage has matured into a feature-rich product with support for a variety of development environments.

Sybase offers two versions of Advantage, local and remote server, both with the same APIs. The remote server version is licensed based on maximum number of concurrent users. The local version is file-server based and allows developers to develop with and deploy royalty-free. Local server is used for solutions that do not require the fully scalable remote server version.

While Advantage Local Server is a free database for developers including royalty-free distribution, you can request a free (with no expiration) 2-user developer version of Advantage Database Server. You can freely download and install Advantage clients including Advantage Data Architect™, which automatically installs the royalty-free Advantage Local Server engine (refer to Installation section).

The Advantage Local Server is a fully functioning local database engine, much like the Visual FoxPro runtime data engine. The Local Server version can be used for both development and free distribution with Visual FoxPro applications, which targets usage scenarios that don't require a full client-server DBMS. The ServerType setting for any Advantage connection can be changed from local to remote at any time to move from Local Server to Remote Server. This is done without making any changes to the source code or any clients accessing the database via one or more of the Advantage drivers.

A significant benefit to using Advantage with Visual FoxPro is that it is not necessary to convert DBF data to another format or upsize it into a relational database in order to use Advantage. It is possible to continue using existing and unmodified Visual FoxPro applications accessing FoxPro DBF data while concurrently reading/writing the same DBF data from various external products and technologies while connected through Advantage.

## SCENARIOS

Advantage provides a natural path for Visual FoxPro developers for migrating to or adding new functionality using products such as Visual Studio (.NET) or other platforms.

### Wrapping DBF data with Advantage

It is typically beneficial and a more flexible solution to use Advantage as a data container (wrapper) around existing DBFs with shared (non-exclusive) access. Developers can create .NET or other applications for use with existing Visual FoxPro applications. This allows Visual FoxPro applications to be migrated or enhanced, while allowing both new and old solutions to work against the same DBF data simultaneously. This results in not having to update the Visual FoxPro application's source code while the new application is being developed.

### Cloning DBC metadata into Advantage

Advantage includes a utility called CloneDBC which was written in Visual FoxPro and includes the source code. The CloneDBC utility copies (or clones) a Visual FoxPro based DBC metadata dictionary and creates a new Advantage Data Dictionary (ADD) file. Generally the term upsizing means to copy or move existing DBF data into a client-server database store. Since the original DBC is not modified and no DBF data is copied, the term upsize is not used for this utility.

### **Migration in stages with existing Visual FoxPro application active**

Because Advantage can share DBF tables with existing Visual FoxPro applications, it is possible to change applications in stages rather than needing to accomplish a full conversion in a single step. Advantage becomes a vehicle to migrate or enhance current Visual FoxPro applications side by side with new applications or other added technology components.

### **Migration without using Advantage**

When not using Advantage to add new connected applications to an existing Visual FoxPro application, modification is generally required for the existing FoxPro solution, in turn requiring modification to the FoxPro solution source code. The traditional migration path for a Visual FoxPro application includes: upsizing the DBF data into a client-server database; changing the Visual FoxPro application to use Remote Views, SQL pass-through, or CursorAdapter for use with remote data; then creating the new .NET application using the new client-server database.

### **Accessing DBF data from .NET**

Advantage provides direct table access not available to ADO.NET developers. This includes the flexibility to combine powerful SQL statements and relational data access methods with the performance and control of navigational operations, such as direct table and index access and direct table movement (seeks, skips, etc.). Combining these two powerful data access methods allows the result set returned from a SQL query or from a table opened directly to be navigated via the highly optimized Advantage ISAM database engine. The result is an easy-to-use interface that supports SQL commands and direct-result-set navigation.

Advantage drivers can be used to create a web application using the Advantage .NET Data Provider using existing DBF data. When sharing DBF data from .NET through Advantage, a key benefit is being able to use the powerful Advantage .NET Data Provider for exclusive functionality within .NET programming such as using LINQ, record level navigation, and many other features with FoxPro DBF data.

### **Adding .NET functionality external to Visual FoxPro applications**

Rather than converting a Visual FoxPro application to .NET, there are benefits to enhancing existing Visual FoxPro applications by adding .NET components for additional functionality. Just a few of these benefits include adding ASP, NET or Silverlight based webpages, .NET WinForms, WPF, or Windows based multi-touch UI.

### **Using DBF metadata tables in .NET applications**

Visual FoxPro developers have generally enjoyed being able to use DBFs for metadata tables, and not just for application data store. Using Advantage, DBF tables can be used (with or without FoxPro being used) for metadata tables within .NET applications, which is often useful for easy access, deployment, and management of small tables within an application that aren't required to be stored and managed through a relational database on a server.

### **Upsizing DBF data into Advantage relational database**

Visual FoxPro provides several different data access mechanisms that can be utilized to integrate Advantage into your existing application. Aside from Visual FoxPro's native data access, some common methods to access external data are Remote Views, Cursor Adapters, and SQL Pass Through.

While you may have Advantage sharing existing DBFs with an existing Visual FoxPro application for use with other clients (such as .NET), you may also have one or more DBF tables in your Visual FoxPro solution upsized to Advantage so those tables can take advantage of full client-server features offered by Advantage (beyond 2GB limit, rich text search, encryption, replication, backup, and more).

## INSTALLATION

Visual FoxPro developers can download, install, and start using the Local Database version of Advantage.

For Visual FoxPro developers, there are several Advantage drivers (ODBC, OLE DB, .NET Data Provider, and JDBC) to access DBF data. Additional Advantage data access drivers are available beyond the ones listed above including those for use with Delphi, Crystal Reports, CA Visual Objects, PHP, and Perl, and even Clipper.

Advantage downloads from sybase.com are easy and quick to install, generally taking less than one minute each from start to finish. The various components typically of interest to a Visual FoxPro developer include:

- Advantage Remote Database Server (free download, free 2-user developer license, ~ 20MB)
- Advantage Local Database Server (free download, royalty-free distribution ~ 15MB)
- Advantage Data Architect with Local Database (free download, royalty-free distribution ~ 20MB)
- Advantage .NET Data Provider (free download, royalty-free distribution ~ 30MB)
- Advantage OLE DB Provider (free download, royalty-free distribution ~ 15MB)
- Advantage ODBC Driver (free download, royalty-free distribution ~ 15MB)
- Advantage JDBC Driver (free download, royalty-free distribution ~ 10MB)
- CloneDBC for Visual FoxPro (free download, included with Advantage OLE DB Provider download)

## FAQ

### ***What platforms can Advantage be developed and deployed on?***

Advantage can be installed on various versions of Windows, Linux, and Netware. For more details, refer to: [http://sybase.com/files/Data\\_Sheets/advantage\\_supported\\_platforms\\_ds.pdf](http://sybase.com/files/Data_Sheets/advantage_supported_platforms_ds.pdf)

### ***Is Advantage easy to learn and use for Visual FoxPro developers?***

Yes, very easy, and does not require a DBA. Similar to Visual FoxPro, installing, deploying, and maintaining Advantage is easy and includes a small portable file based footprint. Advantage cost savings are not only in the competitive licensing, but also in the cost of adoption, usage, and overall functionality.

### ***What are the benefits of using Advantage over Microsoft SQL Server or an open source database?***

Advantage offers unique functionality and scenarios over Microsoft SQL Server for Visual FoxPro applications with its native DBF support, less costly licensing, fast learning curve, and easy deployment. An open source database is only free — only if you don't value your time. Unlike open source databases, Advantage offers a fully supported platform that is rapidly evolving with many added features based on direct customer feedback.

### ***What are the benefits of joining the Advantage partner program?***

Sybase is a channel centric organization that views channel partners as an extension of the Sybase organization, playing a critical role in go-to-market strategy and activities. The partner program goal is to deliver partners an array of benefits with the necessary resources and assistance to grow their business around Sybase products and solutions.

## DATA ACCESS MECHANISMS

One of the great features of Visual FoxPro is the way that it integrates the data access mechanisms into a similar programming paradigm. Once the data has been retrieved (e.g., through a remote view or a Cursor Adapter), the subsequent usage of the data is the same as if it had been retrieved through a USE statement. This reduces the amount of code that you need to change in order to use Advantage to handle your data.

### **Remote Views**

Remote views use ODBC to access data that is external to Visual FoxPro. If you are already using local views in Visual FoxPro, switching to a remote view to access the same data through Advantage may be the simplest option. Note that in order to use a remote view, you must have a database open in your project. Visual FoxPro stores information about the remote view in the DBC. When creating a remote view, it may be desirable to limit the rows that are returned from the table through a WHERE clause (the Filter tab in the View Designer provides access to this functionality). When opening a view, the default behavior is to read all records from the view. If the table is large, this can be an expensive operation.

In order to use a remote view with Advantage, you must have the Advantage ODBC driver installed. A simple way to use a remote view is to use an ODBC data source to specify connection information. You can set up an ODBC data source through the Windows Control Panel. There is usually an icon named "Data Sources (ODBC)" that provides access to the ODBC administrator. You can also start it from a command prompt with the command ODBCAD32.EXE.

If you plan to share DBF tables with Visual FoxPro's native data access and Advantage at the same time, you should choose the "Compatible" option for the "Advantage Locking" choice in the Advantage ODBC driver setup dialog. If you choose "Proprietary" and are using Advantage Database Server (remote server), then Visual FoxPro will not be able to access the tables, because Advantage opens tables in a mode that allows other applications to only open the table in a read-only mode.

The ODBC setup dialog defaults to a table type setting of "Advantage". This table type is used to access Advantage proprietary format tables (ADT tables). Change this value to "Visual FoxPro".

If you do not have Advantage Database Server (remote server) available, you should make sure that only "Local Server (ALS)" is selected in the Advantage ODBC setup dialog. This will speed up the connection to Advantage. If both the remote and local option are chosen, then the ODBC driver will attempt a remote server connection that must first fail before it scales back to the local option.

### Creating a Remote View

1. One way to create a remote view is through the Project Manager in Visual FoxPro. Choose the Data tab, expand the Databases tree, click on the Remote Views tree and click the New button. This will show a dialog that prompts for a connection or data source. If you do not have any connections defined, you can select an ODBC data source by choosing the "Available data sources" option. Once you have selected a connection or data source, click OK and the view designer will be shown. At this point, you can choose which columns the view should contain.
2. Another way to create a remote view is with the CREATE SQL VIEW command in Visual FoxPro. For example, the following command will create a remote view named MyView that retrieves all columns from a table named test. It uses an ODBC data source named ADS.

```
CREATE SQL VIEW MyView REMOTE CONNECTION ADS as select * from test
```

Once the view is created, you can modify it with the view designer the same as if you created it in the project manager.

3. After you have created a remote view, you can use it much like you would a normal table. For example, the commands "use MyView" and "Browse" will open the view and display the results in the Browse window.

### Making a Remote View Editable

The steps described above will create a remote view that can be used to bring data into Visual FoxPro from Advantage. In order for Visual FoxPro to be able to save any edits back to the physical table, it is necessary to provide the information that allows Visual FoxPro to generate the SQL statements to perform the updates. A simple way to do this is through the View Designer.

1. Open the view designer for the remote view. For example, you can use the command "MODIFY VIEW MyView".
2. Click on the "Update Criteria" tab in the View Designer.
3. This tab shows the list of available fields. Choose the key fields that uniquely identify a record by clicking in the left-most column of the list (under the key icon).
4. Select which fields should be updatable by clicking in the second column in the field list or simply click the "Update All" button to make all fields updatable.
5. Select the "Send SQL updates" check box. If this is not selected, Visual FoxPro will not send the update statements to Advantage and edits will not be saved.

### Cursor Adapters

The CursorAdapter in Visual FoxPro is an extensible class that uses ADO (e.g., through OLE DB) to provide access to external data. The following steps show one way to access data through a CursorAdapter. While it is possible to use an ODBC driver through ADO, the best way to use a CursorAdapter with Advantage is to go through the Advantage OLE DB provider.

1. Verify that the Advantage OLE DB provider is installed.
2. Open the Data Explorer in Visual FoxPro. You can do this by using the command "DO dataexplorer.app". The dataexplorer.app file should exist in your Visual FoxPro installation directory.

3. Add a connection in the Data Explorer. Choose the "Add Connection" button and then select "ADO Connection".
4. Click on the "Use connection string" option to use the Advantage OLE DB provider. You can use the Build button to create the connection string, or you can type it into the edit field. An example connection string to a directory containing free tables might be "Provider=Advantage.OLEDB.1;Data Source=x:\data\freatables;ServerType=ADS\_REMOTE\_SERVER;TableType=ADS\_VFP\_TABLE". This connection string specifies that Advantage Database Server (remote server) is to be used and that the table type is VFP (Visual FoxPro). An example connection string to a data dictionary using Advantage Local Server is: "Provider=Advantage.OLEDB.1;User ID=adssys;Data Source=x:\data\dd\test.add;ServerType=ADS\_LOCAL\_SERVER".
5. If you want Visual FoxPro to be able to access data natively and share it concurrently with Advantage Database Server, you need to choose compatibility locking. For example, add "LockMode=ADS\_COMPATIBLE\_LOCKING" to the connection string. The default is to use proprietary locking.
6. After creating the connection, expand the connection in Data Explorer and then expand the Tables tree.
7. Drag (with the mouse) one of the tables onto a code window. Visual FoxPro will generate the code to create a CursorAdapter instance for that table.
8. You can use the generated code as needed. For example, add a Browse command at the bottom of the generated code and run the code to view the table. Note that you can browse tables directly from the Data Explorer too.

### SQL Pass Through

Like remote views, SQL Pass Through utilizes ODBC to perform data access. It provides a more direct access to the ODBC interface. It gives excellent low level control with the ability to specify transactions, execute stored procedures, run specific updates, etc. However, it can involve writing more code, especially if you want updates to be sent to Advantage automatically.

The following example code runs a simple SELECT statement to retrieve the contents of a table named test. It stores the results in a Visual FoxPro cursor named MyResult. It assumes that an ODBC data source named "ads" exists.

```
#include "foxpro.h"
hConn = SQLCONNECT( "ads" )
IF hConn > 0
    SQLEXEC( hConn, "select * from test", "MyResult" )
    BROWSE
    USE
    SQLDISCONNECT( hConn )
ELSE
    ? "Failed to connect to the data source"
ENDIF
```

In the above example, if you wanted to perform updates to the data, one possibility would be to execute SQL statements to do the updates. For example, SQLEXEC( hConn, "insert into test (empid) values (111);").

If you want updates to be automatically sent to Advantage, however, some additional code must be written. In particular, several cursor properties must be set in order for the update statements to be automatically generated. The following code is a short example that makes some of the fields in the view editable.

```
#include "foxpro.h"
hConn = SQLCONNECT( "ads" )
IF hConn > 0
    ** retrieve the cursor
    SQLEXEC( hConn, "select * from test", "MyResult" )

    ** Set the properties necessary for automatic updates

    ** specify the table name
    CURSORSETPROP("Tables", "test", "MyResult" )
    ** indicate which field is the primary key
    CURSORSETPROP("KeyFieldList", "empid", "MyResult" )
    ** specify which fields can be updated
    CURSORSETPROP("UpdatableFieldList", "deptnum, lastname", "MyResult" )
```

```

** provide a mapping of view names to table names for the update
CURSORSETPROP("UpdateNameList", ;
    "deptnum test.deptnum, ;
    empid test.empid, ;
    lastname test.lastname", "MyResult" )
** indicate that the WHERE clause will use only the primary key
CURSORSETPROP("WhereType", DB_KEY, "MyResult" )
** Specify that updates should be sent to the backend
CURSORSETPROP("SendUpdates", .t., "MyResult")

BROWSE
USE
SQLDISCONNECT( hConn )

ELSE
    ? "Failed to connect to the data source"

ENDIF

```

## RESOURCES

The Advantage.FoxPro newsgroup can be used to ask questions and request peer feedback. Advantage newsgroup information can be found at <http://devzone.advantagedatabase.com/dz/content.aspx?key=7>. Additional questions can be directed to the Advantage Technical Services team at [Advantage@iAnywhere.com](mailto:Advantage@iAnywhere.com). The Advantage Developer's Zone ([devzone.advantagedatabase.com](http://devzone.advantagedatabase.com)) can be used to search the newsgroups, search knowledge base items, view online help, etc.

### Additional Information for Visual FoxPro Developers

<http://sybase.com/foxpro>

Advantage Visual FoxPro home page for developers accessing and discovering all the relative resources and downloads for the Advantage products and technologies.

### Advantage Developer Zone

<http://DevZone.AdvantageDatabase.com>

Technical support content including knowledgebase, help, code examples, screencasts, etc. provided by the Advantage Technical Services Team for customer support and as a reference center for developers using the Advantage products and technologies.

### Free Advantage Database Server Evaluation Version

<http://response.sybase.com/forms/ADS10-30-Day>

Advantage clients (which include the Advantage Local Server engine) and various data connectivity drivers are all free to download and include royalty-free distribution with no license required. Use this link to download the full functioning Advantage Database Server Trial version and any clients.

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