Specifications of Paradox for Windows

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IN THIS CHAPTER

For some reason, Borland is a little reluctant to publish specifications for Paradox. This appendix is provided to try to make up for the lack of a centralized location on Paradox and dBASE tables, ObjectPAL, and general Paradox limits.

Borland Database Engine (BDE)

The Borland Database Engine (BDE) was also referred to as IDAPI and ODAPI in previous versions of software released by Borland, including Paradox for Windows, dBASE for Windows, Quattro Pro, and ReportSmith. Following are a few of the specifications for the BDE.

- Local table types supported: Paradox 3.5, 4, Paradox 1.0 for Windows 3.*x*, Paradox 5.0 for Windows 3.*x*, Paradox 7, dBASE III Plus, dBASE IV, dBASE for Windows, and Visual dBASE.
- SQL Database Servers: Interbase Server, Oracle, Sybase, Microsoft SQL Server, Informix, and DB/2.
- ODBC support requires ODBC Driver Manager 2.0. ODBC drivers include: Text, Excel spreadsheets, Access, DB2, AS/400, Btrieve, Ingres, and HP ALBASE/SQL (many others are also available).

Paradox Standard Table Specifications

The Paradox standard table format was introduced in Paradox for DOS version 4. Other products that use the standard format include Paradox for DOS version 4.5, ObjectVision 2.1, and Paradox for Windows versions 1.0 and 4.5.

Earlier versions of the Paradox table type are referred to as the Compatible table type. In the BDE Configuration Utility, the level option for the Paradox driver dictates what default table type is created by Paradox for Windows. Use 3 for Compatible tables and 4 for Standard tables (the default). Following are the specifications for standard Paradox tables.

- 256MB file size limit if the table is in Paradox format and using a 4K block size.
- Up to 255 fields per record.
- Up to 64 validity checks per table.
- A primary index can have up to 16 fields.
- Tables can have up to 127 secondary indexes.
- Up to two billion records per file. Because of the 256MB file size limit and other factors such as block size, however, the limit is much smaller. Tables of 190,000 records are easily achievable (and you can have more if you don't use up the 1,350-bytes-per-record limit for a keyed table). Tables with close to a million records are common.

- Block size can be 1024, 2048, 3072, or 4096. Paradox stores data in fixed records. Even if part or all of the record is empty, the space is claimed. Knowing the interworkings can save you disk space. Paradox stores records in fixed blocks of 1024, 2048, 3072, and 4096 in size.

  After a block size is set for a table, that size is fixed, and all blocks in the table will be of that size. To conserve disk space, you want to try to get your record size as close to a multiple of a block size as possible (minus 6 bytes, which are used by Paradox to manage the table).
- Record size. 1,350 for keyed tables and 4,000 for unkeyed tables. When figuring out the size (the number of bytes or characters) of a table, remember that Alpha fields take up their size (for example, an A10 = 10 bytes), numeric field types take up 8 bytes, short number field types take up 2 bytes, money takes up 8, and dates take up 4 bytes.

  Memos, BLOBs, and so on take 10 bytes, plus however much of the memo is stored in the .DB. For example, M15 takes 25 bytes.

Paradox 5 Table Specifications

The Paradox 5 table format was introduced in Paradox for Windows version 5. Following are the specifications for Paradox 5 tables.

- Up to two billion records per file.
- File size is limited to two gigabytes.
- Up to 255 fields per record.
- Record size: Up to 10,800 bytes per record for indexed tables and 32,750 bytes per record for nonindexed tables. When figuring out the size (the number of bytes or characters) of a table, remember that Alpha fields take up their size (for example, an A10 = 10 bytes), numeric field types take up 8 bytes, short number field types take up 2 bytes, money takes up 8, and dates take up 4 bytes.

  Memos, BLOBs, and so on, take 10 bytes, plus however much of the memo is stored in the .DB. For example, M15 takes 25 bytes.
- Up to 64 validity checks per table for Paradox for Windows tables.
- A primary index can have up to 16 fields.
- Tables can have up to 127 secondary indexes.
- Block size can be from 1K to 32K in steps of 1K. For example, 1024, 2048, 3072, 4096, 5120…32768.

Paradox 7 Table Specifications

The Paradox 7 table format was introduced in Paradox version 7 for Windows 95/NT. The Paradox 7 table format has all the same specifications as the Paradox 5 table format with two additions. Following are the specification additions for the Paradox 7 table format.

- Added descending secondary indexes.
- Added unique secondary indexes

dBASE IV Table Specifications

The dBASE IV table format was introduced in dBASE IV for DOS. Following are the specifications for dBASE IV tables:

- 2GB file size
- Two billion records per file
- A maximum of 255 fields per record
- Maintained indexes can have up to 47 indexes per file. Each index can be created using field expressions of virtually any combination, including conditional expressions of up to 255 characters per expression that result in an index of up to 100 bytes.
- Unlimited non-maintained indexes can be stored on disk. You can use up to 47 indexes simultaneously.

dBASE V Table Specifications

The dBASE V table format was introduced in dBASE V for Windows. Following are the specifications for dBASE V tables:

- Up to one billion records per file.
- A maximum of 1,024 fields per record.
- Up to 32,767 bytes per record.
- Unlimited nonmaintained indexes can be stored on disk. You can use up to 47 of them simultaneously.
- Up to 10 master index files open per database. Each master index can have up to 47 indexes.
- Maintained indexes can have up to 47 indexes per file. Each index can be created using field expressions of virtually any combination, including conditional expressions of up to 255 characters per expression that result in an index of up to 100 bytes.

Paradox and dBASE Field Type Specifications

See Chapter 2 for additional information on the following field types.

NOTE

In this section, the phrase *Paradox 1* is referring to the Paradox 1 for Windows table format and not the software. For example, both Paradox 1.0 and 4.5 for Windows utilize the Paradox 1 for Windows table format, which was introduced with Paradox 1.0 for Windows. In addition, Paradox 3.5 and Paradox 4 are referring to the compatible and standard table formats introduced with Paradox 3.5 and 4.0 for DOS, respectively. Finally, the same applies to the dBASE formats which, coincidentally, were introduced with the same versions of the dBASE software.

Alpha (A)	Paradox 3.5, 4, 5, and 7 field type that can contain up to 255 letters and numbers. This field type was called Alphanumeric in versions of Paradox before version 5. It is similar to the Character field type in dBASE.
Character (C)	dBASE III+, IV, and V field type that can contain up to 254 characters (including blank spaces). This field is similar to the Paradox Alpha field type.
Autoincrement (+)	Field type introduced in the Paradox 5 table format that adds one to the highest number in the table whenever a record is inserted. The starting range can be from –2,147,483,647 to 2,147,483,647. Deleting a record does not change the field values of other records.
BCD (#)	Paradox 5 and 7 field type, which is provided only for compatibility with other applications that use BCD data. Paradox correctly interprets BCD data from other applications that use the BCD type. When Paradox performs calculations on BCD data, it converts the data to the numeric float type, then converts the result back to BCD. When this field type is fully supported, it will support up to 32 significant digits.
Binary (B)	Paradox 1, 5, and 7 field type that can store binary data up to 256MB per field.

Bytes (Y)	Paradox 5 and 7 field type for storing binary data up to 255 bytes. Unlike binary fields, bytes fields are stored in the Paradox table (rather than in the separate .MB file), allowing for faster access.
Date (D)	Paradox 3.5, 4, 5, and 7, as well as dBASE III+, IV, and V. dBASE tables can store dates from January 1, 100, to December 31, 9999. Paradox 5 tables can store from 12/31/9999 B.C. to 12/31/9999 A.D.
Float (F)	dBASE IV and V floating-point numeric field type provides up to 20 significant digits.
Formatted Memo (F)	Paradox 1, 4.5, 5, and 7 field type is like a memo field except that you can format the text. You can alter and store the text attributes of typeface, style, color, and size. This rich text document has a variable length up to 256MB per field.
Graphic (G)	Paradox 1, 5, and 7 field type can contain pictures in .BMP (up to 24 bit), .TIF (up to 256 colors), .GIF (up to 256 colors), .PCX, and .EPS file formats. Not all graphic variations are available. For example, currently you cannot store a 24-bit .TIF graphic. When you paste a graphic into a graphic field, Paradox converts the graphic into the .BMP format.
Logical (L)	Paradox 5 and 7 and dBASE III+, IV, and V field type can store values representing True or False (yes or no). By default, valid entries include T and F (case is not important).
Long Integer (I)	Paradox 5 and 7 field type that can store 32-bit signed integers that contain whole numbers in the range 2,147,483,647 to –2,147,483,647
Memo (M)	Paradox 4, 5, and 7, as well as dBASE III+, IV, and V field. A Paradox field type is an Alpha variable-length field up to 256MB per field. dBASE Memo fields can contain binary as well as memo data. For Paradox tables, the file is divided into blocks of 512 characters. Each block is referenced by a sequential number, beginning at zero. Block 0 begins with a 4-byte number in hexadecimal format, in which the least significant byte comes first. This number specifies the number of the next available block. It is, in effect, a pointer to the end of the memo file. The remainder of Block 0 isn't used.

Money ($)	Paradox 3.5, 4, 5, and 7 field type, like number fields, can contain only numbers. They can hold positive or negative values. Paradox recognizes up to six decimal places when performing internal calculations on money fields. This field type was called Currency in previous versions of Paradox.
OLE (O)	Paradox 1, 5, and 7, as well as dBASE V field type that can store OLE data.
Number (N)	Paradox 3.5, 4, 5, and 7, as well as dBASE III+, IV, and V field type can store up to 15 significant digits -10^{307} to $+10^{308}$ with up to 15 significant digits. dBASE number fields contain numeric data in a Binary Coded Decimal (BCD) format. Use number fields when you need to perform precise calculations on the field data. Calculations on number fields are performed more slowly but with greater precision than are calculations on float number fields. The size of a dBASE number field can be from 1 to 20. Remember, however, that BCD is in Paradox 5 and 7 only for compatibility and is mapped directly to the Number field type.
Short (S)	Paradox 3.5, 4, 5, and 7 field type that can contain integers from –32,767 through 32,767 (no decimal).
Time (T)	Paradox 5 and 7 field type that can contain times of day, stored in milliseconds since midnight and limited to 24 hours.

NOTE

This field type does not store duration, which is the difference between two times. For example, if you need to store the duration of a song, use an Alpha field. Whenever you need to store time, make a distinction between clock time and duration. The Time field type is perfect for clock time. Duration can be stored in an Alpha field and manipulated with ObjectPAL.

TimeStamp (@)	Paradox 5 field type comprised of both date and time values. Rules for this field type are the same as those for date fields and time fields.

ObjectPAL (Applies to Forms, Scripts, and Libraries)

Following are some of the specifications for ObjectPAL:

Variable length	You can use variable names of up to 64 characters.
Object name length	You can use object names of up to 64 characters.
Calculated fields	Calculated fields are limited to just under 1,000 characters.
Parameter limit	Built-in and custom methods and procedures have a 29-parameter limit. Attempting to compile a form or script with more than 29 parameters gives the error `Error: Maximum number of parameters has been exceeded.`
Built-in methods	Built-in methods are limited to 32K. This matches the limit for a memo variable. This limit is important because of the method `methodGet()`.
Quoted strings	Quoted strings are limited to 255 characters. This applies to such expressions as the following: `x = "abc 123"  ;An example of a quoted string.`
Arrays	Arrays are limited to 65,535 elements.
DynArrays	DynArrays are limited only by memory capacity.

Queries

Following are some of the specifications for queries:

- Up to 32 tables in a single query.
- Unlimited number of lines in a query. This is limited by memory.

Launching Parameters

Paradox for Windows enables you to specify command-line options when starting up. You can set up many different icons to start up Paradox for Windows in different ways. One great benefit is that you will be able to launch several sessions of Paradox. To change an icon, select File | Properties in Program Manager. The syntax for the command-line option is `[[Drive:] Path] PDXWIN32.EXE [Command-line options] [Startup file]`.

Table A.1 describes the launching parameters.

Table A.1. The launching parameters.

Parameter	*Description*
`-b`	Prevents Paradox from launching a second instance. Attempting to run a second instance will force the first instance to display.
`-c`	Starts Paradox with a clear desktop. If you prefer to start with a clear desktop, use this option. Also, if you cannot start Paradox for any reason, try using `-c` to start without opening any objects.
`-d` *Filename*	Use `-d`*filepath + filename* to specify an alternative PDOXWORK.INI file. You can use this to hard code a single PDOXWORK.INI file, even if you change working directories by specifying a complete path. In addition, this option enables you to create different folders/Project Viewers for each user.
`-e`	Prevents Paradox from writing all changes to PDOXWIN.INI and PDOXWORK.INI. This option is useful when you have your environment set up the way you like it (that is, when you've set your title, maximized, opened a folder or form, and so on).
`-f`	Allows changes to PDOXWIN.INI and PDOXWORK.INI that have been prevented by `-e`. This option overrides `-e`, even if it's placed in the `FLAGS=` line in the `[PDOXWIN]` section of WIN.INI.
`-i` *Filename*	Use `-i`*filepath + filename* to specify an alternative PDOXWIN.INI file. This is very useful for keeping separate environment settings.
`-m`	Runs Paradox minimized. This is useful if you want to load Paradox but not work with it right away.
`-n`	Doesn't write changes to the registry. Use this option if you use the `-p` and `-w` command-line options to set your private and working directories. You can place `-n` in the `FLAGS=` line of the `[PDOXWIN]` section of registry. If you do this, you can override the `-n` option by starting Paradox with the `-y` option.
`-o` *Filename*	Use `-o`*filepath + filename* to specify an alternative IDAPI.CFG file. This can be useful for maintaining separate lists of aliases.
`-p Path`	Use `-p`*filepath* to specify an alternative private directory. Use this to set up more than one instance of Paradox on each system. You may wish to do this, for example, if you are installing several applications on a single system.
`-q`	Starts Paradox without displaying the title screen.

continues

Table A.1. continued

Parameter	*Description*
`-s`	Prevents users from resizing the Desktop. This option starts Paradox without a resizable window border. It doesn't prevent the window from being resized by ObjectPAL applications.
`-t`	Enables users to resize the Desktop. This option can be used to override `-s` if it's placed in the `FLAGS=` line in the `[PDOXWIN]` section of registry.
`-w Path`	Use `-w`*`filepath`* to specify an alternative working directory. Use this to set up more than one application on each system.
`-y`	Overrides the `-n` command-line option.
`filename`	Use *`filepath + filename`* to load any valid Paradox file. Valid filenames include MYFORM.FSL, MYFORM.FDL, MYREPORT.RSL, MYSCRIPT.SSL, and so on.

When starting a second instance of Paradox, use the `-n`, `-p`, and `-w` command-line options. `-n` prohibits Paradox from saving private and working directory settings in the registry. The `-p` and `-w` options set different private and working directories. If you set up icons using these parameters, you'll be able to launch many different Paradox for Windows sessions and use more than one application at a time. For developers, copying and pasting from other forms becomes easier.

Examples of Using Parameters

Use the following line when you have your environment the way you want:

```
PDOXWIN32.EXE -e
```

Use the following line for launching a particular form in an extra instance:

```
PDOXWIN32.EXE -n -pC:\PDOXWIN\SAMPLE -wC:\PDOXWIN\SAMPLE CUSTOMER.FSL
```