4D v16: Scalable. Fast. Flexible. Engaging

4D v16 New features and benefits

High-speed object database and more users with the full 64-bit environment

- **4D Developer Edition and 4D Volume Desktop Mac OS X in 64-bit**

- **New 64-bit Database Cache Manager** for faster queries and data access. The database cache manager has been entirely rewritten in 4D v16 in order to take full advantage of 64-bit environments. Automatically available, it brings optimized handling of objects in cache memory avoiding any fragmentation issues and allowing more parallel user accesses.

- New **Get cache size**, **Cache info** and **SET CACHE SIZE** commands to configure or dynamically analyse the database cache.

- **Preemptive Web processes**
  Web Server in preemptive mode: just click one checkbox and your application will support more simultaneously connected users, and process more requests in parallel.
  Built-in Web Server of 4D 64-bit for Windows and OS X allows you to take full advantage of multi-core computers by using preemptive Web processes.

- **Preemptive Multithreading for 4D language:** 4D 64-bit for Windows and macOS offers a powerful feature allowing you to execute 4D code in **preemptive processes**. Your 4D applications will now be able to take full advantage of multi-core computers so that their execution will be faster and they can support more connected users.

- **Asynchronous messages between processes**: a simple and powerful way to exchange information between processes and also between processes and forms. This feature is based upon an asynchronous messaging system that allows processes and forms to be called and asked to execute methods with parameters in their own context. Asynchronous programming permits an optimized and efficient use of system resources.

- **Going further with Object fields**: The **DISTINCT ATTRIBUTE VALUES** and **DISTINCT ATTRIBUTE PATHS** commands generate arrays of distinct values based on attributes of **Object fields** in the 4D database. The **QUERY SELECTION BY ATTRIBUTE** command allows you to easily and rapidly perform a search limited to the records of the current selection, using only one 4D command.

- **Improved database indexing**: now a total reindexing of a very large customer database could be up to 50% faster than previously.

- **Outer join SQL query support**: the support of the outer join queries has been enhanced, specifically for queries that have an explicit outer join ON clause with exactly two tables.

- **REPLACE STRING command is now faster** on large amounts of data. During our tests the replacement of 32K occurrences has averaged 950 times faster than before.

- **Commands that are now thread-safe** and can be used in preemptive processes in compiled mode, 64-bit only - check the **complete list** of thread-safe commands.
  - All commands in the **Web Server theme**: **WEB CLOSE SESSION**, **WEB GET BODY PART**, **WEB Get body part count**, **WEB Get Current Session ID**, **WEB GET HTTP BODY**, **WEB GET HTTP HEADER**, **WEB GET OPTION**, **WEB GET SESSION EXPIRATION**, **WEB Get session process count**, **WEB GET STATISTICS**, **WEB GET VARIABLES**, **WEB Is secured connection**, **WEB Is server running**, **WEB SEND BLOB**, **WEB SEND FILE**, **WEB SEND HTTP REDIRECT**, **WEB SEND RAW**

DATA, **WEB SEND TEXT**, **WEB SET HOME PAGE**, **WEB SET HTTP HEADER**, **WEB SET OPTION**, **WEB SET ROOT FOLDER**, **WEB START SERVER**, **WEB STOP SERVER**, **WEB Validate digest**

- o All commands in the **XML DOM** (such as **DOM Append XML child node**, **DOM Append XML element**) and **XML SAX** (such as **SAX ADD PROCESSING INSTRUCTION**, **SAX ADD XML CDATA**) themes
- o All commands in the **HTTP Client** theme: **HTTP AUTHENTICATE**, **HTTP Get**, **HTTP Get certificates folder**, **HTTP GET OPTION**, **HTTP Request**, **HTTP SET CERTIFICATES FOLDER**, **HTTP SET OPTION**
- o Most of the 4D Write Pro commands, as well as the 4D language **FONT LIST** and **FONT STYLE LIST** commands. If you are doing routines for creating or converting documents programmatically, e.g. invoices, you can now do it with preemptive processes.

Enhanced development capabilities

Fully customizable **list box** object, entirely adaptable to user needs; thanks to the following new features you can considerably enhance the user experience.

- The **Execute action upon list box column resizing** feature allows you to create live and responsive interfaces based on the actual width of columns. The event **On Column Resize** is now triggered "live" during the resizing of the list boxes as long as the user modifies the column widths (previously, it was generated only once, at the end of the resizing).
- The **Column Auto-Resizing** and **Variable row height** (4D View Pro) features are based on a new **Row Height Array** property and the new **LISTBOX Get row height** and **LISTBOX SET ROW HEIGHT** commands.
- **Add an icon to list box header** by programming to dynamically show more explicitly the content of the column as for instance unread emails or open invoices. Updated commands: **OBJECT Get format** and **OBJECT SET FORMAT**.
- **New List box property: enter in edition at first click** makes it possible to set list boxes to permit end users to edit the content of the list box cells with a single click.
- **Disabled and non-selectable List boxes rows** to specify the selectable and enabled property of each row individually.
- **List box option to truncate content instead of adding ellipsis** allows you to choose to either display content that is too long with an ellipsis, or just truncate the text with no ellipsis added, to allow more flexible handling of large content on small screens.

- **GRAPH command redesigned** for the 64-bit versions for Mac & Windows, offering you more control and easing the use of your graphs. The redesign has also permitted to enhance the graph custom possibilities. You now have 34 parameters to customize your graph. For example you are able to manage graph properties such as the margins, the font colours and size of the legend, the width, height, colours of the bars, the background colours, etc.

- A powerful **new syntax is available for 4D tags** inside texts and Blobs to be processed - **4D Tags** script and dollar syntax: several improvements for the **PROCESS 4D TAGS** command drastically enhance the support for smart templates. The new dollar syntax increases compatibility with several document formats; 4D code allows you to insert large blocks of 4D method code simply by copy & paste inside a template and finally, the 4D debugger can be used to debug a template!

- **Suspend and Resume transaction** feature allows you more flexibility when you need to perform, from within a transaction, certain operations that do not need to be executed under the control of this transaction. This allows you to **suspend a transaction**, in order to modify or create records outside of the transaction (such as an invoice number counter, etc.). While a transaction is suspended, another **transaction can be started**, even a nested one, which can be suspended as well.

- **Handling of On Mouse Up event for pictures** - new **On Mouse Up event** for non-draggable picture objects: an easy and clear way to draw and/or move SVG objects. This event is accompanied by the new **Is waiting mouse up** command, which allows you to ensure the

consistency of the internal state for a picture object in this context.

- New command **GET PICTURE FORMATS** allows you to **get the list of formats contained in a 4D picture** (field or variable).

- **Unicode**: the texts for all the form objects are stored in **Unicode**, allowing you to use characters from different languages directly in the form editor.

- **Distinct values with counts:** a new parameter for the **DISTINCT VALUE** command allows 4D developers to get the number of occurrences for each distinct value.

- **Define dynamic variable of object type in form editor** allows you, for example to directly use a 4D Write Pro selection as a dynamic variable.

- **4D form wizard:** variable name is now left blank to promote dynamic variables use for all applicable form objects.

- **Handle font style lists:** the command **FONT STYLE LIST** has been created to get all the styles available for the font given in parameter. The command **FONT LIST** has been enhanced with a new parameter that permits you to get only the vectorial fonts on WINDOWS.

- The command **METHOD GET CODE** has been enhanced to use these tokens (constants, 4D commands, tables, fields, 4D plugins…). These tokens can be used by 4D to get an element even if its name has changed. The aim of this improvement is to get the very same result whatever the programming language of the 4D product used for the purpose of exporting/importing 4D code.

- **Error formula system variable**: new system variable has been created to get the offending 4D line of code when an error is raised. This variable is automatically filled like the existing system variables "Error", "Error line", "Error method".

- **EXECUTE FORMULA cache:** a new cache mechanism for **EXECUTE FORMULA** will speed up the execution up to 100 times faster than previously.

- The **LAUNCH EXTERNAL PROCESS** command accepts a new parameter, which is filled by the command with the launched PID process.

- A new parameter in the **DELETE FOLDER** command permits you to delete a folder with all its content at once.

- **New Code editor options in the Preferences to customize the code editor** and develop easily**: Highlight the logical blocks**, **Always show block lines** and **Hide collapse/expand icons**. Also, with the new **Highlighted text** preference, you can graphically visualize occurrences of a given variable in the 4D method editor. It permits you to define your preferred mode: trigger text highlight upon variable selection or cursor insertion.

- Easily **get the list of deprecated pictures via MSC**. The *Maintenance and Security Center* allows you now to detect the deprecated file format images and find their location, so that you can replace them by new modern format ones.

- **Add date/timestamp to the MSC log file** permits you to append a timestamp to a log file after a repair, verify, or compact action in MSC. This feature avoids overwriting the last log when launching a new MSC scan.

- **JSON export for Journal**: now you can extract the log contents into a JSON file using a new command, so you can analyse the activity of the database. The log file is also a vital element for the restoration of your database following an unfortunate contingency.

- **Journal enhancements:** new options for **INTEGRATE MIRROR LOG FILE** allow the

developer to respond to errors and decide if the operation should be cancelled or continued with auto-repair.

4D Write Pro - New powerful integrated text engine

4D Write Pro is fully integrated into 4D itself, making it easier to deploy and manage. It provides a full set of commands for **accessing document content by programming**, so you can easily modify text and image attributes in your documents.

- **4D Write Pro area widget in 4D object library** provides an easy and quick way to add a **predefined user interface for a 4D Write Pro area**.

- **Modifying 4D Write Pro text and image attributes**: a large set of new and updated commands and constants allow fully programmable document creation and manipulation. New commands: **WP SET ATTRIBUTES**, **WP GET ATTRIBUTES**, **WP RESET ATTRIBUTES** and **WP Is font style supported**. Updated commands: **OBJECT SET HORIZONTAL ALIGNMENT**, **OB SET**, **OB Get**, **Stringifying 4D Write Pro attributes** and **QUERY BY ATTRIBUTE**.

- **Handling selections in the documents: a set of new commands are dedicated to manage selections and ranges.** Ranges are objects representing portions of a 4D Write Pro document**: WP Get range**, **WP Get selection**, **WP Get pictures**, **WP Get paragraphs** and **WP SELECT**.

- **Bookmarks**: support of **bookmarks** (named references to ranges) allowing you to build dynamic document templates; new **WP CREATE BOOKMARK**, **WP Get bookmark range,** and **WP DELETE BOOKMARK** commands. Bookmarks permit you to access and reuse specific parts of a document.

- **Handling headers and footers for pages and sections**: you can now not only insert **headers and footers** in your 4D Write Pro documents, but also retrieve any existing headers and footers when opening an existing .4w7 document created with the 4D Write plugin.

- **Importing 4D Write documents**: support of **pagination properties of former 4D Write documents**.

- **New commands for inserting and creating elements and documents**: **WP INSERT DOCUMENT**, **WP New** (new document from a range), **WP INSERT PICTURE,** which permits you to **insert inline pictures programmatically** in your 4D Write Pro document. **WP INSERT BREAK** also allows inserting line, page or section breaks by programming.

- Improved **pagination & printing** settings: 4D Write Pro new **Page view mode** - the document is rendered with multiple pages, as it will be printed. Also, now you can print 4D Write Pro documents and manage print settings by programming using **WP PRINT**. The **WP USE PAGE SETUP** new command (called just before **WP PRINT**) synchronizes the current printer page settings with the 4D Write Pro document page settings

- **New page setup attributes**: page size, page orientation and page margin. With the new **Avoid page break inside** paragraph property you can define how paragraphs will be split between two pages allowing or not page break inside a paragraph.

- **Definition of view properties** for 4D Write Pro areas: without writing a single line of code, you can define several view attributes at design phase: **Resolution**, **Zoom**, **View mode** (**Page**, **Draft**, **Embedded**), **Show page frame**, **Show references**, **Show headers/footers**, **Show background**, **Show hidden characters** and **Show HTML WYSIWYG**.

- **Protection of 4D Write Pro dynamic expression evaluation** to get higher levels of security:

filtering of 4D expressions contained in a 4D Write Pro document using 4D's standard feature of method and command filtering.

- **Inserting document and page expressions**: automatic expressions such as *$wp_title*, *$wp_pageNumber*, or *$wp_dateCreation*.

- **Save and open documents from a disk**: allows you to locally store (save and reopen 4D Write Pro documents to and from disk) without any loss thanks to the new document format (**.4wp**). **WP New**, **WP Import document**, **WP EXPORT VARIABLE** and **WP EXPORT DOCUMENT** commands have been improved accordingly.

- **Store documents in database as an Object field:** Store 4D Write Pro documents in the database in an object field and select how it is stored in the database - in a record, in the data file or outside the data file, in order to optimize and customize access to this field. You can also **Bind a 4D Object field to a 4D Write Pro area in a form**.

- **Persistency of user attributes:** When a 4D Write Pro document is exported on a disk, your own custom attributes you may have set with **OB SET** are now inserted in the created file. These attributes can also be imported in the database with the command **WP import document**.

- **Print forms containing a 4D Write Pro area**.

Rich and immersive user experience

- **Import/export dialogs (64-bit)** are modernized to provide your end-users with a better user experience; the preview areas are now using a list box.
- **Improved user experience for Label editor and Quick Report editor** (64-bit): intuitive and easy to use for your end-users.

- **Application Sleep Notification** 32/64-bit with the new network layer selected, saves end-user's time with the fully **automatic reconnection** after the client exits sleep mode**.** Your end-user just continues to work as if nothing happened; no need to restart the application.

- **Client-Server Single Sign On** (SSO) on Windows**:** thanks to **Single Sign On**, by logging in to your Windows session, you're automatically logged in to your 4D applications. Also, couple SSO with **LDAP** for normalized and secure authentication.

- **Print management:** new commands to **save and restore print settings** quickly and efficiently. The new **BLOB to print settings** and **Print settings to BLOB** commands allow you to save and reuse all of user's current print settings, including "private" printer driver settings. These commands extend and replace the functionality of the (obsolete) 4D Pack **_o_AP BLOB to print settings** and **_o_AP Print settings to BLOB** commands.

- Simplified **4D Product license activation** feature to gain simplicity and speed.

- **New automatic style sheets** allow you to design generic dialog boxes compliant with current platform guidelines: **Automatic (Main)** and **Automatic (Additional)**. These new style sheets can be handled by programming using **two new constants, added to the "Font Styles" theme**: **Automatic style sheet_main** and **Automatic style sheet_additional**.

Miscellaneous

Benefit from the **new architecture for application deployments** and store data file path and server connection information in the user preferences.

- **Store data file path in the user preferences:** to ease the management of the data file path for merged applications it is now stored in a user preference instead of the application package, to avoid overwriting it with a structure update. It also avoids a Mac signature becoming invalid just because the data file path has changed.
- **Store 4D Server URL in merged applications in the user preferences**: now the URL of the server used by a merged application is stored in the user preferences and not inside the client application. When the client application is replaced, for example because of an update, the previously used server location can be reused.
- **User settings linked to a data file**: new **Get 4D file** command allows you to easily retrieve the path for the following files - backup configuration file, last backup file, user structure settings file and user data settings file. In addition, the **Get 4D folder** command now returns the data file of the database. The **user settings linked to the data file** feature helps you gain simplicity, when you run **multiple 4D instances** of an application on the same system. You now have the possibility **to associate a set of different user settings with each data file**. For instance, with the settings file next to each data, you can configure the port ID for each of them independently and the update process preserves these settings.

- **4D Web Server security improvement**: following security offices recommendations, the **HTTP TRACE** method has now been disabled by default.

- **Managing 4D Mobile sessions:** 4D Mobile sessions can be handled on the 4D Server side using regular 4D Web session commands. The 4D Web commands **WEB CLOSE SESSION**, **WEB Get Current Session ID**, **WEB GET SESSION EXPIRATION**, as well as the new **WEB Get session process count** command and the **On Web Close Process database method** support 4D Mobile sessions.

Discover the complete list of **4D v16 features** and how to use them to enrich your applications on:
4D Doc Center.