# Dyalog for macOS
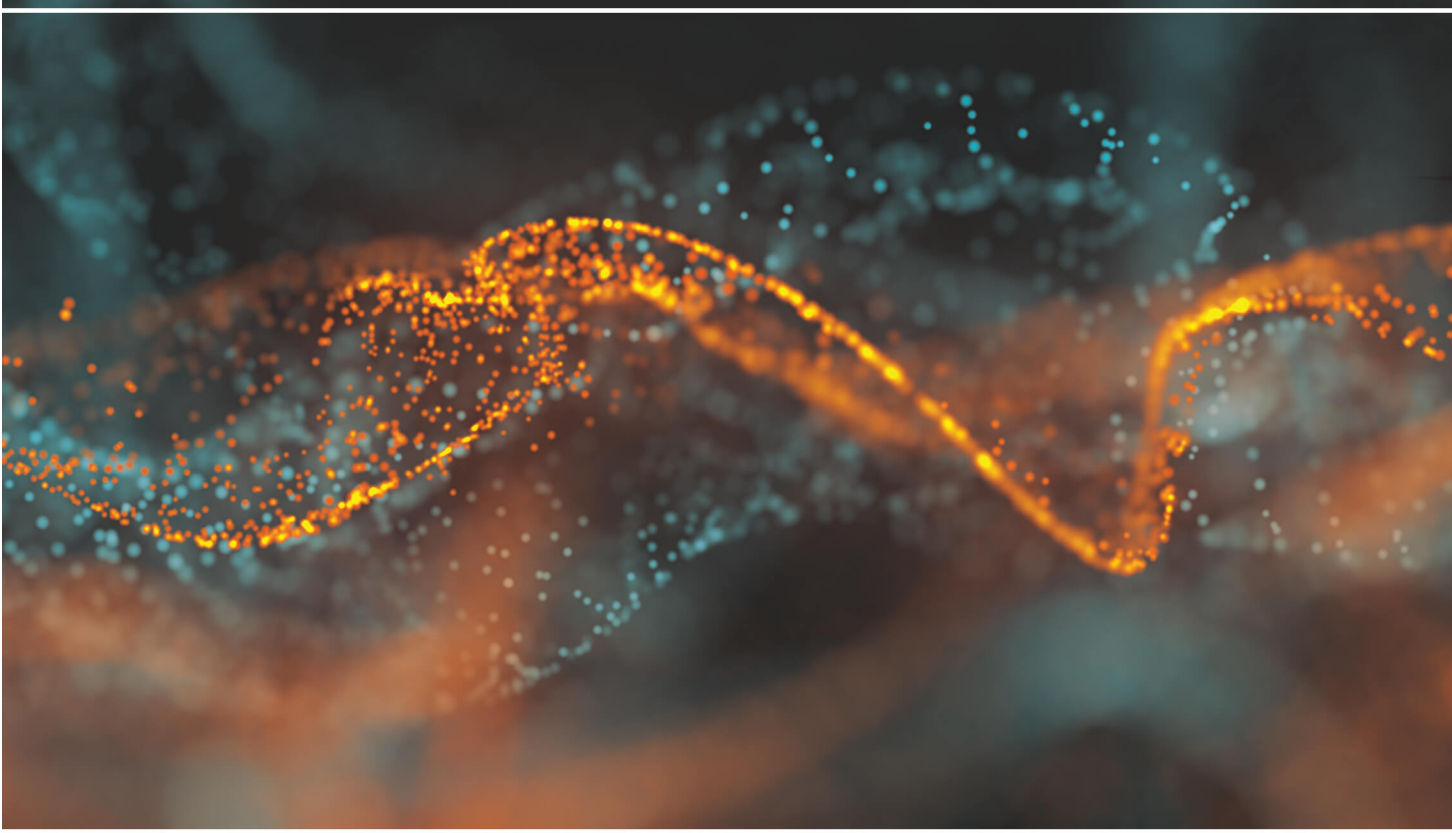# Installation and Configuration Guide

## Dyalog version 17.1

DYALOG

**The tool of thought for software solutions**

Dyalog for macOS Installation and Configuration Guide

Dyalog version 17.1
Document Revision: 20191008_171

Unless stated otherwise, all examples in this document assume that ⎕IO ⎕ML ← 1

# Contents

# 1 About This Document

This document covers the installation procedure and configuration options for Dyalog on macOS. It details the pre-requisites for installation and the environment variables that can be used to customise individual instances.

This document is only part of the full documentation set for Dyalog (updated regularly and available to download from https://docs.dyalog.com). In cases where the information given is different between this document and any of the others, this document should be regarded as the definitive source for Dyalog for macOS.

> ⓘ A complete documentation set is installed in the **[DYALOG]/help** directory when Dyalog is installed. The path to the **[DYALOG]** directory (that is, the directory in which Dyalog is installed) can be found from within a Session by entering:

```
+2⎕NQ '.' 'GetEnvironment' 'DYALOG'
```

## 1.1 Audience

It is assumed that the reader has a basic knowledge of macOS and software terminology; no prior knowledge of Dyalog is required.

## 1.2 Conventions

Unless explicitly stated otherwise, all examples in Dyalog documentation assume that ⎕IO and ⎕ML are both 1.

Various icons are used in this document to emphasise specific material.

General note icons, and the type of material that they are used to emphasise, include:

> 💡 Hints, tips, best practice and recommendations from Dyalog Ltd.

Information note highlighting material of particular significance or relevance.

Legacy information pertaining to behaviour in earlier releases of Dyalog or to functionality that still exists but has been superseded and is no longer recommended.

Warnings about actions that can impact the behaviour of Dyalog or have unforeseen consequences.

Although the Dyalog programming language is identical on all platforms, differences do exist in the way some functionality is implemented and in the tools and interfaces that are available. A full list of the platforms on which Dyalog version 17.1 is supported is available at https://www.dyalog.com/dyalog/current-platforms.htm. Within this document, differences in behaviour between operating systems are identified with the following icons (representing macOS, Linux, UNIX and Microsoft Windows respectively):

# 2   Introduction

Dyalog for macOS is a complete 64-bit Unicode implementation of Dyalog. It contains the same APL language engine as all other variants of Dyalog and is compatible with Dyalog running on other supported platforms – workspaces and component files can be copied between platforms or shared in real time on a network without needing to undergo conversion.

The development environment on the Mac is the Remote Integrated Development Environment (RIDE). The default Mac installation causes RIDE and the APL Engine to start simultaneously and appear to be a single integrated unit. However, the RIDE can also be used to connect to remote Dyalog engines running on any platform. For more information about the full functionality of RIDE as a remote development environment, see the *RIDE User Guide*.

# 3   Pre-requisites for Installation

This chapter details the conditions that must be met before installing Dyalog on the macOS operating system.

## 3.1   Hardware Requirements

The target Mac must have been introduced in 2010 or later.

**To check the year of introduction of your Mac**

1.  In the Apple (⌘) menu in the menu bar, select **About This Mac**.

    A window detailing the technical specifications is displayed.

2.  Open the **Overview** tab.

    An overview of your Mac is displayed, including its model and when it was introduced, for example, "Mac mini (Early 2011)" or "MacBook Pro (Mid 2014)".

## 3.2   Operating System Requirements

The specific versions of the macOS operating system that Dyalog is supported on are detailed on https://www.dyalog.com/dyalog/current-platforms.htm.

**To check the operating system on your Mac**

1.  In the Apple (⌘) menu in the menu bar, select **About This Mac**.

    A window detailing the technical specifications is displayed.

2.  Open the **Overview** tab.

    An overview of your Mac is displayed, including its operating system.

## 3.3   Hard Drive Requirements

There should be at least 0.5 GB of free capacity on the target Mac.

**To check the free capacity of your hard drive**

1.  In the Apple (&#63743;) menu in the menu bar, select **About This Mac**.

    A window detailing the technical specifications is displayed.
2.  Open the **Storage** tab.

    The storage information for your hard drive is displayed.

## 3.4   Dyalog Versions Supported on macOS

Dyalog version 14.1 (64-bit Unicode edition) and later are available for the macOS operating system.

# 4 Installing/Upgrading Dyalog

(i) This chapter is concerned both with new installations of Dyalog and with upgrading existing installations of Dyalog.

**To install/upgrade Dyalog**

1. Download **mac_64_<version>_unicode.pkg** from my.dyalog.com.
2. Double-click on the **mac_64_<version>_unicode.pkg** file.

   The **Dyalog Installer** window is displayed.
3. Follow the instructions in the **Dyalog Installer** window.
4. Close the **Dyalog Installer** window.

Dyalog is now installed and ready to use.

# 5   Verifying a Successful Installation

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**To verify that Dyalog has been successfully installed**

1. Open **Finder**.
2. In the **Go** menu in the **Finder** menu bar, select **Applications**.

   The **Applications** window is displayed.
3. In the **Applications** window, double-click on **Dyalog-<version>**.

   A Dyalog Session is started.

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Starting a Dyalog Session adds the Dyalog icon to the dock. To keep the Dyalog icon in the dock permanently, right-click on the icon and select **Options > Keep in Dock** from the drop-down list that appears.

# 6  Configuration

Although no configuration is necessary and Dyalog can be used as soon as it has been installed, various configuration options are available so that Dyalog can be customised to meet personal preferences.

During a Dyalog Session, the **Preferences** dialog box can be accessed from the **Session** window. For details of the configurations available through the **Preferences** dialog box, see the *Dyalog for macOS UI Guide*.

In addition to configuring Dyalog, the APL385 font can be installed along with a locale specific keyboard. This enables Dyalog glyphs to be entered in other applications (for example, Mail and TextEdit).

Some configuration options require changes to files in the **$HOME/.dyalog** directory. This is a "hidden" directory; to display it so that you can access the files it contains you need to toggle the display of "hidden" directories.

**To toggle display of "hidden" directories**

1. Open **Finder**.
2. In the **Go** menu in the **Finder** menu bar, select **Go to Folder...**.
   A dialog box is displayed.
3. In the field in the dialog box, enter a directory name of **Users/<username>/**.
   The listing for the **Users/<username>/** directory is displayed.
4. Press the following key combination: ⌘ + Shift + .
   The display of "hidden" files is toggled on.

# 6.1 Setting the Dyalog Serial Number

If you have registered your copy of Dyalog or have a commercial licence then you will have been sent a Dyalog serial number; this serial number is individual to you and corresponds to the type of licence that you are entitled to use.

Dyalog Ltd recommends setting the serial number either by editing a file containing the serial number directly or by running a function in a Dyalog Session to update the file containing the serial number. The next time Dyalog is started after setting the serial number, the DYALOG_SERIAL environment variable is set to the contents of this file.

(i) If the DYALOG_SERIAL environment variable already exists and has a non-empty value, then its value is not updated with the contents of the serial file.

In a multi-user environment it might be desirable to set the DYALOG_SERIAL environment variable in a system configuration file so that the serial number is held in a single location.

**To set your Dyalog serial number by editing the serial number file directly**

1. In your preferred text editor, edit the **$HOME/.dyalog/serial** text file so that it contains:

   *serialnumber*

   where *serialnumber* is your Dyalog serial number.

2. Save **$HOME/.dyalog/serial**.

   (i) **$HOME/.dyalog/serial** is the default location for your serial number file but you can set the DYALOG_SERIALFILE environment variable to point to any other valid location.

**To set your Dyalog serial number from within a Session**

1. In a Dyalog Session, enter:

   ⎕SE.Dyalog.Serial *serialnumber*

   where *serialnumber* is your Dyalog serial number.

   The Dyalog serial number is saved in the serial number file **$HOME/.dyalog/serial**.

2. Exit and restart the Session.

Your serial number is displayed in the banner when you start a Session. To see your serial number at any time, enter:

```
    +2⎕NQ'.' 'GetEnvironment' 'DYALOG_SERIAL'
```

or

```
    ⎕SE.Dyalog.Serial ''
```

⚠️ Using or entering a serial number other than the one issued to you is not permitted. Transferring the serial number to anyone else is not permitted. For the full licence terms and conditions, see https://www.dyalog.com/uploads/documents/terms_and_conditions.pdf.

## 6.2   Customising the Dyalog Session

Dyalog is customised using environment variables. These can be specified in the **$HOME/.dyalog/dyalog.config** file (which is created the first time that Dyalog is run and contains comments describing the format required) or in a shell, but cannot be set from within a Session. For a complete list of the environment variables that can be used to configure Dyalog on macOS, see *Appendix B*.

EXAMPLE

To set MAXWS to default to a value of 1 GiB, open **$HOME/.dyalog/dyalog.config** in your preferred text editor and add the following:

```
export MAXWS=1G
```

This sets the value of the environment variable permanently.

Some environment variables already have values set in the **dyalog.config** file; these should be changed rather than adding new entries with the same name.

ℹ️ Environment variable names must be specified entirely in upper case.

## 6.3   Installing the APL385 Unicode Font

When Dyalog is installed, the APL385 font that is used to display the APL glyphs correctly is embedded in the Session. To use this font in other applications (for example, email) it needs to be installed.

**To install the APL385 Unicode font**

1. Download the APL385 Unicode font from https://www.dyalog.com/apl-font-keyboard.htm.
2. Open **Finder**.
3. In the **Go** menu in the **Finder** menu bar, select **Computer**.

   The **System** directory is displayed.
4. Double-click your hard disk icon.

   The **Disk** directory is displayed.
5. Double-click the Library icon.

   The **Library** directory is displayed.
6. Double-click the Fonts icon.

   The **Fonts** directory is displayed.
7. Copy the **Apl385.ttf** file into the **Fonts** directory (this requires administration rights).
8. Exit the **Fonts** directory.

# 6.4   Installing New Keyboard Key Mappings

The default keyboard that is installed with Dyalog for use in a Session is shown in *Appendix A*. For information on customising this keyboard, see the *Dyalog for macOS UI Guide*.

To completely replace the default keyboard with a locale-specific keyboard in the Session or to enter Dyalog glyphs in other applications (for example, email), the requisite keyboard key mappings need to be installed and enabled.

**To install the keyboard key mappings for Dyalog glyphs**

1. Download and unzip the **DyalogAlt.zip** file specific to your locale from https://www.dyalog.com/apl-font-keyboard.htm.

   This zip file contains the **DyalogAlt.keylayout** and **DyalogAlt.icns** files specific to the selected locale. A separate locale-specific **mac_keyboard.pdf** file can also be downloaded from this location – this contains images of the key mappings enabled with the **DyalogAlt.keylayout** and **DyalogAlt.icns** files.

> (i) If your locale does not have files on this webpage, please contact support@dyalog.com.

2. Open **Finder**.

3. In the **Go** menu in the **Finder** menu bar, select **Computer**.

   The **System** directory is displayed.

4. Double-click your hard disk icon.

   The **Disk** directory is displayed.

5. Double-click the Library icon.

   The **Library** directory is displayed.

6. Double-click the Keyboard Layouts icon.

   The **Keyboard Layouts** directory is displayed.

7. Copy the **DyalogAlt.keylayout** and **DyalogAlt.icns** files into the **Keyboard Layouts** directory (this requires administration rights).

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**To enable the keyboard key mappings for Dyalog glyphs**

1. Open **System Preferences**.

   The **System Preferences** window is displayed.

2. Double-click the **Keyboard** icon.

   The **Keyboard** window is displayed.

3. Open the **Keyboard** tab.

4. Check **Show Keyboard & Character Viewers** in menu bar.

   The current keyboard selection is displayed in the menu bar.

5. Open the Input Sources tab.

6. Click **+**.

   The available keyboards to include are listed.

7. Select *Others* from the list on the left-hand side.

   The list on the right-hand side is updated to show the available keyboards.

8. Select *Dyalog Alt <locale>* from the list on the right-hand side and click **Add**.

   The list on the left-hand side is updated to show the enabled keyboard layouts.

9. Open the **Shortcuts** tab.

10. Select *Input Sources* from the list on the left-hand side.

The list on the right-hand side is updated to show the shortcuts that can be configured; these move between the enabled keyboards.

11. Set the shortcuts for the two options (**Select the previous input source** and **Select next source in Input menu**). If Spotlight is not enabled, then the default values of ⌘ **+ Space** and ⌘ **+ ⌥ + Space** can be used; if Spotlight is enabled then they must be changed. Setting these values provides a simple means of switching between all enabled keyboards.

You can now use the Dyalog keyboard in applications other than Dyalog whenever the Dyalog keyboard is selected in the menu bar.

# 7   Uninstalling Dyalog

**To uninstall Dyalog**

1. Open **Finder**.
2. In the **Go** menu in the **Finder** menu bar, select **Applications**.

    The **Applications** window is displayed.
3. Drag the **Dyalog-<version>** icon from the **Applications** window into the Trash.

    Dyalog is now uninstalled.

ⓘ   Although Dyalog has been uninstalled, some directories/files might remain in the
     **Home** directory.

# A   Default Keyboard

The keyboard key mappings shown in *Figure A-1* are enabled whenever a Dyalog Session is started.



***Figure A-1:** The default Session keyboard key mappings (UK keyboard)*

To access the glyphs in the lower right quadrant, press ` followed by the appropriate key.

To access the glyphs in the upper right quadrant, press ` followed by the  **SHIFT** key with the appropriate key.

> To completely replace the default keyboard with a locale-specific keyboard in the Session or to enter Dyalog glyphs in other applications (for example, email), see *Section 6.4*.

# B   Environment Variables

This appendix details the environment variables that can be used to customise Dyalog (for information on how to use them, see *Section 6.2*).

ⓘ  When an environment variable defines a byte size, the value must consist of an integer optionally followed immediately by a single character denoting the units to be used. Valid values for units are K (KiB), M (MiB) and G (GiB) (for completeness, T (TiB), P (PiB) and E (EiB) can also be specified). If no units are specified, then KiB is assumed.

***Table B-1:*** *Environment variables that can be used to configure Dyalog on macOS*

| Variable Name | Description |
|---|---|
| APL_TEXTINAPLCORE | Whether the "Interesting Information" section is included in aplcore files (for more information, see the *Dyalog for macOS UI Guide*). Valid values are:<br>• 0 – the "Interesting Information" section is not included<br>• 1 – the "Interesting Information" section is included<br>Default = 1 |
| DEFAULT_DIV | Value of ⎕DIV in a clear workspace.<br>Default = 0 (can be 0 or 1) |
| DEFAULT_IO | Value of ⎕IO in a clear workspace.<br>Default = 1 (can be 0 or 1) |
| DEFAULT_ML | Value of ⎕ML in a clear workspace.<br>Default = 1 (can be 0, 1, 2 or 3) |

***Table B-1:*** *Environment variables that can be used to configure Dyalog on macOS (continued)*

| Variable Name | Description |
|---|---|
| DEFAULT_PP | Value of ⎕PP in a clear workspace.<br>Default = 10 (must be integer in range 1 to 34) |
| DEFAULT_PW | Value of ⎕PW in a clear workspace.<br>Default = 79 (must be integer in range 42 to 32767) |
| DEFAULT_RTL | Value of ⎕RTL in a clear workspace.<br>Default = 0 (must be integer in range 0 to 32767) |
| DEFAULT_WX | Value of ⎕WX in a clear workspace.<br>Default = 3 (can be 0, 1 or 3) |
| DYALOG | The directory in which Dyalog is installed. This is referred to throughout the documentation as **[DYALOG]**. |
| DYALOG_SERIAL | Your Dyalog serial number. This must be set to the serial number issued to you. If not set, then the software is unregistered. For the full licence terms and conditions, see https://www.dyalog.com/uploads/documents/terms_and_conditions.pdf. |
| DYALOG_SERIALFILE | The full path to the **serial** text file containing your Dyalog serial number. |
| ENABLE_CEF | Whether the HTMLRenderer is enabled. Valid values are:<br>• 0 – the HTMLRenderer is not enabled (necessary on macOS if RConnect is in use)<br>• 1 – the HTMLRenderer is enabled<br>Default = 1 |

*Table B-1:* *Environment variables that can be used to configure Dyalog on macOS (continued)*

| Variable Name | Description |
|---|---|
| ERRORONEXTERNAL EXCEPTION | How the interpreter should behave when an exception occurs in a call to an external DLL. Valid values are:<br>• 0 – terminate with a system error<br>• 1 – generate an EXTERNAL DLL EXCEPTION error (91) – this is trappable.<br>Default = 0<br>ⓘ This should only be used (set to 1) during development, not in production code. |
| HISTORY_SIZE | The size of the buffer (in KB) used to store previously-entered (input) lines in the Session.<br>Default = 10 |
| INPUT_SIZE | The size of the buffer (in KB) used to store marked lines (lines awaiting execution) in the Session.<br>Default = 10 |
| LOG_FILE | Full path and name of the log file in which the Session log is recorded.<br>Default = **$HOME/.dyalog/default.dlf** |
| LOG_FILE_INUSE | Whether the Session log is saved in a Session log file and loaded the next time a Session is started. Valid values are:<br>• 0 – the Session log is not saved<br>• 1 – the Session log is saved in a Session log file and loaded the next time a Session is started<br>Default = 1 |
| LOG_SIZE | The size of the Session log's buffer.<br>Default = 800 |
| MAXWS | The workspace size (amount of memory allocated to the workspace) when a new Dyalog Session is started. Must be an integer greater than 4 MiB.<br>Default = 256M |

**Table B-1:** *Environment variables that can be used to configure Dyalog on macOS (continued)*

| Variable Name | Description |
|---|---|
| SESSION_FILE | Full path and name of the file containing the ⎕SE object that is loaded when a new Dyalog Session is started. This file defines any functions/variables stored in the ⎕SE namespace.<br>Default = **[DYALOG]/default.dse** |
| TRACE_ON_ERROR | Whether the **Trace** window is automatically displayed when execution of a defined function is suspended with an error. Valid values are:<br>• 0 – Do not display the **Trace** window when execution of a defined function is suspended with an error<br>• 1 – Display the **Trace** window when execution of a defined function is suspended with an error<br>Default = 1 |
| UCMDCACHEFILE | Full path and name of the user command cache file (for more information, see the *User Commands User Guide*).<br>Default = **$HOME/.dyalog /UserCommand20.cache** |
| WSEXT | The workspace filename extension, defined as a colon separated string of one or more extensions, including any **.** character that separates the filename from the extension. Used by WSPATH and when saving a workspace that does not have an explicitly-specified extension.<br>Default = **:.dws:.DWS** |
| WSPATH | The workspace path. A list of directories that are searched by the )LOAD, )COPY and )LIB system commands in the order specified. Multiple directories are separated by the **:** character. |

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