



Installation & Configuration Guide

Windows

Revision 6.2

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How to Use This Book

Chapter Introduction

This guide is written for dL4 for Windows users. It describes dL4 for Windows installation and configuration. It is assumed that the user is familiar with Windows operating systems. If you are using Windows for the first time, you may want a comprehensive overview of the Windows operating system. See your Microsoft documentation for details on Windows operating system.

The terms and conventions used in this guide are described below.

General Conventions:

- pfilter** *{-c character-set}* Values that you must supply are shown in italic type for clarity and to distinguish them from other elements of the syntax. In this example, *character-set* must be replaced by an actual character set name.
- pfilter** *{-c character-set}* The right and left brace characters (*{ optional items}*) indicate an item that is optional
- WINDOW (ON | OFF)** Selection of one of a group of items is shown within parenthesis separated by |. Choose only one; in this example, the legal syntax is **WINDOW ON** or **WINDOW OFF**. The parenthesis is not part of the syntactical form.
- Choose** Carry out a menu command or a command button in a dialog box by clicking it with the mouse or pressing the appropriate keys.
- Choose the OK button** Click the OK button with the mouse or press the **ENTER** key on the keyboard to carry out the action of the dialog box or close the message window.

Mouse Conventions

This guide assumes that you have not swapped the left and right mouse buttons in the Windows Control Panel. All mouse actions for dL4 are with the left mouse button. Therefore any mention of a mouse button is referring to the left mouse button.

The following terms are used in this guide to describe actions you take with the mouse:

- Point** Move the mouse until the tip of the mouse pointer rests on the screen object you want to point to.
- Click** Point to the item you want to select and then press and release the mouse button without moving the mouse.
- Double-click** Point to the item you want to select and then press and release the mouse button twice in rapid succession without moving the mouse.
- Drag** Press and hold down the mouse button while you move the mouse. When you have moved the mouse pointer to the position you want, release the mouse button.

Keyboard Conventions

The following conventions are used to define the keys and key combinations:

- Key names appear in capital letters and are referred to by their names only, without the word "key". For example, press **ALT** means press the key labeled "Alt".
- A plus sign (+) between key names means you hold down the keys in the order that they are listed and press the last key. For example, **CTRL+D** means hold down the **CTRL** and the **D** keys together.
- A comma (,) between key names means you press and release each key in turn. For example, "press **ALT,P**" means press **ALT** and release it then press **P** and release it.

Installing dL4 Runtime

Chapter Introduction

The dL4 runtime kit consists of scopew, runw, and various supporting utilities and libraries. This chapter provides all of the information you need to install dL4 runtime on your hard disk from the installation diskettes or from a downloaded installation file.

Minimum System Requirements

dL4 Requires:

- A 32-bit or 64-bit x86 compatible processor.
- dL4 for Windows requires Windows 2000/XP/2003/Vista or Windows 98/ME/NT.
- 20 megabytes of free disk space for installation or 10 megabytes of installed disk space.
- A mouse or other pointing device is recommended.

Licensing

dL4 can only be installed and used with a valid license. Read your dL4 license for terms and conditions in using dL4.

Copying dL4 Installation Files

Before you install dL4 on your hard disk, DCI recommends making a copy of the setup files as a backup.

Installing dL4 from an installation file

To install dL4 for Windows, perform the following steps:

1. Uninstall any previous dL4 for Windows release.
2. The installation file is a self-extracting setup program. Run the installation file and follow the displayed instructions. See your Windows operating system documentation for instructions on how to run programs.
3. If you haven't registered your license and SSN, run the Passport **SSNMaint** utility. dL4 cannot be used until Passport is installed and your license registered.

The program group created by the installation process includes a scopew icon to run dL4 using the command line interface and a README icon to display the README file. The README file describes recent changes in dL4 and contains a list of the installed files.

Removing dL4

Use the standard Windows “Add or Remove Programs” dialog under “Control Settings” to uninstall dL4 for Windows. See your Windows operating system documentation for details on how to uninstall an application.

Working With dL4 Configuration Options

Chapter Introduction

When dL4 is first installed, it uses a default configuration. This default configuration can be modified in the following areas:

Runtime parameters - **PORT** numbers, **SPC()** values, and driver resources

Display window - window size, font, font size, and default colors

Auxiliary printer – auxiliary printer selection and parameters

Keyboard handling - keyboard translation and edit key assignments

This chapter also describes printer configuration, how to create desktop icons for dL4 programs, and setup locale information.

Configuring Runtime Parameters

Runtime parameters control various aspects of the dL4 interpreter as well as dL4 file and device drivers.

The dL4 parameters listed below can be controlled by registry entries placed under one of these keys:

HKEY_CURRENT_USER\Software\DynamicConcepts\dL4\Environment

HKEY_LOCAL_MACHINE\Software\DynamicConcepts\dL4\Environment

The parameters can also be set using environment variables of the same name. It is unnecessary to configure any parameter whose default value is adequate for your usage.

Table of Runtime Parameters

Parameter	Type	Default	Meaning
AVAILREC	REG_DWORD	1	Minimum number of available records reported by the SEARCH statement for indexed contiguous files.
DL4DEFLU	REG_SZ	""	Default subdirectory name used with the DL4LUST runtime parameter.
DL4DRIVERS	REG_SZ	""	Default driver selection options.
DL4EMAILSERVER	REG_SZ	""	Default server name and other options for the Email driver.
DL4LOCALCACHE	REG_SZ	0	Size of the local program cache in bytes.
DL4LUST	REG_SZ	""	Space separated list of directories to searching when opening data files or accessing program files.
DL4MSSQLISAM	REG_SZ	""	Default server name and other options for the Microsoft SQL Full-ISAM driver.
DL4MYSQL	REG_SZ	""	Default server name and other options for the MySQL SQL driver.
DL4MYSQLISAM	REG_SZ	""	Default server name and other options for the MySQL Full-ISAM driver.
DL4PORTDUMP	REG_SZ	""	Path of file used for dump files by the ForcePortDump and ProgramDump intrinsic CALLs.

DL4STOPDUMP	REG_SZ	""	Path of file used to record program variables and state whenever a STOP statement is executed.
ISAMFILES	REG_DWORD	100	Maximum number of concurrently open indexed file directories.
ISAMSECT	REG_DWORD	8	Size in 128 byte blocks of directory nodes in newly created Index files.
ISAMMAXSECT	REG_DWORD	16	Maximum size in 128 byte blocks of directory nodes in Index files.
LIBSTRING	REG_SZ	""	Space separated list of directories to search when linking, CALLing, or CHAINing. This value is displayed by the STATUS UNIT command and returned by the Msc\$(6) function.
LUMAP	REG_SZ	""	Space separated list of directory mapping pairs ("logical_dir=actual_dir"). These mappings are applied to all relative filenames.
MAXPORT	REG_DWORD	4095	Maximum port number
MINPORT	REG_DWORD	0	Minimum port number
MSC7	REG_DWORD	257	Value returned by Msc(7)
PORT	REG_DWORD	dynamic	Port Number
SPC5	REG_DWORD	257	Value returned by Spc(5)
SPC7	REG_DWORD	0	Value returned by Spc(7)
WINDOWDEFAULTS	REG_SZ	""	Used to select the character oriented window driver.

"HKEY_CURRENT_USER" values override "HKEY_LOCAL_MACHINE" values and environment values override all registry settings. To set parameter values in the registry, use the Windows REGEDIT or REGEDT32 utilities to create, if necessary, any or all of the keys "DynamicConcepts", "dL4", and "Environment". The parameters can then be added as values within the "Environment" key. Note that some of the parameters must be created with the type REG_SZ and others as REG_DWORD. When defined by environment variables, all parameters use string values. See your Microsoft documentation for a description of how to modify registry values or set environment variables.

AVAILREC	Minimum number of available records reported by the SEARCH statement for indexed contiguous files.
DL4DRIVERS	A case insensitive comma separated list of default driver selection options. The "Universal" option selects Universal files instead of Portable files as the default file type when creating new files. The "Huge" option selects either Huge Portable or Huge Universal files as the default file type. The "ANSI Text" option causes text files to be read or written using the standard ISO 8859-1 character set instead of the UniBasic ASCII character set.
DL4EMAILSERVER	A comma separated list of default open options for the email driver. The list can include an initial email server name/address, "auth=<method>", "user=<name>", "password=<string>", and "pswd=<string>".
DL4LOCALCACHE	If this parameter is set to a non-zero number, a local program cache of that many bytes will be allocated in each dL4 process and used cache frequently used subprograms or libraries.
DL4LUST	Defines a space separated list of directories searched whenever a data file is opened or a program file is accessed using a relative path. The directory paths in DL4LUST can be either relative or absolute paths. Quotation marks must be used around directory paths that include spaces. If the DL4DEFLU parameter is set, each directory will be checked first with and then without appending the DL4DEFLU subdirectory.
DL4MSSQLISAM	A comma separated list of default open options for the Microsoft SQL Full-ISAM driver. The list can include "server=<name>", "database=<name>", "db=<name>", "user=<name>", "password=<string>", and "pswd=<string>".
DL4MYSQLISAM	A comma separated list of default open options for the MySQL Full-ISAM driver. The list can include "server=<name>", "database=<name>", "db=<name>", "user=<name>", "password=<string>", "pswd=<string>", and "port=<number>".
DL4MYSQL	A comma separated list of default open options for the MySQL SQL driver. The list can include "server=<name>", "database=<name>", "db=<name>", "user=<name>", "password=<string>", "pswd=<string>", and "port=<number>".
DL4PORTDUMP	Filename and path of the text dump file produced by the ForcePortDump and ProgramDump intrinsic CALLs. See the description of the ForcePortDump intrinsic CALL in the dL4 Language Reference manual for additional information.
DL4STOPDUMP	Filename and path of a text dump file produced whenever a STOP statement is executed in an application. The dump file uses the same format as the ProgramDump intrinsic CALL.
ISAMFILES	Maximum number of opened Indexed file directories. For each indexed file opened, one entry is required for each Directory (index) plus 1 for the data file. The default value of 100 supports 25 indexed files open with an average of (3) directories (indices) each. If this value is too small, the error "Internal error in driver" or "Driver resource exhausted" is returned.

ISAMSECT	The size of Index file directory nodes in newly created Indexed files expressed in blocks of 128 bytes. The default value of 8 creates 1024 byte nodes which provide good performance under normal conditions. Larger nodes may be useful for extremely large (> 2 gigabyte) files or large keys.
ISAMMAXSECT	Maximum size of Index file directory nodes expressed in blocks of 128 bytes. If a file uses nodes larger than this value, the error "Internal error in driver" is returned when the file is opened. The default value is 16 (2048 bytes). This value should be greater than or equal to the value of the ISAMSECT parameter.
LIBSTRING	Defines a space separated set of paths to search for program filenames when linking, CALL ing, or CHAIN ing a program. This value is displayed by the STATUS UNIT command and returned by the Msc\$(6) function. If this parameter is not defined, only the current working directory and the directory of the parent program are searched. The LIBSTRING value can be set at runtime by the LIB statement, but that value will only be used by the program that executed the LIB statement. LIBSTRING should be constructed to minimize number of searches required to locate programs.
LUMAP	<p>Defines a list of directory mapping pairs which are applied to all relative filenames for both data and program files. The list is space separated with each mapping pair consisting of a logical directory name, an equals sign ("="), and an absolute path. When a relative filename is used and that filename begins with a logical directory defined in LUMAP, then the logical directory will be replaced by the absolute path from LUMAP.</p> <p>For example, given an LUMAP value of "5=/usr/accounting Mail=/disk2/Mail", the following filenames would be mapped as shown:</p> <pre>5/filename -> /usr/accounting/filename Mail/filename -> /disk2/Mail/filename x/5/filename -> x/5/filename (unchanged because "x" isn't in LUMAP).</pre>
MAXPORT	Defines the maximum port number. The default value of MAXPORT is 4095. The value of MAXPORT is used for automatic port number assignment by the SPAWN statement and during sign on to assign the PORT number of a dL4 session when PORT is undefined. Since dL4 assigns port numbers in a decreasing order from MAXPORT , it may be used along with MINPORT to set unique port numbers on different systems connected via a network.
MINPORT	Defines the minimum port number. The default value of MINPORT is zero.
MSC7	Defines the numeric value to be returned by the MSC(7) function. If MSC7 is not defined, then the value 257 is returned.
PORT	Forces the current session to operate as a specific PORT number, i.e. PORT=23 . The maximum PORT number must be a value between 0 and MAXPORT .
SPC5	Defines the numeric value to be returned whenever the SPC(5) function is called. If SPC5 is not defined as an environment variable the value of 257 is returned.
SPC7	Defines the numeric value to be returned whenever the SPC(7) function is used. If SPC7 is not defined as an environmental variable, zero (0) is returned.
WINDOWDEFAULTS	If set to the string value "type=char", selects the character oriented window driver for use by dL4. This option is provided for compatibility with older versions of dL4 for Windows and its use is not recommended.

Configuring Window Driver Parameters

The window driver parameters control various aspects of the dL4 window driver. Most of these parameters can be set from the Preferences menu as described below in “Configuring the Main Display Window”, but some special features are only available by setting registry entries.

The window driver parameters listed below can be controlled by registry entries placed under one of these keys:

HKEY_CURRENT_USER\Software\DynamicConcepts\dL4\WinTerm

HKEY_LOCAL_MACHINE\Software\DynamicConcepts\dL4\WinTerm

If the WindowDefaults runtime parameter is used to select the character oriented window driver, the driver name in the registry entries must be changed from “WinTerm” to “WndTTY”. It is not necessary to configure any parameter whose default value is adequate for your usage.

Table of Window Driver Parameters

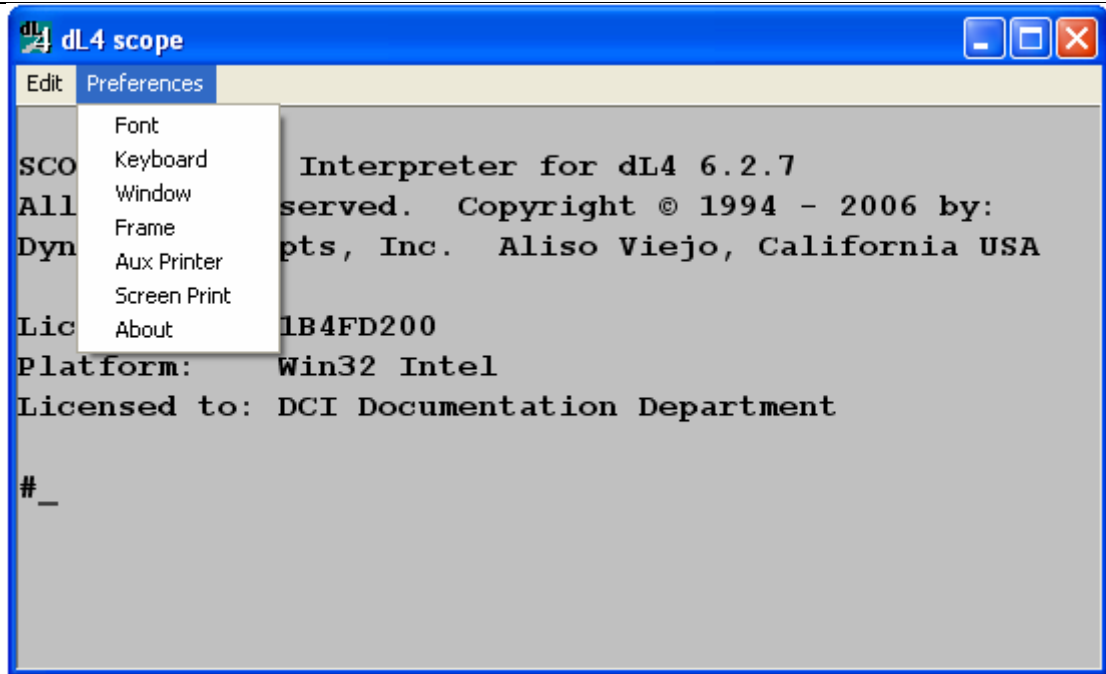
Parameter	Type	Meaning
AllowSYSTEMCmd	REG_DWORD	If non-zero, the SYSTEM 31 and SYSTEM 33 statements will not display a confirmation dialog before running an external program command.
TermType	REG_DWORD	The terminal type number returned by the SPC(13) and MSC(32) functions.
TuningOptions	REG_DWORD	Controls various non-standard terminal behavior options.
WarnOnClose	REG_SZ	Message to be displayed if the user attempts to exit dL4 by closing the main window.

"HKEY_CURRENT_USER" values override "HKEY_LOCAL_MACHINE" values. To set parameter values in the registry, use the Windows REGEDIT or REGEDT32 utilities to create, if necessary, any or all of the keys "DynamicConcepts", "dL4", and "WinTerm". The parameters can then be added as values within the "WinTerm" key. See your Microsoft documentation for a description of how to modify registry values or set environment variables.

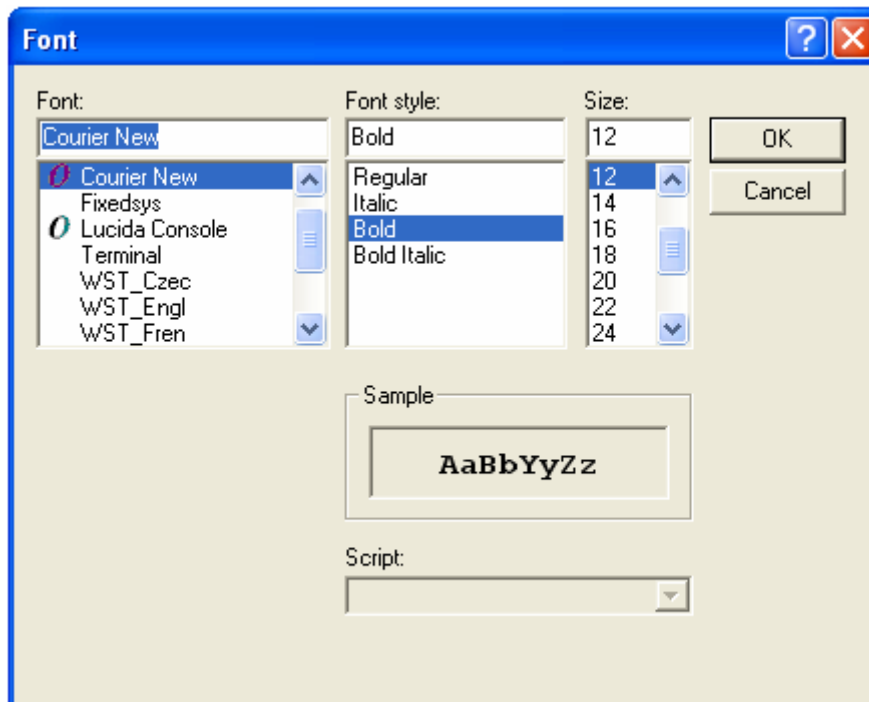
AllowSYSTEMCmd	Normally, the SYSTEM 31 and SYSTEM 33 statements display a confirmation dialog before executing an external program command. If AllowSYSTEMCmd is set to a non-zero value, the confirmation dialog will not be displayed.
TermType	By default, the SPC(13) and MSC(32) functions return a terminal type number of 410 in dL4 for Windows. The TermType parameter can be used to override the default value.
TuningOptions	Individual bits in TuningOptions control non-standard terminal behavior options: <ul style="list-style-type: none"> 0x0004 Swap the functions of the 'NR' and 'WD' mnemonics. 0x0008 Treat the 'BX' and 'EX' mnemonics as 'NR' and 'WD'. 0x0010 Treat the 'BX' and 'EX' mnemonics as 'WD' and 'NR'. 0x0020 Treat the 'BC' and 'EC' mnemonics as 'NR' and 'WD'. 0x0040 Treat the 'BD' and 'ED' mnemonics as 'BP' and 'EP'. 0x0400 Start all line oriented terminal inputs in insert mode rather than in replace mode. 0x0800 Paste the current pointer selected word plus a carriage return if a "left click" is pressed. 0x1000 If the 0x0800 option is also set, act as if a carriage return has been typed if a "left click" is pressed on a blank area of the main window. 0x4000 If cursor address expressions ("@x,y;") attempt to position beyond the maximum column or row coordinate of a window, move the cursor to the rightmost column or bottom row instead of ignoring the expression.
WarnOnClose	Message to be displayed if the user attempts to exit dL4 by closing the main window. This option is used to encourage or force a user to properly exit an application. If this value is defined and the user tries to close the main window, a message box will be displayed containing the message text. The user will be given the choice of continuing without closing the main window or exiting immediately. If the message text begins with the string "NO EXIT" (case sensitive), the user will be given only the option to continue (the text "NO EXIT" is not displayed in the message box). Multiple lines can be displayed by marking the end of each line in the string with "\n" (a backslash followed by the character "n"). A backslash can be displayed by including two consecutive backslashes in the string ("\\").

Configuring the Main Display Window

The main display window of dL4 can be configured in many ways. You can change the font, the font (character) size, the number of lines or columns available, the number of lines or columns displayed, the default foreground and background colors, and various printer options. To change the font or font size, choose the "Preferences" menu as shown below:

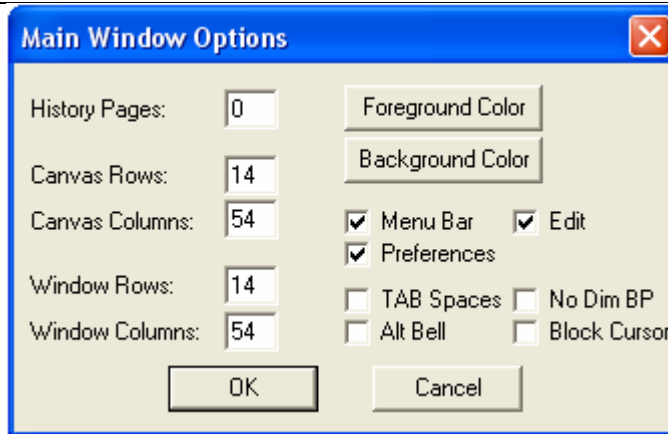


Then choose the "Font" item to display the following font dialog.



You can select a different font or font size by choosing the desired font name and/or size. The "sample" window lets you preview the selected font and font size. The font style can be selected to be either "regular" or "bold". After selecting a new font and/or font size, choose the "OK" button to exit the dialog and apply the new font. Choose the "Cancel" button to continue using the existing font. If the "OK" button is chosen, the selected font and font size will be applied to the current main window and to the main window of any new dL4 sessions.

To change the window size or default colors, choose the "Preferences" menu and then choose the "Window" item. The dialog below will be displayed:



The "canvas" is the virtual display on which all dL4 screen output is drawn. The "window" is that portion of the "canvas" that is actually displayed on the screen. If the "window" is smaller than the "canvas", scroll bars will be displayed so that the user can select which portion of the "canvas" is visible. The "window" cannot be larger than the "canvas". To change the "canvas" or "window" size, simply select the appropriate row or column box and enter the new value. The number of "History Pages" determines whether the user can scroll back through one or more pages of previous output. The "Menu Bar", "Preferences", "Edit", "TAB Spaces", "Alt Bell", "Dim BP", and "Block Cursor" check boxes control display options. If you choose the "OK" button, the various options will be written to the registry and used by all future dL4 sessions. The window of the current session will not be changed.

The "Window" dialog has the following seven check boxes to control special options:

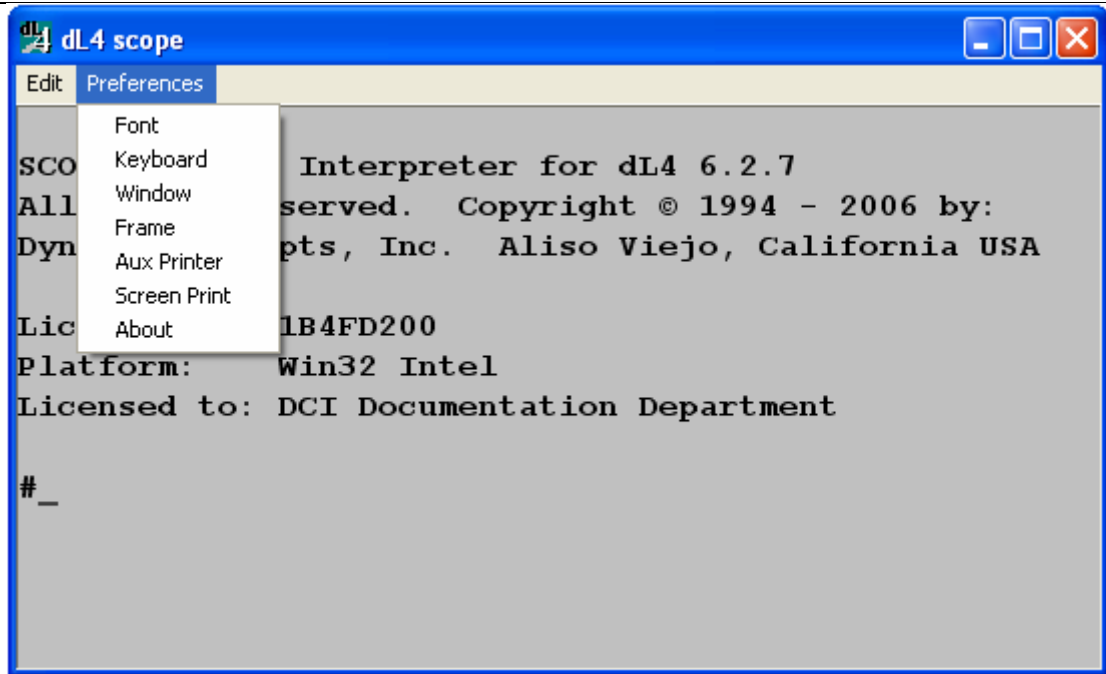
Menu Bar	If not checked, the "Edit" and "Preferences" menus are moved off the menu bar to the system menu.
Edit	If not checked, the "Edit" menu is moved off the menu bar to the system menu.
Preferences	If not checked, the "Preferences" menu is moved off the menu bar to the system menu.
TAB Spaces	If checked, TAB expressions clear any output between the old and new positions.
No Dim BP	If checked, protected text is not displayed as "dimmed".
Alt Bell	If checked, an alternate sound is used for the "bell".
Block Cursor	If checked, the cursor is displayed as a blinking block.

Note that any changes will effect all dL4 applications.

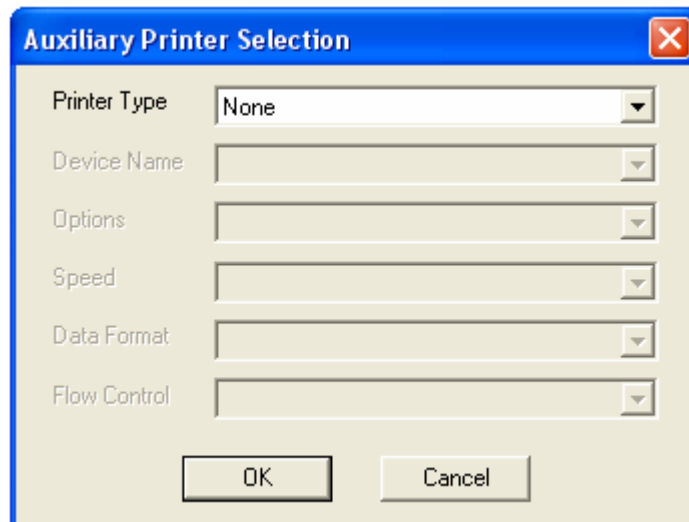
The default foreground and background colors can be changed by choosing the "Foreground Color" or "Background Color" buttons. In either case, a color dialog will be displayed. If you choose the "OK" button within the color dialog, the specified color will be written to the registry and used by all future dL4 sessions. The window of the current session will not be changed.

Configuring the Auxiliary Printer

The 'BA', 'EA', and other auxiliary printer mnemonics in dL4 redirect output from the window to a printer. In traditional systems, this was a printer attached to the user's terminal. In dL4 for Windows, such auxiliary printer output can be directed to a user selected printer, the system default printer, a printer specified by name, or a physical printer port. Auxiliary printer output is ignored in the default configuration. To enable auxiliary printing, first choose the "Preferences" menu as shown below:



Then choose the "Aux Printer" item to display the following dialog.



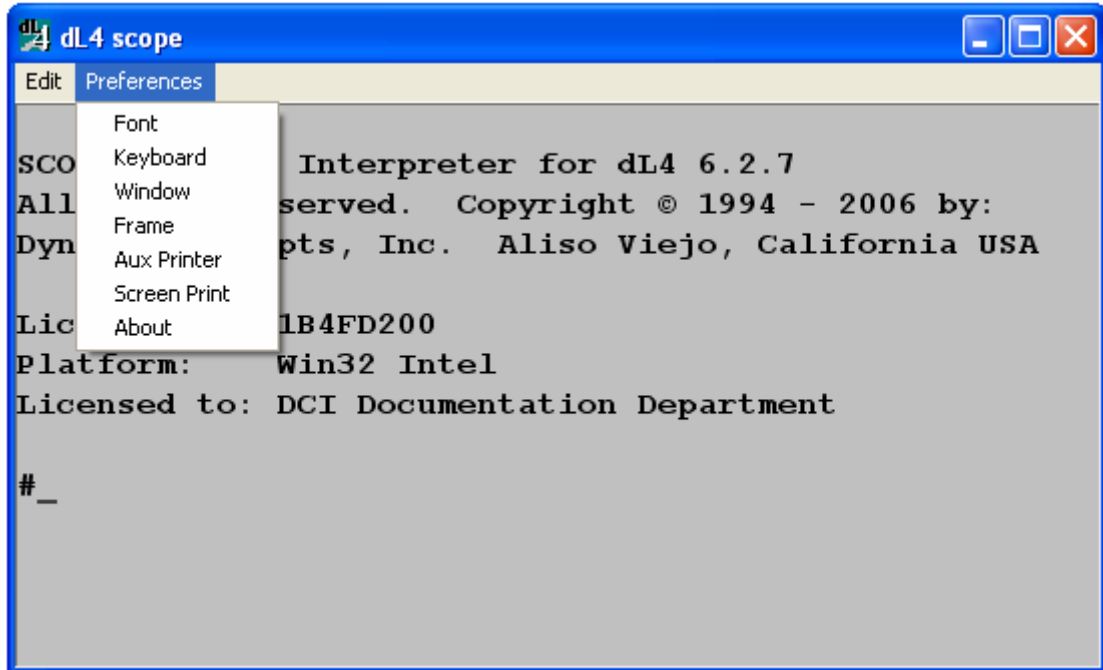
The "Printer Type" can be set to "Default Printer" (the system default printer), "User selected printer" (a printer selected by the user from the standard Windows printer dialog), "Printer" (a specific printer named in "Device Name" section), "Device" (a printer port device such as "LPT1:"), or bidirectional port (usually a serial port such as COM1). The "Device Name" edit box is used to select a printer or device name. The "Options" edit box is used to set printer options such as "binary=true" (for raw character output to a printer) or "CRTtoCRLF=True" (to add line feeds at the end of each line). The "Speed", "Data Format", and "Flow Control" drop down list select options for printers on serial ports.

The "Screen Print" menu item under "Preferences" is used to set the printer page margins used when a screen print is performed.

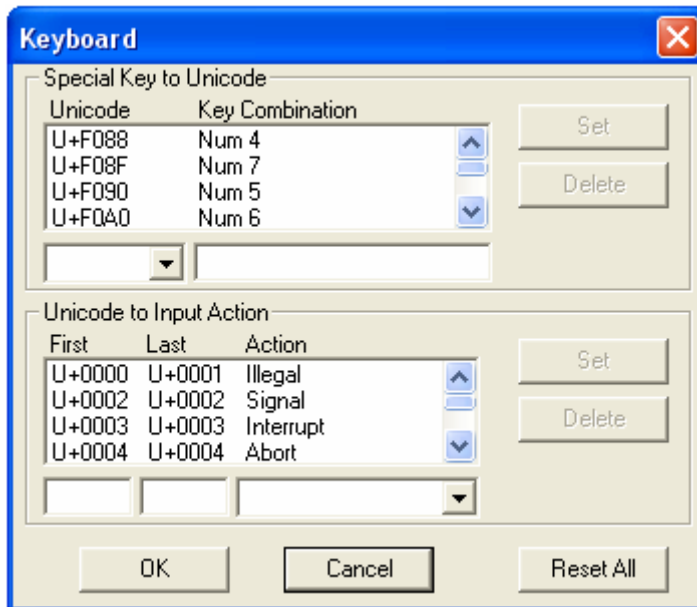
Configuring Keyboard Handling

The processing of keyboard input in dL4 is somewhat complex and the keyboard configuration dialog is similarly complex. When a key (such as "A") or a combination of keys (such as "**CTRL+X**") is pressed and released, the dL4 terminal driver first translates the key or key combination into a Unicode character. The driver then looks up the "input action" associated with the Unicode character. The "input action" determines whether the character is treated as data to be read by a dL4 program or as an editing key. Because the translation is logically done with two tables, keyboard configuration is performed by changing two tables: the "Special Key to Unicode" table and the "Unicode to Input Action" table. The "Special Key to Unicode" table controls the translation of key combinations to Unicode characters. Standard translations, such as "Key-A" to "a", are not shown in the table, but they can be overridden using the table. The "Unicode to Input Action" table controls translation of Unicode characters to input actions. Any character not specified in the table will be treated as a data character. The "Unicode to Input Action" table specifies input actions for characters typed on the keyboard and for characters entered into typeahead by "long **CHAINS**" or the **INPBUF()** intrinsic **CALL**.

To change the keyboard configuration, first choose the "Preferences" menu as shown below:



Then choose the "Keyboard" item to display the following dialog:



To add a new key combination translation to the "Special Key to Unicode" table, perform the following steps:

1. Choose the box under the "Unicode" column of the table and enter the hexadecimal value to which the key combination will be translated.
2. Choose the box under the "Key Combination" column and type the desired key combination. All of the keys in the key combination must be pressed at the same time.
3. Choose the "Set" button to add the new definition to the table.

To delete a key translation from the "Special Key to Unicode" table, select the table row that defines the key and then choose the "Delete" button. The drop down list in the "Unicode" box is used to set the Unicode value using the value associated with an input action.

One reason to add a new translation to the "Special Key to Unicode" table is to redefine standard Windows keys. For example, **ALT+F4** normally causes a Windows program to exit. In the dL4 environment, it might be desirable to treat **ALT+F4** as an **ESCAPE** character, which interrupts the application. This could be done in the "Special Key to Unicode" table of the keyboard dialog, by entering "1B" (assuming **ESCAPE** is used as the **ESCAPE** input action) in the Unicode box, pressing the **ALT** and **F4** keys while in the "Key Combination" box, choosing the "Set" button, and then choosing the "OK" button. Warning: redefining **ALT** key combinations may confuse the user by interfering with expected Windows behavior.

To add a new input action translation to the "Unicode to Input Action" table, perform these steps:

1. Choose the box under the "First" column and enter the hexadecimal value of the first character in the range of Unicode characters to be associated with the input action.
2. Choose the box under the "Last" column and enter the hexadecimal value of the last character in the range of Unicode characters.
3. Choose the drop down list (the "down" arrow) in the "Action" column and select the desired input action.
4. Choose the "Set" button to add the new definition to the table.

To delete an input action translation from the "Unicode to Input Action" table, choose the table row that defines the translation and then choose the "Delete" button.

Choosing the "Reset All" button will set both tables to default values (see the table below).

After making your changes to the "Special Key to Unicode" or "Unicode to Input Action" tables, choose the "OK" button to exit the dialog and apply the changes. Choose the "Cancel" button to continue using the existing keyboard configuration. If the "OK" button is chosen, the new configuration will be applied to the current main window and to the main window of any new dL4 sessions.

The default associations of keys, Unicode characters, and input actions are shown in the table below for all non-data keys.

Key	Character	Input Action
control-B	STX	Send signal to program
control-C	ETX	Interrupt program
control-D	EOT	Abort program
control-E	ENQ	Toggle echo and enter control-E into input
Backspace	Backspace	Backspace and delete character
Enter	Carriage Return	Enter
control-X	CANCEL	Delete all input
Escape	ESCAPE	Escape program
Left-arrow	'ML'	Move cursor left
Right-arrow	'MR'	Move cursor right
Insert	'IC'	Toggle input insert/replace mode
Delete	'DC'	Delete input character
Home	'MH'	Move cursor to start of input
End	'END'	Move cursor to end of input
Control-Left-arrow	'PREV'	Move cursor to previous word
Control-Right-arrow	'NEXT'	Move cursor to next word
Control-End	'CL'	Delete characters to end of input
F9	'F9'	Swap (if enabled via SWAPF())
BEGIN	'BEGIN'	Enter "BEGIN" mode

Configuring a Printer

A dL4 program accesses printers by opening a filename with a leading dollar sign such "\$printer1". Such opens are directed to the pipe driver which selects the actual driver used to perform the open. In dL4 for Windows, there are two standard printers: one opens the system default printer ('OPEN #2,"\$DfltLP") and the other allows the user to select a printer via a dialog ('OPEN #2,"\$SelectLP"). Additional printers can

be defined by adding printer scripts to the dL4 installation directory. These additional printers can define new printers or define different default fonts and other options for existing printers.

A printer script is a file with an extension of **“.BAT”**. The filename should not begin with a dollar sign (“\$”); the dollar sign used in the **OPEN** statement is a special character that tells the dL4 open routine that this is a script open. Thus the actual filenames of the standard printers are **DFLTLP.BAT** and **SELECTLP.BAT**. A printer script file must be in the dL4 installation directory or a directory specified in the **PATH** variable. A printer script cannot have the same name as a actual device such as **CON**, **NUL**, **LPT1** and **PRN**. If a dL4 program needs to use such a printer name, the **LUMAP** runtime parameter must be used to translate the printer name to a legal printer script filename.

There are four types of printer scripts:

1. Page Printer scripts - these scripts are used to output to standard Windows printers.
2. driver indirection scripts - these scripts redirect output to a specific driver and effectively convert any open of the script to an **OPEN AS** statement using filename and option parameters included in the script.
3. direct output scripts - these scripts are used to output to physical devices such as serial ports using the translation features of a Terminal Definition File.
4. executable pipe scripts - these scripts contain executable commands and are executed as separate processes communicating with the dL4 program via pipes.

Most printer scripts will be Page Printer scripts. Note that of all four types only an executable pipe script is actually executed as batch file.

Printer script options are specified by the first line of the script which must begin with the string “rem dl4opts=” (case insensitive). If the first line does not begin with “rem dl4opts=”, the script will be treated as an executable pipe script using the UniBasic-ASCII character set. The options determine the type of script and its features. Each option consists of a case insensitive option name followed by an equals sign and then the option value. Spaces are allowed in the option value. All options are comma separated.

Example:

```
rem dl4opts=openas=page printer,path=Label Printer,lock=true
```

The following options are supported by the pipe driver:

Option Name	Value	Meaning
buildas	driver name	Driver to be opened in build mode by a driver indirection script
charset	character set name	Character set of pipe to an executable pipe script
lock	“true” or “false”	If “true”, the script can only be used by one user and on one channel at a time. Once open, subsequent opens will return a “device open elsewhere” error until it is closed.
openas	driver name	Driver to be opened by a driver indirection script
options	driver option	A driver option to be passed down to the driver used by a driver indirection script
output	device or file name	Device or file name to be opened by a direct output script
path	device or file name	Path argument to be passed down to the driver used by a driver indirection script
translate	file path	Path of printer or terminal definition file used by a direct output script.

In driver indirection scripts or Page Printer scripts, all unrecognized options are passed as options to the driver selected by the script. The “options=” option can be used to pass recognized options such as “charset=” to the lower level driver.

Configuring a Page Printer Script

A Page Printer script consists of a single line beginning with “rem dl4opts=” (case insensitive) and followed by various options. All subsequent lines are ignored and treated as comments. The dl4opts line must contain one of the “openas=driver” options shown below:

```
rem dl4opts=openas=default page printer
rem dl4opts=openas=selected page printer
rem dl4opts=openas=page printer
```

These options will, respectively, open the default printer (as in “\$DFLTLP”), a printer selected via dialog (as in “\$SELECTLP”), or a specific printer. If “openas=page printer” is used, a “path=” option must be used to specify the name of the Windows printer to open.

The default font and font size of a Page Printer script can be controlled by adding “font=” or “fontsize=” options to the dl4opts line. A “font=” option specifies a Windows font name (“font=Times”). A “fontsize=” option specifies the font size in 72ths of an inch (“fontsize=10”). For example, the following printer script:

```
rem dl4opts=openas=page printer,path=Color Printer,font=Times
```

would output to the Windows printer “Color Printer” using the “Times” font.

Configuring a Driver Indirection Script

A driver indirection script causes the pipe driver to open a script specified driver and to pass all I/O operations to that driver. A Page Printer script is actually a driver indirection script that uses a Page Printer driver. A driver indirection script consists of a single line beginning with “rem dl4opts=” (case insensitive) and containing a “buildas=” or “openas=” option to select the I/O driver. All subsequent lines are ignored and treated as comments. A “path=” option can be used to pass a filename argument to the selected driver. All options not recognized by the pipe driver are passed to the driver selected by the “openas=” or “buildas=” value.

The driver indirection script below opens serial port COM1 as a printer at 19200 bps, 8 data bits, no parity, 1 stop bit using default output translation. A “term=” option could be added to select a terminal definition file.

```
rem dl4opts=openas=Serial Terminal,path=COM1,speed=19200,data=8n1
```

Configuring a Direct Output Script

A direct output script causes the pipe driver to open a driver stack consisting of the terminal translation driver and the raw file driver. All output is passed to the terminal translation driver which uses a terminal definition file to translate characters and mnemonics from Unicode to the character sequences needed by the output device. The translated characters are then output through the raw file driver. A direct output script consists of a single line beginning with “rem dl4opts=” (case insensitive) and containing both “output=” and a “translate=” options. All subsequent lines are ignored and treated as comments. The “output=” option selects the device to be opened by the raw file driver while the “translate=” option specifies the path of the terminal definition file. All options not recognized by the pipe driver are passed to the raw file driver.

The direct output script below opens serial port COM1 as a printer at 19200 bps, 8 data bits, no parity, 1 stop bit. The printer definition file “pcl” is used to translate character and mnemonics from Unicode to the character sequences needed by the printer.

```
rem dl4opts=output=COM1,translate=C:\dl4\pcl,speed=19200,data=8n1
```

Configuring an Executable Pipe Script

An executable pipe script accesses printers by opening a pipe to an external program, usually a batch file, and then outputting to that pipe. For example, the statement ‘**OPEN #2,"\$printer1"**’ would start up a

separate process to run the batch file `printer1.bat` (or program `printer1.exe`, if it exists) and send all output from channel 2 to be filtered by `printer1.bat`. The batch file is responsible for reading dL4 program output from standard input, translating the input characters into the form required by the printer, and then sending the translated characters to the printer.

The following is a sample printer batch file:

```
rem dL4opts=charset=utf-8,lock=true
set TERMDIR=c:\dl4\printers
c:\dl4\pfilter -c utf-8 -d \\server\printer_name pclprinter.def
```

The first line of this batch file is an options line interpreted by the dL4 pipe driver. This options line specifies that the pipe driver should send all output to batch file in the UTF-8 character set. It also specifies that the printer should be locked so that any subsequent attempt to open the printer will cause an "device is open elsewhere" error until the printer is closed. To use pipe driver options the first line of the batch file must begin with "rem dL4opts=". The supported options are "charset" and "lock":

charset is used to specify the character set used by pipe I/O. The available character sets and their synonyms are:

```
"US-ASCII" or "ASCII" or "ISO 646"
"ISO 8859-1" or "ANSI" or "ANSI Latin 1"
"IRIS" or "IRIS-ASCII"
"UniBasic" or "UniBasic-ASCII"
"IBM Code Page 437"
"IBM Code Page 850"
"Windows" or "Windows Code Page 1252"
"EBCDIC" or "EBCDIC 037"
"UTF-8"
```

The most flexible character set is UTF-8 which is a multibyte encoding of Unicode, the native character set of dL4. Using UTF-8 allows the pipe driver to pass any character used by a dL4 program to the printer script. UTF-8, however, can only be used with batch files that can accept UTF-8. The default character set is "UniBasic-ASCII" which consists of the ASCII character set and the UniBasic mnemonics.

The sample batch file uses the dL4 pfilter utility to translate the piped output into the form required by the printer and send it to a network printer. The pfilter utility is a console program with the following command line syntax:

```
pfilter {-c character-set} {-d devicename} printer-type
```

Where:

character-set specifies the input character set (default is UniBasic ASCII). The supported character sets are the same as those listed above for the "charset=" batch file option.

devicename can be any printer device available to the system. "lpt1:", "com1:", and "\\server\printer" are common printer devices. Network printers must be shared in order to be used by the pipe driver.

printer-type is the path of a printer definition file, which is similar to a Terminal Definition File (TDF). A printer definition file controls the translation of the character's output by dL4 to the characters required by the printer. The printer definition file should be specified by an absolute path (such as "C:\dl4printers\hplj") or be in the directory specified by the **TERMDIR** environment variable. The **TERMDIR** environment variable can be set in the printer batch file as in the example above.

The format of printer definition files is identical to dL4 for UNIX terminal definition files except that only the output sections are required. See the documentation on the Terminal Description Files for more information. A simple printer definition that copies all ANSI Latin 1 characters without translation would appear as follows:

```
[OutputMacros]
Default=%@%c
[OutputUnicodeMapping]
; This mapping is set up for 8-bit output on a printer using
; the ISO 8859-1 (i.e. ANSI Latin 1) character set.
Set0=
0x0000-0x00ff=0x00
```

Setting Up an Icon for a dL4 Program

Creating a desktop icon for a dL4 application makes it possible for a user to invoke a dL4 program by selecting the icon with the mouse, just like other Windows applications. The icon should be set up with "*dL4path*\runw *programname*" or "*dL4path*\scopew *programname*" as the command line where *dL4path* is the dL4 installation directory. Set the working directory of the icon to the directory expected by *programname*. Note that *programname* must be an absolute path ("E:\ProgramDir\ProgramName") or a path relative to the working directory. See your Microsoft documentation for instructions on creating program icons.

Selecting a Locale

When a dL4 program selects native language format, dL4 uses the Windows locale information to perform numeric, currency and date formatting. See your Microsoft documentation for instructions on how to configure Windows locale information.

Moving Configuration Parameters between Systems

If dL4 runtime parameters are configured via the registry, that configuration can be moved to other systems by exporting the registry key

```
HKEY_CURRENT_USER\Software\DynamicConcepts\DL4\Environment
```

and/or

```
HKEY_LOCAL_MACHINE\Software\DynamicConcepts\DL4\Environment
```

to a file and then importing that file into the registry of the target system. Display window and keyboard handling configuration can be copied by exporting the registry key

```
HKEY_CURRENT_USER\Software\DynamicConcepts\DL4\WinTerm
```

and/or

```
HKEY_LOCAL_MACHINE\Software\DynamicConcepts\DL4\WinTerm
```

Registry keys can be exported and imported with the Windows **REGEDIT** utility. See your Microsoft documentation for instructions on how to use **REGEDIT**.

Installing dL4 Development

Chapter Introduction

The dL4 development kit provides the files necessary to build a customized version of dL4 with user written intrinsic calls and drivers. This chapter provides all of the information you need to install dL4 development on your hard disk from the installation file.

Minimum System Requirements

The dL4 development kit requires:

- Installation of Microsoft Visual C++. See the README.TXT file in the development kit to determine which version of Visual C++ is required. Usage of other C compiler packages is not supported. See Microsoft Visual C++ documentation for Visual C++ hardware requirements.
- A 32-bit or 64-bit x86 compatible processor.
- Windows 2000/XP/2003/Vista or Windows 98/ME/NT.
- 30 megabytes of free disk space for installation or 15 megabytes of installed disk space.
- A mouse or other pointing device is recommended.

Licensing

dL4 can only be installed and used with a valid license. Read your dL4 license for terms and conditions in using dL4.

Copying dL4 Installation Files

Before you install dL4 on your hard disk, DCI recommends making a copy of the setup files as a backup.

Installing dL4 from a installation file

To install dL4 for Windows, perform the following steps:

1. Uninstall any previous dL4 for Windows release.
2. The installation file is a self-extracting installation program. Run the installation file and follow the displayed instructions. See your Windows operating system documentation for instructions on how to run programs.
3. If you haven't registered your license and SSN, run the Passport **SSNMaint** utility. dL4 cannot be used until Passport is installed and your license registered.

The program group created by the installation process includes a scopew icon to run dL4 using the command line interface and README icons to display the README files. The README files describe recent changes in dL4 and contain a list of the installed files.

Removing dL4

Use the standard Windows “Add or Remove Programs” dialog under “Control Settings” to uninstall dL4 for Windows. See your Windows operating system documentation for details on how to uninstall an application.

Working with the dL4 Development Kit

Chapter Introduction

The purpose of this chapter is to briefly introduce the developer to using the dL4 development kit. This chapter does not explain how to write or debug an intrinsic call or a driver.

Compiling/Linking a Customized dL4

The dL4 development kit is used to add user written intrinsic **CALLS**, intrinsic functions, or drivers to dL4. The kit can also be used to recompile the standard drivers in order to change standard options (see the individual driver sources for more information on such options). In dL4 for Windows, most of the runtime system resides in dynamic link libraries (DLLs). All intrinsic CALLs and functions are contained in dl4basic.dll. All drivers are contained in dl4rt.dll. The development kit consists of the object files, sample source files, and nmake control files necessary to build custom versions of dl4basic.dll and dl4rt.dll. It also contains, in the directory dL4Dev\Devel\Release, copies of the standard dL4 front end programs (scopew.exe and runw.exe), utilities (loadsave.exe and pfilter.exe), and support DLLs. The only files produced by the development kit are dl4basic.dll and dl4rt.dll.

To add an intrinsic call or function, you must copy the source files for the new call to the "dL4Dev\Devel\Usercall" directory and add the new call to the files makefile, userproc.c, and userproc.h (these files are in the Usercall directory). Examine the entries for existing calls to determine what changes to make.

To add a driver, you must copy the source files for the new driver to the "dL4Dev\Devel\Driver" directory and add the new driver to the files makefile, driver.c, and drvrlib.h (these files are in the Driver directory). Examine the entries for existing drivers to determine what changes to make. To modify a driver, simply edit the source file.

After making the required modifications, the dl4basic.dll and/or dl4rt.dll libraries must be recompiled and relinked. The current procedure to compile and link the libraries is described in the development kit readme file. This readme file is available as an icon in the development kit program group or as a text file in dL4Dev\Devel\readme.txt.

Installing a Customized Version of dL4

To install a customized version of dL4, install a standard version of dL4 and then replace the two files "dl4basic.dll" and "dl4rt.dll" in the dL4 directory with the customized versions produced in dL4Dev\Devel\Release by the development kit. Please note that the Windows operating system will not allow copying of the files if any of them are currently in use. If dL4 or a dL4 utility is executing, an error will occur if you attempt to delete or replace the current dl4basic.dll or dl4rt.dll.