

F r a m e S c r i p t

Version 7.0

U s e r ' s G u i d e

ELMSOFT INC.

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Table of Contents

1 Introduction - - - - -	1
FrameScript, FrameMaker and the FDK - - - - -	1
What is a script? - - - - -	1
Script usage - - - - -	2
Conventions - - - - -	3
2 Installing FrameScript - - - - -	5
Starting the installation- - - - -	5
Summary of Steps- - - - -	5
Completion - - - - -	6
Directory Structure - - - - -	6
Installation troubleshooting- - - - -	6
Manual connection - - - - -	7
Uninstalling FrameScript - - - - -	7
3 Using FrameScript - - - - -	9
Running Scripts- - - - -	9
Run command - - - - -	9
Alternate Run Methods- - - - -	10
Hypertext commands- - - - -	10
Call Client - - - - -	11
Installing Scripts - - - - -	11
Install Menu command - - - - -	11
Uninstalling Scripts - - - - -	13
Uninstall Script Menu Command - - - - -	13
Compiling Scripts - - - - -	14
Compile Menu command- - - - -	14
Customizing FrameScript - - - - -	17
Options Menu Command - - - - -	17

License - - - - -	19
Activate - - - - -	19
Deactivation - - - - -	20
Customization using the Ini File - - - - -	21
Using the Script Window - - - - -	26
Script Window - - - - -	26
Using other editors - - - - -	26
Batch Processing - - - - -	27
RunEslBatch - - - - -	27
Using RunEslBatch - - - - -	27
Configuring RunEslBatch - - - - -	28
Configuring RunEslBatch for Text Editors - - - - -	28

4 Writing Scripts - - - - - 33

Elements of FrameScript- - - - -	33
Standard Scripts - - - - -	33
Event Scripts - - - - -	33
Integer Constants - - - - -	44
Real constants - - - - -	45
Metric constants - - - - -	45
String constants - - - - -	46
EArray - - - - -	54
EVector - - - - -	55
ECollection - - - - -	55
Basic commands - - - - -	56
Creating and Deleting Data - - - - -	57
Built-in Dialogs- - - - -	57
Subroutines and Functions - - - - -	57
Possible Problem - - - - -	59
Local Data Space - - - - -	59
Local Command - - - - -	60
Modules- - - - -	65
Standard Script Library - - - - -	69
Function DocIsAlreadyOpen - - - - -	70
Function ForAllDocsInBook - - - - -	70
Function GetCellXY - - - - -	71
Sub AddParaToCellXY - - - - -	71

Function DlgStringDualSelect - - - - -	72
Function DlgDB_Connection - - - - -	73
Function DBTableExists - - - - -	74
Events - - - - -	74
Multiple Undo/Redo (<i>Frame 7.2 or Greater</i>) - - - - -	76
List of Error Messages - - - - -	78
Common Script Errors - - - - -	82

5 Frame Architecture - - - - - 85

Object Lists - - - - -	85
Session Object - - - - -	85
Book Object - - - - -	86
Document Object- - - - -	86
Body Page - - - - -	87

6 Using ElmStudio - - - - - 89

Introduction - - - - -	89
Editor Menus - - - - -	89
File- - - - -	89
Edit - - - - -	90
Search- - - - -	91
View- - - - -	91
Exec - - - - -	92
Debug - - - - -	92
Options - - - - -	93
Windows - - - - -	93
Help - - - - -	94
Customization- - - - -	96
Abbreviations file - - - - -	96
SciElmEdit Stand Alone Editor - - - - -	96
ScriptBuilder - - - - -	97
Interactive Debugger - - - - -	99
Setting Breakpoints- - - - -	100
Examine Dataspace Window - - - - -	100
Sample Debug Session - - - - -	100

Chapter 1

Introduction

FrameScript, FrameMaker and the FDK

FrameScript is a high level, user-oriented, scripting (or macro) language designed to work with FrameMaker versions 2015, 2017, 2019, 2020 and 2022. FrameScript allows users to customize their FrameMaker product with simple script commands, to create new functions for their FrameMaker product, to automate many current functions into one script command.

FrameMaker is a popular document publishing software system. Since it is a mainstream product, its goal is to appeal to a large client base. Like any large software vendor, Adobe has to carefully choose which 'features' to put into each new release of the product. If it doesn't put enough useful features in, it might lose customers. If it puts in too many, which appeal to only a small market segment, it will be accused of software bloat. The problem is that someone's bloat is someone else's need.

To allow users to customize the FrameMaker product, Adobe provides the Frame Developer's Kit (FDK), which allows programmers access to FrameMaker's capabilities. It requires the use of the Microsoft Visual C++ compiler plus the services of an experienced, expensive computer programmer. The FDK gives programmers the power to customize FrameMaker. FrameScript now brings that power to FrameMaker users instead of just programmers.

The script language itself is geared toward high-level users as opposed to programmers. The commands are simplified with many options but with defaults for almost everything. In the simplest case, a FrameScript script is just a sequence of commands in a simple text file; you can use FrameMaker itself to produce these script files (save as text). To run the script, the user selects the FrameScript->Run Script menu item, and chooses the script file from the resulting dialog box.

You may also install a script. In this case, the script (with a user defined label) appears on the FrameScript menu. The user can select a menu item to run the script.

There is also an initial script, which, optionally, runs when the FrameMaker product starts. You may use this 'initial script' to make general customizations for the product and to automatically install other predefined scripts.

Finally, you may also develop 'event scripts'. These are scripts which stay around and process FrameMaker events. In event scripts you may create your own custom menu items, have script commands run whenever a user opens a certain type of document (and even cancel the operation if it suits you), have script commands run before or after documents or books are closed or saved, plus many other events.

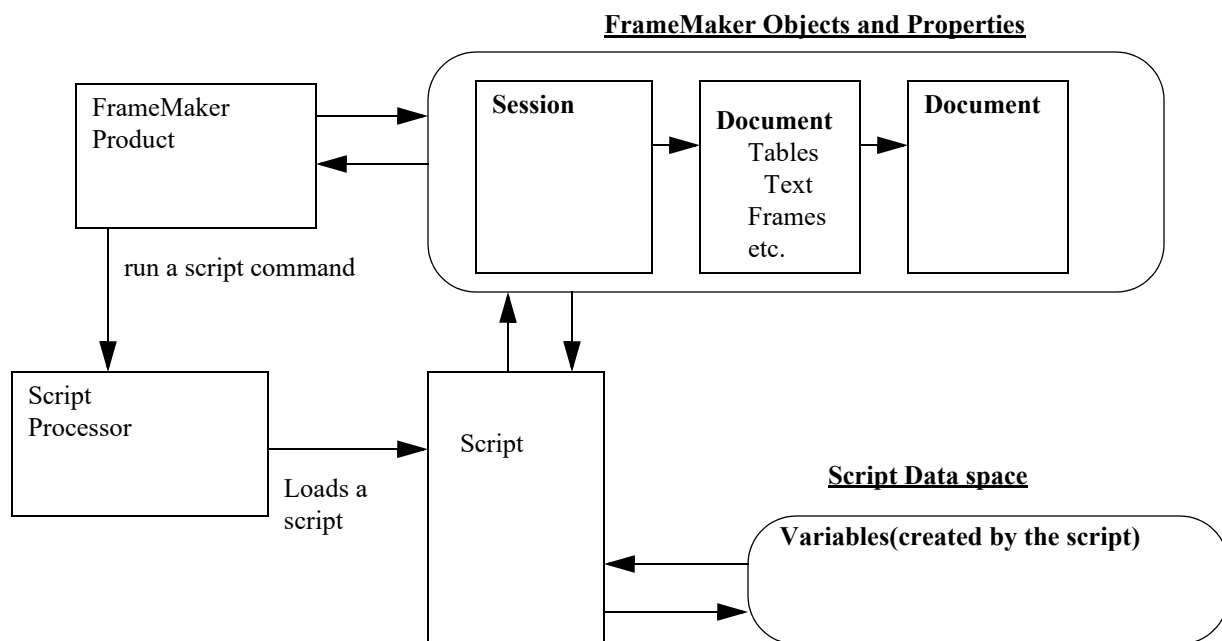
What is a script?

Standard Scripts

In the simplest terms, a FrameScript script is just a text file containing a set of FrameScript commands. The basic unit of a FrameScript script is the command. Commands are executed one at a time until it reaches the end of the script. You may control the execution sequence of commands by using control commands. These allow you to conditionally (based on run time conditions) execute a set of commands or repeatedly execute the same sequence of commands also based on run time conditions.

FrameScript runs under the FrameMaker product. It is completely dependent on FrameMaker for most (but not all) of its functionality. When the FrameMaker product starts it creates a session object. This session object has a list of properties associated with that session. Among these properties are: a list of the open documents (initially empty) in the session, a list of the open books (initially empty) in the session, a list of menus and commands, version number and so on. Whenever FrameMaker opens a document or book, it creates a large number of objects (with their associated properties) under that document or book. Each FrameScript script has access to all these objects and their properties. You may create new objects and delete old ones. You may modify the properties of these objects (if they are updatable). All this FrameMaker information is inherently part of each FrameScript script.

Each FrameScript script has its own data space to use as it wishes. In this data space, a script can create its own data names. These are called variables (because you may change the value of any of these data names whenever you wish). A data space is created when a script starts and it is deleted when the script ends. The following diagram illustrates this process.



Script usage

Customization.

Scripts may be used to customize your FrameMaker session. You can replace FrameMaker functions with your own functions if you want some special action to be taken or some special options to be invoked. You can automatically set various options depending on some data item, such as the User name, to individually customize the properties of the session, including selectively removing or adding functions.

Add new functionality to FrameMaker.

You may write scripts to add new functions that are not currently available in FrameMaker. These functions may be of interest to only a small number of customers making it impractical for Adobe to put them in the mainstream product. They may be on the list for a future release. You can have them now with FrameScript.

Automate tasks.

Sometimes there are processes that are available in FrameMaker but consists of number of manual steps to perform. You can automate these processes with FrameScript.

Information reporting.

Most of the properties of objects in a FrameMaker system are invisible (or at least hidden behind a layer of dialog boxes). You can use FrameScript to generate various reports, such as information about all the documents in a book with the component properties listed.

Conventions

The typeface for the standard text in this reference manual looks like this text in the sentence that you are now reading. It gives explanations for the topic under consideration. Samples of FrameScript source examples look like the following:

```
Command Option(value) Option(value);
```

Properties when list within explanations look like this `propertyname`. Commands within the explanations look like this. Here is the **SampleCommand** command.

Command options that are enclosed within straight brackets ([]) are optional. Default values will be used for them when the command is executed. Make sure that the default value is the one you wish. Most of the time it will be. Items enclosed in curly braces ({}) means that you should select one (or sometimes more than one) of the items within. Most of the options are, as the name implies, optional. Any command that needs a document will use the currently active document if not otherwise specified.

Example:

```
[option(value)]
```

This next example shows an optional selection list.

Example:

```
[option({item1 item2 ... itemn})]
```


Chapter 2

Installing FrameScript

FrameScript is delivered as a single installation file, which, when run, installs the entire product into a directory of your choosing. The form of the installation file name is **Fs17Install.exe**.

IMPORTANT: You should not install one version of FrameScript over an older version. You should first uninstall the old version. You can, however, keep the old version around if you install the new version into a different directory. Only one can be active at a time for a particular FrameMaker installation.

Starting the installation

IMPORTANT: Make sure that FrameMaker is **NOT** running when you install FrameScript. If it is running, then the registration step will not work.

IMPORTANT: If you are installing an evaluation copy of FrameScript, ignore any references to the activation. It will not be required.

You start the installation by double-clicking on the installation file. The InstallShield process takes over from there. It will let you choose the directory to install the product. The default directory is

C:\Program Files\ElmSoft\FrameScript7

Follow the instructions on the ensuing screens to create the correct directory structure and copy the files into the right places. When this is complete, an activation screen will appear unless the product has been previously activated. This screen will allow you to activate your FrameScript license. It will skip this step for evaluation versions. See “Activate” on page 19.

Since FrameScript is an add-on to FrameMaker, FrameScript must be connected to FrameMaker as well. This connection screen will also locate the correct version of FrameMaker and make the necessary entry in FrameMaker’s add-on list. If you have more than one FrameMaker installation, you may have to choose to which version of FrameMaker you wish to register this version of FrameScript.

Summary of Steps

1. Double click on the installation file.
The install file does not have to be in any special directory. You can keep it anywhere you keep your downloaded files.
2. Choose the directory to place the files.
The default directory will be the correct one for most installations.

3. When the activation screen appears, enter your FrameScript order reference, fml reference, user name, and optionally you company name. Press the activate button to send this information and activate the license.
4. When the connection screen appears, choose the versions of FrameMaker for which you wish to have FrameScript installed.. You can run this program (RegEsl6.exe) again, if you upgrade your FrameMaker version
5. Press Done.

Completion

The next time you start FrameMaker you should see the FrameScript menu in the FrameMaker menubar. If this does not happen, look at the installation trouble shooting section.

Directory Structure

This directory structure should look like the following illustration.

```

MainDirectory
  SysScripts--      Folder, Contains various system scripts
  Docs              -- Folder, Contains documentation files (PDF)
  Lib               -- Folder, Contains library scripts
  Demos             -- Folder, Contains demonstration scripts and docs
  SampleScripts     Folder, Contains the sample scripts
  Tutorial          -- Folder, Contains a form tutorial
  StructTutorial--  Folder, Contains a Structured Import/Export tutorial
  ScriptBuilder     Folder, contains the ScriptBuilder files
  fsl6_80.dll       File, The FrameScript Api client
  FslStruct.dll     File, The FrameScript Structured client
  WinSys.dll        File, An auxillary client file
  WinSys64.dll     File, An auxillary client file 64-bit
  EslDlgs.dll       File, Dialog Resources
  EslDlgs64.dll    File, Dialog Resources 64-bit
  fscript.ini       File, The customization file
  SciElmEdit.exe   File, The Stand alone script editor
  RegisterEsl.exe  File, The registration program
  EslReg.ini        File, contains the registration information
  RelNotes.pdf     File, Release Notes for this release.
  WhatsNew.pdf     File, Describes the new features of this release.
  Plus several .Property files for the ElmStudio and SciElmEdit text editors.

```

Installation troubleshooting

If the FrameScript menu does not appear when you start FrameMaker, first check to make sure that the above directory structure is in place. If not, then the installation failed for some reason. You may have to try to uninstall it before trying to install it again. See the uninstall instructions.

If the product installed correctly (the above directory structure is in place), but the FrameScript menu does not appear on the FrameMaker menu bar, then the connection step may have failed. You can try running this part again by running the RegisterEsl.exe program from the main directory. This will bring up the connection screen again. Check to make sure all the information is correct including the FrameScript registration number.

Manual connection

IMPORTANT: Make sure that FrameMaker is **NOT** running when you manually install FrameScript. If it is running, then the connection step will not work.

To connect FrameScript manually you will need to use a text editor, such as notepad.exe, located in the accessories folder (Start->Programs->Accessories->NotePad). To add FrameScript to the list of FrameMaker clients, do the following:

Use notepad and open the file maker.ini, located in your FrameMaker directory. You will need to run the editor as Administrator. Locate the section called [APIClients]. Go to the end of this section and add the following line:

```
fsl=TakeControl,FrameScript,FrameScriptFolder\clientName,all
where clientName is as follows:

for FM 2022--Fs17_170_64.dll
for FM 2020--Fs17_160_64.dll
for FM 2019(64 bit)--Fs17_150_64.dll
for FM 2019(32-bit)--Fs17_150.dll
for FM 2017--Fs17_140.dll
for FM 2015--Fs17_130.dll
```

Replace the FrameScriptFolder with your actual FrameScript installation directory.

Save the file and re-start FrameMaker.

Uninstalling FrameScript

You uninstall FrameScript by using the MS Windows Add/Remove programs icon located in the MS Windows Control Panel. Bring up the control panel and double click on this icon. It will provide a list of installed software. Select the line identifying FrameScript and click uninstall. If the product is still activated, it will ask you to deactivate it.

Chapter 3

Using FrameScript

When FrameScript is installed, it will place a new menu on the FrameMaker menubar called FrameScript (though the actual text may be different due to customization options). This menu will contain six commands (and optionally a sub menu).

Using FrameScript primarily involves running and installing scripts. These scripts may have been written by you or provided by others. A script is usually a text file (commonly using the extension fsl) containing a set of FrameScript commands. In some cases, it can also be an object file (FrameScript style object file), commonly using the extension fso. These object files are generated using the Compile command. This is usually done by the script writer and is not of interest to someone just using scripts.

There are two kinds of scripts, standard scripts and event scripts. These are discussed more thoroughly in the Basics.pdf document. Standard scripts are designed to run and then return to the user. Event scripts are installed, which means they are loaded in the system and they wait for any of the system events for which they were programmed to wait. These events can be menu command events, messages or system notifications. The script developer (scripter) decides what type of script it will be when it is designed. As a script user, you will need to know whether a script is a standard script or an event script before you can use it, because the menu commands will work differently for each type.

Running a script is simple. You just need to select the **Run** menu command, from the FrameScript menu, then choose the script file (containing a standard script) from the resulting dialog. This dialog allows you to navigate to any place on your hard disk (or network disk).

Installing scripts can be more complicated because there are two kinds of scripts that may be installed. Installing standard scripts is just a way of making it easier to access them by automatically creating a menu command which allows the user to run that script. When event scripts are installed, however, they are loaded into the system where they wait for their events to occur.

Compiling scripts is something that script writers do. This takes a script in a text file and converts it into an object file.

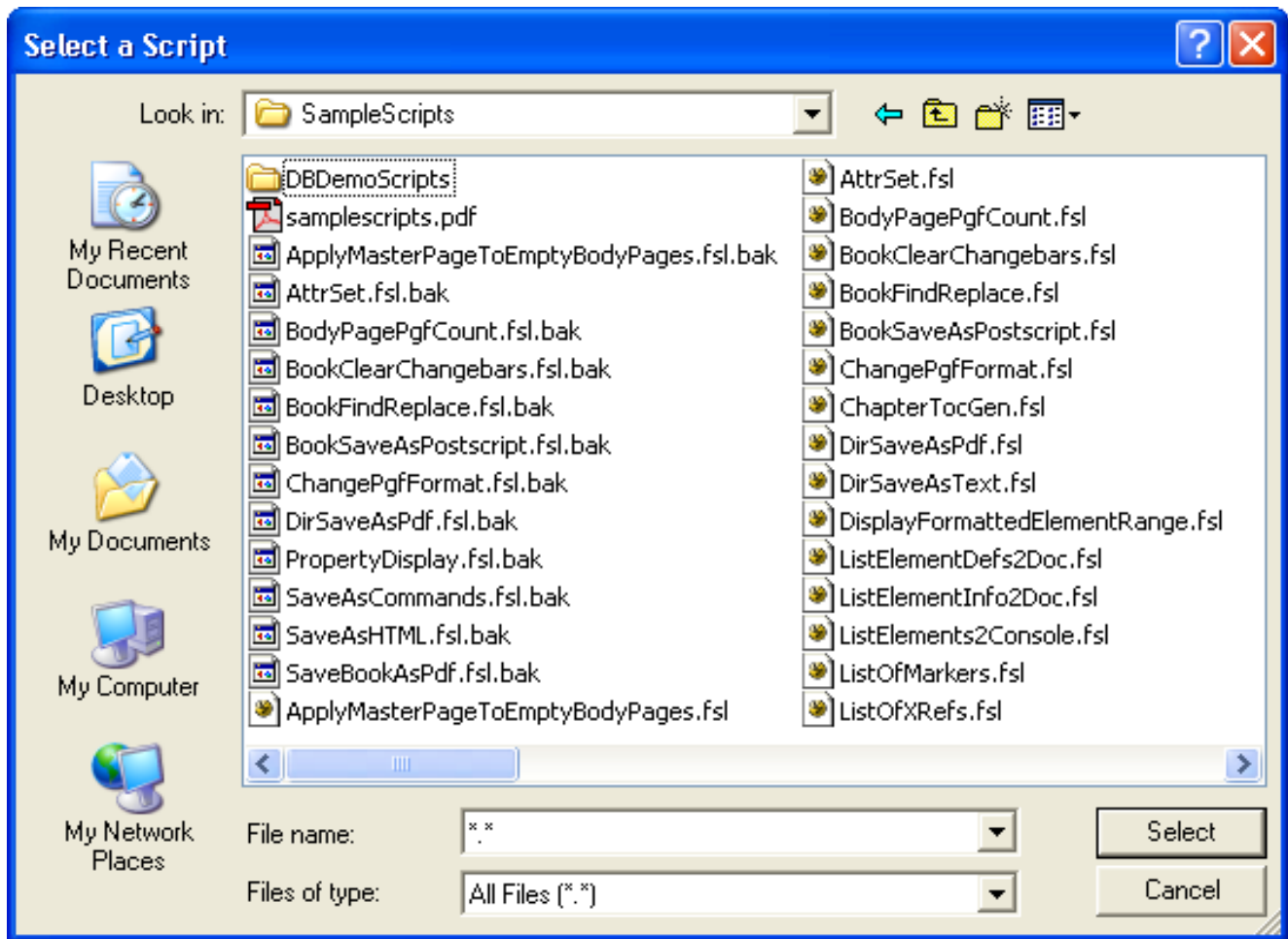
IMPORTANT: If you wish information on writing scripts, see the section on Writing Scripts.

Running Scripts

Run command

You use the Run command to start a standard script. When you select this command a dialog box appears asking you to select the script you wish. See “Select a Script to Run” on page 10. If you select an event script instead of a standard script, nothing will happen.

Figure 3-1 Select a Script to Run



When you choose your script it runs immediately.

IMPORTANT: If you wish to stop a running script after it has started, press the ESC key. This causes the script to come to a halt immediately after the next threshold command finishes. See “UserAbortThreshold” on page 22

Alternate Run Methods

Hypertext commands

You can run scripts by having the user click on specially formatted hypertext commands in FrameMaker documents.

Call Client

Scripts can be started from other FrameMaker API clients. Other clients can use the `F_ApiCallClient` API function to send a command to FrameScript that will run a specified script. The syntax for this command is as follows:

```
F_ApiCallClient((ConStringT)"fsl", (ConStringT)"command");
```

The command string has the same syntax as the above hypertext message without the "message fsl" prefix. an example would be:

```
F_ApiCallClient((ConStringT)"fsl", (ConStringT)"cmd RunFileScript \"MyScript.fsl\" ");
```

Where `MyScript.fsl` is a script somewhere in the search path.

Installing Scripts

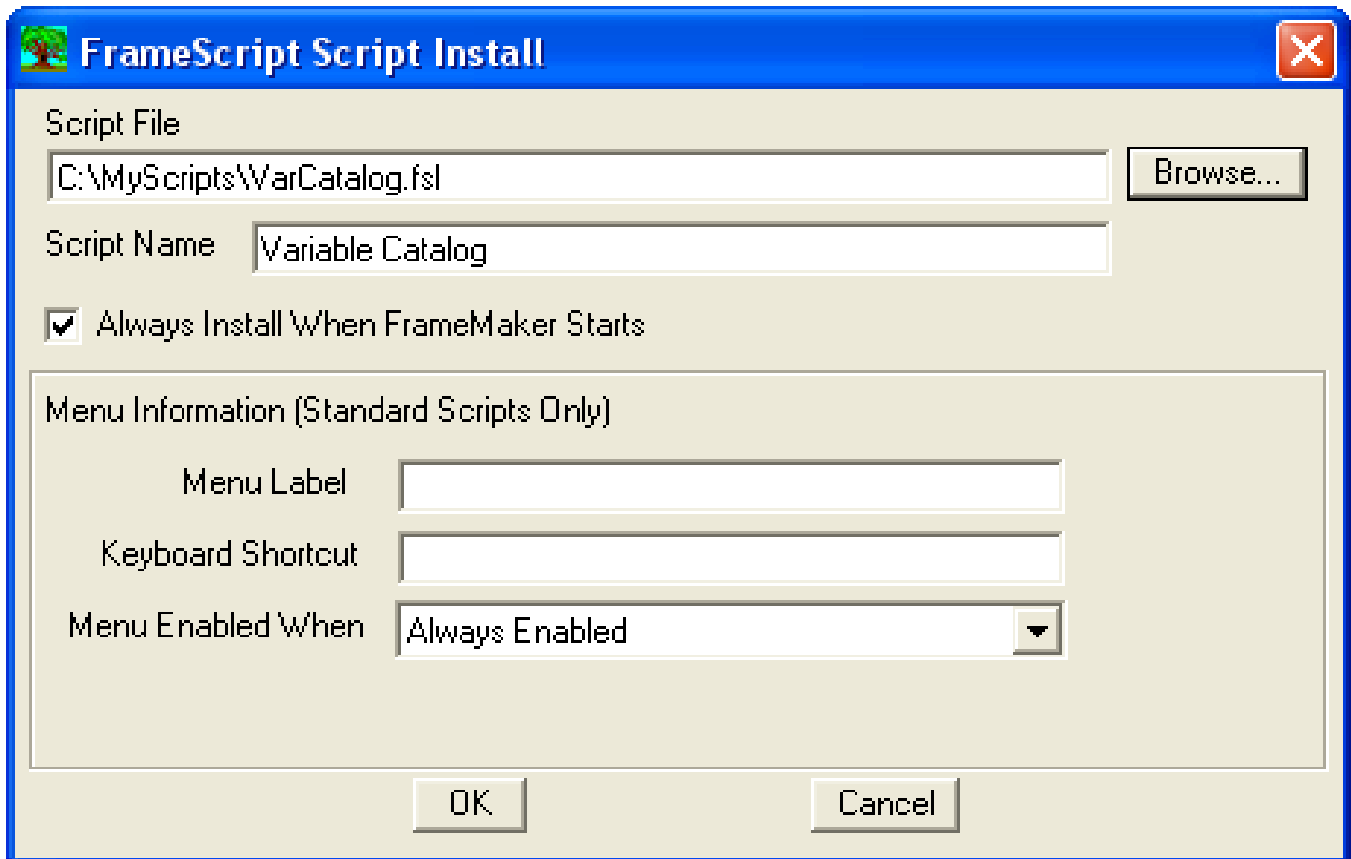
Install Menu command

The Install menu command tells FrameScript to install a script into the FrameScript system. A standard script will be assigned a menu item for easy access. An event script will be initialized so it can handle any events it has defined. When you select this menu command, FrameScript will present the FrameScript script install dialog box (See Figure 3-3, "Install Standard Script," on page 13). You can enter the file name of the script you wish to install (or more conveniently use the browse button to select a script file). Then enter a name for the script. This name is used to allow you identify the script later if you wish to uninstall it. If you do not specify a name, FrameScript will make up a name (`StandardScriptName n`), which is not very helpful.

If you are installing an event script all you have to do is press the OK button and the script will be installed. The figure below shows the install event script dialog.

IMPORTANT: A script is installed only for the current FrameMaker session. To have a script installed each time FrameMaker starts, use the Install script command in the Initial Script. See "InitScript=c:\FrameScript\myinit.fsl" on page 17

Figure 3-2 Install Event Script

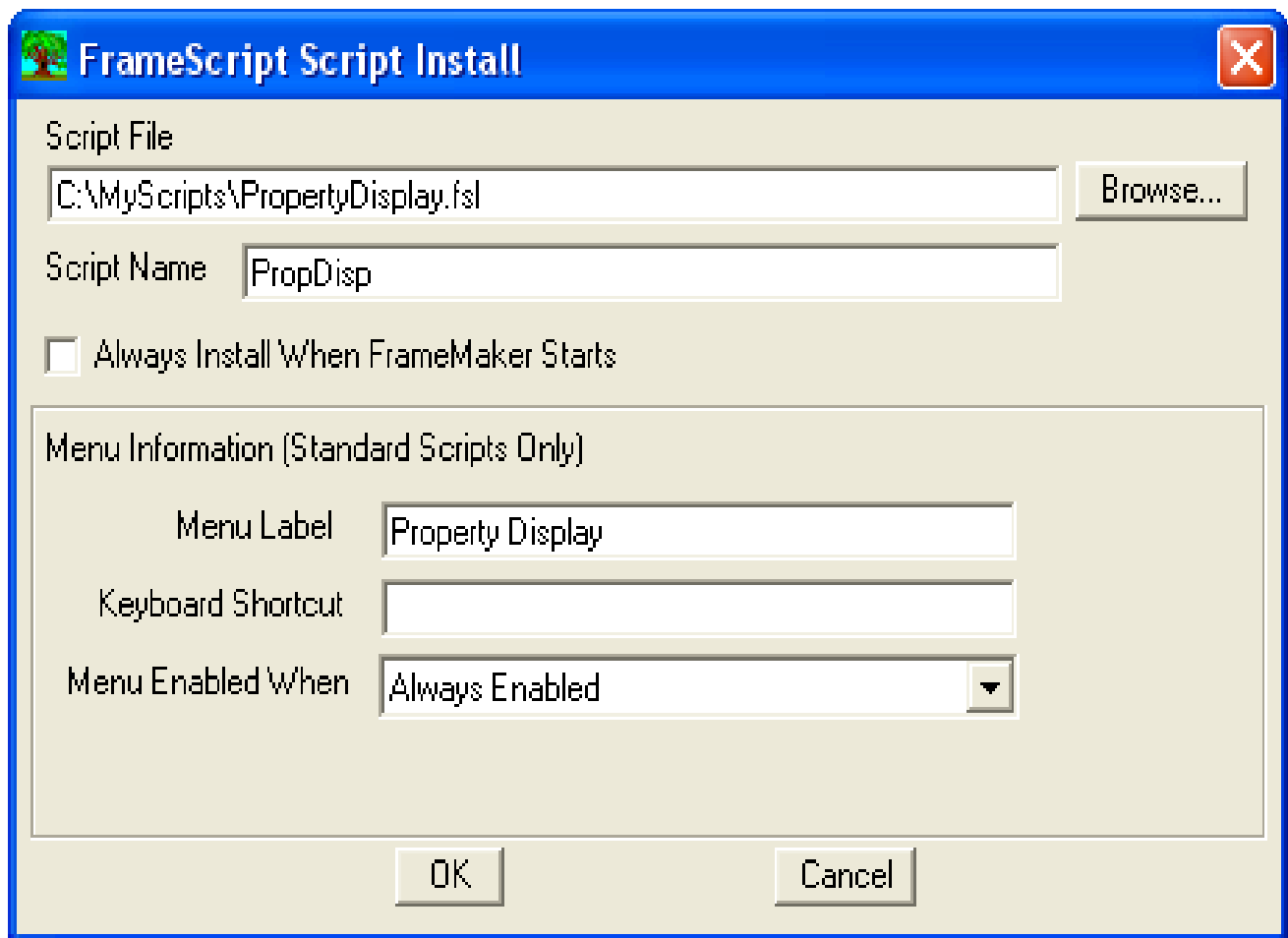


If you are installing a standard script, you should supply more information. Since installing a standard script creates a menu command for easy access, you should enter the text of that menu command. If this is left blank a default name will be chosen. You can optionally supply a keyboard shortcut and you can also specify when the menu command will be activated. The following table shows the text to use for each type of keyboard shortcut.

Keyboard key combination	Text for the keyboard shortcut field
Alt-Fn (where Fn is any function key)	~/Fn
Ctl-n (where n is any letter)	^n
Ctl-Fn (where Fn is any function key)	^/Fn
Sft-Fn (where Fn is any function key)	/Fn

The figure below shows the install standard script dialog.

Figure 3-3 Install Standard Script

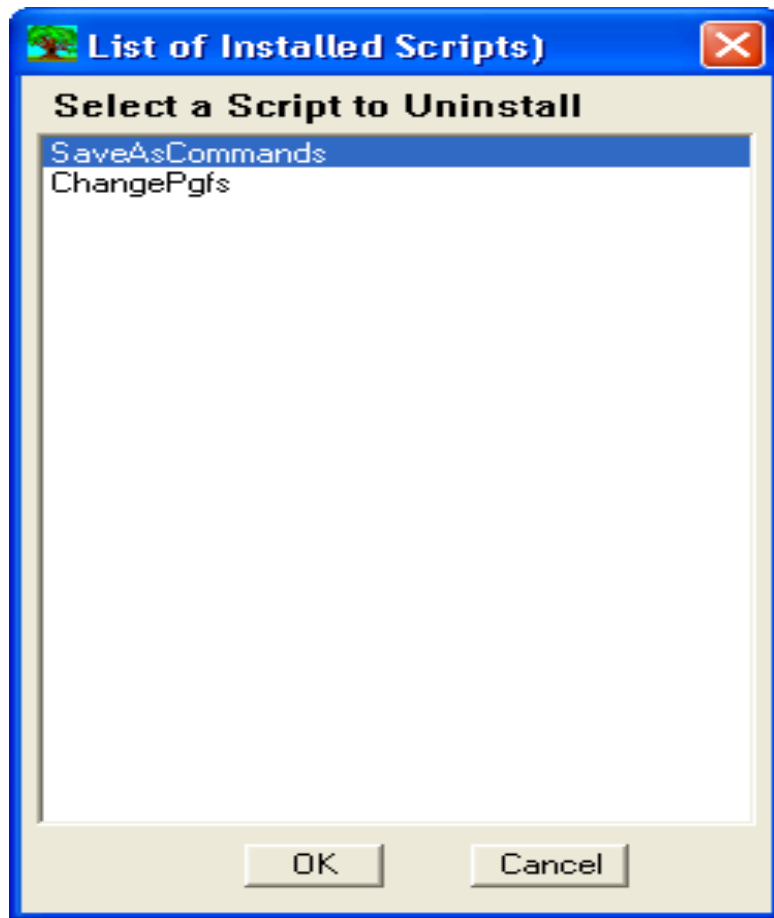


Uninstalling Scripts

Uninstall Script Menu Command

The Uninstall script command removes a previously installed script from the script space, making it unavailable to the user. When the user selects this command, a dialog box will appear with a list of all the installed scripts, see Figure 3-4. Select the one you wish, then press the OK button. The selected script will be removed.

Figure 3-4 Uninstall Script (Windows)



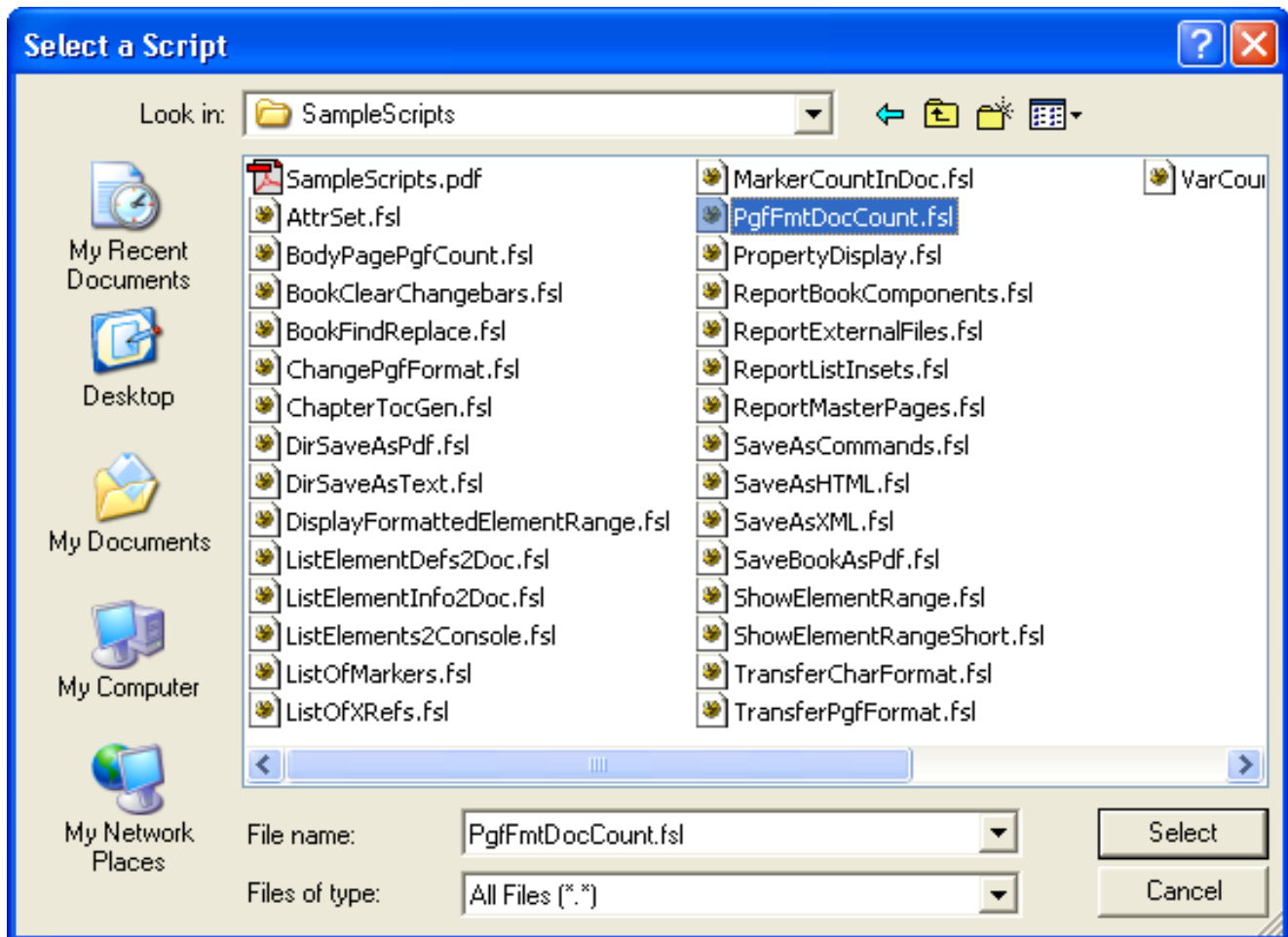
Compiling Scripts

The compile menu command allows the script writer to convert a script from the text file format to the FrameScript object format. The primary reason for doing this is to distribute a script without giving the user the ability to modify it (or even look at it). This is useful in organizations where a small number of script writers write scripts for others to use and they do not want the user modifying them. It is also useful for script developers who sell scripts to others.

Compile Menu command

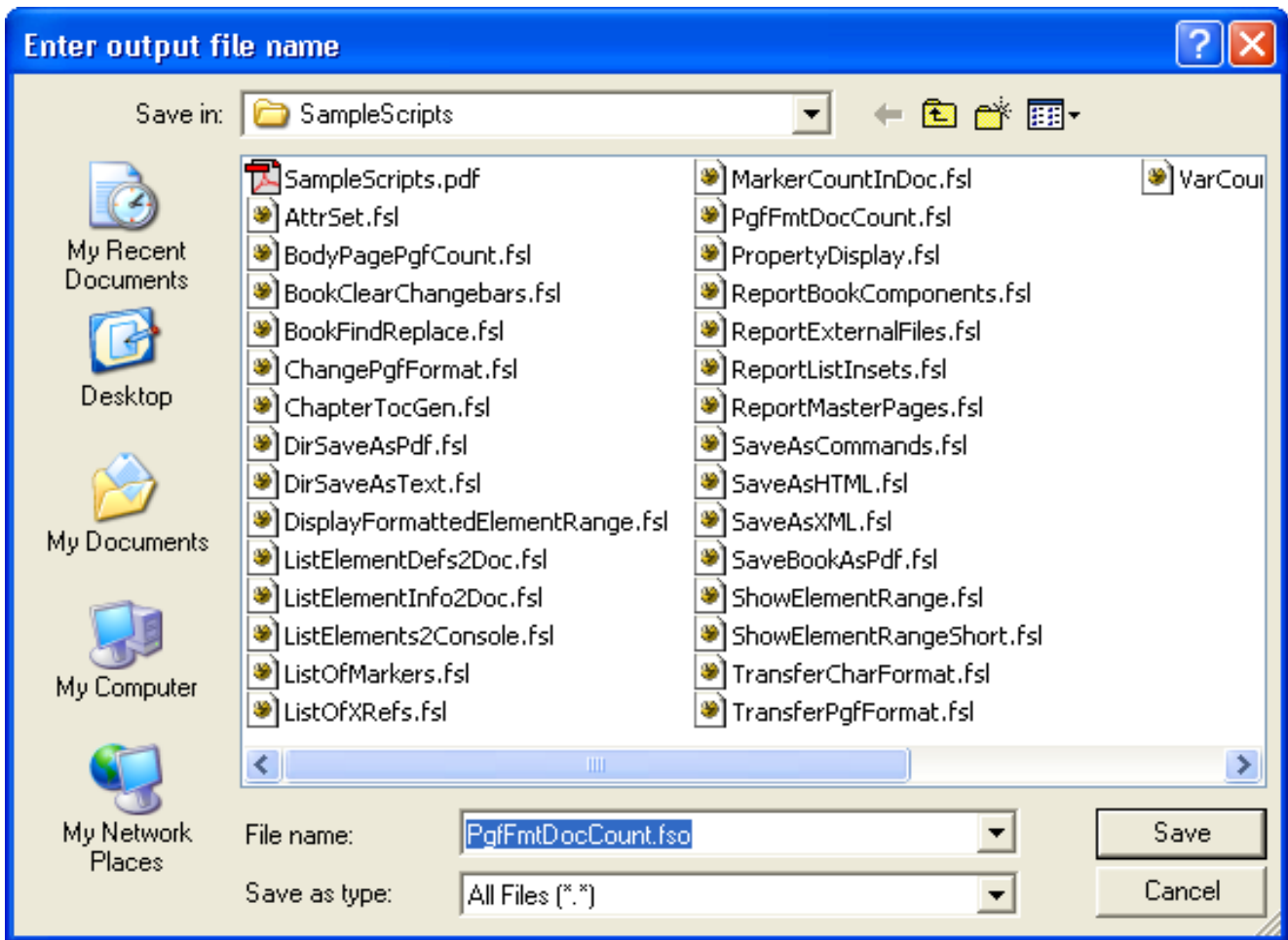
When you select the FrameScript->Compile command a dialog box appears asking you to select the script to compile. This screen is very similar to the one used to select a script to run (See “Select a Script to Compile” on page 15).

Figure 3-5 Select a Script to Compile



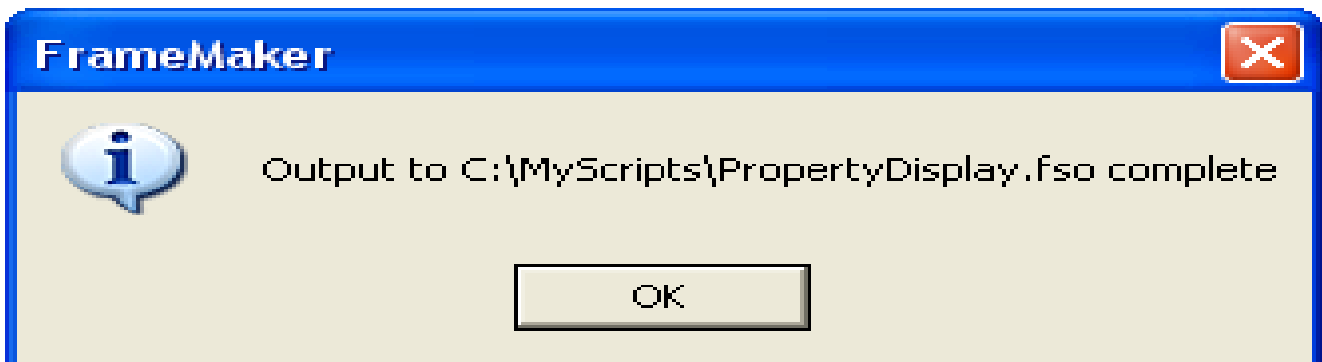
When you select a script, however, it does not run it but instead it puts up a second dialog asking for the location to put the compiled script (See “Select the output file for the compiled script” on page 16). It starts in the same directory as the source script and places a default name using the name of the source script with a fso extension. Most of the time, you will want to keep it that way. If you don’t, then you can change the name (and/or directory) to suit your needs.

Figure 3-6 Select the output file for the compiled script



A confirmation message appears when the process is complete.

Figure 3-7 Confirmation of the compiled script function



Customizing FrameScript

You can customize the way that the user interface looks, how FrameScript responds to errors, how it searches for scripts and other items. You do this with the Options menu item

Options Menu Command

You can modify the customization options by using the Options menu command. This command brings up a dialog box which has three panels selected via a drop down box. The General panel allows you to select the initial script, log file and error handling. The Search path panel defines how FrameScript searches for scripts and the Menus panel lets you change the names of the menu items and it also lets select which menu items (if any) will appear.

Use the drop down box to change to a different panel.

General Panel

The initial script field allows you to select a script to run when FrameMaker (and FrameScript) starts. The Keep initial data checkbox says to keep the global data space available when the initial script terminates. This allows you to define read-only variables for all other scripts to use. You would want to turn this off if these variables might interfere with variables defined in other scripts.

If the Signon screen checkbox is on, then a small window will appear whenever FrameScript starts. Uncheck this to turn off that behavior. *The Text Encoding drop down box is only available on FrameMaker 8 or greater.*

The following figure shows the general panel.

Figure 3-8 Options Dialog (General Panel)

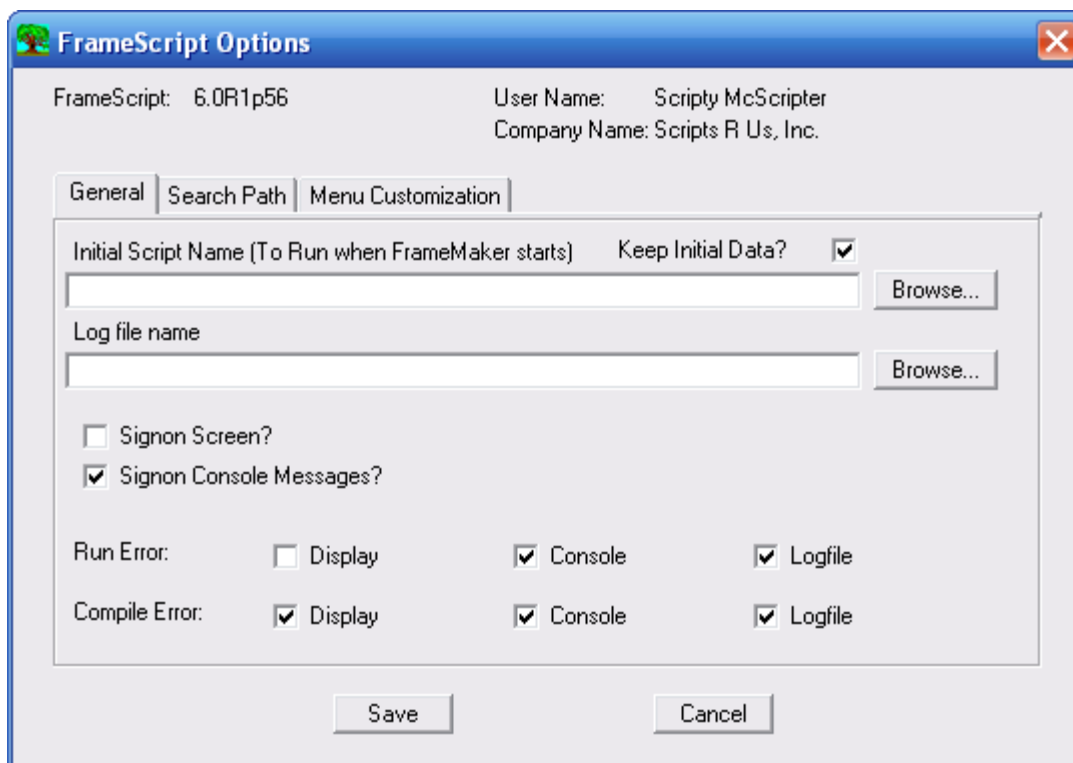
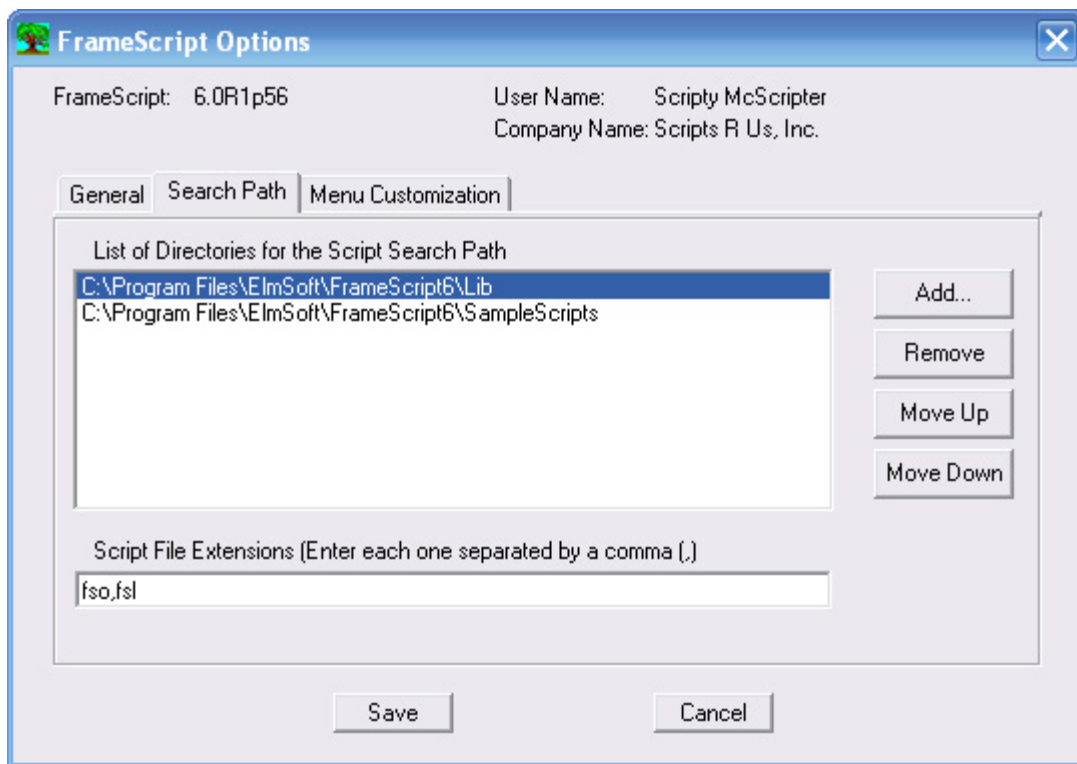


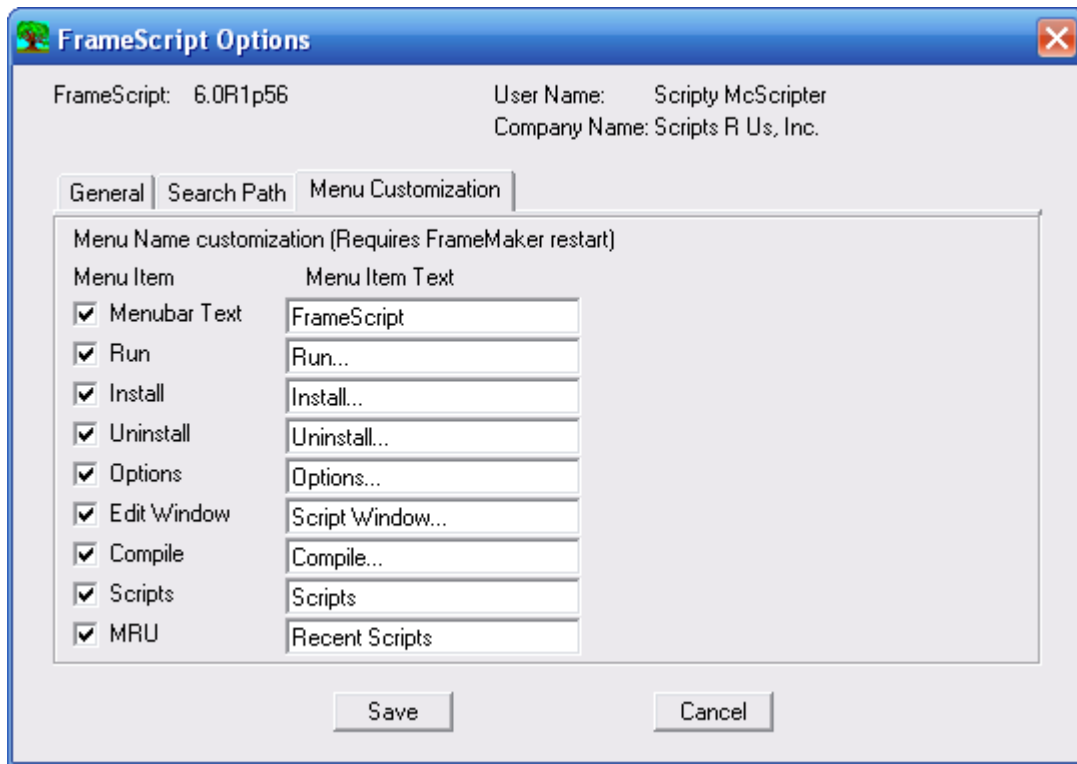
Figure 3-9 Options Dialog (Search Path Panel)



Search Path Panel

If a FrameScript command tries to access another script (the install script command for example), and a full pathname is not specified, FrameScript will search the directories in the search path for that file. If the file extension is not given, then it will use the set of file extensions specified here. Use the buttons to add new entries or change the order of the directories.

Figure 3-10 Options Dialog (Menus Panel)



Menus Panel

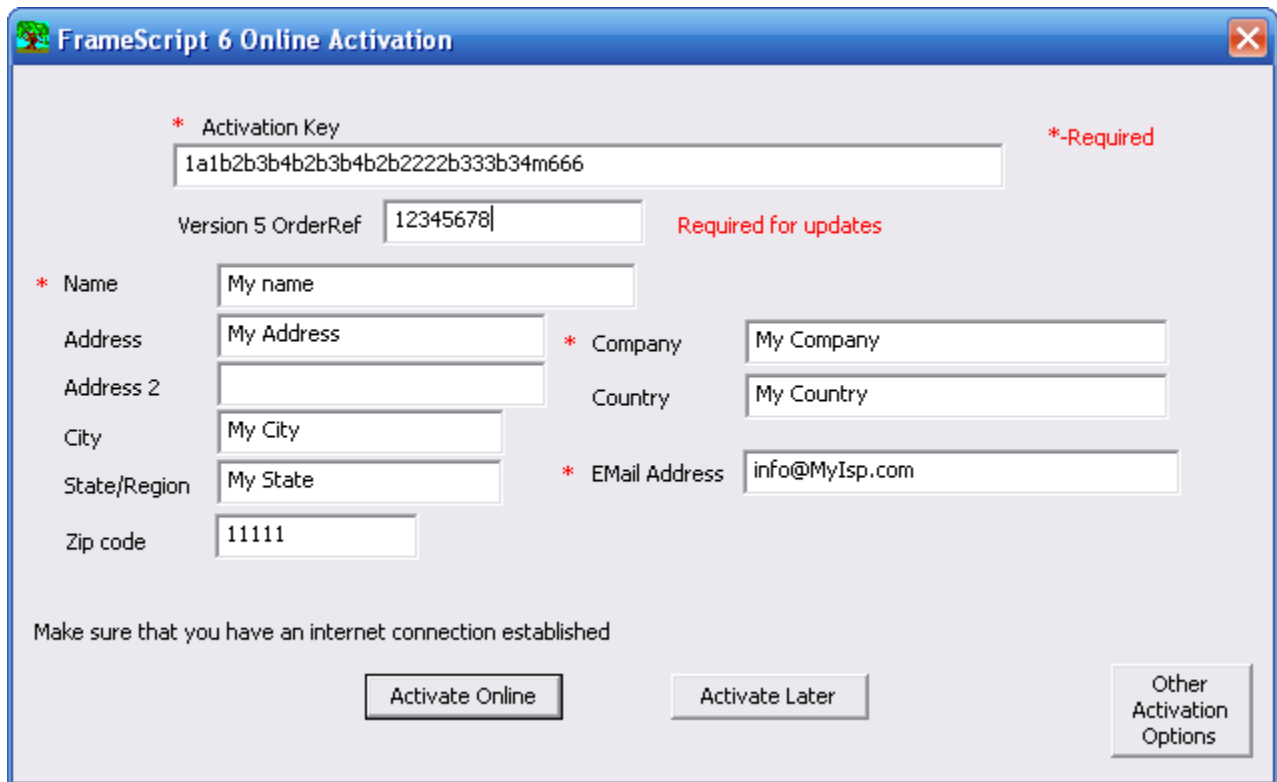
This panel lets you customize the user interface. A check in the checkbox indicates that the corresponding item will be available to the user. You may also change the text of the menu item. If you turn off the Menubar text, then the FrameScript menu will not appear at all.

License

The license menu items lets you activate and deactivate. The activate screen will appear when FrameMaker starts and the license has not been activated. It also appears during the installation process. If you have deactivated the product, the Activate sub menu item will be available. The deactivate menu item is available if you wish to deactivate the license and transfer it to another computer.

Activate

The following screen appears during activation. Only the Order Reference and Fml Reference are required. You receive these values when you purchase the product.

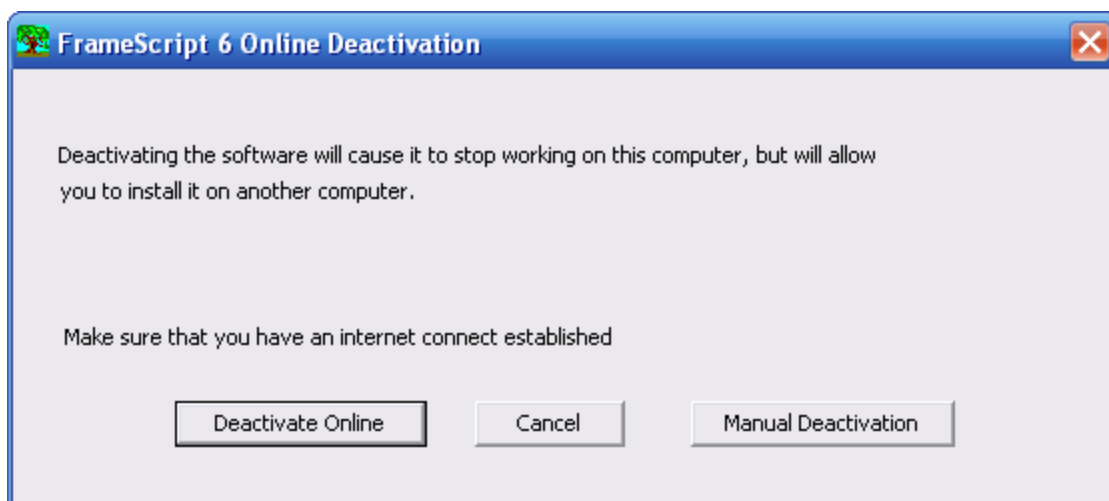


The screenshot shows a dialog box titled "FrameScript 6 Online Activation". It contains several input fields and buttons. The fields are: "Activation Key" (with a red asterisk and "Required" label) containing "1a1b2b3b4b2b3b4b2b2222b333b34m666"; "Version 5 OrderRef" (with a red asterisk and "Required for updates" label) containing "12345678"; "Name" (with a red asterisk) containing "My name"; "Address" containing "My Address"; "Address 2" (empty); "City" containing "My City"; "State/Region" containing "My State"; "Zip code" containing "11111"; "Company" (with a red asterisk) containing "My Company"; "Country" containing "My Country"; and "EMail Address" (with a red asterisk) containing "info@MyIsp.com". At the bottom, there are three buttons: "Activate Online", "Activate Later", and "Other Activation Options". A note at the bottom left says "Make sure that you have an internet connection established".

Use the Other Activation Options if you do not have an internet connection.

Deactivation

The following screen appears when you select the deactivation menu item.



The screenshot shows a dialog box titled "FrameScript 6 Online Deactivation". It contains a message: "Deactivating the software will cause it to stop working on this computer, but will allow you to install it on another computer." Below the message is a note: "Make sure that you have an internet connect established". At the bottom, there are three buttons: "Deactivate Online", "Cancel", and "Manual Deactivation".

Customization using the Ini File

FrameScript provides a customization file which allows you to set various options. Ordinarily, you will use the Options dialog box to modify these items, but you can use a text editor to modify them manually. Make sure the FrameMaker is not running when you do this. The name of the customization file is `fscript.ini`. For Windows XP and earlier it is located in the Documents and Settings directory

(`C:\Documents and Settings\\ElmSoft\Esl\V6\FmXX`) and for Windows Vista, it is located in the Users directory (`C:\Users\\AppData\Roaming\ElmSoft\Esl\v6\FMXX`), where XX is the target FrameMaker version).

The following table shows the section names, options, a description and the default values that will be used if it is not specified in this file.

Table 1: FScript.ini File customization options

Section	Option	Description
[GENERAL]	SignonScreen	This option specifies whether you wish to have the FrameScript signon window appear when you start a Frame session. e.g. <code>SignonScreen=Yes</code> If not specified, the signon screen <i>will</i> appear. A value of <code>No</code> means it will not appear.
	SignonMessage	This option specifies whether you wish to have the FrameScript signon console messages appear when FrameMaker starts. e.g. <code>SignonMessage=Yes</code> If not specified, the signon console messages <i>will</i> appear. A value of <code>No</code> means it will not appear.
	AutoCheckForUpdates	This option specifies whether you wish to have the FrameScript check for updates when FrameMaker starts. e.g. <code>AutoCheckForUpdates=No</code> If not specified, FrameScript <i>will not</i> check for updates. A value of <code>Yes</code> means it will check for updates when FrameMaker starts.
	GlobalDataSpaceForInitialScript	This option specifies whether you wish to have the global data space from the initial script (if any) saved as read-only global variables. e.g. <code>GlobalDataSpaceForInitialScript=Yes</code> If not specified, the global variables <i>will</i> be saved. A value of <code>No</code> means they will not be saved.
	Encoding	The possible values are as follows: <code>FrameRoman</code> <code>JISX0208.ShiftJIS</code> <code>BIG5</code> <code>GB2312-80.EUC"</code> <code>KSC5601-1992</code> <code>UTF-8 FrameMaker 8 or Greater</code> For FrameMaker 7.2 (and lower) <code>FrameRoman</code> is the only choice unless you have a FrameMaker version which accepts Asian characters.

Table 1: FScript.ini File customization options

Section	Option	Description
[FILES]	LogFile	This option allows you to specify the name and location of the FrameScript log file. This log file is where FrameScript writes comments and error messages. e.g. LogFile=c:\fscript.log If not specified then no logfile will be generated.
	InitScript	This option allows you to specify the name of a script to run at the start of a FrameScript session. You must specify the complete pathname of the initial script to run. e.g. InitScript=c:\FrameScript\myinit.fsl If not specified, then no script is run when FrameScript starts.
[Defaults]	ScriptExtensions	This option specifies the default file extensions that FrameScript will search for when not specified. e.g. ScriptExtensions=fso, fsl
	UserAbortThreshold	This option specifies how often the user abort is checked. A higher number improves performance. e.g. UserAbortThreshold=50 The default value is usually adequate.
[ScriptSearchPath]	n (A sequence number)	This option specifies a set of directories that FrameScript uses to search when a complete path is not specified. e.g. 1=c:\Program Files\ElmSoft\FrameScript6\Lib 2=c:\Program Files\ElmSoft\FrameScript6\SampleScripts
[Directories]	SearchScript	This option specifies the initial directory to look for scripts when the user selects the Run... menu command. e.g. SearchScript=c:\FrameScript\SampleScripts If not specified, then FrameScript will start looking in the same directory as the FrameScript client program.

Table 1: FScript.ini File customization options

Section	Option	Description
[MENUS]	RunMenuItem	This option specifies whether you wish to have the Run... menu item on the FrameScript menu or not. e.g. RunMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	InstallMenuItem	This option specifies whether you wish to have the Install... menu item on the FrameScript menu or not. For Example: InstallMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	UninstallMenuItem	This option specifies whether you wish to have the Uninstall... menu item on the FrameScript menu or not. For Example: UninstallMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	OptionsMenuItem	This option specifies whether you wish to have the Options... menu item on the FrameScript menu or not. For Example: OptionsMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	ScriptWindowMenuItem	This option specifies whether you wish to have the Script Window... menu item on the FrameScript menu or not. For Example: ScriptWindowMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	CompileMenuItem	This option specifies whether you wish to have the Compile... menu item on the FrameScript menu or not. For Example: CompileMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	ScriptsMenuItem	This option specifies whether you wish to have the Scripts sub menu on the FrameScript menu or not. For Example:. ScriptsMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	LicenseMenuItem	This option specifies whether you wish to have the License sub menu on the FrameScript menu or not. For Example:. LicenseMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	UseElmEdit	This option specifies whether you wish to use the ElmEdit editor or the standard script editor. For Example: UseElmEdit=Yes No is the default value, which means that the standard editor will be used..
		ActivateMenuItem

Table 1: FScript.ini File customization options

Section	Option	Description
	DeactivateMenuItem	This option specifies whether you wish to have the Deactivate... menu item on the FrameScript menu or not. For Example: DeactivateMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.
	MainMenuItem	This option specifies whether you wish to have the FrameScript menu appearing or not. If this is not on, then the other menus items will not appear For Example: MainMenuItem=Yes If not specified, the menu item <i>will</i> appear. A value of No means it will not appear.

Table 1: FScript.ini File customization options

Section	Option	Description
[MENUNAMES]	RunMenuName	This option specifies the label of the Run... menu item. Default: RunMenuName=Run...
	InstallMenuName	This option specifies the label of the Install menu item. Default: InstallMenuName=Install...
	UninstallMenuName	This option the label of the Uninstall... menu item. Default: UninstallMenuName=Uninstall...
	OptionsMenuName	This option specifies the label of the Options... menu item. Default: OptionsMenuName=Options...
	ScriptWindowMenuName	This option specifies the label of the Script Window... menu item. Default: ScriptWindowMenuName=Script Window...
	CompileMenuName	This option specifies the label of the Compile... menu item. Default: CompileMenuName=Compile...
	ScriptsMenuName	This option specifies the label of the Scripts sub menu. Default: ScriptsMenuName=Scripts
	LicenseMenuItem	This option specifies the label of the License sub menu. Default: LicenseMenuItem=License
	ActivateMenuItem	This option specifies the label of the activate menu item. Default: ActivateMenuItem=Activate...
	DeactivateMenuItem	This option specifies the label of the deactivate menu item. Default: DeactivateMenuItem=Deactivate...
	UpdatesMenuItem	This option specifies the label of the Updates menu item. Default: UpdatesMenuItem=Check for updates
	MainMenuName	This option specifies the name of the FrameScript menu. Default: MainMenuName=FrameScript
	[ErrorHandling]	RunErrorDisplay

Table 1: FScript.ini File customization options

Section	Option	Description
	RunErrorConsole	This option tells if FrameScript will report a FrameScript command run error to the console. e.g. RunErrorConsole=Yes If not specified, no reporting is done.
	RunErrorLogFile	This option tells if FrameScript will report a FrameScript command run error to the logfile. e.g. RunErrorLogFile=Yes If not specified, no reporting is done.
	CompileErrorDisplay	This option tells if FrameScript will report a FrameScript command option error to the display (dialog box). e.g. CompileErrorDisplay=Yes If not specified, no reporting is done.
	CompileErrorConsole	This option tells if FrameScript will report a FrameScript command option error to the console. e.g. CompileErrorConsole=Yes If not specified, no reporting is done.
	CompileErrorLogFile	This option tells if FrameScript will report a FrameScript command option error to the logfile. e.g. CompileErrorLogFile=Yes If not specified, no reporting is done.

Using the Script Window

Script Window

The Script window is now part of the ElmStudio system. For complete documentation, see Chapter 6, “Using ElmStudio.”

Using other editors

The script editor is provided as a convenience for script writers. But you do not have to use this editor. Since script files are standard text files, any standard text editor will work for creating and modifying scripts. There are many of these available, including the notepad.exe program that comes with MS Windows. Many customers have used UltraEdit from IDM Computer Solutions (www.ultraedit.com) and TextPad from Helio Software Solutions (www.textpad.com). These two text editors have programmable tools that allow direct connection to FrameScript via the RunEslBatch.exe program, described in the next chapter. Other editors may also have this feature.

The SciElmEdit program is a stand-alone text editor that comes with the product. See “SciElmEdit Stand Alone Editor” on page 96.

Batch Processing

RunEslBatch

RunEslBatch.exe is a batch oriented windows program that sends messages to FrameScript telling it to run scripts. RunEslBatch is also capable (if properly configured) to start FrameMaker if it is not already running, before attempting to send the message.

Using RunEslBatch

The format for running RunEslBatch is as follows:

```
RunEslBatch -f"ScriptFilename" [-aValue] ... [-aValue]
or
RunEslBatch -s"ScriptText" [-aValue] ... [-aValue]
```

This is how it might appear in a DOS batch file.

Using the -f option, the ScriptFilename is the full path name of the file containing the script that you wish to run or a partial name of a script that is in the SearchPath. Using the -s option, the ScriptText is the actual text of a script to run. The -a option(s) are used to pass string values to a script. Use double quotes if the values contains spaces or special characters. These arguments are passed to the script like subroutine/function arguments. You can access them in a script using the Args array. Args.Count will give you the number of arguments passed. Args [1] will be the first argument, Args [2] the second, and so on. Also the name of each argument is of the form ArgN, where N is the order number (starting at 1) of the arguments.

IMPORTANT: These arguments are only available in the main part of the script, because the Args object is used to pass information to subroutines. If you want to access the RunEslBatch arguments in FrameScript subroutines or functions, then you should pass the values as arguments to the subroutine or function, or copy the values to global variables.

For example, you could have RunEslBatch send the included script as follows:

```
RunEslBatch -s" Quit Session;"
```

This single line script will cause FrameMaker to quit running.

IMPORTANT: Due to limitations with the DOS/Windows command line processing, the -s option is useful only for a short scripts without special characters.

Here is a sample batch file using RunEslBatch. You could also include other programs in the batch file.

```
RunEslBatch -f"MyScript1.fsl" -a"My String Value" -a"My other string value"
RunEslBatch -f"c:\MyScripts\MyOtherScript.fsl"
RunEslBatch -s" Quit Session;"
```

IMPORTANT: When running in batch mode, be sure that the scripts do not require any user interaction, because the script will wait for it. If you wish to run a long operation over night, this could be a problem.

Configuring RunEslBatch

RunEslBatch will run without being configured if FrameMaker is already running when the program is started. If FrameMaker is not running, RunEslBatch will check the registry for the current version of FrameMaker. It will automatically start this version of FrameMaker. If you have more than one version of FrameMaker installed and RunEslBatch starts the wrong version, you can configure it manually using the configuration file. The configuration file is called EslBatch.ini and it is located in the Windows directory (WinNT for Windows 2000 systems). It has the following form:

```
[FM]
ExeFile=C:\Program Files\Adobe\Framemaker7.0\Framemaker.exe
```

The ExeFile keyword identifies the location of the FrameMaker exe file. The above example shows the usual location for a FrameMaker 7.0 installation. You will need to replace this with the complete path of your own FrameMaker installation. You will need a text editor to do this.

The RunEslBatch.exe and EslBatch.ini files are installed into the Windows directory by default. They can be located elsewhere as long as they are together.

IMPORTANT: If the RunEslBatch program is not in a directory which is part of the PATH, then you will need to include a full path to run it.

Configuring RunEslBatch for Text Editors

To create and modify scripts, you can use the built-in Script Window editor, but, since scripts are standard text files, you can also use any other standard text editor to perform the same function. Notepad.exe comes as part of MS Windows, so it is always available. It is a simple, single file at a time text editor. You can use this to write and modify scripts, then test them using the FrameScript Run command. Another text editor, WordPad.exe, also comes with MS Windows. It is a more advanced editor, but you have to remember to save the files as Text-Only files. The default is to save as RTF. RTF files will not work with FrameScript. There are also 3rd party solutions, which can be purchased separately from their respective software vendors. They are generally inexpensive and have evaluation versions available.

Our customers have recommended two 3rd party Text Editors, UltraEdit and TextPad. These editors are multifile text editors that have many compelling features, including syntax highlighting. Syntax highlighting lets you configure how the text file looks on the screen. You can have various types of words color coded to make it easier to read and modify the scripts. Many users have developed a syntax lists that are freely available. Also, both these editors allow you to run other programs from inside them. This means you can use RunEslBatch to run scripts directly from the editor windows. To do this you must first configure the editor to run this program correctly.

Note: UltraEdit is available from IDM Computer Solutions (www.ultraedit.com).

Note: TextPad is available from Helio Software Solutions (www.textpad.com)

Configuring for UltraEdit

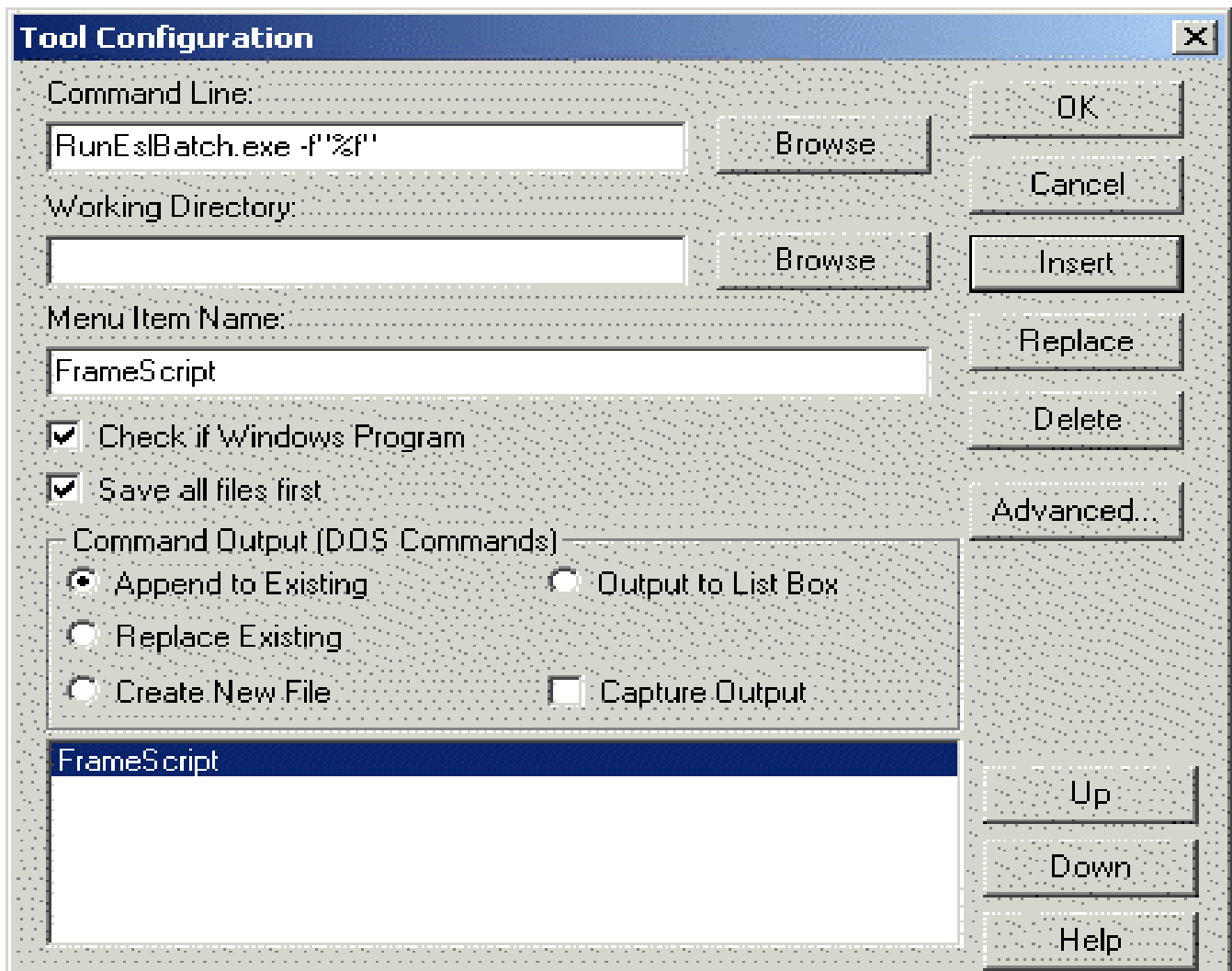
To configure UltraEdit to run scripts with RunEs1Batch, do the following:

- From within UltraEdit, on the Advanced menu, select the Tool Configuration menu item (Advanced->Tool Configuration...).
- A dialog box appears that lets you define a tool. On the Command Line field, enter the following:

```
RunEs1Batch.exe -f"%f"
```

- On the Menu Item Name field, enter some text of your choosing. This text will appear as a label of a menu item in UltraEdit.
- Check the box labeled 'Check if Windows Program'.
- Press the Insert button to register the new command to UltraEdit.
- Press OK to finish.

Figure 3-11 UltraEdit Tool Configuration dialog



A new menu item should now appear at the bottom of the Tools menu in UltraEdit. Whenever you select this menu item, RunEslBatch will run using the name of the currently active text file as its parameter. This means you can run the current script file whenever you wish just by selecting the menu item instead of switching to FrameMaker and using the Run command.

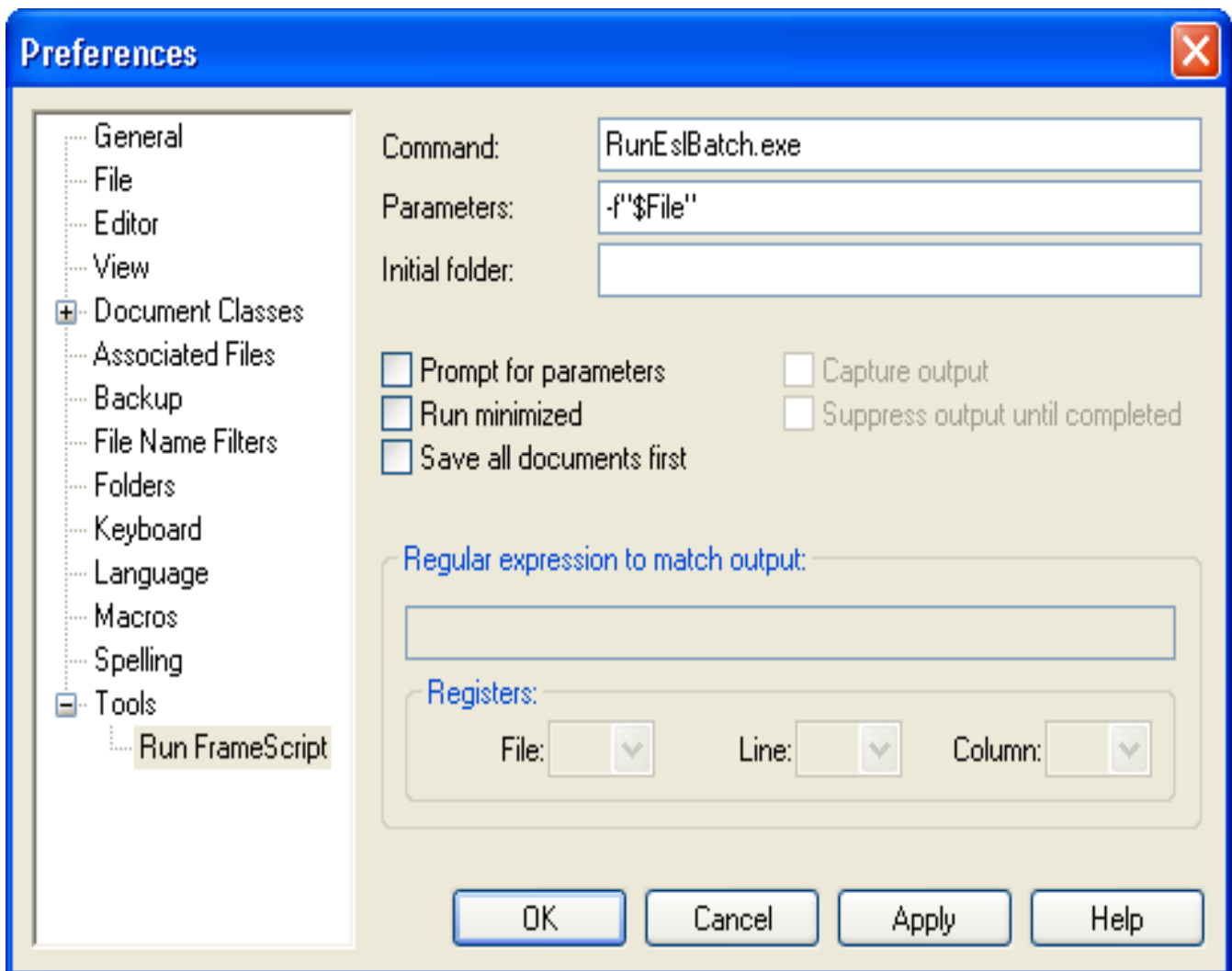
IMPORTANT: Make sure that the current file is saved before trying to run it.

Configuring for TextPad

To configure TextPad to run scripts with RunEslBatch, do the following:

- From within TextPad, on the Configure menu, select the Preferences menu item (Configure->Preferences...).
A dialog box appears.
- In the left panel, select the Tools item, then use the Add button (in the right panel) to add a new Program (Add->Program...).
This will take you to a file selection dialog.
- Navigate to the Windows directory and select the RunEslBatch program.
A new entry will appear in the list box.
- Rename this to something of your own choosing by selecting it, then making your changes.
- Press the Apply button to record the entry.
- In the left panel, expand the Tools item and select the new command.
A dialog appears on the right panel. See “TextPad Preferences for Tools dialog” on page 31
The Command line should be correct.
- In the Parameters text box, enter the following:
`-f"$File"`
- Press OK to finish

Figure 3-12 TextPad Preferences for Tools dialog



A new menu item should now appear at the bottom of the Tools menu in Textpad. Whenever you select this menu item, RunEslBatch will run using the name of the currently active text file as its parameter. This means you can run the current script file whenever you wish just by selecting the menu item instead of switching to FrameMaker and using the Run command.

IMPORTANT: Make sure that the current file is saved before trying to run it.

Chapter 4

Writing Scripts

Elements of FrameScript

Format of a Script

There are two types of FrameScript scripts: Standard Scripts and Event scripts.

Standard Scripts

Standard scripts are used for creating new functions and automating a set of current (and new) functions. These functions (started using the run menu command or using the scripts sub-menu) run to completion before returning control to FrameMaker and the user. All script data variables are destroyed when the script ends.

The following illustrates the format of a standard script.

```
Command options;  
Command options;  
.  
.  
.  
Command options;
```

When FrameScript runs a standard script, it performs the following steps:

- It loads the script into memory.
- It creates a data space for the script.
- It executes each command one at a time until it reaches the last line of the script.
The execution order may be altered by the control commands (if, loop, sub, etc.)
- It destroys the data space.
- It removes the script from memory.

The user can run a standard script in one of two ways: Using the Run command from the FrameScript menu or clicking on a menu item for installed standard scripts. The Run command prompts the user for a file name. The user selects the script file and then the script runs. A standard script may also be installed. When a standard script is installed (via the install menu item or the install FrameScript command), a menu item is created (under the FrameScript -> Scripts menu). This provides a convenient shortcut for executing commonly used scripts.

Event Scripts

Event scripts are a special type of FrameScript script which, instead of running to completion and terminating, stays loaded in memory (its data space is also kept active) and processes FrameMaker events. These events include user

defined menus, hypertext messages, and various file (document) actions, see FrameMaker Reference for a list of events. An event script is divided into a set of event routines. Each event routine, though it uses the same data space, acts like a separate script to itself. An event routine will be run when the specially assigned event occurs. This type of script is useful for defining your own functions and even replacing standard FrameMaker commands with your own functions. See the Event Scripts section for more information.

Format of an event script

The format of an event script is as follows:

```

Event eventname1
    command options
    command options
    . . .
EndEvent

Event eventname2
    command options
    command options
    . . .
EndEvent
. . .
Event eventnamen
    command options
    command options
    . . .
EndEvent

```

FrameScript does not run an event script. These scripts are installed with the *install* menu command (or by the **install** script command, see FrameMaker Reference for information on the Install command) and uninstalled with the *uninstall* menu command (or the **uninstall** script command).

When FrameScript installs an event script, it performs the following steps:

- It loads the script into memory.
- It creates a data space for the script.
- It executes the `Initialize` event in the script (if present). Each command of this event is executed one at a time until it reaches the last line of the event (the `EndEvent` command).
The execution order may be altered by the control commands (if, loop, sub, etc.)
- The script goes into a wait mode while it waits for the events particular to this script occur.

When FrameScript uninstalls an event script, it performs the following steps:

- It executes the `Terminate` event in the script (if present). Each command of this event is executed one at a time until it reaches the last line of the event (the `EndEvent` command).
The execution order may be altered by the control commands (if, loop, sub, etc.)
- It destroys the data space.
- It removes the script from memory, removing any defined events, such as menus or notifications.

Initial Script

When FrameScript starts it will run an initial script, if specified in the customizing options. This initial script is a convenient place to install other scripts, via the `install` command. This initial script also allows you to create *Session* variables for other scripts to read (See “Variable Scope” on page 52.).

IMPORTANT: Remember that any global variables that remain after the Initial script terminates will become read-only session variables for every other script that runs during this FrameMaker session. This might produce a conflict with the names of variables these other scripts are trying to create or use. There is a configurable run-time option to prevent this, if you wish. See “Customizing FrameScript” on page 17 for how to do this.

Format of FrameScript commands

The command is the basic unit of a FrameScript script. Each script, whether it is a standard script or an event script, executes each command consecutively one at a time. Each command begins with a command name and ends with a semicolon. When FrameScript loads a script, it treats every occurrence of a command name as the start of a new command. A common error is to accidentally use a reserved command name as a data name. The semicolon acts as a command terminator. It is not always necessary to include it, since the command next name will begin a new command (and terminate the current one), but there are some cases where you may omit the command name (such as `Set` or `Run`) and FrameScript may not be able to determine when one command stops and another begins.

FrameScript has commands that support the standard programming/scripting concepts, such as sequence, If-Then-Else (and now `ElseIf`), Looping, Subroutines, Functions and Modules, as described below.

Many FrameScript commands have the following form:

```
CommandName Option1(expression1) . . . OptionN(expressionN);
```

A reserved command name is followed by a series of options with the value for that option enclosed within parentheses. Some options do not have values and are specified by the name of the option itself. Some commands have a large number of options. Some have only a few. You need only specify the options that you wish. Any unspecified options will be assigned default values. Sometimes the command name alone is enough.

Examples:

Since there is no file name specified, this command will display a dialog box for the user to select a document to open. The selected document will then be opened.

```
Open Document;
```

This command will open the specified document.

```
Open Document File('testdoc.fm');
```

Comments

In addition to commands and script structure elements, a FrameScript script may contain comment entries. Comments allow you to document the script. These aren’t necessary for the actual script execution; they are ignored when the script runs. But when a script gets beyond a few lines it’s important to give yourself reminders of what it is suppose to do.

Comments can occur in two forms: the line form and the block form. Putting two slashes (`//`) together indicates that the rest of the current line is a comment and not to be processed during execution. The following is an example:

```
Open document File('testdoc.fm'); // this command opens the test document
```

Everything following the `//` is ignored during script execution.

Another way to do comments is the block method. This is more convenient for a comment that contains many lines. Block comments use the `/*` and `*/` to delimit the start of comment and end of comment. For example:

```
/* The following commands loops through all the paragraphs in the currently
   active document and counts the number of paragraphs with the
   paragraph format 'Heading1' */
Set gvCount = 0;
Loop ForEach (Pgf) In(ActiveDoc) LoopVar(gvPgf)
  if gvPgf.Name = 'Heading1'
    set gvCount = gvCount + 1;
  EndIf
EndLoop
MsgBox 'The number of heading1 paragraphs are '+gvCount;
```

Include Directive

You can include one script file inside another using the `#Include` directive. The syntax is as follows:

```
<#Include 'filename'>
```

The **filename** can be a full path name or just a filename where the file is in the same directory or somewhere in the search list. This file should be a text file containing FrameScript script commands.

When FrameScript encounters some text like this in a source file (text script file), FrameScript opens the text file and continues processing the script as if the text in the **filename** were pasted directly into the main source file. These include files can be nested, that is, one include file may also have include directives.

Data Types

FrameScript supports the following data types for variables and properties.

Table 2: FrameScript Data Types

Data type	Description
Integer	An integer is a whole number (no decimal point) ranging from -2147483647 to 2147483647. FrameMaker also uses this data type for True and False values (0 is False, 1-True)
Metric	A metric value is used for measurements. By itself, it is the number of points (there are 72 points in an inch) on the screen (or printer). You may specify other units (in constants) when it is more convenient, but the value of the metric number itself is always in points. The range for metric values is 0 to 32767. Decimal points are allowed. 23.5, 89.99 are all allowable metric values (they represent 23.5 and 89.99 points respectively). Some properties ask for percentages (e.g. color). These use metric values, 0 through 100. See metric constants for a way to specify these numbers in inches, centimeters, etc.
String	A string variable is a list of characters (Case-sensitive). A string can be of any length that fits in memory. See “Character sets” on page 43.
Real	A real is a number variable that allows decimal points. Real number have an extremely large range of values (-10^{4932} to 10^{4932}). Most likely you will use numbers in the middle of that huge range. There is only an estimated 10^{80} protons, neutrons and electrons in the entire known universe. Unless you are using FrameScript for astronomical research (an unlikely scenario), this numerical range should prove adequate. Numbers such as 456.12, 1.0, -56.99 are all valid real numbers.

Table 2: FrameScript Data Types

Data type	Description
Object	An object value represents a FrameMaker object (document, paragraph, table, etc.). Objects cannot be used in computations. Their purpose is to access properties of the object and to specify some action on the individual object in a FrameScript command. See the discussion below on Objects. This is a FrameMaker specific data type.
EslObject	An EslObject data type represents a FrameScript object (database, form, etc.). Like FrameMaker Objects, these cannot be used in computations. Their purpose is to access properties of the object and to specify some action on the individual object in a FrameScript command.
TextLoc	<p>A TextLoc identifier represents a location in a FrameMaker text object. Text objects are those objects which contain text, such as paragraphs (<code>Pgf</code>) and textlines (<code>TextLine</code>). A TextLoc identifier has two parts, an object and an offset within that object. The object part is an object identifier (see above). The offset part is an integer specifying the distance in the object of the location. In FrameScript you can get the object part of a TextLoc by specifying a modifier on the identifier as follows: if <code>tloc</code> is a TextLoc identifier, then</p> <p><code>tloc.Object</code> is the object part</p> <p><code>tloc.Offset</code> is the offset part.</p> <p><code>tloc.TextRange</code> gives a text range from the text loc (begin and end)</p> <p><code>tloc.TextRange1</code> gives the text range for one text position ahead.</p> <p>You may also get all the text properties at the location represented by the TextLoc variable by using the <code>.Properties</code> property, as follow:</p> <pre>SET propList = tloc.Properties;</pre> <p>You can also get individual properties for the location represented by the TextLoc variable by using the property name. For example, the following gets the color object for the text location represented by <code>tloc</code>:</p> <pre>SET colorVar = tloc.Color;</pre> <p>NOTE: Text in a FrameMaker text object contains many items that are not just text strings. It also contains table anchors, footnote anchors, etc. You cannot always count the characters to get an accurate offset value. This is a FrameMaker specific data type.</p>

Table 2: FrameScript Data Types

Data type	Description
TextRange	<p>A TextRange identifier represents a range of text in a FrameMaker text object. A text range is just two TextLocs together. If trange is a TextRange identifier then:</p> <p>trange.Text is a string representing the text within the text range.</p> <p>trange.Begin is a TextLoc representing the starting text location.</p> <p>trange.End is a TextLoc representing the ending text location.</p> <p>You may also access the TextLoc fields directly by:</p> <p>trange.Begin.Object is the object of the beginning text loc.</p> <p>trange.Begin.Offset is the offset of the beginning text loc.</p> <p>trange.End.Object is the object of the ending text loc.</p> <p>trange.End.Offset is the offset of the ending text loc.</p> <p>trange.Properties allows you to assign properties (text properties) to the range of test specified by this TextRange or it allows you to get the text properties from the beginning point in the range. The following sets the area of text to the properties in PropList.</p> <pre>SET trange.properties = PropList;</pre> <p>The Text property may be used to get the text in a text range or to replace the text in a text range. One of the most important TextRange properties is the TextSelection document property. This indicates the current insertion point (if both TextLocs are the same) or the text selection (if the textlocs have different values). This is a FrameMaker specific data type.</p>
Point	<p>A Point identifier represents a point value for a FrameMaker graphic. If pPoint is a point variable then:</p> <p>pPoint.X is the X offset value.</p> <p>pPoint.Y is the Yoffset value.</p> <p>This is a FrameMaker specific data type.</p>

Table 2: FrameScript Data Types

Data type	Description
Tab	<p>A Tab identifier represents a tab value for a FrameMaker paragraph. If <code>tTab</code> is a tab variable then:</p> <p><code>tTab.X</code> is the offset value.</p> <p><code>tTab.Type</code> is the location type. This value can be one of the following:</p> <ul style="list-style-type: none"> <code>TabLeft</code> - Left Tab <code>TabRight</code> - Right Tab <code>TabCenter</code> - Center Tab <code>TabDecimal</code> - Decimal Tab <code>TabRelativeLeft</code> - Relative Left Tab (Format Change List Only) <code>TabRelativeRight</code> - Relative Right Tab (Format Change List Only) <code>TabRelativeCenter</code> - Relative Center Tab (Format Change List Only) <code>TabRelativeDecimal</code> - Relative Decimal Tab (Format Change List Only) <p><code>tTab.Decimal</code> is the Decimal Tab character</p> <p><code>tTab.Leader</code> is a string giving the characters before the tab.</p> <p>This is a FrameMaker specific data type.</p>
ElementLoc	<p>An <code>ElementLoc</code> identifier represents a location in a FrameMaker document or book. A <code>ElementLoc</code> identifier has three parts, a parent element, a child element and an offset within that object. The offset part is an integer specifying the distance in the object of the location. In FrameScript you can get the parts of an <code>ElementLoc</code> by specifying a modifier on the identifier as follows: if <code>eloc</code> is an <code>ElementLoc</code> identifier, then</p> <ul style="list-style-type: none"> <code>eloc.Parent</code> is the parent element. <code>eloc.Child</code> is the child element. <code>eloc.Offset</code> is the offset. <p>This is a FrameMaker specific data type.</p>

Table 2: FrameScript Data Types

Data type	Description
ElementRange	<p>An ElementRange identifier represents a range of elements in a FrameMaker document or book. An element range is just two ElementLocs together. If erange is an ElementRange identifier then:</p> <p>erange.Begin is an ElementLoc representing the starting element location.</p> <p>erange.End is an ElementLoc representing the ending element location.</p> <p>You may also access the elementloc fields directly by:</p> <p>erange.Begin.Parent is the parent element of the beginning elementloc.</p> <p>erange.Begin.Child is the child element of the beginning elementloc.</p> <p>erange.Begin.Offset is the offset of the beginning elementloc</p> <p>You may use the text property (erange.text) of an ElementRange variable or property to obtain the text within that element range.</p> <p>One of the most important ElementRange properties is the ElementSelection document property. This indicates the currently selected element (if both elementlocs are the same) or the range of elements (if the elementlocs have different values).</p> <p>This is a FrameMaker specific data type.</p>
Attribute	<p>An Attribute identifier represents a attribute value for an element in a FrameMaker document or book. An attribute is a structure with several sub values. These are the attribute name, the attribute value(s), the special allow as special indicator and the AllowAsSpecial flag. If attr is an Attribute identifier then:</p> <p>attr.attrName is the name of the attribute.</p> <p>attr.attrValues is this list of values for the attribute. This is a StringList type.</p> <p>attr.AllowAsSpecial is a boolean, value True-it is allowed a special case, False-not.</p> <p>This is a FrameMaker specific data type.</p>
AttributeEx	<p>An AttributeEx identifier represents an extended attribute value for an element in a FrameMaker document or book. An attributeEx is a structure with several sub values. These are the same as the Attribute values (above) with the addition of two more properties as follows: (FM 10 or greater):</p> <p>attr.OrigAttrValues is this list of original values for the attribute. This is a StringList type.</p> <p>attr.OverriddenFlags is an integerwith one of the following values:</p> <p>OverriddenDefault, OverriddenNoValue, OverriddenConrefDuct or OverriddenKeydefToKeyDef.</p> <p>This is a FrameMaker specific data type.</p>

Table 2: FrameScript Data Types

Data type	Description
AttributeDef	<p>An AttributeDef identifier represents a attribute definition value for an element definition in a FrameMaker document or book. An attribute definition is a structure with several sub values. These are the attribute definition name, the attribute value(s), the special allow as special indicator and the AllowAsSpecial flag. If attrDef is an Attribute identifier then:</p> <p>attrDef.AttributeDefName is the name of the attribute definition.</p> <p>attrDef.AttributeDefChoices is this list of possible choices for the attribute definition. This is a StringList type.</p> <p>attrDef.AttributeDefDefaults is this list of default values for the attribute definition. This is a StringList type.</p> <p>attrDef.AttributeDefRequired is a boolean, value True-if it is required, False-if not.</p> <p>attrDef.AttributeDefFlags is a bitwise value: Possible values are:</p> <ul style="list-style-type: none"> AfReadOnly The attribute value is read-only AfHidden The attribute value is hidden. <p>attrDef.AttributeDefType is the type of the attribute definition: Possible values are:</p> <ul style="list-style-type: none"> AtString Any string value. AtStrings A stringlist AtChoices A value from a list of choices. AtInteger An integer value (possibly in a range (Min/Max) AtIntegers An IntList value (possibly in a range (Min/Max) AtReal A real value (possibly in a range (Min/Max) AtReals A list of real values (possibly in a range (Min/Max) AtUniqueID A string that uniquely identifies the element. AtUniqueIDREF A reference to a UniqueID attribute AtUniqueIDREFS One or more references to UniqueID attributes. <p>attrDef.AttributeDefRangeMin is the minimum value for a range test (if present):</p> <p>attrDef.AttributeDefRangeMax is the maximum value for a range test (if present):</p> <p>This is a FrameMaker specific data type.</p>
File	<p>A file identifier represents a text file on your computer system. This is a special type that is used only with the file commands.</p>
SubVar	<p>A subroutine identifier represents a subroutine in your script. You can use this as an easy way to access (RUN) a subroutine.</p>
LibVar	<p>A Library identifier represents a directory on your computer system, which can be used as a library of scripts. This gives you an easy way to access other scripts. LibVar variables have the following properties:</p> <ul style="list-style-type: none"> LibPath The name of the directory used as a LibVar

Table 2: FrameScript Data Types

Data type	Description
ScriptVar	A Script identifier represents a script file on your computer system. This gives you an easy way to access (RUN) this script. ScriptVar variables have the following properties: <p style="text-align: center;">FilePath The name of the File used as a ScriptVar</p>
TextItem	A text item is a representation of an item found in a text object. A text item is a structure containing the following members. TextOffset - The offset in the text location of the item. TextType - The type of the item. See the Reference Manual for more information. TextData - The actual data. This is a string for string types and an object for object types. This is a FrameMaker specific data type.
Property	A property of an object. A property has two parts, PropName - The name of the property PropVal - The value of the property. This is a FrameMaker specific data type.
DataRecord	A collection of named values. This is similar to an EStruct object except that it is a data item type instead of the object type.
List Types	FrameMaker and FrameScript has several data types that are lists of other data types. You can use the Get Member command to access the individual members of a list. The members are numbered from 1 to size, where size is the number of members in the list. You can also access these members using the indexing operator ([]). These data types come usually as FrameMaker properties and were designed to return lists of information. These can be updated (using the Add Member, Replace Member, Remove Member commands) but these data types were not designed for efficient updating. See Chapter 12, "List Commands," of the <i>FDK Programmer's Reference</i> . for more information on using lists in your scripts.
StringList	A list of strings. FrameMaker uses these for lists of font names, marker names, etc. You may use them for specifying the list of entries for a scroll list dialog or just to keep a list of names together. This is a FrameMaker specific data type.
MetricList	A list of metric values. FrameMaker uses this type whenever it wants a list of measurements, such as the column widths of a table. This is a FrameMaker specific data type. This is a FrameMaker specific data type.
IntList	It is a list of integer values. FrameMaker uses it for a list of objects in some cases. For example, the InCond property is an IntList. This is a FrameMaker specific data type.
TabList	It is a list of Tab values. FrameMaker uses it for lists of tabs in paragraph and paragraph formats. This is a FrameMaker specific data type.
PointList	It is a list of Point values. FrameMaker uses it for lists of vertices in some graphic objects, such as PolyLine. This is a FrameMaker specific data type.
UIntList	This is a rarely used list. It is a list of unsigned integer values. FrameMaker uses it for a list of f-code values. This is a FrameMaker specific data type.

Table 2: FrameScript Data Types

Data type	Description
TextItemList	A list of text item values. You get this list using the Get TextItems command. It represents the elements of a paragraph or group of paragraphs. This is a FrameMaker specific data type.
PropertyList	A list of properties for an object. This is retrieved with the Get TextProperties command or the <code>object.properties</code> modifier. Each item in the list is a property type. This is a FrameMaker specific data type.
AttributeList	A list of attributes. FrameMaker uses these to keep a all the attributes for an element. This is a FrameMaker specific data type.
AttributeExList	A list of attributeEx values. FrameMaker uses these to keep a all the extended attributes for an element. This is a FrameMaker specific data type.
AttributeDefList	A list of attribute definitions. FrameMaker uses these to keep a all the attribute definitions for an element definition. This is a FrameMaker specific data type.
DataList	A list of various values. This is similar to the EVector data type, but it is a Data item instead of an object.

Character sets

FrameMaker uses a different character set for its string data than the standard MS Windows character set (Ansi). FrameMaker originated on the Unix platform and the character set it uses more closely resembles that of Unix. Most of the common characters in the FrameMaker character set and the Ansi character set, however, are identical so it does not matter to the majority of FrameMaker users. The differences lie in the upper ascii area. This area contains characters (such as Å, È, ®) that contain accents or special symbols. The FrameMaker character set issue affects mostly European and South American customers (Asian customers use the MBCS (multi-byte character) supported by Adobe).

If you do not use these special characters in your documents and/or file names, then you do not have to worry about this distinction. If you do use these characters, then you should continue reading this section.

Problems arise sometimes with file names that use special characters. It also might occur if you insert text typed directly into a script (or read from a text file) into a FrameMaker document. To ameliorate this problem, we have added the `PlatformEncodingMode` option to this release. This is a session variable that applies to each script individually. If you set this value to `True`, the FrameScript will automatically convert any string value coming from FrameMaker from the Frame Character set to the Ansi (Windows) character set and convert any string value going to FrameMaker from the Ansi character set to the Frame character set. This alleviates you from having to be concerned about it. We recommend that any new script written, which might use special characters, put the following line at the beginning of the script.

```
Set PlatformEncodingMode = True;
```

Of course, this is not backward compatible with previous versions of FrameScript.

See “PlatformEncodingMode” on page 51.

FrameMaker 8 introduces a new text encoding called UTF-8. This is the internal encoding that FrameMaker 8 uses. This is a multibyte encoding that allows many more separate characters than the Ascii, Ansi or FrameRoman character sets. You can set this mode usig the Options dialog box or by using the `SetDefFontEncoding` method of the `eSys` object.

Standard Object Information

There are some properties that apply to all data types. Some apply to certain kinds of objects and variables. The following table illustrates some of these special properties.

Table 3: Standard Object Properties

Property Name	Description
<code>dataname.Objectname</code>	Returns a string value containing the name of the data type. This applies to any variable or property. Possible values are 'String' 'Integer' 'Doc'
<code>dataname.Size</code>	Returns the physical size of the data item (length of the string for string variables or properties).
<code>dataname.Count</code>	Returns the number of items in a list object. This value is 1 for single data items.
<code>dataname.Properties</code>	Returns a complete property list for this object. The user may use this (for frame objects) to assign the properties of one object to another. The dataname must be a FrameMaker object variable or property.
<code>dataname.Valid</code>	True or False, depending on whether the variable contains a valid object. The dataname must be a FrameMaker object variable or property.
<code>dataname.Text</code>	The text of a text object. The dataname must be a FrameMaker text object (paragraph, textrange, or textline) variable or property. The result is a text string.
<code>dataname.IsObject</code>	True or False, depending on whether the variable is a FrameMaker object.
<code>dataname.Doc</code>	The document part of a Frame Object variable.
<code>dataname.Menu</code>	The Menu part of a Command, Menu or MenuItemSeparator Object variable.
<code>dataname.Page</code>	The Page object (Bodypage, reference page, master page) where the Frame Object resides. If the dataname is not an object or if it does not reside on a page (e.g. paragraph format), then this value is zero.
<code>dataname.Pgf</code>	The Paragraph object that contains the Frame Object. If the dataname is not an object or if it does not reside in a pgf (e.g. paragraph format), then this value is zero. Tables, Table Rows and Table Cells return the paragraph of the table anchor. Objects inside an anchored frame return the paragraph of the frame anchor. Paragraphs return themselves.
<code>dataname.IsParm</code>	If the dataname is a parameter passed to a subroutine, then the value is True, otherwise the value is False.

Constants

Constants are values that you specify directly in a FrameScript script (i.e. they are not in variables or properties). You may specify constants for several (but not all of the above data types).

Integer Constants

An integer constant is just a whole number in the allowable integer range. The following are valid integer constants:

1, 25, -123

You may also specify a suffix (H or B) to indicate a hexadecimal value by using the H suffix and a binary value by using the B suffix, as follows:

`10H` - indicates a hexadecimal 10 which is 16 decimal.

`10B` - indicates a binary 10 which is 2 decimal.

Note: The integer constant must start with a numeric digit. Therefore, to specify a hexadecimal constant that starts with the letters A through F, you must put in a leading 0 (e.g. 0AH) otherwise it will be treated as an identifier.

Real constants

A real constant is similar to an integer constant except that you can put in decimal places. The following are valid real constants:

`123.33`, `77.9`, `-12345.6789`.

Metric constants

Metric constants are similar to real constants except that you can specify the metric units as part of the constant. To represent a number as a point measurement, a metric constant looks just like a real constant. The value will be converted based on the context of its use. To specify units other than points, append a suffix onto the number *without any spaces intervening*. The following list shows the type of suffix and the corresponding units.

<code>pts</code>	Points
<code>in</code>	Inches (72 points per inch)
<code>"</code>	Inches (72 points per inch)
<code>cm</code>	Centimeters (~28 points per cm)
<code>mm</code>	Millimeters (~2.8 points per mm)
<code>pica</code>	Pica (12 points per pica)

The following are valid metric constants.

<code>345pts</code>	This represents 345 points (same as 345).
<code>5.5"</code>	This represents 5.5 inches (or 396 points)
<code>129.99cm</code>	This represents 129.99 centimeters (or 51.1 inches or 3684.75 points)

String constants

A string constant is a set of characters enclosed in *single* quotation marks. Remember double quotation marks are used for metric values to represent inches. The value inside string constants are case sensitive (unlike most other things in FrameScript). The following are valid string constants:

```
'This is a string constant'
'This is also a string constant, but this is much longer than the first constant'
'1234.45'
```

IMPORTANT: Use the apostrophe (') (not the slanted quote mark (’)) to enclose a string constant.

You can also use an integer value with an S suffix to specify a single character string. The integer value is the character code representation. For example,

65S - represents a single character string with the value 'A'.
since 65 is the character code for the letter A.

IMPORTANT: Using this method, it is possible to generate invalid characters. Not all byte values (1-255) correspond to valid characters. This is especially true when using the multi-byte UTF-8 character set in FrameMaker 8.0 and greater. FrameMaker will not process invalid UTF-8 strings.

Predefined Named Constants

The following table presents a list of constant values identified by reserved names. You may use these identifiers in place of the values they represent.

Table 4: List of Named Constants

Global Variable Name	Description
BackSlash	This is a string value representing a backslash (\) character. You may use BKSL for short.
CharCR	This is a string value representing a carriage return character.
CharLF	This is a string value representing a linefeed character.
CharTAB	This is a string value representing a tab character.
CharPropChangeNameList	A <code>StringList</code> value containing the names of all the char prop change names.
ClientDir	A string value containing the directory name of the FrameScript product. This can be useful for locating files in the same directory as the FrameScript product.
ClientName	A string value, usually 'fsl'. This is the name that FrameMaker uses to identify the FrameScript client. You can use this value in Hypertext markers to send messages to FrameScript scripts.
FslBuildNumber	This is an integer value indicating the current build number FrameScript program.
FslVersionMajor	This is an integer value indicating the current major version of the FrameScript program.
FslVersionMinor	This is an integer value indicating the current minor version of the FrameScript program..
InstallName	This is the name chosen when a script is installed.
InstalledEventScriptList	This is a <code>StringList</code> value containing the names of all the currently installed event scripts.

Table 4: List of Named Constants

Global Variable Name	Description
<code>InstalledScriptList</code>	This is a <code>StringList</code> value containing the names of all the currently installed scripts.
<code>InstalledStandardScriptList</code>	This is a <code>StringList</code> value containing the names of all the currently installed standard scripts.
<code>MainScript</code>	A string value containing the name of the main (the one that you started) script.
<code>NotificationNameList</code>	A <code>StringList</code> value containing the names of all the notification event names.
<code>Null</code>	This is a constant representing the <code>NULL</code> value.
<code>ObjEndOffset</code>	The last offset position in a paragraph. This is used for setting a text range to include the entire paragraph.
<code>ProductRevision</code>	The revision information for FrameScript. For example, R1. This goes with the <code>FslVersionMajor</code> and <code>FslVersionMinor</code> .
<code>Quote</code>	This value represents a single quote character. You can use this to insert a single quote in a string constant. <div style="text-align: center;"><code>e.g. Set gvStr = 'Can' + QUOTE + 't do it';</code></div> The value of <code>gvStr</code> will be <code>Can't do it</code> .
<code>TextItemNameList</code>	A <code>StringList</code> value containing the names of all the text item names.
<code>ThisProc</code>	A string value containing the name of the currently running sub, function or event.
<code>ThisScript</code>	A string value containing the name of the currently running script. This can be useful for doing call backs in subroutines.

Operators

Operators are tokens which allow you to perform computations and comparisons. The following are valid operators in FrameScript. Not all operators are valid with all data types.

Table 5: Operators

+	Plus operator: This operator adds two numerical type data items together. This also works for string variables and acts to concatenate two strings together into one longer string.
-	Minus operator: This operator subtracts two numerical data items
*	Multiple operator: This operator multiplies two numerical data items.
/	Division operator: This operator divides the numerical expression on the right into the numerical expression on the left.
%	Modulus (remainder) operator: This operator divides the numerical expression on the right into the numerical expression on the left and returns the remainder.
=	Equal operator: This operator compares two expressions for equality. If they are equal, the result is <code>True</code> . Otherwise it is <code>False</code> .
>	Greater than operator: This operator compares two expressions. If the expression on the left has a greater value than the one on the right, the result evaluates to <code>True</code> . Otherwise it evaluates to <code>False</code> .

Table 5: Operators

<	Less than operator: This operator compares two expressions. If the expression on the left has a lower value than the one on the right, the result evaluates to <code>True</code> . Otherwise it evaluates to <code>False</code> .
>=	Greater than or equal to operator: This operator compares two expressions. If the expression on the left has a value that is greater than or equal to the one on the right, the result evaluates to <code>True</code> . Otherwise it evaluates to <code>False</code> .
<=	Less than or equal to operator: This operator compares two expressions. If the expression on the left has a value that is lower than or equal to the one on the right, the result evaluates to <code>True</code> . Otherwise it evaluates to <code>False</code> .
not	Not operator: This operator reverses the effect of the following operator. E.g., <code>not =</code> means not equal
and	And operator: This operator allows you to combine several comparative expressions into the same expression. Both expressions must be <code>True</code> for the entire expression to be <code>True</code> . E.g. <code>a = b and c = d</code>
or	Or operator: This operator allows you to combine several comparative expressions into the same expression. If either expression is <code>True</code> the entire expression is <code>True</code> . E.g. <code>a = b or c = d</code>
. (dot)	The dot operator indicates a property. The left side is the property source and the right side is the property name. E.g. <code>Set gvName = gvObject.ObjectName</code>
, (comma)	The comma operator indicates a join operation. An <code>EVector</code> is created or extended with the values in the operation. The join operation can continue with subsequent member as well. E.g. <code>Set gvVector = 1,2,3,4,5,6;</code> This expression creates an <code>EVector</code> with six members, the numbers one through 6. Another example: <code>Set gvVector = (1,2), (3,4), (5,6) .</code> This creates an <code>EVector</code> consisting of 3 members, each of which is an <code>EVector</code> with 2 members.

Table 5: Operators

[] (brackets)	<p>Brackets are used for the indexing operation that allows access to members of arrays and pseudo-arrays. The format is as follows:</p> <pre style="text-align: center;">arrayValueType [expression] ;</pre> <p>The arrayValueType is any data type that allows indexing operations. This includes the built-in List types (StringList, IntList, etc.), the Array Objects (EArray, EVector and ECollection), and some EslObjects (such as EQuery and EForm). Usually the expression must evaluate to an integer value within the range of the data list. Sometimes (as with EForm, EQuery or ECollection) you can use other value types, such as Strings, as index values.</p>
{} (braces)	<p>Braces are used for passing arguments to functions. The brace indicate to FrameScript that it is a function call and not an Command Option. The format is as follows:</p> <pre style="text-align: center;">Set gvReturn = FuncCall{value1, value2, ..., valueN};</pre> <p>See the discussion of Functions and Subroutines for more information.</p>
#&	<p>Bitwise And operator: This operator allows you to do a bitwise AND operation on two integer variables. The result is a value in which there will be a 1 bit set in every position where a 1 bit occurs in both variables This is useful for certain Frame properties which are defined as bit-wise variables, such as ValidationFlags for an Element Object. E.g.</p> <pre style="text-align: center;">Set gvVF = gvElt.ValidationFlags #& ElemAttrValInvalid; If gvVF Display 'Element has an invalid attr value'; EndIf</pre>
#	<p>Bitwise Or operator: This operator allows you to do a bitwise OR operation on two integer variables. The result is a value in which there will be a 1 bit set in every position where a 1 bit occurs in either variable .</p>
~	<p>Bitwise not operator: This operator allows you to do a bitwise NOT operation on an integer value. The result is a value in which the bits are reversed.</p>
<<	<p>Bitwise Left Shift operator: This operator allows you to shift the bits of an integer value the number of bits specified in the second argument.</p>
>>	<p>Bitwise Right Shift operator: This operator allows you to shift the bits of an integer value the number of bits specified in the second argument.</p>

Most operations proceed from left to right. However, some operators have a higher precedence than others. For example, if you evaluate the expression, $5+8*3$, from left to right, the answer would be 39. However, since multiplication has a higher precedence than addition, the multiplication will be performed first and the answer will be 29. You can always use parentheses to alter the order of operations. (i.e. $(5+8)*3$ will result in the answer of 39).

The following table shows the operator precedence. Operators at the same precedence level will evaluate from left to right.

Table 6: Operator Precedence

. (dot) []	The PropertyOf and Indexing operators.
#& # ~ -not	Bitwise operators, Unary minus and Logical Not.

Table 6: Operator Precedence

* / %	Multiple, Divide, Modulus operators:
+ -	Plus and Minus operators.
> < >= <= == << >>	Greater than, Less Than, Greater or equal, Less or equal, equal and bitwise shift operators.
and or ,	Logical operators and the join operator(comma).
=	Assignment operator.

Identifiers

Identifiers are the names you use for variables, subroutine (and function) names, property names, command names and option names. All FrameScript identifiers are case-insensitive. You can use upper or lower case names as you prefer. The identifier DocObject is the same as DOCOBJECT (or docobject or even DoCoBjEcT). An identifier may contain letters, digits and the Underscore (`_`) character and it must start with a letter. .

IMPORTANT: FrameScript and FrameMaker have a large number of predefined identifier names (see FrameMaker Reference). There are many object names and hundreds of property names, plus a selection of command and option names. When defining your own variable names you should make sure that your names do not conflict with a previously defined identifiers. Also, future versions of FrameScript may (and probably will) add more reserved names. Since most of these reserved names are real words (or combinations of words), when creating your own variable names, it is useful to supply a prefix (e.g. `vDocVar`) instead of using a name that means something. A convention has developed in the user community of using the letter `v` (short for variable) as a prefix to any variable name that you create in a script. When we, at ElmSoft, write scripts we use an extension to this convention. We use `gv` as a prefix for Global variables, `lv` for local variables, `pv` for parameters passed to subroutines and `sv` for variables that are part of a structure. Following this convention (or one similar to it) will reduce the probability that there will be naming conflicts.

Variables

When a FrameScript script starts, a Data Space is created for it. The data space contains the various types of user created variables. Variables are places to store data values. Unlike many other computer languages, you do not declare a variable to be of a certain data type. A type is assigned to a variable when the value is assigned to it. There are three kinds of variables in FrameScript, Session variables, Global variables, and Local variables. Session variables are created for you when a script starts. These are always present. You cannot create nor delete them. You can, however (except for those marked as Read-Only), change their values.

Table 7: List of Fixed FrameScript Session Variables

Global Variable Name	Description
ErrorCode	An integer variable specifying an error code. Zero means that no error occurred. Other values indicate some type of error. Note that this value is never reset to zero by FrameScript. After you process an error condition, you should reset this value to zero.
ErrorMsg (Read-Only)	A string variable contain an explanation of the last error condition. This value corresponds to the errorCode variable explained above.
DeclareVarMode	An integer variable indicating whether automatic variable creation is allowed. If this variable is False (default), then global variables will be created automatically. If this value is True , then you must declare all global variables using the GlobalVar command, otherwise an error will occur.
PlatformEncodingMode	An integer variable indicating whether platform encoding mode is enabled. If this variable is False (default), then there is no automatic translation from the FrameMaker character set and the platform character set. If this value is True , then FrameScript will automatically convert any strings coming from FrameMaker to the platform character set (Ansi for Windows) and it will convert any strings going to FrameMaker to the FrameMaker character set. This is especially useful if you use characters in the upper ascii range (above 127). If you are using the UTF-8 encoding on FrameMaker 8 or greater, the action of this session variable is disabled.

IMPORTANT: Also note that any global variables still present when the "Initial Script" terminates (if this option is used) will become Read-Only Session variables for every other script in the system. There is an option to prevent this (See Users Guide for the list of options), if you do not want this to happen.

The second type of variable is the Global variable. This is probably the most common type of variable, especially for short scripts. You can create (and initialize) global variables with the **GlobalVar** command (See “GlobalVar command” on page 28), but this is optional. The default behavior is to create a new global variable automatically whenever you attempt to assign a value to a variable name that does not yet exist. For example

```
Set gvMyVar = 100; // This creates a global variable and assigns a value to it
Get Object Type(PgFfmt) Name('Heading1') NewVar(gvMyPgFVar);
// This also creates a global variable called gvMyPgFVar
// (assuming that it does not already exist)
// because the Get Object command returns a value in the NewVar option.
GlobalVar gvMyVar2(100) gvMyStringVar('My String');
// This creates two global variables and assigns values to them.
```

The third type of variable is the Local variable. Local variables are only present inside the subroutine or function in which they are created. When a subroutine or function terminates all of its local variables are destroyed. Local variables become more useful as scripts become larger. A large script may have many subroutines and user defined functions. Sometimes you may use a variable name in one subroutine that you also used in another, intending them to be different. A value may unexpectedly change. These are some of the most difficult problems to find and fix. It is good programming practice to use local variables inside subroutines or functions to limit the unplanned interaction between various parts of a script. Most of the sample scripts will show examples of using Local variables in subroutines.

Note: When you create a variable with the GlobalVar or Local commands (See “Local Command” on page 56) and do not provide an initial value, the value assigned will be 0 (zero).

Variable Scope

Any variable created in a script is accessible anywhere within that script. These variables are not accessible outside the script. That is, a variable created in one script will not interfere with a variable by the same name being created and used in another script. They exist in a different data space. There is one exception to this rule. Variables created in the initial script (see initial script) are global variables. Any script may read variables created within the initial script, but not change their value (or delete the variables themselves). Of course, if the initial script creates and then deletes a variable it will not be present for other scripts to access.

These global, read-only variables are useful for putting values for every script to use. This may be handy for customizing an installation (or a department within a larger institution) without having to put special variables into every script. Each department could put a department name in a variable and various True/False flags in the initial script and each department could still use a set of scripts without changing them.

Objects and Properties

There are two general types of values, Data Items and Objects. For data items (such as Strings and Integers), the value is stored with the variable itself. When the variable is destroyed, the data associated with it is also destroyed. Objects, on the other hand, are only references to something. The value in the variable is usually just an ID number (or sometimes a pair of numbers) that uniquely identifies something. Sometimes these are called handles or pointers. We use the word 'something' here because an object can refer to different kinds of things. It might refer a set of functions. It might refer to a database or to a Form. FrameMaker objects can refer to documents, paragraphs, anchored frames, etc. Access to the actual object is via properties and methods (functions or subroutines).

When a variable with a non-object value is deleted, the value is also deleted. For example, if a variable contains a string value and you delete the variable (using the Delete Var command or a local variable when a subroutine ends), the variable itself goes away and the string value is also deleted. A variable with an object data type value works differently. When you delete this type of variable the variable itself goes away, but the object it references stays around. To delete an object, you must use the Delete Object command. This is one of the major differences between the value types. Another difference is when you assign a value to variable. When you assign a non-object value (such as a string), the whole value is copied. For example, if one variable contains a string value and you assign it to another variable a second copy of the string is made.

```
Set gvMyVar1 = 'My String';
Set gvMyVar2 = gvMyVar1;
```

Now there are two copies of the string 'My String'. However, when you assign the value from a variable with an object value only the ID is copied, not the object. A new object is not created. For example,

```
Set gvMyPgfObject = FirstPgfInDoc;
Set gvMyPgfObject2 = gvMyPgfObject;
```

The variable gvMyPgfObject2 contains the same ID (handle, pointer, whatever), but it does not create a new paragraph object.

Objects are usually created with the New command and removed with the Delete Object command. For example,

```
New Paragraph NewVar (gvPgfvVar);
```

creates a new paragraph in the currently active document and places the object value in the gvPgFVar variable.

```
Delete Object(gvPgFVar) ;
```

This would delete the above paragraph.

The properties of an object are accessed by the dot (.) operator. The format is as follows:

```
gvMyObjectvar .PropertyName
```

where gvMyObjectvar is a scriptwriter defined variable name that refers to an object and PropertyName is the name of a property for the object type.

You can get an object representation into a variable as the return value in some commands, such as Open Document or New Document, or New Table, etc. The return value for these commands will be a variable representing a FrameMaker object (in the NewVar option). Some properties of objects also supply object variables. A FrameMaker document object contains many lists of FrameMaker objects that can be access those properties (see below).

If you omit the object variable and just specify an property name, FrameScript will still attempt to find the value. It will first check the properties of the FrameMaker Session object to see if that property name exists, then, failing that, it will look up properties from the currently active document (if any). If that also fails, it will look up properties from the currently active book (if any). If all this fails, FrameScript will assume that the identifier is a scriptwriter defined variable.

This means that you can specify the following session property names without specifying an object name.

```
UserName, FirstOpenDoc, FirstOpenBook
```

and many others (see Session properties)

It also means that you can specify various document properties without specifying a document object variable. This assumes that there is a currently active document available. Among these properties are:

```
FirstPgFmtInDoc, FirstPgInDoc, CurrentPage, DocIsViewOnly
```

The same can be applied to book properties for the currently active book.

IMPORTANT: The properties `ActiveDoc` and `ActiveBook` are FrameMaker session properties that are available all of the time FrameMaker is running (see FrameMaker Reference). However, these values contain zero whenever there is no currently active document or book, respectively. Before using these objects and their properties you should check this value for zero. If `ActiveDoc` is zero and you try to access one of its properties, the command will fail. The same is true for the `ActiveBook` object. Also note that the `ActiveBook` value is zero when a FrameMaker document is in the current window, and the `ActiveDoc` is zero when the active FrameMaker window contains a book.

The property names for all FrameMaker objects are completely described in the FrameMaker Reference. There are some properties that apply to all data types. Some apply to certain kinds of objects and variables. The FrameMaker Reference contains a list of these special properties.

Arrays

There are many types of arrays in FrameScript. There are the Data Item arrays (such as `StringList`, `IntList`, etc.), which are described above. There are also several object type arrays (described below). You can reference the members of arrays in various ways. The `Get Member` command will retrieve the specified member number. You can also reference a member using the index operator, the open and close brackets. You can access the individual members by providing a number between one and ten inside the bracket, as follows:

If gvArray is a variable that contains an array with 10 members, you can access its members in the following ways:

```
Set gvFirstMember = gvArray[1]; // Get the first member
Set gvLastMember = gvArray[10]; // Get the last member
```

You can also use negative indexes to refer to the members from the end instead of the beginning.

```
Set gvFirstMember = gvArray[-10]; // Get the first member
Set gvLastMember = gvArray[-1]; // Get the last member
```

You can replace members the same way.

```
Set gvArray[1]=gvNewValue; // Set the first member
Set gvArray[10]=gvNewValue; // Set the last member
Set gvArray[-10]=gvNewValue; // Set the first member
Set gvArray[-1]=gvNewValue; // Set the last member
```

You can add members to an array using the Add Member command and for the Data Item type arrays you can add members using the index operators.

```
Set gvArray[0]=gvNewValue; // Add member before the first member
Set gvArray[11]=gvNewValue; // Add member after the last member
```

Object Arrays and Collections

The Object array types are designed for larger lists of data items. They can contain different types of data in the same array. Since they are object types you have to delete the object when you are finished with it. These array types only use positive indexes and you insert values using method calls. See the [EslObjects.pdf](#) document for more information.

EArray

The first of the FrameScript array types is the EArray. This is used for fixed length arrays. To use an EArray, you first create the array with the New command as follows:

```
New EArray NewVar (gvArray) Count(10);
```

This creates an array of 10 members, each of which as a NULL value. You can access and modify the members of this array using the indexing operator (brackets). For example,

```
Set gvArray[1] = 100;
Set gvArray[2] = 'String Data';
Loop InitVal(3) Incr(1) LoopVar(gvIdx) While(gvIdx <=10)
  Set gvArray[gvIdx] = 1000;
EndLoop
```

The above script fragment sets the first member of the array to the integer value 100, the second to the string value 'String Data' and the third through 10th members to the integer value 1000.

You can also create an EArray object using a utility function.

```
Set gvArray = eUtl.EArray{100, 'String Data', 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000};
```

This will produce the same result as the above loop.

EVector

Another type of array is the EVector. This is similar to the EArray except that it is designed to be extensible. When you create the object, it is initially empty. You use the PushBack property to push values onto the end of the array. You can then access the members the same way you do an array (via the index operator).

```
New EVector NewVar (gvVector);
Run gvVector.PushBack Value(100);
Run gvVector.PushBack Value('String Data');
Loop InitVal(3) Incr(1) LoopVar (gvIdx) While (gvIdx <=10)
    Run gvVector.PushBack Value(1000);
EndLoop
```

The above creates a vector similar to the Array created in the previous example. You can access the members via the index, but you can keep on adding members to the end of a vector. You can even insert members, if you wish.

You can also create an EVector using a utility function.

```
Set gvVector = eUtl.EVector{100, 'String Data',
    1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000};
```

A third way to create an EVector is with the Join operator (,).

```
Set gvVector = (100, 'String Data', 1000, 1000, 1000, 1000, 1000, 1000, 1000, 1000);
```

ECollection

A third type of array is the ECollection. This is the most flexible, in the you can store members of various kinds, you can use it as a Linked List and you can access the members using other data types besides integers.

```
New ECollection NewVar (gvColl);
Run gvCollVar.PushBack Value('First Member') Value('Second Value'); // Add two values
Set gvMember = gvCollVar.FirstMember;
Loop While (gvMember)
    write console 'Member='+gvMember.Value;
    Set gvMember = gvMember.NextMember;
EndLoop
```

This code fragment creates a collection, pushes (adds) two members, then dumps the whole collection to the console.

```
New ECollection NewVar (gvColl);
Set gvColl['John Smith'] = 1000;
Set gvColl['Jane Doe'] = 2000;
...
Set gvValue = gvColl['John Smith'].Value; // Get the value for John Smith
```

This code fragment creates a collection and adds two members indexed by string values, then retrieves one of the values.

See the *EslObject Reference Manual* for more information on the array objects

Expressions

An expression is any valid combination of constants, variables, properties, delimiters (parentheses), and operators. An expression can be as simple as one constant or one variable (or property name). It can also be a long sequence of tokens. Data types are converted automatically. The order of precedence for two unlike data items is as follows:

String, Real, Metric, Integer.

A string and anything else becomes a string. An integer or a metric combined with a real becomes a real, etc.

The following are examples of expressions.

<code>ActiveDoc</code>	A property name representing the currently active document.
<code>4.33"</code>	A metric constant indicating a value of 4.33 inches.
<code>a * b + c</code>	An arithmetic expression (assuming that a, b and c are variable), where a and b are multiplied together then the value of c is added to the result.
<code>a * (b + c)</code>	This is similar to the above expression, except that the parentheses cause the values in b and c to be added before the value of a is multiplied.
<code>'This is' + ' an expression'</code>	This is an expression containing two strings with the plus (+) operator between them. The result is the string expression as follows: 'This is an expression'
<code>ActiveDoc.SnapGridUnits + 100pts</code>	This is an expression which adds the value of the SnapGridUnits property of the currently active document and 100 points together.
<code>ActiveDoc.Name+' is the filename'</code>	This expression concatenates the file name of the currently active document with a string.

Basic commands

The most basic commands are the following: Set, If, and Loop. The Set command assigns a value to a script variable or to a property of an object. The If command lets you do conditional commands and the Loop command allows you to repeat a series of commands until (or while) some condition is true.

Creating and Deleting Data

Many times you can create data values as the result of expressions using the Set command. For example, the following commands create several different types of data and places the values into variables:

```
Set gvVar1 = 100;  
Set gvVar2 = gvVar1*200 + 50;  
Set gvVar3 = 'A string fragment';  
Set gvVar4 = gvVar3 + '--Add some to the end';  
Seg gvVar5 = 2"; // Create a metric value of 2 inches  
Set gvVar6 = ActiveDoc;
```

The expressions on the right side of the equals (=) sign created a data value (the first two create integer values, the second two create string values, the fifth creates a Metric value and the sixth one evaluates to the ID of a FrameMaker object (the currently active document)) and assigns that value to a variable name (on the left side of the equals sign).

Some commands (such as Get String and Find String) also return values, which are assigned to variables.

Many times though, you will need to create data or objects using the New command. This is the general purpose command for creating objects, but it can also be used to create simple data items.

Built-in Dialogs

Although you can create custom forms (see the *EsObjects.pdf* document), it is sometimes easier to use the common dialogs. Common dialogs (DialogBox command) are available to select a file (ChooseFile), select an item from a list (ScrollBox) or enter a few lines of data (MEdit). There are also commands for displaying messages to the user, such as MsgBox and Display.

Subroutines and Functions

Overview

Subroutines are a way of grouping a set of commands together, usually to perform a specific operation. For small scripts this is not usually necessary. As scripts become larger though, they will probably consist of several (perhaps many) steps. Just as in non-scripting tasks, it is important to be able to divide a large problem into a set of smaller (and hopefully easier) sub-problems. In turn, a sub-problem can sometimes be divided into even smaller parts. In programming or scripting languages, these sub-problems and sub-parts are implemented as subroutines.

It is also a good idea to be able to test each sub-problem separately. If a task is designed correctly from the beginning, you may be able to reuse some subroutines many times in other scripts.

It is not always easy to determine which group of commands should be written as a subroutine. For example, suppose that you wrote a short script to change all the paragraph formats in the currently active document from 'Heading1' to 'Heading2', as follows:

```
Get Object Type (pgfFmt) Name ('Heading2') NewVar (gvToFmt) ;
Loop ForEach (Pgf) In (ActiveDoc) LoopVar (gvPgf)
  If gvPgf.Name = 'Heading1'
    Set gvPgf.Properties = gvToFmt.Properties ;
  EndIf
EndLoop
```

This short script gets the paragraph format object named 'Heading2', loops through each paragraph in the active document and for each paragraph that has its Name property equal to 'Heading1', it sets all the properties of the paragraph to those of the paragraph format. If you copy these lines into a text file and save it, all you have to do is select this script file with the Run command anytime you want to change all the 'Heading1' paragraphs to 'Heading2' paragraphs in the active document. This looks like a candidate for a stand-alone script with no subroutines. We will discuss this later on.

IMPORTANT: A real script would do some error checking. One, to make sure there *is* an active document and, two, to make sure that it contains a 'Heading2' paragraph format. In these examples, we are just focusing on the issue at hand.

Basic Subroutines

You start a subroutine using the keyword **Sub** followed by an identifier representing the name of the subroutine. This name must be unique in the script file where it is defined. It is the name you will refer to when you want to run the commands in the subroutine. This is followed by the commands that you want inside the subroutine. You end a subroutine with the **EndSub** keyword. The following shows the basic syntax of a subroutine definition.

```
Sub SubName
  command1 ;
  command2 ;
  ...
  commandN ;
EndSub
```


To run the commands in a subroutine, you use the **Run** command. The simplest form of the Run command is the keyword **Run** followed by the name of the subroutine you wish to run. Look at the following example.

```
Run sbChangePgFormat;

Sub sbChangePgFormat;

  Get Object Type (pgfFmt) Name ('Heading2') NewVar (gvToFmt);
  Loop ForEach (Pgf) In (ActiveDoc) LoopVar (gvPgf)
    If gvPgf.Name = 'Heading1'
      Set gvPgf.Properties = gvToFmt.Properties;
    EndIf
  EndLoop

EndSub
```

This script performs the same function as in the first example (“Overview” on page 57), except this time the work is done in a subroutine. The main script consists of just the Run command. Is there some advantage in doing it this way? The answer is Yes! Once you have the commands in a subroutine, you can cause them to run by just using the Run `sbChangePgFormat` command. In many ways, it is just like creating a new command consisting of a series of other commands. If you have a large script, you may want to perform this operation from different places within that script. Without subroutines, you would have to copy and paste the commands everywhere you wanted to use them and whenever you made a change, you would have to do it in all those places.

Local Variables

Possible Problem

FrameScript creates variables as you need them. These variables will be global variables. They can be accessed (and their values changed) from anywhere in the script (inside subroutines or outside them). In the example above, the subroutine creates two variables, `gvToFmt` and `gvPgf`. The `Get Object` command puts a value in `gvToFmt` that is an Object value for the new paragraph format. The `gvPgf` variable is created by the `Loop` command to store the paragraph object for each iteration of the loop. You want to be able to run this subroutine whenever you want all the paragraph formats changed from ‘Heading1’ to ‘Heading2’. What if you already had a variable named `gvToFmt` or `gvPgf`? In this case, whenever you call the subroutine, it will change the values perhaps unexpectedly. This is the cause of some of the most difficult scripting problems to debug (in any language), unexpected interaction from different parts of the script. It is always a good practice to minimize the dependence of one part of the script (subroutine) with the other parts of the script. The problem here is that we are using global variables. We need to use variables whose scope is limited to the subroutine itself, so changing its values will not affect other parts of the script.

Local Data Space

When a script starts, a data space is created for all global variables. This data space exists as long as the script is running. Whenever you set a variable’s value (with the `Set` command or otherwise) and the variable does not exist, FrameScript will create the new variable and put it in this global data space. In addition, whenever a subroutine is run (with the `Run` command), a local data space is created. The variables in this data space are only accessible by commands within that subroutine. When FrameScript looks for a variable, it looks first in the local data space of the current subroutine before looking in the global data space. If it finds it there, it does not look further. We create local variables with the **Local** command.

Local Command

The Local command starts with the keyword `Local` and is followed by a list of one or more variable names with optional initialization. If you do not include an initial value, a NULL value is assumed. Now we will update our subroutine using local variables for names only used in the subroutine.

```

Run sbChangePgFormat;

Sub sbChangePgFormat;
  Local lvToFmt lvPgFormat;

  Get Object Type (pgFormat) Name ('Heading2') NewVar (lvToFmt);
  Loop ForEach (PgFormat) In (ActiveDoc) LoopVar (lvPgFormat)
    If lvPgFormat.Name = 'Heading1'
      Set lvPgFormat.Properties = lvToFmt.Properties;
    EndIf
  EndLoop

EndSub

```

Since we have used the Local command to create the local variables, `lvPgFormat` and `lvToFmt`, we do not have to worry about unintentionally modifying a variable created in some other part of the script. Notice also that we have changed the name of the variable to use an `lv` prefix instead of the `gv` in the original example. This is just a convention that we chose to use. We use `gv` as a prefix for global variables and `lv` as a prefix for local variables. We also use `sb` as a prefix for subroutine names.

Passing Arguments to Subroutines

The above subroutine could be a useful bit of code if you need to change all Heading1 paragraphs to Heading2 paragraphs. But what if you wanted to change Heading1 paragraphs to Heading3 or Body to Normal or whatever to whatever else?. Do we need to write a separate subroutine for each combination paragraph formats? No, we simply need a way to give the subroutine some more information when we run it. This involves passing values to the subroutine. These values are known as arguments or parameters and these are stored as variables in a special parameter data space. Like the local data space, there is one of these for each subroutine and it is created when the subroutine is run.

In FrameScript, there is a very loose calling convention. Parameters are passed on the `Run` command. The keyword `Run` is followed by the subroutine name which is followed by zero or more parameters in the form:

```

Run subname ParmName1 (expr1) ParmName2 (expr2) ..., ParmNameN (exprN);

```

For each Parameter name on the `Run` command, a variable is created in the parameter data space for that subroutine using the parameter name. The expression is evaluated and the corresponding variable is given that value. In the following example, the `Run` command creates a parameter data space with two variables, `pvFromFmtName` and `pvToFmtName` and their values will be 'Heading1' and 'Heading2', respectively. The `Sub` command also mentions the

variable names, but this is just for documentation. When the subroutine runs and it looks for a variable name, it looks first at the local data space, then at the parameter data space before looking for global variables.

```
Run sbChangePgFormat pvFromFmtName('Heading1') pvToFmtName('Heading2');

Sub sbChangePgFormat using pvFromFmtName pvToFmtName;
  Local lvToFmt lvPgf;

  Get Object Type(pgfFmt) Name(pvToFmtName) NewVar(lvToFmt);
  Loop ForEach(Pgf) In(ActiveDoc) LoopVar(lvPgf)
    If lvPgf.Name = pvFromFmtName
      Set lvPgf.Properties = lvToFmt.Properties;
    EndIf
  EndLoop

EndSub
```

Now we have a subroutine that we can run anytime we want to change all paragraphs with one paragraph to another of any type. All we have to do is supply the from paragraph tag and the to paragraph tag.

Returning values from Subroutines

One more thing you might want to do with subroutines is to return a value (or more than one value). The subroutine might compute a value that you want to use back in the main part of the script. For example, suppose you wanted to know how many paragraphs were changed in our example script. You can return values from a subroutine using a special type of parameter identified by the **returns** keyword. When you put the **returns** keyword before a parameter on the **Run** command, it makes the parameter updatable. You must use a variable name as the parameter value. Here is our sample subroutine updated to return the number of paragraphs changed.

```
Run sbChangePgFormat pvFromFmtName('Heading1') pvToFmtName('Heading2')
  returns pvPgfChgCount(gvCount);
Display 'The number of paragraphs changed was '+gvCount;

Sub sbChangePgFormat using pvFromFmtName pvToFmtName pvPgfChgCount;
  Local lvToFmt lvPgf lvCount(0);

  Get Object Type(pgfFmt) Name(pvToFmtName) NewVar(lvToFmt);
  Loop ForEach(Pgf) In(ActiveDoc) LoopVar(lvPgf)
    If lvPgf.Name = pvFromFmtName
      Set lvPgf.Properties = lvToFmt.Properties;
      Set lvCount = lvCount + 1;
    EndIf
  EndLoop
  Set pvPgfChgCount = lvCount;

EndSub
```

After this subroutine runs, the `gvCount` variable should contain the number of paragraphs changed. We used a new local variable (`lvCount`) to hold the running count. We could have just used the `pvPgfChgCount` variable and it would have worked just as well, but it was a good time to illustrate setting an initial value for a local variable.

User Functions

User functions are similar to subroutines in that they consist of groups of commands identified by a name (identifier). There are some major differences however.

- A user function is designed to work as part of an expression and not started by the Run command.
- Functions return a value.
- Arguments are surrounded by **Braces** ({}) and are separated by commas.
- If no arguments are required, then you must use a pair of empty braces.
- The order of the arguments is important.
- The parameter names on the function command are no longer just a comment. They show the expected order of the parameters when the function is called.
- Updatable parameters are labeled with the keyword **ByRef**

Here is our sample subroutine modified to work as a function.

```

Set gvCount = fnChangePgFormat{'Heading1','Heading2'};
Display 'The number of paragraphs changed was '+gvCount;

Function fnChangePgFormat using pvFromFmtName pvToFmtName;
  Local lvToFmt lvPgfv lvCount(0);

  Get Object Type(pgfFmt) Name(pvToFmtName) NewVar(lvToFmt);
  Loop ForEach(Pgf) In(ActiveDoc) LoopVar(lvPgfv);
    If lvPgfv.Name = pvFromFmtName
      Set lvPgfv.Properties = lvToFmt.Properties;
      Set lvCount = lvCount + 1;
    EndIf
  EndLoop
  Set Result = lvCount;

EndFunction

```

Notice that the function body looks almost identical to the subroutine version of the same thing. In fact, the only difference in the body of the function is the command after the **EndLoop**. **Result** is a reserved name. Every function has a **Result** variable defined. Its initial value is **NULL**. Whatever value is in the **Result** variable when the function ends is returned to the expression where the function was called. If you do not assign the Result variable a value, when the function ends the original **NULL** value will be returned.

With subroutine calls, each parameter is named on the **Run** command. Since functions are run from inside expressions, there is no way to name any of the values when the function is run. The names of parameters come from the names listed on the function declaration command. The order of the parameter names must match the order in which they appear between the braces. In the subroutine version, we could have put the `pvFromFmtName` and `pvToFmtName` options in any order we wished on the Run command. With functions the order matters, as follows:

```

Run sbChangePgFormat pvFromFmtName('Heading1') pvToFmtName('Heading2')
  returns pvPgfvChgCount(gvCount);

```

is the same as

```

Run sbChangePgFormat pvToFmtName('Heading2') pvFromFmtName('Heading1')
  returns pvPgfvChgCount(gvCount);

```

On the other hand:

```

Set gvCount = fnChangePgFormat{'Heading1','Heading2'};

```

is very different than

```
Set gvCount = fnChangePgffFormat{'Heading2', 'Heading1'};
```

IMPORTANT: This is just a reminder that the parameters are enclosed inside braces ({}) and not parentheses. Most languages use parentheses, but the syntax of FrameScript, since it uses parentheses for option names, requires braces. In fact, I'll mention it once again. Use BRACES for function arguments.

Functions can have a variable number of arguments. If you supply fewer arguments when the function is called than on the declaration, the remaining parameters are given NULL values. If you have more arguments when the function is called than on the declaration then each additional argument is given a name with the following pattern:

FuncArgN

where N is the number of the argument. Also, there is an argument pseudo-array, called **Args** which represents each of the arguments passed. **Args.Count** gives the number of arguments. **Args[1]** is the first argument, etc.

Functions can only return one value, but, like subroutines, you can modify the parameters if you use a variable instead of a value. Also, you have to tell the function to expect a variable to using the **ByRef** keyword before the name in the parameter list on the function command. For example, if we wanted to modify our sample script to return to total number of paragraphs in the document as well as the count of the number of paragraph changed. We could do the following:

```
Set gvTotalPgfs = 0;
Set gvCount = fnChangePgffFormat{'Heading1', 'Heading2', gvTotalPgfs};
Display 'The number of paragraphs changed was '+gvCount+
      ' Total Pgfs-'+gvTotalPgfs;

Function fnChangePgffFormat using pvFromFmtName pvToFmtName ByRef pvTotal;
  Local lvToFmt lvPgff lvCount(0) lvTotalPgfs(0);

  Get Object Type (pgffFmt) Name (pvToFmtName) NewVar (lvToFmt);
  Loop ForEach (Pgff) In (ActiveDoc) LoopVar (lvPgff)
    Set lvTotalPgfs = lvTotalPgfs + 1;
    If lvPgff.Name = pvFromFmtName
      Set lvPgff.Properties = lvToFmt.Properties;
      Set lvCount = lvCount + 1;
    EndIf
  EndLoop
  Set pvTotal = lvTotalPgfs;
  Set Result = lvCount;

EndFunction
```

Be sure to use a variable name and not a value for any ByRef argument.

Calling a Function

The following shows the format of calling a Function.

Format:

```
Set value = ([functionExpression()]{[arg1[,arg2[...][,argN]]});
```

Table 8: Calling Function Options

Option Name	Option Description
functionExpression (Required)	An expression resulting in a function (SubVar) value. You may have to enclose this in parentheses
argI	An expression or a variable name (if ByRef is used in the function declaration). The arguments are enclosed in Braces. If a function has no arguments, then a set of empty braces is required.

Sub/Function Expressions

In the above discussion, we have been running subroutines and calling functions using the name of the subroutine or function. In fact, we are using subroutine and function expressions. When a subroutine or function is declared, a read-only variable is created to represent that subroutine or function, using the function name as the variable name. This subroutine or function variable name has a data type of **SubVar**. Running a subroutine or calling a function means computing a SubVar data type. So any expression that evaluates to a SubVar data value can be used to identify a subroutine or function. Since the name of the subroutine or function is a variable with a SubVar value, using the subroutine or function name is the easiest way to access the subroutine or function. Also, as a special case, if the expression evaluates to a **String** data type and the string value is the name of a subroutine or function, then it re-evaluates it into a SubVar using that subroutine or function name.

Most of the time you will just use the subroutine or function name, but, occasionally, you may want to use an expression. This allows you to determine which subroutine or function to call at run time.

Here is an example of using a string variable to run a subroutine.

```
Set gvString = 'MyTestSub';
Run gvString pvParm1(100) pvParm2('QQQQ');
...
Sub MyTestSub using pvParm1 pvParm2;
...
EndSub
```

You can do the same thing with a string expression, as follows:

```
Run 'MyTest'+ 'Sub' pvParm1(100) pvParm2('QQQQ');
...
Sub MyTestSub using pvParm1 pvParm2;
...
EndSub
```

Sub and Function expressions will be more important in the next chapter about Modules.

Modules

Introduction

Many (if not most) scripts consist of one text file (or object file, .fso), not counting any text files that are 'Included' in another file. It is possible for one logical script to consist of several physical script text files. Each of these script files are referred to as **Modules**. There is always one Main script. This is the one that you **Run** (for standard scripts) or **Install** (for Event scripts). The **MainScript** session variable (read-only) gives the name of this script. This main script, however, can run subroutines and functions in other physical script files. Most of the time these other script files are used to store a set of utility functions or subroutines. One can develop a library of utilities that are used in many other scripts. FrameScript comes with a few sets of utilities, located in the Lib folder under the FrameScript folder. Also, if you have a very large and complicated script, it may be more practical to break it down into several source files. This is especially true if only some parts of the script are used in any one run.

The Main script is loaded into memory when the script is Run or Installed. The other script files are loaded as needed, whenever you try to Run a subroutine or function located in that script file. It stays around until the main script is finished.

\$Main

Even though we've been discussing subroutines versus the main script, all FrameScript commands are inside some subroutine. Anytime you have commands outside of a subroutine, FrameScript automatically creates a subroutine called \$Main. When FrameScript runs a script it actually runs the \$Main subroutine. Most of the time you don't have to know about this. There are times, however, in dealing with Modules, that this concept will be important.

Using Modules

As described in the last chapter, to run a subroutine or to call a function, an expression is evaluated that results in a SubVar value. A SubVar data value contains all the information necessary to locate a subroutine or function. To run a subroutine or call a function in another script file, you must do the same thing. A SubVar data value not only has the name of the subroutine or function, it also has the name of the script file where the subroutine or function is located. SubVar data values also have information about calling subroutines and functions inside EsObjects, but that is described in the EsObject Reference. There are two other data types that are useful in subroutine and function expressions. There are LibVar and ScriptVar. A LibVar represents a folder on a disk and a ScriptVar represents a script file. Both of these can be involved in expressions that result in SubVar values. A string variable can also represent a script file.

Using a SubVar

The simplest way to access a subroutine in another script file is to create a SubVar variable using the New SubVar command. Of course, you can use a SubVar variable to access a subroutine or function in the same script as well. Here are two examples:

```
New SubVar NewVar (gvMySub) SubName ('Sub1') ;
Run gvMySub;
. . .

Sub Sub1
. . . ;
EndSub
```

and

```
New SubVar NewVar (gvMySub) SubName ('Sub1') File ('C:\TestScripts\Test.fsl') ;
Run gvMySub;
. . .
```

The first example creates a SubVar that identifies a subroutine in the same script. The second identifies a subroutine in the script file called c:\TestScripts\Test.fsl.

Using a SubVar may be the simplest way to access a subroutine or function in another script file, it may not be the most convenient or easiest to use. Suppose you have a script file that has many subroutines and functions. Using SubVars to access them would mean creating a separate subvar variable for each one. This might be tedious for a file with a large number of subroutines and functions.

Using a ScriptVar

An alternative is to use a ScriptVar instead. A ScriptVar represents an entire script file. You can access individual subroutines and functions using the property operator(.). The following creates a ScriptVar, then calls a subroutine (called Sub1) inside that script file.

```
New ScriptVar NewVar (gvMyScript) File ('c:\TestScripts\Util.fsl') ;
Run gvMyScript.Sub1;
. . .
```

Using the property operator on a ScriptVar (except for the standard properties) causes it to evaluate to a SubVar value with the script file taken from the ScriptVar variable and the SubName comes from the property (in this case, Sub1). Using a ScriptVar, you can create one variable, yet be able to access each subroutine or function inside that script file. You can also Run the script file itself:

```
New ScriptVar NewVar (gvMyScript) File ('c:\TestScripts\Util.fsl') ;
Run gvMyScript;
. . .
```

In this case, it evaluates to a SubVar value with the script file taken from the ScriptVar and the SubName will be \$Main, running the main script (if any) inside the script file.

There is another way to build a script file other than reading commands from a script file. You can build a string value that contains the commands (with or without subroutines or functions) and use the ScriptText option of the New ScriptVar command.

```
Set gvString = ' Set gvCount = 0; ';
Set gvString = gvString + ' Loop ForEach(Pgf) In(ActiveDoc) LoopVar(gvPgf); ';
Set gvString = gvString + ' Set gvCount = gvCount + 1; '
Set gvString = gvString + ' EndLoop; '

New ScriptVar NewVar(gvMyScript) ScriptText(gvString);
Run gvMyScript;
. . .
```

This small script counts the total number of paragraphs in the currently active document.

Using a LibVar

Another way is to use the LibVar variable. A LibVar represents an entire folder. A property of a LibVar data value (except for the standard properties) evaluates to a ScriptVar. For example:

```
New LibVar NewVar(gvMyLib) Path('c:\TestScripts');
Run gvMyLib.extFile;
```

The gvMyLib.extFile evaluates to a ScriptVar where the script name it composed of a combination of the folder (c:\TestScripts), the file name (extFile), and the extensions in the Run options (fsl or fso). Since there is no SubName, it uses \$Main to run the main script in that file (C:\TestScripts\extFile.fsl).

Since the LibVar property expression evaluates to a ScriptVar, you can also continue the expression by adding a subroutine or function name to completely identify a subroutine or function starting with the LibVar, as follows:

```
New LibVar NewVar(gvMyLib) Path('c:\TestScripts');
Run gvMyLib.extFile.Sub1;
```

This evaluates to a SubVar with subname Sub1 located in the identified script file.

Using a String

In the last chapter we illustrated how to run a subroutine in the same script file by putting the name of the subroutine in a string value. You can also run a subroutine in another script file in a similar manner. You put the script file name into a string variable and use the name of the subroutine as the property. For example:

```
Set gvStrFileName = 'c:\TestScripts\Util.fsl';
Set gvSubName = 'Sub1';
Run gvStrFileName.gvSubName;
```

Summary

The preferred way to access subroutines and functions in other scripts is to use the SubVar data type for single subroutines or functions, but use the ScriptVar method when you have many subroutines or functions in a script file, such as a set of utility subroutines or functions. Using string variables is discouraged. It is an older method and, since string values have many possible properties, there is much more danger of a naming conflict. The LibVar method has problems because it expects a file name and the naming conventions of system file names are different than FrameScript identifiers. Some script files cannot be identified this way.

Some Examples

Example 1:

This sample script runs the same subroutine if it were located in another script file (c:\TestScripts\util.fsl).

```
. . .
Set gvRetVar = 99;
Set gvLibScript = 'c:\FrameScript\util.fsl';
Set gvSubroutinestr = 'MySubroutine';
Run gvLibScript.gvSubroutinestr pvIntVal(60) pvStrVal('MyString')
    returns pvGetIt(gvRetVar);
Display 'This subroutine modified the gvRetVar variable to be '+gvRetVar;
. . .
```

Example 2:

This sample script runs a script called MyExternalSub.fsl located in the directory (c:\FrameScript\lib).

```
. . .
Set gvRetVar = 99;
New LibVar NewVar(gvMyLib) Path('c:\FrameScript\lib');
Run gvMyLib.MyExternalSub pvIntVal(60) pvStrVal('MyString') returns pvGetit(gvRetVar);
Display 'This subroutine modified the gvRetVar variable to be '+gvRetVar;
. . .

-->IN THE FILE c:\FrameScript\lib\MyExternalSub.fsl

If pvStrVal = 'MyString'
    Set pvGetit = pvIntVal * 2;
Else
    Set pvGetit = pvIntVal * 10;
EndIf
```

Example 3:

This sample script runs a subroutine called MyExternalSub.fsl located in the script file (c:\FrameScript\Util.fsl).

```
. . .
Set gvRetVar = 99;
New ScriptVar NewVar(gvMyScript) File('c:\FrameScript\Util.fsl');
Run gvMyScript.MyExternalSub pvIntVal(60) pvStrVal('MyString')
    returns pvGetIt(gvRetVar);
Display 'This subroutine modified the gvRetVar variable to be '+gvRetVar;
. . .

--->IN THE FILE c:\FrameScript\lib\Util.fsl
Sub MyExternalSub using pvIntVal pvStrVal returns pvGetIt
    If pvStrVal = 'MyString'
        Set pvGetIt = pvIntVal * 2;
    Else
        Set pvGetIt = pvIntVal * 10;
    EndIf
EndSub
```

Example 4:

This example creates a SubVar variable and uses it pass the name of the subroutine to the subroutine called TestSub, which runs it.

```
. . .
New SubVar NewVar(gvMySub) SubName('Sub1');
Run TestSub pvCallBack(gvMySub) returns pvRVal(gvMyRetVal);
Display gvMyRetVal;
. . .
. . .

Sub Sub1 using pvParm1 pvParm2 pvVal
    Set pvVal = pvParm1 + 999;
    Display pvParm2;
EndSub

. . .
Sub TestSub using pvCallBack pvRVal
    Local    lvBBB;
    Run pvCallBack parm1(444) Parm2('qqq') returns Val(lvBBB);
    Set pvRVal = lvBBB;
EndSub
```

Standard Script Library

Introduction

The Lib folder under your FrameScript directory contains a set of scripts that make up the standard library. These scripts should not be changed as they are used by many of the sample scripts. When the product is installed, the Lib folder is part of the search path (see Options). If you wish to have your own script library, it is best that you create a

new folder (for example, 'MyLib') and place the scripts there. You can use the Options dialogs to add this folder to the search path (in addition to the Lib folder).

In the standard script library (Lib Folder), there are three script files, DocUtils, DlgDualSelect and DBUtils (in addition to the EDBUtils which is left over from version 2.1).

DocUtils

The DocUtils script contains the following Functions and Subroutines. These are useful for working with documents. In order to use the subroutines and functions in this script, you have to first create a ScriptVar variable, which identifies the DocUtils script, as follows:

```
New ScriptVar NewVar(eDocUtils) File('DocUtils');
```

Since the Lib folder is in the search path, you do not have to specify a full path name to locate it. FrameScript will search the folders in the search path for a script if a complete path is not specified. Also, it will use the file extensions from the file extension list, if no file extension is specified. So, as long as the DocUtils.fsl file is located somewhere in the search path, the above command will create a variable that can access the subroutines and functions in the file.

You only have to create this variable once if you make it a global variable.

Function DocIsAlreadyOpen

This function takes one parameter (a file name) and returns a document object if the file is already open and it returns NULL if it is not open.

Format:

```
Set gvDoc = eDocUtils.DocIsAlreadyOpen{filename};
```

Where **filename** is a string containing the name of the file.

Example:

```
New ScriptVar NewVar(eDocUtils) File('DocUtils');

Set gvDoc = eDocUtils.DocIsAlreadyOpen{'C:\MyFiles\MyTestFile.fm'};
If gvDoc
  MsgBox 'File is Already Open';
Else
  MsgBox 'File is Not Open';
EndIf
```

Function ForAllDocsInBook

This function is a utility function that makes it easier to process all the documents in a book. It takes care of some of the housekeeping issues and lets the script write concentrate on what to do with each component. This function takes two parameters, a book object and a SubVar variable. For each document in the book, this function will open the document (if not already open) and it will call the subroutine specified by the SubVar parameter with the document object as its parameter. For an example of this, see the BookFindReplace.fsl sample script.

Format:

```
Set gvCount = eDocUtils.ForAllDocsInBook{bookVar,mySubVar};
```

Where **bookVar** is a book object variable and **mySubVar** is a SubVar variable.

Example:

```
New ScriptVar NewVar(eDocUtils) File('DocUtils');
Set gvBook = ActiveBook;
If gvBook = 0
  LeaveSub;
EndIf
New SubVar NewVar(gvCallBackSub) SubName('ProcessDoc');
Set gvCount = eDocUtils.DocIsAlreadyOpen{gvBook,gvCallBackSub};

...

Sub ProcessDoc using pvDocVar

  Write console 'Processing Doc-'+pvDocVar.Label;

EndSub
```

Function GetCellXY

This function is a utility function that returns the Table Cell object of the specified table, row and column number, if it exists. It returns NULL otherwise. This will save you the trouble of navigating through the table rows and columns.

Format:

```
Set gvCellVar = eDocUtils.GetCellXY{tableVar,rowNumber,colNumber};
```

Where **tableVar** is a table object variable, **rowNumber** is the row number of the cell and **colNumber** is the column number of the cell that you want.

Example:

```
New ScriptVar NewVar(eDocUtils) File('DocUtils');
Set gvTable = FirstTableInDoc;
If gvTable = 0
  LeaveSub;
EndIf
Set gvCellVar = eDocUtils.GetCellXY{gvTable,3,5};

...
```

In this example, the value returned from the function should be the cell object for the third row and fifth column of the specified table.

Sub AddParaToCellXY

This function is a utility function that allows you to specify the text of the first paragraph of the specified table cell, identified by row and column number. This will save you the trouble of navigating through the table rows and columns.

Format:

```
Run eDocUtils.AddParaToCellXY pvTable(tableVar) pvRowNum(rowNumber)
    pvColNum(colNumber) pvText(text) pvPgFmt(pgfFmtVar);
```

Where **tableVar** is a table object variable, **rowNumber** is the row number of the cell and **colNumber** is the column number of the cell that you want. **text** is the text string to be the first paragraph in the cell and **pgfFmtVar** is a paragraph format object that specifies the paragraph format for this paragraph. The **pvPgFmt** parameter is optional.

Example:

```
New ScriptVar NewVar(eDocUtils) File('DocUtils');
Set gvTable = FirstTableInDoc;
If gvTable = 0
    LeaveSub;
EndIf
Get Object Type(PgfFmt) Name('Body') NewVar(gvPgFmt);
Run eDocUtils.AddParaToCellXY pvTable(gvTable) pvRowNum(3) pvColNum(5)
    pvText('Text for first para') pvPgFmt(gvPgFmt);

...

```

Dual Select Dialog

The Dual Select dialog script (DlgDualSelect) contains one function that displays a dialog box allowing the user to select multiple items from one string list data type into another. These are useful for presenting the user a way of selecting a group of items instead of just one (as in the standard ScrollBox). In order to use the function in this script, you have to first create a ScriptVar variable, which identifies the DlgDualSelect script, as follows:

```
New ScriptVar NewVar(eDlgScript) File('DlgDualSelect');
```

Since the Lib folder is in the search path, you do not have to specify a full path name to locate it. FrameScript will search the folders in the search path for a script if a complete path is not specified. Also, it will use the file extensions from the file extension list, if no file extension is specified. So, as long as the DlgDualSelect.fsl file is located somewhere in the search path, the above command will create a variable that can access the function in the file.

You only have to create this variable once if you make it a global variable.

Function DlgStringDualSelect

This function is presents a dialog box to the user with two list boxes, one is the source list and the other is the selected list. You may specify a title and headings for each list box

Format:

```
Set gvCellVar = eDlgScript.DlgStringDualSelect{srcList, InitToList,
    titleString, Head1String, Head2String};
```

Where **srcList** is a string list providing the source list and **InitToList** is a string List providing the initial contents of the selected list (this parameter is options), **titleString** is the string in the caption of the dialog and **Head1String** is the heading for the source list and **head2String** is the heading for the selected list.

Example:

```

New ScriptVar NewVar(eDlgScript) File('DlgDualSelect');
Local lvPgfSourceList(DocPgFmtNameList);
Local lvPgflist;
Set lvPgflist = eDlgScript.DlgStringDualSelect{lvPgfSourceList,,
  'Select Paragraph Formats',
  'Paragraph Formats',
  'Selected Formats'};
...

```

In this example, a list of paragraph format names is passed as the source list and the value returned is a list of paragraph formats that the user selected.

Database Utilities

The database utilities script (DBUtils) contains the following Functions and Subroutines. These are useful for working with databases. In order to use the subroutines and functions in this script, you have to first create a ScriptVar variable, which identifies the DBUtils script, as follows:

```

New ScriptVar NewVar(eDBUtils) File('DBUtils');

```

Since the Lib folder is in the search path, you do not have to specify a full path name to locate it. FrameScript will search the folders in the search path for a script if a complete path is not specified. Also, it will use the file extensions from the file extension list, if no file extension is specified. So, as long as the DocUtils.fsl file is located somewhere in the search path, the above command will create a variable that can access the subroutines and functions in the file.

You only have to create this variable once if you make it a global variable.

Function DlgDB_Connection

This function is presents a dialog box to the user allowing the user to select a data source from a list of available data sources or to specify an MS Access or MS Excel file name. This function will open the database (make a connection to it) and return the database object back to the calling script.

Format:

```

Set gvDatabase = eDBUtils.DlgDB_Connection{mode};

```

Where **mode** is an optional string value. If this value is 'Update', then the database will be opened for updating. Otherwise it is read-only.

Example:

```

New ScriptVar NewVar(eDBUtils) File('DBUtils');
Set gvDatabase = eDBUtils.DlgDB_Connection{'Update'};
If gvDatabase
...
Else
  MsgBox 'User did not select a database';
EndIf

```

In this example, the user is presented with a dialog box to select a data source or database file. If the user selects one and it opens successfully, the database object is returned to the calling script.

Function DBTableExists

This function returns True if the specified table exists in the database and False otherwise.

Format:

```
Set gvPresent = eDBUtils.DBTableExists{databaseObject, tableName};
```

Where **databaseObject** is a database object variable and **tableName** is a string value specifying the name of the table.

Example:

```
New ScriptVar NewVar(eDBUtils) File('DBUtils');
Set gvPresent = eDBUtils.DBTableExists{gvDatabase, 'MyTableName'};
If gvPresent
  MsgBox 'The Table is present';
Else
  MsgBox 'The Table is not present';
EndIf
```

Events

Overview

Events in FrameScript are the same as subroutines except that they are meant to be Run by FrameScript itself (or FrameMaker) and not Run directly in a script by the Run command. Events are known as Callback subroutines. Also, they have a fixed number and type of parameters determined by the event type. The format for an event declaration is similar to the Sub command, except that you do not include a parameter list.

Some event names are pre-defined, such as those involving notification of FrameMaker events. FrameMaker uses these names and runs the events as it chooses.

With other events you choose the name of the event yourself. These occur when you define menu commands and in other places as well.

Predefined Events

When you create a menu item, you specify the name of an event that you wish to run when the user clicks on the menu item. There are other FrameMaker events that occur during a FrameMaker session that you may respond to, if you choose. Responding to these events is optional. If you wish to have a FrameScript event run whenever one of these predefined FrameMaker events occur, all you have to do is declare the event with the reserved event name that corresponds to the event you wish. See Appendix B for a complete list of predefined events. Event of this type are passed three parameters some of which may not apply to all events of this type. The parameters are as follows:

FrameDoc	The document object which was active when the event occurred.
FileName	The name of the filename for file type events.
IParm	A special parameter passing the f-code for certain functions.

These events are run *as if* they were subroutines run with the following command:

```
Run eventname FrameDoc(ActiveDoc) Filename(filenamestring) IParm(fcode) ;
```

See the table to see which parameters are valid for which events.

For example, the following script fragment, shows how to display a message on the screen before a any document is opened.

```
Event NotePreOpenDoc
  MsgBox 'Somebody just opened a document named-'+Filename;
EndEvent
```

The name `NotePreOpenDoc` tells FrameScript that you wish to run this event just before any standard FrameMaker document is opened.

Note: See the Reference Manual for a complete list of predefined event names.

Hypertext Events

A Hypertext event is similar to the above events, except that this event is run when the user presses a hypertext marker in a document. The name of the event is `Message`. If you specify a `Message` event, this event will be run whenever the user clicks a hypertext marker with a marker text in the following form:

```
message fsl scriptname message
or
message fsl cmd commandName [optional items]
```

The message is the hypertext command name. `fsl` is the name of the FrameScript client and `scriptname` is the name of the script to receive the message. This is one difference between the other notification events (except for `NoteCallClient`) and the message event. Many scripts (as well as other clients) can receive the same notification event. It will occur one after the other. But only one script (or client) will receive a message event.

Format:

```
Event Message
. . .
EndEvent
```

The following parameters are passed to a message event.

FrameDoc	The document object of the document containing the hypertext marker.
FrameObject	The object variable of the marker causing the hypertext event.
Message	A string variable containing the message in the marker text.

The second format allows you to send commands to FrameScript itself. There are two commands at present, **RunFileScript** and **RunScriptText**. These commands let you run scripts via hypertext markers. The `RunFileScript` command lets you run a script located in a disk file. The syntax is as follows:

```
message fsl cmd RunFileScript "filename.fsl" [arg1] ... [argN]
```

When the user clicks on a hypertext marker in a FrameMaker document with the above command syntax, FrameScript will run the script with the supplied parameters. If the file is in the search path, you do not need to supply a full path name. If the script file is not in the search path, then you should include a complete path.

The second command lets you run a script directly from the text. The syntax is as follows:

```
message fsl cmd RunScriptText "Script commands" [arg1] ... [argN]
```

Because the length of a FrameMaker hypertext command is limited, the size of this kind of script must be very short. Also, note that since you must contain the script commands inside double quotes, the script cannot contain any double quotes.

CanTerminate Function

In Event Scripts, you can have an optional function called CanTerminate. This function is called by FrameMaker before the Terminate function to determine whether the script can exit. This should only happen if the script is keeping some data that has not been saved yet. For example, if you have unsaved data in a form, you might want to ask the user to save, don't save or cancel. If the user chooses Cancel then the CanTerminate function should return False. If this function is not present in an event script, then FrameScript will assume that it can be safely terminated, which is like the behavior of earlier releases. See "User Functions" on page 58.

IMPORTANT: Do not include this function in your script unless you have some reason to cancel the termination of a script. If you accidentally have an error where it always returns False, then the script will never be able to be uninstalled. You will probably have to quit FrameMaker with the Task Manager under MS Windows!

Format:

```
Function CanTerminate
    Set Result = True;
    ...
EndFunc
```

Multiple Undo/Redo (*Frame 7.2 or Greater*)

Overview

FrameMaker 7.2 (or greater) has enhanced undo and redo capability in a number of ways. You can undo and redo multiple operations. The Edit->Undo/Redo menu shows the most recent command, but the complete command history is available in the Edit->History palette, so the user can select a specific action to undo or redo.

The command history, (undo and redo stacks) is kept separately for each document, so undoing or redoing an operation in one document does not change the undo capability of another open document. See the FrameMaker 7.2 release notes for more information about which commands are undoable and which commands clear the undo history.

New commands have been added to FrameScript to support the control of this feature.

IMPORTANT: The unique identifiers of document objects, which are persistent across sessions, can change after undo and redo operations.

FrameMaker initialization file

There is a new flag in the maker.ini file called **EnableUndoInFDK**, which allows you to explicitly enable or disable functionality for these undo/redo operations for any API client, including FrameScript. It is False by default, meaning that the undo/redo behavior for FrameScript commands is the same as in previous versions. To enable the new undo behavior for FrameScript commands, set this flag to True.

When the **EnableUndoInFDK** flag is set to True, all FrameScript commands that modify document contents can be undone (see undoable commands). Commands that do not modify content, such as saving a document, copying text or manipulating windows, cannot be undone and are not recorded in the command history (undo stack).

Session properties

There are two new session properties which relate to multiple undo/redo. These are **UndoFdkRecording** and **StackWarningLevel**. The **UndoFdkRecording** property can override the default value specified in the initialization flag (maker.ini), **EnableUndoInFDK**. Set this property to False to disable the undo recording and set it to true to enable the new undo/redo behavior. The **StackWarningLevel** property determines how warnings are displayed when the history-clearing operations occur. It corresponds to an option set in the Preferences dialog ("Show warnings while clearing history") and to the preferences-file flag `hpWarning`. Set the property to `WarnNever` to disable history-clearing warnings, to `WarnOnce` to display a warning when a particular history-clearing command is issued, but does not warn on subsequent uses of that command or to `WarnAlways` to display warnings every time a history-clearing command is issued.

Commands

The Exec `ClearUndoHistory` command clears both the undo and redo stacks in the specified document. Ordinarily, an undo/redo stack entry is created for each undoable command. Many times though you want to group a set of changes under one entry. The Exec `StartUndoCheckpoint` command allows you to start a group containing series of changes. The Exec `EndUndoCheckpoint` command terminates the current group. See the `UndoDemo.fsl` sample script for an example of using these commands.

Commands that can be undone

The following commands make changes that can be undone with the undo command.

```

New TableCols
New TableRows
New Text
Apply PageLayout
Clear Text
Clear ChangeBars
Cut Text
Delete Object() where the object deleted is from a Document.
Delete TableColumns
Delete TableRows
Delete Text
Delete TextInsetContents
Demote
Import File
Import Formats
Import ElementDefs
Merge
New AFrame
New Footnote
New Marker
New TiApiClient
New Variable
New XRef
New Element
New "GraphicObject" (Arc, Ellipse, etc.)
New BodyPage
New BookComponent
New "Named Objects" (Book, CharacterFormat, Color, ConditionFormat, etc.)
New Table
Paste Text
Update objTypes
Straddle TableCells
Wrap/Unwrap
Split
Set Properties

```

List of Error Messages

The following table list the possible error codes and message resulting from FrameScript commands. A zero value indicates that there was no error. All errors have negative values. Error codes with values between -1 and -999 are FrameMaker generated error codes. Those from -1000 through -3000 are FrameScript error codes.

IMPORTANT: Some errors are unresolvable such as memory errors or internal errors. Many errors, however, are just codes that inform you of the result of the command. You may want to do a **Get Object** command just to see if a particular object name exists. If it returns an negative error code, then that's just a normal part of the script's function. You continue on as normal, perhaps by adding the name with the New command. The point is that all errors are not bad or cause problems. They just tell you what happened. Some can safely be ignored if you understand the function ahead of time.

Table 9: List of Error Messages

Errorcode value	Error Message Description
0	No error
-1	Communications between FrameMaker and its clients is failing. This is an internal FrameMaker error.
-2	Invalid Document or Book object specified
-3	Invalid FrameMaker Object specified
-4	Current object doesn't have this property
-5	Property's type different than requested
-6	Can't write into this property
-7	Value not in legal range for property
-8	Closing modified doc without the IgnoreMods option
-9	Can't select/deselect object in group
-10	Must implicitly move between frames first
-11	Value must be an Object of a Graphic object
-12	Value must be an Object of a Frame object
-13	Value must be an Object of a Group object
-14	Can't move given object to this Frame
-15	Can't move given object to this Group
-16	Can't make this prev/next connection
-17	Can't delete this kind of object
-18	Can't delete this page
-19	Wrong type for Get Object command
-20	Bad name for Get Object command
-21	Can't find requested offset
-22	Some XRefs or Text Insets were unresolved
-23	Bad New object command
-24	Expecting Object of a Body Page object
-25	Expecting Object of a Pgf object
-26	Expecting Object of a Book Component object
-27	A general error for any bad command
-32	A same type item of this name exists
-33	Trying to give an object an illegal name
-34	Can only compare book to book or doc to doc
-35	Compare operation failed

Table 9: List of Error Messages

Errorcode value	Error Message Description
-36	Two ends of range not in same flow or hidden
-37	PageFrames can't be moved or selected
-38	Can't smooth/unsmooth this object
-39	Value must be an Object of a TextFrame object
-40	Value must be an Object of a non hidden page
-41	Expecting Object of a Pgf, TextLine, Flow, Cell, TextFrame, SubCol, Fn, XRef, Var, TiFlow, TiText, TiTextTable, TiApiClient
-42	Unable to open the document due to system error.
-43	Parameter passed to an command was invalid.
-44	User canceled operation. The command required user intervention and the user canceled it
-45	Document was in an inconsistent state.
-50	Invalid file name on a save command
-58	String value is invalid for this operation
-59	Text Selection in document is not valid for operation
-60	Can't access this object type
-65	Bad insertion position
-66	Bad book Object specified
-67	Book is unstructured
-68	Bad book component path specified
-70	File was closed by an api client when it processed a notification.
-71	Expecting Object of a Pgf or Flow
-72	Expecting Object of a Menu
-73	Expecting Object of a Command
-74	Expecting Object of a Command defined by an api client
-75	Menu item (Command or Menu) is not in menu
-76	Expecting a valid keyboard shortcut
-77	Expecting a menu to contain menus only
-81	Importing document would cause a circular reference.
-82	Requested flow did not exist in the source document.
-83	The type of the file on disk was not the type of file the import operation expected. Or the type that the Update TextInset command expected based on the inset was invalid
-84	The file no longer exists on disk
-85	The Inset is a Mac Edition, but we aren't running on a Mac.
-86	An API Client or a script canceled the operation
-87	Object has no text in it

Table 9: List of Error Messages

Errorcode value	Error Message Description
-88	FM not in safe state for asynchronous invocation. This is an internal FrameMaker error.
-89	A filter that was filtered (input or output) failed
-90	Asian capable system required
-91	Can't change tinted color this way
-92	Can't Set Ink Name without Color Family
-93	String exceeds max length for property, truncated
-94	Internal code to move Graphic Inset data from current document to a file has failed, leaving user with a file with missing data. This is an incomplete, unsuccessful Save.
-2003	Parameter Error
-2201	Missing Script
-2202	Missing Script File
-2203	Command Error
-2205	Compile Error
-2402	Bad I/O
-2403	File Seek Error
-2404	Missing File
-2405	Missing Subroutine
-2406	Missing Script
-2407	Missing Required Parameter
-2408	Parameter is invalid for this command
-2409	Error during a file operation
-2502	Variable Not Found
-2504	No Variable
-2505	Wrong Data Type
-2506	Invalid Property
-2509	Expression Error
-2510	Invalid Operation
-2511	Invalid Data Type
-2521	Invalid Object for this command
-2522	Missing Object
-2523	Read Only Variable
-2525	Cannot make new variable
-2526	Qualifiers Present
-2527	Invalid Property

Table 9: List of Error Messages

Errorcode value	Error Message Description
-2528	Value out of range
-2529	Item not found
-2801	FrameScript Memory Failure

Common Script Errors

It's impossible to list all of the things that can go wrong in writing any script in any script language. The following list gives some common errors types to look for when things go wrong.

IMPORTANT: When writing and testing scripts, it is imperative that you use copies of your documents to test the scripts before putting them into production with real data. It is very easy to make mistakes during script development. All measures should be taken to assure that a script is working correctly before using them on live documents.

Reserved Words

One common error is using reserved words as variable names. Any occurrence of a FrameScript command name automatically stops the current command and starts a new one. Using a command name as a variable name will cause all sorts of compiling problems.

EndIf, EndLoop, EndSub, EndEvent

Each If command, Loop command, Sub command and Event command starts a block of FrameScript commands. These blocks must be terminated by the appropriate EndXXXX command. For example, a common error is forgetting to put in the EndIf command at the end of a list of commands under an If command.

It is useful (but not necessary) to indent the commands under any of these block start type of commands. This makes reading the script easier.

Logic Errors

The most common error is simple logic errors. Commands are executed one at a time, one after the other until the end of a list of commands is reached. Following the logic step by step is usually enough to solve these types of errors.

Check Error Codes

Another common error is not checking an error code after a command. You cannot always assume that an open document command will work (perhaps the file no longer exists, or it has a warning and the user elected to cancel the operation) An invalid text insertion point is a common mistake. For a list of error codes see FrameMaker Reference.

Read-only variables

Some variables (global) and properties are marked as read-only. This means that you may use these variables in commands and in computations but you may not try to change the value.

Run Away Scripts

If you are running a script that is taking a long time, it may be in a run away condition (an infinite loop using programmer terminology). This means that due to some logic error the script will never stop without stopping FrameMaker or re-booting the computer. If this happens, you can press the ESC key to interrupt the script. Of course, you can also do this if the script is just taking too long.

Chapter 5

Frame Architecture

Object Lists

The FrameMaker product keeps many lists of objects. Some objects have properties which act as the start of a set of other objects. This means that they have a property which contains an object variable representing another FrameMaker object. This other FrameMaker object variable has a property which indicates the next object in the list. These object lists have the following general form: `FirstXXXXInYYYY` and `NextXXXXInYYYY`, where `XXXX` is the name of the object in the list and `YYYY` is the name of the head object. For example, a document has a property called `FirstPgfInDoc`, which contains an object variable representing the first paragraph object in the document. The paragraph itself has a property called `NextPgfInDoc`, which contains an object variable representing the next paragraph in the document. FrameScript provides an easy way to navigate through these lists using the `ForEach` option of the `Loop` command. Note that the paragraph list illustrated above does not give you all the paragraphs in order in the document. It is simply a list of all the paragraphs in the document (the order appears to be the order that the paragraphs were entered). If you want a list of paragraphs in order, you have to go through the flow structures.

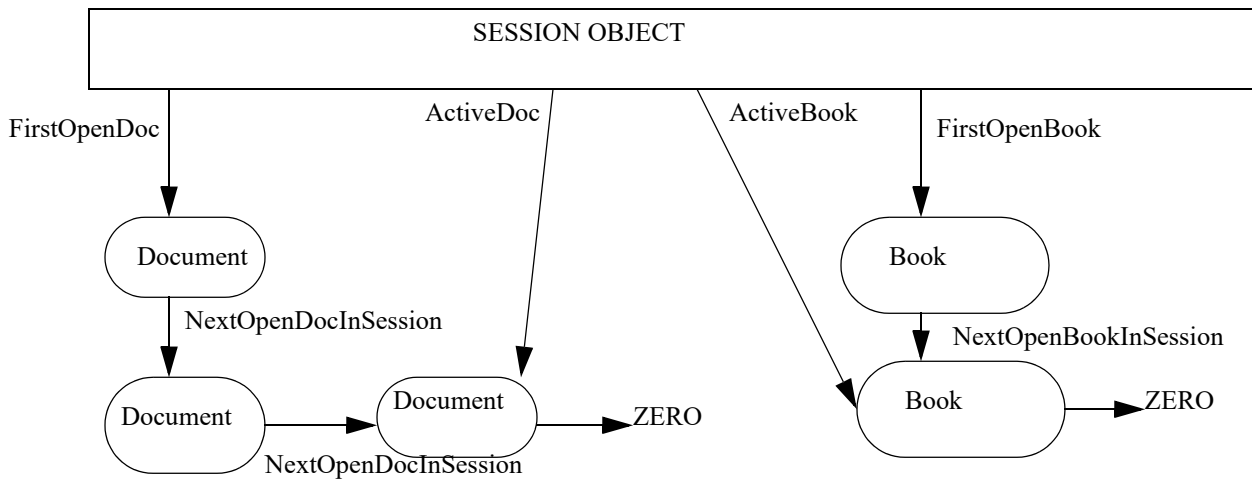
Session Object

When the FrameMaker product starts, it creates one and only one session object. This object provides information (in its properties) that are global to FrameMaker. Some of these properties are `AutoBackup` flag, `AutoSave` flag, `FontAngleNames`, etc. For a complete list of properties, see *Scriptwriter's Reference*. The session maintains two lists: a list of open documents and a list of open books. For the architecture the most important properties are in the following list:

Table 10: List of Session Architecture Properties

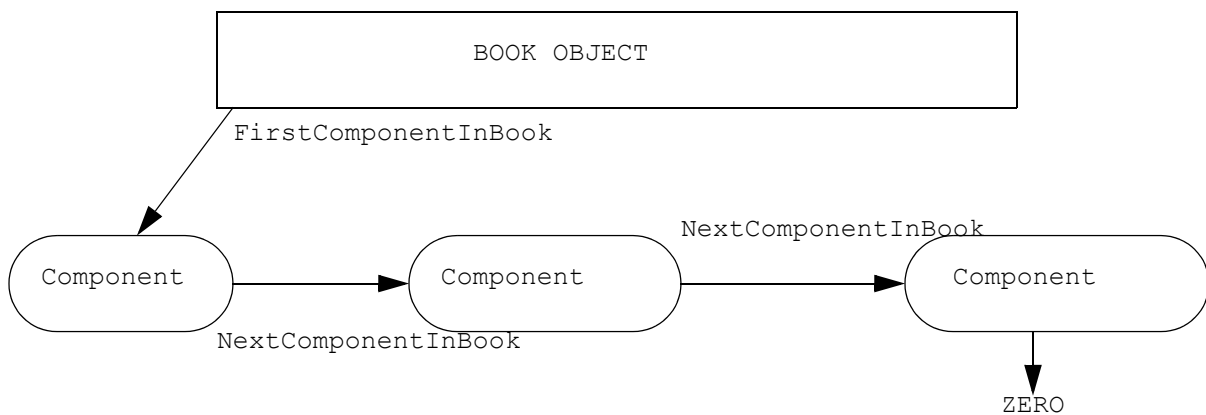
Property Name	Description
<code>ActiveDoc</code>	The object of the currently active document.
<code>ActiveBook</code>	The object of the currently active book.
<code>FirstOpenDoc</code>	The first in a list of open documents
<code>FirstOpenBook</code>	The first in a list of open books.

The following illustrates the relationship between the session and the documents and books.



Book Object

A book object contains a list of book component objects. These book components describe the global properties of the documents of a book file. See the *Scriptwriter's Reference* for more information about book components and for more information about books. The `FirstComponentInBook` property of the Book object gives the object for the first book component in the list of components. In the book component object, the `NextComponentInBook` property gives the next book component object. The following diagram illustrates the relationship between books and components.

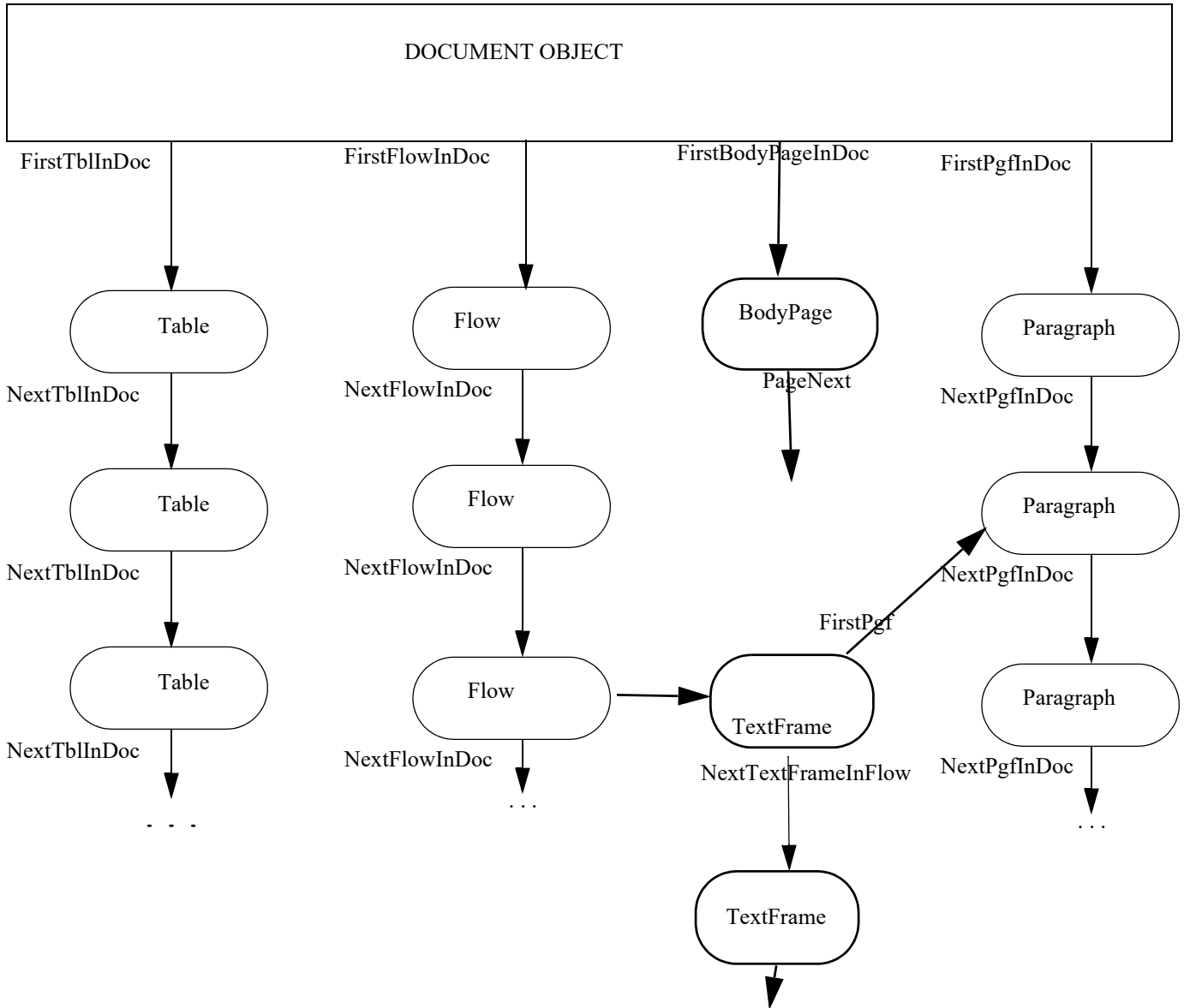


Document Object

The document object is the fundamental object in the FrameMaker system. It is the source of most of the other FrameMaker objects. A document object contains the start of many lists, which gives you access to these other objects.

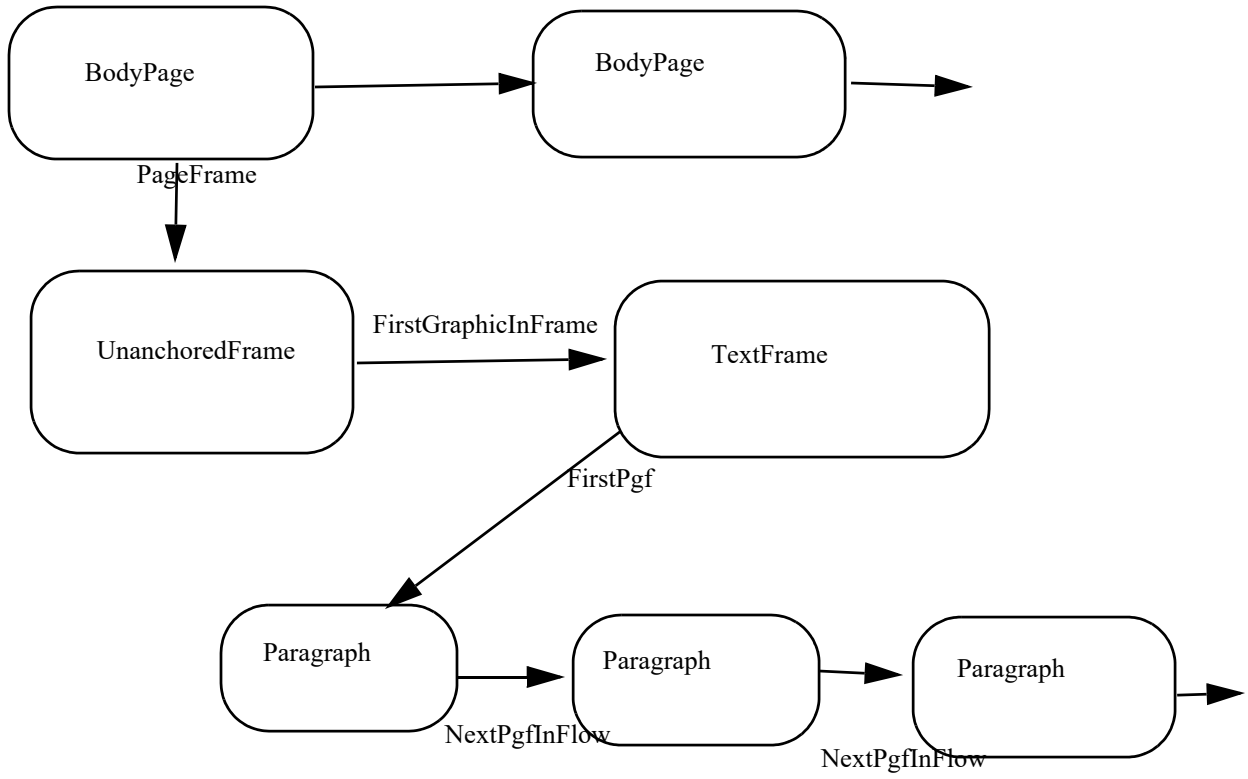
These lists include a list of all the marker objects in a document, all the body pages, all the character formats, all the paragraph formats, all the flows, all the tables, and so on. For a complete list of object lists for a document see the Scriptwriter's Reference.

The following illustrates three of the lists and structures.



Body Page

The following illustrates the Body Page Object.



Chapter 6

Using ElmStudio

Introduction

ElmStudio is a text editor and source code debugger for FrameScript scripts. The editor allows you to create, open, modify, save and run scripts without leaving the FrameMaker environment. Although you can edit any reasonably sized text file, there are special features available for developing FrameScript scripts. The editor follows the standard conventions of most text editors (such as NotePad, WordPad, and other stand-alone commercial text editors). There is a File menu with standard file operations (New, Open, Save, etc.), an Edit menu with cut, copy, paste, bookmarks, etc., a search menu with find text commands and so forth. In addition to these standard operations, it has syntax coloring (for any script with an .fsl extension), folding, word completion and running scripts.

There is also a stand-alone editor, which runs outside the FrameMaker environment. It is called SciElmEdit.exe. It has a similar structure as the ElmStudio editor. It can even run scripts (it will automatically start FrameMaker). SciElmEdit is a general purpose editor. You can use it to edit text files for other programming languages (perl, python, C/C++, etc.). See “SciElmEdit Stand Alone Editor” on page 96.

IMPORTANT: Both the ElmStudio editor and the SciElmEdit editor are based on the public domain SciTE editor. For complete documentation of this stand-alone editor is located at <http://scintilla.sourceforge.net/SciTEDoc.html>. ElmStudio is a subset of this editor geared toward writing scripts. It does not have all the features of the SciTE editor, which is designed as a stand-alone IDE for many languages. The SciElmEdit editor however has all the features of the original SciTE editor, plus a few more available only here.

Editor Menus

File

The File menu is primarily concerned with operations on the entire text file, such as creating, opening, saving, etc.

Table 11: File Menu Items

Data type	Description
New	Creates a new empty text file. Note: There is a current limit of 10 open documents at a time.
Open	Opens an existing text file. If the file extension is .fsl, then syntax highlighting will be invoked. Note: There is a current limit of 10 open documents at a time.
Open Selected Filename	If you select some text and that text is a file name, this command will open the file. Note: There is a current limit of 10 open documents at a time.

Table 11: File Menu Items

Data type	Description
Revert	The command will reload the last saved version of the file, removing any unsaved changes.
Close	Closes the current text file. You will be prompted to save the file if any changes have been made but not saved.
Save	Saves the current text file, replacing the currently saved file. No prompting will be done.
Save As...	Saves the current text file after prompting you for a new name. The file name in the text editor will change to the new file name.
Save A Copy...	Saves the current text file after prompting you for a new name. The file name in the text editor will remain the same.
Encoding	Allows you to change the current character encoding. Note that this is primarily for non-script text files. FrameScript only recognizes standard 8-bit encoding. Changing to another encoding value might create an invalid script file.
Export	Allows you to save the text file into Html, Xml, Rtf, Latex or PDF format.
Page Setup	Displays a dialog allowing you to change the page setup (Margins, printer, etc) for printing scripts . This is <i>not</i> the same as the Print setup for FrameMaker, which is for FrameMaker documents.
Print	Prints the current document.
Exit	Quits the editor.
At the bottom of this menu is a list of the most recently opened text files.	

Edit

The Edit menu has commands for editing the characters in a text file, such inserting characters, cut/copy/paste, etc.

Table 12: Edit Menu Items

Data type	Description
Undo	Undo last command or text operation.
Redo	Redo last command.
Cut	Delete the current selection and send to the clipboard.
Copy	Copy the current selection to the clipboard.
Paste	Paste the text contents of the clipboard to the current insertion point.
Delete	Delete the current selection.
Select All	Select all the text in the current document.
Copy as RTF	Copies the current selection to the clipboard as rtf text.
Complete Word	The editor scans the other words in the document and presents a list that matches the current word prefix.
Expand Abbreviation	The editor scans the abbrev.properties file for a match for the text at the cursor. See “Abbreviations file” on page 96 for information about the abbrev.properties file.
Insert Abbreviation...	A dialog appears allowing you to select an abbreviation (from the abbrev.properties file) to expand. See “Abbreviations file” on page 96 for information about the abbrev.properties file.

Table 12: Edit Menu Items

Data type	Description
Block Comment or Uncomment	Comments each line of the selection with a <code>//~</code> set of characters. If the lines have been previously commented using this command, they will be uncommented. Note: The double slashes produce the actual commenting characters, the <code>~</code> character is used as an indication that this menu command produced this result. If a line has been commented manually, it will not uncomment it correctly.
Box Comment	Comment the selected text using the <code>/*</code> in the beginning of the block and the <code>*/</code> at the end. It also places an <code>*</code> at the beginning of each line (to box the comment).
Stream Comment	Comment the selected text using the <code>/*</code> in the beginning of the block and the <code>*/</code> at the end.
Make Selection Uppercase	Makes the current selection into all uppercase characters.
Make Selection Lowercase	Makes the current selection into all lowercase characters.

Search

The Search menu has commands for navigating the text file.

Table 13: Search Menu Items

Data type	Description
Find...	Brings up the Find Text dialog.
Find Next	Finds the next occurrence of the previously found text.
Find Previous	Finds the previous occurrence of the previously found text.
Find In Files...	Finds text in a set of files.
Replace...	Find and Replace within the document.
Go To...	Moves the cursor and scrolls the window to a specified line number.
Next Bookmark	Moves the cursor and scrolls the window to the next bookmark in the document.
Previous Bookmark	Moves the cursor and scrolls the window to the previous bookmark in the document.
Toggle Bookmark	Set a bookmark at the current line if none exists or remove it if it does.
Clear All Bookmarks	Remove all bookmarks in the current document.

View

The View menu has commands for show or hiding various editor interface elements.

Table 14: View Menu Items

Data type	Description
Toggle Current Fold	Toggle the fold (expanded/contract) where the cursor resides.
Toggle All Folds	Toggle (expanded/contract) all folds.

Table 14: View Menu Items

Data type	Description
Tool Bar	Show/Hide the tool bar.
Tab Bar	Show/Hide the file name tab bar.
Status Bar	Show/Hide the status bar.
Whitespace	If checked, show the whitespace characters with dots, otherwise hide the dots.
End Of Line	If checked, show the end of line characters (CR LF), otherwise hide them.
Indentation Guides	If checked, show the graphical vertical indentation lines, otherwise hide them.
Line Numbers	If checked, show line numbers in the margin, otherwise hide them.
Margin	Show/Hide the gray margin area.
Fold Margin	Show/Hide the fold margin area.
Output	Show/Hide the output panel.
Parameters	Present a dialog box where you can enter up to four parameters that will be sent the script when you run it. This can be helpful for testing a script that you intend to use as a subroutine.
ScriptBuilder	A dialog box that allows you to select commands, property names and values names into the current script text file. You can build a script with some mouse clicks instead of typing.

Exec

The Exec menu has commands for running scripts and for analyzing the result.

Table 15: Exec Menu Items

Data type	Description
Run/Go	This command starts running the script in the currently active text window.
Next Message	Move cursor to the next error message in the Output Pane.
Previous Message	Move cursor to the previous error message in the Output Pane.
Clear Output	Clear the output pane.
Switch Pane	If the cursor is in the output pane, move to the text pane. If the cursor is in the text pane, move the cursor to the output pane.

Debug

The Debug menu has commands for the interactive source debugger. See “Interactive Debugger” on page 99 for detailed information on the debug commands. The debug menu is not available in the SciElmEdit editor. It is only available on the ElmStudio editor that runs from within FrameMaker.

Table 16: Debug Menu Items

Data type	Description
Run In Debug Mode	Start a script in debug mode. Execution will stop at the first command. Note: you can only run in debug mode if the file is saved.
Stop Debug	Stop a debugging session. The script will stop when you run this command.
Step Into	Execute the current command and stop at the before next command. You can use this command to step through the commands one at a time.
Step Over	Execute the current command and stop at the before next command, but skip going into any subroutine or function.
Run To Cursor	The script will run until it gets to the command where the cursor resides. If that command is not reached, then the script will continue until a break point is encountered or the end of the script occurs.
Toggle Breakpoint	Sets a breakpoint (red dot) at the line where the cursor reside if none exists. If there is already a break point at this line, then it will remove it.
Clear All Breakpoints	Clears all break points in the current file.
Examine Dataspace	Displays a modeless dialog which allows you to inspect the current variables (Script, Local, Parameter, as well as Globals). You can also set watches, where you can enter your own expressions.

Options

The Options menu has items that allow you to change some over all options for the editor.

Table 17: Options Menu Items

Data type	Description
Always On Top	Keep the editor window as the top most window.
Vertical Split	If checked, make the output panel vertical, otherwise it will be horizontal.
Wrap	If checked, line wrapping will take place, otherwise no line wrapping.
Line End Characters	Specify the line end characters to use (CR+LF, CR, LF). Note this will only change the characters for any additional line ends that occur. To convert all line ends to the new characters, use the following convert command.
Convert Line End Characters	This command will convert all the line end characters to the specified line end settings.
Change Indentation Settings...	Displays a dialog that allows you to set the tab size, indent size and whether to use actual tab characters or space.
Use Monospaced Font	Changes to a mono-spaced font.

Windows

The Windows menu has items that allow you to navigate through the open windows.

Table 18: Windows Menu Items

Data type	Description
Previous	Make the previous window active.
Next	Make the next window active.
Close All	Close all text windows.
Save All	Save all open documents.
At the bottom of this menu is a list of names of the open documents. You can select them and make them the active window.	

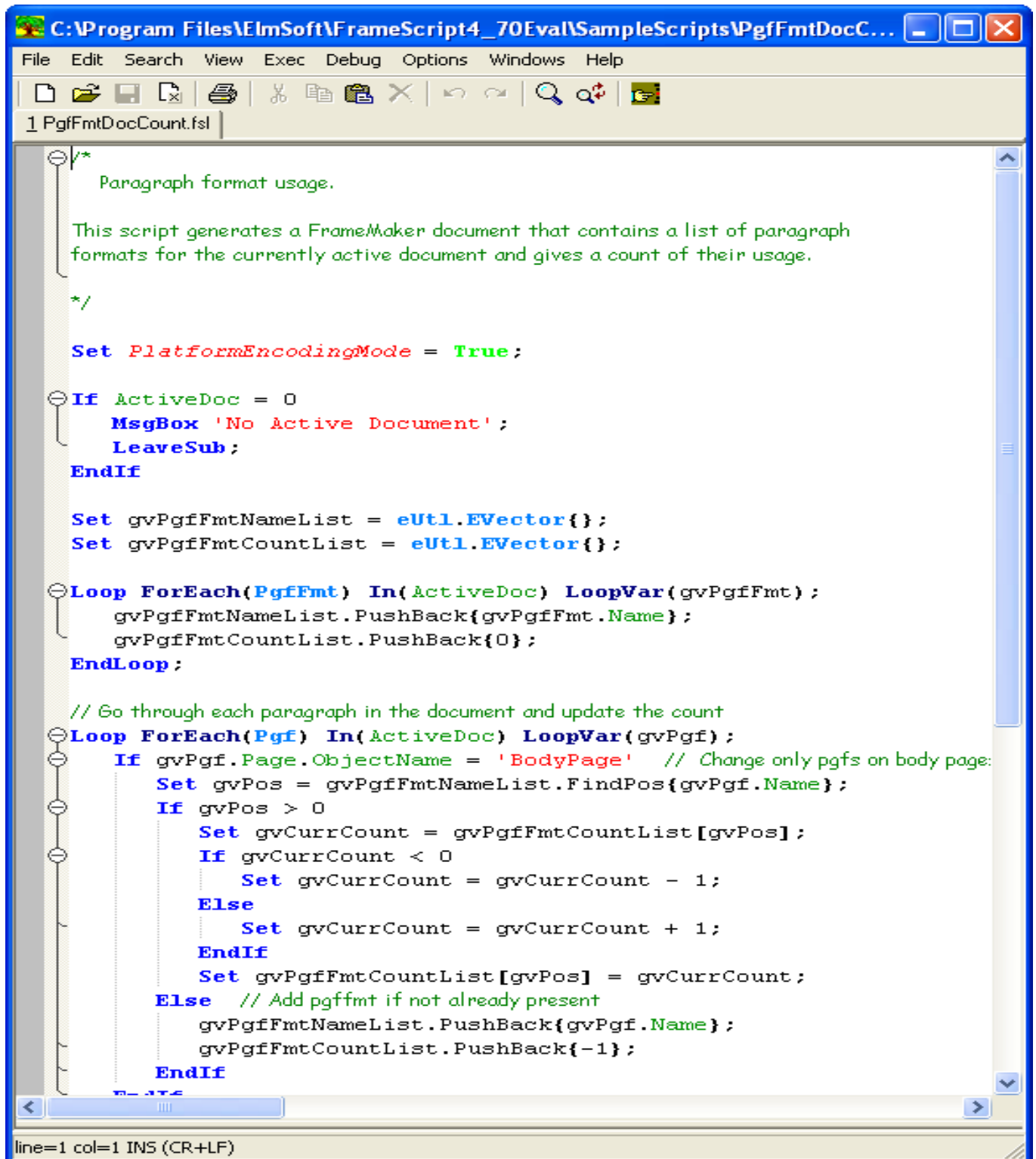
Help

The Help menu has items that allow you to display various help files.

Table 19: Help Menu Items

Data type	Description
Help	<p>Displays a FrameScript help file. The default value is to bring up the FrameScript RefManual.pdf file. To bring up your own file (such as an HTML file) modify the entry in the ElmStudioUser.properties file to use the following entry:</p> <pre>command.help.*.fsl="\$ (ElmStudioUserHome) \MyFile.html"</pre> <p>Replace the Myfile.html with the name of your own file. The file should be in the FrameScript folder.</p>
Editor Help	<p>Displays a help file for using the editor. By default, it brings up the FrameScript UsersGuide.pdf file. If you want to bring up your own file, add the following entry to the ElmStudioUser.properties file:</p> <pre>command.scite.help="\$ (ElmStudioUserHome) \MyFile.html"</pre> <p>Replace the Myfile.html with the name of your own file. The file should be in the FrameScript folder.</p>
About ElmStudio	Displays the standard "About..." screen.

Figure 6-1 ElmStudio Window



Customization

The editor has three customization files, `ElmStudioGlobal.properties`, `ElmStudioUser.properties` and `ElmStudio.properties`. The options in the `ElmStudio.properties` file override those in the `ElmStudioUser.properties` file which, in turn, override the options in the `ElmStudioGlobal.properties` file. The options in these '.properties' files have the following format:

```
[#]optionname[.optname2[.optname3]] =value
```

A '#' in the first position indicates a comment line.

For most users there should be no need to change these files. The `ElmStudio.properties` file is updated by ElmStudio itself reflecting any changes made by the user with the interface, such as window position, view settings, etc. This file will be rewritten every time ElmStudio quits. This file should not be changed except in unusual circumstances. The `ElmStudioGlobal.properties` file contains the predefined options and also should not be changed. If you find it necessary to customize the ElmStudio editor (colors, syntax highlighting, etc.), you should modify the `ElmStudioUser.properties` file. See the web site at <http://scintilla.sourceforge.net/SciTEDoc.html> for information about the possible options.

The SciElmEdit stand-alone editor has a similar set of property files. They are `SciElmEditGlobal.properties`, `SciElmEditUser.properties`, and `SciElmEdit.properties`. These property files are structured differently because the SciElmEdit editor is a general purpose editor and it has more general purpose functions.

Abbreviations file

The file `abbrev.properties` contains the abbreviations used in the 'Expand Abbreviation' and 'Insert Abbreviation...' menu commands. You can add your own abbreviations to this file if you wish. The format for this file is simple. It contains a list of abbreviations (one per line) in the following form:

```
abbreviation=expansion
```

See the file itself for examples.

SciElmEdit Stand Alone Editor

As state above, the ElmStudio text editor is based on the SciTE editor. The SciElmEdit text editor is also based on this text editor. In fact, it has all the features of SciTE along with some new ones (from ElmStudio) for FrameScript alone. The most important addition is the ScriptBuilder functionality.

There is no Exec or Debug menu on the SciElmEdit menu bar. Instead there is a Tools menu and a Language menu. The Tools menu is similar to the Exec menu except that it has items (such as Compile and Build) that apply to other languages. The language menu items lets you apply any of the supported languages to the current document.

The SciElmEdit text uses a different set of property files than the ElmStudio text editor. The property files for SciElmEdit are `SciElmEditGlobal.properties`, `SciElmEditUser.properties` and `SciElmEdit.properties`. There are also a set of language property files (one for each supported programming language). The `SciElmEditGlobal.properties` file does not have any values for a particular language. Instead, at the end of the file, there are a series of import lines where the properties of various supported programming languages are added. Most of these lines are commented out in the FrameScript installation. You may download some of these property files from the SciTe web site, if you wish to use the editor to edit other types of files.

ScriptBuilder

The ScriptBuilder helps in writing scripts by providing a various lists of information that you may click on to include in your script. The window shows a tree of selectable items. The tab control at the top allows you to select from several types of values as follows: Command List, Property List, Value List, EslObjects and Structured Import/Export. Select a tab, then click on the plus(+) sign to expand an item. Under the general heading of " Command List", ScriptBuilder provides the names of each of the FrameScript commands. The Property List tab shows the properties of each FrameMaker object and there is a list of options for the Open/Close/Save/Import/Export/Update commands. Under "Value List" tab, you can select from various lists of Object names, Fcodes, TextItem types, Notifications, and Character Property changes as well as a list of various constant names. The "Esl Objects" tab shows the various properties and methods of the Esl Objects and the "Structured Import/Export" tab shows the events, methods, properties and constants involved in the structured import/export clients.

The ScriptBuilder not only lets you see the above items, but it also allows you to select and paste into the edit window any item in the list. The "Command List" list can let you select an entire command syntax and paste it into the edit window.

Figure 6-2 ScriptBuilder Command List Tab

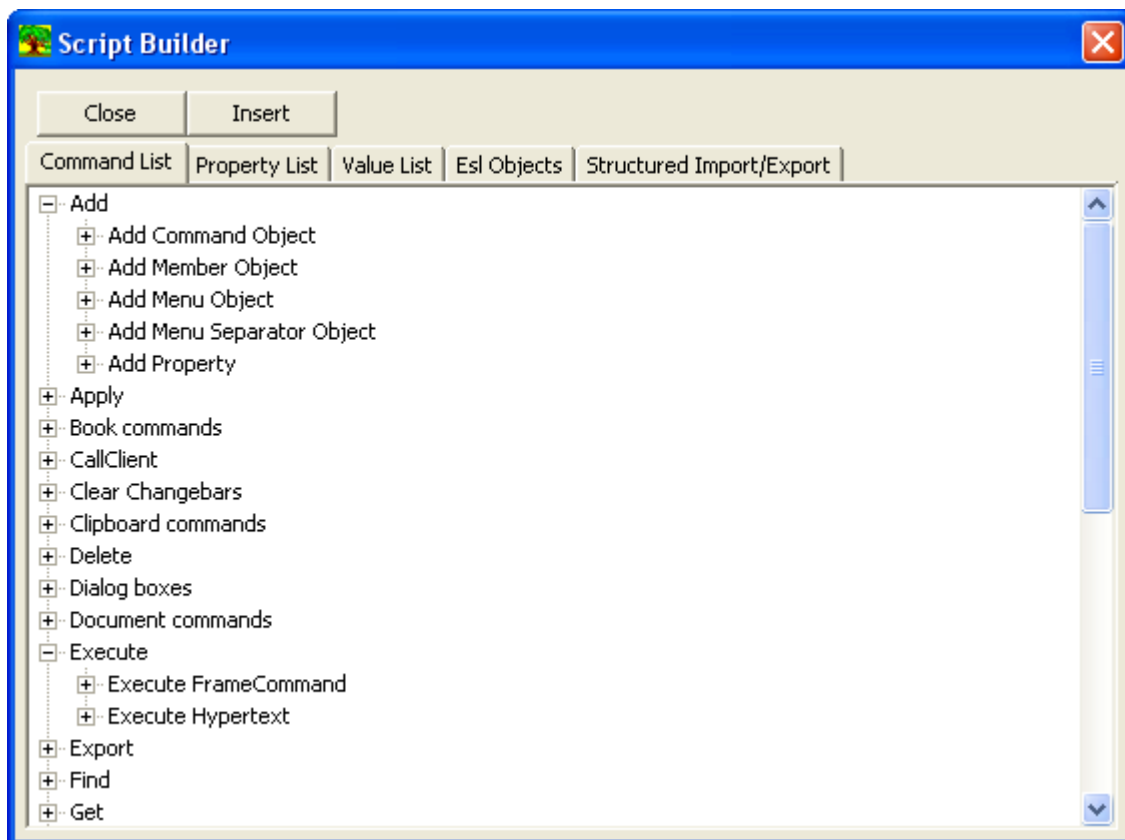


Figure 6-3 ScriptBuilder Property List Tab

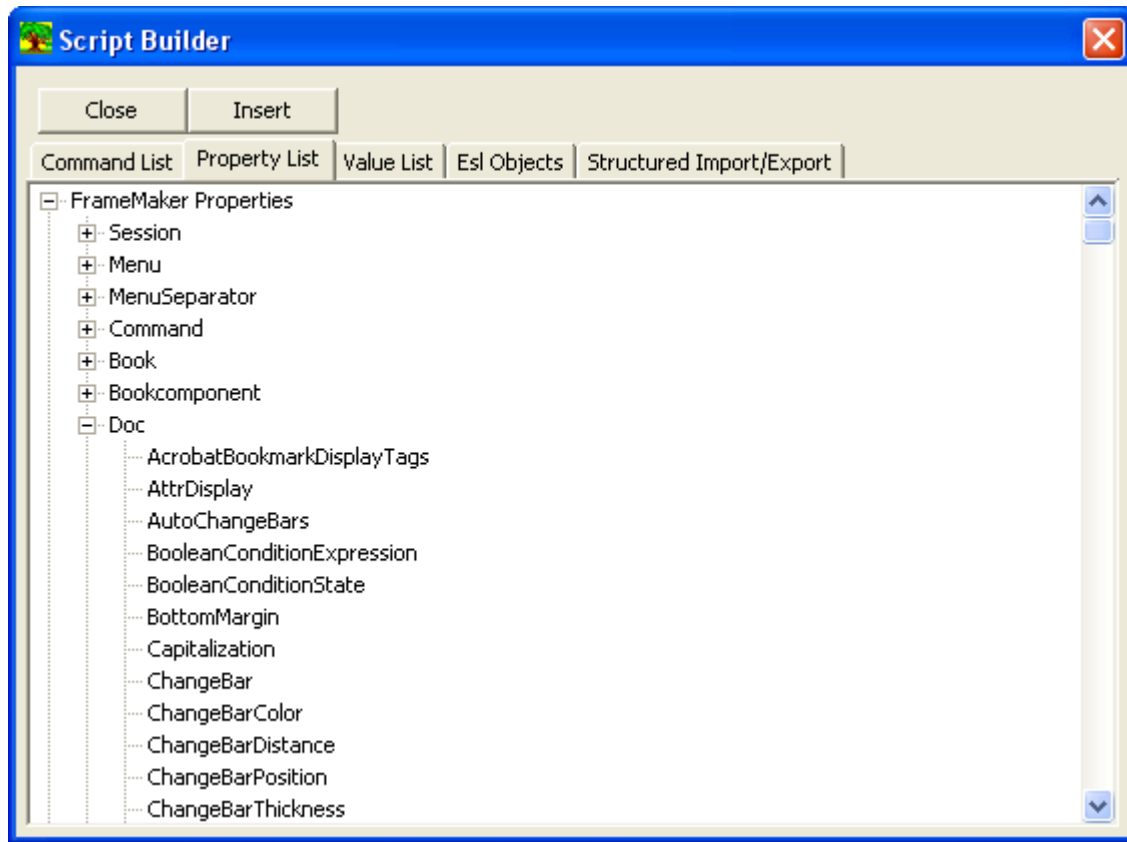
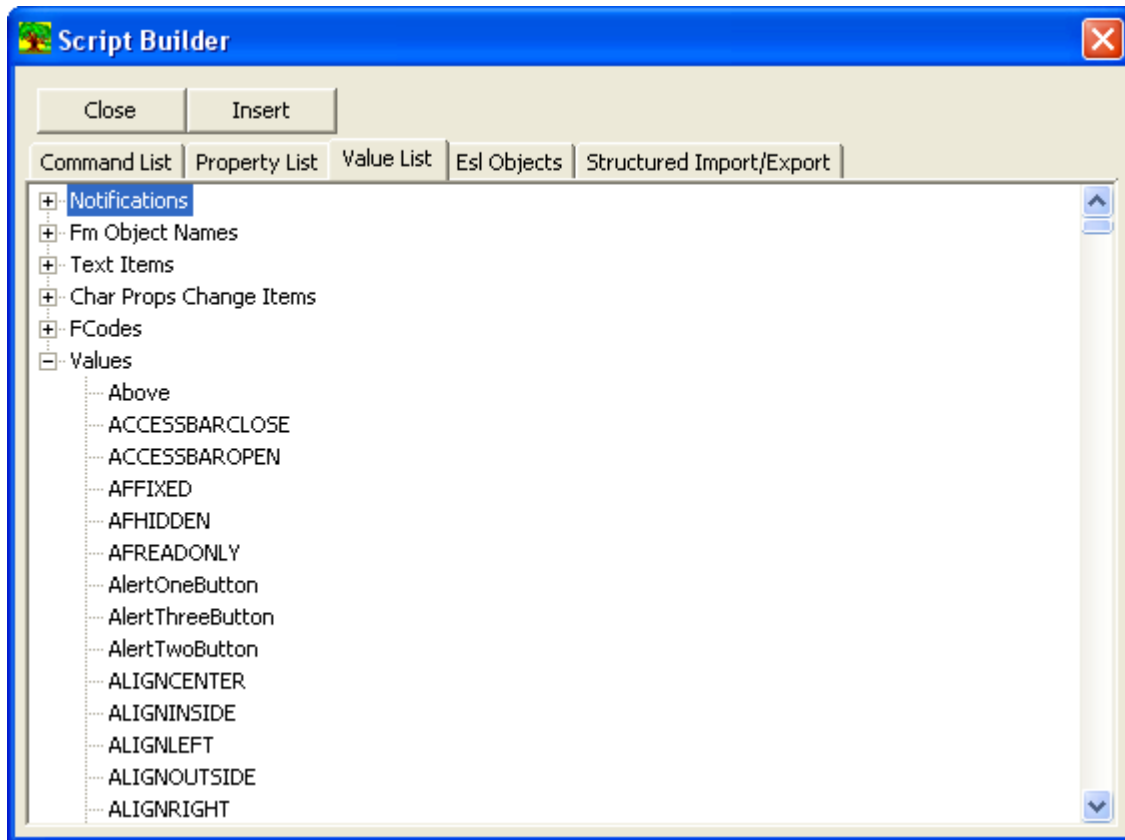


Figure 6-4 ScriptBuilder Value List Tab



Interactive Debugger

Up until now, debugging a script usually involved some of the following steps.

- Examining the script in the text editor. Look at it and hope that something becomes clear.
- Inserting some debug statements, such as Display or Write Console, at various places in the script and seeing what values are stored at various times. This can be hit and miss.
- Use the Trace facility (eDebug, available in FrameScript Version 3 or greater) to follow the order of the commands as they are executed. This tends to generate a lot of output.

IMPORTANT: The interactive debugger is only available using the ElmStudio internal script editor. It is *not* available with the stand-alone SciElmEdit editor.

Now, with FrameScript, you can now do interactive debugging using ElmStudio. When you start a script in debug mode, you can stop it anywhere you choose and examine the contents of any variables at that point in time. You can also step through a script command by command or run the script to some predefined point (breakpoint).

To run a script from the ElmStudio, you open the script file (or type the script into a new document) then select the Exec->Run/Go menu item (or press F5 or press the Run Script button on the toolbar). The script does not have to be saved to a disk file, it will use the text in the window as the script.

To run a script in debug mode, however, you must have a saved script file. Open a script file (or type in a new one), and if you are any unsaved changes be sure to save them. Use the Debug->Run in Debug Mode command to start the script in debug mode.

When you run a script in debug mode, the script stops at the first executable command. From here you can press the F11 key to step through the script command by command or you can set breakpoints at various places then press F5 to run the script until it reaches one of the breakpoints (or the end of the script).

IMPORTANT: Scripts running in debug mode will run slower than normal.

IMPORTANT: The interactive debugger is not available using the SciElmEdit editor.

Setting Breakpoints

You set breakpoints using the Debug->Toggle Breakpoint menu command. This is also possible using the right-click menu. Move the text cursor to the line where you want to insert the breakpoint, then do the command. A red dot should appear in the margin. To remove a breakpoint, repeat the procedure. You can also clear all breakpoints in the script file by selecting the Debug->Clear All Breakpoints menu command.

IMPORTANT: Breakpoints are disabled when a modal form appears on the screen. A modal dialog intercepts all the keystrokes and other events from the application, making it impossible to step through the script or interacting with the debugger in any way. You can set breakpoints, but they will be ignored as long as the modal form is on the screen.

Examine Dataspace Window

The examine dataspace window lets you look at the current state of the user defined variables. There are five nodes in the main window. These are labeled Global, Script, Local, Parm and Watchlist. The Global variables are those that you defined in the Initial script. The script variables are variables the you create as part of your script. The Local variables are those created with the Local command and Parm variables are the current set of parameters if you are inside a subroutine or function. Watch expressions can be created by pressing the "Add Watch..." button and then entering an expression. All these values are recalculated whenever the script reaches a stopping point (such as a breakpoint or a step). To delete a watch in the watchlist, select the item and press the "Delete Watch" button.

Sample Debug Session

The following is a short tutorial on using the interactive source debugger. The script for this example is designed to illustrate the features of the debugger. It performs a simple function. It is suppose to count the number of paragraphs in the current document and also count the number of empty paragraphs. For some reason, it is not working correctly. It is saying that there are no empty paragraphs and we know there must be some empty paragraphs (on reference pages for example). We will try to find the problem using the interactive debugger.

- Start FrameMaker
- Open (or create a new) document.
- Start ElmStudio (FrameScript->Script Window...).

In the following steps, the menu selections are from the ElmStudio window.

- Turn on line numbering (View->Line Numbers).
- Open the DebugTest.fsl script, located in the Demos\DebugDemo folder.
- Just to see the problem, run the script without the debugger, by pressing the Run button (or selecting the Exec->Run/Go menu item).

A dialog box should appear telling you that there are some number of paragraphs but zero empty paragraphs. Now lets debug the script.

- Start the script in debug mode (Debug->Run in Debug Mode).

The script should stop at the first command and there should be a yellow triangle in the margin of line number 2. The yellow triangle in the margin will indicate the line of the command that is about to be executed.

- Bring up the Dataspace window (Debug->Examine Dataspace).

The dataspace window should appear showing the various categories of data.

- Expand the Script variables node.
- Make the ElmStudio window active by clicking in the caption area.

Whenever you leave the ElmStudio window you have to make it active again or it will not recognize the keyboard commands.

- Press F11.

The yellow triangle should move to the next line (line 3). Notice also that a value appears in the dataspace window, under the script variables.

- Press the F11 key a few more times until the triangle gets to line 14 (the start of the loop command). Watch the data window as the script proceeds to see the changes in the script variables.

At this point you can continue to use the F11 key and step through each command. However, this loop will continue for 100 iterations and stepping through that many commands will be time consuming and tedious. Unless we are looking for a bug that is occurring inside the loop, we might want to just let the script run until the loop is finished.

- Move the text cursor to line 19 (a set command). Select the "Run to Cursor" ElmStudio menu command (Debug->Run to Cursor).

The script should run and stop at line 19.

- Look at the dataspace window and see the results of the calculation from the loop (the gvCount and gvSum variables).

Lines 19 is a set command with user functions in the expression. If you wish to enter the function and follow the script use the F11 key. If you wish to "step over" the function and go to the next command (line 20), use the F10 key.

- Press F11.

The triangle should move inside the function (to line 44). Look at the dataspace window. Expand the parm variables node. You should see the values for the two parameters passed to the function.

- Make the ElmStudio Window active again by clicking in the caption area.
- Press F11.

A local variable should now be created. Expand the Local variable node in the dataspace window to see this. You should also see the Result variable.

- Make the ElmStudio Window active again by clicking in the caption area.
- Step through (press F11) the rest of the function until it finishes and the yellow triangle goes out of the function to line 20 (the line after the previous command). Notice that the local and parm variables are now gone. They are deleted as soon as the function ends.
- Since (in this example) we do not need to go into the function again. Press F10 to skip over the function call. The yellow triangle should skip to line 22. Remember, the function was called as usual. The F10 (step over)

key just stopped the debugger from showing it. In the dataspace window you should see the results of the function calls in the variables `gvVar3` and `gvVar4`.

- The loop command starting at line 22 is very short. Press the F11 key repeatedly and watch the script go through it. See the index variable (`gvIdx`) increase as the loop proceeds.
- When the loop finishes the yellow triangle should be at line 26. Stop here.

Now we are down to the part of the script that actually counts the number of paragraphs in the active document. If you did not open (or create a new) document, the script will stop after the **If** command on line 26. If you did open (or create a new) document, then we can proceed.

Looking ahead we can see the **Loop** that scans through all the paragraphs and we can also see that the `gvPgEmptyCount` variable is suppose to accumulate the number of empty paragraphs. Since we want to look at the text property of the each paragraph to see if it is empty, we will add a watch to the examine dataspace window.

- In the examine dataspace window, press the "Add Watch..." button.
- Enter the following in the resulting dialog box:

`gvPgFVar.Text`

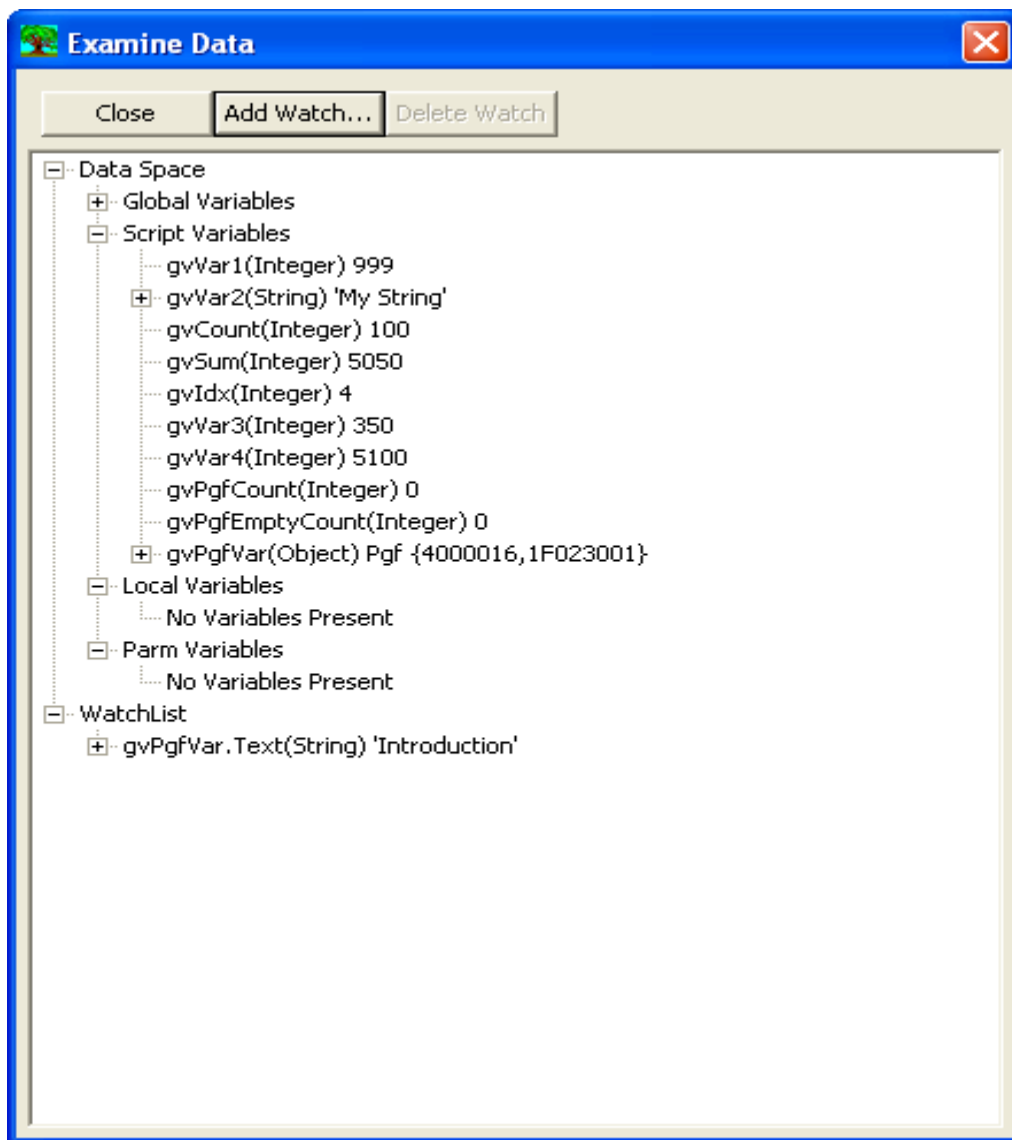
- Press OK.

A new node appears under the watchlist node. This will let you see the value of a specific property. Notice that the value of this is currently Null. At line 26 we have not yet created this variable.

- Press F11 4 times to get to line 30. See "ElmStudio Window with script running in debug mode" on page 105 for a picture showing how the window should look.

Now we should see a string value in the Text property of `gvPgFVar`. It might be an empty string or it might be a real string value. It depends on the document you have open. See "ElmStudio Examine Dataspace Window" on page 103 for a picture of the examine dataspace window at this point in the run.

Figure 6-5 ElmStudio Examine Dataspace Window



At this point, we could step through the loop until we reach an empty paragraph, then see what happens to the counter, but this could take a long time. We see that the **If** command on line 32 checks for empty paragraphs (text size is less than 1). We want to see what happens when we get there. So, to save time, we will set a breakpoint inside the **If** command on line number 33.

- Move the text cursor to line 33 (using the mouse or arrow keys).
- When the cursor is on line 33, use the toggle breakpoint command (Debug->Toggle Breakpoint).

A red circle should appear in the margin marking this line as a breakpoint line.

- Press the F5 key.

The script will continue running until it reaches line 33. If it never reaches line 33, it will continue to run until the end of the script. But, of course, our script should stop there.

When it stops at line 33, look at the current value of `gvPgffEmptyCount` in the dataspace window. It should be zero. Also look at the examine dataspace window and look at the value of `gvPgffVar.Text`. It should be an empty string. This means we have not made a mistake with our test.

- Press F11 to do the command and see what happens to the counter.

Look at the counter again. The value is still zero. What went wrong?

If we look closer at the `Set` command, we will discover that we used the wrong operator. To count values we want to add them, therefore we want to use the plus (+) operator, not the multiplication operator (*).

Now that we've found the problem, we do not need to keep debugging any longer. We can clear all the breakpoints (Debug->Clear All Breakpoints) and press F5, then the script will continue running until the end. On the other hand, there is no use continuing to run the script, since the result will still be incorrect. Also, in some scripts, it may take a long time to finish. Therefore, we should just stop running immediately, so we can fix the problem.

- Do the Stop Debugging command (Debug->Stop Debug) to stop the script.

The script will stop running and the Examine Dataspace window will disappear.

- Change the * to a + on line 33 to fix the problem.
- Run the script (without the debugger) by pressing the run button.

This time you should see the correct answer.

Figure 6-6 ElmStudio Window with script running in debug mode

```

1
2   Set gvVar1 = 999;
3   Set gvVar2 = 'My String';
4
5   If gvVar1 > 500
6     Write Console 'Greater than 500';
7   Else
8     Write Console 'Less than or equal to 500';
9   EndIf
10
11  Set gvCount = 0;
12  Set gvSum = 0;
13
14  Loop InitVal(1) Incr(1) LoopVar(gvIdx) While(gvIdx<=100)
15    Set gvCount = gvCount + 1;
16    Set gvSum = gvSum + gvCount;
17  EndLoop
18
19  Set gvVar3 = TestFunc{gvCount, 300} + 20;
20  Set gvVar4 = TestFunc{gvSum, 300} + 50;
21
22  Loop InitVal(1) Incr(1) LoopVar(gvIdx) While(gvIdx<=3)
23    Write Console 'In Loop Idx-' + gvIdx;
24  EndLoop
25
26  If ActiveDoc
27    Set gvPgfCount=0;
28    Set gvPgfEmptyCount=0;
29    Set gvPgfVar=ActiveDoc.FirstPgfInDoc;
30    Loop While(gvPgfVar)
31      Set gvPgfCount=gvPgfCount+1;
32      If gvPgfVar.Text.Count<1
33        Set gvPgfEmptyCount = gvPgfEmptyCount * 1;
34      EndIf
35      Set gvPgfVar = gvPgfVar.NextPgfInDoc;
36    EndLoop
37    MsgBox 'Total Paragraphs-' + gvPgfCount +
38          ' Empty Paragraphs-' + gvPgfEmptyCount;
39  EndIf
40
41

```

line=30 col=7 INS (CR+LF)

