

Creating and Modifying Source Code

The program editor supports bi-directional languages where text is written from right-to-left (for example, Arabic and Hebrew), and multi-byte character set languages such as Japanese and Chinese.

We recommend that you create source code in structured mode rather than reporting mode. Otherwise, you cannot use the expand/collapse editor feature (see *Showing and Hiding Source Code*).

For the differences between structured and reporting mode, see the section *Natural Programming Modes* in the *Programming Guide*. If you want to check whether structured mode has been activated or switch structured mode on, proceed as described in *Programming Modes* in the *First Steps* documentation.

For programming advice, see *Using Context-Sensitive Help* and the documentation in the Language section of the main overview page of Natural for Windows.

This section contains the following topics:

- Entering and Inserting Text
- Selecting Text
- Copying, Cutting and Pasting Text
- Dragging and Dropping Text
- Undoing or Redoing Modifications
- Deleting Text
- Adding and Removing Comments
- Renumbering Lines
- Translating to Upper or Lower Case
- Using Automatic Line Breaks
- Converting to and from Hexadecimal Format
- Recording, Replaying and Saving Keystrokes
- Protecting Source-Code Lines

Entering and Inserting Text

You start entering text in the first line (numbered with 0010) of an empty editor window.

When you add lines to the source code of an object, Natural numbers the added lines in increments of ten. When you insert lines in source code, Natural numbers the inserted lines in increments of one. Upon saving the source code, Natural automatically renumbers all lines contained in the source code in increments of ten beginning with 0010 at the first line.

Apart from that, you can renumber all source-code lines any time by using the renumber command as described in *Renumbering Lines*.

▶ To insert text

- Place the cursor at the position in the source code where you want to insert text (the current line is highlighted by default) and type in new text or paste text from the clipboard (see *Copying, Cutting and Pasting Text*). See also *Importing Data Fields*.

Or:

To insert a blank line, place the cursor at the beginning of the source-code line above which you want the new line to be inserted and press ENTER.

The new text is inserted in the source code.

Selecting Text

You can select one of the following:

- A whole word.
- A series of consecutive characters within a source-code line.
- A series of consecutive characters that spans one or more lines.

▶ To select a whole word

- Double-click on the word to be selected.

Or:

Position the cursor on the first character to be selected by using either the left mouse button or the arrow keys. Drag the cursor to the last character to be selected by pressing and holding down SHIFT and using the arrow keys.

The selected word is highlighted.

▶ To select any portion of text

1. Position the cursor on the first character to be selected by using either the left mouse button or the arrow keys.
2. Drag the cursor to the last character to be selected by holding down the left mouse button or by pressing and holding down SHIFT and using the arrow keys.

The selected text is highlighted.

3. Release the mouse button or the keys.

▶ To select the entire text

- From the **Edit** menu, choose **Select all**.

Or:

Choose the following toolbar button:



▶ To deselect text

- Click anywhere in the source code.

Or:

Press an arrow key.

The text is no longer highlighted.

Copying, Cutting and Pasting Text

The copy/cut and paste functions of the program editor are used to copy, move or delete text within a single object source or between multiple object sources (see also *Dragging and Dropping Text*).

It is possible to revoke a cut or paste operation after it has been performed. See *Undoing or Redoing Modifications*.



If you want to create data fields, as an alternative to using copy and paste, you can import fields from another source object as described in *Importing Data Fields*.

▶ To copy or cut and paste text

1. Select the text you want to copy or cut by proceeding as described in *Selecting Text*.
2. From the **Edit** menu, choose **Copy** or **Cut**.

Or:

Choose either of the following toolbar buttons:

 (Copy) or  (Cut)

Or:

Press CTRL+C (to copy) or CTRL+X (to cut).

The selected text is placed on the clipboard and can be pasted in the source code contained in the active object window.

3. If the text is to be pasted in another object source, open the respective source.
4. Position the cursor on the source-code line above which the copied or cut text is to be pasted.
5. From the **Edit** menu, choose **Paste**.

Or:

Choose the following toolbar button:



Or:

Press CTRL+V.

The text is pasted at the specified position in the source code contained in the active object window.

6. If you want to paste the same text again, repeat Steps 4 and 5.

Dragging and Dropping Text

Drag-and-drop operations can be used to move or copy text. The drag source and drop target may be Natural Studio or a different application that supports drag-and-drop.

It is possible to revoke a drag and drop operation after it has been performed. See *Undoing or Redoing Modifications*.

To move or copy text using drag-and-drop functionality

1. Select the text you want to move or copy (see also *Selecting Text*) and position the mouse pointer anywhere in the selected (highlighted) text.
2. Press and hold down the left mouse button and move the mouse. In addition, hold down CTRL if you want to copy the text instead of moving it which is the default.

The mouse pointer changes to an arrow pointer inside a rectangle indicating that drag-and-drop editing is enabled. For a copy operation, a plus sign (+) is attached to the rectangle. A text insertion caret next to the arrow pointer indicates the position where the selected text can be dropped.

If the mouse pointer changes to a "no drop" pointer (slashed circle), the current target location does not accept a drop. This happens when you attempt to insert text into protected source code (see also *Protecting Source-Code Lines*) or when the drop target has no drag-and-drop capabilities. If you execute a move operation on protected source code, the text will be copied rather than moved to the target location.

You can press ESC if you want to cancel drag-and-drop editing.

3. Release the mouse button where you want to drop the text.

The selected text is dropped at the current position of the caret.

If the mouse button is released when the "no drop" pointer is visible, the drag-and-drop operation is canceled.

Undoing or Redoing Modifications

The editing actions you perform in the editor window can be revoked by using the **Undo** command or redone (after being undone) by using the **Redo** command. The **Undo** or **Redo** command applies to any source-code modifications that are *not* made via the command line (for example, RENUMBER or STRUCT).

The number of actions which can be undone or redone is determined by the value specified in the preferences for the program editor and is limited by the memory allocated: see the editor options **Max undo mem (MB)** and **Max no of undo** described in *Program Editor Options* in the *Using Natural Studio* documentation.

The undo/redo buffer is cleared when you close the editor window.

Undo operations restore line numbering to its status before the operation. Redo operations restore line numbering to its status before the previous undo operation.

▶ To undo an action

- From the **Edit** menu, choose **Undo**.

Or:

Press CTRL+Z.

Or:

Choose the following toolbar button:



The source code is restored to its condition before the previous editing action or redo operation.

▶ To redo an action that has been undone

- From the **Edit** menu, choose **Redo**.

Or:

Press CTRL+Y.

Or:

Choose the following toolbar button:



The source code is restored to its condition before the previous undo operation.

Deleting Text

When you delete text, it is cut from the object but is *not* placed on the clipboard. The only way to recover deleted text is by undoing the delete operation. See *Undoing or Redoing Modifications*.

Note that when text is deleted from a source, no warning is provided.

▶ To delete text

1. Select text by proceeding as described in *Selecting Text*.
2. From the **Edit** menu, choose **Delete**.

Or:

Choose the following toolbar button:



Or:

Press DEL.

The text is deleted from the source code contained in the active object window.

Adding and Removing Comments

You can mark or unmark an entire source-code line as a comment line or place a commentary text within a line.

▶ To add a comment line

- At the beginning of a source-code line, enter an asterisk (*) followed by at least one blank character. For example: `* This is a comment line.`

Or:

At the beginning of a source-code line, enter two asterisks (**), with or without subsequent blanks. For example: `**This is a comment line.`

Or:

At the beginning of a source-code line, enter the character string slash-asterisk (/*), with or without subsequent blanks. For example: `/*This is a comment line.`

▶ To append a comment to a statement

- In a source-code line, at the end of a statement, enter the character string blank-slash-asterisk (/*).

For example: `DEFINE DATA /*This is a comment.`

▶ To mark lines as comment lines

1. Place the cursor anywhere in the source-code line you want to mark.

Or:

Select one or more source-code lines as described in *Selecting Text*.

2. From the **Edit** menu, choose **Advanced > Add Comment Mark(s)**.

Or:

Press CTRL+M.

A comment mark (*) followed by a blank character is added to the beginning of the specified source-code line(s).

▶ To unmark lines as comment lines

1. Place the cursor anywhere in the comment line you want to unmark.

Or:

Select one or more source-code lines as described in *Selecting Text*.

2. From the **Edit** menu, choose **Advanced > Remove Comment Mark(s)**.

Or:

Press CTRL+SHIFT+M.

A comment mark (* , ** or /*) is removed from the beginning of the specified source-code line(s).

Renumbering Lines

▶ To renumber source-code lines

- From the **Edit** menu, choose **Renumber**.

Or:

Choose the following toolbar button:



Or:

In the command line, enter the following system command:

```
RENUMBER
```

See also RENUMBER in the *System Commands* documentation.

The source-code lines of the object in the active window are renumbered in increments of ten.

Related Topic:

- *Renumbering of Source-Code Line Number References - Programming Guide*

Translating to Upper or Lower Case

You can translate source code from upper to lower case or from lower to upper case.

▶ To translate text from upper to lower case or vice versa

1. Select the text you want to translate as described in *Selecting Text*.
2. From the **Edit** menu, choose either **Advanced > Upper Case** or **Advanced > Lower Case**.

Or:

Press CTRL+SHIFT+U for upper case or CTRL+SHIFT+L for lower case.

You can switch automatic upper-case translation on by setting the corresponding editor option as described in *Program Editor Options* in the *Using Natural Studio* documentation. With automatic upper-case translation, the entire source code (except commentary text) is translated to upper case whenever you save, check or catalog the source code. Automatic upper-case translation is useful in a remote environment on a mainframe computer where the LOWSRCE (Allow Lower-Case Source) compilation option is set to OFF. For details, see LOWSRCE in COMPOPT in the *System Commands* documentation for mainframes.

Using Automatic Line Breaks

The program editor provides the option of inserting automatic line breaks at a specified column while editing text or after selecting existing text.

The following rules apply when this option is active:

- A line break is inserted whenever the cursor crosses the ruler while entering new text or modifying existing text. (For information on setting a ruler position, see *Program Editor Options* in the *Using Natural Studio* documentation.)
- A line break is inserted at the blank character located next to the ruler (blank characters at the beginning of a line are ignored).

If there is no blank, the editor generates a long line which extends beyond the ruler as shown in the example below:

```

0010  DEFINE DATA LOCAL
0020  01 #NAME (A20)
0030  /* Thisisanexampleofalongline
0040  END-DEFINE
0050  END

```

- If you insert text or replace text strings that generate a long line, no automatic line break is performed. A line break will only be inserted if you modify this text and move over the ruler.
- A text constant is continued on the next line(s).

An apostrophe (') or a quotation mark (") followed by a minus sign (-) is inserted at the line break where the cursor crosses the ruler or, if the constant contains one or more blank characters, at the blank located next to the ruler. Additionally, an apostrophe (') or a quotation mark (") is added to the beginning of the new line(s). For example:


```

0010  DEFINE DATA LOCAL
0020  01 #NAME (A20)
0030  END-DEFINE
0040  MOVE '123456789012' -
0050  '345'
0060  TO #NAME
0070  WRITE #NAME
0080  END

```

- A comment is continued on the next line(s) if it contains a blank character or if it is preceded by a blank character. The mark that indicates a comment (*, ** or /*) is automatically added to the beginning of the new line(s). For example:

```

0010  DEFINE DATA LOCAL
0020  01 #NAME (A20)
0030  END-DEFINE
0040  /* This is an
0050  /* example of
0060  /* line breaking.
0070  END

```

- If BACKSPACE is used at the end of a split line, this line will be concatenated with the next one. Any marks resulting from a previous line break will be retained in the new line and must be removed manually.

▶ To activate automatic line breaking

- In the **Options** dialog box, set the position of the ruler by using the **Ruler position** spin box and select the **Automatic line breaks** check box as described in *Program Editor Options* in the *Using Natural Studio* documentation.

A line break is inserted automatically whenever you move the cursor over the ruler while typing in text.

▶ To insert automatic line breaks for existing text

1. Select the desired text section.
2. From the **Edit** or context menu, choose **Advanced > Break at Ruler position**.

Automatic line breaks are inserted into the text according to the rules described earlier.

Converting to and from Hexadecimal Format

The program editor provides options to display the hexadecimal Unicode format of characters contained in a text constant and to convert these characters to their equivalent hexadecimal format. You can convert characters either to hexadecimal code page format or hexadecimal Unicode format, or vice versa. For conversion to hexadecimal code page format, the code page defined for the source is used. If no code page is defined for the source, the code page defined for the current Natural Studio session is used.

▶ To display hexadecimal Unicode format

- Hover the mouse pointer over a character contained in a text constant to display the hexadecimal value of the character.

Or:

Select multiple characters from a text constant and hover the mouse pointer over the selected characters to display the hexadecimal value of the characters.

A tool tip shows the hexadecimal Unicode representation of the character(s).

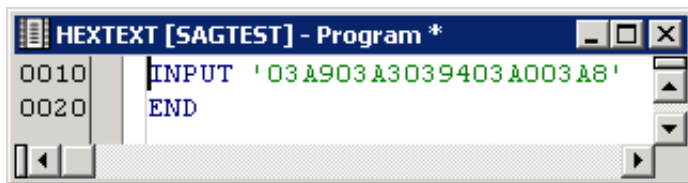
▶ To convert characters to hexadecimal format

1. For hexadecimal code page format, select single or multiple characters from a text constant and press CTRL+ALT+X.

Or:

For hexadecimal Unicode format, select single or multiple characters from a text constant and press CTRL+ALT+U.

2. The selected character(s) are replaced by the equivalent hexadecimal format as shown in the Unicode example with the Greek letters ΩΣΔΠΥ below:



For hexadecimal code page format: a character that cannot be converted will be replaced by the substitution character of the defined code page.

3. Place either of the following prefixes before the apostrophe that precedes the constant:
 - For hexadecimal Unicode format: UH
 - For hexadecimal code page format: H

The constant must start with the hexadecimal value as shown in the Unicode example below:

```

HEXTEXT [SAGTEST] - Program
0010 | INPUT UH'03A903A3039403A003A8'
0020 | END

```

Therefore, if you only convert part of a text constant, you may have to split the constant into multiple constants to avoid syntactical errors as shown in the Unicode example below:

```

HEXTEXT [SAGTEST] - Program *
0010 | INPUT 'Greek letters:'UH'03A903A3039403A003A8'
0020 | END

```

▶ To convert hexadecimal to character format

- Select the hexadecimal string you want to convert and press CTRL+ALT+C. For example:

All digits selected in '41424344' are converted to 'ABCD'.

If the hexadecimal string selected is prefixed with UH or H, it is interpreted as a Unicode character.

For example:

All digits selected in U'0041004200430044' or UH'0041004200430044' are converted to U'ABCD' or UH'ABCD' respectively.

A hexadecimal value that cannot be interpreted by the defined code page is substituted by non-printable characters.

For example:

All digits selected in '0041004200430044' are converted to '[NUL]A[NUL]B[NUL]C[NUL]D'.

Recording, Replaying and Saving Keystrokes

The keystroke recorder records and replays only input from the keyboard; mouse movements and operations are ignored. The keystroke sequence recorded last is retained for the duration of the Natural Studio session. The keystroke sequence can be saved as a macro for permanent use during any subsequent sessions.

This section contains the following topics:

- Recording and Replaying Keystrokes
- Handling Macros

Recording and Replaying Keystrokes

▶ To record a keystroke sequence

1. Place the cursor at the position where you want to begin recording.
2. From the **Tools** menu, select **Macros > Start Recording**.

Or:

Choose the following toolbar button:



Or:

Press CTRL+SHIFT+R.

The mouse pointer changes to an arrow pointer with a symbol illustrating a cassette tape. This indicates that recording is in progress.

3. Press the keys in the sequence you want to record.

▶ To stop recording

- From the **Tools** menu, select **Macros > Stop Recording**.

Or:

Choose the following toolbar button:



Or:

Press CTRL+SHIFT+S.

Recording ends. The recording is retained for the duration of the current session and is overwritten by any subsequent recordings.

▶ To replay a recorded keystroke sequence

1. Place the cursor at the position where you want to begin replaying the recording.
2. From the **Tools** menu, select **Macros > Replay Recording**.

Or:

Choose the following toolbar button:



Or:

Press CTRL+SHIFT+P.

The keystroke sequence recorded last is replayed.

Handling Macros

You can save a recording as a macro, which can be used permanently, in any Natural Studio session. You can add a most frequently used macro or a macro command to the toolbar or menu bar or create shortcuts. You can overwrite macro code or delete a macro that is no longer required.

▶ To save a recording as a macro

1. When you have stopped recording, from the **Tools** menu, choose **Macros > Save Macro**.

The **Save Macro** dialog box appears.

2. In the **Name** box, type a name of up to 32 characters and choose **OK** to save the macro.

If a macro with the specified name already exists, an appropriate message appears asking whether to overwrite the contents of the existing macro or save the macro under a different name: choose **Yes** to overwrite or **No** to rename the macro.

The macro is saved under the specified name, added to your user profile and listed in the **Macros** submenu of **Tools**.

You can save a maximum of 16 macros.

▶ To run a macro

1. From the **Tools** menu, choose **Macros**.

All macros saved in your user profile are listed in the submenu.

2. From the macro list, choose the required macro.

The macro is executed and replays the recorded keystroke sequence.

▶ To delete a macro

1. From the **Tools** menu, choose **Macros > Delete Macro**.

The **Delete Macros** window appears with a list of all macros saved in your user profile.

2. Select the macro you want to delete and choose **Delete**.

The macro is deleted from the list.

3. Choose **OK** to confirm the action and remove the macro from your user profile.

Or:

Choose **Cancel** to exit the dialog box without any action.

▶ To add a macro or a macro command to the toolbar or menu bar

1. Invoke the **Customize** dialog box and open the **Commands** page as described in *Customizing Natural Studio* in the *Using Natural Studio* documentation.

2. From the **Categories** drop-down list box, select **Tools.Macros**.

All macro commands and available macros are listed in the **Commands** list box.

3. Select a command or a macro and drag it to the menu bar. For detailed instructions, see *Customizing Natural Studio*.

To assign a shortcut to a macro or a macro command

1. Invoke the **Customize** dialog box and open the **Keyboard** page as described in *Customizing Natural Studio*.

2. From the **Categories** drop-down list box, select **Tools.Macros**.

All macro commands and available macros are listed in the **Commands** list box.

3. Select a command or a macro and press the key combination you want to assign as a shortcut to the selected command or macro. For detailed instructions, see *Keyboard* in *Customizing Natural Studio*.

The keyboard shortcut is now assigned to the macro or macro command and appears next to the associated macro command or macro name listed in the **Macros** submenu of **Tools**.

Protecting Source-Code Lines

You can protect a single source-code line or a block of source-code lines against unauthorized modification by using read-only tags.

Protected source-code lines cannot be edited. In addition, you cannot add lines to the beginning or end of source code where a protected block of lines starts in the first line (0010) and ends in the last (here: 0090) as shown in *Example of Line Protection*. You can only add lines if the protected block is preceded or followed by an unprotected line.

The following editor functions cannot be performed on protected source-code lines:

- Cut and paste
- Delete
- Replace
- Add/remove comment mark(s)
- Upper/lower case translation
- Insert/add line at top/bottom of protected block that starts in the first line of the source and ends in the last



Warning:

Read-only tags cannot be modified or deleted once the respective source object has been reloaded into the source buffer.

Read-only tags are stored in the source object in the Natural system file. They are removed from the source buffer and are therefore hidden when the respective source object is reloaded into the source buffer. A source object is reloaded into the source buffer, for example, when you execute a system command such as `STRUCT` or `RENUMBER` on the source, or when you open the source object in the editor window.

You can exclude protected source-code lines from structural indentation by proceeding as described for the `STRUCT` command under *Indentation of Source Code Lines* in the *System Commands* documentation.

In a reloaded source object where read-only tags are hidden, protected source-code lines are grayed out as shown in *Example of Line Protection*. (You can specify a different background color by changing the color definition as described in *Program Editor Options* in the *Using Natural Studio* documentation.)

▶ To protect a single line

- At the end of the line to be protected, enter a blank character and append the following tag:

```
/*<RO>
```

▶ To protect a code block

1. At the end of the line where the block to be protected begins, enter a blank character and append the following tag:

```
/*<RO>>
```

2. At the end of the line where the block to be protected ends, enter a blank character and append the following tag:

```
/*<<RO>
```

Read-only tags are reinserted into the source buffer whenever you save the source object. You can prevent read-only tags from being reinserted by proceeding as described below.

▶ To stop reinsertion of read-only tags

- At the end of the first source-code line, enter a blank character and append the following tag:

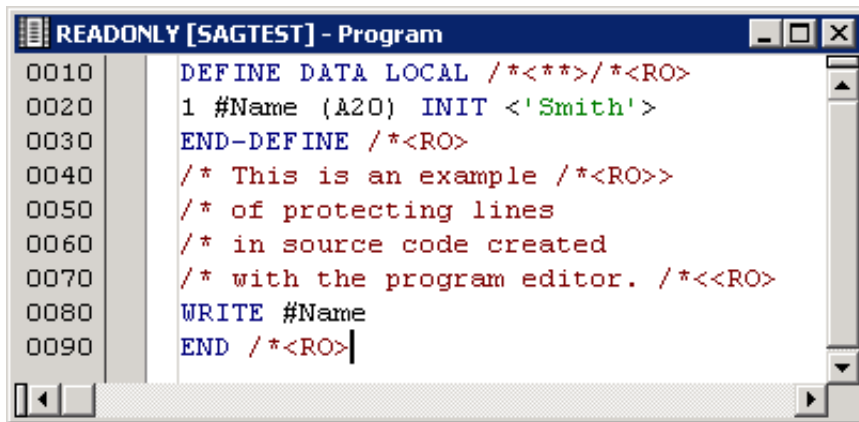
```
/*<***>
```

If the first source-code line contains a read-only tag, place this tag immediately (not separated by a blank character) in front of the read-only tag.

See also *Example of Line Protection* below.

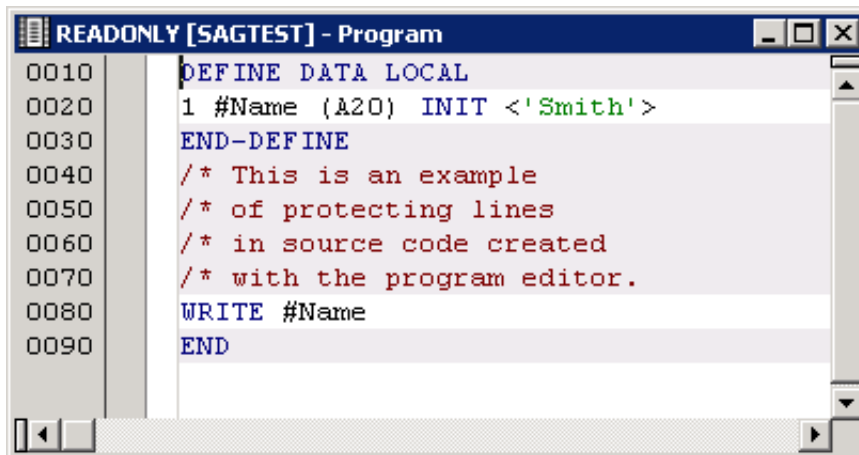
Example of Line Protection

In the example of a source object below, the lines of the `DEFINE DATA` statement and the consecutive comment lines are protected with read-only tags. The tag `/*<***>` guarantees that the read-only tags are not reinserted into the source buffer.



```
0010 DEFINE DATA LOCAL /*<*>/<RO>
0020 1 #Name (A20) INIT <'Smith'>
0030 END-DEFINE /*<RO>
0040 /* This is an example /*<RO>>
0050 /* of protecting lines
0060 /* in source code created
0070 /* with the program editor. /*<<RO>
0080 WRITE #Name
0090 END /*<RO>|
```

Read-only tags are hidden when the source object is reloaded into the source buffer as shown in the example below. Protected lines are grayed out.



```
0010 DEFINE DATA LOCAL
0020 1 #Name (A20) INIT <'Smith'>
0030 END-DEFINE
0040 /* This is an example
0050 /* of protecting lines
0060 /* in source code created
0070 /* with the program editor.
0080 WRITE #Name
0090 END
```