Table of Contents

Getting Started

Road Map

This documentation provides an in-depth description of Hex Editor Neo features. It is structurally divided into several sections. The Getting Started with Hex Editor Neo section provides generic information about the product, briefly describes its features and technologies. The Hex Editor Neo Definitive Guide section provides detailed description of every Hex Editor Neo feature. The File Document Scripting section describes the programming interface provided by the product.

Supported Document Types

Hex Editor Neo supports editing files, shared files, volumes, disks, process memory and physical memory.

File Editing

Hex Editor Neo is an advanced file editor. Numerous powerful features, such asPattern Coloring, Structure Viewer, Bookmarks as well as highly-optimized commands can be utilized to make file editing task quick and simple.

Any loaded or created file is called a document in the editor. There is at least one editor window for each document. For convenience, multiple editor windows may be opened for a single document, each having its own properties (view type, encoding, cursor position and selection). Hex Editor Neo provides a very flexible window organization tools, including window splitting and separating the workspace with frames. A huge set of supported encodings allows you to interpret (and edit) document's data in different ways.

Data encryption and decryption is provided, utilizing any installed block or stream cipher.

Large set of data operations allow you to modify data in large blocks.

Hex Editor Neo fully supports NTFSalternate data streams. Several special tools are provided that simplify working with streams and even locating them on your computer.

The unique multiple selection concept is used throughout the Hex Editor Neo. A multiple selection is a collection of contiguous ranges. Such selection may arise as a result of user's action or as a result of executing a command. All Hex Editor Neo's commands and modules fully support multiple selections and work with them in a very efficient way.

A full “basic” editing command set is supported by the editor: you can modify data, insert data, delete data and change file's size. In addition, advanced editing commands, such as Fill and Insert File are provided.

Hex Editor Neo provides the most powerful and flexible solution when it comes to searching and replacing data in files: the Find command is used to search for a pattern and Replace command is used to search for a pattern and then replace it with another pattern. The size of the search and replace pattern may differ and the replace pattern may even be empty.

Even more powerful Find All command is capable of locating all pattern occurrences and returning them as a selection. It's needless to say that selection is fully browseable and can be saved to a file.

Yet more powerful Replace All command does it all in one step: locates all occurrences of the pattern in a file (or a selection - all Hex Editor Neo commands support multiple selections) and replaces all of them with another pattern. Again, pattern sizes may differ and replace pattern may be empty. The latter case is equivalent to using the **Find All** command and then the **Delete** command with only difference that **Replace All** command operates much faster!

Find in Files and Replace in Files commands do the same for a group of files. These commands are extremely powerful and provide a flexible setup. They are also capable of utilizing the full power provided by the multi-core and multi-processor computers.

Other advanced Hex Editor Neo features arePattern Coloring, Structure Viewer, Bookmarks, Operation History, Statistics, Attributes, Data Inspector and Base Converter, Patch Creation, standard Clipboard support and advanced Copy & Export feature. Checksum Calculation feature provides a lot of checksum calculation algorithms.

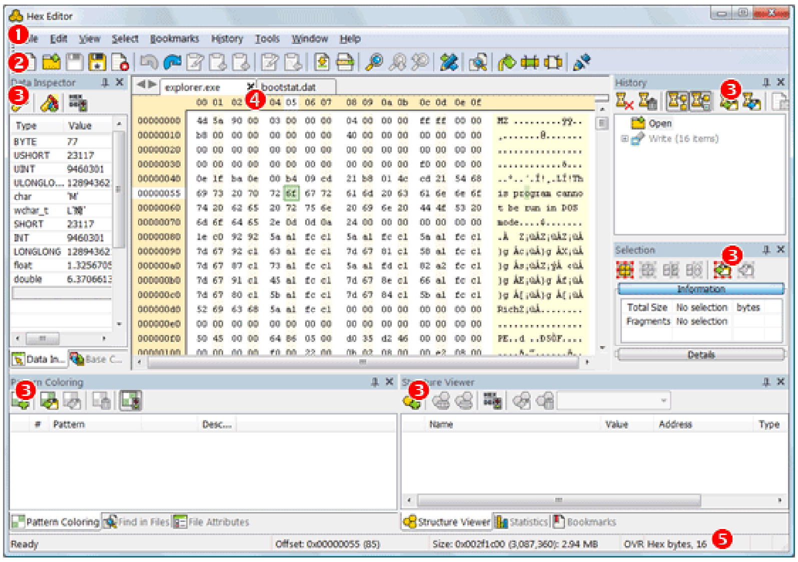
Usage Comfort and Environment Customization

A number of user interface features, such as toolbars and tool windows are all called to simplify most everyday's tasks and make editing faster and simpler.

Every aspect of the user interface is customizable. More detail is provided in corresponding documentation sections.

Main Window Details

Below is a screenshot of the main Hex Editor Neo window:



All important elements are numbered and are described below:

Main Menu

Hex Editor Neo's main menu contains all supported commands. See the main menu section for the detailed information on using the main menu.

Main Toolbar

Main toolbar provides a quick access to a subset of Hex Editor Neo's commands. The toolbar is fully customizable. You can also create additional toolbars.

See the toolbars section for the detailed information on using and customizing toolbars.

Tool Windows

Hex Editor Neo provides most of its powerful features by means of Tool Windows. These features includePattern Coloring, Structure Viewer, Bookmarks, Operation History and much more.

See the Tool Windows section for the detailed information about tool windows.

Editor Windows

Editor windows display the documents, loaded into the Hex Editor Neo. They allow you to view and edit the document's content.

Detailed information on editor windows, their features, usage and customization is provided in the Editor Windows section.

Status Bar

A status bar displays the current cursor's offset, current file's size, a view type of a current editor window and a number of indicators. When a command is selected in a main menu, the command's description is also displayed on the status bar. Status bar is described in more detail throughout the documentation.

Data Processing Engine

Hex Editor Neo implements the unique data processing engine which endows it with a number of interesting and powerful features.

The main characteristics of the data engine include:

Operation History

Hex Editor Neo implements an unlimited operation history with branches and immediate switching between operations. Every command that modifies the state of the document (overwrites existing data, inserts new data, deletes document's data or changes the size of the document) creates a new operation and adds it to the operation history.

The amount of RAM required to store operation's data is minimal and is much less than corresponding memory amounts required by most competitive products. In addition, operation's data is automatically compressed and moved to disc when not required. It then loaded and decompressed on-demand.

Branches feature allows you to create several operation sequences that "grow" from a common "root" operation and represent different variants of the document. All such sequences are "equal in rights": you can switch between them at any time, copy data from one branch to the Clipboard in order to paste it into another branch and so on.

Switching between operations is performed immediately.

The entire operation history can be saved to a file and later loaded for the same document. Imagine you begin working with a file. You open it in the Hex Editor Neo, perform several operations on it, create branches and so on... Then you save the operation history to a file and close the edited file without saving changes. Now you have an option of opening the same file and loading saved operation history to continue your work from the same point.

The Operation History section in this documentation provides you with a detailed description.

Multiple Selection

All Hex Editor Neo commands are capable working with a multiple selection. A multiple selection is a collection of contiguous ranges. A multiple selection may arise as a result of user actions, or as a result of the Find All command. It can also be saved to a file and later loaded from it.

Algorithms, implemented in the Hex Editor Neo, provide an extremely efficient way to store and process multiple selections. This makes, for example, executing the Find All command for a several gigabytes-long file quite an ordinary operation that will not "eat up" all available virtual memory and disk space, as it happens in most competitive binary file editors.

The "native" support of multiple selections by every Hex Editor Neo's command, starting fromFill and Clipboard to Statistics makes this instrument a valuable and helpful editing tool in everyday's work.

The Multiple Selection section provides in-depth description of this feature.

Operation Efficiency

Due to unique characteristics of the Hex Editor Neo's data processing engine, most Hex Editor Neo commands finish in constant-time. In other words, they have a constant-time complexity. Constant-time complexity means that a command operates in approximately constant time and this time does not depend on latent or obvious command's complexity. For example, Insert File command has a constant-time complexity. This means, that inserting a 1 KB file takes exactly the same time as inserting a 1 GB file.

Other Hex Editor Neo commands finish in linear-time. In other words, they have a linear-time complexity. The time required to process such command usually linearly depends on the file's size, selection's complexity or some other factor. None of Hex Editor Neo commands has worse than linear-time complexity.

Most linear-time commands depend on the selection's complexity, that is, number of ranges in a selection. That is, for single-range selections these commands have a constant-time complexity. For example, the Fill command has a linear-time complexity, depending on selection's complexity. That is, if the command is used to fill a single-range selection, it operates in constant-time: filling 1 KB file takes exactly the same time as filling a 1 GB file. Filling a selection that has 20 million ranges will take 20 times longer than filling a selection that has 1 million ranges.

This documentation always states the command's complexity when it describes a given command. When linear-time complexity is mentioned, a dependent factor is given.

Multi-Document & Multi-Editor Environment

Multiple documents (files) may be opened for editing in the Hex Editor Neo. They all have their own operation history, which are not related with each other. Multiple editor windows may be opened for each document, each of which also has its own state: view type, cursor position, selection and encoding.

Encodings Support

Each editor window has two panes: code pane and text pane (the panes are configurable). Text pane is displayed when the editor is in `BYTE` or `WORD` grouping mode. For the latter, text pane automatically displays UNICODE (UTF-16-encoded) characters. For the first mode, you can select one of over 130 supported encodings, including UTF-8.

After that, you get a full support for the selected encoding - the editor will correctly parse and display encoded characters and automatically encode characters pressed on the keyboard or pasted from the Clipboard.

Native Support of x64 Platform

Hex Editor Neo's data processing engine natively supports the x64 platform and utilizes all features provided by it, including extended register list, larger address space, new processor commands and full support for SSE2 commands.

Hex Editor Neo's installer automatically installs correct binaries (installation package contains compiled binaries for x86 and x64 platforms).

Parallel Operation

Starting from version 5.01, Hex Editor Neo utilizes multiple processors or cores when it performs complex lengthy operations. It also allows running multiple lengthy operations on several opened documents in parallel.

Programming Access

Hex Editor Neo has a documented programming interface that can be used by external code to access all powerful features of the Hex Editor Neo. This interface is implemented by an ActiveX component. When an external code uses functions provided by the component, the Hex Editor Neo's user interface is not required and not displayed.

The Scripting section contains in-depth description of the programming interface. Interface overview and detailed reference with a lot of sample codes in different programming languages, including `C++`, `JavaScript` and `C#`, are provided.

Features

This section contains a comprehensive list of Hex Editor Neo features. It also contains links to other parts of this documentation that describe a given feature in more detail.

Instantly opening files of any size

Hex Editor Neo does not force any limit on file's size. Any file supported by the underlying file system (FAT, FAT32 or NTFS) is supported.

Working with shared file

Hex Editor Neo may share edited files with other applications. Should another application make a change to a shared file, Hex Editor Neo detects it and allows you to either discard a change or to merge it with changes in the editor. Automatic file compare may be used to find differences between the current and previous version. As an option, all previous versions of a file may be kept by the editor and used in your work.

Opening volumes (logical disks)

Hex Editor Neo supports opening volumes (logical disks) for viewing and editing.

Opening physical disks

Hex Editor Neo supports opening physical disks for viewing and editing.

Opening process memory

Hex Editor Neo allows you to open virtual memory of any running process for read-only or read-write access.

Opening computer physical memory (RAM)

Hex Editor Neo provides a read-only view into the computer physical memory (RAM) - only on supported operating systems.

Full support for NTFS alternate data streams

Hex Editor Neo fully supports NTFS alternate data streams. A special NTFS Streams Tool Window displays all streams for the currently active file, allows you to delete or rename them, open them for editing or create new streams. In addition, the powerful Find Stream feature allows you to locate all streams on your computer.

Multiple Selection

Hex Editor Neo widely uses the concept of multiple selection. All Hex Editor Neo commands are fully compatible with multiple selection.

Selection Saving, Loading and Exporting

Selection object of any complexity can be compressed and saved to the file. Later, you may load this selection and/or merge it with an existing selection using different algorithms. In addition, all ranges in a selection may be copied to the Clipboard or saved to a text file. See the Working with Selection topic for more information.

Basic File Editing (write, fill, insert, delete, put/insert file, Clipboard operations, change file size, modify bits)

All these commands are described in detail in the Editor Commands documentation section.

Document Printing

Hex Editor Neo provides full support for printing documents with configurable margins, coloring, page headers and footers.

Data encryption and decryption

A whole document or a part of it may be encrypted and decrypted, using any installed block or stream cipher.

Data Operations

A large set of data operation (bitwise, arithmetic, shifts, case change and bit/byte reversing) are provided.

Text Clipboard Operations

In addition to basic Clipboard operations (moving data blocks between the same or different documents or exchanging file data with Windows Explorer); Hex Editor Neo is capable of pasting text from the Clipboard. Text may be pasted "as is" or parsed as a sequence of numbers (decimal, hexadecimal, octal or binary). Parsed numbers are then put into the document.

Different encodings

Hex Editor Neo supports more than 130 different encodings, configurable separately for each editor window. They are used to interpret and edit document's data in different formats. Starting from version 4.95, UTF-8 encoding is supported as well.

Find and Find All

Hex Editor Neo provides an extremely efficient implementation of Find and Find All commands. Full support for ECMAScript-compatible regular expressions is provided. The result of a Find All command is a multiple selection - a browseable and easily editable object.

Replace and Replace All

Hex Editor Neo provides an extremely efficient implementation of Replace and Replace All commands. Full support for ECMAScript-compatible regular expressions is provided. Replace pattern may also be a regular expression.

Find in Files & Replace in Files

Hex Editor Neo provides you with a simple and effective mechanism of pattern searching and replacing in files residing in different folders. This feature is described in more detail in the Find in Files and Replace in Files sections. Include streams option may be used to add alternate data streams to a search list. Full support for ECMAScript-compatible regular expressions is provided.

Unlimited Undo & Redo steps

In fact, a more advanced Operation History management is provided by the Hex Editor Neo.

Operation history browsing

Hex Editor Neo allows you to instantly switch to any history operation.

History Save & Load

An entire document's operation history may be compressed and saved to a file and later loaded from it, effectively restoring all operations performed on the document.

File comparison

Hex Editor Neo provides two file comparison algorithms, which are fast and accurate and can be used to compare text and binary data files.

Disassembler

Hex Editor Neo includes a disassembler module. The current implementation is capable of disassembling 32-bit x86 code, including support for FPO, MMX, SSE, SSE2 and 3DNow! instruction sets. It also supports disassembling of x64 images and .NET assemblies. Disassembler automatically searches for symbol files and uses the information from them to increase the assembly output readability. The Disassembler View may be connected to ordinary editor window which provides you with another handy data viewing and manipulation tool. The disassembler module works with files and processes' memory and is even automatically updated when you modify the document.

Patch creation

Hex Editor Neo supports creation of a patch, which represents the changes made to a document. The patch is saved to the file in a compressed format. A patch may then be freely distributed and applied on the same or another computer. A patch may be packaged inside the executable file. A Patch API is also provided to allow programmatic patch installation.

Editor Window customization

All aspects of an editor window are fully customizable. Several predefined schemes are shipped with a product.

Displayed data may be grouped as bytes, words, double or quad words and represented as hexadecimal, decimal, octal, binary integer numbers as well as single or double precision floating-point numbers.

Document's data may be represented in one of the listed view types.

Fully customizable user interface

Hex Editor Neo's interface is fully customizable. You can customize toolbars, tool windows, keyboard shortcuts and editor windows. You even have an option of choosing one of three window switching mechanisms.

Connecting Editor Windows

You can connect two editor windows with each other. This synchronizes cursor movement in both windows, which is an extremely useful editing technique in some scenarios.

Two Built-In Explorer Windows

Hex Editor Neo hosts two Explorer windows. Use them to browse your file system and network neighborhood. All standard operations are supported, including Clipboard operations and Drag&Drop. Explorer windows are tightly integrated with an editor and Find in Files feature.

File attributes

The Attributes Tool Window displays current file's attributes and allows you to modify them. It also displays the total number of streams in a file, size of all streams and total size of the file, including its unnamed and named streams.

Pattern Coloring

Hex Editor Neo can be configured to automatically highlight given patterns in its editor windows. See the Pattern Coloring section for more information. Full support for ECMAScript-compatible regular expressions is provided.

Data Inspector

Data Inspector Tool Window interprets data under the cursor in several formats. In addition, it supports highlighting data boundaries and allows data modification.

Base Converter

Base Converter Tool Window provides tools to convert data from one format or encoding into another.

Bookmarks

Hex Editor Neo's bookmarks provide you with an extremely flexible way of document navigation. You can define any number of bookmarks groups, exchange data between a bookmarks group and selection, save and load bookmarks and so on. See the Bookmarks section for more information.

Structure Viewer

The powerful Structure Viewer feature allows you to define data structures and bind them to specific locations in edited files. See the Structure Viewer section for more information.

Statistics

Hex Editor Neo contains tools that can be used to quickly compute several file statistics. See the Statistics section for more information.

Advanced Copy & Export

Hex Editor Neo provides an advanced data conversion tool. Selected binary data from the editor may be processed in a number of formats to produce a text output to be placed into the Clipboard or written to text file. Data may be converted into character string (more than 150 different encodings are supported); packaged as a sequence of numbers (to be put into spreadsheet application, for example) or as programming language array declaration (7 popular programming languages supported). In addition, data may be encoded in Base64, UUencode, Quoted-Printable, Intel HEX or Motorola S-Records formats.

Checksum Calculation

Hex Editor Neo supports more than twenty checksum calculation algorithms, including MD5, SHA-1, CRC-16, CRC-32 and others. Custom CRC algorithm is also provided.

Automatic updates

Hex Editor Neo can be configured to automatically check for released updates, display a list of changes, download and install updates (by your request).

File Document Scripting

Hex Editor Neo exposes its root functionality for external programs through automation-compatible ActiveX library. See the Scripting section for more information.

Native x64 platform support

Hex Editor Neo natively supports an x64 platform. A number of basic algorithms have been revised and optimized to use the powerful features available on this platform, including larger virtual address space, native wider registers and new processor commands.

Native support for high-DPI displays

Hex Editor Neo fully supports high-DPI displays. All Hex Editor Neo's user interface elements, including texts and icons, are properly scaled. As long as all graphics elements are rendered using vector technology, there are no artifacts on high-DPI displays. In addition, Hex Editor Neo allows you to change the size of icons on the main toolbar in a wide range. Hex Editor Neo supports both Windows XP and Windows Vista high-DPI implementations.

Native support of Windows Vista and its Aero interface

Hex Editor Neo fully supports the latest Microsoft operating system, Windows Vista (both 32-bit and 64-bit editions). It also takes a full power of its Aero user interface.

Support of Windows 7

Hex Editor Neo completely supports Windows 7 and also supports its new taskbar, with configurable task list, recent document list and progress indication.

Support for Intel HEX and Motorola S files

File » Open » Open Hex… and **Edit » Insert Hex…** commands allow the user to convert Intel HEX and Motorola S files to binary form and insert them into the Hex Editor Neo.

Volume Navigator

Built-in support for parsing NTFS volume structure, opening file and directory records and data locations. Ability to copy files, directories or entire volumes.

What's New

Version 6.25

This version adds a few new directives and attributes to the Structure Viewer language, adding look-ahead support to structure binding.

Version 6.20

Version 6.20 introduces the Settings Manager which centralizes application settings management.

Version 6.12

This version adds support for creating volume snapshots and opening files or entire volumes from these snapshots.

Version 6.01

This is a major release. This version introduces the following new modules, technologies and updates to current features:

Updated Data Inspector

This releases updates Data Inspector, adding support for custom types.

Updated Structure Library

Structure Viewer has been updated significantly, featuring separate library tool window, language and stability improvements.

Built-in Structure Editor

This version adds a built-in Structure Editor.

Volume Navigator

Volume Navigator, with support for NTFS volumes is capable of parsing NTFS volume structure on disk.

Version 5.14

This is a bug fix release. Fixed bugs:

Possible crash on startup on 64-bit systems

Hex Editor Neo could crash if launched on some 64-bit systems. Fixed.

Invalid editor window scrolling with mouse wheel

Editor window was scrolled incorrectly using high-resolution mouse wheel. Fixed.

Structure Viewer incorrectly compiled and bound some structures

Structure Viewer could incorrectly compile and bind some structure definitions, namely, the ones that contained huge arrays of static types. It could start allocating more and more memory and binding could take too long. Fixed.

Incorrect file opened after double clicking on error in Structure Errors window

Fixed.

Incorrect handling of multi-byte encodings

The editor incorrectly rendered Text Pane when multi-byte encoding was selected. This bug has been fixed.

Several reported bugs fixed

Several reported bugs, including application crashes, have been fixed.

Updated functionality:

Selection is now retained when number of columns change

Multiple selection is not dropped when you change the number of columns in the editor window.

Installer now keeps user settings on upgrade

Hex Editor Neo's installer now tries to keep user settings during upgrade from previous version.

Version 5.13

Due to significantly better compression of included images (mostly in documentation), this version greatly reduces the installation size and installed disk footprint. In addition, this version fixes following important bugs:

- Several bugs in Structure Viewer fixed
- Structure Viewer now respects the "Byte order change affects floating-point types" setting.
- Floating-point numbers in scientific format are now displayed correctly.
- Error saving changes to logical and physical disks Hex Editor Neo hung during saving of changes to logical and physical disks if the application was launched non-elevated on Windows Vista or later operating systems. Fixed.
- Rare crash on exit fixed Application could crash on exit. Fixed.

Version 5.12

This release introduces significant improvements to the Structure Viewer. See the What's New in Structure Viewer (version 5.12) topic for more information.

In addition, the following bugs have been fixed:

Crash in disassembler

Hex Editor Neo could crash when you invoked Disassembler in some situations. Fixed.

Updated and new functionality:

Language Pack storage location changed

This release changes the default language pack's storage location, allows user to change it and better supports language packs in portable mode: in addition to user-configurable storage location, language packs are also searched in `<program launch folder>\Localization` folder.

Some dialogs re-designed

Some dialogs were re-designed to better fit German localization.

Version 5.11

Fixed bugs:

`[noindex]` and `[noautohide]` attributes ignored

Structure Viewer ignored `[noindex]` and `[noautohide]` attributes. This resulted in incorrect behavior and increased memory usage. Fixed.

Proxy tab was missing from Settings

One of the recent updates incorrectly removed the Proxy settings tab. Fixed.

Crash after pressing Copy in Keyboard Map dialog

Program crashed after you pressed the Copy button in Keyboard Map dialog. Fixed.

Program crashed after saving downloaded update in non-default location

Program crashed when you tried to save to or execute the downloaded update from non-default location.

Structure Viewer's scheme loading bug

Hex Editor Neo could hang if you loaded Structure Viewer's scheme with multiple bound structures. Fixed.

New and updated features:

"All opened documents" mode for Find in Files feature

Find in Files/Replace in Files function now provides "All opened documents" pseudo-location, allowing you to perform an operation on all currently opened documents.

Automatic detection of Language Pack availability

Hex Editor Neo now automatically detects if on-line language pack for user's default language is available and offers to download it.

Improved Structure Viewer performance

Structure Viewer's compilation and binding time reduced by about 10%.

Version 5.10

This release adds support for localization. Language packs are created as part of open source project and will be available through built-in updater once they are finished.

The first available language pack is Russian.

Besides, this release fixes a number of reported bugs. Please consult the View Changes page for detailed information.

Version 5.01

Major update to Structure Viewer

This version has completely new Structure Viewer, with a lot of new functionality and improvements. See the What's New in Structure Viewer (version 5.01) topic for more information.

Parallel operations

Several operations, like Find All and Replace All, now utilize several cores or processors (if they are available). It does not give linear speed-up, but sometimes up to 30% performance gain is obtained. Performance gain is more noticeable in Replace All commands, especially in regular expression mode.

True parallel execution of all lengthy operations

Previous versions allowed you to execute multiple operations in parallel, but user interface was rather limited: for example, it did not allow you to finish the first operation before the second finishes. Now, all started operations are equal and are executed truly in parallel. Application user interface is not blocked. Only windows of the current document are disabled until the operation execution is completed.

Support for Intel HEX and Motorola S files

Advanced Copy & Export now allows exporting selection into Intel HEX and Motorola S formats. In addition, new commands, File » Open » Open Hex… and Edit » Insert Hex… allow the user to convert Intel HEX and Motorola S files to binary form and insert them into the Hex Editor Neo.

Additional information is displayed for several lengthy operations

For Find All, Replace All and other operations, the number of occurrences found so far is displayed on the progress dialog.

Completely rewritten Checksum module

Checksum module has undergone complete rewrite, featuring new algorithms, greatly improved performance and parallel execution. That is, when several algorithms are selected at once, Hex Editor Neo utilizes multiple cores or processors (if they are available) to execute them in parallel.

More hash algorithms are offered (the actual list depends on algorithms available through Cryptography API). More different ways to sum all values in a document or selection are offered, including signed and unsigned sums.

User interface for a Checksum module has also been improved.

Ability to copy/export the current selection

Hex Editor Neo now allows you to get the list of selected ranges into the Clipboard or directly to text file.

Improved experience when opening volumes and disks

Hex Editor Neo is now capable of opening volumes and disks in the same running instance, even if it runs under non-privileged user account.

Goto Navigation panel

Each editor window has its own navigation panel with individual location history.

Improved setup speed

Speed of Hex Editor Neo setup application has been greatly improved. Installer now needs to update less files and system settings and operates much quicker.

Improved application start-up time

We have improved the application start-up time by reducing time required by various components to initialize and allowing several components to initialize in parallel.

Improved Find in Files/Replace in Files commands.

New version provides better utilization of multiple cores as well as proper operation on single-core computers; smoother operation on SSDs.

Improved support for eastern languages

Hex Editor Neo now provides better visual output of eastern languages characters in text pane.

Version 4.97

Support for Using Regular Expressions in Replace Pattern

Replace and Replace All commands now support regular expressions as replace patterns, allowing you to refer to parts of matched expression when performing a replace.

Support for Encodings in all Commands that Work with Regular Expressions

Find, Find All, Replace, Replace All, Find in Files, Replace in Files, Pattern Statistics - all these commands now fully support currently selected encoding when they work in regular expressions mode.

New scripting methods

The following new methods are available in IFileDocument:

- IFileDocument.FindAllRegExp2
- IFileDocument.FindRegExp2
- IFileDocument.ReplaceAllRegExp2
- IFileDocument.ReplaceAllRegExpWithRegExp
- IFileDocument.ReplaceAllRegExp2S
- IFileDocument.PatternStatisticsRegExp2

Version 4.96

Integration with Windows Error Reporting

Hex Editor Neo now fully integrates with Windows Error Reporting. We will be able to receive each submitted crash or hang report, analyze it and provide a solution to the customer.

New Data Operations – Reverse Bits and Byte Swap

New Reverse Operations commands were implemented in this release. Use the first command to reverse the order of bits in each value in a selection and use the second command to reverse the order of bytes.

New Arithmetic Operations – Set Minimum and Set Maximum

Two new arithmetic operations allow you to limit each value in a selection.

Regular Expression Scheme Association

Structure Viewer now uses regular expressions to match a scheme with a the document.

Improvements in the editor

Various small bug fixes and minor improvements in the editor:

- Application now remembers the state of the Details Selection tab between launches.
- Keyboard focus is now moved into the opened document.
- Shift+Home and Ctrl+Shift+Home keyboard combinations now correctly update selection.
- Insert Mode can now be switched during editing.

Several Bug Fixes

Several reported bugs were fixed in Structure Viewer (see What's New in Structure Viewer (version 4.96) for more information) and Disassembler. In addition, reported errors in exporting selected data as Delphi array were fixed.

Version 4.95

UTF-8 Support

This release finally adds the UTF-8 to a list of supported encodings. Now it is not only supported in theAdvanced Copy & Export module, but also in editor windows, Structure Viewer and everywhere else.

Hex Editor Neo supports single-byte, two-byte, three-byte and four-byte UTF-8 characters. Please note, however, that Hex Editor Neo has limited support for UTF-16 surrogate pairs. See more information on UTF-8 support in the Encodings section.

Encodings in Structure Viewer

This release covers the last "hole" in encoding support in Hex Editor Neo - now Structure Viewer also uses the code page of the current editor window when it displays single-byte character arrays or strings.

Pasting Encoded Text

In this release, Hex Editor Neo also uses the current encoding when pasting text into the Text Pane of the current editor window.

Bug fixes

Several bugs were fixed in the Structure Viewer.

Version 4.94

This release introduces several bug fixes and a few improvements to various product functions:

- Ability to specify the proxy server to use. Configured proxy server will be automatically used by such features as Check for Updates, Downloader and Crash Dump Uploader.
- An additional column is added to the Open Disk dialog. It displays the physical drive information in a form of `\\.\PHYSICALDRIVEN`, where `N` is a disk ordinal number assigned by operating system. This allows you to distinguish between the same disks from the same manufacturer.
- All operations (bitwise, arithmetic and shift) dialogs now include the option "Whole File". You can use it to target an operation to a whole file without the need to select it first.
- Current bookmarks are now displayed in the Go to Offset dialog.
- Added an ability to manipulate the current selection directly from Go to Offset dialog. You can replace, add, remove or invert the current selection while changing the cursor offset in the document.

Portable Installations Improvements

Before this version, when you use the Hex Editor Neo in portable installation, it still uses the target system's registry and file system to store configuration data as well as temporary files.

Version 4.94 of the editor has been modified the following way:

1. On startup, Hex Editor Neo creates a key in the registry and imports the configuration data from portable.config file (located in the product startup folder).
2. On exit, Hex Editor Neo saves the configuration data back to this file and removes the registry key.

In addition, Hex Editor Neo stores vector image cache (used to decrease start-up time) in the user's profile temporary folder. You can switch off this behavior in the Tools » Settings..., General Tab.

Version 4.93

This release fixes a number of Structure Viewer bugs and further improves structure binding performance.

Here is a list of all changes in this release:

- New tool window layout "Structure Analysis" provides maximum working space for analyzing the document's structure.
- TGA file structure is updated to support run-length encoded images.
- Changed the displayed type name for bit fields. It now shows the number of bits a field occupies (for example: int: 4).
- More accurate structure binding progress update. In addition, a progress window may switch to the marquee mode

when binding complex structure with forward and backward pointers.
- A bug that prevented bit fields from being indexed is fixed. Now when you click on the cell which contains a bit field in the editor, the field is properly highlighted in Structure Viewer.
- The execution of the assignment statement (variable = expr;) is greatly optimized. Such complex iterative structures as AVI, TGA and others will benefit from this optimization.
- Structure Viewer now displays a single common progress when binding a structure that executes delayed binds (like PE header, for example).
- Structure Viewer tool window's main operations, like navigation, expanding/collapsing, scrolling and so on were optimized.

Version 4.92

General Bug Fixes

- Sometimes when **Compare Files** command was launched as Windows 7 task from the pinned application icon, it crashed after you pressed the OK button.
- Hex Editor Neo's patch files were incorrectly registered by setup.

General

- Hex Editor Neo now prevents the computer from going to sleep (unattended) when performing lengthy operation. This of course does not prevent the user to manually sleep the computer.
- Now there is an option to move the cursor to the end of the pasted data after the Paste operation (turned on by default).
- Now it is much more easier to select data with mouse. The behavior is more consistent with other Windows applications.
- All Hex Editor Neo commands (such as Edit » Fill..., Edit » Find..., Edit » Replace... etc) now respect the current window's encoding, when single-byte string type is chosen. The current encoding is also displayed in the command's dialog. Note: when using regular expressions, default system encoding is always used.
- Current editor window's encoding is also respected by Pattern Coloring module.
- Mouse wheel scrolling now correctly works with high-definition mice.

Structure Viewer

Bug Fixes

- Incorrect scope resolution for complex array indices.
- Empty structures incorrectly had zero alignment, breaking any structure that referenced them.
- Hex Editor Neo could crash when expanding `string` or `wstring` values.
- When a script file referenced by a structure definition file was modified, Hex Editor Neo did not refreshed it properly, although notified the user of the change.
- Enumeration visualization could produce incorrect results, if you used signed values in an unsigned enum.
- Structure Viewer tool window could incorrectly display vertical lines.

New features

- New statements: while, for and do...while.
- $print directive now does not automatically convert its argument to string; instead it uses Structure Viewer's data visualization engine. This allows it, for example, to respect the “Display Hex Values” setting when displaying integer values.
- For pointed types, not only the pointer value, but the snapshot of pointed type contents is visualized on a line (as it is for arrays and structures). In addition, a computed address is also displayed.
- JavaScript code now may be specified inline with a new `javascript` keyword. Note that `VBScript` code must still be referenced with #pragma script directive.
- Structure Viewer now uses the current editor window's encoding when displaying non-Unicode strings.
- PE header sample has been greatly enhanced. Now it parses more PE file structures, including import and export directory, resource directory, base relocation table, debug directory and others. It also illustrates how to use Javascript to extend the power of Structure Viewer's declaration syntax.

Checksum

- Click-and-calculate feature implemented: non-computed checksum value is automatically computed when you double-click it (no need to click checkbox and then Refresh)

File Compare

- File Compare tool window’s commands are now application-wide commands. You can put them on the toolbar or assign keyboard shortcuts to them.

Clipboard

- Now Edit » Copy and Edit » Cut commands automatically put selected data in text format into the Clipboard. Copy & Export tool window is still used to fine-tune the format used.
- “Formatted Values” copy&export mode now allows exporting data without separators (as text stream).
- “Raw Text” copy&export mode also lists "Current Encoding" as encoding type. When selected (default), encoding from the current editor window is used.

Version 4.91

This version features a completely rewritten setup for Hex Editor Neo.

Transactional Installation

Setup now performs installation of the product as a single transaction (on supported operating systems and configurations, see below). If anything goes wrong during installation, including software or hardware errors, computer configuration is not modified. All setup activities are part of the transaction, including modifications done to the file system and system registry.

Setup always tries to use transactions on supported operating system. If installation fails due to the transaction error, it retries the operation without using transactions. It also does not use transactions on legacy operating systems.

Restart Manager Support

Now, when setup needs to replace or remove a locked file, it uses the system restart manager (Windows Vista or later) to find the application that has a file open. It also offers a way to gracefully restart the application in order to update the file. This new feature greatly reduces the need for system restart during setup.

On legacy operating systems setup emulates the restart manager's behavior, still trying to minimize the need to restart a computer.

Per-User Installation

In addition to the previous, “per-machine” installation mode, a new installation mode is offered. It allows the user to install the application only for himself. In this mode, setup does not modify any per-machine settings. In addition, a user does not have to have administrative rights to install the Hex Editor Neo. After the product is installed in per-user mode, it is not visible to other users of the computer, but may also be installed by them in per-user mode.

Limitations

Take the following limitations into account when installing Hex Editor Neo in per-user mode:

On Windows Vista and later operating systems, standard user (and even computer administrator without elevation) does not have enough privileges to create System Restore points. This does not apply to administrator user on Windows XP computer. Setup always tries to create a system restore point, but will silently ignore this step if it does not have enough privileges.

Portable Installation

Another new installation mode is used to make a portable copy of Hex Editor Neo. Once installed, the copy of the product may be transferred to other locations, or to other computers where it can be used without installation. In this mode setup allows the user to install the product on the removable media and network shares.

Limitations

Take the following limitations into account when installing Hex Editor Neo in portable mode:

- Setup does not create shortcuts, does not update system registry and does not publish installed application (it will not appear in Add/Remove Programs Control Panel applet (Programs and Features starting with Windows Vista).
- You will need to manually delete product installation folder in order to remove the product from your computer.
- Setup does not register Hex Editor Neo's type libraries, preventing you from using the product in scripting environment.
- Setup does not register Windows shell extension, making “Edit with Hex Editor Neo” and "Edit with Hex Editor Neo (shared)" context menu options unavailable.

Command-line Parameters

New Hex Editor Neo's setup allows you to specify several parameters on the command line:

Parameter	Description
`-silent`	Suppress any user interface dialogs during setup
`-uninstall or -u`	Turn on uninstall mode
`-portable`	Turn on portable mode
`-prop INSTALLDIR=[path]`	Specify the installation folder location. Must end with a backslash.
`-user`	Turn on per-user mode
`-machine`	Turn on per-machine mode

Examples:

This will install Hex Editor Neo in per-user mode into the “c:\Programs\Hex Editor Neo” folder:

PowerShell

```
hex-editor-neo.exe -user -prop "INSTALLDIR=c:\Programs\Hex Editor Neo\" -silent
```

This will uninstall the Hex Editor Neo:

PowerShell

```
hex-editor-neo.exe -u -silent
```

Version 4.85

Below is a list of changes in Hex Editor Neo 4.85:

Shared Files Support

Hex Editor Neo is now capable of working with files shared with other applications. Using theFile » Open » Open Shared File... command you can open a file in the editor, at the same time allowing other applications to make changes to the file.

This feature is supported on all operating systems Hex Editor Neo natively supports. A shared file may be located on a local, removeable or remote media formatted with any supported file system (FAT, FAT32, NTFS, ExtFS...)

After you open a shared file, Hex Editor Neo starts watching for file's modifications. If another application makes changes to a file, Hex Editor Neo displays aShared File Conflict Dialog which gives you options to ignore a change, update editor's copy, and/or merge changes with local changes.

In addition, for all “update”-kind options you may instruct the editor to compare the new version with a previous one. Two file comparison algorithms provided by File Compare module are supported. Hex Editor Neo also allows you to retain older versions of a file in the editor. You may edit these old versions as any other kind of document in the editor, save your changes and so on.

Hex Editor Neo also detects file deletion. In this case it gives you an option to close a file or continue working with it, retaining all the changes you made to a file.

A configurable option exists which governs how Hex Editor Neo reacts on file renames. If enabled, renaming a file in another application (like Windows Explorer, for example) automatically changes the file's name in Hex Editor Neo's interface (without any prompts).

Single selection mode option

“Single selection mode” option, which was previously only available in General Settings page (under name "Auto drop selection"), is now also available from the Select menu and on Selection Tool Window's toolbar.

In addition, a number of reported bugs have been fixed in this release.

Version 4.83

This version fixes a potential crash on application exit and introduces new formatted text output format: Assembler array.

In addition, MBR format (for Structure Viewer) definition is fixed (see mbr.h).

Version 4.82

Below is a list of changes in Hex Editor Neo 4.82:

Restore original file attributes

File Attributes tool window now offers a way to restore original file attributes, even after you modify them and apply your changes.

Auto completion in Explorer

Address bar in Explorer tool window now offers autocompletion.

NTFS streams support in File Compare

When compared files are identical, they are also checked for one or more alternate streams. A user is warned if two identical files contain NTFS streams.

2D graph in Statistics.

Statistics Tool Window now provides you with two graphical data representations, instead of one.

Extended goto in Disassembler

Goto command in Disassembler Window now allows you to go to a named function or method. Autocompletion is supported.

In addition, the following reported or known bugs were fixed:

Elevation bugs

When Hex Editor Neo elevates itself (on Windows Vista or later operating systems), elevate.exe process is not terminated and remains running forever. Fixed.

Invalid progress bar

Invalid progress bar is displayed for some operations. Fixed.

Crash in operations

Bitwise, arithmetic, shift and case change operations may crash when used in some configurations. Fixed.

Version 4.81

Below is a list of changes in Hex Editor Neo 4.81:

Full history tree window

You can now view the entire document change history in a special window. History is represented as a tree with a node for each document change. You can quickly switch between states, get more information about each state or execute one of the purge commands. Comfortable zooming and panning features are provided by the window.

Complete rewrite of command routing and toolbar customization system

This release brings completely new version of the command routing and toolbar customization subsystem. We have greatly optimized Hex Editor Neo's startup and runtime performance and brought greater flexibility to user interface customization. Built-in and user-created layouts now not only affect tool windows, but also change commands on default toolbars and size of their buttons.

Checksums and Statistics now store per-document information

Checksums module and Statistics module now store per-document information. For example, you calculate statistics for a document, switch to another one and calculate statistics for it as well. Now, if you switch back to the first document, Statistics tool window will immediately display information it previously calculated for the first document.

Changes in the Free Edition End User License Agreement

Free version's EULA now grants commercial usage of the free edition of the Hex Editor Neo.

Improved Explorer integration

“Edit with Hex Editor Neo” shortcut menu option is now added to drives as well.

Improved Windows dialog

Windows dialog (it displays a list of all opened editor windows) now automatically activates a window under the cursor. There is no need to click the Activate button anymore.

In addition, the following reported or known bugs were fixed:

Several bugs in Structure Viewer

A number of non-critical bugs were found and fixed in Structure Viewer.

32-bit integer types (both signed and unsigned) were incorrectly handled in big-endian mode. Note that this did not affect 32-bit signed and unsigned long types. This bug is fixed as well.

Decrypt function is not working

On some computers it was unable to run a Edit » Decrypt… command. This has been fixed.

A lot of small glitches that were in our "suggestion queue" have finally found their time to be fixed in this release.

Version 4.76

This release focuses on major performance improvement in one of the core Hex Editor Neo components, responsible for working with large files. (Hex Editor Neo considers files bigger than 64 MB on 32-bit systems and bigger than 128 MB on 64-bit systems as large files).

Careful optimizations and wiser use of system resources allowed us to greatly optimize this core component. As performance of most editor functions depends on it, we have managed to improve the speed of various functions from 2x to 8x!

The most boost is displayed in "cheap" operations, like General Statistics and Pattern Statistics, moderate boost in heavier functions as Replace All and less boost in "heavy" functions like Find All, for example.

In addition, document saving performance has also been greatly improved. On some of our test platforms, file copying (File » Open command followed by File » Save As… command) works faster than in Windows Explorer!

In addition, several reported bugs have been fixed.

Version 4.75

New and updated features in this release:

Revised Operation History

User interface for document operation history has been completely revised. Now it is much more comfortable to use one of the most powerful and unique Hex Editor Neo's features - history branches.

Application load-time improvement

A lot of attention in this release has been paid to reduce the time Hex Editor Neo needs to launch.

Offset display type

An offset (or address) may now be displayed as hexadecimal, decimal or octal numbers.

New view types

In addition to hexadecimal, decimal, float and double, data in editor windows may now be displayed as octal and binary values. All Hex Editor Neo's commands and modules are also compatible with new view types, including Copy & Export module.

New range rule type in Pattern Coloring

Pattern Coloring introduces a special rule type: range rule. For range rule, you define a range which is then hilighted in a document.

Advanced support for Editor Window settings

You can now configure the default editor window settings on special settings page (Tools » Settings » Editor). These settings include offset display type, data display type and grouping, byte ordering, a number of columns, character encoding and visibility of code pane and text pane. In addition, there is a special option to associate a different set of window settings for each opened document and restore them next time the document is opened.

In addition, several known and reported bugs have been fixed.

Version 4.73

New and updated features in this release:

Windows 7 Beta support

This release introduces support for new cool features of the Windows 7 Beta taskbar. Progress indication and jump lists are fully supported and utilized by the Hex Editor Neo, and in addition, user is in control of customizing the tasks presented on the taskbar.

Structure Viewer

New structure formats: RAR, ICC, VHD, ZIP, TIFF, WAV, TGA, PSD, PIC, PCX, PAL, EMF, EPS, CAB, MBR, CDA.

New column: Size (to see the size of the field).

See also below for a list of fixed bugs.

File Compare

Recompare Files command added.

Color picker dialogs

A color may now be selected with a double-click.

Bugs fixed in this release:

Structure Viewer

The following bugs are fixed:

- Nested pointers are not supported.
- Array size is parsed incorrectly if multiplication is used in size expression.
- Invalid script file causes a crash.
- Several parser bugs fixed.

Find in Files

Deadlocks and possible crashes were fixed. In addition, performance for the feature has been increased.

Explorer

Several bugs are fixed in Explorer and it is now compatible with Windows 7 Beta.

Version 4.72

New and updated features in this release:

Disassembler

Version 4.72 brings support for x64 executable files.

In addition, a bug that sometimes lead to program crash has been fixed.

Version 4.71

New and updated features in this release:

Disassembler

Version 4.71 brings support for .NET assemblies. It also features an updated disassembler view window, with support for fast navigation, selection of assembly text, column configuration and much more. It also allows you to display an assembly listing in AT&T format.

Disassembler has an improved quality of the assembly listing. Module imports are now also analyzed and displayed, in addition to symbols.

Structure Viewer

The most of the new functionality is within the Structure Viewer module again. It now understands newbuilt-in types, statements and directives. It also supports variables, constant and variable arrays and expression evaluation with dynamic type inferring.

This release eliminates most of previously imposed limits on structure size, array size etc. TheStructure Viewer Tool Window has been updated to easily handle billions of items with very fast and clean navigation. Commands like Expand All and Collapse All will take less than a second expanding/collapsing a structure with a billion of items. If you bind a complex structure to a huge file (for example, AVI), you can estimate the editor to easily carry the job without running out of memory.

A number of handy features, such as Synchronize Position (which works “both sides” - from structure to document and from document to structure), Mouse over field tracking (which highlights a field under the mouse cursor) greatly simplify the file structure analysis.

Structure definitions may extend their functionality by referring to functions written in JavaScript or VBScript. These functions have access to the underlying parser and document, thanks to the IFileDocument and IParser interfaces, exposed to them by the Hex Editor Neo.

The overall compilation and binding performance has been greatly improved.

There is a special topic in this documentation that describes the changes in the Structure Viewer module.

Copy&Export

The Advanced Copy & Export module now follows the model offered by the editor window. It now allows you to execute the Copy and Export commands with no selection present. In this case, a cell under the cursor is copied/exported.

The current byte order is now taken into account when performing copy or export functions.

It also offers an option to configure the number of digits to be exported for floating-point and double precision floating-point types.

Refresh View Command

When working with logical or physical disks, process or physical memory, this command allows you to refresh the editor window to display any possible changes to the underlying data, performed by some other application or operating system.

/s Command-Line Parameter

When launched with "/s" command-line parameter, Hex Editor Neo forwards the list of files to open to an already running instance, if there is one.

"Display cursor address on the left" Option

Several customers complained about the address of the cursor location being displayed at the start of the line. Now this functionality can be switched off. See the General Settings topic for more information.

Reverse Sorting on Statistics Columns

Statistics window now allows you to sort columns in both ascending and descending order in its table mode.

New IFileDocument Methods to Be Called from Scripts

A previously introduced ISequence object was called to make it possible to call methods of the IFileDocument interface from scripting languages (such as JavaScript and VBScript). Although, our tests has shown, that in some cases it is still impossible for a script to call one or another method due to the limitations in the Automation model and the way scripting engines are implemented.

This release finally resolves the problem by providing a special variant of each affected method. Every such variant may be easily called from the scripting languages.

Go to in Process

Go to in Process command now interactively updates the cursor position when you click on the image sections or modules (without closing the Go to window).

UI Sugar

You can now make any tool window appear as a tabbed document. That means that the tool window will not be dockable to one of the four sides of the main window anymore, nor it will float over the main window, but instead will be placed where all editor windows reside. You may then take advantage of the Editor Window Placementfeature to position a tool window.

Each tool window now also memorizes its floating position separately of its parent frame.

Ctrl+Mouse Wheel now quickly changes the font size in an editor window. This is a quick way to change a font size without using the Layouts dialog.

The following is a fixed bug list:

Purge All History and Load History Commands

These commands did not work properly in Free Edition mode.

Copy&Paste Bugs

Several bugs with copying and pasting document data have been found and fixed. This may include several application crashes.

A Lot of Minor Bugs

Quite a few of minor bugs or inconsistencies were found and fixed throughout the product.

Version 4.64

New and updated features in this release:

Structure Viewer

Structure Viewer has been completely redesigned and rewritten. It now supports a sophisticated structure definition language with expression evaluation, pointers and bit fields, case unions and assertions, constants and enumerations and much much more.

In addition, C99-compliant preprocessor is run before a source file is compiled, a preprocessor with full support for macros and conditional compilation.

Source files are optimized and saved into precompiled files, which are then quickly loaded by Hex Editor Neo on demand. Structure binding performance has also been greatly increased.

In addition to the ability to bind a structure to an absolute or relative address or to a cursor position, a structure may now be bound to an expression. This expression may reference constants and enumerations declared on the global source file scope or even reference previously bound structures.

Scripting

New Sequence Object provides scripting languages (such as JavaScript and VBScript) a way to build a pattern and pass it to File Document Object methods that require a pattern.

Version 4.51

A number of reported bugs are fixed in this release. Hex Editor Neo version 4.51 introduces a major performance boost.

Thanks to a new internal data structure and handling algorithms, a major performance boost is found in the following functions:

- Fill, Delete, Cut and Paste - when they operate over a multiple selection - have up to 3x performance boost.
- Find All, File Compare, Selection Loading - up to 10% performance boost.
- Replace All - from 1.5x to 2x performance boost.

Similar numbers refer to Find in Files and Replace in Files functions.

New features in this release:

Disassembler

Hex Editor Neo now includes a disassembler module. The current implementation is capable of disassembling 32-bit x86 code, including support for FPO, MMX, SSE, SSE2 and 3DNow! instruction sets. Disassembler automatically searches for symbol files and uses the information from them to increase the assembly output readability. The Disassembler View may be connected to ordinary editor window which provides you with another handy data viewing and manipulation tool. The disassembler module works with files and processes' memory and is even automatically updated when you modify the document.

Regular Expressions

Find, Find All, Replace, Replace All, Find in Files, Replace in Files, Pattern Coloring and Pattern Statistics commands and modules now fully support regular expressions. ECMAScript-compatible implementation of regular expressions provides you with extreme power ever found in binary editors. Very efficient implementation of “bulk” commands (Find All, Replace All, Find in Files and Replace in Files) combined with unique features of Hex Editor Neo's multiple selection feature, together form an invaluable editing tool. A concept of named regular expression classes even allows you to define recursive grammars.

Window Switching

Hex Editor Neo now provides fast and convenient tool that can be used to instantly activate any visible tool window or editor window. When you press Ctrl + Tab or Ctrl + Shift + Tab (user configurable), a navigation window is displayed. It provides the list of visible tool windows and all opened editor windows for you to activate. See the Window Switching section for more information.

Code Pane

Hex Editor Neo now provides you with a method to completely hide a code pane, leaving only the text pane visible. Combined with the auto columns mode, it is a powerful tool to edit text or binary-text data.

Default Layouts (Three Different Ones)

When you run the Hex Editor Neo for the first time, you are provided with a choice of default working layout. You can choose between a “Novice User Layout”, "Advanced User Layout" and “Expert User Layout”. You can later change the chosen layout or make your own. See the Default Layout section for more information.

Version 4.41

Version 4.41 fixes a number of reported bugs and introduces some performance optimizations. New features in this release:

Case Change Operations

Hex Editor Neo now offers three new Data Operations: Lower Case, Upper Case and Invert Case. Case change operations take into account current encoding and are capable to work with Unicode data.

Application-Wide Byte Order Support

Hex Editor Neo now fully supports both little-endian and big-endian byte orders. Different byte order can be set separately for each editor window and there is an option that controls whether floating-point types are affected by byte order change. Byte order change commands have been removed from Data Inspector and Structure Viewer modules, as they now respect the byte order configured for a window.

Modify Bits Command

New Modify Bits command allows you to see a visual binary representation of the number and modify individual bits.

Printing Support

Full printing support is now available in Hex Editor Neo.

Copy and Cut Work Without Selection

Copy and Cut commands can now be used when there is no selection in the current editor window. In this case, only the cell under the cursor is copied/cut into the Clipboard.

Version 4.33

Hex Editor Neo version 4.33 fixes a number of reported bugs. Affected modules:Data Inspector, Structure Viewer, NTFS Streams, File Compare.

It also adds the “Hide All Tool Windows” command on the toolbar so you can quickly maximize the workspace and then return to the previous configuration at one mouse click.

Version 4.32

Hex Editor Neo version 4.32 fixes a number of reported bugs and introduces a lot of new cool features. New features in this release:

New Document Types

Hex Editor Neo is now capable of opening volumes, physical disks, process virtual memory and computer physical memory (on supported operating systems).

New Editor Commands

Encrypt and Decrypt commands may now be used to encrypt and decrypt a document (or part of it), using one of the installed block or stream ciphers.

A large set of new data operations: bitwise (NOT, OR, AND, XOR), arithmetic (Negation, Addition, Subtraction, Multiplication, Division and Remainder) and shift (Logical Left and Right, Arithmetic Left and Right and Rotation), are provided. They operate in linear time (depending on selection's complexity), that is, for single-range selection they execute immediately, regardless of data size.

File Comparison

Hex Editor Neo provides two methods, simple comparison algorithm and difference algorithm to locate changes between two files.

Little-endian/Big-endian in Structure Viewer

Structure Viewer may now be switched between little-endian and big-endian data representation.

Version 4.21

Hex Editor Neo version 4.21 fixes a number of reported bugs, provides a number of optimizations as well as introduces new cool features. New features in this release:

Performance Optimizations

This release has undergone several performance optimizations resulted in significant speed-ups in the following commands and features:

- A special image cache speeds up application loading time. This special cache stores pre-rendered vector images (which are used throughout the Hex Editor Neo) to significantly reduce the application startup time, which was very small even before this cache was implemented!
- A number of algorithm improvements allowed several editing functions to operate much faster and consume much less RAM. This include typing, inserting and deleting (with complex multiple selection).
- Several improvements were made to the Find in Files feature, leading to much less memory consumption by this function.
- File saving algorithms undergone several optimizations leading to smoother and faster saving.

NTFS Streams Support

Hex Editor Neo now fully supports NTFSalternate data streams. A special NTFS Streams Tool Window displays all streams for the currently active file, allows you to delete or rename them, open them for editing or create new streams.

In addition, the powerful Find Stream feature allows you to locate all streams on your computer.

File Attributes has also been updated to display more information related to streams: the total number of streams, size of all file's streams and the total size occupied by a file (including all its alternate streams).

Find in Files now has an option "Include streams" that you may use to include alternate data streams in Search or Search and Replace operations.

Version 4.11

Hex Editor Neo version 4.11 fixes a number of reported bugs as well as introduces new cool features. New features in this release:

Built-In Explorer

Hex Editor Neo now has two Windows Explorer-like windows as part of its user interface. They can be used to perform usual file and folder operations and also tightly coupled with Hex Editor Neo. For example, you can open files in the editor by double-clicking them in the Explorer window simply dragging them to the editor's window.

Encodings

Hex Editor Neo is now capable of displaying text in the text pane according to a selected encoding. More than 130 different encodings are supported (subject to installed code page files and fonts). When the cursor is in the text pane, typed characters are also converted using the selected encoding. Encoding can be set separately for each editor window. Different ANSI, UNICODE, ISO, OEM, MAC, EBCDIC and country-specific encodings are supported.

Checksum Calculation

Hex Editor Neo supports 16 checksum calculation algorithms, including MD5, SHA-1, CRC-16, CRC-32 and others. Custom CRC algorithm is also provided. You can compute the checksum for the whole file or for the current (multiple) selection. Several checksums may be computed at the same time. Results are easily exportable and copyable to the Clipboard.

Advanced Copy & Export

Selected document data may now be converted into a number of supported text formats and placed into the Clipboard or exported to a file. Space-separated or comma-separated numbers, raw text with selected encoding, programming language array declaration, Base64, UUencode and Quoted-Printable are among supported formats.

Pasting Text

Text may now be pasted into the editor. Depending on the active pane, the text is either pasted "as is" (if the text pane is active), or parsed as a sequence of hexadecimal or decimal integers (if the code pane is active).

Version 4.01

Version 4.01 is an absolutely new release, designed and developed from scratch. It does not contain any code from the previous product version.

On the other hand, Hex Editor Neo shares some code base with ourSerial Monitor and USB Monitorproducts, which are part of the Hex Editor Neo product.

Hex Editor Neo retains all interesting and useful features of its predecessor, such as multiple selection, multiple editor windows, vector icons and bookmarks, but implements all these features in a new way, significantly lowering memory requirements and increasing performance and stability.

The performance of all functions has been significantly increased. Several functions that previously executed in several steps now execute in one step (this includes Replace All command, for example).

Hex Editor Neo does not longer support Windows 98 and Windows ME operating systems. But the list of supported operating systems has actually increased:

- Windows Vista (x86)
- Windows Vista (x64)
- Windows XP (x86)
- Windows XP (x64)
- Windows Server 2003 (x86)
- Windows Server 2003 (x64)
- Windows 2000

Pentium III or newer processor is now required by the Hex Editor Neo.

A lot of new features have been implemented in this release. The full list is provided in the Hex Editor Neo's Features section.

Definitive Guide

User Interface Elements

Commands

All functions of the Hex Editor Neo are invoked through commands. For convenience, almost every command is accessible using several user interface tools:

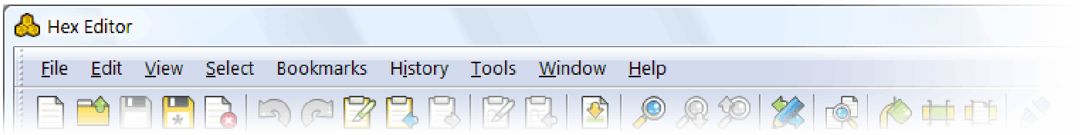
- Each command is accessible through the main menu. Several commands used to execute local actions of specific tool windows are accessible through context, or shortcut menu. Shortcut menu is invoked by clicking the right mouse button, or by pressing “Context Menu” keyboard button (usually located next to the right `Ctrl` key).
- Most commands are also displayed on toolbars. Two kinds of toolbars are used in the Hex Editor Neo. Main toolbar is located right under the menu bar and is fully customizable. You can also create new toolbars and place them near the menu bar. Other toolbars, which are not customizable, are located in tool windows and contain the most used commands that are specific for those tool windows.
- Several most used commands have associated keyboard shortcuts or hot keys. Pressing such associated key or key combination invokes the command. You can change assigned key combinations as well as assign new key combinations to other commands.

All commands described in this documentation are mentioned by their location in the main menu. For example, the **Open...** command, located under the **File** main menu item is referenced as File » Open.... Other examples are File » Close for a **Close** command under **File** menu and **Tools » Settings...** for a **Settings...** command under **Tools** menu.

By convention, if ellipsis symbol (...) terminates menu item's name, it means that user is required to provide additional information to execute this command. This may include displaying a dialog box, asking for confirmation etc. For example, the File » New command does not require any additional action from you, while the File » Open... command opens a File Open dialog, therefore requiring you to provide additional information.

Main Menu

Main menu bar is located at the top of application window, right under the title bar.



Main menu contains almost all commands implemented by the Hex Editor Neo. It is structurally divided into the following groups:

File

Contains commands related to creating, opening, saving and closing of documents.

Edit

Contains all editing commands, Clipboard commands, Edit » Undo and Edit » Redo commands.

View

Contains the list of tool windows, commands to export/import tool window configuration or load a predefined configuration. It also contains commands that can be used to switch the layout of editor window.

Select

Contains commands that manage a current selection.

Operations

Contains commands that perform bitwise, arithmetic and shift operations on an opened document.

Bookmarks

Contains commands that control the Bookmarks Tool Window.

NTFS Streams

Contains commands that are used to manage file's alternate data streams.

History

Contains commands related to operation history management.

Tools

Contains commands that control different tool windows, including Pattern Coloring, Structure Viewer, Attributes, Statistics and Data Inspector. The Tools » Settings… command is an entrance to the central place where you fine tune the Hex Editor Neo by changing different options.

Window

Contains commands that manage the number and location of editor windows.

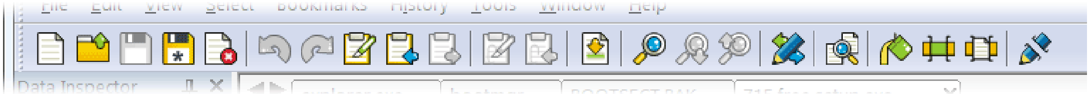
Help

Contains commands that can be used to access this documentation file, check for program updates, display keyboard map (a table of associated shortcuts) as well as display information about the Hex Editor Neo.

Select and Window menu are hidden when there are no documents open in the editor.

Toolbars

Toolbars present a subset of Hex Editor Neo commands to the user by means of displaying commands' images. Main toolbar and user created toolbars are located under the menu bar:



To execute a command located on the toolbar left-click its image. If you hold a mouse pointer over an image for a while, command's name is displayed in a tooltip window, along with assigned keyboard shortcuts. More detailed command description is displayed on the status bar at the same time.

Main toolbar, as well as user defined toolbars, are fully customizable. You can quickly change the order of commands on the toolbar using the following procedure:

1. Press and hold an Alt key.
2. Locate the mouse cursor over the command you want to move to another location.
3. Press the left mouse button.
4. Drag mouse to another location and see how the command moves within the toolbar.
5. Release a left mouse button to “drop” a command on its new location. Release an Alt key as well. If you moved mouse away from the toolbar, the command is removed from the toolbar.

You can also create toolbar separators using this procedure.

Advanced toolbar customization is described in the Toolbar Customization topic. For example, in addition to command arrangement you can smoothly change the size of toolbar images.

Toolbars located in tool windows are not customizable and contain commands related to the tool window where they are located.

Keyboard Shortcuts

Hex Editor Neo associates a number of itscommands with keyboard shortcuts. You can always see the list of all currently assigned shortcuts using the Help » Keyboard Map command. The list of assigned shortcuts may also be printed for reference or copied to the Clipboard to be used in another application.

Most commands that are present in other applications, like File » Open…, File » New, File » Save, Edit » Find… and others are assigned standard Windows shortcuts (`Ctrl+O`, `Ctrl+N`, `Ctrl+S` and `Ctrl+F` for listed commands) by default. For those commands for which several standard shortcuts exist (like the Edit » Replace… command, for which both `Ctrl+H` and `Ctrl+R` are widely used), several shortcuts are assigned by default.

We also refer you to Keyboard Customization section where it is illustrated how you can change default keyboard shortcuts or create your own.

Tool Windows

Tool windows are a special-purpose windows that are always visible to the user (unless they are hidden) and always ready to perform a task. The following Hex Editor Neo features and functions are implemented as tool windows:

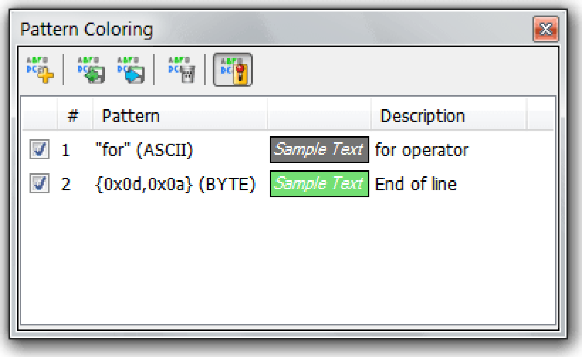
- Operation History
- Selection
- Pattern Coloring

- Structure Viewer
- Statistics
- File Attributes
- Find in Files
- Downloader
- Data Inspector
- Base Converter
- Structure Library

Location

A tool window may either be floating or docked to the application frame. A docked tool window may also be auto-hidden. All these terms are described later in this section.

Floating Tool Window



	#	Pattern		Description
☑	1	"for" (ASCII)	Sample Text	for operator
☑	2	{0x0d,0x0a} (BYTE)	Sample Text	End of line

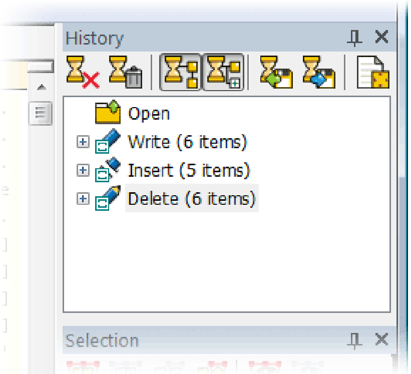
Floating tool window is convenient when you want to maximize the working space used by editor windows. It may be positioned outside of the main application window, and may even be located on another monitor if you have it connected to your computer. This is contrary to the docked tool window, which may only be located within application window.

The position of the floating tool window may be changed by dragging it by its title with a mouse. You can also use mouse to change the size of the floating tool window by dragging either its frame or one of four corners.

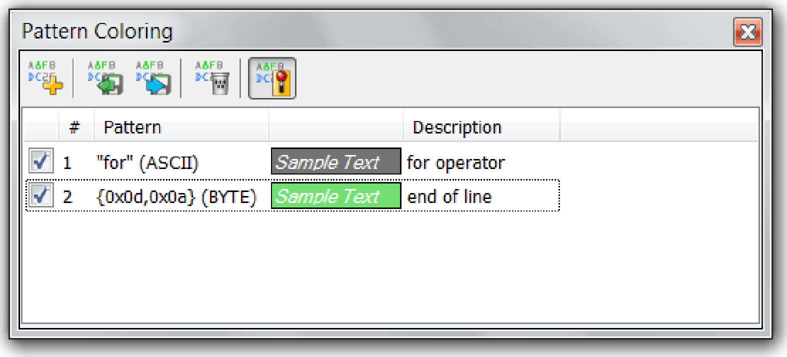
The important thing to have in mind while working with floating tool windows is the keyboard focus. Operating system directs all keyboard input to the window owning keyboard focus. Usually an active title is used to indicate the window that has keyboard focus. Blinking caret may also be used to indicate the focused window. Activating floating tool window by a mouse click always brings a keyboard focus to this window, allowing you to provide input to the window. Clicking outside of the floating tool window usually takes a keyboard focus away from it. To continue sending keyboard input to the tool window, you may need to activate it again.

Docked Tool Window

A tool window may also be docked. When docked, it is attached to a tool window frame. A frame may be attached next to another frame or directly to the top, left, right or bottom side of application window. Frames may be located next to each other, inserted one into another and merged. Each frame contains at least one docked tool window and may also contain several. Below is a screenshot of a frame with a single tool window docked to the right side of application window:



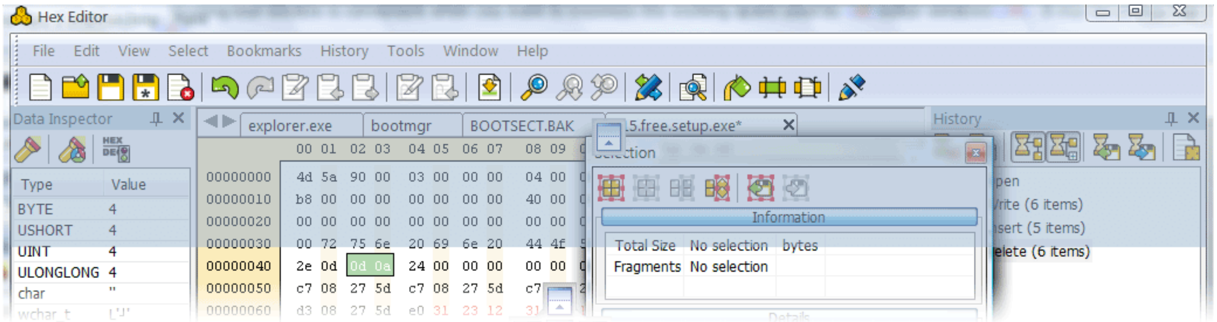
Here's another example, where frame contains several docked tool windows. Several docked windows are tabbed within a single docked frame:



	#	Pattern		Description
☑	1	"for" (ASCII)	Sample Text	for operator
☑	2	{0x0d,0x0a} (BYTE)	Sample Text	end of line

You can dock any tool window by dragging it by its title bar or tab. During dragging, special placeholders appear on the screen. When you move the mouse pointer over the placeholder, semi-transparent rectangle appears on the screen, indicating an approximate position of the docked window. Releasing the mouse button docks a window in the indicated position.

Side placeholders always appear, allowing you to dock a tool window into a new frame and attach it to the top, left, right or bottom side of the application window.

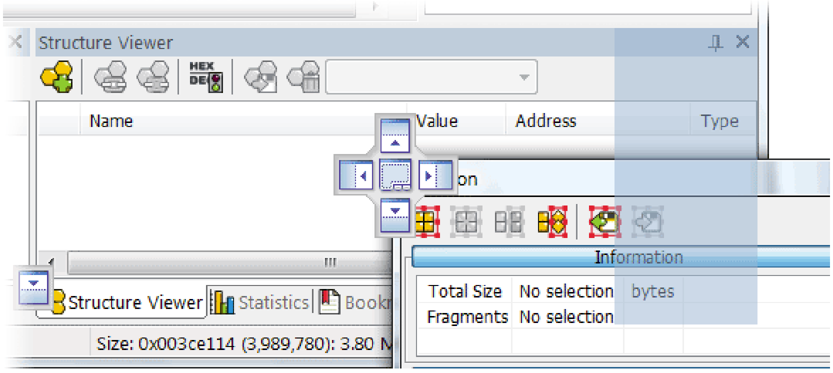


Type	Value
BYTE	4
USHORT	4
UINT	4
ULONGLONG	4
char	''
wchar_t	L''

```
         00 01  02 03  04 05  06 07  08 09
00000000 4d 5a  90 00  03 00  00 00  04 00
00000010 b8 00  00 00  00 00  00 00  40 00
00000020 00 00  00 00  00 00  00 00  00 00
00000030 00 72  75 6e  20 69  6e 20  44 4f
00000040 2e 0d  0d 0a  24 00  00 00  00 00
00000050 c7 08  27 5d  c7 08  27 5d  c7
00000060 d3 08  27 5d  e0 31  23 12  31
```

Total Size	No selection	bytes
Fragments	No selection	

When you drag a window over a docked frame or over the editor windows area, another placeholder appears. It is composed of five boxes: top, left, middle, right and bottom. Dragging a window over the side box docks the window into a new frame, which is attached to the top, left, right or bottom of the frame currently under mouse pointer.



Total Size	No selection	bytes
Fragments	No selection	

Size: 0x003ce114 (3,989,780): 3.80 M

If you drop a window to the middle box, you will dock it into the frame currently under mouse pointer. Dropping a window to the docked window's title also docks it to target window's frame.

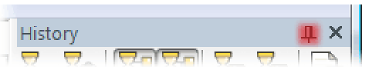
You can use mouse to change position of docked windows within a docked frame, as well as drag the window “out of the frame” to make it floating or to dock it into another frame or new frame.

Double-clicking on the docked frame's title makes a frame floating. Double-clicking on the docked window's tab makes only that window floating. Double-clicking on the floating frame's title docks it back to the same location it previously occupied.

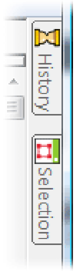
All docked frames are separated with each other by splitters. When you position a mouse pointer over such splitter, it changes its shape, telling you that you can drag the splitter to change size of adjoining frames. Splitter position is proportional to the application window size; frames are resized automatically and proportionally when you resize application window.

Auto-Hidden Tool Windows

Any docked tool window frame may be auto-hidden. To auto hide a frame, click the Auto Hide button:



Four auto-hide bars are located on four application window sides. They are hidden when empty and appear as soon as you add at least one frame to it. When you auto-hide a docked frame, it chooses one of four auto-hide bars, depending on the docked position. That is, if the frame was docked closer to the right side of application window, right auto-hide bar is chosen and so on.



Each docked window's tab in the auto-hidden frame is displayed on the auto-hide bar. Two auto-hidden frames are separated from each other with a slightly larger gap. Dragging mouse over the tab opens corresponding tool window. The tool window smoothly drives out of the auto-hide bar. Click in the tool window to switch keyboard focus to it if you need to provide any keyboard input to the window. The window is automatically closed (quickly drives back into the auto-hide bar) when keyboard focus is lost by the window and mouse cursor is not over it.

Auto hiding tool windows allow you to save the screen space, while still having quick access to functionality provided by the tool windows.

Pressing Auto Hide button again “unhides” the docked frame and returns it to its original docked position.

Tool Window Visibility

Any tool window is always in one of two states: visible and hidden. Visible means the tool window is floating or docked to any of the docked frames or auto-hidden and appears on one of four auto-hide bars. Hidden tool window does not appear anywhere on the screen. Note that a tool window, which is not directly visible by the user, but which tab is visible in one of the docked frame, considered visible by this definition.

Pressing the Close button hides the tool window or entire frame, depending on the “Close affects the current tool window only” setting on the General settings page. To make a previously hidden window visible, select its name in the View menu. This restores the previous position, docked and auto-hidden state of the window and activates it. It also activates the tool window even if it is in visible state, therefore, allows you to quickly move keyboard focus to the tool window, without using mouse.

Tool Window Configuration

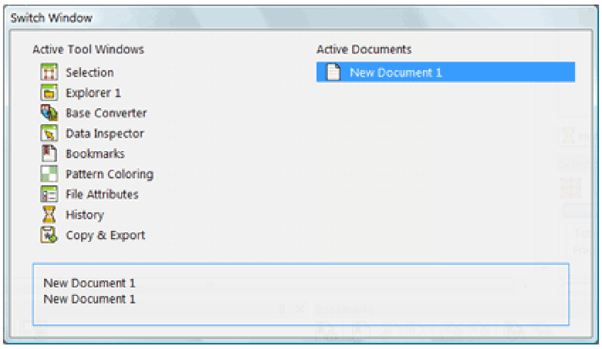
The current location of all tool windows, their state and visibility, comprise the tool window configuration. Hex Editor Neo allows you to export and import this configuration to the file for sharing, exchanging or archiving purposes. There are also a number of predefined tool window configurations shipped with a product. You can quickly switch between them using the View Predefined Layouts menu group.

View Predefined Layouts function scans the “Tool Window Layouts” folder (located in the product installation folder) at application startup. Placing your own tool window configuration files in this folder enables fast switching for them too.

First three options (Novice User Layout, Advanced User Layout and Expert User Layout) correspond to three options described in the Default Layout section. Selecting one of those options not only switches to a given layout, but also sets it as a default one.

Window Switching

Hex Editor Neo interface presents you with a large number of tool windows, as well as an unlimited number of editor windows. Starting with version 4.51, a convenient window switching mechanism is provided for you. This mechanism is called a navigation window.



Navigation window is opened when you press the `Ctrl + Tab` or `Ctrl + Shift + Tab` key combination (see also Keyboard Customization). It lists all visible (possibly auto-hidden) tool windows as well as all opened editor windows. Using the arrow keys, `Tab`, `Shift + Tab` or mouse, you may select the window you want to activate. As soon as you release a `Ctrl` key, the navigation window is closed and selected window becomes active.

Navigation window provides a quick window activation mechanism.

Other Window-Switching methods

The General Settings page contains a “Window switching style” setting, using which you may set how Hex Editor Neo switches windows.

Legacy

Window switching operates exactly the same as in previous (prior to 4.51) versions of Hex Editor Neo.

Last recently used

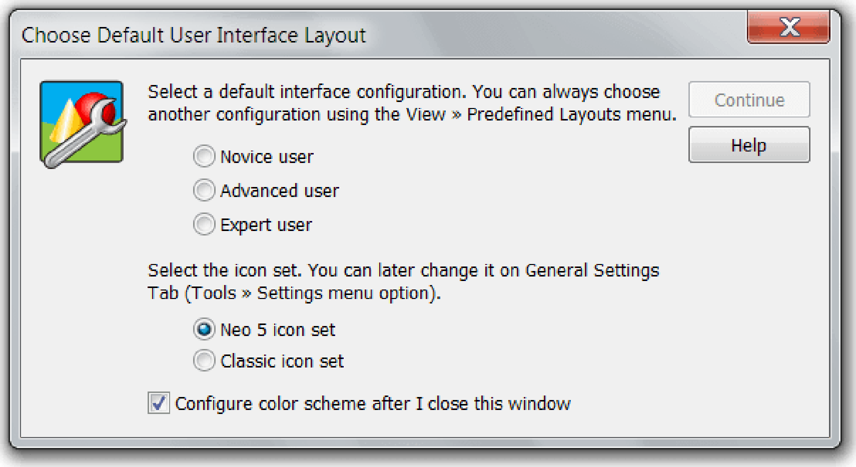
Navigation window is not used. `Ctrl + Tab` and `Ctrl + Shift + Tab` work on the list of editor windows using the last recently used algorithm. You cannot activate tool windows using this method.

Using navigation window

The navigation window is displayed and allows you to select any visible (or auto-hidden) tool window as well as any opened editor window.

Default Layout

The first time you start the Hex Editor Neo, you are asked to choose a default tool window layout.



Select a default interface configuration. You can always choose another configuration using the View » Predefined Layouts menu.

○ Novice user
○ Advanced user
○ Expert user

Select the icon set. You can later change it on General Settings Tab (Tools » Settings menu option).

● Neo 5 icon set
○ Classic icon set

☑ Configure color scheme after I close this window

You are offered a choice of three options: Novice user, Advanced user and Expert user.

After you click an option, Hex Editor Neo's user interface immediately switches to the selected layout. Once you have chosen your layout, press the Continue button.

Choosing Another Default Layout

Although the "Choose Default User Interface Layout" window is presented only once, you can easily change a layout at a later time. To do this, go to the View » Predefined Layouts menu, and select a layout from the list.

Documents

Supported Document Types

Hex Editor Neo supports several documents to be viewed and edited in its environment. All supported document types are listed below.

Files and Streams

The first and most commonly used document type is a file. Hex Editor Neo allows you to edit any file for which you have Modify access and allows you to view the contents of any file for which you have a Read access. In addition, full support for NTFS alternate data streams is provided.

Starting from version 6.12, Hex Editor Neo provides a way to open files for which you normally receive "Sharing Violation" error.

Working with Files in Shared Mode

Hex Editor Neo normally locks opened files, granting only Read access to other processes. The lock is held until a file is closed, preventing other applications from making modifications to a file. In addition, if the file is already opened by another application, Hex Editor Neo may fail to open a file if it fails to obtain a lock.

While this scheme allows an editor to work with files of virtually any size in a very effective way, it sometimes may be convenient to work with a file in a shared mode.

Starting from version 4.85 Hex Editor Neo supports opening files in shared mode.

Volumes

Hex Editor Neo allows you to view or edit contents of any mounted volume, or logical disk. Hex Editor Neo is also able to open volumes that do not have associated drive letters, that is volumes, only mounted to directory on another volume. Starting from version 6.12, Hex Editor Neo allows you to create and open volume snapshots.

Disks

In addition to volume editing, direct access to physical disk is provided by the Hex Editor Neo. Thus, you can get access to disk's partition table, boot sector and so on.

Process Memory

With Hex Editor Neo you can view and modify the virtual memory of any running process, provided you are granted required rights. The editor gives you detailed representation of the edited process memory space.

Computer Physical Memory (RAM)

On supported operating systems (Windows 2000 and Windows XP), Hex Editor Neo gives you a read-only view into the system RAM, allowing you to investigate and copy its contents, if required.

Opening Documents

Document represents a file, shared files, disk, volume, process memory or physical memory, opened in the Hex Editor Neo for viewing and editing. Each opened document has at least one editor window associated with it. You can also have multiple editor windows for an opened document.

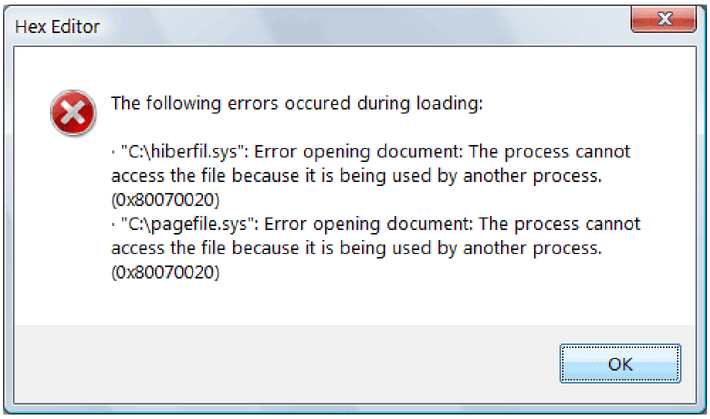
Hex Editor Neo does not allow you to have multiple documents for a single file, but you can open as many windows for each document as you need.

Any file opened in the Hex Editor Neo is accessed with Read Only access. Sharing access is set to allow Read operation only. Starting from version 6.12, if Hex Editor Neo is unable to get a Read access to a file due to sharing violation, it asks the user if he wants to create a volume snapshot and open the file from a snapshot.

When you open a disk, volume or a process memory, they are also always opened with Read Only access, but no sharing restrictions are applied. That is, if some other application changes the contents of the edited documents, you will need to scroll document's editor window to view changes or use the View » Refresh... command.

Errors Opening Files

If there are any errors the editor encounters during opening files it displays the list of failed files with corresponding error messages. The following window is displayed regardless of the way you chose to open files, in case editor encounters any errors trying to open them.



The following errors occured during loading:

· "C:\hiberfil.sys": Error opening document: The process cannot access the file because it is being used by another process. (0x80070020)
· "C:\pagefile.sys": Error opening document: The process cannot access the file because it is being used by another process. (0x80070020)

Opening Files

There are several ways a file may be opened by the Hex Editor Neo.

File Open Command

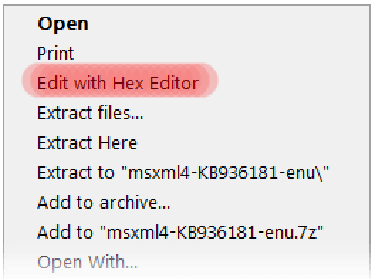
Use the **File » Open » Open File...**command to open the standard File Open dialog. Select a file or multiple files and click the Open button. The "Open as read-only" flag may be used to have the editor open file(s) in read-only mode, preventing the modification of original file(s).

Files you select may be located either on the local computer, or on the remote computer. Make sure your connection to the remote host is fast enough before opening the remote file in the editor. Usually, 10 Mbit connection will be enough for most editing tasks.

If a "Sharing Violation" error is received, which means other process(es) have the file opened and do not allow Read access, Hex Editor Neo asks if you still want to open a file using volume snapshot. This allows you to access file data even if another process has the file locked. Note that operating system may cache file data in memory. In this case those data may not be available in the snapshot. A snapshot is automatically discarded as soon as file is closed. Support for opening locked files is available starting from version 6.12.

Using the Right-click Menu in the Windows Explorer

If you chose an option to integrate with Windows Explorer during Hex Editor Neo installation, the "Edit with HHD Hex Editor Neo" command appears when you right click on the selected file(s) in the Windows Explorer. Select this option to open all selected files in the Hex Editor Neo.



This will launch the Hex Editor Neo (if it is not already running) and instruct it to open all the files you selected in the folder.

Note: Windows Explorer references the extension DLL that is used to implement the right-click menu command. If you try to uninstall the product right after using the command, it will fail to delete all installed files and will have to schedule a reboot to finish installation.

Drag&Drop

You may select a file or a number of files in Windows Explorer (or any other compatible application) and drag them to the running instance of the Hex Editor Neo. This will instruct the editor to open all dragged files.

Specify Files to Open in Command Line

Launching the Hex Editor Neo with a list of files in its command line instructs the editor to open all of them.

Remember that all file names that contain spaces must be enclosed in the double quotation marks. There is a limit enforced by the operating system to the maximum length of the command line. Generally, it should be less than 256 characters.

Example:

```
PowerShell
.\HexFrame.exe c:\temp\rom.dat c:\windows\system32\calc.exe "c:\Program Files\Windows NT\dialer.exe"
```

Running this command will load the Hex Editor Neo and open all specified files.

Specifying the command line option `/s` tells the Hex Editor Neo to reuse the running Hex Editor Neo instance. If omitted, a new Hex Editor Neo instance will be launched.

The following command line switches are supported by Hex Editor Neo:

`/shared`

  Open the next file specified in the command line in shared mode.

`/readonly`

  Open the next file specified in the command line in read only mode.

Opening Files in Shared Mode

There are several ways a file may be opened by the Hex Editor Neo in shared mode.

File Open Shared Command

Use the **File » Open » Open Shared File...**command to open the standard File Open dialog. Select a file or multiple files and click the Open button.

Files you select may be located either on the local computer, or on the remote computer. Make sure your connection to the remote host is fast enough before opening the remote file in the editor. Usually, 10 Mbit connection will be enough for most editing tasks.

Using the Right-click Menu in the Windows Explorer

If you chose an option to integrate with Windows Explorer during Hex Editor Neo installation, the “Edit with HHD Hex Editor Neo (Shared Mode)” command appears when you right click on the selected file(s) in the Windows Explorer. Select this option to open all selected files in the Hex Editor Neo.

Note that this option may be available only when you hold Shift key when bringing up the context menu.

This will launch the Hex Editor Neo (if it is not already running) and instruct it to open all the files you selected in the folder.

Note: Windows Explorer references the extension DLL that is used to implement the right-click menu command. If you try to uninstall the product right after using the command, it will fail to delete all installed files and will have to schedule a reboot to finish installation.

Specify Files to Open in Command Line

Launching the Hex Editor Neo with a list of files in its command line instructs the editor to open all of them. Remember that all file names that contain spaces must be enclosed in the double quotation marks. There is a limit enforced by the operating system to the maximum length of the command line. Generally, it should be less than 256 characters. Remember to prepend each file you want to be opened in shared mode with a `/shared` switch.

Example:

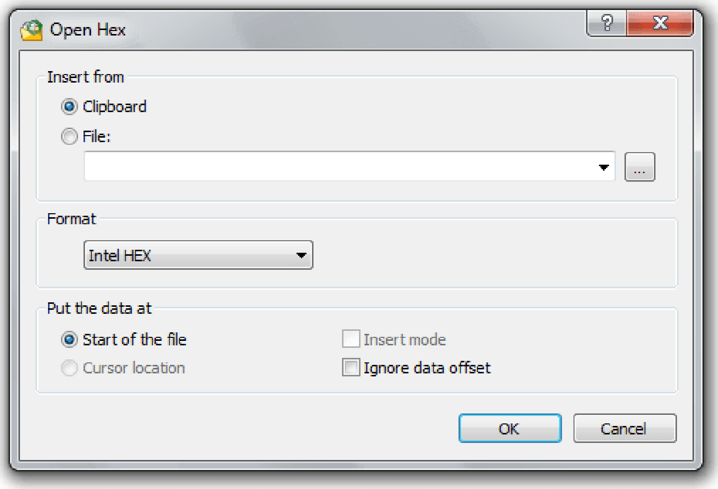
```
PowerShell
.\HexFrame.exe /shared c:\temp\rom.dat /shared c:\windows\system32\calc.exe /shared "c:\Program Files\Wind
```

Running this command will load the Hex Editor Neo and open all specified files in shared mode.

Specifying the command line option `/s` tells the Hex Editor Neo to reuse the running Hex Editor Neo instance. If omitted, a new Hex Editor Neo instance will be launched.

Opening Encoded Hex Files

Hex Editor Neo supports decoding Intel HEX and Motorola S-Records files. You may decode and put them into any opened document using the Edit » Insert Hex... command or open as new documents using the **File » Open » Open Hex...** command.



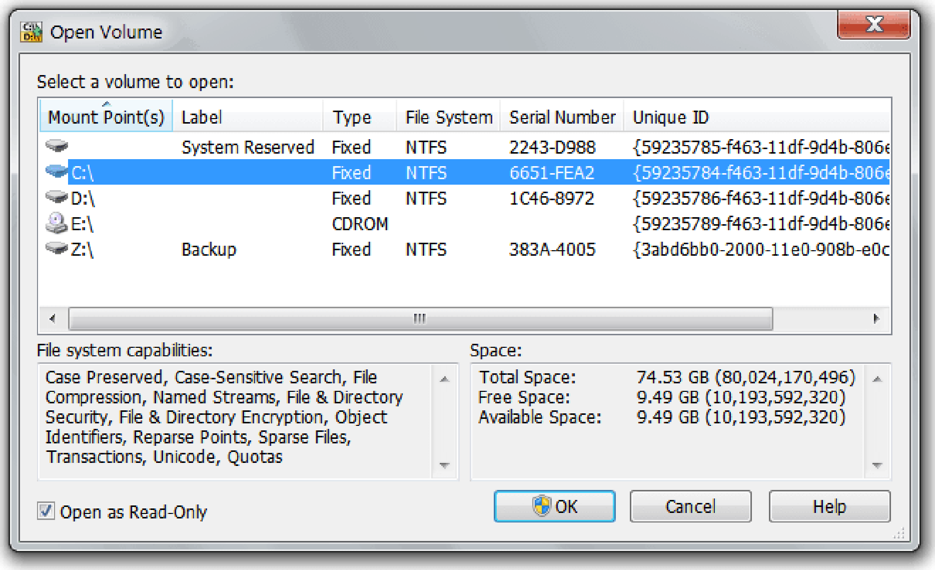
● Clipboard
○ File:
Intel HEX
● Start of the file
○ Cursor location
□ Insert mode
□ Ignore data offset

See the Edit » Insert Hex... topic for the window description.

After you execute this command, Hex Editor Neo creates new document and decodes the specified hex file.

Opening Volumes

To open a volume, execute the File » Open » Open Volume... command. Open Volume window appears:



Mount Point(s)	Label	Type	File System	Serial Number	Unique ID
	System Reserved	Fixed	NTFS	2243-D988	{59235785-f463-11df-9d4b-806e
C:\		Fixed	NTFS	6651-FEA2	{59235784-f463-11df-9d4b-806e
D:\		Fixed	NTFS	1C46-8972	{59235786-f463-11df-9d4b-806e
E:\		CDROM			{59235789-f463-11df-9d4b-806e
Z:\	Backup	Fixed	NTFS	383A-4005	{3abd6bb0-2000-11e0-908b-e0c

Case Preserved, Case-Sensitive Search, File Compression, Named Streams, File & Directory Security, File & Directory Encryption, Object Identifiers, Reparse Points, Sparse Files, Transactions, Unicode, Quotas

```
Total Space:       74.53 GB (80,024,170,496)
Free Space:        9.49 GB (10,193,592,320)
Available Space:   9.49 GB (10,193,592,320)
```

☑ Open as Read-Only

For each detected volume, its mounting point (drive letter and/or mounting directory), label, volume type, volume's file system (if any), volume's serial number and volume's unique ID are provided. You can sort the list in ascending or descending order on any of the list's columns.

In addition, detailed information about the current volume's file system and free space is provided in the dialog.

Select a volume from the list of all volumes and click the OK button to open it. “Open as Read-Only” option may be used to have the editor open a volume in read-only mode (default). Some volumes can only be opened in read-only mode.

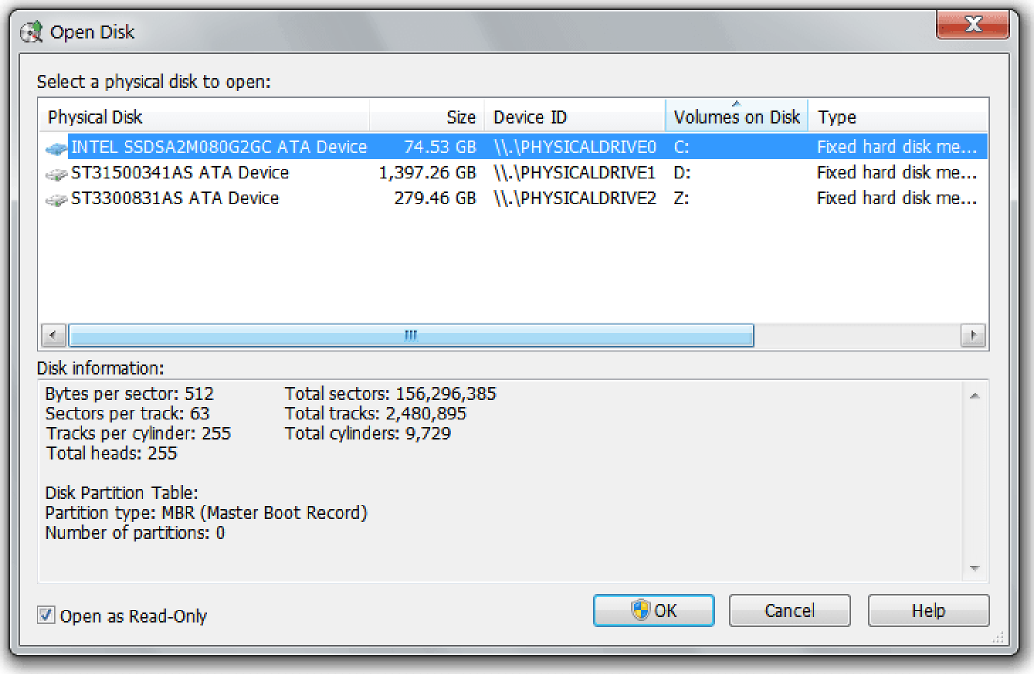
Starting from version 6.12, Hex Editor Neo allows you to create a volume snapshot and open its snapshot in read-only mode. This allows you to “freeze” volume contents at a specific time point. Snapshot is automatically discarded as soon as volume is closed.

Volume Navigator Support

If NTFS-formatted volume is opened, Volume Navigator automatically starts parsing its structure.

Opening Disks

To open a physical disk, execute the File » Open » Open Physical Disk... command. The Open Disk dialog appears:



Select a physical disk to open:

Physical Disk	Size	Device ID	Volumes on Disk	Type
INTEL SSDSA2M080G2GC ATA Device	74.53 GB	\\.\PHYSICALDRIVE0	C:	Fixed hard disk me...
ST31500341AS ATA Device	1,397.26 GB	\\.\PHYSICALDRIVE1	D:	Fixed hard disk me...
ST3300831AS ATA Device	279.46 GB	\\.\PHYSICALDRIVE2	Z:	Fixed hard disk me...

Disk information:

Bytes per sector: 512
Sectors per track: 63
Tracks per cylinder: 255
Total heads: 255

Total sectors: 156,296,385
Total tracks: 2,480,895
Total cylinders: 9,729

Disk Partition Table:
Partition type: MBR (Master Boot Record)
Number of partitions: 0

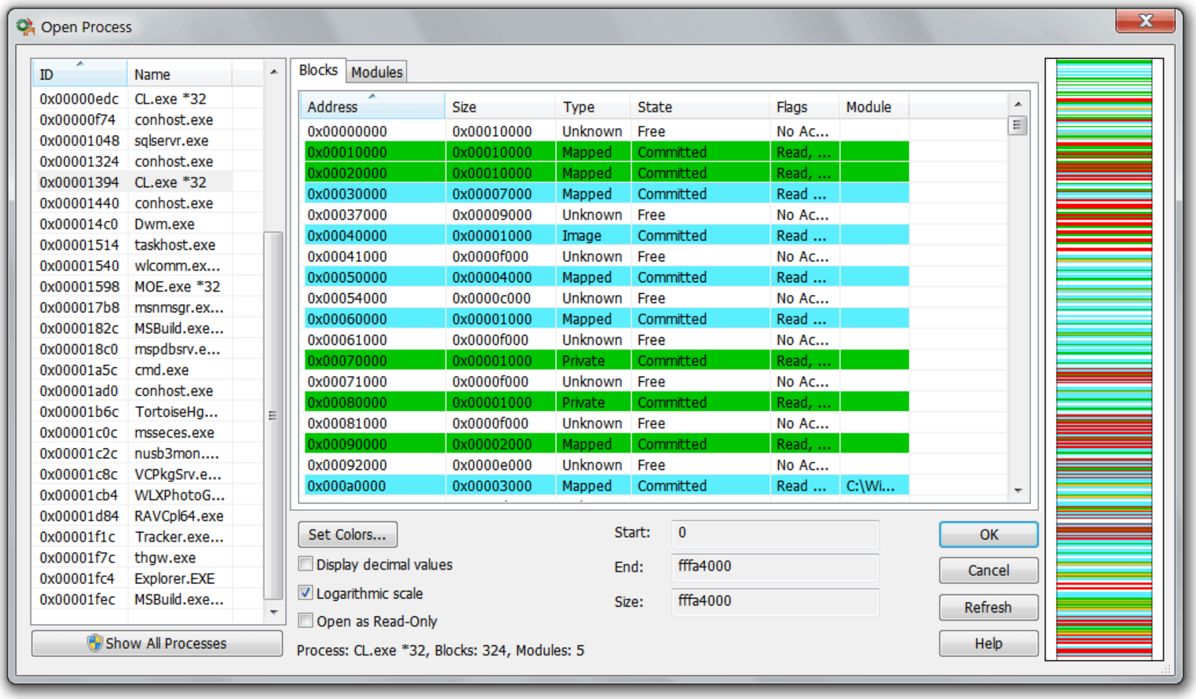
☑ Open as Read-Only

For each detected disk, its name (model name), size, mounted volumes, disk type and disk capabilities are displayed. You can sort the list in ascending or descending order on any of the list's columns.

Select a disk from the list of all disks and click the OK button to open it. “Open as Read-Only” option may be used to have the editor open a disk in read-only mode (default). In addition, detailed disk information (disk geometry and partition table) is displayed for a selected physical disk.

Opening Processes

To open a process memory, execute the File » Open » Open Process... command. The Open Process window appears:



ID	Name
0x00000edc	CL.exe *32
0x00000f74	conhost.exe
0x00001048	sqlservr.exe
0x00001324	conhost.exe
0x00001394	CL.exe *32
0x00001440	conhost.exe
0x000014c0	Dwm.exe
0x00001514	taskhost.exe
0x00001540	wlcomm.ex...
0x00001598	MOE.exe *32
0x000017b8	msnmsgr.ex...
0x0000182c	MSBuild.exe...
0x000018c0	mspdbsrv.e...
0x00001a5c	cmd.exe
0x00001ad0	conhost.exe
0x00001b6c	TortoiseHg...
0x00001c0c	msseces.exe
0x00001c2c	nusb3mon....
0x00001c8c	VCPkgSrv.e...
0x00001cb4	WLXPhotoG...
0x00001d84	RAVCpl64.exe
0x00001f1c	Tracker.exe...
0x00001f7c	thgw.exe
0x00001fc4	Explorer.EXE
0x00001fec	MSBuild.exe...

Address	Size	Type	State	Flags	Module
0x00000000	0x00010000	Unknown	Free	No Ac...	
0x00010000	0x00010000	Mapped	Committed	Read, ...	
0x00020000	0x00010000	Mapped	Committed	Read, ...	
0x00030000	0x00007000	Mapped	Committed	Read ...	
0x00037000	0x00009000	Unknown	Free	No Ac...	
0x00040000	0x00001000	Image	Committed	Read ...	
0x00041000	0x0000f000	Unknown	Free	No Ac...	
0x00050000	0x00004000	Mapped	Committed	Read ...	
0x00054000	0x0000c000	Unknown	Free	No Ac...	
0x00060000	0x00001000	Mapped	Committed	Read ...	
0x00061000	0x0000f000	Unknown	Free	No Ac...	
0x00070000	0x00001000	Private	Committed	Read, ...	
0x00071000	0x0000f000	Unknown	Free	No Ac...	
0x00080000	0x00001000	Private	Committed	Read, ...	
0x00081000	0x0000f000	Unknown	Free	No Ac...	
0x00090000	0x00002000	Mapped	Committed	Read, ...	
0x00092000	0x0000e000	Unknown	Free	No Ac...	
0x000a0000	0x00003000	Mapped	Committed	Read ...	C:\Wi...

☐ Display decimal values

☑ Logarithmic scale

☐ Open as Read-Only

Start: 0

End: fffa4000

Size: fffa4000

Process: CL.exe *32, Blocks: 324, Modules: 5

This resizable window lists all running processes on the left. It is recommended to run the Hex Editor Neo as an elevated user with Administrative rights to be able to view and edit process memory. In some operating system, there are always several processes that cannot be edited even by a most privileged user. This limitation is dictated by the operating system and is not related to Hex Editor Neo.

To open the whole process virtual memory, double click the process in the list.

If you need only a subset of process' virtual memory, select it in the list. Hex Editor Neo will analyze the process' allocated and free memory blocks and provide you with a detailed list in the middle part of the Open Process window.

Process' memory blocks may be viewed as is (Blocks tab) or as a list of loaded modules (Modules tab). For each block, its starting address, size, type, state and access are provided. In addition, for blocks that are mapped to file system files, the full name of the file is provided.

The list may be sorted in ascending or descending order on every list's column.

Hex Editor Neo uses coloring to display the access state of every memory block. You can change colors used by the editor if you like by pressing the Set Colors... button.

All integers in this dialog may be displayed in decimal or hexadecimal, depending on the state of the “Display decimal values” switch.

The “Open as Read-Only” switch will prevent you from modifying the opened region.

Support for 32-Bit Processes on 64-Bit Operating System

If you run Hex Editor Neo on 64-bit operating system, you will see both 64-bit and 32-bit processes in the list. Hex Editor Neo is fully compatible with both process types and allows you to view and edit both process type's memory space.

Memory Map

There is a colored map on the right of the dialog. It displays essentially the same information as the memory block list in the middle, but draws each memory block in correct scale and also displays its location in process address space.

“Logarithmic scale” option switches the display mode for the memory map between the normal and logarithmic. In logarithmic scale you do not see proper block sizes anymore, but individual blocks are represented better. This switch is ON on 64-bit operating systems by default, as it is virtually impossible to see anything in normal scale with huge virtual memory space.

Opening Blocks

To open one or several memory blocks, select it (them) in the list and press the OK button. Double-clicking on the block opens this block (or module) only.

Note that you will not be able to select multiple blocks if you change the default list sorting order.

Opening Physical Memory

On supported operating systems (Windows 2000 and Windows XP) Hex Editor Neo allows you to open computer physical memory for read-only access only. You must be a member of Administrators local or domain group in order to get proper access to the physical memory.

Limitations

Microsoft has discontinued access to computer physical memory starting from Windows Server 2003 SP1. That is, this OS and all subsequent OSes (including Windows Vista, Windows 7, Windows 8 and Windows 10) do not provide access to RAM to user-mode applications. There is no way around this.

For older operating systems, Windows 2000 and Windows XP, users with corresponding access rights have full access to RAM. Hex Editor Neo limits this access to read-only in order to maintain system stability.

RAM is always rapidly modified, so contents of every range of this "document" may change at any time.

Creating New Documents

The Hex Editor Neo allows you to quickly create an empty document with a use of the**File » New** command. Created document is virtual and is not backed up by any real file until you save it for the first time.

Empty document always has zero size. You can use the wide range of editing commands to insert data to the file.

Closing Documents

Closing document in a Hex Editor Neo releases all references to the opened file, optionally saves all changed made to the file, frees all memory and disk space used to maintain this file. The effect of closing a document will also be that the sharing restrictions set on the file at the time it was opened are cancelled, making it possible for other processes to open the file for writing.

Hex Editor Neo provides you with several ways of closing documents:

1. The document is automatically closed when all editor windows, associated with it, are closed. See the topic for editor windows to find out the ways to close a window.
2. The **File » Close** menu command can be used to immediately close the document, regardless of the number of editor windows you have opened for it.
3. The **File » Close All** command is used to close all opened documents.
4. All opened documents are automatically closed when you exit the Hex Editor Neo.

Right before closing the document, the editor checks if it is in modified state. In this case, you are asked whether you want to save the changes, cancel them, or abort the close operation.

The same prompt is displayed when you shut down your operating system, perform restart or log off. If you have any unsaved changes to any of the opened documents, you will be prompted whether you want to save them. This may delay the system shutdown process or even cancel it.

More information on saving changes made to documents can be found in Saving Documents section.

Saving Documents

All changes made to a document always reside in memory. In order to apply them, you have to save a document.

When the document has any modifications, the "*" symbol appears next to the document's name in each of its editor windows. Two of Hex Editor Neo commands,**File » Save** and **File » Save As...** are used to save documents. The first command applies changes to the document file itself, while the second one allows you to save a copy of the current version of the file, which is the version that includes all changes, to another file.

The **File » Save** command is not available for documents opened with Open as Read Only flag set on as well as for documents created with a File » New command. Being executed, this command behaves exactly as **File » Save As...** command.

Save All Command

Use the **File » Save All** command to save all modified documents.

Always Create Backups Option

There is an option on the General Settings tab, called "Always create backups" that governs the behavior of the**File Save** command. When it is on, the save operation does the following:

- Creates a temporary file in the same folder where the original file is located.
- Saves the entire copy of the current version of the file to the temporary file.
- Renames the original file, adding the `.bak` to its filename and renames the temporary file to the filename of the original file. Both these renames are performed as an atomic operation. If there already exists a file with a `.bak` extension, it is silently deleted.

When the "Always create backups" option is turned off (the default state), the editor determines if it is more efficient to write only the changes made to a file than to write an entire file. For example, you may open a 4GB file in the editor, modify several bytes in the middle of it and save the changes. It is obvious, that writing only a small number of changed bytes will be much faster than writing the full copy of the original file - that's why the editor prefers to have this option off by default.

If any error occurs during "optimized" file save operation, the file will be left in undefined state. It is recommended to switch this option ON if you have any vital information in the edited file.

This option also governs the behavior of Replace in Files function. If you execute the function in Replace all occurrences and save mode, the editor warns you to switch this option on, otherwise, you may lose some valuable information. With this option on, on the other hand, each modified file is backed up before overwriting.

This option does not affect streams. Hex Editor Neo never creates a backup for a modified stream. This behavior is by design and governed by the operating system.

Requirements

Usually, Hex Editor Neo creates a temporary file in the original file's folder, so it is required to have enough free space on the volume. Otherwise, Hex Editor Neo will not be able to save changes made to a file. Disk quota settings may also prevent the editor from saving changes.

When the "Always Create Backups" option is turned off and Hex Editor Neo determines that it is possible to do an effective save, it does not create a temporary file, and lowers its requirements on free volume space.

If you get a "not enough space" error message when trying to save a file, all your modifications are retained - you can free up the required space on the volume, or use the **Save As...** command to save the file on another volume.

Working with Shared Files

Opening file in shared mode will allow other applications to continue working with a file, and moreover, to continue making changes to it.

After you open a file in a shared mode, you may update it in Hex Editor Neo and in any other application.

Working with a file opened in shared mode in Hex Editor Neo is exactly the same as working with any other type of document. The only difference is that Hex Editor Neo displays an overlay warning icon on top of file's icon in its user interface, reminding you that the file has actually been opened in shared mode.

When the file is updated in another application, Hex Editor Neo automatically detects the change and displays aShared File Conflict Dialog. It gives you options to discard or apply your changes, to discard and apply other application's changes, or both at the same time. It also allows you to close the file if you do not need it anymore.

This dialog is displayed only if Hex Editor Neo is a foreground application. If it is not, it flashes its icon on the task bar and its application window frame until you bring it to the front.

Supporting Scenarios

Hex Editor Neo supports opening files in shared mode on any Windows operating system it supports (Windows 2000 or later), any file system (FAT, FAT32, NTFS, ExtFS), and any kind of storage media (local hard disks, network shares, removeable devices).

Limitations

As opening a file in a shared mode is almost equivalent to copying a file, Hex Editor Neo warns you if you instruct it to open a file which is too large. On Windows Vista or later it uses the disk system rating to guess the maximum supported size, on previous systems it limits the size to nearly 15 MB.

If the size of a file opened in shared mode exceeds the limit, a warning is displayed. You may still continue opening in shared mode if you agree to wait or instead open a file in normal, locked mode.

Solving File Conflicts

Hex Editor Neo watches for changes in each file opened inshared mode. It is able to detect the following change types: deletion, modification and renaming. By default, rename change detection is switched off, as it may interfere with a way several applications modify files. Imagine the following scenario:

You open a file A in Hex Editor Neo and some application B. You then make a change to a file in application B and save it. Application B follows this algorithm:

1. It creates a temporary file T and writes the full copy of A (with changes made) into it from its memory.
2. It renames the original file A into file C.
3. It renames the temporary file T into file A.
4. It deletes the file C.

If rename change detection is ON, Hex Editor Neo catches it on the step 2, renames the document and then catches the delete notification on step 4, thus effectively missing actual file modification made on step 3. That is why this option is turned OFF by default. You may turn in on in theGeneral Settings page using the option “Ignore renames of shared opened files”.

Rename Change Notification

When a shared file is renamed and “Ignore renames of shared opened files” option is ON, Hex Editor Neo automatically renames all opened editor windows for the file. No notifications are presented to the user.

Delete Change Notification

When a shared file is deleted, Hex Editor Neo presents a dialog with two options:

Discard all changes and close the file.

Automatically discard all changes you made to a file (if there are any) and close a file. Use this option if you intentionally deleted a file and are not going to work with it anymore.

Continue working with a file.

Continue working with a file. Note that Hex Editor Neo stops watching for file modifications if you select this option. So, if another application creates a file with a same name in a same folder, Hex Editor Neo will not detect it.

Modify Change Notification

When a shared file is modified, Hex Editor Neo presents one of two dialogs, depending on whether you have made modifications in the editor or not. Your further actions are described in the following table:

Change type	There are no modifications in Hex Editor Neo	There are modifications in Hex Editor Neo
File's size is unchanged	• Ignore changes • Close the file • Update the file	• Retain all changes and do not update the file • Discard all changes and close the file • Discard all changes and update the file • Retain all changes and update the file (changes are merged into the new version)
File's size is changed	• Ignore changes • Close the file • Update the file	• Retain all changes and do not update the file • Discard all changes and close the file • Discard all changes and update the file • Retain all changes and update the file (requires “Highlight changes in the file” option also be set to ON; changes are retained in old version)

The following table briefly describes each option:

Ignore changes

Hex Editor Neo ignores any changes made by another application.

Retain all changes and do not update the file

Hex Editor Neo ignores any changes made by another application. All changes made in Hex Editor Neo are retained.

Close the file

Immediately close the file in Hex Editor Neo.

Discard all changes and close the file

Discard any changes and close the file in Hex Editor Neo.

Update the file

Update the file in Hex Editor Neo to reflect changes made by another application.

Discard all changes and update the file

Discard all changes made in Hex Editor Neo and load changes made by another application.

Retain all changes and update the file

Load changes made by another application but also retain local changes.

Note that if another application changes the shared file's size and you select the “Retain all changes and update the file” option, the "Highlight changes in the file" option must also be selected (it is done automatically).

Highlighting Changes in the File

If you select one of the “update” options, an option to highlight changes in a file becomes available. It automatically performs a file comparison between the old and new versions of the shared file. Both algorithms, Simple Compare Algorithm and Diff Compare Algorithm are provided.

When you check this option, Hex Editor Neo renames the current document and opens a new version of the file. It then instructs the File Compare module to compare them and highlight their differences. An option “Close older versions of the file” will instruct Hex Editor Neo to close older versions used in previous comparisons.

Note that older versions are not backed up by an actual file, but nevertheless are normal documents which can be edited, saved and so on.

Notes

Please note that Hex Editor Neo may be unable to detect a file change if too many files in the file's folder are modified at the same time.

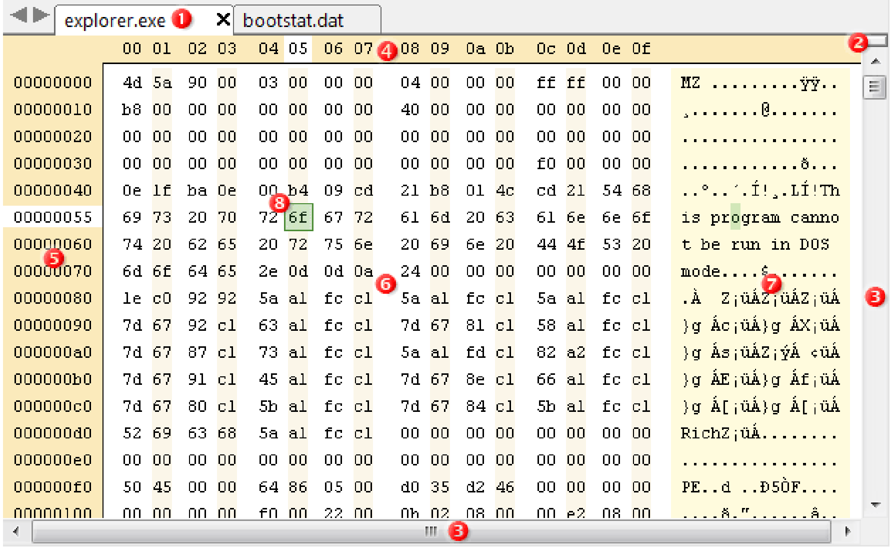
Editor Windows

Editor window is the main Hex Editor Neo element provided for file viewing and editing. These windows are used to display and edit the contents of opened files. This section describes the editor windows in detail.

The new window is opened each time you open or create a new document. Additional windows for a document may also be opened using the Window New Window command. Another way for opening additional editor windows for a document, window splitting is described later in this section.

Basic Elements

Here's a typical editor window:



```
          00 01  02 03  04 05  06 07  08 09  0a 0b  0c 0d  0e 0f
00000000  4d 5a  90 00  03 00  00 00  04 00  00 00  ff ff  00 00   MZ ........ÿÿ..
00000010  b8 00  00 00  00 00  00 00  40 00  00 00  00 00  00 00   ¸.......@.......
00000020  00 00  00 00  00 00  00 00  00 00  00 00  00 00  00 00   ................
00000030  00 00  00 00  00 00  00 00  00 00  00 00  f0 00  00 00   ............ð...
00000040  0e 1f  ba 0e  00 b4  09 cd  21 b8  01 4c  cd 21  54 68   ..º..´.Í!¸.LÍ!Th
00000055  69 73  20 70  72 6f  67 72  61 6d  20 63  61 6e  6e 6f   is program canno
00000060  74 20  62 65  20 72  75 6e  20 69  6e 20  44 4f  53 20   t be run in DOS 
00000070  6d 6f  64 65  2e 0d  0d 0a  24 00  00 00  00 00  00 00   mode....$.......
00000080  1e c0  92 92  5a a1  fc c1  5a a1  fc c1  5a a1  fc c1   .À  Z¡üÁZ¡üÁZ¡üÁ
00000090  7d 67  92 c1  63 a1  fc c1  7d 67  81 c1  58 a1  fc c1   }g Ác¡üÁ}g ÁX¡üÁ
000000a0  7d 67  87 c1  73 a1  fc c1  5a a1  fd c1  82 a2  fc c1   }g Ás¡üÁZ¡ýÁ ¢üÁ
000000b0  7d 67  91 c1  45 a1  fc c1  7d 67  8e c1  66 a1  fc c1   }g ÁE¡üÁ}g Áf¡üÁ
000000c0  7d 67  80 c1  5b a1  fc c1  7d 67  84 c1  5b a1  fc c1   }g Á[¡üÁ}g Á[¡üÁ
000000d0  52 69  63 68  5a a1  fc c1  00 00  00 00  00 00  00 00   RichZ¡üÁ........
000000e0  00 00  00 00  00 00  00 00  00 00  00 00  00 00  00 00   ................
000000f0  50 45  00 00  64 86  05 00  d0 35  d2 46  00 00  00 00   PE..d ..Ð5ÒF....
00000100  00 00  00 00  f0 00  22 00  0b 02  08 00  00 e2  08 00   ....ð."......â..
```

There are the following elements in each editor window:

Title Bar

Title bar displays the full file name and a close button. Holding a mouse over the title bar displays a tooltip with a full path to the file. Clicking on a close button closes the current editor window. If this is a last window for a given document, the document is closed. In the latter case, you are asked if you want to save any changes made to the document, if there are any.

The Window Close Window command may also be used to close an editor window.

Clicking on a title bar and dragging starts editor window placement customization.

Split Anchor

Split anchor is used to split an editor window into two windows horizontally. Click and drag with a left mouse button to split a window. As a result of your operation, a new editor window is created. It is another view of original window's opened document. Each editor window has its own cursor position, number of columns and view type and its own selection.

After the window has been split, the split anchor disappears, but you can use the splitter bar between two windows to change their relative sizes. As soon as you move the splitter bar to window's top border, the top window is hidden and the split anchor appears again. Note, that the hidden window is not destroyed and all its properties are restored as soon as you split window again.

Hex Editor Neocommand **Window » Split** is used to split the window without using a mouse. If the window has already been split, use this command to hide the top view.

Scroll Bars

As most opened documents are large enough not to fit into their editor windows, scroll bars are used to scroll the file content's through the view, provided by the window. Horizontal scrolling is used to scroll the window's content horizontally, if the current window's size and layout does not allow all the information to be visible. Vertical scrolling is a fast and convenient way to navigate to any portion of the file.

Right-clicking on the scroll bar displays a shortcut menu with following commands (vertical/horizontal):

- **Scroll Here** - scrolls to the mouse position
- **Top/Left Edge** - scrolls to the beginning of the file/first column
- **Bottom/Right Edge** - scrolls to the end of the file/last column
- **Page Up/Page Left** - scrolls a few rows/columns backwards/to the left
- **Page Down/Page Right** - scrolls a few rows/columns forward/to the right
- **Scroll Up/Scroll Left** - scrolls one row/column backwards/to the left
- **Scroll Down/Scroll Right** - scrolls one row/column forward/to the right

The vertical scrollbar is disabled if the whole file is visible on the screen. Horizontal scrollbar is disabled if the window fits horizontally and all columns are visible.

Columns' Numbers

To make a file contents more readable, editor windows display the number of each column on the first row. Columns are numbered in hexadecimal, decimal or octal numbers (depending on the way Address Area is displayed) with first column having number zero. The cursor's current column is highlighted if it is visible on a screen.

Each view can be configured to display any number of columns in a row. By default, 16 columns are displayed. The View » Columns command group can be used to change the number of columns. You can choose between standard 4, 8, 16 or 32 columns, specify your own number or select “Auto”. In the latter case, the number of columns is determined automatically depending on the window's width.

When actual number of columns is a power of 2, smart indentation may be applied to a window. In this case, editor window inserts small gaps between columns in a way to greatly increase data readability.

Address Area

For convenience, the address of the first cell in a row is displayed at the beginning of each row. You can configure the address to be displayed as a hexadecimal, decimal or octal number.

The cursor's current row is highlighted and address of the first cell in a cursor row is temporary replaced by the cursor's address. You may switch this behavior off in the Tools » Settings... » General Tab

Data or Code Pane

This pane displays the document's content. Data is displayed in a number of cells, where the cell is a byte, word, double word, quad word, float or double. Cell type is individually configured for each editor window through the View » Display As command group.

More information on data pane is provided in further in the documentation.

Text Pane

This optional pane provides a textual representation of document's content. In editing binary files, it is sometimes convenient to display data in both binary and textual form. This pane is allowed only for Bytes and Words grouping modes.

In word view types, document's data is displayed as an UNICODE (UTF-16) text while in byte view types the window's current encoding type is used to display document's data. You can change the window's encodings through the shortcut menu, or through the View » Encodings menu.

You can turn text pane on or off at any time using the View » Text Pane command.

Cursor

Cursor is a position where subsequent editing commands will take place. This includes typing, inserting or deleting data. The cursor is also used as an anchor point for keyboard selection.

More information on cursor movement and keyboard selection are provided in corresponding sections.

Encodings

There are a lot of different character encodings that describe how characters of some specific alphabet are encoded in single or multi-byte codes. The editor window text pane is used to display the textual representation of the document. The text it displays may of course be interpreted according to one or another encoding.

Hex Editor Neo allows you to choose the editor window's encoding from a wide set of supported encodings. As long as an encoding is a property of individual editor window, you can set different encoding for each editor window, even if they represent the same document.

Below is a full list of supported encodings.

NOTE: Support for a specific encoding depends on installed Windows code pages and fonts. If required components cannot be found for a selected encoding, the “Encoding not supported” text is displayed instead of document's data. Typing in text pane is also disabled until you select another, supported encoding.

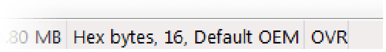
Encoding	Encoding	Encoding
Default ANSI	Default OEM	UTF-8
ANSI - Arabic	ANSI - Baltic	ANSI - Central European

Encoding	Encoding	Encoding
ANSI - Cyrillic	ANSI - Greek	ANSI - Hebrew
ANSI - Latin I	ANSI - Turkish	Arabic - ASMO 449+, BCON V4
Arabic - ASMO 708	Arabic - Transparent Arabic	Arabic - Transparent ASMO
ISO 2022 Japanese JIS X 0201-1989	ISO 2022 Japanese with halfwidth Katakana	ISO 2022 Japanese with no halfwidth Katakana
ISO 2022 Korean	ISO 2022 Simplified Chinese	ISO 2022 Traditional Chinese
ISO 6937 Non-Spacing Accent	ISO 8859-1 Latin I	ISO 8859-15 Latin 9
ISO 8859-2 Central Europe	ISO 8859-3 Latin 3	ISO 8859-4 Baltic
ISO 8859-5 Cyrillic	ISO 8859-6 Arabic	ISO 8859-7 Greek
ISO 8859-8 Hebrew	ISO 8859-8 Hebrew	ISO 8859-9 Latin 5
IBM EBCDIC - Arabic	IBM EBCDIC - Cyrillic (Russian)	IBM EBCDIC - Cyrillic (Serbian, Bulgarian)
IBM EBCDIC - Denmark/Norway	IBM EBCDIC - Denmark/Norway (20277 + Euro symbol)	IBM EBCDIC - Finland/Sweden
IBM EBCDIC - Finland/Sweden (20278 + Euro symbol)	IBM EBCDIC - France	IBM EBCDIC - France (20297 + Euro symbol)
IBM EBCDIC - Germany	IBM EBCDIC - Germany (20273 + Euro symbol)	IBM EBCDIC - Greek
IBM EBCDIC - Hebrew	IBM EBCDIC - Icelandic	IBM EBCDIC - Icelandic (20871 + Euro symbol)
IBM EBCDIC - International	IBM EBCDIC - International (500 + Euro symbol)	IBM EBCDIC - Italy
IBM EBCDIC - Italy (20280 + Euro symbol)	IBM EBCDIC - Japanese Katakana Extended	IBM EBCDIC - Korean Extended
IBM EBCDIC - Latin 1/Open System	IBM EBCDIC - Latin America/Spain	IBM EBCDIC - Latin America/Spain (20284 + Euro symbol)
IBM EBCDIC - Latin-1/Open System (1047 + Euro symbol)	IBM EBCDIC - Modern Greek	IBM EBCDIC - Multilingual/ROECE (Latin-2)
IBM EBCDIC - Thai	IBM EBCDIC - Turkish	IBM EBCDIC - Turkish (Latin-5)
IBM EBCDIC - U.S./Canada	IBM EBCDIC - U.S./Canada (037 + Euro symbol)	IBM EBCDIC - United Kingdom
IBM EBCDIC - United Kingdom (20285 + Euro symbol)	ISCII Assamese	ISCII Bengali
ISCII Devanagari	ISCII Gujarati	ISCII Kannada
ISCII Malayalam	ISCII Oriya	ISCII Punjabi
ISCII Tamil	ISCII Telugu	MAC - Arabic
MAC - Croatia	MAC - Cyrillic	MAC - Greek I
MAC - Hebrew	MAC - Icelandic	MAC - Japanese
MAC - Korean	MAC - Latin II	MAC - Roman
MAC - Romania	MAC - Simplified Chinese (GB 2312)	MAC - Thai
MAC - Traditional Chinese (Big5)	MAC - Turkish	MAC - Ukraine
OEM - Arabic	OEM - Baltic	OEM - Canadian-French
OEM - Cyrillic (primarily Russian)	OEM - Greek (formerly 437G)	OEM - Hebrew
OEM - Icelandic	OEM - Latin II	OEM - Modern Greek
OEM - Multilingual Latin I	OEM - Multilingual Latin I + Euro symbol	OEM - Nordic
OEM - Portuguese	OEM - Russian	OEM - Turkish
OEM - United States	Japanese (Katakana) Extended	Japanese (Latin) Extended and

Encoding	Encoding	Encoding
JIS X 0208-1990 & 0121-1990	Korean (Johab)	Japanese Korean Extended and Korean
Simplified Chinese	Simplified Chinese (GB2312)	Simplified Chinese Extended and Simplified Chinese
Russian - KOI8-R	T.61	TCA - Taiwan
TeleText - Taiwan	Ukrainian (KOI8-U)	US/Canada and Japanese
US/Canada and Traditional Chinese	US-ASCII (7-bit)	Wang - Taiwan
CNS - Taiwan	Eten - Taiwan	EUC - Japanese
EUC - Korean	EUC - Simplified Chinese	EUC - Traditional Chinese
Europa 3	HZ-GB2312 Simplified Chinese	IA5 German (7-bit)
IA5 IRV International Alphabet No. 5 (7-bit)	IA5 Norwegian (7-bit)	IA5 Swedish (7-bit)
IBM5550 - Taiwan		

Working with Encodings

The current editor window's encoding is displayed on the status bar:



30 MB | Hex bytes, 16, Default OEM | OVR

Text pane displays text data according to selected encoding. When you type new data on the keyboard (with text pane active), typed characters are processed according to selected encoding.

When the editor window is displaying data in Hex Words or Decimal Wordsview type, the UNICODE (UTF-16) encoding is automatically selected (as the text pane displays UNICODE data in these modes).

To change the current window's encoding, open the shortcut menu, select “Encoding” item and choose an encoding from the list. The list consists of "Default ANSI", ”Default OEM”, 5 recently used encodings and the "Other" item. Selecting the Other item opens a full list of supported encodings.

UTF-8 Support

UTF-8 is the first (any only, for now) multi-byte encoding supported by the editor.

The editor provides the full support for UTF-8 encoding. It not only displays the text encoded in UTF-8, but also allows you to type new data in this encoding. When you type, entered characters are converted on-the-fly and a single entered character may occupy up to 4 bytes.

When a character occupies several bytes, a space character is displayed in all but the last cell (in Text View). The last cell displays the character itself.

UTF-8 encoding defines strict rules for encoding UNICODE characters into single, two, three or four bytes. If these rules are broken and Hex Editor Neo cannot decode the character, it displays the ‘?’ character for each cell that contains invalid data.

All editor features, such as Find, Fill and so on are compatible with current editor window's encoding, and, therefore, are capable of working with UTF-8 as well.

Byte Order

In computing, two basic number representation schemes are used: Little-Endian and Big-Endian. In little-endian scheme, multi-byte values are stored starting from least significant byte to most, and vice-versa in big-endian scheme.

For example, the double word value 0x12345678 will be stored by little-endian computer as:

```
78 56 34 12
```

And by big-endian computer as:

```
12 34 56 78
```

x86 and x64 processors use little-endian encoding, while some other processors from Motorolla® and IBM® use big-endian encoding.

Hex Editor Neo allows you to change the byte order for eacheditor window individually. Please note that any changes will be visible only in words, double words and quad words view types.

The “Default byte order” option on theGeneral Settings page is used to set the default byte order for newly opened editor windows.

To change a byte order for the opened window, use the commands available in the **View » Byte Order**menu. By default, the `Ctrl+E` key combination is bound to the **View » Byte Order » Little-Endian**command, while the `Ctrl+Shift+E` key combination is bound to the **View » Byte Order » Big-Endian** command.

Effect on Floating-Point Types

Floating-point standard (IEEE 754) does not define exact encoding of floating-point data types on little-endian and big-endian computers. According to the standard, encoding should not be affected by the change of byte order, although, floating-point type's bytes are actually swapped on several big-endian platforms.

Hex Editor Neo supports scenarios, where floating-point types are not affected by big-endian byte order, and where floating-point types are affected by the byte order change. The “Byte order change affects floating-point types” option on the General Settings page controls this. This option is ON by default.

Data Inspector and Structure Viewer

Data Inspector and Structure Viewer modules also take the current window's byte order into account when they display and process data.

Simple Editing

Cursor Movement and Navigation

Cursor is an important concept in any editor. It displays the position where the next editing command will take place.

Hex Editor Neo distinguishes between the navigation cursor and editing cursor. The cursor can be in any of these two types at any given time. Most of the time it is in navigation mode which is described in this section. Seedata modification section for more information on editing cursor.

As any editor window may have data pane and text pane, which essentially display the same data, cursor position applies to both panes simultaneously. To distinguish between the active and inactive pane, the cursor image in active pane is outlined, while in inactive pane it is not outlined. You can switch between data and text pane either by pressing the TAB key, or using your mouse.

When the window does not have keyboard focus, the cursor image is not outlined in both panes.

“Unlimited” Editing Space

Hex Editor Neo utilizes the unique feature called “unlimited editing space”. This means that you are not limited by the current file's size during editing. After the file data ends, the special "empty" data character is displayed. It consists of “.” symbols and is usually painted with different color (see Color Schemes for more information). Cursor movement is therefore is not limited by the file size. You are allowed to move cursor at any position beyond the end of file and then start typing data or apply any editor command.

If new data inserted or any editor command applied after the end of the file, the corresponding number of zeroed cells is inserted to extend the size of the file. This operation has constant time complexity. It also does not consume memory or disk space so it can be considered a “cheap” operation.

For convenience, the vertical scroll bar is scaled to display the real current size of the edited document. This allows you to quickly position a cursor to a real position within the document. Several keyboard navigation keys also respect the real current document size as described below.

Keyboard Movement

The cursor may be driven by keyboard keys and key combinations. These key combinations repeat those found in almost every text/binary editor and cannot be customized:

`Left Arrow`

> Moves the cursor one cell to the left. If the current cell is first in a row, the cursor goes to the last cell in a previous row. If the current cell is the very first cell in a file, the cursor position is not changed.

`Right Arrow`

Moves the cursor one cell to the right. If the current cell is last in a row, the cursor goes to the first cell in a next row. According to the “unlimited editing space” rule, the cursor movement is not restricted.

`Up Arrow`

Move the cursor one row up. If the current row is a very first row in a file, the cursor position is not changed.

`Down Arrow`

Move the cursor one row down. According to the “unlimited editing space” rule, the cursor movement is not restricted.

`Home`

Moves the cursor to the first cell in a current row.

`End`

Moves the cursor to the last cell in a current row.

`PgUp`

Moves the cursor several rows up. Number of rows to move is selected in such a way that the first visible row becomes last. If the resulting cursor position lies before the beginning of the file, the cursor is moved to the beginning (zero offset).

`PgDn`

Moves the cursor several rows down. Number of rows to move is selected in such a way that the last visible row becomes first. According to the “unlimited editing space” rule, the cursor movement is not restricted.

`Ctrl+Home`

Moves the cursor to the beginning of the file.

`Ctrl+End`

Moves the cursor to the (real) end of the file.

`TAB`

Activates the text pane if data pane is active and data pane if text pane is active.

If the cursor moves out of the window as a result of keyboard action, the window is automatically scrolled so the cursor is visible again.

Navigation with Mouse

To scroll the contents of the window with a mouse, use the scroll bars or mouse wheel. Rotating the mouse wheel scrolls the contents of the window up or down by several rows at a time. Scrolling before the beginning of the document is not allowed, scrolling down is always allowed according to the “unlimited editing space” rule.

Using mouse navigation it is possible to scroll the window so the cursor position becomes invisible. To quickly scroll back to the cursor, press one of the keyboard navigation keys or start *modifying data*. Alternatively, left-click any visible cell to move the cursor to it.

Cursor Movement with Mouse

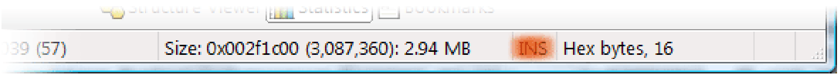
Mouse can also take part in cursor movement.

Left clicking any cell (in any visible pane) moves the cursor to that cell. Left-clicking on the cursor cell again enters the edit mode. In hexadecimal view types the actual position of this second click is used to move the caret to specific digit within the cell. In decimal or floating-point view types, the entire cell is always selected for editing.

Insert Mode

Editor windows operate in two modes: overwrite mode and insert mode. The mode is a property of individual editor window. That means that each opened window may be in different mode.

To switch between modes use the **Edit » Insert Mode** command. The state of the command item denotes the current mode - pressed (or checked) means *insert mode* and unpressed (unchecked) means *overwrite mode*. Insert mode for the current editor window is also displayed on the status bar.



39 (57) | Size: 0x002f1c00 (3,087,360): 2.94 MB | INS | Hex bytes, 16

By default, each opened editor window is in overwrite mode.

Influence on Editor Commands

Insert mode changes the behavior of several editor commands. Below is a list of commands whose behavior changes when insert mode is enabled:

- Typing - when insert mode is on, new data does not overwrite existing. Instead, the file size is increased, part of the file lying beyond the cursor position is moved and typed data is inserted at the cursor position.
- Insert File - in overwrite mode the file's content overwrites current file's content (possibly increasing file's size). In insert mode a file is inserted at the cursor position, moving remaining part forward. The file's size is always increased.
- Paste - in overwrite mode the Clipboard's content overwrites current file's content (possibly increasing file's size). In insert mode Clipboard's content is inserted at the cursor position, moving remaining part forward. The file's size is always increased.

Other editor commands are not influenced by the insert mode.

Data Modification

Direct data modification is a simplest editing action provided by the Hex Editor Neo.

First, we'll describe all supported view types in more detail.

View Types

Hex Editor Neo supports a number of different view types. A view type is a property of individualeditor window, therefore, you can have several editor windows (for the same or different documents) with different view types. Hex Editor Neo supports hexadecimal, decimal, octal and binary data representation. In addition, two floating-point formats are also supported. For some of these representations, it allows you to select data grouping, according to the following table:

Representation	Bytes	Words	Double Words	Quad Words
Hexadecimal	0 to FF16	0 to FFFF16	0 to FFFF,FFFF16	0 to FFFF,FFFF,FFFF,FFFF16
Decimal[1]	0 to 25510 (0 to 2^{8}-1)	0 to 65,53510 (0 to 2^{16}-1)	0 to 4,294,967,29510 (0 to 2^{32}-1)	0 to 18,446,744,073,709,551,61510 (0 to 2^{64}-1)
Octal	0 to 3778	0 to 177,7778	0 to 37,777,777,7778	0 to 1,777,777,777,777,777,777,7778
Binary	0 to 2^{8}-1 (binary)	0 to 2^{16}-1 (binary)	0 to 2^{32}-1 (binary)	0 to 2^{64}-1 (binary)
Float[2]	N/A	N/A	Single-precision floating-point number (IEEE 754)	N/A
Double[2]	N/A	N/A	N/A	Double-precision floating-point number (IEEE 754)

You can change the editor window display type using the **View » Display As**command, and change grouping using **View » Group By** command, both of which are available through the popup menu.

Modifying File Data

When you move the cursor in an editor window, you are working with navigation cursor. In order to be able to modify the document's data you need to switch to editing cursor. This can be achieved using one of the following ways:

- Execute the **Edit » Edit Cell** command. This will switch the cursor mode. For hexadecimal and octal view types, the caret is placed at the first cell's digit. For other view types, the entire cell is selected, like in standard edit control.
- Double-click on a cell to start editing it. For hexadecimal view types, the caret is placed at the first cell's digit. For other view types, the entire cell is selected, like in standard edit control.
- For hexadecimal and octal view types, click on a specific digit in the current cell. This switches into the edit mode and moves the caret to a digit you clicked.
- Press a ‘0’ - '9' key, ‘A’ - 'F' key (for hexadecimal view types) to start editing the current cell when data pane is active. Press any alpha-numeric key to change the current cell's value when text pane is active.

Once in an edit mode, only the ‘0’ - '9' keys and ‘A’ - 'F' keys (for hexadecimal view types) may be pressed if data pane is active and any alpha-numeric keys may be pressed if text pane is active. Navigation keys cancel the edit mode, except for the right and left keys, which moves the caret within the current or neighbor cells.

For hexadecimal view types, when last digit in a cell is modified, the cursor automatically moves to the next cell, continuing to stay in edit mode. The caret is moved to the next cell's first digit. Pressing Esc key cancels any modification made to the current cell. Pressing Enter key commits any modifications made to the current cell, moves the cursor to the next cell and cancels edit mode.

For decimal and floating-point view types, press Enter key to accept changes and move to the next cell or press Esc key to cancel any changes made to the cell. Arrow keys work only within the current cell.

For floating-point view types, you may use the sign symbol ('-'), floating-point symbol ('.') as well as exponent symbol ('e') to enter floating-point values. For example, the following floating-point values are correct:

```
1.2
-105.45
2.34e-23
``
The last "scientific" form represents the 2.34·10^-23^ number.
```

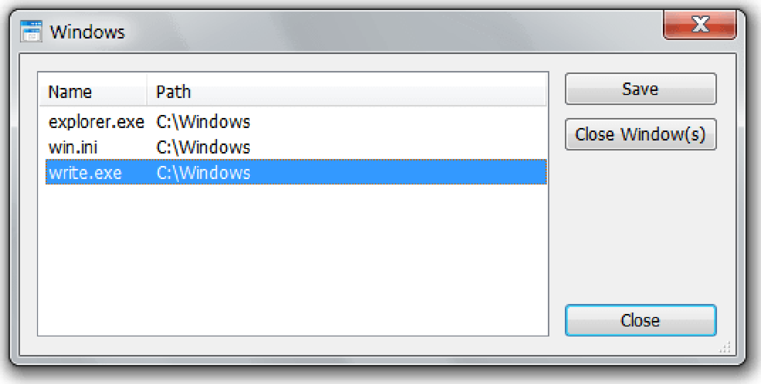
---

1. When "Digit Grouping" option is enabled (default), regional settings govern the formatting of the decimal numbers. For example, 1351680 decimal number will be displayed as 1,351,680 for standard U.S. regional settings.↩

2. Float is a single-precision floating-point number, encoded according to the IEEE Standard for Binary Floating-Point Arithmetic (IEEE 754). Double is a double-precision floating-point number, defined in the same IEEE standard. These types correspond to the float and double C/C++ fundamental language types as well as floating-point types in most other programming languages.↩↩

Editor Windows List

Use the Window » Windows... command to access the window list.



Name	Path
explorer.exe	C:\Windows
win.ini	C:\Windows
write.exe	C:\Windows

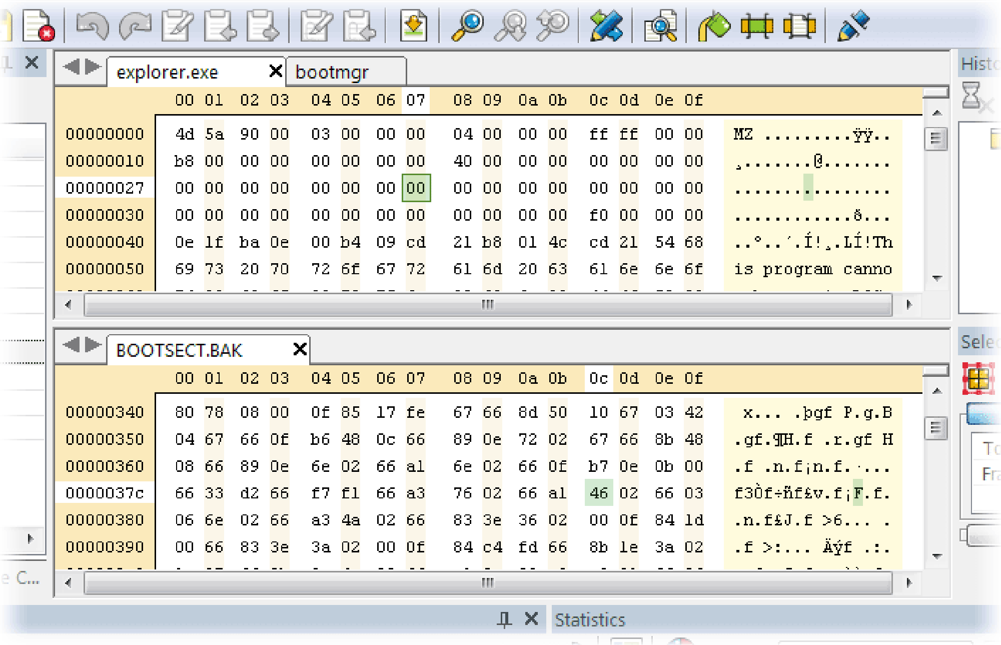
Use the commands provided by this dialog to view the list of all opened editor windows, save changes made to documents, close one or more editor windows or activate specific editor window.

Customization

Editor Windows Placement

Hex Editor Neo provides an extremely convenient way of organizing the work space when working with more than one document or with more than one editor window.

The workspace is divided into one or more frames. Each frame contains one or more editor window.



```
          00 01  02 03  04 05  06 07   08 09  0a 0b  0c 0d  0e 0f
00000000  4d 5a  90 00  03 00  00 00   04 00  00 00  ff ff  00 00   MZ ........ÿÿ..
00000010  b8 00  00 00  00 00  00 00   40 00  00 00  00 00  00 00   ¸.......@.......
00000027  00 00  00 00  00 00  00 00   00 00  00 00  00 00  00 00   ................
00000030  00 00  00 00  00 00  00 00   00 00  00 00  f0 00  00 00   ............ð...
00000040  0e 1f  ba 0e  00 b4  09 cd   21 b8  01 4c  cd 21  54 68   ..º..´.Í!¸.LÍ!Th
00000050  69 73  20 70  72 6f  67 72   61 6d  20 63  61 6e  6e 6f   is program canno
```

```
          00 01  02 03  04 05  06 07   08 09  0a 0b  0c 0d  0e 0f
00000340  80 78  08 00  0f 85  17 fe   67 66  8d 50  10 67  03 42    x... .þgf P.g.B
00000350  04 67  66 0f  b6 48  0c 66   89 0e  72 02  67 66  8b 48   .gf.¶H.f .r.gf H
00000360  08 66  89 0e  6e 02  66 a1   6e 02  66 0f  b7 0e  0b 00   .f .n.f¡n.f.·...
0000037c  66 33  d2 66  f7 f1  66 a3   76 02  66 a1  46 02  66 03   f3Òf÷ñf£v.f¡F.f.
00000380  06 6e  02 66  a3 4a  02 66   83 3e  36 02  00 0f  84 1d   .n.f£J.f >6... .
00000390  00 66  83 3e  3a 02  00 0f   84 c4  fd 66  8b 1e  3a 02   .f >:... Äýf .:.
```

Each editor window is represented by a tab in a frame. The document's file name is displayed on each tab. Click on a tab to switch to the window. If there are too much tabs in a frame that they cannot fit in it, the Scroll Left and Scroll Right (arrows) buttons are enabled. Use them to scroll the tabs to the left or right correspondingly.

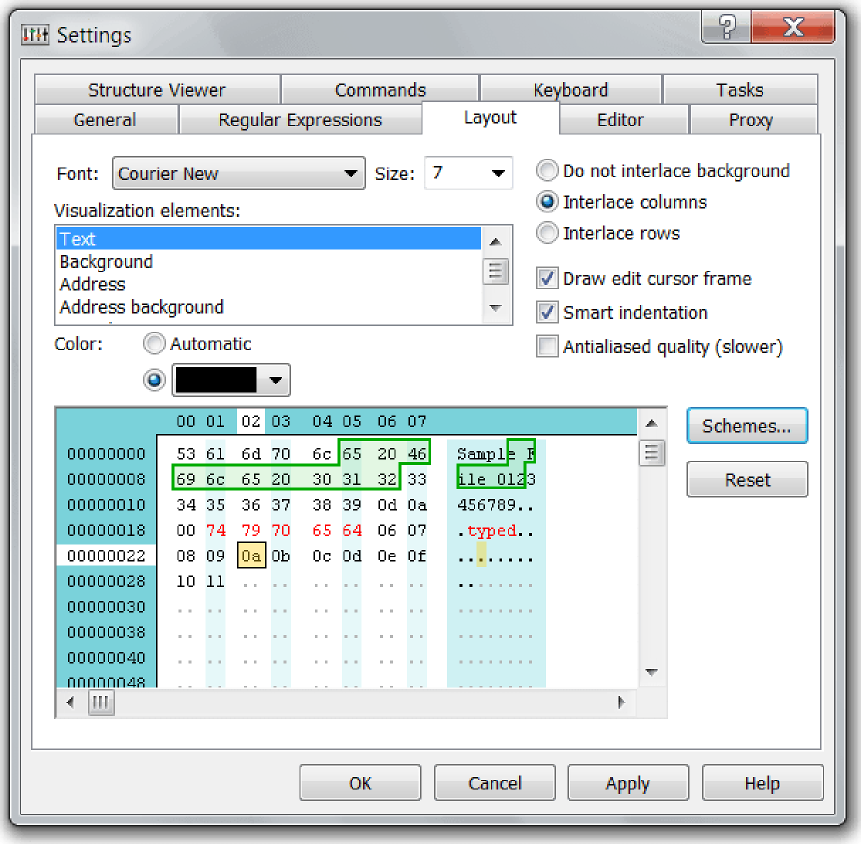
When you create new editor window, it is placed in the first visible frame. To create a new frame, click on a tab and drag it away from other tabs. Releasing a mouse button brings up the menu with two options: New Horizontal Frame and New Vertical Frame. Selecting either of these options creates a new frame and transfers the dragged window into it.

Windows may be freely moved between frames, and inter-frame splitter bars may be used to change frames' relative sizes. When you close or move away the last frame's window, the frame is closed.

Layout and Color Schemes

An editor window provides you with a large set of customizable properties, including display layout and coloring scheme. The Layout tab in the Tools » Settings is used to set up these properties.

Configurable Options



Font: Courier New Size: 7

Visualization elements:
- Text
- Background
- Address
- Address background

Color: ○ Automatic ●

○ Do not interlace background
● Interlace columns
○ Interlace rows

☑ Draw edit cursor frame
☑ Smart indentation
☐ Antialiased quality (slower)

```
          00 01 02 03  04 05 06 07
00000000  53 61 6d 70  6c 65 20 46  Sample F
00000008  69 6c 65 20  30 31 32 33  ile 0123
00000010  34 35 36 37  38 39 0d 0a  456789..
00000018  00 74 79 70  65 64 06 07  .typed..
00000022  08 09 0a 0b  0c 0d 0e 0f  ........
00000028  10 11 .. ..  .. .. .. ..  ........
00000030  .. .. .. ..  .. .. .. ..  ........
00000038  .. .. .. ..  .. .. .. ..  ........
00000040  .. .. .. ..  .. .. .. ..  ........
00000048  .. .. .. ..  .. .. .. ..  ........
```

Font and Font Size

You can select the font and font size to be used by an editor window. Only monospace fonts can be selected. Hex Editor Neo automatically scans your system for all compatible fonts and presents them in a Font combo box.

Interlacing

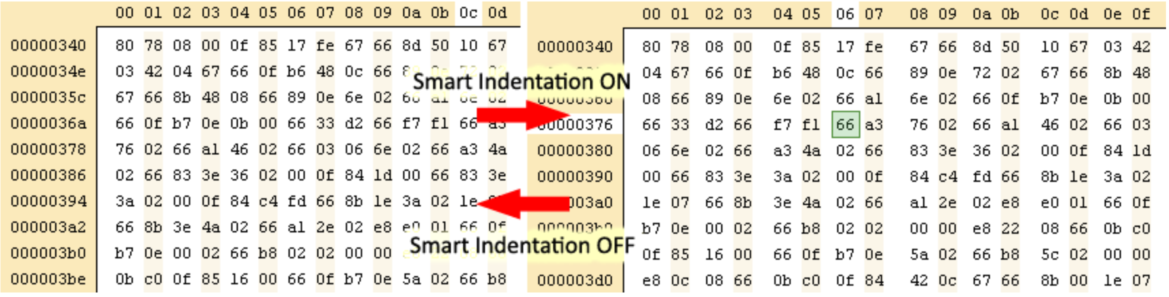
It is well known that humans better understand the screen table full of numbers if each odd table's row or column has different background color than even row or color.

Hex Editor Neo supports both row and column interlacing. In addition, it allows you to specify odd and even row/column color separately.

Interlacing provides you with a choice from three options: “Do not interlace background”, "Interlace columns" (the default one) and “Interlace rows”.

Additional Options

A “Draw edit cursor frame” configures whether the editor draws a frame outside the cell being currently edited. This option is ON by default. "Smart indentation" option enables the special feature of Hex Editor Neo, where additional small gaps are inserted between columns to improve readability.



```
          00 01 02 03 04 05 06 07 08 09 0a 0b 0c 0d
00000340  80 78 08 00 0f 85 17 fe 67 66 8d 50 10 67
0000034e  03 42 04 67 66 0f b6 48 0c 66 89 0e 72 02
0000035c  67 66 8b 48 08 66 89 0e 6e 02 66 a1 6e 02
0000036a  66 0f b7 0e 0b 00 66 33 d2 66 f7 f1 66 a3
00000378  76 02 66 a1 46 02 66 03 06 6e 02 66 a3 4a
00000386  02 66 83 3e 36 02 00 0f 84 1d 00 66 83 3e
00000394  3a 02 00 0f 84 c4 fd 66 8b 1e 3a 02 1e 07
000003a2  66 8b 3e 4a 02 66 a1 2e 02 e8 e0 01 66 0f
000003b0  b7 0e 00 02 66 b8 02 02 00 00 e8 22 08 66
000003be  0b c0 0f 85 16 00 66 0f b7 0e 5a 02 66 b8
```

```
          00 01  02 03  04 05  06 07   08 09  0a 0b  0c 0d  0e 0f
00000340  80 78  08 00  0f 85  17 fe   67 66  8d 50  10 67  03 42
00000350  04 67  66 0f  b6 48  0c 66   89 0e  72 02  67 66  8b 48
00000360  08 66  89 0e  6e 02  66 a1   6e 02  66 0f  b7 0e  0b 00
00000376  66 33  d2 66  f7 f1  66 a3   76 02  66 a1  46 02  66 03
00000380  06 6e  02 66  a3 4a  02 66   83 3e  36 02  00 0f  84 1d
00000390  00 66  83 3e  3a 02  00 0f   84 c4  fd 66  8b 1e  3a 02
000003a0  1e 07  66 8b  3e 4a  02 66   a1 2e  02 e8  e0 01  66 0f
000003b0  b7 0e  00 02  66 b8  02 02   00 00  e8 22  08 66  0b c0
000003c0  0f 85  16 00  66 0f  b7 0e   5a 02  66 b8  5c 02  00 00
000003d0  e8 0c  08 66  0b c0  0f 84   42 0c  67 66  8b 00  1e 07
```

Smart indentation is applied only when the number of columns in a window is a power of 2.

“Antialiased quality” option greatly improves the quality of text on LCD monitors. It also decreases the rendering performance. It is recommended to turn on this option only if you have fast computer and/or graphics card.

Cell Coloring

Cell coloring is widely used in Hex Editor Neo. Such features as cursor, selection,Pattern Coloring, Structure Viewer and Data Inspector all use coloring to highlight important places in a document.

Hex Editor Neo provides the unique color mixing engine, letting all these components to apply coloring to cells without misleading the user. As finally you are the one who specifies all colors for all components, some care must be taken to maintain usability of all these features.

Most components allow you not only to specify the color to be used by some feature/component, but also to apply alpha (or transparency) to it. As long as you have two colors with transparency less than 1 (opaque), these colors mix well. In general, only the “downmost” colors may be (and usually are) opaque. Such things like selection and cursor usually have alpha much less than 1 to provide good mixing.

Color Schemes

Hex Editor Neo allows you to set colors of almost every editor window's element. Select an element in a list and then select a color using color picker control. You can also set the color to “automatic”. The sample window layout below immediately reflects changes you make. Pressing Apply button also immediately applies your current coloring scheme to all opened editor windows. The color of the following elements may be customized:

Text

the color of text in data and text panes.

Background

the color of window background. If interlacing is used, rows or columns use “Even column/row” and "Odd column/row" colors instead. Background color is still used for the rest of the window.

Address

address area text color.

Address background

address area background color.

ASCII/UNICODE text

color of the text in text pane.

ASCII/UNICODE background

text pane background color.

Even column/row (for interlaced modes)

background color for even columns or rows. Used in interlaced modes.

Odd column/row (for interlaced modes)

background color for odd columns or rows. Used in interlaced modes.

“No data” text

text color for the “empty” file data.

Cursor fill

cursor fill color.

Cursor outline

cursor outline color.

Active row & column highlight text

row/column text highlight color.

Active row & column highlight background

row/column background highlight color.

Changed text

text color for changed cells.

Changed background

background color for changed cells.

Changed outline

outline color for changed cells.

Selection

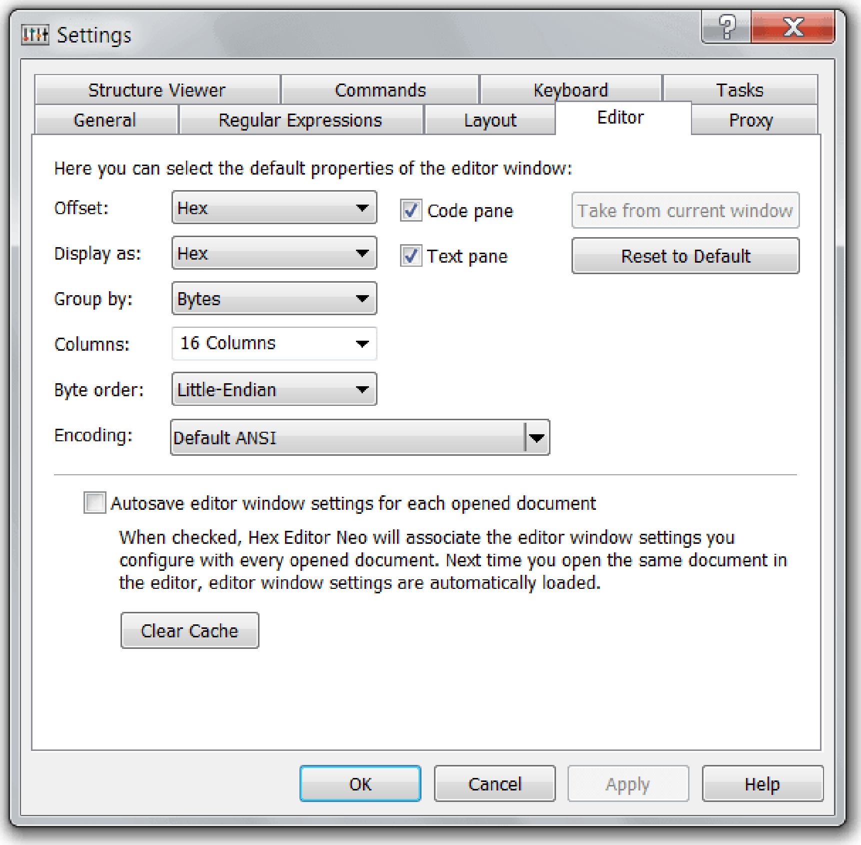
color of selection. Selection color's alpha must allow proper color mixing, so selected data is clearly visible.

Default Editor Windows Settings

Hex Editor Neo offers a wide variety of settings for eacheditor window. By default, when the new editor window is created, it gets the following settings:

Setting	Value
Offset (address) display mode	Hex
Data display mode	Hex
Grouping	Byte
Columns	16
Byte order	Little-Endian
Encoding	Default ANSI
Code pane	ON
Text pane	ON

To change these defaults, open the Editor settings page (**Tools » Settings... » Editor**).



Here you can select the default properties of the editor window:

Offset: Hex

Display as: Hex

Group by: Bytes

Columns: 16 Columns

Byte order: Little-Endian

Encoding: Default ANSI

☑ Code pane

☑ Text pane

□ Autosave editor window settings for each opened document

When checked, Hex Editor Neo will associate the editor window settings you configure with every opened document. Next time you open the same document in the editor, editor window settings are automatically loaded.

You can manually change any setting, or press the “Take from current window” button to get all settings from an active editor window. Press the "Reset to Default" button to return back to defaults.

Associating Editor Window Settings with Documents

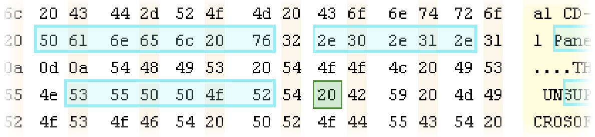
Another feature, offered by Hex Editor Neo is the ability to associate specific editor settings for each opened document. When this feature is ON, each time you close an editor window, its settings are automatically stored and applied next time you open the same document in the editor.

You can clear stored settings at any time by pressing the **Clear Cache** button.

Selection

Multiple Selection

Hex Editor Neo offers the unique feature called multiple selection. Unlike in most other editors, where you are only allowed to select a contiguous text or data, Hex Editor Neo allows you to have several contiguous ranges (or blocks) in a selection. In addition, you are not limited in a number of such contiguous blocks, there can be as many blocks as you need.



```
6c  20 43  44 2d  52 4f  4d 20  43 6f  6e 74  72 6f   al CD-
20  50 61  6e 65  6c 20  76 32  2e 30  2e 31  2e 31   l Pane
0a  0d 0a  54 48  49 53  20 54  4f 4f  4c 20  49 53   ....TH
55  4e 53  55 50  50 4f  52 54  20 42  59 20  4d 49    UNSUP
52  4f 53  4f 46  54 20  50 52  4f 44  55 43  54 20   CROSOF
```

By default, the multiple selection feature is enabled. When you start selecting data, all previously selected data remains selected.

Most Hex Editor Neo commands work with a current selection. Among those commands are:

Delete

Deletes the current selection. All selected ranges are removed from the document. Remaining data is shifted to “eliminate” gaps. File size is decreased.

Fill

Fill may be instructed to fill the current selection. All selected blocks are filled with a repeating pattern. In normal mode, filling of each block starts from the beginning of the pattern, while in “transparent” mode, filling of the next block continues from the end of the previous one.

Cut, Copy, Merge and Cut, Merge and Copy

Clipboard operations always work with a current selection.

Find, Find All, Replace, Replace All

Find and replace operations may be instructed to operate within a current selection.

Single Selection Mode Option

This option, being enabled, makes Hex Editor Neo always drop current selection before selecting new block. You can still take advantage of the multiple selection using mouse.

Selecting with Keyboard

When the `Shift` key is pressed, all cursor movement results in a current selection being modified. The range between the original cursor position and resulting cursor position is added to, subtracted from or laid upon the current selection, depending on its original configuration.

When “Single Selection mode” option is on, you can only make a single selection with keyboard. See alsoSelecting with Mouse section for information how to make a multiple selection with enabled "Auto drop selection" option

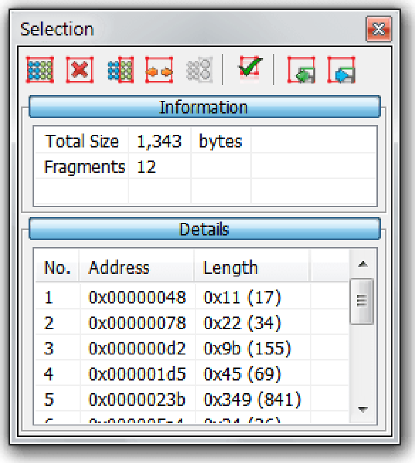
Selecting with Mouse

To select a data with a mouse, position the mouse cursor over the starting cell, press the left mouse button and drag the mouse to the target cell. See the table below to see the result of such operation. Pressing `Ctrl` or `Alt` key modifies the behavior of an operation. In the table, the range is data between the starting and target cell.

Pressed Keys	“Single Selection mode” option is OFF	"Single Selection mode" option is ON
No keys pressed	The range is inverted	Current selection is dropped, range is added to selection
`Ctrl` is pressed	The range is added to current selection	The range is added to current selection
`Alt` is pressed	The range is removed from current selection	The range is removed from current selection

Selection Tool Window

Selection tool window is used to view and control the properties of the current selection. It consists of two parts, Information and Details.



Selection

Information

Total Size	1,343	bytes
Fragments	12	

Details

No.	Address	Length
1	0x00000048	0x11 (17)
2	0x00000078	0x22 (34)
3	0x000000d2	0x9b (155)
4	0x000001d5	0x45 (69)
5	0x0000023b	0x349 (841)

Information

This pane displays generic information about the current selection. The total number of bytes selected and total number of selection blocks are shown.

Details

Selection details lists all selection blocks. For each block its ordinal number, block address and length are displayed. You can sort the list by any column (sorting is disabled if a list contains more than 500 thousands items), navigate to any block using mouse or keyboard. You can also use the list to select and delete individual block from the selection. All these commands are accessible via the shortcut menu.

Working with Selection

The following commands are used to work with a selection:

Select All

Selects the whole document.

Complexity: constant-time.

Select None

Drops the current selection.

Complexity: constant-time.

Invert Selection

Inverts the current selection. Selected blocks become unselected, and vice versa.

Complexity: constant-time.

Select Range...

Use this command to add, subtract or overlap the given range with a current selection.

Complexity: from constant-time to linear-time, depending on the current selection.

Select Modified

Drops the current selection and adds all modified document data to the current selection.

Complexity: linear-time, depending on number of document modifications.

Save Selection...

Compresses and saves the current selection to a disk file.

Complexity: linear-time, depending on the number of blocks in a current selection.

Load Selection...

Loads and optionally merges the selection from disk file with a current one.

Complexity: linear-time, depending on loaded selection complexity and current selection complexity (for merge operations).

Performance Considerations

Hex Editor Neo uses unique time- and space- efficient algorithm to work with a selection. Nevertheless, as a number of blocks in a selection grows, more disk space and processor time required to work with it. This does not apply to “constant-time” selection commands, which always work in approximately constant time and do not depend on the number of blocks in a selection.

Most Hex Editor Neo commands, when instructed to work on the current selection, reveal linear-time complexity. The processing time then depends on the selection complexity, that is, the number of blocks in a selection.

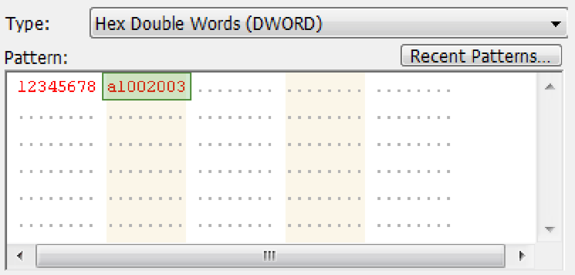
Hex Editor Neo automatically starts utilizing disk space to back up complex selections. As a result, Hex Editor Neo consumes very little RAM when working with even most complex ones. Internal compression is used to minimize disk space usage.

Care must be taken while using keyboard selection with complex selections, as most keyboard selection commands operate in linear time. For example, if you have a selection with 20 million blocks and press `Ctrl+Shift+End` with a cursor positioned at offset 0, then the time required to fulfill the operation will be proportional to a number of blocks in a selection. Select » Invert Selection command, on the other hand, will do the same in constant time, that is, immediately.

Editor Commands

Pattern Window

The pattern dialog is used throughout the Hex Editor Neo to specify patterns to fill, insert, find, replace and so on.


Type: Hex Double Words (DWORD)

Pattern:

12345678 a1002003

The Type selector with Size selector let you specify the type of pattern you are going to enter:

Size/Type	BYTE	WORD	DWORD	QWORD
String (Current Encoding)	A pattern is specified as a single-byte text string. Current window's encoding is used.	N/A	N/A	N/A
UNICODE String	N/A	A pattern is specified as a single-byte text string. Current window's encoding is used.	N/A	N/A
Hex	8-bit hexadecimal values	16-bit hexadecimal values	32-bit hexadecimal values	64-bit hexadecimal values
Decimal	8-bit decimal values	16-bit decimal values	32-bit decimal values	64-bit decimal values
Octal	8-bit octal values	16-bit octal values	32-bit octal values	64-bit octal values
Binary	8-bit binary values	16-bit binary values	32-bit binary values	64-bit binary values
Float	N/A	N/A	A pattern consists of single-precision floating-point values (encoded according to IEEE 754 standard).	N/A
Double	N/A	N/A	N/A	A pattern consists of double-precision floating-point values (encoded according to IEEE 754 standard).

All pattern types except for String and UNICODE strings are entered using standardeditor window, which is part of the pattern window. Keyboard navigation, selection and data modification operate exactly the same. A shorter version of shortcut menu is also provided for the window.

When in String or UNICODE string mode, you can select one of the previous strings by pressing the down-arrow combo-box button. For other types, "Recent Patterns…" button is used to access recent patterns or clear the current pattern.

Every window that contains a pattern dialog is resizable. You can change its size and it will be restored next time you open the same window. Each window also stores its own list of recent patterns and strings.

Byte Order

Byte order in the pattern dialog automatically matches the one in the current editor window. Commands in the shortcut menu let you change the byte order.

Regular Expressions

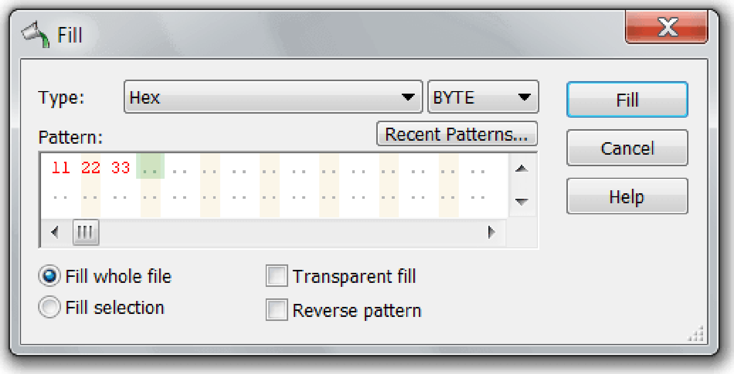
Several editor commands allow the regular expressions to be entered in "ASCII string" and "UNICODE string" modes. In this case, the "Regular Expression" checkbox and "Sub-match" field appear. Sub-match field allows you to specify whether you want to match the entire expression (sub-match = 0), or sub-expression (sub-match > 0).

When regular expressions are used in single byte string mode, system default encoding is used.

Fill

The Fill command is used to fill the whole file or the current selection with a specified pattern.

Complexity: from constant-time to linear-time (depends on the number of blocks in a current selection).



Type: Hex BYTE

Pattern: 11 22 33

● Fill whole file

○ Fill selection

□ Transparent fill

□ Reverse pattern

Pattern Window is used to specify the pattern to fill. Other options are listed below:

Fill whole file

The whole file will be filled with a pattern.

Fill selection

Only the current selection will be filled with a pattern.

Transparent fill

Each selection block will continue filling from the end of the previous block. If this option is off (default), each block is filled starting from the beginning of the pattern.

Reverse pattern

The pattern is reversed before filling. Reversing is always performed on the byte level, regardless of the pattern type.

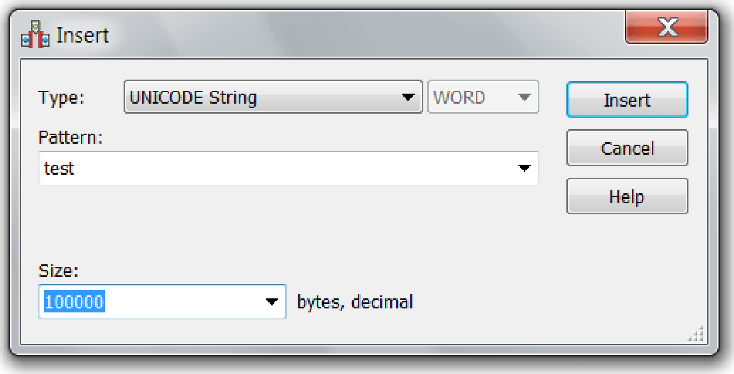
Note, that Find All command followed by Fill may be replaced with Replace All command, which will operate faster than these two commands.

Insert

The Insert command is used to insert the specified pattern at a current location in the document. You specify the pattern and the total insert size. The pattern is then repeated until the block of given size is inserted into the document. The data beyond the cursor is shifted, effectively extending file size.

The Pattern Window is used to specify the pattern to insert.

Complexity: constant-time



Type: UNICODE String WORD

Pattern: test

Size: 100000 bytes, decimal

Delete

Deletes the current selection. If there is no selection in an editor window, the cell under the cursor is deleted.

Complexity: constant-time to linear-time (depends on the number of blocks in a current selection).

After deleting data, remaining data is shifted to fill all gaps. The size of the file is then reduced to compensate for removed data.

Insert File

Inserts the contents of specified file at the current cursor position. The behavior of this command differs depending on the current Insert Mode.

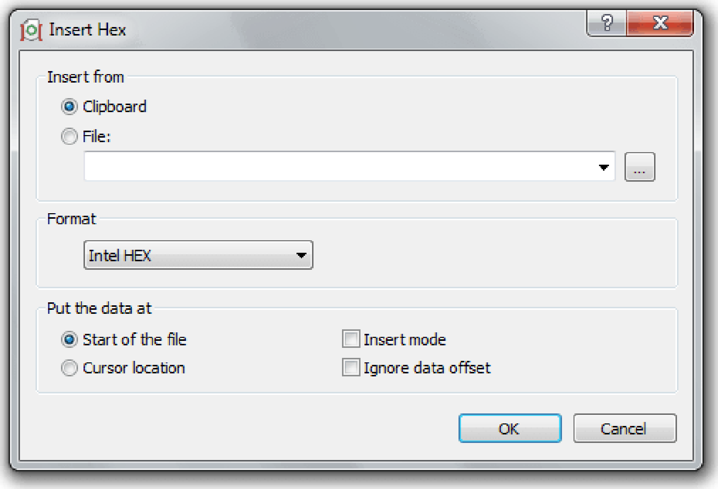
If **Insert Mode** is off, the file's content overwrites the current document's content, possibly increasing file's size.

If **Insert Mode** is on, file is inserted at the current position. Current file's content is shifted to prepare space for the file being inserted. File size is always increased.

This command has a constant-time complexity.

Insert Hex

Inserts the decoded contents of specified encoded file file at the current cursor position.



Insert Hex

Insert from

● Clipboard
○ File:

Format

Intel HEX

Put the data at

● Start of the file
○ Cursor location
□ Insert mode
□ Ignore data offset

Insert from

Select whether you are inserting Intel HEX or Motorola S-Records encoded data from Clipboard or from a text file. Click the Browse button to browse for the file or enter the path manually.

Format

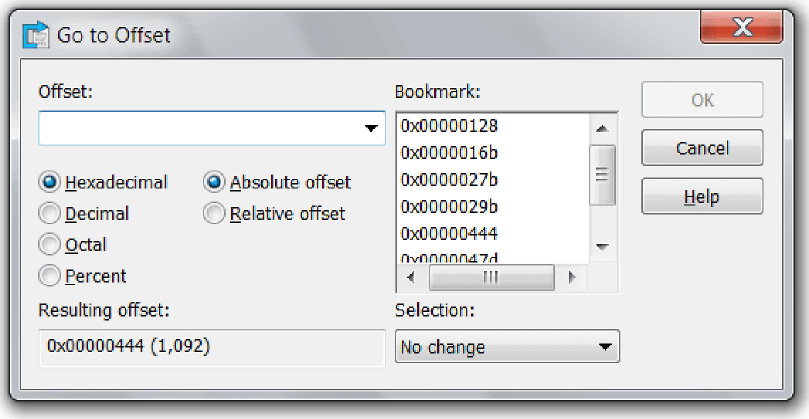
Select the format of your Intel HEX / Motorola S-Records encoded file (or Clipboard contents). Hex Editor Neo can sometime automatically discover the format.

Put the data at

Select where you want to put decoded data and whether the editor should overwrite any existing data or make space for new Intel HEX or Motorola S-Records data. You may also use the Ignore data offset option to ignore original data offset specified in hex file.

Go to Offset

This command is used to move the cursor to the given position.



Go to Offset

Offset:

● Hexadecimal
○ Decimal
○ Octal
○ Percent

● Absolute offset
○ Relative offset

Resulting offset:

0x00000444 (1,092)

Bookmark:

0x00000128
0x0000016b
0x0000027b
0x0000029b
0x00000444
0x0000047d

Selection:

No change

You can change the way entered offset is interpreted, according to the following table:

Number Type	Absolute offset	Relative offset
Hexadecimal	Absolute offset in hexadecimal format. Only nonnegative values are allowed.	Relative offset in hexadecimal format. May either be positive or negative number. The resulting offset is then calculated by adding the given offset to the current one.
Decimal	Absolute offset in decimal format. Only nonnegative values are allowed.	Relative offset in decimal format. May either be positive or negative number. The resulting offset is then calculated by adding the given offset to the current one.
Octal	Absolute offset in octal format. Only nonnegative values are allowed.	Relative offset in octal format. May either be positive or negative number. The resulting offset is then calculated by adding the given offset to the current one.
Percent	Absolute offset in decimal format as a percent of the current file's size.	

In addition, you may select one of the bookmarks in the Bookmark list to jump to.

The resulting offset is displayed at the bottom of the window in hexadecimal and decimal formats.

Selection

You may instruct the Hex Editor Neo to change the current selection when jumping to the specified address. You may select one of the following options:

No change

The current selection is not changed by the operation.

Replace selection

The current selection is discarded and new one is created. It includes all bytes from the current cursor position to the resulting position.

Add to selection

The range from the current cursor position to the resulting position is added to the current selection.

Remove from selection

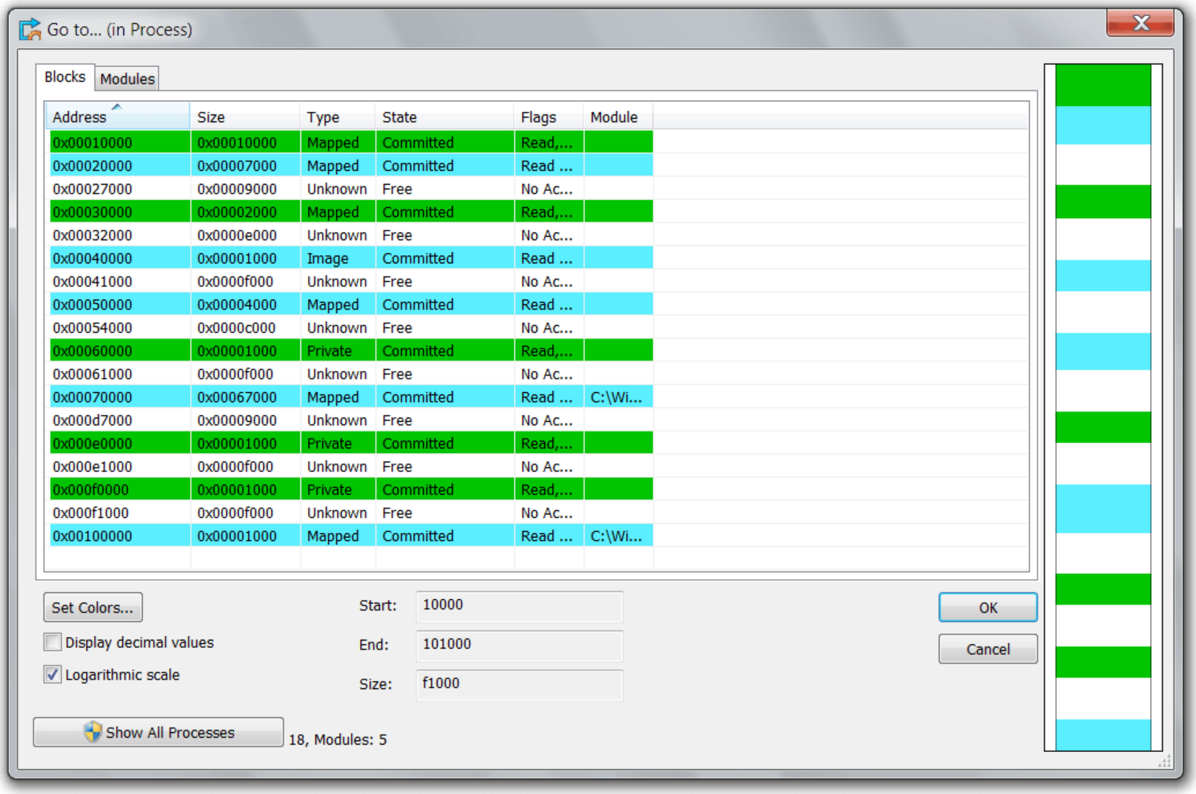
The range from the current cursor position to the resulting position is subtracted from the current selection.

Invert selection

The range from the current cursor position to the resulting position is inverted.

Go to Offset (Process)

This command is used to jump to a given memory block within a currently edited process.



Address	Size	Type	State	Flags	Module
0x00010000	0x00010000	Mapped	Committed	Read,...	
0x00020000	0x00007000	Mapped	Committed	Read ...	
0x00027000	0x00009000	Unknown	Free	No Ac...	
0x00030000	0x00002000	Mapped	Committed	Read,...	
0x00032000	0x0000e000	Unknown	Free	No Ac...	
0x00040000	0x00001000	Image	Committed	Read ...	
0x00041000	0x0000f000	Unknown	Free	No Ac...	
0x00050000	0x00004000	Mapped	Committed	Read ...	
0x00054000	0x0000c000	Unknown	Free	No Ac...	
0x00060000	0x00001000	Private	Committed	Read,...	
0x00061000	0x0000f000	Unknown	Free	No Ac...	
0x00070000	0x00067000	Mapped	Committed	Read ...	C:\Wi...
0x000d7000	0x00009000	Unknown	Free	No Ac...	
0x000e0000	0x00001000	Private	Committed	Read,...	
0x000e1000	0x0000f000	Unknown	Free	No Ac...	
0x000f0000	0x00001000	Private	Committed	Read,...	
0x000f1000	0x0000f000	Unknown	Free	No Ac...	
0x00100000	0x00001000	Mapped	Committed	Read ...	C:\Wi...

□ Display decimal values

☑ Logarithmic scale

Start: 10000

End: 101000

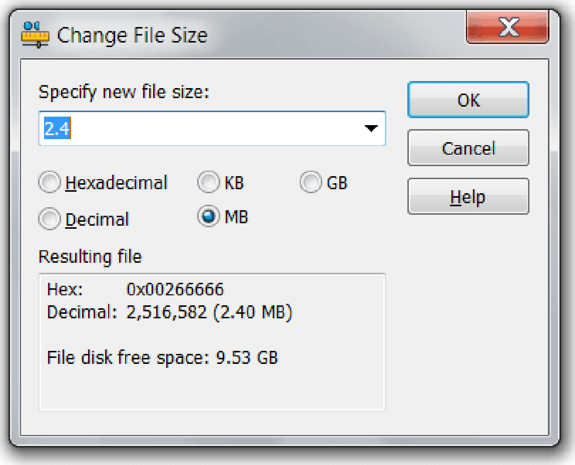
Size: f1000

18, Modules: 5

Select a memory block in the list or on the map and press the OK button.

Change File Size

This command allows you to quickly change the size of the current document.



Specify new file size: 2.4

○ Hexadecimal ○ KB ○ GB

○ Decimal ● MB

Resulting file

Hex: 0x00266666
Decimal: 2,516,582 (2.40 MB)

File disk free space: 9.53 GB

Complexity: constant-time.

Entered number is interpreted according to the following table:

Type	Interpretation
Hexadecimal	Size of the file in bytes in hexadecimal format.
Decimal	Size of the file in bytes in decimal format.
KB	Size of the file in kilobytes in decimal floating-point format.
MB	Size of the file in megabytes in decimal floating-point format.
GB	Size of the file in gigabytes in decimal floating-point format.

The resulting file size among with a free space on the drive from which you opened a file is displayed at the bottom of the window.

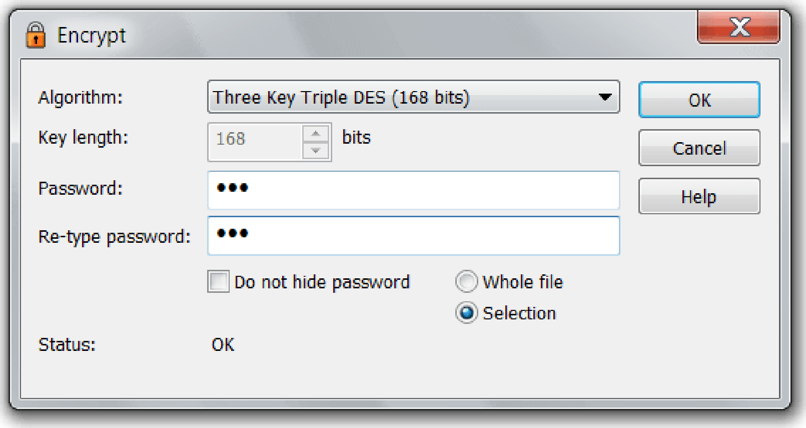
Memory or disk space is not consumed regardless of the resulting file size. Although, make sure you have enough free disk space if you are going to save the document.

When the size of the file is increased as a result of this operation, a newly inserted area is filled with byte `00`.

Encrypt

Encrypt command encrypts the current document or the current selection.

Complexity: linear-time.



Algorithm: Three Key Triple DES (168 bits)

Key length: 168 bits

Password: •••

Re-type password: •••

□ Do not hide password

○ Whole file

● Selection

Status: OK

Algorithm

Provides you with a list of installed encryption algorithms. Cryptography API block and stream ciphers are supported by the Hex Editor Neo.

Key length (bits)

Allows you to change the key length in bits for some algorithms. For others, this field is read-only.

Password and Re-type password

Enter the encryption password here. You have to enter the same password into both fields. The password will then be required to decrypt the encrypted data.

Do not hide password

Select to make password visible.

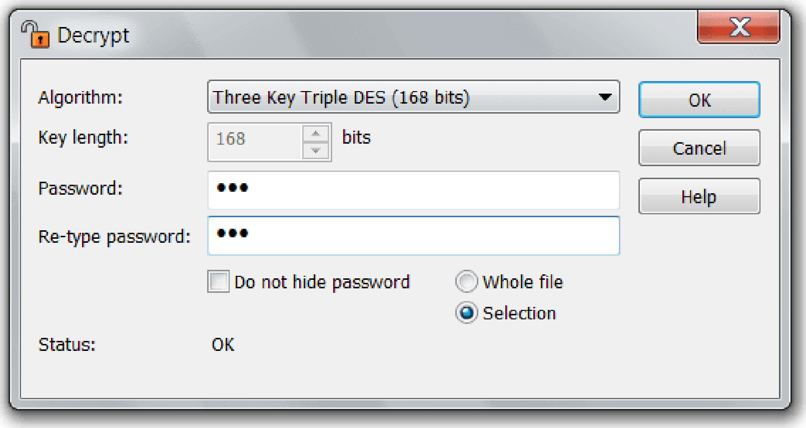
Whole file/Selection

Select whether encryption takes place on the whole document or only its part.

Decrypt

Decrypt command decrypts the current document or the current selection.

Complexity: linear-time.



Algorithm: Three Key Triple DES (168 bits)

Key length: 168 bits

Password: •••

Re-type password: •••

□ Do not hide password ○ Whole file ● Selection

Status: OK

Algorithm

Provides you with a list of installed encryption algorithms. Cryptography API block and stream ciphers are supported by the Hex Editor Neo.

Key length (bits)

Allows you to change the key length in bits for some algorithms. For others, this field is read-only.

Password and Re-type password

Enter the encryption password here. You have to enter the same password into both fields. The password must match the one used during encryption.

Do not hide password

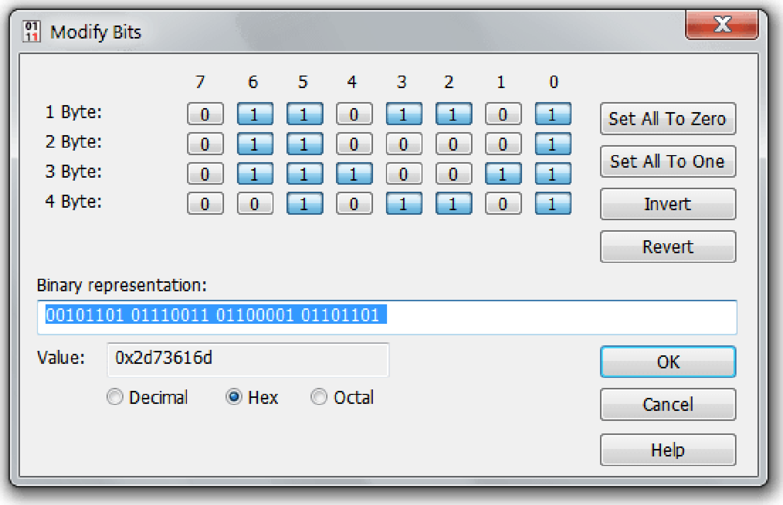
Select to make password visible.

Whole file/Selection

Select whether decryption takes place on the whole document or only its part.

Modify Bits

Modify Bits command allows you to modify individual bits of the cell under the cursor.



	7	6	5	4	3	2	1	0
1 Byte:	0	1	1	0	1	1	0	1
2 Byte:	0	1	1	0	0	0	0	1
3 Byte:	0	1	1	1	0	0	1	1
4 Byte:	0	0	1	0	1	1	0	1

Binary representation: 00101101 01110011 01100001 01101101

Value: 0x2d73616d

○ Decimal ● Hex ○ Octal

There are several checkboxes at the top of the dialog for each bit in the cell. Click on the check box to change its state. In addition, use Set All to Zero, Set All to One, Invert and Revert buttons to edit cell's bits.

“Binary representation” field allows you to edit bits directly. Position the cursor to the bit you want to modify and press '0' or ‘1’ keyboard button.

Printing Documents

Hex Editor Neo contains a powerful printing tool, which supports printing headers, footers, and has configurable margins. Page Setup section contains documentation on how to setup a page. Once the document is configured properly, use the

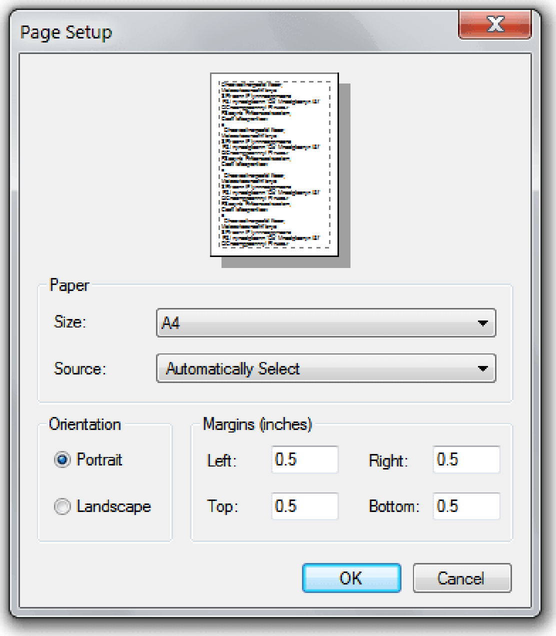
File » **Print...** command to open the Print Window.

Printing Options

There are three options related to printing documents, all available on the General Settings page.

Page Setup

Page setup dialog allows you to specify a page layout and select a printer.



Paper
Size: A4
Source: Automatically Select

Orientation
● Portrait
○ Landscape

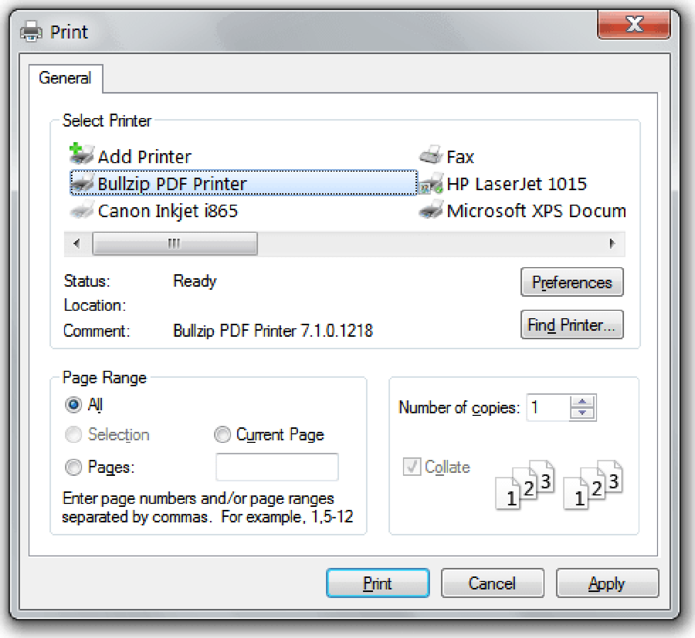
Margins (inches)
Left: 0.5 Right: 0.5
Top: 0.5 Bottom: 0.5

Use the controls in this dialog to select a paper size, paper source, paper orientation and margins. By default, Hex Editor Neo sets margins to 5 mm each. You can press the **Printer...** button to change the default printer.

When you press the **OK** button, all changes are stored and used for subsequent prints.

Printing

Use the **File** » **Print...** command to open the Print Dialog and start printing.



Select Printer
Add Printer
Bullzip PDF Printer
Canon Inkjet i865
Fax
HP LaserJet 1015
Microsoft XPS Docum

Status: Ready
Location:
Comment: Bullzip PDF Printer 7.1.0.1218

Page Range
● All
○ Selection ○ Current Page
○ Pages:
Enter page numbers and/or page ranges separated by commas. For example, 1,5-12

Number of copies: 1
☑ Collate

In this dialog you can select a printer (if you are going to print to non-default one) and click the Preferences button to configure it.

Use the controls in Page Range group to specify the range to print. Select the “All” option to print the whole document, "Current Page" option to print only the page containing the cursor. You can also enter the list of page ranges into the “Pages” box, as described in the dialog to print only the given pages.

Printing Selection

If the current editor window contains a selection, “Selection” option becomes active. Select it to print only the selected data. Take the following into consideration when printing selection, however:

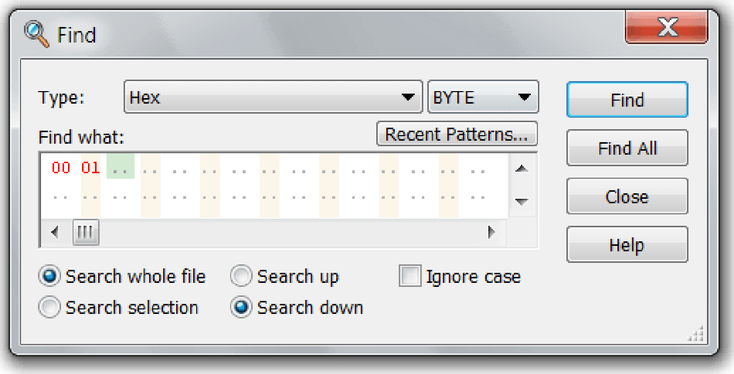
- Multiple Selection is treated as a single selection, that is, all data between the first selected byte and the last selected byte will be printed.
- Printing always starts from the beginning of the page.

Find and Replace

Find & Find All

Find Window

The Find Window contains a Pattern Window where you specify the search pattern.



Type: Hex BYTE

Find what: 00 01

● Search whole file ○ Search up □ Ignore case

○ Search selection ● Search down

Find Dialog options are described below:

Search whole file

Search for a pattern in a whole document.

Search selection

Limit the search to the current selection. This option is disabled if no selection is currently active.

Search up

Search backward

Search down

Search forward

Ignore case

Ignore case during searching.

See the Find and Find All sections for more information on pattern searching.

Find

The Find command is used to locate specific pattern in a file. The Find Window is used to specify the pattern to search for, as well as a number of additional options. Complexity: linear-time.

Find Operations

When the pattern is found, the cursor is moved to the beginning of located pattern. To continue searching, execute the Find » Find Next or Find » Find Previous commands. The direction of find depends on whether the “Search up” or "Search down" option is selected in a Find Dialog:

Operation	Search down	Search up
Find Next	Forward	Backwards
Find Previous	Backwards	Forward

If pattern is not found in the remaining part of the document, the message box is displayed and find is terminated.

Regular Expressions

The Find command fully supportsregular expressions. To search using regular expressions, select either “ASCII string (char[])” or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

If the match is found, the cursor is moved to the beginning of the matched expression or sub-expression. When you use the **Find Next** command to find the next match, the search is started from the next cell, not the end of the matched expression.

Take the following limitations into account:

- Searching with regular expressions backwards is not supported.
- Searching with regular expressions within a selection (either single-range, or multiple) is not supported.

Find All

This extremely powerful command locates all occurrences of specified pattern. TheFind Window is used to specify the pattern to search for, as well as a number of additional options.

Complexity: linear time (depends on the file's size and resulting number of noncontiguous matches).

Find All Results

The result of the Find All operation is aselection, which describes all pattern occurrences. Selection Details window may be used to browse results. In addition, message box with a total number of occurrences found is displayed when searching finishes.

If the pattern has not been found in a file, the message box is displayed.

Regular Expressions

The **Find All** command fully supports regular expressions. To search using regular expressions, select either “ASCII string (char[])” or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

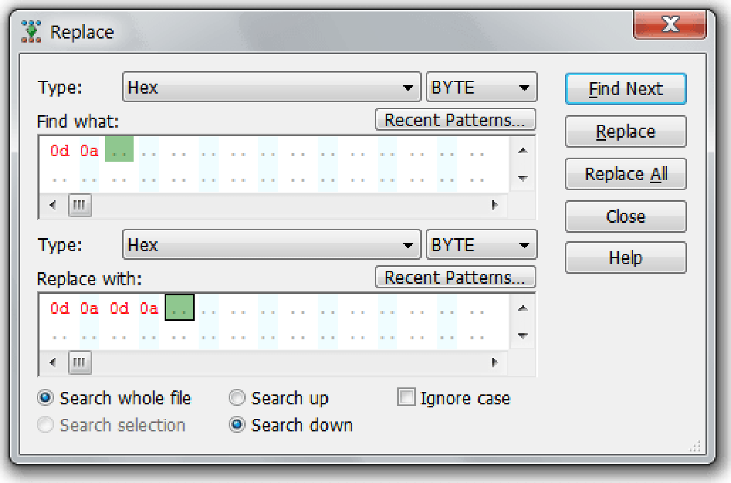
Take the following limitation into account:

- Searching with regular expressions within a selection (either single-range, or multiple) is not supported.

Replace & Replace All

Find & Replace Window

The Find & Replace Window contains twoPattern Windows where you specify the pattern to search and the pattern to replace.



Type: Hex BYTE

Find what: 0d 0a

Type: Hex BYTE

Replace with: 0d 0a 0d 0a

● Search whole file ○ Search up □ Ignore case

○ Search selection ● Search down

Find Dialog options are described below:

Search whole file

Search for a pattern in a whole document.

Search selection

Limit the search to the current selection. This option is disabled if no selection is currently active.

Search up

Search backwards

Search down

Search forward

Ignore case

Ignore case during searching.

See the Replace and Replace All sections for more information on pattern searching and replacing.

Replace

The Replace command is used to locate a specific pattern in a file and replace it with another pattern. The Find & Replace Window is used to specify both patterns, as well as a number of additional options. It is not required that the size of the search and replace patterns match, in addition, the replace pattern may be empty. In the latter case, found pattern occurrences are removed from the document.

Complexity: linear-time.

Find & Replace Operations

When you press the Replace button for the first time, Hex Editor Neo starts searching for a pattern. When pattern is located, the cursor is moved to the beginning of the pattern and a Find & Replace Dialog is displayed again. Now you have a choice of pressing Find Next button to skip this match and search for another, or Replace button to replace this match and continue searching.

The direction of the next search is governed by the “Search up” or "Search down" option.

When there are no more matches, the message box is displayed.

Regular Expressions

The Replace command fully supports regular expressions. To search using regular expressions, select either “ANSI string” or "UNICODE String" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

If the match is found, the cursor is moved to the beginning of the matched expression or sub-expression. When you use the Find Next command to find the next match, the search is started from the next cell, not the end of the matched expression. If you press the Replace button, the matched expression or sub-expression is replaced with a replace pattern.

A replace pattern may contain special characters. To tell Hex Editor Neo to treat a replace pattern specially, make sure its "Regular expression" checkbox is checked. If it is, the following restrictions apply:

1. The type of the replace pattern automatically matches the type of the search pattern (encoded or UNICODE string).
2. You are restricted to use sub-expression 0 for a search pattern (that is, the whole expression).

If you enable a regular expression mode for a replace pattern, but do not use any of the special characters, Hex Editor Neo will automatically turn this mode off when performing replace in order to achieve greater performance.

See the Replace Pattern Syntax topic for further information on supported syntax.

Take the following limitations into account:

- Searching with regular expressions backwards is not supported.
- Searching with regular expressions within a selection (either single-range, or multiple) is not supported.

Replace All

This extremely powerful command can be used to locate all occurrences of one pattern and replace them to another pattern. The Find & Replace Window is used to specify both patterns, as well as a number of additional options. It is not required that the size of the search and replace patterns equals, in addition, the replace pattern may be empty. In the latter case, found pattern occurrences are removed from the document.

Complexity: linear-time (depends on the file's size and resulting number of noncontiguous matches).

Replace All Results

After all occurrences of the search pattern are found and replaced, the message box with a total number of occurrences is displayed. If there were no matches, the message box with "No matches" text is displayed.

The **Replace All** command is always faster than a series of commands, such as Find All and Fill, or Find All and Delete. The latter command sequence is easily replaced with a **Replace All** command with empty replace pattern.

Replace All command, as most other commands, creates an operation in the operation history.

Regular Expressions

The **Replace All** command fully supports regular expressions. To search using regular expressions, select either "ASCII string (char[])" or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the "Regular expression" checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

A replace pattern may contain special characters. To tell Hex Editor Neo to treat a replace pattern specially, make sure its "Regular expression" checkbox is checked. If it is, the following restrictions apply:

1. The type of the replace pattern automatically matches the type of the search pattern (encoded or UNICODE string).
2. You are restricted to use sub-expression 0 for a search pattern (that is, the whole expression).

If you enable a regular expression mode for a replace pattern, but do not use any of the special characters, Hex Editor Neo will automatically turn this mode off when performing replace in order to achieve greater performance.

See the Replace Pattern Syntax topic for further information on supported syntax.

Take the following limitations into account:

- Searching with regular expressions within a selection (either single-range, or multiple) is not supported.

Find in Files & Replace in Files

Find in Files and Replace in Files are the two powerful Hex Editor Neo commands that allow you to perform batch find and replace operations. They can be instructed to operate on all files in a folder or the whole folder tree.

The Find in Files Window is used to enter the find and/or replace patterns and specify the list of folders to search in. You can also narrow the search by entering the mask (for example, "*.txt") to search only in files that match the mask. Several masks may be specified (separate them with a semicolon). Below is an example that can be used to search within C/C++ source files:

```
*.c;*.cpp;*.cxx;*.cc;*.h;*.hpp;*.hxx;*.idl
```

All matched documents are displayed in the Find in Files Tool Window. In several operation modes, matched files are immediately opened in the editor, in others, you may open them by double-clicking on the file's item in a result list.

Scalability

The implementation of Find in Files and Replace in Files commands scales well, that is, it works faster on multi-core or multi-processor computers. Several dedicated threads of execution are launched on such computers and perform searching and replacing in parallel.

Note that the real performance boost is achieved only if you have a fast disk system or access files over a fast network connection.

Safety

Replace in Files function, operating in Replace all occurrences and save mode may potentially be harmful to your data. Hex Editor Neo automatically detects if you are trying to execute this operation and have Always create backups Option turned off. It then warns you about the possible data loses and offers several actions to continue:

- Hex Editor Neo offers you to enable the Always create backups Option and continue the operation.
- It also offers you to switch to safer Replace all occurrences and open mode, in which all modifications are stored in memory and you decide when and whether to save them.
- It then offers you to continue the operation, if you understand its consequences.
- And finally, it offers you to cancel operation.

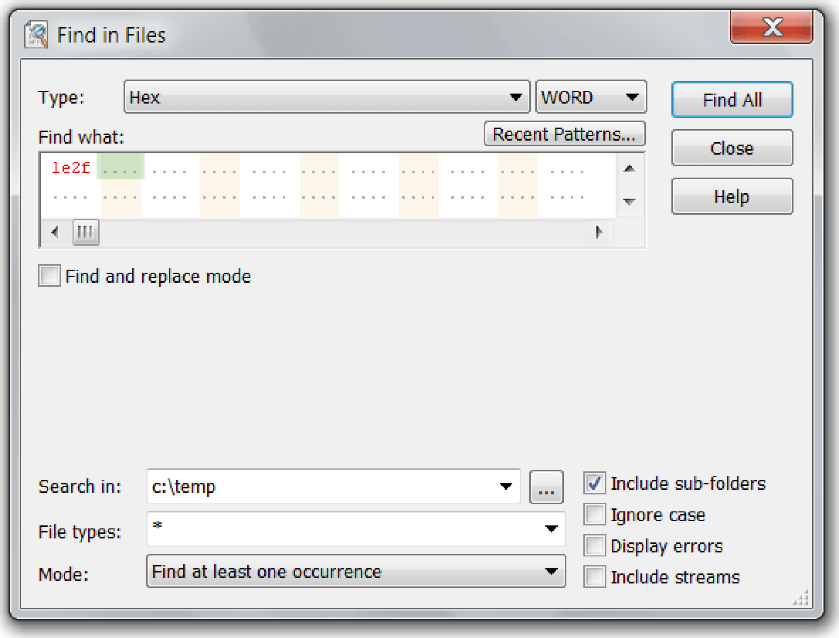
If you have Always create backup Option turned on, then each modified file is first backed up before modification.

Regular Expressions

Both Find in Files and Replace in Files functions fully support regular expressions.

Find in Files Window

Find in Files Window is used to specify the search pattern, replace pattern (optional) and other options required by Find in Files and Replace in Files commands.



Type: Hex WORD

Find what: 1e2f

☐ Find and replace mode

Search in: c:\temp

File types: *

Mode: Find at least one occurrence

☑ Include sub-folders

☐ Ignore case

☐ Display errors

☐ Include streams

Dialog options are described below:

Find and replace mode

Check to enable the Replace in Files mode, uncheck to enable Find in Files mode.

Search in

Enter the list of folders (separated with semicolon) to search in or press the browse (...) button to display the Folder List Dialog, where you can manage the list.

File types

The list of file masks to search for. Each mask is separated with a semicolon.

Include sub-folders

Sub-folders of each folder in a folder list are automatically included into the folder list.

Ignore case

Case is ignored during pattern searching.

Display errors

File opening or saving errors are displayed in the output.

Include streams

NTFS alternate data streams are included in the searching/replacing. Please note that this option includes all streams of any matched file in a search, there is no way to filter streams, only files.

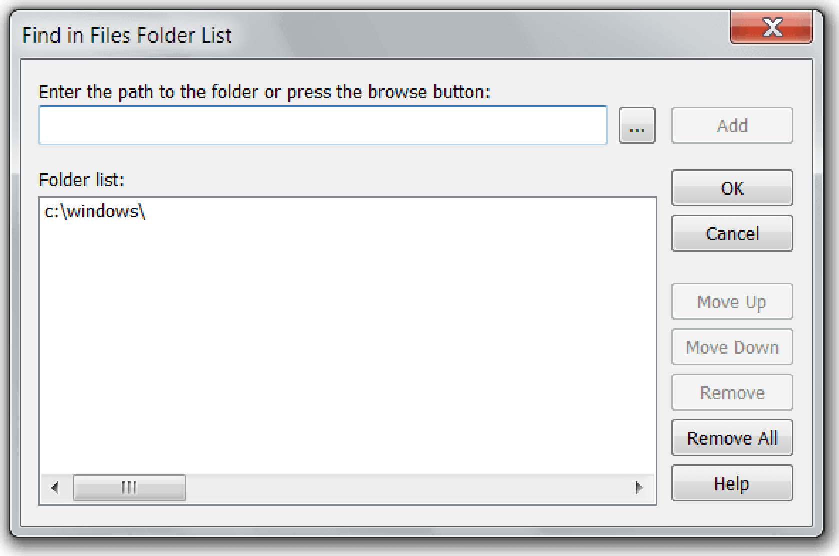
Mode

Operation mode. Two operation modes are available for Find in Files command and two operation modes are available for Replace in Files command:

Command	Mode	Description
Find in Files	Find at least one occurrence	Each file that matches specified mask(s) is searched for a pattern. Once the pattern is found, its offset is recorded and file is included in the result list. Find is aborted for this file.
	Find all occurrences	Each file that matches the mask(s) is searched for a pattern. The file that contains at least one pattern occurrence is opened in the Hex Editor Neo and all pattern occurrences are added to a multiple selection.
Replace in Files	Replace all occurrences and save	Each file that matches specified mask(s) is searched for a pattern. Each pattern occurrence is replaced by the replace pattern. The file is then saved and closed.
	Replace all occurrences and open	Each file that matches specified mask(s) is searched for a pattern. Each pattern occurrence is replaced by the replace pattern. The file is then opened in the editor. You can then review the changes and either cancel them or commit (by saving the document).

Folder List Window

Folder List Window is used to manage the folder list for Find in Files and Replace in Files functions.


Find in Files Folder List
Enter the path to the folder or press the browse button:
...
Add
Folder list:
c:\windows\
OK
Cancel
Move Up
Move Down
Remove
Remove All
Help

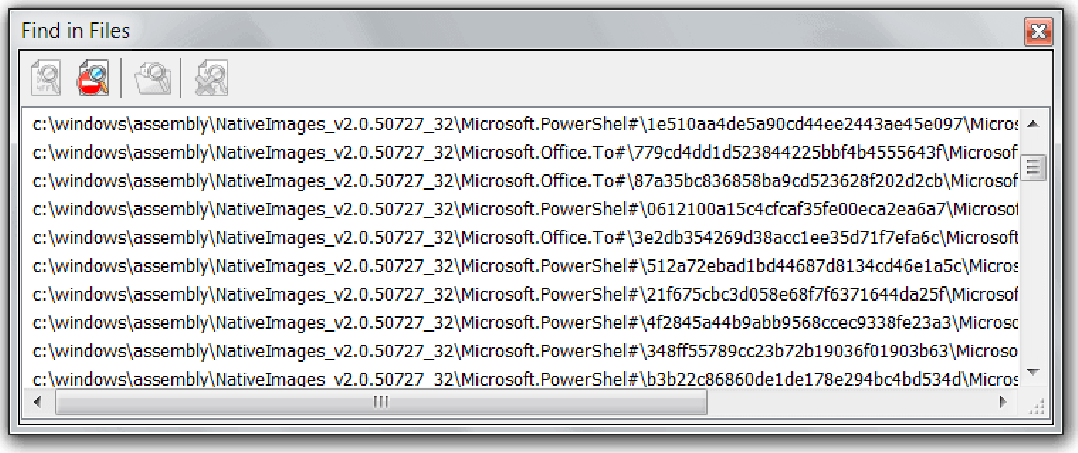
To remove a folder or folders from a list, select them with mouse or keyboard and press the **Remove** button. To add new folder, enter its full path or press the **Browse** (...) button. Then press the **Add** button.

To clear the folder list, press the **Remove All** button.

To change folders order, select one folder and press **Move Up** or **Move Down** button.

Find in Files Tool Window

This tool window is used to display the Find in Files and Replace in Files function results. During the function execution, all matched files are listed in the window.



```
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\1e510aa4de5a90cd44ee2443ae45e097\Micros
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.Office.To#\779cd4dd1d523844225bbf4b4555643f\Microsof
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.Office.To#\87a35bc836858ba9cd523628f202d2cb\Microsof
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\0612100a15c4cfcaf35fe00eca2ea6a7\Microsol
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.Office.To#\3e2db354269d38acc1ee35d71f7efa6c\Microsoft
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\512a72ebad1bd44687d8134cd46e1a5c\Micros
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\21f675cbc3d058e68f7f6371644da25f\Microsof
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\4f2845a44b9abb9568ccec9338fe23a3\Microsc
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\348ff55789cc23b72b19036f01903b63\Microso
c:\windows\assembly\NativeImages_v2.0.50727_32\Microsoft.PowerShel#\b3b22c86860de1de178e294bc4bd534d\Micros
```

Depending on the operation mode, slightly different information is displayed.

Find at least one occurrence

Each matched file's full path is displayed. To open a file and navigate to located pattern, double click it or select it and press the **Open File** button on the toolbar.

Find all occurrences

Each matched file's full path and number of pattern occurrences are displayed. A file is opened in the editor. **Open File** command is disabled (as the file is already opened).

Replace all occurrences and save

Each file where any replacements are made is added to the result list. The full file's path along with a number of replacements is displayed. Double-clicking on the file opens it in the editor.

Replace all occurrences and open

Each file where any replacements are made is added to the result list and opened in the editor. The full file's path along with a number of replacements is displayed. The **Tools** » **Find in Files** » **Open File** command is disabled.

During operation, the last item in a list displays an operation progress. The following information is displayed:

```
p % completed. N of T files in F folders have been checked. M matched file(s) found. S of TS processed.
```

Where

p

A percentage of the operation completed. It is always zero until the total number of files that match criteria (folder list and mask) is determined.

N

A number of files processed so far.

T

A total number of files to process. This is an amount of all files that match the mask and folder list filters. If Hex Editor Neo is still scanning folders, the "(...)" is added after the current total number of files. The percentage p is always zero in this case. Folder scanning and pattern searching/replacing are always performed concurrently.

F

A total number of folders to process.

`M`

A total number of matched files.

`S`

A number of bytes processed.

`TS`

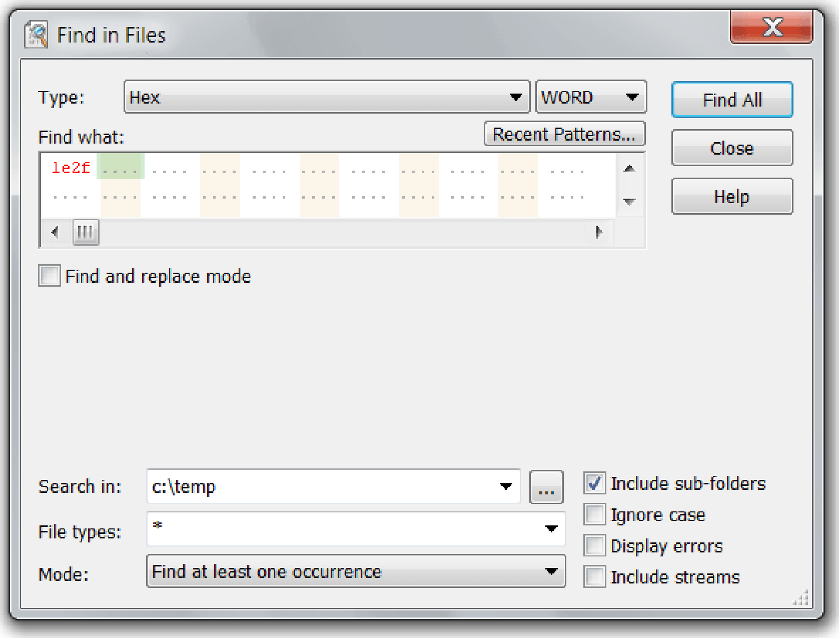
A total number of bytes to process.

To clear all items in a list, execute the **Tools » Find in Files » Clear All** command.

To cancel the current operation, execute the **Tools » Find in Files » Stop Searching** command.

Find in Files

The Find in Files command is used to search a list of files for a specified pattern. You specify the list of folders and file mask that determine the list of files and you enter a pattern to search. The Find in Files Window is used to provide all this information.



Type: Hex

WORD

Find what: 1e2f

□ Find and replace mode

Search in: c:\temp

File types: *

Mode: Find at least one occurrence

☑ Include sub-folders

□ Ignore case

□ Display errors

□ Include streams

Find in Files function operates in one of two modes: Find at least one occurrence and Find all occurrences.

Find at Least One Occurrence

In this mode, all candidate files are searched for a first pattern occurrence. If it is found, the file is added to a result list and searching continues with a next file.

Double-clicking the file in a result list opens the file and navigates to the located position.

Find All Occurrences

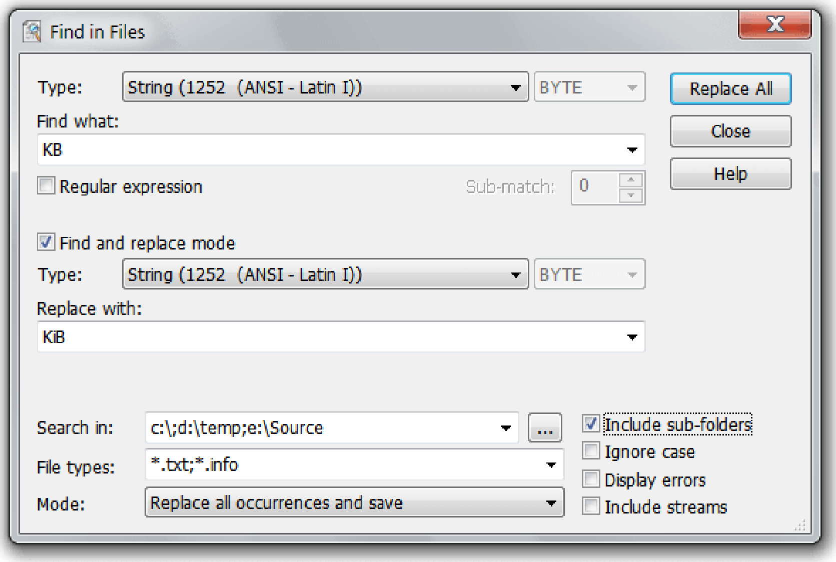
In this mode, all occurrences of the pattern are located. If there are any, the file is opened in the editor and selection displays all matched locations. The file's path is also added to the result list.

Regular Expressions

The Find in Files command fully supportsregular expressions. To search using regular expressions, select either “ASCII string (char[])” or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

Replace in Files

The Replace in Files command is used to search a list of files for a specified pattern and replace it with another pattern. You specify the list of folders and file mask that determine the list of files and you enter both patterns to search in a Find in Files Window. The "Find and replace mode" switch must be enabled for this command.



Find in Files

Type: String (1252 (ANSI - Latin I)) BYTE

Find what: KB

□ Regular expression Sub-match: 0

☑ Find and replace mode

Type: String (1252 (ANSI - Latin I)) BYTE

Replace with: KiB

Search in: c:\;d:\temp;e:\Source

File types: *.txt;*.info

Mode: Replace all occurrences and save

☑ Include sub-folders

□ Ignore case

□ Display errors

□ Include streams

Replace in Files function operates in one of two modes: Replace all occurrences and save and Replace all occurrences and open.

Replace All Occurrences and Save

In this mode, all candidate files are searched for a search pattern. All occurrences are replaced with a replace pattern. If the replace pattern is empty, all matches are removed from the file. Any matched file is added to the results list. All modifications made to a file are immediately saved. The Always create backups Option is used to determine whether to make backup copies of modified files.

Double-clicking the file in a result list opens the file.

Replace All Occurrences and Open

In this mode, all candidate files are searched for a search pattern. All found occurrences are replaced with a replace pattern. Files then are opened in the editor. Operation history for an opened file contains a Replace All command. You can then continue editing the document, save changes, or close the document without saving changes.

Regular Expressions

The Replace in Files command fully supports regular expressions. To search using regular expressions, select either "ASCII string (char[])" or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the "Regular expression" checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself. Replace pattern cannot be a regular expression.

Regular Expressions

Regular expressions provide a concise and flexible means for identifying strings of text of interest, such as particular characters, words, or patterns of characters. Regular expressions are written in a formal language. The syntax used by the Hex Editor Neo is essentially the syntax standardized by ECMAScript, with minor changes in support of internationalization. The following section briefly describes the syntax.

Regular expressions are supported by the following Hex Editor Neo commands and modules:

- Find
- Find All
- Replace
- Replace All
- Find in Files
- Replace in Files

- Pattern Coloring
- Pattern Statistics

Capturing Sub-expressions

Every Hex Editor Neo function that works with regular expressions allows you to specify what sub-expression you want to capture. Sub-expression zero represents the entire expression, sub-expression 1 and greater represent corresponding sub-expressions.

If you specify the sub-expression that is greater than the total number of sub-expressions, the error message is displayed.

Usage Tips and Performance Considerations

Using regular expressions affect performance and memory usage. Always prefer using normal pattern searching functions whenever possible. Replace All command with regular expressions may need as much as 3 times more memory compared to a simple (pattern based) Replace All command.

The following limitations are present in the current version of the Hex Editor Neo:

- Searching for a regular expression backwards is not supported.
- Searching within selection (either single or multiple) is not supported.
- Pattern Coloring will sometimes fail to highlight a complex match if it starts long before the visible area and/or ends long after the visible area.
- Zero-matching regular expressions are forbidden.

Future versions of the Hex Editor Neo will eliminate some of these limitations, while others are by design and cannot be eliminated.

Regular Expressions Syntax

A regular expression is a pattern of text that consists of ordinary characters (for example, letters `a` through `z`) and special characters, known as *metacharacters*. The pattern describes one or more strings to match when searching text. The following table contains the complete list of *metacharacters* and their behavior in the context of regular expressions (regular expressions syntax):

Metacharacter	Description
`\`	Marks the next character as a special character, a literal, a backreference, or an octal escape. For example, `n` matches the character `n`. `\n` matches a newline character. The sequence `\\` matches `\` and `\(` matches `(`.
`^`	Matches the position at the beginning of the input string. Also matches the position following `\n` or `\r`.
`$`	Matches the position at the end of the input string. Also matches the position preceding `\n` or `\r`.
`*`	Matches the preceding character or sub-expression zero or more times. For example, `zo*` matches `z` and `zoo`. `*` is equivalent to `{0,}`.
`+`	Matches the preceding character or sub-expression one or more times. For example, `zo+` matches `zo` and `zoo`, but not `z`. `+` is equivalent to `{1,}`.
`?`	Matches the preceding character or sub-expression zero or one time. For example, `do(es)?` matches the `do` in `do` or `does`. `?` is equivalent to `{0,1}`.
`{n}`	`n` is a non-negative integer. Matches exactly `n` times. For example, `o{2}` does not match the `o` in `Bob`, but matches the two o's in `food`.
`{n,}`	`n` is a non-negative integer. Matches at least `n` times. For example, `o{2,}` does not match the `o` in `Bob` and matches all the o's in `foooood`. `o{1,}` is equivalent to `o+`. `o{0,}` is equivalent to `o*`.
`{n,m}`	`m` and `n` are non-negative integers, where `n <= m`. Matches at least `n` and at most `m` times. For example, `o{1,3}` matches the first three o's in `fooooood`. `o{0,1}` is equivalent to `o?`. Note that you cannot put a space between the comma and the numbers.
`?`	When this character immediately follows any of the other quantifiers (`*`, `+`, `?`, `{n}`, `{n,}`, `{n,m}`), the matching pattern is non-greedy. A non-greedy pattern matches as little of the searched string as possible, whereas the default greedy pattern matches as much of the searched string as possible. For example, in the

string `oooo`, `o+?` matches a single `o`, while `o+` matches all `o`s.

Metacharacter	Description
`.`	Matches any single character.
`(pattern)`	A sub-expression that matches pattern and captures the match. To match parentheses characters ( ), use `\(` or `\)`.
`(?:pattern)`	A sub-expression that matches pattern but does not capture the match, that is, it is a non-capturing match that is not stored for possible later use. This is useful for combining parts of a pattern with the ”or” character `|`. For example, `industr(?:y|ies)` is a more economical expression than `industry|industries`.
`(?=pattern)`	A sub-expression that performs a positive lookahead search, which matches the string at any point where a string matching pattern begins. This is a non-capturing match, that is, the match is not captured for possible later use. For example `Windows (?=95|98|NT|2000)` matches `Windows` in `Windows 2000` but not `Windows` in `Windows 3.1`. Look-aheads do not consume characters, that is, after a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the lookahead.
`(?!pattern)`	A sub-expression that performs a negative lookahead search, which matches the search string at any point where a string not matching pattern begins. This is a non-capturing match, that is, the match is not captured for possible later use. For example `Windows (?!95|98|NT|2000)` matches `Windows` in `Windows 3.1` but does not match `Windows` in `Windows 2000`. Look-aheads do not consume characters, that is, after a match occurs, the search for the next match begins immediately following the last match, not after the characters that comprised the lookahead.
`(?>pattern)`	Independent sub-expression, match pattern and turn off backtracking.
`(?<=pattern)`	Positive look-behind assertion, match if after pattern but don't include pattern in the match. (pattern must be constant-width).
`(?<!pattern)`	Negative look-behind assertion, match if not after pattern. (pattern must be constant-width).
`(?i:pattern)`	Match pattern disregarding case. Allows to temporary turn off case sensitiveness during pattern matching.
`(?$name)`	Reference a named regular expression class. A class must be defined in the Regular Expressions Settings, otherwise, the error will be generated.
`x|y`	Matches either `x` or `y`. For example, `z|food` matches `z` or `food`. `(z|f)ood` matches `zood` or `food`.
`[xyz]`	A character set. Matches any one of the enclosed characters. For example, `[abc]` matches the `a` in `plain`.
`[^xyz]`	A negative character set. Matches any character not enclosed. For example, `[^abc]` matches the `p` in `plain`.
`[a-z]`	A range of characters. Matches any character in the specified range. For example, `[a-z]` matches any lowercase alphabetic character in the range `a` through `z`.
`[^a-z]`	A negative range characters. Matches any character not in the specified range. For example, `[^a-z]` matches any character not in the range `a` through `z`.
`\b`	Matches a word boundary, that is, the position between a word and a space. For example, `er\b` matches the `er` in `never` but not the `er` in `verb`.
`\B`	Matches a non-word boundary. `er\B` matches the `er` in `verb` but not the `er` in `never`.
`\cx`	Matches the control character indicated by `x`. For example, `\cM` matches a Control-M or carriage return character. The value of `x` must be in the range of `A-Z` or `a-z`. If not, `c` is assumed to be a literal `c` character.
`\d`	Matches a digit character. Equivalent to `[0-9]`.
`\D`	Matches a non-digit character. Equivalent to `[^0-9]`.
`\f`	Matches a form-feed character. Equivalent to `\x0c` and `\cL`.
`\n`	Matches a newline character. Equivalent to `\x0a` and `\cJ`.
`\r`	Matches a carriage return character. Equivalent to `\x0d` and `\cM`.
`\s`	Matches any white space character including space, tab, form-feed, and so on. Equivalent to `[ \f\n\r\t\v]`.

Metacharacter	Description
`\S`	Matches any non-white space character. Equivalent to `[^ \f\n\r\t\v]`.
`\t`	Matches a tab character. Equivalent to `\x09` and `\cI`.
`\v`	Matches a vertical tab character. Equivalent to `\x0b` and `\cK`.
`\w`	Matches any word character including underscore. Equivalent to `[A-Za-z0-9_]`.
`\W`	Matches any non-word character. Equivalent to `[^A-Za-z0-9_]`.
`\xn`	Matches `n`, where `n` is a hexadecimal escape value. Hexadecimal escape values must be exactly two digits long. For example, `\x41` matches `A`. `\x041` is equivalent to `\x04` & `1`. Allows ASCII codes to be used in regular expressions.
`\num`	Matches `num`, where `num` is a positive integer. A reference back to captured matches. For example, `(.)\1` matches two consecutive identical characters.
`\n`	Identifies either an octal escape value or a back-reference. If `\n` is preceded by at least `n` captured sub-expressions, `n` is a back-reference. Otherwise, `n` is an octal escape value if `n` is an octal digit (0-7).
`\nm`	Identifies either an octal escape value or a back-reference. If `\nm` is preceded by at least `nm` captured sub-expressions, `nm` is a back-reference. If `\nm` is preceded by at least `n` captures, `n` is a back-reference followed by literal `m`. If neither of the preceding conditions exists, `\nm` matches octal escape value `nm` when `n` and `m` are octal digits (0-7).
`\nml`	Matches octal escape value `nml` when `n` is an octal digit (0-3) and `m` and `l` are octal digits (0-7).
`\un`	Matches `n`, where `n` is a Unicode character expressed as four hexadecimal digits. For example, `\u00A9` matches the copyright symbol (©).

Replace Pattern Syntax

Hex Editor Neo allows you to use special characters in replace pattern when performing commands Replace and Replace All with regular expressions.

The main advantage of using regular expressions during pattern matching operations is the ability to match different patterns with a single expression. This function natively is cooperated with an ability to refer to matched pattern in replace pattern. Hex Editor Neo allows you to perform such referrals.

All characters in a replace pattern are treated “as is”, except for the following character combinations:

Combination	Description
`$&`	Refers to the whole matched expression.
`$n`	Where n is [1..9]: Refers to numbered sub-expression of matched expression.
`$$`	Means a single `$` character.
`\xnn`	Where n is [0..9 or a..f or A..F]: A single hexadecimal code byte. Can be used only if performing search/replace in single-byte string mode (ASCII or encoded).
`\xnnnn`	Where n is [0..9 or a..f or A..F]: A single hexadecimal code word. Can be used only if performing search/replace in UNICODE mode.

Examples

This section lists a few regular expressions examples. The description section describes the results of the **Find All** command used with a given regular expression.

`\w+`

Match all identifiers in a programming language source file.

`(.)\1+`

Match any sequence of repeated characters, which length is at least two characters.

`[\x00\x01\x02]`

Match 00, 01 or 02 bytes in the document.

`\w+(?=\s*\*)`

Match all C++ class names in the document which are followed by a `*` character. `*` character and any optional space characters before it are not matched.

`(?<=http://)[\w\.]+?\.(com|net|org)`

Match all domain name portions of URLs.

`\d{1,3}\.\d{1,3}\.\d{1,3}\.\d{1,3}\`

Match all IPv4 addresses.

`^{`

Match "{" characters at the beginning of the line.

Named Classes

Hex Editor Neo allows you to define any number of named regular expression classes. Each class is a regular expression with a name assigned to it. A defined class may later be referenced in the regular expression (and in another named class) using the following syntax:

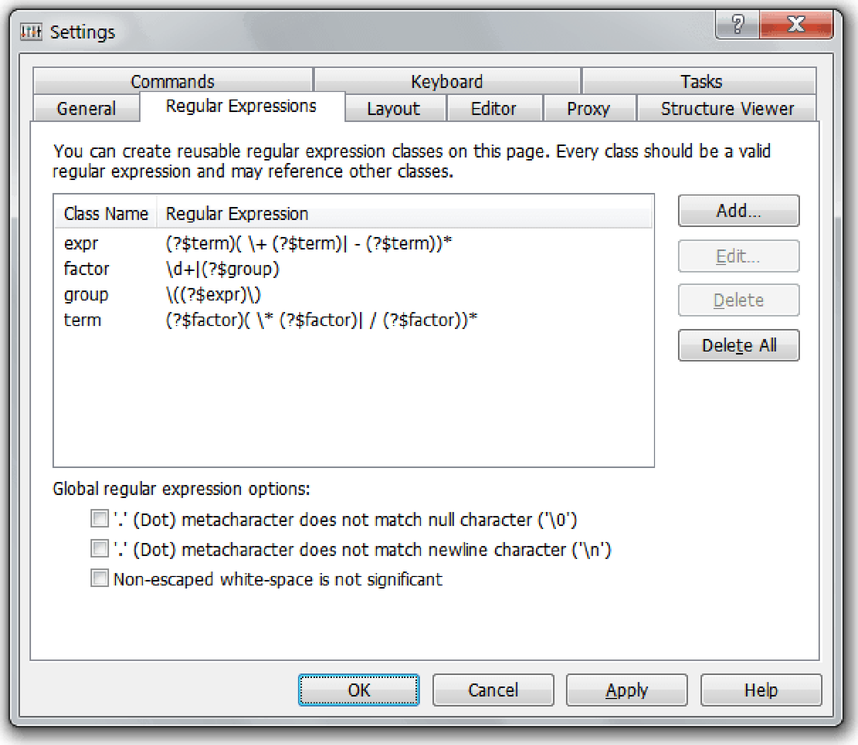
```
(?$name)
```

Recursive Grammars

The concept of named classes is so powerful, that it even allows you to define complex recursive grammars. This documentation provides one example of how this feature may be used. See the Expression Demo section for more information.

Creating and Managing Classes

The Regular Expressions Settings is used to create new named classes and edit existing ones.



You can create reusable regular expression classes on this page. Every class should be a valid regular expression and may reference other classes.

Class Name	Regular Expression
expr	(?$term)(\+ (?$term)| - (?$term))*
factor	\d+|(?$group)
group	\((?$expr)\)
term	(?$factor)(* (?$factor)| / (?$factor))*

Global regular expression options:

☐ '.' (Dot) metacharacter does not match null character ('\0')

☐ '.' (Dot) metacharacter does not match newline character ('\n')

☐ Non-escaped white-space is not significant

Add Button

Press the button to create a new named class. A class must have the unique name.

Edit Button

Press the button to edit a currently selected class. You can change a class name and a regular expression. If you change a class name, a new name must be unique.

Delete Button

Press the button to delete a currently selected class.

Delete All Button

Press the button to delete all classes.

If you accidentally made a mistake, you may press the **Cancel** button to cancel all changes. The **Cancel** button cancels the changes even if the **Apply** button has been pressed.

Regular Expression Syntax Errors

Syntax errors in entered regular expressions are not checked until the expression is actually used in one of the find/replace operations.

Example

This section shows you how the named regular expression classes may be used, for example, to match standard mathematical expressions, like `2 + 3 * (7 - 9) or 2 + 3 * 8 - 11`. First, we need to define a number of regular expression classes:

```
group
\((?$expr)\)

factor
\d+|(?$group)

term
(?$factor)( \* (?$factor)| / (?$factor))*

expr
(?$term)( \+ (?$term)| - (?$term))*
```

Now, if you execute the Find All command in regular expression mode and enter the

```
(?$expr)
```

as regular expression to search for, all mathematical expressions in the document get selected.

Clipboard

Supported Formats

Hex Editor Neo supports two clipboard formats: internal format and Windows Explorer format.

Hex Editor Neo uses the internal format to exchange data between its documents and uses the Windows Explorer format to exchange files and data with Windows Explorer.

When you put a selection into the Clipboard, it is automatically placed in both supported formats.

Internal Format

This format allows you to exchange data between two documents in the Hex Editor Neo as well as between several locations within the same document. Data placed to Clipboard in one running Hex Editor Neo instance cannot be pasted into another. To exchange data between two documents, open them both in a single Hex Editor Neo instance.

Internal format fully supports multiple selection.

Windows Explorer Format

Hex Editor Neo supports exchanging data with Windows Explorer.

Hex Editor Neo's Document Data to File

You can paste the copied document's data into the file in Windows Explorer. Select the data you want to copy (multiple selection is fully supported) and put it into the Clipboard (for example, execute the Edit » Copy command). Open a folder in Windows Explorer where you want the data to be pasted. Execute the Paste command. Copied data will be pasted into the new file, named “HHD Hex Editor Neo 4 Copied Data”.

File Data to Hex Editor Neo's Document

You can also paste a file copied to the Clipboard from Windows Explorer (or any other compatible application) into the current cursor position in a document.

Text

You can paste a text copied from some other application into the Hex Editor Neo. See thePasting Text section for detailed feature description. Copy & Export Tool Window, on the other hand, provides a number of tools to encode binary document data and place it into the Clipboard in textual form.

Copying, Cutting and Merge Modifier

Several commands exist in the Hex Editor Neo that can be used to put data into the Clipboard. They always operate on the current selection unless it is empty. In the latter case, all Clipboard operations work on the cell under the cursor. Hex Editor Neo's Clipboard operations fully support multiple selection.

The behavior of Clipboard commands differ:

Copy Command

> The selected data is placed into the Clipboard.
>
> Complexity: from constant-time to linear-time (depends on the number of selection blocks).

Cut Command

> The selected data is placed into the Clipboard and then removed from the document, as if you executed theDelete command.
>
> Complexity: from constant-time to linear-time (depends on the number of selection blocks). The performance of the Cut operation is better than of the Copy operation followed by Delete operation.

Merge and Copy

> All selection blocks are merged together and then the resulting contiguous block is placed into the Clipboard.
>
> Complexity: from constant-time to linear-time (depends on the number of selection blocks).

Merge and Cut

> All selection blocks are merged together and then the resulting contiguous block is placed into the Clipboard. The selected data is then removed from the document, as if you executed the Delete command.
>
> Complexity: from constant-time to linear-time (depends on the number of selection blocks). The performance of the Cut operation is better than of the Copy operation followed by Delete operation.

Important Considerations

The file whose data is put into the Clipboard is referenced until something else is placed into the Clipboard (by any application), running instance of the Hex Editor Neo is closed, or referenced document issaved. In all these cases, data is silently removed from the Clipboard.

While the file is referenced, it cannot be deleted or modified outside the Hex Editor Neo.

Third-party Clipboard extension tools may prevent the document from being unreferenced at the proper time leading to an inability to modify the file outside the Hex Editor Neo until you close it.

Advanced Copy & Export

Hex Editor Neo has anAdvanced Copy & Export module, which may be used to convert binary data into text, using one of a large number of supported formats. Starting from version 4.92, Hex Editor Neo also automatically puts data into Clipboard in one of those formats (depending on the current editor window's settings) when you execute the Edit » Copy or Edit » Cut commands.

Limitations

The current version of the Hex Editor Neo does not support creatingpatches if the document contains data pasted from other documents. On the other hand, if the document contains only data pasted from itself, the patch can be created.

This limitation will be removed in future versions.

Pasting Data

This section describes pasting file (or binary) data into Hex Editor Neo documents. To learn how to paste text data, see the Pasting Text section.

You can paste data into the Hex Editor Neo if it is in one of thesupported formats. To paste data from the Clipboard, you need to have an editor window active. Position the cursor to the offset where you want the data to be placed and execute the **Edit » Paste** command.

The current Insert Mode governs the behavior of the Paste command. If it is on, file's data beyond the cursor position is shifted to free required space, in which Clipboard data is placed. If Insert Mode is off, file's data is overwritten with data from the Clipboard.

If the multiple selection existed at a time you executed the **Copy** or **Cut** commands, additional gaps are inserted into the document. If **Insert Mode** is on, those gaps are cumulative.

Paste Command Complexity

If Clipboard contains a file copied from the Windows Explorer, the paste command operates in constant-time, that is, immediately. If data has been copied or cut from the same or another Hex Editor Neo's document, the complexity is linear-time, depending on the number of blocks in the selection.

Pasting Text

Hex Editor Neo supports pasting text from Clipboard. This section describes supported formats and usage strategies:

Pasting Raw Text

Any plain text placed into the Clipboard may be pasted into the Hex Editor Neo'sdocument. In order to paste the text, perform the following steps:

1. Open (or create) the document you want to paste text to.
2. Make sure the required encoding is selected.
3. Navigate to the position where you want to paste text.
4. Check the Insert Mode switch. Turn it OFF to overwrite existing document's data with Clipboard's data, or ON to make room for Clipboard's data.
5. Make sure the text pane is visible and active (the cursor image has a frame around it).
6. Execute the **Edit » Paste** command.

Pasting Formatted Numbers

In addition to providing the ability to paste the text “as it is”, Hex Editor Neo also supports parsing Clipboard's text in order to extract a sequence of decimal or hexadecimal numbers.

Make sure the code pane is active before pasting data. If the text pane is active, Clipboard contents will be pasted “as is”, as described in the previous section. As always, the **Insert Mode** switch is used to specify whether you want to overwrite or insert data.

The current view type dictates the type of integers parsed from the input text. If current view type is a hexadecimal view type, integers are assumed to be in base 16; otherwise, they are assumed to be in base 10. Use the “0x” prefix to temporary change number's base to 16 (it affects only the number immediately following the prefix).

Numbers may be separated with one or more separators. Hex Editor Neo treats all non-digit (or non-hexadecimal digit) characters as separators, including line feed and carriage return characters. If there are no separators, current editor window's grouping mode is used to separate them.

Multiple separators are allowed. Parsing continues to the end of the input text.

Pasting Formatted Numbers feature is not supported for Float and Double view types.

Examples

The following text pasted into the editor window, currently in Hex Bytes view type…

```
1 2 3 4a 0x5
a 7f 12, ff; 12
```

results in the following sequence (displayed in hex) to be inserted into the document:

```
01 02 03 4a 05 0a 7f 12 ff 12
```

The same text pasted into the Decimal Bytes window results in the following sequence (displayed in decimal):

```
1 2 3 4 5 7 12 12
```

Parsing ignored all invalid characters, treating them as separators. "0x" prefix may be used to temporary switch to hexadecimal mode:

```
0x34 23 0x5a 0xaa 17
```

Which results in the following sequence (displayed in decimal):

```
52 23 90 170 17
```

The following text can be pasted into the editor window, which is currently in Hex Words mode:

```
7a20, 5, ffff, AE01;
12c 15 0 0 17FF
```

Advanced Copy & Export

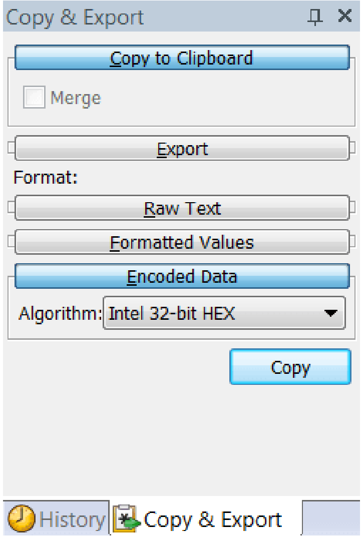
In addition to standard Clipboard support, Hex Editor Neo provides advanced copy/export feature.

This feature allows you to convert selected data (multiple selection is fully supported) into one of supported format and either place it into the Clipboard or write to a file.

All currently supported formats generate textual data that can directly be pasted into or opened by nearly every application. Three formats, Raw Text, Formatted Data and Encoded Data are provided, each of which offer a rich set of configurable options.

Copy & Export Tool Window

This tool window is used to configure the feature and start data conversion.



A window is divided into two parts: at the top, two panes, "Copy to Clipboard" and "Export" are displayed. Only one pane may be opened at a given time. The active pane determines the action to be held by the Hex Editor Neo: if the "Copy to Clipboard" pane is opened, data will be placed into the Clipboard, if "Export" pane is opened, data will be exported to a given file.

"Copy to Clipboard" pane contains a single configurable option: a Merge switch. It becomes active when there is a multiple selection and allows you to merge all selected blocks during data conversion.

"Export" pane allows you to specify the full path to the file you want the data to be written to. The Append switch allows you to append new data to an existing file and Merge switch, as already described, allows you to merge all selected blocks during data conversion.

Second part of this tool window contains one pane for each supported data format. Only one pane may be opened at a given time. Opened pane determines the format to be used for data conversion. Subsequent sections describe each format in greater detail.

Raw Text Format

This data format is used to copy the contents of the text pane of the editor window, “as you see it”. In fact, selected document's data is interpreted as textual data and placed into the Clipboard (or exported) in the given encoding.

The format has a single configurable parameter, Encoding, which can be used to tell Hex Editor Neo how to export document's data.

NOTE: Support for a specific encoding depends on installed Windows code pages and fonts. If required components cannot be found for a selected encoding, resulting output will be empty.

The following table lists all “special” encodings:

Encoding	Notes
None	Document's data is placed into the Clipboard (or file) “as is”. No processing is performed. Selection is assumed to contain ANSI text.
Current	The current editor window's encoding is used to convert data. This option is the default.
System default	Selected data is assumed to contain ANSI text in current system encoding. It is converted to UTF-16.
OEM	Selected data is assumed to contain ANSI text in current system OEM encoding. It is converted to UTF-16.
UTF-7	Selected data is assumed to contain multi-byte UNICODE text encoded in UTF-7 encoding. It is converted to UTF-16.
UTF-8	Selected data is assumed to contain multi-byte UNICODE text encoded in UTF-8 encoding. It is converted to UTF-16.
Unicode (UTF-16)	Document's data is placed into the Clipboard (or file) "as is". No processing is performed. Selection is assumed to contain UNICODE UTF-16 text.

When selected data is not too complex, it is automatically put into the Clipboard in this format when user executes the Edit » Copy or Edit » Cut and cursor is in the text pane.

All following encodings assume the text to be a single-byte or multi-byte DBCS text and convert it to UTF-16.

- ANSI - Arabic
- ANSI - Baltic
- ANSI - Central European
- ANSI - Cyrillic
- ANSI - Greek
- ANSI - Hebrew
- ANSI - Latin I
- ANSI - Turkish
- ANSI/OEM - Japanese, Shift-JIS
- ANSI/OEM - Korean (Unified Hangul Code)
- ANSI/OEM - Simplified Chinese (PRC, Singapore)
- ANSI/OEM - Thai (same as 28605, ISO 8859-15)
- ANSI/OEM - Traditional Chinese (Taiwan; Hong Kong SAR, PRC)
- ANSI/OEM - Vietnamese
- Arabic - ASMO 449+, BCON V4
- Arabic - ASMO 708
- Arabic - Transparent Arabic
- Arabic - Transparent ASMO
- CNS - Taiwan
- Eten - Taiwan
- EUC - Japanese
- EUC - Korean

- EUC - Simplified Chinese
- EUC - Traditional Chinese
- Europa 3
- HZ-GB2312 Simplified Chinese
- IA5 German (7-bit)
- IA5 IRV International Alphabet No. 5 (7-bit)
- IA5 Norwegian (7-bit)
- IA5 Swedish (7-bit)
- IBM EBCDIC - Arabic
- IBM EBCDIC - Cyrillic (Russian)
- IBM EBCDIC - Cyrillic (Serbian, Bulgarian)
- IBM EBCDIC - Denmark/Norway (20277 + Euro symbol)
- IBM EBCDIC - Denmark/Norway
- IBM EBCDIC - Finland/Sweden (20278 + Euro symbol)
- IBM EBCDIC - Finland/Sweden
- IBM EBCDIC - France (20297 + Euro symbol)
- IBM EBCDIC - France
- IBM EBCDIC - Germany (20273 + Euro symbol)
- IBM EBCDIC - Germany
- IBM EBCDIC - Greek
- IBM EBCDIC - Hebrew
- IBM EBCDIC - Icelandic (20871 + Euro symbol)
- IBM EBCDIC - Icelandic
- IBM EBCDIC - International (500 + Euro symbol)
- IBM EBCDIC - International
- IBM EBCDIC - Italy (20280 + Euro symbol)
- IBM EBCDIC - Italy
- IBM EBCDIC - Japanese Katakana Extended
- IBM EBCDIC - Korean Extended
- IBM EBCDIC - Latin 1/Open System
- IBM EBCDIC - Latin America/Spain (20284 + Euro symbol)
- IBM EBCDIC - Latin America/Spain
- IBM EBCDIC - Latin-1/Open System (1047 + Euro symbol)
- IBM EBCDIC - Modern Greek
- IBM EBCDIC - Multilingual/ROECE (Latin-2)
- IBM EBCDIC - Thai
- IBM EBCDIC - Turkish (Latin-5)
- IBM EBCDIC - Turkish
- IBM EBCDIC - U.S./Canada (037 + Euro symbol)
- IBM EBCDIC - U.S./Canada
- IBM EBCDIC - United Kingdom (20285 + Euro symbol)
- IBM EBCDIC - United Kingdom
- IBM5550 - Taiwan
- ISCII Assamese
- ISCII Bengali
- ISCII Devanagari
- ISCII Gujarati
- ISCII Kannada
- ISCII Malayalam
- ISCII Oriya
- ISCII Punjabi
- ISCII Tamil
- ISCII Telugu
- ISO 2022 Japanese JIS X 0201-1989
- ISO 2022 Japanese with halfwidth Katakana
- ISO 2022 Japanese with no halfwidth Katakana
- ISO 2022 Korean
- ISO 2022 Simplified Chinese
- ISO 2022 Traditional Chinese
- ISO 6937 Non-Spacing Accent
- ISO 8859-1 Latin I
- ISO 8859-15 Latin 9
- ISO 8859-2 Central Europe

- ISO 8859-3 Latin 3
- ISO 8859-4 Baltic
- ISO 8859-5 Cyrillic
- ISO 8859-6 Arabic
- ISO 8859-7 Greek
- ISO 8859-8 Hebrew
- ISO 8859-8 Hebrew
- ISO 8859-9 Latin 5
- Japanese (Katakana) Extended
- Japanese (Latin) Extended and Japanese
- JIS X 0208-1990 & 0121-1990
- Korean (Johab)
- Korean Extended and Korean
- MAC - Arabic
- MAC - Croatia
- MAC - Cyrillic
- MAC - Greek I
- MAC - Hebrew
- MAC - Icelandic
- MAC - Japanese
- MAC - Korean
- MAC - Latin II
- MAC - Roman
- MAC - Romania
- MAC - Simplified Chinese (GB 2312)
- MAC - Thai
- MAC - Traditional Chinese (Big5)
- MAC - Turkish
- MAC - Ukraine
- OEM - Arabic
- OEM - Baltic
- OEM - Canadian-French
- OEM - Cyrillic (primarily Russian)
- OEM - Greek (formerly 437G)
- OEM - Hebrew
- OEM - Icelandic
- OEM - Latin II
- OEM - Modern Greek
- OEM - Multilingual Latin I + Euro symbol
- OEM - Multilingual Latin I
- OEM - Nordic
- OEM - Portuguese
- OEM - Russian
- OEM - Turkish
- OEM - United States
- Russian - KOI8-R
- Simplified Chinese (GB2312)
- Simplified Chinese Extended and Simplified Chinese
- Simplified Chinese
- T.61
- TCA - Taiwan
- TeleText - Taiwan
- Ukrainian (KOI8-U)
- US/Canada and Japanese
- US/Canada and Traditional Chinese
- US-ASCII (7-bit)
- Wang - Taiwan

Formatted Data Format

This powerful format allows you to convert a binary data to a sequence of numbers, encoded according to the selected type. You select a type of number, whether base 16 or base 10 is used to represent them, the number of numbers in a row and output type.

When selected data is not too complex, it is automatically put into the Clipboard in this format when user executes the Edit » Copy or Edit » Cut and cursor is in the code pane.

The *Elements* combo among with Group combo provide you with a choice of number type and grouping mode:

Group/Elements	BYTE	WORD	DWORD	QWORD
Hex	8-bit hexadecimal values	16-bit hexadecimal values	32-bit hexadecimal values	64-bit hexadecimal values
Decimal	8-bit decimal values	16-bit decimal values	32-bit decimal values	64-bit decimal values
Octal	8-bit octal values	16-bit octal values	32-bit octal values	64-bit octal values
Binary	8-bit binary values	16-bit binary values	32-bit binary values	64-bit binary values
Float	N/A	N/A	Single-precision floating-point values (encoded according to IEEE 754 standard).	N/A
Double	N/A	N/A	N/A	Double-precision floating-point values (encoded according to IEEE 754 standard).

When *Elements* or *Group* are set to “Default”, their values are taken from the current editor window.

Columns combo lets you specify the number of values in a row. If “Default” is selected, it is taken from the current editor window.

Addresses switch may be used to include row addresses in the output. *Text pane* switch includes the text pane in the output as well. Text pane is included only if the element type size is one or two bytes. In the latter case, Unicode text appears in the text pane. The text is separated from value list by the tabulation character (0x09). Both these options are available only for “Space-separated text” and "Comma-separated text" output formats.

Use *Type* combo to select an output format:

Without separators

Select data is encoded into a text stream:

```
6fa864000001c349444154384fbd934f4893611cc7dfcaa16188985887898c31294407319d2df12082d0452112ea344f157811
```

Space-separated text

Selected data is encoded into space-separated value list. Below is a sample text (Addresses and Text pane options are turned OFF):

```
61 73 00 00 09 61 75 64 69 6f 73 69 7a 65 00 41
72 6f f6 60 00 00 00 00 08 68 61 73 41 75 64 69
6f 01 01 00 0a 61 75 64 69 6f 64 65 6c 61 79 00
```

Below is a sample text (Addresses and Text pane options are turned ON):

```
00000140: 61 73 00 00 09 61 75 64 69 6f 73 69 7a 65 00 41 as...audiosize.A
00000150: 72 6f f6 60 00 00 00 00 08 68 61 73 41 75 64 69 ro.`.....hasAudi
00000160: 6f 01 01 00 0a 61 75 64 69 6f 64 65 6c 61 79 00 o....audiodelay.
```

Comma-separated text

Selected data is encoded into comma-separated value list. Below is a sample text (Addresses and Text pane options are turned OFF):

```
61, 73, 00, 00, 09, 61, 75, 64, 69, 6f, 73, 69, 7a, 65, 00, 41
72, 6f, f6, 60, 00, 00, 00, 00, 08, 68, 61, 73, 41, 75, 64, 69
6f, 01, 01, 00, 0a, 61, 75, 64, 69, 6f, 64, 65, 6c, 61, 79, 00
```

Below is a sample text (Addresses and Text pane options are turned ON):

```
00000140: 61, 73, 00, 00, 09, 61, 75, 64, 69, 6f, 73, 69, 7a, 65, 00, 41 as...audiosize.A
00000150: 72, 6f, f6, 60, 00, 00, 00, 00, 08, 68, 61, 73, 41, 75, 64, 69 ro.`.....hasAudi
00000160: 6f, 01, 01, 00, 0a, 61, 75, 64, 69, 6f, 64, 65, 6c, 61, 79, 00 o....audiodelay.
```

C/C++ array

Selected data is converted into C/C++ array initialization:

```
C++
unsigned char b1[] = {
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
};
```

or

```
C++
unsigned short b1[] = {
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980
    367, 1, 24842, 25717, 28521, 25956, 24940, 121
};
```

Java array

Selected data is converted into Java array initialization:

```
byte b1[] = {
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
};
```

or

```
ushort b1[] = {
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980,
    367, 1, 24842, 25717, 28521, 25956, 24940, 121
};
```

JavaScript array

Selected data is converted into Javascript array initialization:

```
JavaScript
var b1 = new Array (
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
);
```

or

```
JavaScript
var b1 = new Array (
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980
    367, 1, 24842, 25717, 28521, 25956, 24940, 121
);
```

Delphi array

Selected data is converted into Delphi array initialization:

```
b1 = array[1..48] of Byte = (
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
);
```

or

```
b1 = array[1..24] of Word = (
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980,
    367, 1, 24842, 25717, 28521, 25956, 24940, 121
);
```

C# .NET array

Selected data is converted into C# array initialization:

```
C#
Byte [] b1 = new Byte [] {
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
};
```

or

```
C#
UInt16 [] b1 = new UInt16 [] {
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980
    367, 1, 24842, 25717, 28521, 25956, 24940, 121
};
```

Visual Basic .NET array

Selected data is converted into Visual Basic array initialization:

```
Dim b1() As Byte = { _
    61h, 73h, 00h, 00h, 09h, 61h, 75h, 64h, 69h, 6fh, 73h, 69h, 7ah, 65h, 00h, 41h,  _
    72h, 6fh, f6h, 60h, 00h, 00h, 00h, 00h, 08h, 68h, 61h, 73h, 41h, 75h, 64h, 69h,  _
    6fh, 01h, 01h, 00h, 0ah, 61h, 75h, 64h, 69h, 6fh, 64h, 65h, 6ch, 61h, 79h, 00h _
}
```

or

```
Dim b1() As UInt16 = { _
    29537, 0, 24841, 25717, 28521, 26995, 25978, 16640, 28530, 24822, 0, 0, 26632, 29537, 30017, 26980,  _
    367, 1, 24842, 25717, 28521, 25956, 24940, 121 _
}
```

PHP array

Selected data is converted into PHP array initialization:

```
var $b1 = array (
    0x61, 0x73, 0x00, 0x00, 0x09, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x73, 0x69, 0x7a, 0x65, 0x00, 0x41,
    0x72, 0x6f, 0xf6, 0x60, 0x00, 0x00, 0x00, 0x00, 0x08, 0x68, 0x61, 0x73, 0x41, 0x75, 0x64, 0x69,
    0x6f, 0x01, 0x01, 0x00, 0x0a, 0x61, 0x75, 0x64, 0x69, 0x6f, 0x64, 0x65, 0x6c, 0x61, 0x79, 0x00
);
```

Assembler array

Selected data is converted into Assembler language array initialization:

```
b1 db   61h, 73h, 00h, 00h, 09h, 61h, 75h, 64h, 69h, 6fh, 73h, 69h, 7ah, 65h, 00h, 41h,
        72h, 6fh, f6h, 60h, 00h, 00h, 00h, 00h, 08h, 68h, 61h, 73h, 41h, 75h, 64h, 69h,
        6fh, 01h, 01h, 00h, 0ah, 61h, 75h, 64h, 69h, 6fh, 64h, 65h, 6ch, 61h, 79h,
```

Encoded Data Format

This format converts selected data into the following formats: `Base64`, `UUencode`, `Quoted-Printable`, `Intel HEX` and `Motorola S-Records`.

Its single parameter *Algorithm* lets you choose the format to be used.

Below is an example of a data encoded in various formats.

Base64:

```
YXMAAAlhdWRpb3NpemUAQXJv9mAAAAAACGhhc0F1ZGlvAQEACmF1ZGlvZGVsYXkA
```

UUencode:

```
begin 666 c:\file.bin
M87,```EA=61I;W-I>F4`07)O]F``````"&AA<T%U9&EO`0$`"F%U9&EO9&5L
#87D`
`
end
```

Quoted-Printable:

```
as=00=00 audiosize=00Aro=F6`=00=00=00=00=08hasAudio=01=01=00=0Aau=
diodelay=00
```

Intel HEX:

```
:10000000CFBEC96422B97C49A6963FA3E62F8FA331
:080010000100000032000000B5
:00000001FF
```

Motorola S-Records

```
S1130000CFBEC96422B97C49A6963FA3E62F8FA32D
S10B00100100000032000000B1
```

NTFS Streams

NTFS (a native file system for all "NT-based" operating systems) has a little-known and usually underestimated feature, called alternate data streams. Each file and directory on NTFS-formatted volume may have an unlimited number of data streams. Each stream may be of any size, provided there is enough free space on the volume. Every file on the volume always contains at least one stream, but may also contain other streams. Unlike the first, default stream, which is unnamed, other file streams have names, which follow the same rules, as defined for naming files and folders on NTFS volume.

By convention, to refer to a specific named stream within a file, add the colon followed by a stream name to a full file name. For example, if we have a named stream "AltStream" in a file "c:\temp\file.bin", then its full name is

```
PowerShell
c:\temp\file.bin:AltStream
```

This named stream can almost be considered as a separate file, which has its own attributes, such as size, sparse-ness and so on. At the same time, it shares several attributes, such as security descriptor, with its "parent" file.

In addition, the system automatically copies or moves all file's streams each time a file is copied or moved.

This all is good. The bad thing is Windows (up to the very recent versions) does not support streams in its user interface well. Windows Explorer and Command Prompt are completely unaware of streams. They will not show you file's streams, they will not even show you the size they occupy on your disk! In fact, you may be quite surprised to see how much space is "wasted" in this obscure and little-documented part of the file system.

In addition, if you copy or move a file to a volume which is not formatted with an NTFS, all alternate data streams are silently deleted. The system also does not warn you if you delete a file with alternate data streams. (Note: this has changed a bit in Windows Vista: at least the system now warns you if you copy a file with named streams to a volume that does not support streams).

NTFS's alternate data streams is a not widely used feature, although, it is slowly becoming more popular. Several common usage scenarios are provided below:

- Microsoft Internet Explorer creates a small (usually 26 bytes long) stream called “Zone.Identifier” in each file it downloads from the "outside" world. In its file it records a zone identifier, naming the original zone a file came from. This stream is later used by Windows Explorer, for example, to warn you that you are about to launch a downloaded file. As soon as you open file's properties and click the “Unblock” button, the stream is deleted.
- Several image viewing utilities are known to create a named stream and save a thumbnail version of the image inside each catalogued image file on your disk.
- Several anti-virus products store the information about last scan time and results in each scanned file so they can subsequently quickly access it without the burden of maintaining complex database.
- There have been reports of several malware and viruses that use the alternate data streams NTFS feature. Although the Windows Explorer and Windows Command Prompt are unaware of streams, Win32 API supports streams quite well. For example, a program or a script may start any named data stream for execution. Thus, a zero-sized file may actually contain quite a big executable in one of its streams, or the executable may be disguised as a simple harmless text file. Luckily, most anti-virus products today are capable of scanning NTFS streams and locating viruses and malware in them. Hex Editor Neo can also be used to locate named streams on your computer.

Streams Support in Hex Editor Neo

Hex Editor Neo provides a rich toolset to work with NTFS alternate data streams. Most of the tools are available through the NTFS Streams Tool Window.

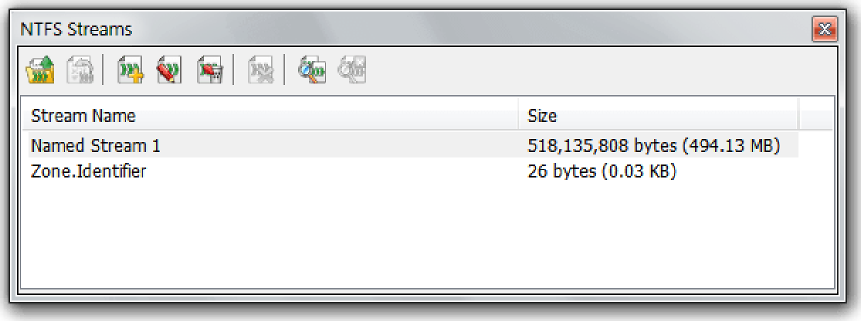
The editor automatically detects and displays all named streams of each opened file. It allows you to open any stream for viewing or editing, delete a stream or create a new stream. It also implements a Find Streams function, which allows you to locate files, satisfying a given criteria, that contain one or more named streams of data. The result window then allows you to open them in the editor, or delete them.

File Attributes Tool Window displays the total number of streams in a file, as well as three file size values: the size of the main, unnamed stream - this is a size reported by Windows Explorer and most other programs; the size of all named streams; and the total size occupied by a file, that is, a sum of two previous values.

Find in Files supports searching and replacing a pattern in named data streams.

NTFS Streams Tool Window

NTFS Streams tool window displays a list of streams. It operates in two modes. The first and default mode is to display all streams of the active document. The window automatically updates as you switch between opened documents.



Stream Name	Size
Named Stream 1	518,135,808 bytes (494.13 MB)
Zone.Identifier	26 bytes (0.03 KB)

Execute the **NTFS Streams » Create Stream...** command to create a new stream. You will be asked to provide a stream name. A file cannot have two streams with the same name. A stream name must also be a valid file name, that is, it cannot contain the following characters: `/`, `:`, `?`, `*`, `"`, `<`, `>`, `|`.

To rename a stream, select it and execute the **NTFS Streams » Rename Stream...** command. Note that the operating system lacks support for renaming streams, so the Hex Editor Neo emulates renaming by copying the whole stream. It can take a long time for large streams. In this case a progress bar is displayed and you may use the **NTFS Streams » Cancel Current Operation** command to cancel stream renaming.

To delete a stream (or several streams), select it (or them) in the list and execute the **NTFS Streams » Delete Stream(s)...** command. Please note that the delete operation cannot be undone.

To open stream (or several streams) in the editor, select them and execute the **NTFS Streams » Open Stream(s)** command. All selected streams are opened in the editor. You may edit them as you edit normal files. The Always Create Backups Option does not affect streams - backup is never created for a saved modified stream.

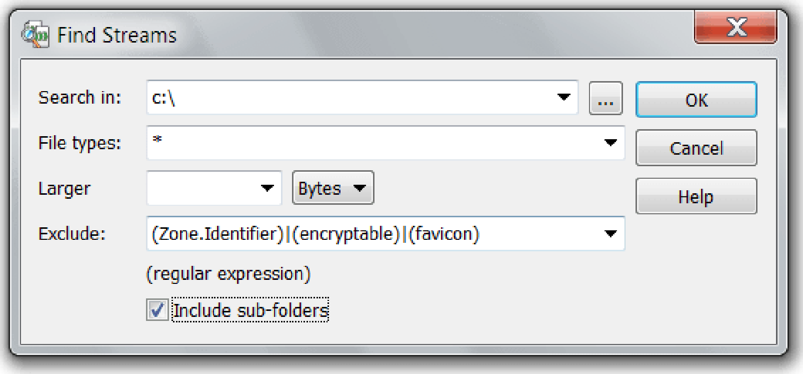
If the current document in the editor is a stream and not a file, NTFS Streams tool window displays a notification message, because NTFS does not allow streams to have sub-streams. In this case, you may use the NTFS Streams » Open Parent File command to open stream's parent file in the editor.

Find Stream Mode

The Find Stream mode is described in detail in the following section.

Searching for Streams

Hex Editor Neo provides you with a powerful feature that allows you to locate all files (according to a given criteria) that have alternate data streams in them. It can also be used to quickly calculate a total space occupied by streams on your disk. Found streams may then be opened in the editor or deleted.



Search in: c:\

File types: *

Larger Bytes

Exclude: (Zone.Identifier)|(encryptable)|(favicon)

(regular expression)

☑ Include sub-folders

Execute the **Tools » Find Streams...** command to start searching for streams.

Provide a folder or a list of folders (separated by semicolon) in the *Search In* box. You may also press the **Browse** button to open up the Folder List Window where you can visually select folders.

Use the *File* types box to specify the mask. You may specify several masks, separated by semicolons. This mask is used only to filter files, not streams.

You may limit a search by defining the lower bound for a stream size, either in bytes, KBytes, MBytes or GBytes in the Larger than box.

Exclude box lets you enter the regular expression used to exclude located streams. The predefined value `(Zone.Identifier)|(encryptable)|(favicon)` excludes streams `Zone.Identifier`, `encryptable` and `favicon`, as the system widely uses them and their size is small.

Include sub-folders option may be used to search deep into the selected folders.

When you finish configuring searching options, click the **OK** button.

Search Process and Results

As soon as you start searching for streams, the NTFS Streams Tool Windowenters the search mode. In this mode it stops displaying streams of the active document and starts displaying streams satisfying your criteria. The last line in the list always tells you how much streams were found, how much files and folders scanned and total streams size. You may abort searching by executing the NTFS Streams » Cancel Current Operation command.

When the search is finished, all matched streams are displayed in the list. You may sort the list by clicking on any column.

To open a stream (or several streams) in the editor, select it (or them) and execute the **NTFS Streams » Open Stream(s)** command. All selected streams are opened in the editor. You may edit them as you edit normal files.

To delete a stream (or several streams), select it (or them) in the list and execute the **NTFS Streams » Delete Stream(s)...** command. Please note that the delete operation cannot be undone.

To exit a search mode execute the **NTFS Streams » Exit Find Streams Mode** command.

Operation History

The Hex Editor Neo widely uses the concept of operation history. Operation history is a series of operations performed on the document. The history is a document's property and is therefore shared by all document's editor windows.

An operation is a command executed on the document that caused any modifications to it. Below is a list of all commands that lead to document modification and thus always form an operation:

- Typing (or Write)
- Fill
- Insert
- Delete
- Insert File
- Change File Size
- Replace
- Replace All
- Cut
- Merge and Cut
- Paste
- Encrypt
- Decrypt
- Bitwise Operations
- Arithmetic Operations
- Shift Operations
- Case Change Operations

All other commands (such as Find and Copy) do not modify the document's data and do not form an operation.

The current document's operation history is always displayed in the History Tool Window. In addition, Edit » Undo and Edit » Redo commands can be used to navigate through the operations.

Organization

As you issue more and more commands on the document, they are added to its operation history, forming an operation list. There is always a "current" operation in the list. The current operation is the last operation performed on the document. At the very top of the list there is an Open or New operation in most cases. The New operation is used if the document was created and Open operation is used if the document was opened.

If the History » Clear History command were used on the document, the root of the list may not be a New or Open operation.

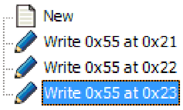
You can change the current operation using one of the following methods:

- Execute another operation. The operation is added to the operation list and becomes a current operation.
- Execute the **Edit » Undo** command. The operation, which is previous to the current one (if there is one), becomes a current operation.
- Execute the **Edit » Redo** command. The operation, which is next to the current one (if there is one), becomes a current operation.
- Select any operation in an operation tree in the **History Tool Window**. Selected operation becomes current.

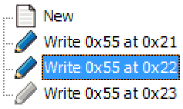
When the current operation is not a last executed operation, all operations executed AFTER the current are grayed in the **History Tool Window**. They are then called phantom operations, or operation tail. All these operations are stored in a history, but are not currently affecting the document. Although, they can always be applied again to the document, if you change the current operation.

Branches

Like in most other editors, the sequence of operations you perform on a document form an operation history. Imagine you create a new document and perform several operations. This is a resulting operation history:


New
Write 0x55 at 0x21
Write 0x55 at 0x22
Write 0x55 at 0x23

Now, you decide to undo the last operation and execute the Edit » Undo command. This is how the history list looks like now:


New
Write 0x55 at 0x21
Write 0x55 at 0x22
Write 0x55 at 0x23

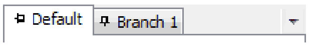
The last operation is still displayed, but this time in gray color. It is still available for you, but is not currently affecting a document. If you execute the Edit » Redo command, the operation becomes active again.

But what if you execute a new operation, say, delete a byte at offset 0x1f? In most other editors, the grayed operation is removed and you no longer can access it.

Hex Editor Neo introduces a concept of history branches. Think of an operation history as a tree; then a branch is a full path from the tree's root to a tree's leaf. The number of branches equals the number of leafs. When new operation is added to an operation history, one of the following occurs (providing the Auto Create Branches switch is ON):

- If the current operation is a last one and there are no grayed (undone) operations, the new operation is added to the end of the list and becomes active. This is a standard behavior found in most editors.
- If the current operation is not a last in a list and there are grayed operations following it, a new branch is created. Then, depending on the pinned state of the current branch, either the new operation is put into the newly created branch, or the grayed tail is moved into the newly created branch.

Branches are displayed as tabs at the top of the History Tool Window.



Additionally, a special icon is added to every tree's fork. See the History Tool Window section for more information.

You can perform the following actions with branches:

Switch to a branch

To switch to a branch, click its tab.

Rename a branch

To rename a branch, double click its tab.

Delete a branch

To delete a branch, right-click it to bring up a shortcut menu and select a “Delete Branch” option.

Pin or unpin a branch

To pin or unpin a branch, click the pin icon. See below for a description of pinned branches.

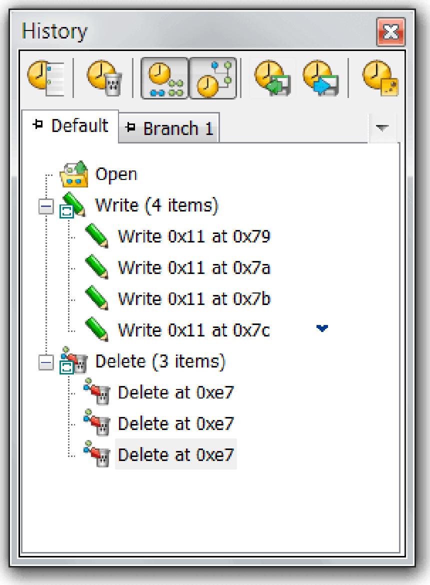
Pinned Branches

When a new branch is created, the tail of the current branch is moved into a newly created branch, the new operation is added to the current branch and it still remains a current one. This is a default behavior of unpinned branch.

When a branch is pinned, a new operation is added to a newly created branch which in turn becomes a current branch. This allows you, for example, to assign a name to an important branch and make sure it stays ”untouched” whenever you fork a new branch from it.

History Tool Window

History Tool Window displays the operation history of the current document. The current document is a document whose editor window is currently active.



There is a list of branches at the top of the window. Each branch is represented by a tab which holds its name and its pinned state.

Operations are displayed in a list in ascending order: older operations are at the top and newer operations are at the bottom. Similar operations (operations of the same type) can be grouped, which is a default behavior. The History » Group Same Operations switch is used to turn grouping on or off. Each operation is displayed with an image and operation name. Operation parameters are also displayed. Grouped items are marked with a special overlay icon. To switch to a given operation, click on it in a list. All document windows are immediately updated to reflect changes. The selected operation becomes a current operation. All operations, issued after the current operation in the same branch become phantom operations and are displayed in gray color. They currently do not affect the document's state.

If a displayed operation is a fork, a special “arrow” icon is displayed (as illustrated on a picture above). You can click on an icon to bring up a list of all branches (except the current one), that are forked from the given operation.

Operation Tree Actions

In addition to History Commands, several actions may be carried directly on a tree using mouse or keyboard.

- Use arrow keys or mouse to navigate operations in a tree.
- Use the mouse to switch to branches (click on tabs).
- Pin or unpin a branch by clicking on its pin icon.
- Press Del button to execute the Purge Tail command.
- Right-click the mouse button or press the Menu key to bring up the shortcut menu.
- When on fork, press the `Spacebar` to display a list of branches growing from this fork. Alternatively, click on a arrow with a mouse button or find one in a shortcut menu.

History Commands

Several Hex Editor Neo commands are related to document's history.

Edit » Undo

The last executed operation is undone and becomes the phantom operation. The previous operation becomes a current operation. This command is disabled if there is no previous operation.

Complexity: constant-time.

Edit » Redo

The first operation in operation tail becomes a current operation. If there are no phantom operations, this command is disabled.

Complexity: constant-time.

History » Clear History

All operations in a history are deleted. The document state is NOT changed, all modifications are "merged" into the single operation, which becomes an operation list root.

Complexity: linear-time (depends on the number of operations in history and their complexity).

History » Purge...

History Purge provides you with three ways of purging an operation history:

- Purge redo tail - all phantom operations (or operation tail) are dropped and removed.
- Purge branches - all branches except the current one are dropped and removed.
- Purge all - remove all operations except the very first one. In most cases (if Clear History command was not used), this root operation is "Open" or "New".

Complexity: constant-time. See the Purging History.

History » Group Same Operations switch

Turns automatic grouping on or off. Automatic grouping groups operations of the same type into one operation in a list. You can expand this operation to see each operation that forms a group.

History » Auto Create Branches switch

When this switch is on (default), new branches are automatically created if there are any phantom operations at a time you execute a new operation. When this switch is off, phantom operations are silently deleted and new operation is added to the current branch.

History » Save Operation History...

The entire operation history is compressed and saved to a disk file. It then may be loaded and applied to the same document. See the Saving History section for more information.

Complexity: linear-time.

History » Load Operation History...

Loads a saved operation history from a disk file. Several checks are performed to make sure the history is loaded for the same document. See the Loading History section for more information.

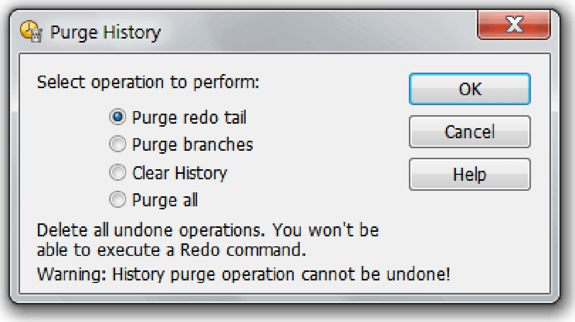
Complexity: linear-time.

History » Full Operation History Tree...

Displays a complete operation history tree. See the Operation History Tree Window topic for more information.

Purging History

When the **History » Purge...** command is executed, the following window appears:



Select operation to perform:

● Purge redo tail
○ Purge branches
○ Clear History
○ Purge all

Delete all undone operations. You won't be able to execute a Redo command.
Warning: History purge operation cannot be undone!

You may select the way you want to purge a history.

- Purge redo tail - all phantom operations (or operation tail) are dropped and removed.
- Purge branches - all branches except the current one are dropped and removed.
- Clear history - all operations in a history are deleted. The document state is NOT changed, all modifications are "merged" into the single operation, which becomes an operation list root.
- Purge all - remove all operations except the very first one. In most cases (if Clear History command was not used), this root operation is "Open" or "New".

Purge History operation cannot be undone.

Saving and Loading History

Saving History

The entire operation history tree, complete with all operations and branches may be compressed and saved to a disk file. Later, this operation history may be applied to the same document.

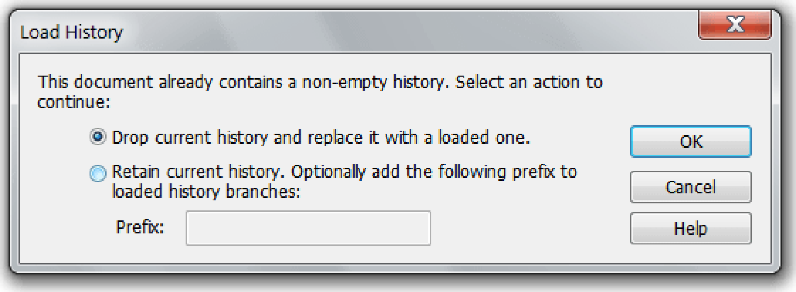
The complexity of this operation depends linearly on the number of operations in a history (in all branches).

Hex Editor Neo automatically stores a document's name and size in a history file.

Loading History

This command allows you to restore the previously saved operation history tree. Saved history must be loaded for the same document it was created from.

If there is non-empty history in the current document when this command is invoked, the following window appears:



Load History

This document already contains a non-empty history. Select an action to continue:

● Drop current history and replace it with a loaded one.

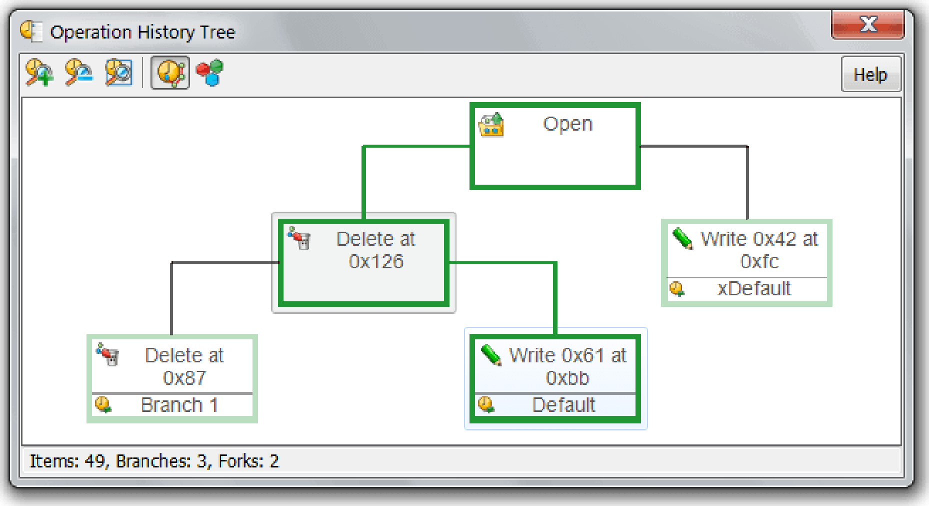
○ Retain current history. Optionally add the following prefix to loaded history branches:

Prefix:

Select the *Drop current history and replace it with a loaded one* option to drop the current history and replace it with a one you are loading.

Select the *Save current history* option if you want to retain the current history. In this case, you may enter an optional prefix to be added to the name of each loaded branch to easily distinguish them from each other.

Operation History Tree Window



Items: 49, Branches: 3, Forks: 2

The purpose of this window is to display the entire document's operation history. Each operation is displayed as a box with operation's icon and short description. A tooltip with more detailed information is displayed when you hover a mouse pointer over the box.

The window works in two modes: *full mode* and *forks only* mode. The **Forks Only** command is used to switch between modes.

Full Mode

In this mode, entire operation history tree is displayed. As operation history grows larger, the tree gets more and more complex. It is recommended to switch to the forks only mode in this situation.

Forks Only Mode

In forks only mode only tree's root, "leafs" and forks are displayed. Thus, all history branches are clearly visible, but the tree stays compact. This mode may be useful for displaying complex history trees.

Navigation

As operation history tree grows large, it becomes impossible to display the entire tree in the window. Use the scroll bars, keyboard keys or mouse to scroll the contents of the window to locate the required part.

Use the **Zoom In**, **Zoom Out** or mouse wheel to change the zoom level. The **Fit to Screen** command may be used to automatically adjust the zoom level to try to completely fit the tree into the window. Please note however that there are minimum and maximum zoom level limits.

You can use a keyboard navigation keys and mouse to select any operation in the tree. The underlying document's state is immediately switched to the selected operation. Press the **Enter** key, or double-click the operation box to close the window and switch to the selected operation.

Press the **Esc** key to cancel the changes and close a window.

Legend

Hex Editor Neo uses different colors and line widths to display the current branch, other (than current) branches as well as undone operations in the current branch. You can change the colors using the Select Colors… command.

Shortcut Menu

Right-click the mouse button on any operation box to bring up the operation's shortcut menu. The following commands are available:

Switch To

Switch to the given operation and close the window.

Purge Branches

Purge all history branches besides the one holding the given operation. Note that any branch originating below this operation is not purged.

Purge Tail

Purge all operations below the given one.

File Comparison

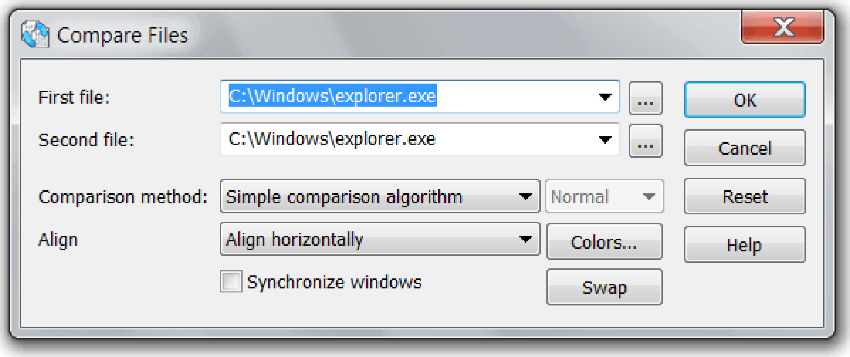
File Comparison feature compares two files (either binary or text). It can be used, for example, to locate all changes you have made to a file. After the operation completes, the File Comparison Tool Window contains comparison results. In addition, corresponding areas are highlighted in the editor.

To change colors used by the file comparison feature, press the **Select Colors…** button on the **File Comparison Tool Window**'s toolbar.

To compare files execute the Tools » Compare Files… command.

Compare Files Window

This dialog is used to configure the file comparison feature and to start comparing files.



First file: C:\Windows\explorer.exe

Second file: C:\Windows\explorer.exe

Comparison method: Simple comparison algorithm Normal

Align: Align horizontally

□ Synchronize windows

First file, second file

Select the first and the second files to compare. All currently opened documents as well as last recently used documents are listed in the drop-down. In addition, you can enter the full path manually, or use the **...** button to browse for it. After pressing the browse button, select one or two files. If you select a single file, it is used either as a first file, or second file. If you select two files, they will be used as first file and second file correspondingly.

Comparison method

Select either the Simple comparison algorithm or Difference algorithm.

Normal/Precise

The quality/performance level of the difference algorithm.

Align documents

Select the automatic alignment of compared documents.

Synchronize windows

Select to synchronize cursor movement in compared documents (applicable only to the simple comparison algorithm).

Colors button

Press to change colors used to highlight different areas.

File Comparison Tool Window

This tool window contains the results of the file comparison operation.

For each block, its type, its size and offset in both files is provided. The block is colored according to its color in the editor window. You can navigate the blocks using the keyboard or mouse, convert the blocks to selection, switch number display between decimal and hexadecimal values.

“Combine mode” is used to display blocks from both documents in the list. When "combine mode" is off, only blocks from the current document are displayed. Switch the documents to view blocks for another one.

Comparison Algorithms

Simple Comparison Algorithm

This algorithm compares file data byte-by-byte. It uses three types of blocks:

- Matched
- Different
- Not Found

If two bytes are the same in both files - they will be marked as *Matched*. Otherwise, they are marked as *Different*. If one file is larger than another, its excess part is marked as *Not Found*.

This algorithm is convenient if two files are almost equal and there were no data inserted or removed from them.

Difference Algorithm

This algorithm searches for matched, modified, inserted and removed blocks in both files:

- Matched blocks are blocks of equal data in both files.
- Inserted blocks are blocks of data inserted into the first file. They are marked only in the second file as they are missing

in the first one.

- Removed blocks are blocks of data removed from the first file. They are marked only in the first file as they are missing in the second one.
- Modified blocks are blocks of completely different data.

This algorithm has a quality/performance tuning option, specified in the Compare Files Window. If set to “Normal”, it may operate faster, but less accurately, and if set to "Precise", it may operate slower (sometimes much slower), but will be able to find more matches.

Patches

A patch is a difference between two states of a document. In most cases the size of this difference is much smaller than the size of the file itself. Hex Editor Neo supports creating a special patch file, which contains all modifications made to an opened document. The patch can subsequently be distributed and applied to the same file resulting in the same modifications being made to a file.

Hex Editor Neo does not support applying patches in its framework. Instead, the separate application,PatchApply.exe is provided for this purpose. Alternatively, Patch API provides several other methods of applying patches.

Distribution

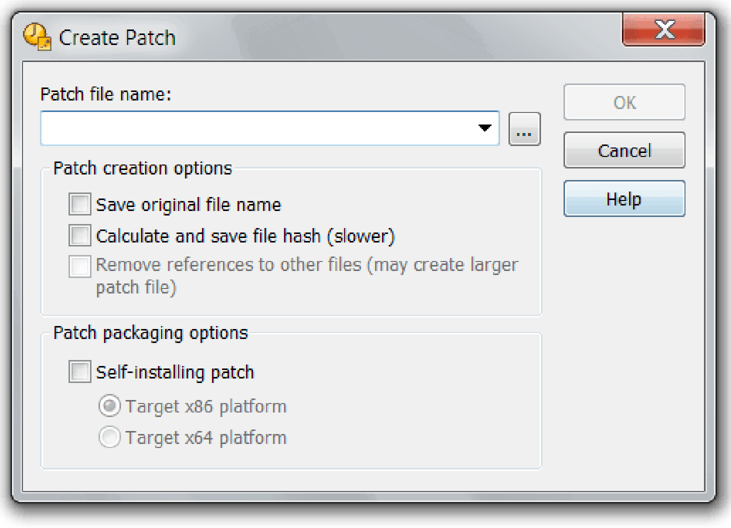
Patch files created by the Hex Editor Neo may be freely distributed without any limitations. This also applies to self-installing patch files.

Limitations

Currently, Hex Editor Neo does not allow you to create a patch if a file contains data,pasted from other documents. If a file contains data pasted from itself, the patch may be created.

Creating Patches

To create a patch, you must have an opened and modified document. Execute the **File » Create Patch...** command.



Create Patch

Patch file name:

Patch creation options

□ Save original file name

□ Calculate and save file hash (slower)

□ Remove references to other files (may create larger patch file)

Patch packaging options

□ Self-installing patch

● Target x86 platform

○ Target x64 platform

Patch file name

Enter the full path name to the patch file or use the **Browse** (**...**) button. Hex Editor Neo automatically appends the `.hexpatch` file extension if you omit it. If *Self-installing patch* option is turned on, `.exe` extension is appended instead.

Save original file name

Original file's name is saved in the patch file and then compared with a name of file the patch is applied on. If this option is turned off, file name comparison is skipped.

Calculate and save file hash

A hash value is calculated for the whole file. Later, when the patch is applied, the hash value is calculated for the target file and compared to this value.

Remove references to other files

This option is not currently implemented.

Self-installing patch

The patch file is packaged inside the executable file. It can subsequently be used without the PatchApply.exe application. You may specify whether you want to target any platform ("Target x86 platform") or x64 platform only ("Target x64 platform").

After you press the **OK** button, Hex Editor Neo starts creating a patch. This may take a while.

Applying Patches

A separate application, the `PatchApply.exe` utility, is used to apply patches created by the Hex Editor Neo. The patch may also be packaged inside the executable file. In this case, nothing else (except the target file, of course) is required to apply the patch.

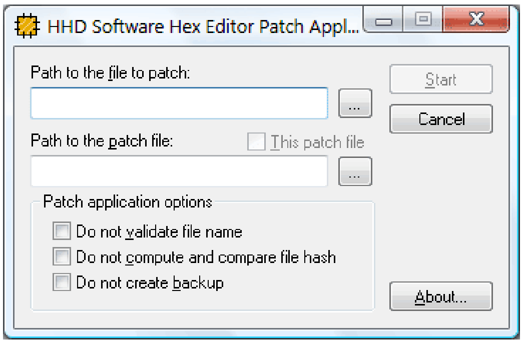
Patch API may also be used to apply the patch.

Care must be taken to make sure the patch is applied to exactly the same file. Hex Editor Neo provides three simple mechanisms to validate the file's identity:

1. Hex Editor Neo always compares the size of the source and target files. If they differ, patch cannot be applied. This option cannot be disabled by the user.
2. Hex Editor Neo may store and compare the name of the source and target files. You may disable this option.
3. Hex Editor Neo may compute the hash value for both files and compare it. You may disable this option. Hash calculation may significantly slow down patch creation/applying but provides quite a good degree of confidence.

PatchApply.exe

The Apply Patch utility is launched from the Hex Editor Neo's group in the Start menu.



HHD Software Hex Editor Patch Appl...
Path to the file to patch:
...
Start
Cancel
Path to the patch file:
□ This patch file
...
Patch application options
□ Do not validate file name
□ Do not compute and compare file hash
□ Do not create backup
About...

Hex Editor Neo always installs two versions of the utility. One is a native x86 application and another is a native x64 application. Only x86-platform version may be used on x86 platform and any version may be used on x64 platform (but x64-platform version is preferable).

Path to file to patch

The full path to the target file you are going to apply patch on. You may enter the path manually or click on the **Browse** (**...**) button.

Path to the patch file

The full path to the patch file. You may enter the path manually or click on the **Browse** (**...**) button.

This patch file

This switch is active if the patch file is encapsulated in the executable (self-installing patch).

Do not validate file name

File name validation is disabled. This option takes no effect unless "Save original file name" option was active during patch creation.

Do not compute and compare file hash

Skip calculation and validation of file's hash value. This option take no effect unless "Calculate and save file hash" option was active during patch creation.

Do not create backup

Skip creation of the backup copy of the target file. Use this option with care as you may lose your data if wrong patch is applied to a file, or patch is applied to a wrong file.

Command Line Interface

`PatchApply.exe` utility also provides the command-line interface.

```
PowerShell
PatchApply.exe [<target file>] [/patch <patch file>] [/noui] [/silent] [/skipfilename] [/skiphashcheck] [/
```

where

`target file`

full path to the file being patched

`patch file`

full path to patch file (omit for self-installing patches)

`/noui`

do not display user interface (except progress and status)

`/silent`

do not display progress and status

`/skipfilename`

do not validate target file name

`/skiphashcheck`

do not calculate and compare file hash

`/skipbackup`

do not create target file backup

`/help or /?`

display this information

Patch API

Patch API provides the programming interface to the Hex Editor Neo's patch application functions. Patch API may not be used to create a patch, only to apply it.

Hex Editor Neo's installer provides an option to install the Patch API on your computer.

More information on the API is found in separate documentation file, installed with a Patch API.

Pattern Coloring

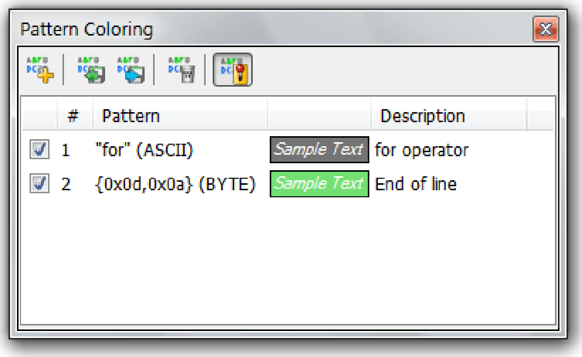
Hex Editor Neo provides a feature called Pattern Coloring that can be used to automatically highlight specific patterns in an edited document. You define a pattern and specify the coloring applied to it in an editor window. Pattern Coloring fully supports regular expressions.

“Range Rule” type also allows you to specify a range in a document and coloring to apply to this range.

A Pattern Coloring Tool Window is used to define one or more patterns and coloring rules. For each defined pattern (or range), background color, foreground (text) color, outline color and rounded edges flag are defined. It is recommended to specify semi-transparent background colors. In this case, if several modules apply coloring to the same editor's cell, it is still possible to differentiate them.

Pattern Coloring Tool Window

Pattern Coloring Tool Window is used to define a set of rules that associate specific patterns or data ranges with coloring rules.

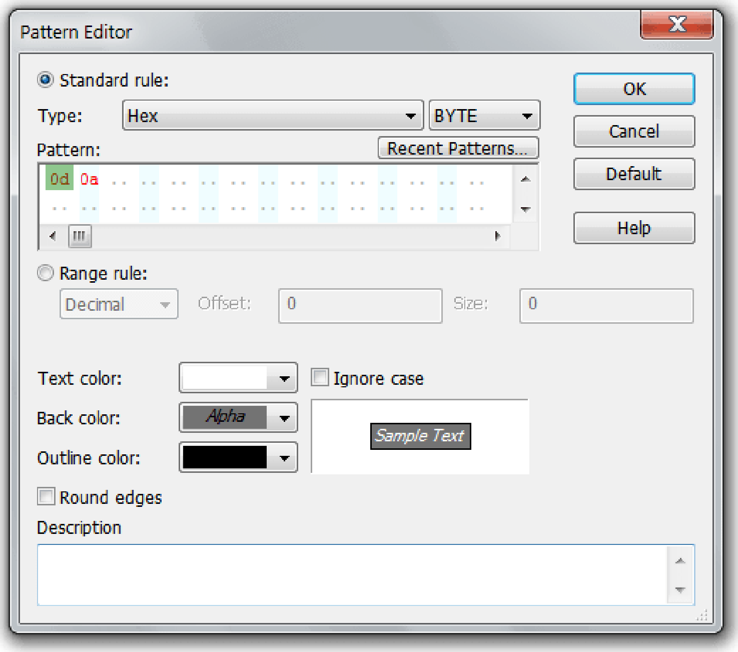


	#	Pattern		Description
☑	1	"for" (ASCII)	Sample Text	for operator
☑	2	{0x0d,0x0a} (BYTE)	Sample Text	End of line

The **Tools** » **Pattern Coloring** » **Enable Pattern Coloring** switch is used to quickly disable or enable application of all defined coloring rules.

Creating and Editing Rules

Use the **Tools** » **Pattern Coloring** » **Add New Rule** command to define a new pattern coloring rule.



● Standard rule:

Type: Hex BYTE

Pattern: 0d 0a

○ Range rule:

Decimal Offset: 0 Size: 0

Text color:

□ Ignore case

Back color: Alpha

Outline color:

□ Round edges

Description

You define a pattern using the Pattern Window, which is part of this dialog. You also specify whether to ignore case while matching the pattern. You can then specify the foreground and background colors, outline color and Round edges flag. In addition, description may be specified for a pattern. It is then displayed in a tooltip when you hover the mouse over highlighted pattern in an editor window.

Instead of entering a pattern to match in a document, you may create a range rule. For this rule, you enter a range by specifying its starting offset and size in either hexadecimal or decimal formats. The coloring you specify is then applied to the given range in all editor windows.

To edit a rule, double-click it in a list, or bring up the shortcut menu and choose the “Modify Rule...” option.

To remove a rule, select it in a list, bring up the shortcut menu and choose the “Remove” option.

Rule Schemes

All defined rules comprise the pattern coloring scheme. A scheme may be saved to a disk file and later loaded from it. To do it, execute **Tools** » **Pattern Coloring** » **Save Scheme...** or **Tools** » **Pattern Coloring** » **Load Scheme...** correspondingly. To delete all currently defined rules, execute the **Tools** » **Pattern Coloring** » **Clear Coloring Scheme** command.

Hex Editor Neo automatically records all defined rules and restores them next time you launch the application.

Regular Expressions

The Pattern Coloring fully supports regular expressions. To search using regular expressions, select either “ASCII string (char[])” or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

Take the following limitation into account:

- Complex regular expressions that start long before a visible area and/or end long after a visible are may not be highlighted.

Structure Viewer

Structure Viewer interprets document's data according to some structure definition. A structure is an ordered set of fields, each of which has defined type. A type may be a built-in type or another structure.

Structure Viewer allows you to bind structure definition to a given position within a file and analyze file's data according to a structure definition. In addition, you may use parsed fields to modify data in a document.

This section describes features provided by the Structure Viewer and how to control it.

See also the What's new in Structure Viewer section for more information on latest changes.

What's New in Structure Viewer

What's New in Structure Viewer (version 6.31)

Starting from version 6.31, a new JavaScript engine is used by Structure Viewer. This allows writing JavaScript ES2015 code.

This is also a breaking change: the document object is no longer exposed directly to the structure being bound. Only subset of methods and properties are now available. See the document object topic for more information.

`_SVC_VER` compiler version macro value has been changed to `0x401` (major version: 4, minor version: 1), which indicates a major upgrade. The major version change is related to breaking change in support for the document object and the version of JavaScript engine.

What's New in Structure Viewer (version 6.25)

New Language Features

_SVC_VER compiler version macro

Compiler version in 6.01 has a value of 0x307 (major version: 3, minor version: 7), which indicates minor upgrade.

New directives

New directives are supported: $revert_to, $shift_by and $remove_to. New field attribute exact_only.

What's New in Structure Viewer (version 6.01)

This is a minor upgrade to Structure Viewer. This release also introduces the new built-in structure definition file editor.

New Language Features

_SVC_VER compiler version macro

Compiler version in 6.01 has a value of 0x306 (major version: 3, minor version: 6), which indicates minor upgrade.

New built-in value type

New built-in value type ByteArray is now supported.

New built-in functions

This release adds the following new functions: array, length, element, subarray, substring and find.

Structure Library revised

Structure Library is now a separate tool window.

Fixed bugs

Various function scope bugs fixed

Invalid scope rules were used when executing native functions.

Incorrect if statement branch optimization

The editor could incorrectly optimize if statement branch in some cases.

Incorrect language grammar

Structure definition language grammar was fixed: it sometimes erroneously prohibited otherwise legitimate constructs.

What's New in Structure Viewer (version 5.12)

This is a minor upgrade to Structure Viewer. In addition to several bug fixes

New Language Features

_SVC_VER compiler version macro

Compiler version in 5.12 has a value of 0x305 (major version: 3, minor version: 5), which indicates minor upgrade.

New predefined macros

This version adds the following predefined macros: `_SVC_X86`, `_SVC_X64`, `_SVC_POINTER_SIZE`, `_SVC_POINTER_SIZE_REAL`.

Optimization of core algorithms

Optimization of core algorithms improved binding time by about 10%. This is more noticeable for complex structures, where a lot of computations and other expression evaluation occurs during binding.

Integer type modifiers

It is now possible to use little_endian and big_endian to change integer's type default byte ordering. This functionality complements the #pragma byte_order directive and has priority over it.

New type [display] attribute

This release introduces the first type attribute: display. Previous versions automatically generated values for collapsed items. Values of first 5 type's fields in curly braces is displayed by default. Version 5.12 allows you to override this behavior for a specific type. You provide an expression, whose evaluated value is used. This expression is evaluated in current type's scope and has access to all its fields.

New built-in functions

New functions — is_valid() Function and evaluate_if() Function have been added to a list of supported built-in functions.

Limited support for references

Version 5.12 adds support for taking references of fields. References may be used to pass fields (including arrays and complex type fields) as arguments to native functions or to compare two objects. A new built-in function ref is used to get a field's reference.

New method in Parser object

This release adds the IParser.add_coloring_scheme method to the IParser interface.

Fixed bugs

Error removing non-existing files from the library

It was impossible to remove a non-existing structure definition file from the library.

Invalid operation

In some rare cases Structure Viewer could read garbage from the document instead of real data.

Errors updating Output window

Several inconsistences with Structure Errors tool window and present/absent definition files have been fixed.

Errors in native functions implementation

Assignment statement did not work in native functions, which also resulted in inability to use for statement in them.

Incorrect scope for array indexing operator

Array indexing operator used incorrect scope while evaluating the index expression, which could led to bugs or “ID not found” exceptions.

Crash after removing file from the library

Application could crash after removing structure definition file from the library (after it stopped watching its directory for changes, that is, after the last file from that directory was removed).

Crash when trying to remove used file from the library

Application crashed when you tried to remove used structure definition file from the library.

Very long string handling issue

Structure Viewer could crash when it tried to display a very long string (longer than 65536 characters).

What's New in Structure Viewer (version 5.01)

This is a major upgrade to Structure Viewer. This module has almost been rewritten from scratch, taking advantage of new compiler, parallel processing (on multi-processor and multi-core computers), new features and a major performance boost.

Hex Editor Neo does not perform pre-compilation anymore. The speed of compilation is now 10-100 times faster and is performed by multiple cores. Structure Viewer initialization no longer slows down application start up.

New version improves the binding time and reduces memory consumption of bound structures.

New Language Features

_SVC_VER compiler version macro

Compiler version in 5.01 has a value of 0x300 (major version: 3, minor version: 0), which indicates major upgrade.

Breaking change

break operator now always exits the current scope, even if not used inside a loop or switch statement.

Breaking change

When defining constants, the expression at the right side must evaluate to a constant value at compile time. Compare this to variables.

Breaking change

Visual Basic Scripting is not supported anymore. You can create external functions on Javascript only.

Alternative syntax for specifying enumeration's base type

New syntax (the one described in C++11) for specifying enumeration's base type may be used. The old one is still supported.

Update to #pragma byte_order behavior

This pragma may now be used at any scope. It changes the byte ordering immediately (effective for next fields if used inside a user-defined type, for example).

Non-fatal $assert directive is supported

This release finally makes use of non-fatal $assert directive possible (it was documented, but not supported in previous releases).

Updating of array elements

Previous versions allowed you to declare variable arrays. This version adds support for modifying individual array elements after they have been declared (and possibly initialized).

New attributes

In addition to noindex attribute, the following attributes introduced:

- noautohide - allows you to turn off automatic hiding of empty fields.
- onread - specify the expression to be evaluated each time the value is read.
- format - specify the format string to be used when displaying the field's value.
- description - specify the user-friendly description of the field.
- color_scheme - specify the color scheme for the field.

New built-in functions

The following new built-in functions were introduced: bool, decimal, hex, octal, binary, integer_convert and format.

Support for native functions

In addition to existing support for using JavaScript functions (either inline or defined in external files), new Structure

Viewer allows you to define native functions. This also introduces the return statement.

Automatic optimization of sub-expressions

Previous versions of Structure Viewer could automatically optimize constant expressions. New version adds automatic optimization to sub-expressions as well.

New directive

New $alert directive allows you to evaluate an expression at bind time and display the result in a message box.

New UI Features

Support for color schemes

Combined with new color_scheme attribute, allows the customer to apply different color schemes to individual fields in a bound structure.

Structure Library dialog improvements.

Various improvements of the Structure Library dialog.

External structure editor support

Added support for external structure editor.

Improved error detection and reporting

This version dramatically improves syntax error detection and reporting. The editor is now capable of detecting more errors and provides more accurate position for an error. It is also now has so-called “expectation points” in its grammar. For example, in the following code fragment:

C++

```cpp
public struct A
{
    int a[5;
};
```

A “syntax error” with message "] expected" is displayed. A cursor points to the ‘;’ character.

Change to bind error behavior

Now, when bind error occurs, all items that have already been bound are left in the Structure Viewer. Exception item is added to the end of the list of bound items.

Structure Errors tool window

New tool window displays all compilation and binding errors. You can double-click any entry in a list to display the position of the error.

What's New in Structure Viewer (version 4.96)

Hex Editor Neo is a constantly developing application. Structure Viewer in version 4.96 adds support for the following:

_SVC_VER compiler version macro

Compiler version in 4.96 has a value of 0x206 (major version: 2, minor version: 6).

Incorrect bit field values editing fixed : This version fixes the error in editing bit field values.

Regular Expressions in File-Scheme Association

Structure Viewer now uses regular expressions to associate a file and a scheme.

What's New in Structure Viewer (version 4.92)

Hex Editor Neo is a constantly developing application. Structure Viewer in version 4.92 adds support for the following:

_SVC_VER compiler version macro

Compiler version in 4.92 has a value of 0x205 (major version: 2, minor version: 5).

New statements

New statements are now supported: while, for and do...while.

In-line javascript code

Javascript code may now be specified in the same file, without using the #pragma script directive. A new javascript keyword is used for this.

Changes in $print directive operation

Before this version, $print directive always converted its argument to string. Now it preserves the argument's type and uses Structure Viewer's visualization engine to display it. It will now appear exactly as any other parsed field. And do not remember, that $print directive not only displays its value, it also introduces new field into the scope.

New visualization mode for pointers

Hex Editor Neo now also prints computed address for a pointer as well as “peeks” inside the pointed type (as it does for structures and arrays).

What's New in Structure Viewer (version 4.71)

Hex Editor Neo is a constantly developing application. Structure Viewer in version 4.71 adds support for the following:

_SVC_VER compiler version macro

Starting from the current version, Structure Viewer defines a macro that holds a current compiler version. Compiler version in 4.71 has a value of 0x200 (major version: 2, minor version: 0).

New built-in types

The parser now natively recognizes three additional types: bool (one-byte boolean type), string (null-terminated single-byte character string) and wstring (null-terminated two-byte character string).

Dynamic typing

When evaluating expressions, dynamic typing rules are used. For example, adding two integers produces an integer, but adding a floating-point number and an integer number produces a floating-point number. The same rules apply to other types and other operators.

Note that this feature introduces a breaking change: the syntax for defining constants has changed.

Variables

You can now define variables, and change their values at a later time. Variable's type is polymorphic, that is, it may be changed by assigning a value of another type.

Constant and Variable Arrays

You can now define constant or variable arrays and reference their elements in expressions:

C++

```cpp
const Months[]={
    "January",
    "February",
    "March",
    "April",
    "May",
    "June",
    "July",
    "August",
    "September",
    "October",
    "November",
    "December"
};

public struct A
{
    short month;
    $print("Month as string",Months[month]);
};
```

Scripting support

You may now call functions written in Javascript or VBScript from the Structure Viewerexpressions. In addition, a number of internal functions are provided. Structure Viewer makes two objects, parser and document, available to the running script.

functions.js:

JavaScript

```javascript
function ScriptAdd(a,b)
{
    return a+b;
}

function IsModified()
{
    return document.Modified;
}
```

structure.h:

C++

```cpp
#pragma script("functions.js")

struct A
{
    if (IsModified())
        $print("warning","The document has been modified!");
    char array[ScriptAdd(10,8)];    // equivalent to char array[10+8];
};
```

Statements

Hex Editor Neo's parser now understands the if statement and switch statement.

“Infinite” Arrays

An array may now be declared as having an infinite (unknown) number of elements. Combined with a new $break_array directive, this allows declaring arrays for which the number of elements is not known beforehand.

`#pragma byte_order`

You may now instruct the parser how your multi-byte values are packed.

Array optimization

Arrays of simple integer types are now optimized by the parser, reducing the binding time and memory consumption. In addition, you may refer to character arrays (arrays of type char and wchar_t) in expressions. In this case, the contents of an array is represented as a string:

C++

```cpp
struct A
{
    char TagName[10];
    if (TagName == "#Default")
        // do something
};
```

hidden: and visible: directives

You may now use “hidden:” and "visible:" directives to change the visibility of a field in a user-defined type. The visibility only affects the displaying of the field, otherwise it remains visible when referenced in expressions.

public and private user-defined types.

A user-defined type may now be marked as private or public: private types are not displayed in the Bind Structure Dialog.

$bind directive

$bind directive allows a structure definition to bind another structure.

current_offset built-in variable

You may now use the current_offset pseudo variable in expressions. It will always equal to the offset the next field will be bound to.

array_index built-in variable

This variable evaluates to a current array index when used in an user-defined type. For example:

```
C++
struct B;

struct A
{
    B b[10];  // array of 10 B's
};

struct B
{
    int b;
    if (array_index == 3)  // fourth element contains another integer
        int c;
};
```

“Synchronize Position” mode

A new “Synchronize Position” mode allows you to easily match the location of a bound field anywhere in the document.

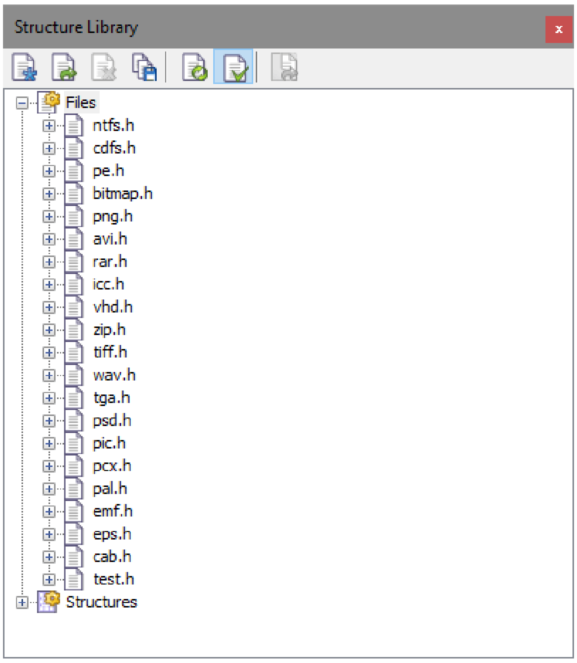
Overall performance enhancements and several bug fixes.

Structure Viewer can now easily handle extremely complex structures and arrays with billions and billions of items. Navigating such complex structure is very simple and fast.

Structure Library Tool Window

A structure is defined in a text file (that usually has `.h` extension). A file may contain one or more structure definitions and may also reference other files with an #include directive. The syntax for structure definition is defined in the Language Reference section.

A Structure Viewer Library is used to manage a list of structure files from which a list of defined structures is taken. To access the Structure Library, open the Structure Library tool window by executing the **View » Tool Windows » Structure Library** command.



The library window displays a list of managed files and a list of structure definitions, taken from them. They are grouped under the *Files* and *Structures* folders correspondingly.

Double-click the file to open its contents in the built-in editor. Double-click the structure name to open its definition file in the built-in editor. Cursor is automatically moved to the structure definition location.

Hex Editor Neo watches for modifications ofbound structure files added to the Structure Library. If the file is changed outside the Hex Editor Neo, you are offered to reload and re-scan it.

Library Management

Use the **Tools » Structure Viewer » Library » Add Definition File...**command to add an existing structure definition file to the library. A file is compiled and a list of error messages is displayed in Output window.

Use the **Tools » Structure Viewer » Library » New Definition File...**command to create an empty structure definition file and add it to the library. You will be prompted for a file location.

Highlight the file in the library window and execute the **Tools » Structure Viewer » Library » Remove Definition File**to remove a file from the library.

Compilation

Hex Editor Neo compiles all structure definition files on each launch. It also automatically re-compiles source files when they are modified using built-in editor or by an external program unless the **Tools » Structure Viewer » Library » Auto Recompile** option is turned OFF. You may manually force the editor to recompile all structure definition files by executing the **Tools » Structure Viewer » Library » Compile** command.

Structure Editor

Starting from version 6.01, Hex Editor Neo includes built-in Structure Editor. Use this editor to modify any existing structure definition or to create new definitions. The editor has built-in syntax coloring and you may customize used colors as described in Structure Editor Coloring section.

Built-in structure editor allows you to view and edit structure definition files. To open a file, use one of the following:

Structure Library Tool Window

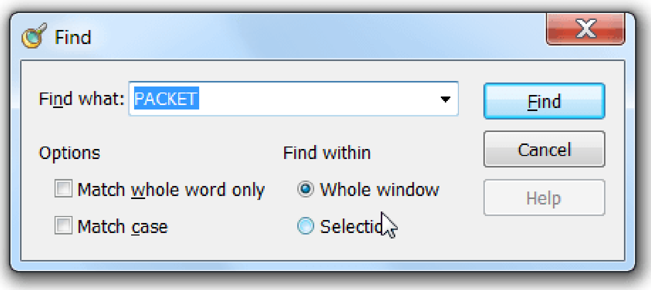
Double-click on any file or structure in a list to automatically open it in the editor.

Tools » Structure Viewer » Library » New Structure File...

Use this command to create a new structure definition file and open it in the editor. You will be asked for a location and name.

Editor uses syntax coloring (which you may customize as described in the Structure Editor Coloring section) and provides advanced editing capabilities.

Find



Find what: PACKET

Options

☐ Match whole word only

☐ Match case

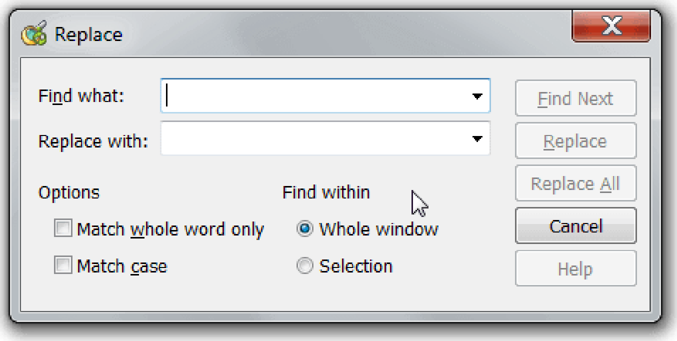
Find within

● Whole window

○ Selectio

Use the **Edit » Find...** command to bring up the Find window. Enter the pattern to search, configure options and press the Find button. Then use the **Edit » Find Next** command to jump to the next pattern occurrence.

Replace



Find what:

Replace with:

Options

☐ Match whole word only

☐ Match case

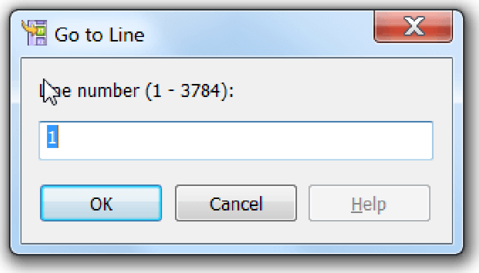
Find within

● Whole window

○ Selection

Use the **Edit » Replace...** command to bring up the Replace window. Enter the source and replacement patterns, configure options and then press the **Replace** or **Replace All** button.

Go to Line

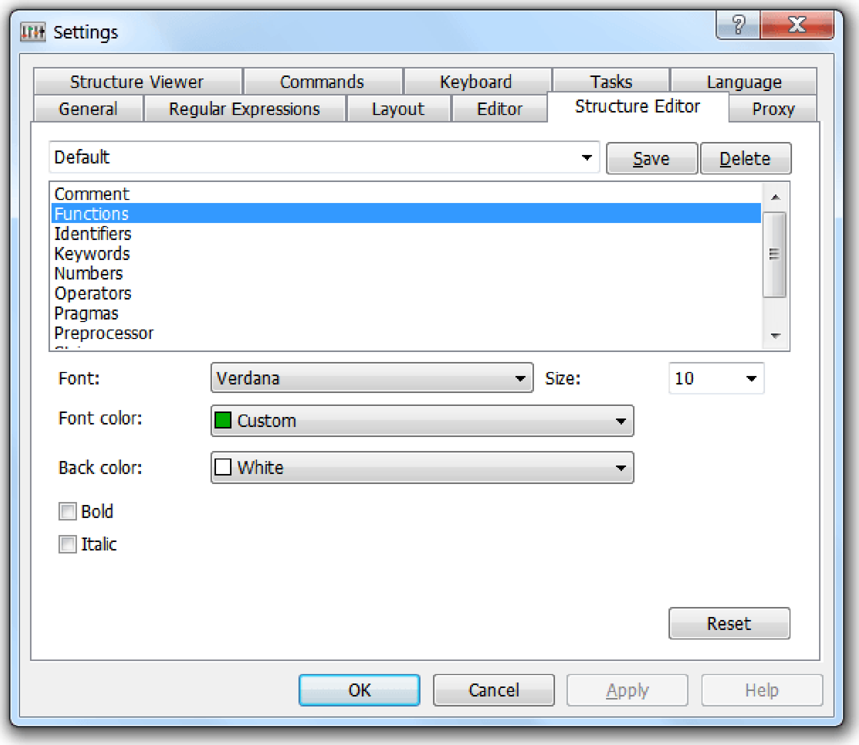


Line number (1 - 3784):

1

Use the **Edit » Go to Line** command to bring up the Go to Line window. Enter the line number and press **OK** button.

Structure Editor Coloring



Default

Comment
Functions
Identifiers
Keywords
Numbers
Operators
Pragmas
Preprocessor

Font: Verdana

Size: 10

Font color: 🟩 Custom

Back color: □ White

☐ Bold

☐ Italic

This window allows you to configure fonts and colors used by Structure Editor. You can change the appearance of the following categories:

Comments

> Comments are standard C/C++ comments sections, enclosed between /* and */ or one-line commentaries started with //

Functions

> Built-in functions.

Identifiers

> Identifiers, such as field names, variable names and structure names.

Keywords

> Structure definition language keywords, such as statements and types.

Numbers

All numeric values.

Operators

All supported operators.

Plain text

Other un-categorized text.

Pragmas

Pragma declarations.

Preprocessor

Preprocessor directives.

Strings

String literals.

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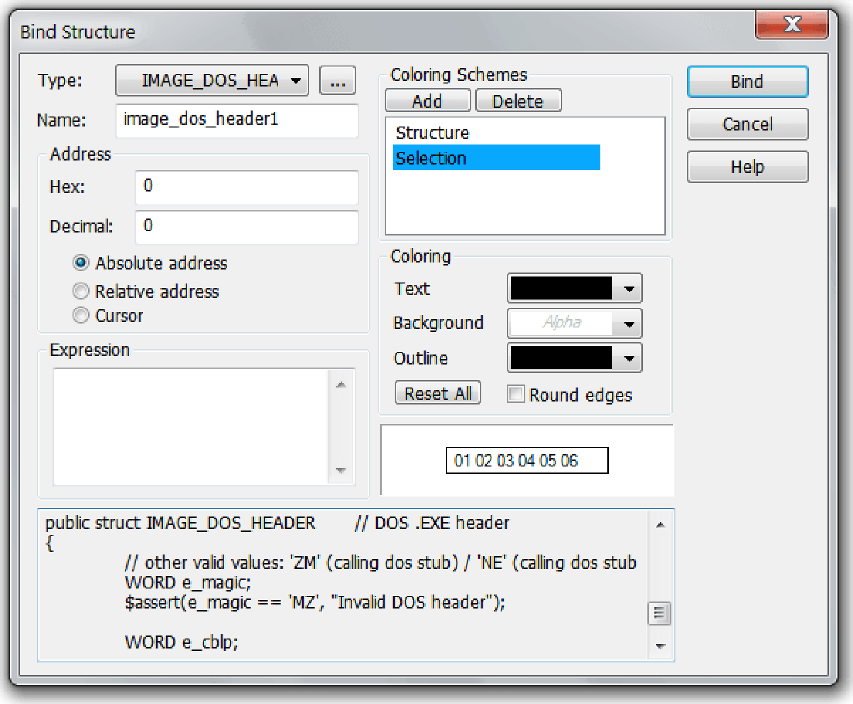
Structure Binding

In order to be able to use any structure defined in the Structure Library, you must bind it to the document's data.

To bind a structure, execute the **Tools » Structure Viewer » Bind...** command. This brings up the Structure Bind dialog:



Type: IMAGE_DOS_HEA

Name: image_dos_header1

Hex: 0

Decimal: 0

● Absolute address
○ Relative address
○ Cursor

```
public struct IMAGE_DOS_HEADER      // DOS .EXE header
{
        // other valid values: 'ZM' (calling dos stub) / 'NE' (calling dos stub
        WORD e_magic;
        $assert(e_magic == 'MZ', "Invalid DOS header");

        WORD e_cblp;
```

Select the structure you want to bind from the *Type* list. You can also press the **Browse** (**...**) button to go to the Structure Library where you can add new source files, for example. Give a bound structure a name - this will allow you to differentiate between several bound structures of the same type and to reference structure's fields.

Specify the address of the structure in a file. *Address* may be specified as hexadecimal or decimal value. You may select one of the following bind types which change the meaning of the address value:

Absolute address

The structure is bound to the absolute address. The structure remains at the given address regardless of any actions performed on the document.

Relative address

The structure is bound to the given address. The structure is then moved each time you insert or delete data before its start address. This does not relate to complex editing commands, such as Delete (with multiple selection), Replace or Replace All.

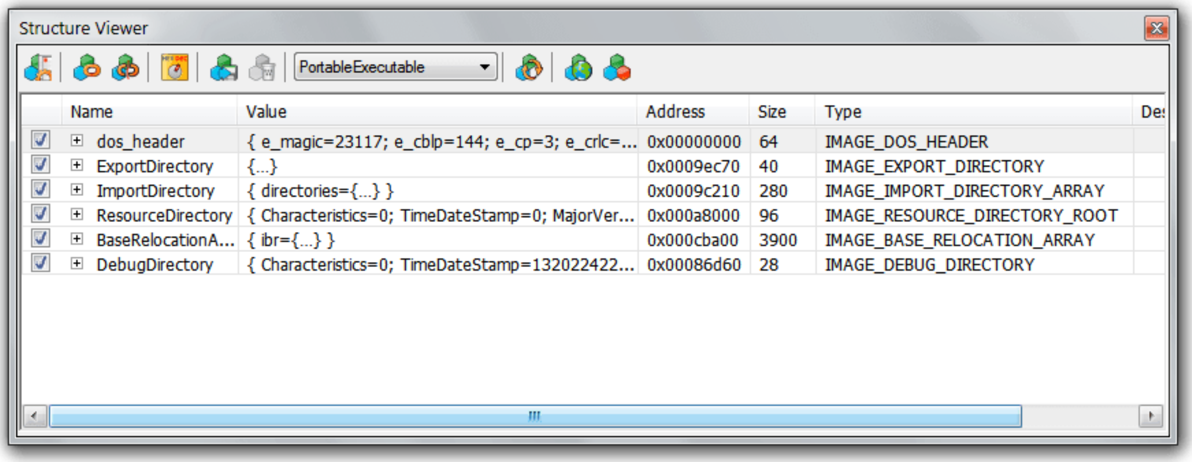
Cursor : The structure is bound to the cursor's location and moves with it.

Alternatively, you can enter the address of a structure as an expression. An expression is allowed to use constants, enumerations (defined in the global scope of any of added source files) and fields of already bound structures.

You also specify two coloring rules (one for the whole structure and another for a structure's field). The first coloring is applied when a bound structure is visible in an editor window. When you select a structure's field in a Structure Viewer Tool Window, the second coloring rule is applied to each cell the field occupies in an editor window.

Structure Viewer Tool Window

Structure Viewer Tool Window displays structures bound to the current document.



Structure Viewer

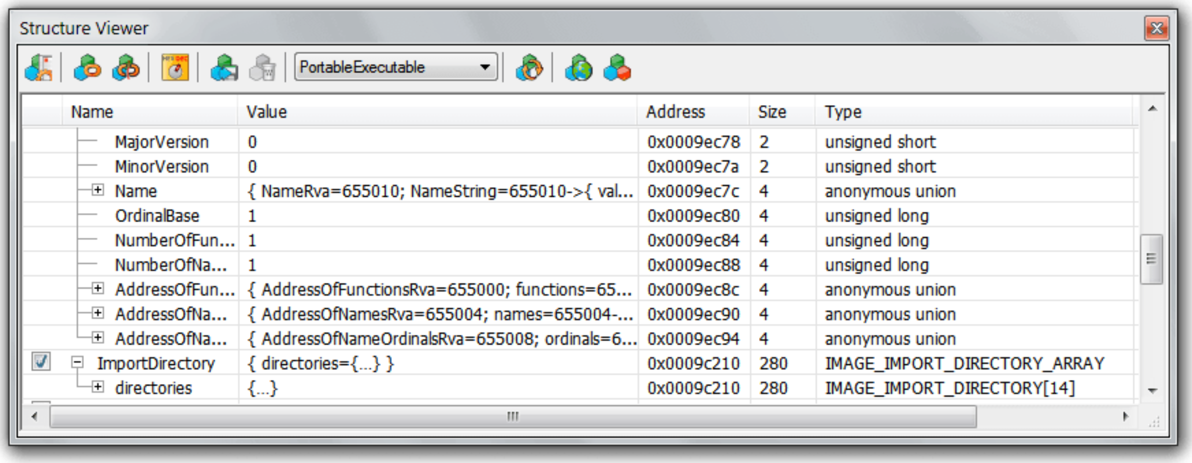
PortableExecutable

	Name	Value	Address	Size	Type	De:
☑	⊞ dos_header	{ e_magic=23117; e_cblp=144; e_cp=3; e_crlc=...	0x00000000	64	IMAGE_DOS_HEADER	
☑	⊞ ExportDirectory	{...}	0x0009ec70	40	IMAGE_EXPORT_DIRECTORY	
☑	⊞ ImportDirectory	{ directories={...} }	0x0009c210	280	IMAGE_IMPORT_DIRECTORY_ARRAY	
☑	⊞ ResourceDirectory	{ Characteristics=0; TimeDateStamp=0; MajorVer...	0x000a8000	96	IMAGE_RESOURCE_DIRECTORY_ROOT	
☑	⊞ BaseRelocationA...	{ ibr={...} }	0x000cba00	3900	IMAGE_BASE_RELOCATION_ARRAY	
☑	⊞ DebugDirectory	{ Characteristics=0; TimeDateStamp=132022422...	0x00086d60	28	IMAGE_DEBUG_DIRECTORY	

For each bound structure, its name, type, binding address and coloring sample are displayed. Click on the plus button to expand the structure.

A checkbox on the left to the bound structure controls whether it and the currently selected field are highlighted in the editor window.

After the structure is expanded, all its fields appear on a screen:



Structure Viewer

PortableExecutable

	Name	Value	Address	Size	Type
	MajorVersion	0	0x0009ec78	2	unsigned short
	MinorVersion	0	0x0009ec7a	2	unsigned short
	⊞ Name	{ NameRva=655010; NameString=655010->{ val...	0x0009ec7c	4	anonymous union
	OrdinalBase	1	0x0009ec80	4	unsigned long
	NumberOfFun...	1	0x0009ec84	4	unsigned long
	NumberOfNa...	1	0x0009ec88	4	unsigned long
	⊞ AddressOfFun...	{ AddressOfFunctionsRva=655000; functions=65...	0x0009ec8c	4	anonymous union
	⊞ AddressOfNa...	{ AddressOfNamesRva=655004; names=655004-...	0x0009ec90	4	anonymous union
	⊞ AddressOfNa...	{ AddressOfNameOrdinalsRva=655008; ordinals=6...	0x0009ec94	4	anonymous union
☑	⊟ ImportDirectory	{ directories={...} }	0x0009c210	280	IMAGE_IMPORT_DIRECTORY_ARRAY
	⊞ directories	{...}	0x0009c210	280	IMAGE_IMPORT_DIRECTORY[14]

For every field of an expanded structure, you see the name, value, address and field type. As the structure may contain fields whose types are also structures, you may continue expanding them until only built-in types are visible.

The data displayed in a “Value” column is not read-only. You may edit any field by double-clicking on it or executing the Edit » Edit Cell command. When you finish editing a field's value, press the Enter key to submit the changes. The changes are then propagated directly to the current document.

Managing Bound Structures

To bind a new structure, execute the Tools » Structure Viewer » Bind... command. To change the bound structure's properties, double-click it in the list, or select the Edit... option from the shortcut menu.

You may copy the structure's field or the whole structure into the Clipboard using the Copy to Clipboard or Copy All to Clipboard shortcut menu options. Structure may also be exported into the CSV file.

NOTE
Structure viewer limits the amount of data that you can place into the Clipboard. Export to CSV, on the other hand, is capable of processing the entire structure tree, regardless of its complexity, provided you have enough free disk space.

To unbind (delete) a bound structure, select it and press the Del key. You may also select the Unbind option from the shortcut menu.

Execute the **Tools** » **Structure Viewer** » **Unbind All** command to remove all bound structures.

The **Tools** » **Structure Viewer** » **Display Hex Values** switch is used to switch between displaying data in decimal or hexadecimal formats.

The **Synchronize Position** toolbar command tells the Structure Viewer to synchronize cursor movement between the current editor window and the bound structure.

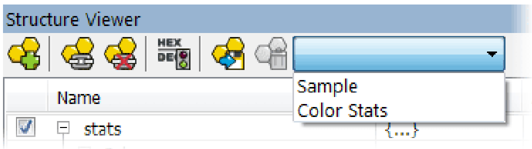
Autorefresh option (on the toolbar) controls whether the Structure Viewer automatically re-binds all currently bound structures whenever a document changes. It is recommended to switch this option off if you have a complex structure bound.

Press the **On-line Repository...** toolbar button to open an on-line structure definition repository.

Working with Schemes

All bound structures may be saved as a scheme. To save a scheme, execute the **Tools** » **Structure Viewer** » **Save Scheme...**. Specify the scheme's name and click the **OK** button.

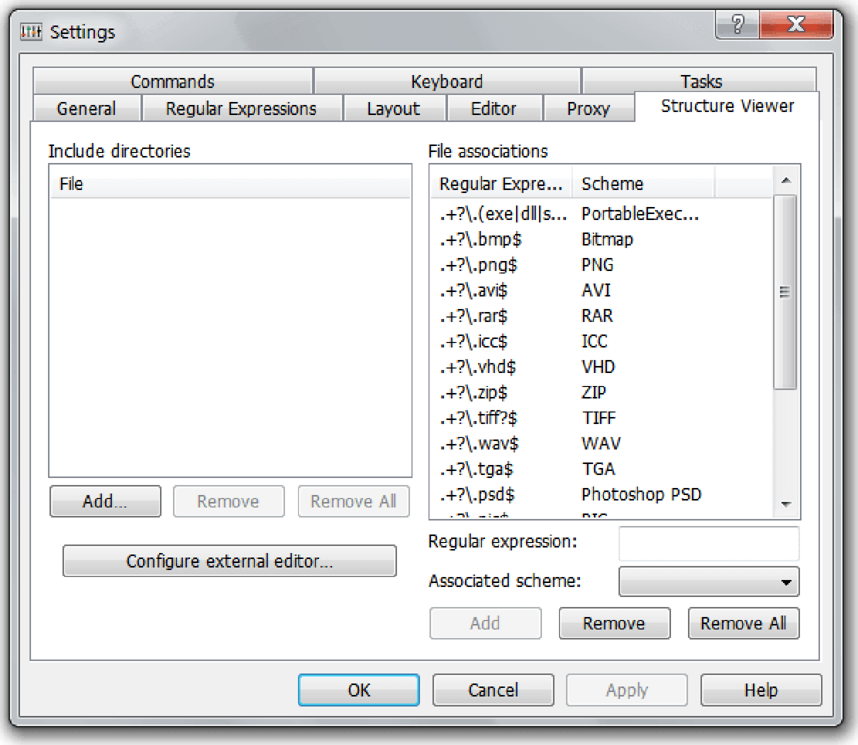
All defined schemes are then listed in a scheme combo box.



To load a given scheme, select it in a list. To remove a current scheme execute the **Tools** » **Structure Viewer** » **Remove Scheme** command.

Structure Viewer Settings Page

The Structure Viewer Settings Page allows you to specify the list of include directories and structure-file associations.



Regular Expre...	Scheme
.+?\.(exe|dll|s...	PortableExec...
.+?\.bmp$	Bitmap
.+?\.png$	PNG
.+?\.avi$	AVI
.+?\.rar$	RAR
.+?\.icc$	ICC
.+?\.vhd$	VHD
.+?\.zip$	ZIP
.+?\.tiff?$	TIFF
.+?\.wav$	WAV
.+?\.tga$	TGA
.+?\.psd$	Photoshop PSD

Include Directories

The list of include directories is managed in the left part of the window. Use the **Add**, **Remove** and **Remove All** buttons to manage the list. Include directories are scanned by the #include directive when it searches for included structure files.

File Associations

File Associations let you associate a Structure Viewer Scheme with a specific file using regular expressions. Next time a file which name matches the regular expression is opened in the Hex Editor Neo, the given structure scheme is automatically loaded. File associations are managed in the right part of the window.

Use the **Add**, **Remove** and **Remove All** buttons to manage associations.

Language Reference

Hex Editor Neo supports advanced structure definition syntax. It is based on the Standard C type definition syntax and extends it in a number of ways.

While Standard C only allows defining*static* types, that is, data structures which size and memory allocation is strictly defined at compile time, Hex Editor Neo extends the syntax to allow definition of*dynamic* types. The following code illustrates this:

C++
```cpp
struct StaticType
{
    int Array[128];
};

struct DynamicType
{
    int ArraySize;

    // invalid in Standard C (non const expression), valid in Hex Editor Neo
    int Array[ArraySize / sizeof(int)];
};
```

The `DynamicType` structure definition is valid in Hex Editor Neo. The size of the structure is determined at the time it is *bound* to the data and the number of elements in `Array` array varies.

Workflow

Hex Editor Neo compiles all protocol definition files in its library on each application start. Apreprocessor is run on each source file. It is responsible for the following tasks:

- Elimination of all comments from the source file.
- Macro evaluation.
- Processing of conditional compilation blocks.
- Processing of all `#include` directives and building the dependency graph.

Multiple files are pre-processed and compiled in parallel if Hex Editor Neo is running on multi-processor and/or multi-core computer.

Tokenization

Source files are tokenized according to standard C language rules: there must be one or more space characters between tokens if they cannot be distinguished without spaces and there may optionally be one or more spaces between tokens if they are distinguishable without spaces.

Space is a space character (`' '`), tabulation (`'\t'`), newline (`'\n'`) or comment.

C++
```cpp
int a;              // valid, space is used to separate tokens "int" and "a"
int/* comment */a;  // valid, comment  is used to separate tokens "int" and "a"
inta;               // invalid, compiler cannot distinguish between "int" and "a" and parses it as "inta"
int                 // continued on the next line…
     a              // still continued…
          ;         // valid, newline is valid space character

a & b               // valid, space is used to separate "a" and "&" and "&" and "b"
a&b                 // still valid, space is not required - compiler is able to
                    // distinguish between "a" (identifier) and "&" (operator)
```

Space must not be used inside a keyword, such as built-in type `int` or operator `&&`:

```C++
in t a;       // invalid, "int" must not contain space
a & & b       // valid, but will be parsed as a & (&b)
a | | b       // invalid, space inside keyword (operator "||")
```

Comments

Two standard C-style comments are supported: single-line and multi-line comments. Single-line comment starts with `//` character sequence and continues to the end of the current line. Multi-line comments must be started with `/*` sequence and terminated with `*/` sequence.

```C++
// Single-line comment
/* multi-line
  (continued here)
  comment */
```

Multi-line comments may be used "in-place":

```C++
struct /* comment */ A
{
    int /* another comment */ a;
};
```

Comments are completely ignored and removed from the document prior to compiling it.

Preprocessor

Preprocessor is a special compiler that is run each time the application compiles the protocol definition file. It executes before compilation of the source file and prepares a source file for compilation.

Hex Editor Neo provides a fully C99-compliant preprocessor which supports the following directives:

`#include`

Performs a physical inclusion of the contents of another source file into the current file.

`#pragma once`

Prevents a file from being included multiple times.

`#define`, `#undef`

Allows defining preprocessing constants and macros.

`#if`, `#ifdef`, `#ifndef`, `#else`, `#elif`, `#endif`, `defined() operator`.

Provides support for conditional compilation.

`#error`

Unconditionally stops source file compilation.

#include directive

`#include` directive physically includes the contents of a specified file into the current file.

Syntax:

```C++
#include "filename"
```

or

```C++
#include <filename>
```

When used in its first form, the referenced file is searched in the same folder as the current file.

For example, let us have following two files:

`file1.h`

C++
```cpp
struct A
{
    // …
};
```

And `file2.h`:

C++
```cpp
#include "file1.h"

struct B
{
    A a;
};
```

If there was no `#include` directive in `file2.h`, you would not be able to add this file to a Structure Library, as it uses an undefined type `A`. But preprocessor, which runs on the file before it is compiled, transforms the file into the following:

C++
```cpp
struct A
{
    // …
};

struct B
{
    A a;
};
```

That is, it physically inserts the contents of `file1.h` into `file2.h`, thus, making `file2.h` compilable. See also the `#pragma once` directive.

Using Absolute and Relative Paths

Both syntax forms, form 1 and form 2 allow you to specify absolute or relative paths, for example:

C++
```cpp
// will use an absolute path
#include "c:\Projects\definitions.h"

// includes "definitions.h" file, located in "inc" sibling
#include "..\inc\definitions.h"

// includes "definitions.h" file, located in "lib" subdirectory
// of one of standard include paths.
#include <lib\definitions.h>
```

#pragma once Directive

`#pragma once` directive prevents the file from being included multiple times.

Syntax:

C++
```cpp
#pragma once
```

Let `fileA.h` be `#include`-ed into `fileB.h` and into `fileC.h`. If you now write a `fileD.h` with the following two lines:

C++
```cpp
#include "FileB.h"
#include "FileC.h"
```

“fileA.h” will get included twice. In order to prevent this, put a following line into the "fileA.h" file:

C++
```cpp
#pragma once
```

#define Directive

`#define` directive lets you define preprocessor-time constants and macros.

Syntax:

C++
```
#define id [token-string]
```

or

C++
```
#define id([id, [id, […]]]) [token-string]
```

A macro declaration must end on the same line. If you need to continue on the next line, finish a line with a backslash character:

C++
```
#define MY_STRING "This is a start of the long "   \
          "long long " \
          "string"    // the end of macro declaration
```

Defining Constants

In its first form, #define creates a preprocessor-time constants. For example:

C++
```
#define MAX_LENGTH 5
```

This declaration will instruct the preprocessor to scan the source file and replace all occurrences of `MAX_LENGTH` with `5`. The preprocessor is smart enough to only perform a replace when `MAX_LENGTH` is used as an identifier, that is, it will transform the following code fragment:

C++
```
// This example uses MAX_LENGTH:
struct A
{
    int array[MAX_LENGTH];
    const int MaxLength = MAX_LENGTH;
    $assert(MaxLength == MAX_LENGTH, "Error with MAX_LENGTH");
};
```

into the following:

C++
```
// This example uses MAX_LENGTH:
struct A
{
    int array[5];
    const int MaxLength = 5;
    $assert(MaxLength == 5, "Error with MAX_LENGTH");
};
```

As you see, substitution had not occurred in comment and in string. All other occurrences have been replaced.

A constant may be more complex, for example:

C++
```
#define MAX_LENGTH (2 + 5)
```

Note the use of parenthesis in order to prevent operator precedence errors.

Defined constants may refer to constants defined before:

C++
```
#define SECOND 10000000
#define MINUTE (60 * SECOND)
```

The following form:

C++
```cpp
#define SOME
```

will only define a constant, without assigning it a particular value. If occurred in a text, it gets removed from it. However, you may successfully test such constant within the `#ifdef` directive or using a `defined()` operator:

C++
```cpp
#define INCLUDE_STRUCT_A
// …
#ifdef INCLUDE_STRUCT_A
struct A
{
    // …
};
#endif
```

By convention, macros and preprocessor constants are named with uppercase letters.

Defining Macros

The second form of the directive is used to define macros:

C++
```cpp
#define ADD(x,y) ((x) + (y))
```

The preprocessor will not only perform a replace, but also will perform a parameter substitution:

C++
```cpp
ADD(7,8)        // will be replaced with ((7) + (8))
ADD(n,-1)       // will be replaced with ((n) + (-1))
```

Macros may contain any number of parameters:

C++
```cpp
#define MAX(a,b) ((a) > (b) ? (a) : (b))
```

Variadic Macros

Hex Editor Neo supports variadic macros. To use variadic macros, the ellipsis may be specified as the final formal argument in a macro definition, and the replacement identifier `__VA_ARGS__` may be used in the definition to insert the extra arguments. `__VA_ARGS__` is replaced by all of the arguments that match the ellipsis, including commas between them.

#undef Directive

An `#undef` directive is used to remove the macro definition.

Syntax:

C++
```cpp
#undef id
```

Example:

```
C++
#define MAX_LENGTH 5
struct A
{
    int array[MAX_LENGTH];
};

#undef MAX_LENGTH
struct B
{
    // compile-time error, "MAX_LENGTH" identifier not found
    // (preprocessor did not replace it with "5")
    int array[MAX_LENGTH];
};
```

#error Directive

`#error` directive stops compilation of the current source file.

Syntax:

```
C++
#error error-message-string
```

`error-message-string` is displayed to the user.

Preprocessor Operators

# Stringizing Operator

The number-sign or “stringizing” operator `#` converts macro parameters to string literals without expanding the parameter definition. It is used only with macros that take arguments. If it precedes a formal parameter in the macro definition, the actual argument passed by the macro invocation is enclosed in quotation marks and treated as a string literal. The string literal then replaces each occurrence of a combination of the stringizing operator and formal parameter within the macro definition.

White space preceding the first token of the actual argument and following the last token of the actual argument is ignored. Any white space between the tokens in the actual argument is reduced to a single white space in the resulting string literal. Thus, if a comment occurs between two tokens in the actual argument, it is reduced to a single white space. The resulting string literal is automatically concatenated with any adjacent string literals from which it is separated only by white space.

Further, if a character contained in the argument usually requires an escape sequence when used in a string literal (for example, the quotation mark (") or backslash () character), the necessary escape backslash is automatically inserted before the character.

```
C++
#define ASSERT(condition, message) $assert(condition, message ": " #condition)

// …
struct A
{
    int a;
    ASSERT(a > 5, "a must be greater than 5");
// The previous line will be replaced with $assert(a > 5, "a must be greater than 5" ": " "a > 5");
};
```

## Token-Pasting Operator

The double-number-sign or “token-pasting” operator `##`, which is sometimes called the "merging" operator, is used in both object-like and function-like macros. It permits separate tokens to be joined into a single token and therefore cannot be the first or last token in the macro definition.

If a formal parameter in a macro definition is preceded or followed by the token-pasting operator, the formal parameter is immediately replaced by the un-expanded actual argument. Macro expansion is not performed on the argument prior to replacement.

Then, each occurrence of the token-pasting operator in token-string is removed, and the tokens preceding and following it are concatenated. The resulting token must be a valid token. If it is, the token is scanned for possible replacement if it represents a macro name. The identifier represents the name by which the concatenated tokens will be known in the program before replacement. Each token represents a token defined elsewhere, either within the program or on the compiler command line. White space preceding or following the operator is optional.

This example illustrates use of token-pasting operator:

```
C++
#define BIT_FIELD(type, n)  type field##n:n
// …
struct A
{
    BIT_FIELD(unsigned,5); // will be replaced with: unsigned field5:5;
    BIT_FIELD(unsigned,7); // will be replaced with: unsigned field7:7;
};
```

Conditional Compilation Directives

`#if`, `#elif`, `#else`, `#endif`, `defined() operator`

The `#if` directive, with the `#elif`, `#else`, and `#endif` directives, controls compilation of portions of a source file. If the expression you write (after the `#if`) has a nonzero value, the line group immediately following the `#if` directive is retained in the translation unit.

```
C++
#if expression
text
[
#elif expression
text
[
#elif expression
text
]]
[
#else
text
]
#endif
```

Each `#if` directive in a source file must be matched by a closing #endif directive. Any number of `#elif` directives can appear between the #if and #endif directives, but at most one #else directive is allowed. The #else directive, if present, must be the last directive before `#endif`.

The `#if`, `#elif`, `#else`, and `#endif` directives can nest in the text portions of other #if directives. Each nested `#else`, `#elif`, or `#endif` directive belongs to the closest preceding `#if` directive.

All conditional-compilation directives, such as `#if` and `#ifdef`, must be matched with closing `#endif` directives prior to the end of file; otherwise, an error message is generated. When conditional-compilation directives are contained in include files, they must satisfy the same conditions: There must be no unmatched conditional-compilation directives at the end of the include file.

Macro replacement is performed within the part of the command line that follows an `#elif` command, so a macro call can be used in the expression.

The preprocessor selects one of the given occurrences of text for further processing. A block specified in text can be any sequence of text. It can occupy more than one line. Usually text is program text that has meaning to the compiler or the preprocessor.

The preprocessor processes the selected text and passes it to the compiler. If text contains preprocessor directives, the preprocessor carries out those directives. Only text blocks selected by the preprocessor are compiled.

The preprocessor selects a single text item by evaluating the constant expression following each `#if` or `#elif` directive until it finds a true (nonzero) constant expression. It selects all text (including other preprocessor directives beginning with #) up to its associated `#elif`, `#else`, or `#endif`.

If all occurrences of constant-expression are false, or if no `#elif` directives appear, the preprocessor selects the text block after the `#else` clause. If the `#else` clause is omitted and all instances of constant-expression in the `#if` block are false, no text block is selected.

The constant-expression is an integer constant expression with these additional restrictions:

- Expressions must have integral type and can include only integer constants, character constants, and the `defined()` operator.
- The expression cannot use sizeof() operator.

The preprocessor operator `defined` can be used in special constant expressions, as shown by the following syntax:

C++

```
defined(identifier)
defined identifier
```

This constant expression is considered true (nonzero) if the identifier is currently defined; otherwise, the condition is false (0). An identifier defined as empty text is considered defined. The `defined` directive can be used in an `#if` and an `#elif` directive, but nowhere else.

C++

```
// Define the structure definition variant:
#define VARIANT 2

// …

struct A
{
#if VARIANT == 1
    char a;
#elif VARIANT == 2
    short a;
#elif VARIANT == 3
    int a;
#else
    long a;
#endif
};
```

`#ifdef`, `#ifndef`

The `#ifdef` and `#ifndef` directives perform the same task as the `#if` directive when it is used with `defined(identifier)`.

C++

```
#ifdef identifier
#ifndef identifier

// equivalent to
#if defined(identifier)
#if !defined(identifier)
```

You can use the `#ifdef` and `#ifndef` directives anywhere `#if` can be used. The `#ifdef` identifier statement is equivalent to `#if 1` when identifier has been defined, and it is equivalent to `#if 0` when identifier has not been defined or has been undefined with the `#undef` directive. These directives check only for the presence or absence of identifiers defined with `#define`.

Predefined Macros

Hex Editor Neo defines several macros, called predefined macros. These macros are available for each structure definition file:

Macro	Description
`_SVC_VER`	An integer that specifies the current compiler's version. Low 8 bits represent the minor version, high 8 bits represent major version. For example, version 3.05 is represented as 0x305.
`_SVC_X86`	Defined for 32-bit version of Hex Editor Neo. Undefined for 64-bit version.
`_SVC_X64`	Defined for 64-bit version of Hex Editor Neo. Undefined for 32-bit version.
`_SVC_POINTER_SIZE`	An integer that specifies the size of pointer in bits on current machine. Equals to 32 for 32-bit version of Hex Editor Neo and 64 for 64-bit version.
`_SVC_POINTER_SIZE_REAL`	An integer that specifies the size of pointer in bits on current machine. Always returns the real value, even if 32-bit version of Hex Editor Neo is running on 64-bit OS.

Built-in Types

Integer Types

Hex Editor Neo natively supports the following integer types:

Type Name	Other Valid Names	Typedefs in stddefs.h	Description	Range
`bool`	N/A	N/A	One-byte boolean value. Displayed as “true” and "false".	N/A
`char`	`signed char`	CHAR, int8, __int8	8-bit signed character	-2^7 to $2^7 - 1$
`wchar_t`	N/A	`WCHAR`	16-bit UNICODE character	0 to $2^{16} - 1$
`unsigned char`	N/A	`UCHAR`, `BYTE`, `uint8`	8-bit unsigned character	0 to $2^8 - 1$
`short`	`signed short`, `short int`, `signed short int`	`SHORT`, `int16`, `__int16`	16-bit signed integer	-2^{15} to $2^{15} - 1$
`unsigned short`	`unsigned short int`	`USHORT`, `WORD`, `uint16`	16-bit unsigned integer	0 to $2^{16} - 1$
`int`	`signed int`, `signed`	`INT`, `int32`, `__int32`	32-bit signed integer	-2^{31} to $2^{31} - 1$
`unsigned int`	`unsigned`	`UINT`, `uint32`	32-bit unsigned integer	0 to $2^{32} - 1$
`long`	`signed long`, `long int`, `signed long int`	`LONG`	32-bit signed integer	-2^{31} to $2^{31} - 1$
`unsigned long`	`unsigned long int`	`ULONG`, `DWORD`	32-bit unsigned integer	0 to $2^{32} - 1$
`__int64`	N/A	`LONGLONG`, `int64`	64-bit signed integer	-2^{63} to $2^{63} - 1$
`unsigned __int64`	N/A	`ULONGLONG`, `FILETIME`, `uint64`	64-bit unsigned integer	0 to $2^{64} - 1$

Type Modifiers

Two modifiers, `little_endian` and `big_endian` may be used to change the default byte ordering of a type. They may be used directly in declaring fields:

C++

```cpp
struct A
{
    big_endian short value;
};
```

or in typedef declaration to create a new type:

C++

```cpp
typedef big_endian short b_short;
```

Note that #pragma byte_order directive may still be used to change default byte ordering for the rest of a scope. If `little_endian` or `big_endian` modifier is present, it always overwrites the current default.

Floating-Point Types

Hex Editor Neo natively supports the following floating-point types:

Type Name	Description	Size, in Bytes	Range
`float`	Single-precision floating-point type, according to IEEE 754-1985	4	$3.4 \cdot 10^{\pm 38}$ (7 digits)
`double`	Double-precision floating-point type, according to IEEE 754-1985	8	$1.7 \cdot 10^{\pm 308}$ (15 digits)

String Types

Hex Editor Neo natively supports the following string types:

Type Name	Description
`string`	Null-terminated ANSI string (each character occupies single byte).
`wstring`	Null-terminated UNICODE string (each character occupies two bytes).

Expressions

Expressions are allowed in different places in the structure definition. For example, the size of the bit field, the number of items in array and pointer offset are all specified using expressions. Expressions are also used in calculating constant values and enumeration values.

Expression is a combination of immediate values, constants, enumeration values, function calls and field references. All these elements are connected with one or more operators.

An expression may be as simple as:

C++

```cpp
5  // evaluates to integer "5"
```

or as complex as:

C++

```cpp
5 + 7*(10 - 2)    // calculate an expression
info.bmiHeader.sel.header.biSizeImage  // take a value of a field several scopes deep
bfTypeAndSignature.bfType == 'BM' && bfReserved1 == 0 && bfReserved2 == 0   // verify a condition
RvaToVa(OptionalHeader.DataDirectory[i].VirtualAddress)  // access a field in a nested structure and array
```

Operators

Below is a table of supported operators. Operators are sorted by their precedence, from highest to lowest. Operators in the same row have the same precedence value and are evaluated from left to right.

Operator(s)	Name or Meaning
`.` `[]` `()`	Field access, array indexing, expression grouping
`()`	Function call
`-` `~` `!` `sizeof()` `&`	Unary minus, bitwise NOT, logical NOT, sizeof, address-of
`*` `/` `%`	Multiplication, division, modulo division
`+` `-`	Addition, subtraction
`<<` `>>` `>>>`	Left shift, right shift, right unsigned shift
`<` `<=` `>` `>=`	Less than, less than or equal, greater than, greater than or equal
`==` `!=`	Equality, inequality
`&`	Bitwise AND
`^`	Bitwise XOR
`|`	Bitwise OR
`&&`	Logical AND
`||`	Logical OR
`?:`	Conditional operator

Optimization

All expressions are evaluated at the time a structure file is compiled. If expression is successfully evaluated to constant value (that is, it does not contain any field references), calculated value is used instead of the expression. It is used each time a type is bound to the data, thus greatly minimizing bind time. You can get advantage of this optimization taken by the Hex Editor Neo: instead of

```cpp
C++
const SecondsInHour = 3600;    // 60 * 60
const SecondsInDay = 86400;    // 60 * 60 * 24
```

use

```cpp
C++
const SecondsInHour = 60*60;
const SecondsInDay = SecondsInHour * 24;
```

As the result will be the same after the source file is compiled.

Hex Editor Neo is also capable of optimizing sub-expressions:

```cpp
C++
struct A
{
    int size;
    byte data[size * (sizeof(int) - 1)];
};
```

Important note here is that constant sub-expression must be enclosed in parenthesis in order to be optimized. Otherwise, Hex Editor Neo will not optimize it because it considers a variable as having arbitrary type:

```cpp
C++
var i = ...
var j = i + (5 + 3);    // will be optimized to i + 8
var j = i + 5 + 3;    // will not be optimized (consider the case when i is a string, for example, which r
```

Immediates

An expression may contain an *immediate value*. There are several ways to specify an immediate:

Integer Number

A signed or unsigned integer number may be specified in either base 10 or base 16:

C++

```
9    // integer number 9
-7   // integer number -7
0x5a // integer number 90
```

Floating-Point Number

A floating-point number is specified in either standard or scientific notation:

C++

```
2.3    // floating-point number 2.3
-4e-9  // floating-point number -0.000000004
```

Character Constants

A character constant is one, two or four symbols enclosed in single quotation marks:

C++

```
'c'      // integer number 99
'BM'     // integer number 19778
'NTFS'   // integer number 1397118030
```

A standard C escape character may be used inside the quotation marks:

C++

```
'\n'   // integer number 10
'\t'   // integer number 9
```

String Constants

String constants are only allowed in $assert directive and in $print directive. A sequence of characters (including escape characters) enclosed in double quotation marks. Several subsequent strings are automatically concatenated.

C++

```
"Hello, World!"               // "Hello, World!" string
"Hello, " "World!"            // the same "Hello, World!" string (automatically concatenated)
"Col1\tCol2\tCol3\n1\t2\t3"   // simple table with two rows and three columns
```

References

Hex Editor Neo allows getting a reference to a field by using the built-in functionref. The following operators are allowed for two references:

- == operator
- != operator
- < operator
- <= operator
- > operator
- >= operator

If one argument of a binary operator is a reference and another one is not, a reference is automatically dereferenced and then the normal operator rules apply.

In addition, a reference may be dereferenced using one of the built-in conversion functions.

Limitations

The result of ref function application may not be used with [] operator and . operator. Assign the result of the function to the local variable and use the variable instead:

C++
```
struct A
{
    struct { int a,b; } field;

    var t1 = ref(field).a;    // syntax error
    var r_field = ref(field);
    var t2 = r_field.a;       // OK

    int array[100];
    var t3 = ref(array)[50];  // syntax error
    var r_array = ref(array);
    var t4 = r_array[50];     // OK
};
```

Byte Arrays

Byte arrays are introduced in version 5.15. This is a new value type in addition to previously supported `boolean`, `integer`, `floating-point`, `string` and reference value types.

Byte arrays represent contiguous ranges in memory and usually contain unstructured data. The following operations are supported on byte arrays:

- References are implicitly converted to byte arrays if they are used in the expression with other byte arrays. See example below.
- Byte arrays may be specified as immediate values using the following syntax:

  C++
  ```
  struct Header
  {
      unsigned char Signature[3];

      $assert(Signature == { 0x20, 0xff, 0xfe }); // Immediate byte array
      // Note the implicit conversion between the array field and byte array.
      // Array field is first automatically converted to reference and then implicitly converted to
      // byte array
  };
  ```

- Other value types may be explicitly converted to byte array using the array() function.
- Arrays may be compared for equality and inequality. Arrays also support the following operators: `<`, `>`, `<=` and `>=` for which lexicographical comparison is used.
- An individual element of byte array may be taken using the element() function.
- A portion of an array may be extracted using the subarray() function.
- A length() function returns the number of bytes in an array. This function also works with strings, returning the length of the string.
- A find() function allows you to search for an occurrence of one byte array within another one. This function also works with strings.

Field Access

An expression may reference any field within visible scope. A field is referenced by its name, which is case sensitive. Name lookup continues from child scope to parent scope until the match is found. If the field is not found, constants and enumeration values are searched. If no match is found in constants and enumeration values, an error is generated.

The following example illustrates this:

```
C++
enum
{
    EnumerationValue      =0x20,
};

const ConstantValue = 0x30;

struct A
{
    int a;
    int Array1[a];                 // references a in this structure
    int Array2[ConstantValue];     // references ConstantValue in global scope
    int Array3[EnumerationValue];  // references EnumerationValue in global scope
    struct
    {
        int Array4[a];             // references a in parent scope
    } contained;
};
```

Pointed to types are allowed to reference fields in pointer field's scope. It is their direct enclosing scope. For example:

```
C++
struct PointedType;      // forward declaration

struct PointerType
{
    int a;
    int b as PointedType *;    // b is converted to a pointer to PointedType structure
    int c;
};

struct PointedType
{
    int Array[a + c];        // references a and c in PointerType (note c is declared AFTER b, the referen
};
```

`this` Pseudo-Field

The special field this is defined for each bound user-defined type and evaluates to the absolute offset of this bound structure.

```
C++
struct B
{
    // …
};

struct A
{
    int OffsetToB as B *(this);    // B will automatically be bound to &A + OffsetToB
};
```

When passed to the built-in `ref` function, the result is a `reference` to the current object.

`array_index` Built-In Variable

This built-in variable evaluates to the current array element index, if the structure is being used inside an array, otherwise it is evaluated to -1.

C++

```
struct B;

struct A
{
    B b[10];
};

struct B
{
    int a;
    if (array_index == 3)    // array_index evaluates to a current array index
        int b;
};
```

`current_offset` Built-In Variable

This built-in variable evaluates to the address the next field will be bound to.

C++

```
#pragma script("get_doc_size.js")    // we use a GetDocumentSize() function

struct A
{
    int b[10];
// pad this structure to the end of the file
    char padding[GetDocumentSize() - current_offset];
};
```

. Field Access Operator

Field access operator is used to access fields in contained scopes.

Syntax:

C++

```
id.id[.id[.id …]]
```

The following code fragment illustrates the use of the field access operator:

C++

```
struct A
{
    struct
    {
        int c;
    } b;
    int Array[b.c];     // access the c field inside the b field
};
```

struct, union, case union or pointer field may be used on the left of the field access operator.

[] Array Indexing Operator

Array indexing operator allows you to reference individual array items.

Syntax:

C++

```
id[exp]
```

The following code fragment illustrates the use of the array indexing operator:

C++

```
struct A
{
    int Array1[10];         // static array of 10 integers
    int Array2[Array1[2]];  // dynamic array, which size is taken from the third value of Array1 array
};
```

Array elements are numbered from 0 to `Count` - 1, where `Count` is (static or dynamic) array size.

() Expression Grouping Operator

Expression grouping operator allows you to change the precedence rules of operators in an expression.

Syntax:

```
C++
(exp)
```

The following code fragment illustrates the use of the expression grouping operator:

```
C++
2 + 3 * 4 - 7        // evaluates to 7
2 + 3 * (4 - 7)       // evaluates to -7
```

You can use parenthesis whenever you need to change the precedence of operators or increase the readability of the expression.

() Function Call Operator

Function call operator allows you to call an internal or external function.

Syntax:

```
C++
id( [param-list] )
param-list: expr [,expr ,[…] ]
```

The following code fragment illustrates the use of the function call operator:

```
C++
struct A
{
    int Array1[int(10.2)];         // Call an internal cast function
    int Array2[ExternalFunction()];  // Call an external function with no parameters
};
```

External function calls are never optimized at compile-time. All expressions containing external function calls will be computed at run-time.

- Unary Minus Operator

Unary minus operator change the sign of the expression.

Syntax:

```
C++
-exp
```

The following code fragment illustrates the use of the unary minus operator:

```
C++
-7       // evaluates to integer number -7
```

~ Bitwise NOT Operator

Bitwise NOT operator inverts all bits of the expression.

Syntax:

```
C++
~exp
```

The following code fragment illustrates the use of the bitwise NOT operator:

```cpp
~7        // evaluates to -8
```

This operator is not applicable to floating-point values.

& Bitwise AND Operator

This operator performs a bit-wise AND operation on its operands.

Syntax:

```cpp
exp1 & exp2
```

Usage:

```cpp
7 & 8                   // evaluates to 0
2 & 2                   // evaluates to 2
```

This operator is not applicable to floating-point values.

^ Bitwise XOR Operator

This operator performs a bit-wise XOR (eXclusive OR) operation on its operands.

Syntax:

```cpp
exp1 ^ exp2
```

Usage:

```cpp
7 ^ 8                   // evaluates to 15
2 ^ 2                   // evaluates to 0
```

This operator is not applicable to floating-point values.

| Bitwise OR Operator

This operator performs a bit-wise OR operation on its operands.

Syntax:

```cpp
exp1 | exp2
```

Usage:

```cpp
7 | 8                   // evaluates to 15
2 | 4                   // evaluates to 6
```

This operator is not applicable to floating-point values.

! Logical NOT Operator

Logical NOT operator inverts (logically) an expression. Evaluates to 0 if the expression is non-zero or to non-zero if the expression is zero.

Syntax:

```cpp
!exp
```

The following code fragment illustrates the use of the logical NOT operator:

```
C++
!7       // evaluates to 0
!0       // evaluates to 1
```

&& Logical AND Operator

This operator evaluates to non-zero if and only if both operands are non-zero, otherwise it evaluates to zero.

Syntax:

```
C++
exp1 && exp2
```

Usage:

```
C++
7 && 8                // evaluates to 1
0 && 2                // evaluates to 0
5 == 5 && 2==2        // evaluates to 1
```

If *exp1* evaluates to zero, *exp2* is not evaluated.

|| Logical OR Operator

This operator evaluates to non-zero if at least one of if its operands is non-zero, otherwise it evaluates to zero.

Syntax:

```
C++
exp1 || exp2
```

Usage:

```
C++
0 || 0                // evaluates to 0
0 || 2                // evaluates to 1
5 == 5 || 2==3        // evaluates to 1
```

If *exp1* evaluates to a non-zero value, *exp2* is not evaluated.

sizeof() Operator

This operator returns the size, in bytes, of the enclosed identifier.

Syntax:

```
C++
sizeof(id)
```

`id` may be either a built-in type, typedef'ed type, user-defined type or field reference. Taking the size of user-defined dynamic type is incorrect and will result in compile error.

The following code fragment illustrates the use of the `sizeof() operator`:

C++
```
struct A
{
    int a;
    int b;
    int c[4];
};

struct B
{
    int a;
    int b[a];
};

struct C
{
    B b;

    const SizeOfInt = sizeof(int);      // correct, evaluates to 4
    const SizeOfA = sizeof(A);          // correct, evaluates to 24 (size of static user-defined type A)
    const SizeOfB = sizeof(B);          // incorrect, results in compile-time error, B is dynamic type
    var SizeOfb = sizeof(b);          // correct, will be calculated at run-time
};
```

& Address-Of Operator

This operator takes the address (offset) of the given field.

Syntax:

C++
```
&field-id
```

Returned address is absolute.

C++
```
struct A
{
    int a;
    int b;
    const OffsetTob = &b - this;    // offset to field b (in bytes) from the beginning of the
                                    // structure is now stored in OffsetTob constant
};
```

*** Multiplication Operator**

This operator computes the multiplication of two given expressions.

Syntax:

C++
```
exp1 * exp2
```

Usage:

C++
```
7 * 8               // evaluates to 56
(2 + 2) * (7 - 1)    // evaluates to 24
```

/ Division Operator

This operator computes the result of division of one operand by another.

Syntax:

C++
```
exp1 / exp2
```

If the divisor evaluates to zero, a run-time error occurs. If the result of the expression is used as an integer value, the result of the division is truncated to the nearest integer value.

C++
```
4 / 2       // evaluates to 2
3 / 2       // evaluates to 1
5 / 0       // a run-time error occurs
```

% Modulo Division Operator

This operator computes the remainder of the division of the first operand by the second operand.

Syntax:

C++
```
exp1 % exp2
```

If the divisor evaluates to zero, a run-time error occurs.

C++
```
4 % 2     // evaluates to 0
5 % 2     // evaluates to 1
5 % 0     // a run-time error occurs
```

This operator is not applicable to floating-point values.

+ Addition Operator

This operator computes the sum of two given expressions.

Syntax:

C++
```
exp1 + exp2
```

Usage:

C++
```
7 + 8               // evaluates to 16
2 + 2               // evaluates to 4
```

Addition operator may also be used in string expressions to concatenate strings or to add `immediate` or `field` to a string.

- Subtraction Operator

This operator computes the difference between two given expressions.

Syntax:

C++
```
exp1 - exp2
```

Usage:

C++
```
7 - 8               // evaluates to -1
2 - 2               // evaluates to 0
```

<< Left Shift Operator

This operator performs a left shift of the first operand. The second operand specifies how many bits to shift.

Syntax:

C++
```
exp1 << exp2
```

Usage:

C++

```
7 << 1          // evaluates to 14
-3 << 3         // evaluates to -24
```

This operator is not applicable to floating-point values.

>> Right Shift Operator

This operator performs an arithmetic right shift of the first operand. The second operand specifies how many bits to shift.

Syntax:

C++

```
exp1 >> exp2
```

Usage:

C++

```
456 >> 3          // evaluates to 57
-100 >> 2         // evaluates to -25
```

This operator is not applicable to floating-point values.

>>> Right Unsigned Shift Operator

This operator performs a logical (unsigned) right shift of the first operand. The second operand specifies how many bits to shift.

Syntax:

C++

```
exp1 >>> exp2
```

Usage:

C++

```
456 >>> 3          // evaluates to 57
-100 >>> 2         // evaluates to 1073741799 (0x3fffffe7)
```

This operator is not applicable to floating-point values.

< Less Than Operator

This operator evaluates to non-zero value if first operand is less than the second operand or to zero value otherwise.

Syntax:

C++

```
exp1 < exp2
```

Usage:

C++

```
7 < 8               // evaluates to 1
2 < 2               // evaluates to 0
```

<= Less Than or Equal Operator

This operator evaluates to non-zero value if first operand is less than or equal to the second operand or to zero value otherwise.

Syntax:

C++

```
exp1 <= exp2
```

Usage:

C++

```
7 <= 8               // evaluates to 1
2 <= 2               // evaluates to 1
3 <= 2               // evaluates to 0
```

> Greater Than Operator

This operator evaluates to non-zero value if first operand is greater than the second operand or to zero value otherwise.

Syntax:

C++

```
exp1 > exp2
```

Usage:

C++

```
8 > 7               // evaluates to 1
2 > 2               // evaluates to 0
3 > 5               // evaluates to 0
```

>= Greater Than or Equal Operator

This operator evaluates to non-zero value if first operand is greater than or equal to the second operand or to zero value otherwise.

Syntax:

C++

```
exp1 >= exp2
```

Usage:

C++

```
8 >= 7               // evaluates to 1
2 >= 2               // evaluates to 1
3 >= 5               // evaluates to 0
```

== Equality Operator

Evaluates to non-zero value if both operands are equal or to zero otherwise.

Syntax:

C++

```
exp1 == exp2
```

Usage:

C++

```
7 == 8               // evaluates to 0
2 == 2               // evaluates to 1
```

!= Inequality Operator

Evaluates to non-zero value if operands are different or to zero otherwise.

Syntax:

C++

```
exp1 != exp2
```

Usage:

C++
```
7 != 8                  // evaluates to 1
2 != 2                  // evaluates to 0
```

?: Conditional Operator

This is the only supported ternary operator. It evaluates to the value of its second operand if the first operand evaluates to non-zero value, otherwise, it evaluates to the value of the third operand.

Syntax:

C++
```
exp1 ? exp2 : exp3
```

Usage:

C++
```
5 == 3 ? 8 : 7                  // evaluates to 7
2 == 2 ? 8 : 7                  // evaluates to 8
```

Functions

Internal Functions

Built-In Functions

Hex Editor Neo provides a number of built-in functions:

<table>
<tr><th>Function Name</th><th>Description</th></tr>
<tr><td><code>bool(exp)</code></td><td>Convert a given parameter <code>exp</code> to a boolean value. The following conversion rules apply:
<table>
<tr><th>Value's type</th><th>Behavior</th></tr>
<tr><td><code>bool</code></td><td><code>exp</code> returned</td></tr>
<tr><td><code>int</code></td><td><code>false</code> if exp equals to zero, <code>true</code> otherwise</td></tr>
<tr><td><code>double</code></td><td><code>false</code> if exp equals to zero, <code>true</code> otherwise</td></tr>
<tr><td><code>string</code></td><td><code>false</code> if exp is an empty string, <code>true</code> otherwise</td></tr>
<tr><td><code>reference</code></td><td><code>false</code> if reference is not initialized, <code>true</code> otherwise</td></tr>
</table>
Note that when a statement expects a boolean, it converts the passed value to boolean automatically. The same rules are used during this implicit conversion.</td></tr>
<tr><td><code>int(exp)</code></td><td>Convert a given parameter <code>exp</code> to an integer value. Floating-point numbers are truncated to nearest integer, strings are parsed as containing an integer. If parsing error occurs, the result of the conversion is zero. If passed string starts with <code>0</code>, it is considered as containing octal number. If passed string starts with <code>0x</code> or <code>0X</code>, it is considered as containing hexadecimal number. References are first dereferenced and then converted to integer.</td></tr>
<tr><td><code>double(exp)</code></td><td>Convert a given parameter <code>exp</code> to a floating-point value. If used on string, a string is parsed as containing a floating-point number. If parsing</td></tr>
</table>

Function Name	Description
	error occurs, the result of the conversion is zero. References are first dereferenced and then converted to floating-point.
`string(exp)`	Convert a given parameter `exp` to a string value. References are dereferenced.
`decimal(exp)`	Convert a given parameter `exp` to an integer value. Always treats a passed string as containing decimal number (regardless of any prefixes). References are dereferenced.
`hex(exp)`	Convert a given parameter `exp` to an integer value. Always treats a passed string as containing hexadecimal number (regardless of any prefixes). References are dereferenced.
`octal(exp)`	Convert a given parameter `exp` to an integer value. Always treats a passed string as containing octal number (regardless of any prefixes). References are dereferenced.
`binary(exp)`	Convert a given parameter `exp` to an integer value. Always treats a passed string as containing binary number (regardless of any prefixes). References are dereferenced.
`integer_convert(exp, radix)`	Convert a given parameter `exp` to an integer value. An integer's base is passed as second argument to the function. It is automatically converted to integer. References are dereferenced.
`format(fmt_string, ...)`	This function takes a format string `fmt_string` and arbitrary number of arguments. It returns a string after placing each passed parameter to corresponding placeholder in a format string.
`substring(string, pos, [count])`	This function extracts a substring from a given `string`. `pos` is zero-based index of the first character of the substring and count is an optional number of characters in a substring. If omitted, substring continues until the end of the string. If `pos` is greater than the string length, an exception occurs. Count can be any positive integer or -1, which is equivalent to omitting the parameter.
`subarray(array, start_offset[, length])`	This function extracts a sub-array of a byte array. First and second arguments are required. `array` is an array from which you are extracting a sub-array and `start_offset` is a zero-based offset of the beginning of sub-array. Optional `length` parameter specifies the length of the resulting sub-array in bytes.
`element(array, position)`	Returns the byte at a given offset in an array byte array.
`length(exp)`	Return a length of a string if `exp` is a string expression, or byte array (in bytes), if `exp` is a byte array.
`find(find_where, find_what[, start_pos)`	Find a substring in a string (if both `find_where` and `find_what` expressions are strings) or one array within another, if both expressions are byte arrays. Optional `start_pos` parameter specifies the location from which to start searching. It defaults to 0. The function returns integer specifying the found location or -1 if no occurrence is found.
`type(exp)`	Determine the type of the expression exp. Returns one of the following values (symbolic names are

<table>
<tr><th>Function Name</th><th>Description</th></tr>
<tr><td></td><td>predefined in <code>stddefs.h</code>):
<table><tr><th>Symbolic Constant</th><th>Value</th><th>Type of Expression</th></tr><tr><td>BooleanType</td><td>0</td><td><code>bool</code></td></tr><tr><td>IntegerType</td><td>1</td><td><code>int</code></td></tr><tr><td>FloatingPointType</td><td>2</td><td><code>double</code></td></tr><tr><td>StringType</td><td>3</td><td><code>string</code></td></tr><tr><td>ReferenceType</td><td>4</td><td><code>reference</code></td></tr></table></td></tr>
<tr><td><code>ref(exp)</code></td><td>Take the reference of expression. Expression must be a Field Access or Array Indexing Operator. The result of this function may not be used on the left of . operator or [] operator.
A special construct <code>ref(this)</code> is used to get a reference to the current object.</td></tr>
<tr><td><code>array(exp)</code></td><td>Convert an expression to a byte array. Little-endian representation of <code>boolean</code>, integer and floating-point values are returned. If <code>exp</code> is a reference, a copy of referenced value is returned as byte array. All other conversions are prohibited.</td></tr>
<tr><td><code>is_valid(exp)</code></td><td>This function evaluates the expression and returns <code>false</code> if any exception occurs during evaluation, otherwise, it returns <code>true</code>. Expression's result is never used and is silently discarded.</td></tr>
<tr><td><code>evaluate_if(exp1, exp2)</code></td><td>This function evaluates expression <code>exp1</code> and returns its result. If any exception occurs during evaluation, it returns the value of expression <code>exp2</code>. Note that if another exception occurs during evaluation of <code>exp2</code>, it is handled as usual (propagated to user interface). This function is equivalent to
C++
<code>is_valid(exp1) ? exp1 : exp2</code>
but evaluates <code>exp1</code> only once.</td></tr>
</table>

Examples

```
C++
int(2.5)            // results to 2 (integer)
int("89")           // results to 89 (integer)
double("7.8")       // results to 7.8 (floating-point)
double("string")    // results to 0.0 (floating-point)
```

Native Functions

Hex Editor Neo supports*native functions*. A native function is a function defined in the header file that uses the same language syntax.

The following syntax is used to define a function:

```
C++
optional-attributes
function f_name ( parameter-list )
{
  function-body
}

optional-attributes := [ function-attribute [, function-attribute [, …] ] ]

function-attribute := arguments_array | nooptimize

parameter-list := param-name1 [, param-name2 [, … ] ]

function-body := *(variable-declaration | statement)
```

The function may be declared at any scope (either global or user-defined). Function's name must be unique within a scope. A function can take any number of arguments (or no arguments). It is allowed to pass different number of arguments during a function call. If fewer arguments passed, the rest are undefined, if more arguments passed, extra parameters are ignored.

Only the following constructs are allowed in a function body:

- A declaration of constants or constant arrays.
- A declaration of variables or variable arrays.
- Any supported statement, including expression calculation statement.

Ability to use any statement allows you to create branches and loops. A return statement sets function's return value and exits function. A function is allowed to have multiple return statements.

A following pseudo-variables are available for a function's body:

`parameter_count`

Holds the actual number of passed parameters.

`arguments_array`

Holds values of all passed parameters. The size of the array is `parameter_count`. If function has named arguments, both named parameters and values of this array may be used to reference passed parameters.

Note: for performance reasons this array is generated only when `arguments_array` attribute is specified before the function's definition.

All parameters are always passed by value. If `arguments_array` attribute is specified and a function has named arguments, corresponding array elements and named parameters have copies of values (that is, modifying one does not modify another).

Function Scope

Each function defines its own scope. All variables declared in this scope are destroyed when function execution finishes and re-created next time it is run.

Function Optimization

Hex Editor Neo automatically optimizes constant functions. If it encounters a function that always returns a constant value and is being used with constant arguments, it replaces the function call with a calculated value. That means that all native functions must be immutable, that is, they must not affect any global state.

If you still need to use a function that modifies a global state, use the `nooptimize` attribute to suppress function optimization.

Note that function optimization always works at the call site. Consider the following example:

```
C++
function square(x)
{
    return x * x;
}

struct A
{
    char array[square(5)];    // will be optimized to 25
    int size;
    char array2[square(size)];  // will not be optimized
};
```

External Functions

Attaching Scripts

External functions referenced in your structure definition files must be defined in separate files. Hex Editor Neo supports functions written in JavaScript.

Use the following syntax to attach a script file to the structure definition file:

```
C++
#pragma script(path-to-script-file)
```

`Path-to-script-file` is a string containing the absolute or relative (to the structure definition file) path to a script file. Only JavaScript external files (with any extension) are supported.

As with included files, Hex Editor Neo automatically rescans a file if it is modified outside the editor.

Examples

functions.js

```
C++
function f()
{
    return 10;
}
```

structure.h:

```
C++
#pragma script("functions.js")

public struct A
{
    char array[f()];
};
```

`javascript` Keyword

In addition, JavaScript code may be specified in the structure definition file using the `javascript` keyword:

```
C++
javascript
{
  function f()
  {
    return 10;
  }
};

public struct A
{
  char array[f()];
};
```

The number of javascript blocks is not limited. All blocks are processed before any structure is bound, so all functions declared in these blocks are always visible to any structure, regardless of the place where you define them.

External Functions

Hex Editor Neo allows you to use external functions inexpressions. External functions are defined in script files, attached to structure definition files using the #pragma script preprocessor directive.

An external function accepts zero or more parameters and must always return a value ("void" functions, or procedures are not supported). External function must be written in JavaScript.

Hex Editor Neo automatically performs parameter type conversion when the function call is made. Although, make sure the value returned by the function is of correct type, as Hex Editor Neo expects a value of a given type in several places, such as in array declaration:

functions.js:

```
C++
function GetArraySize()
{
    return 11/2;
}
```

structure.h:

```
C++
#pragma script("functions.js")

struct A
{
    int array[GetArraySize()];         // error here: script returns a floating-point number, integer
    int array[int(GetArraySize())];    // correct
};
```

Script Objects

Hex Editor Neo provides scripts running as part of expression evaluation with two built-in objects:

Object Name	Description
document	References the document for which Structure Viewer parses a structure. Refer to the Working with Document Object section for more information.
parser	Allows script to reference other bound structures, their fields, as well as bind other structures to the current document and display debugging messages. This object is a default "global" object for a script, so its methods may be called directly, without using `parser.Method` notation. Refer to the Working with Parser Object section for more information.

Example

```
C++
function GetDocumentSize()
{
    return document.FileSize;
}
```

Statements

Statements control the flow of execution. They are allowed on user-defined type scope and in the function body. This section describes all statements supported by the Hex Editor Neo.

The general statement syntax may be described by the following grammar:

```
C++
statement:
    statement-if | statement-switch | statement-break | statement-while | statement-for | statement-dowhil

statement-block:
    statement | field-declaration
```

Where `field-declaration` is either standard or user-defined type, or structure definition.

See the following topics for more information:

- if statement
- switch statement
- break statement
- while statement
- for statement
- do...while statement
- return statement

if Statement

`if` statement has the following syntax:

```
statement-if:
if (expr)
    statement-block | { statement-block * }
[else
    statement-block | { statement-block * }
]

statement-block:
    statement | field-declaration
```

`expr` is evaluated at run-time and if `true`, the first *statement-block* is evaluated, otherwise, the second *statement-block* is evaluated. If it is omitted and `expr` is false, nothing is evaluated and control flows to the next statement or declaration. If multiple statements or declarations need to be specified in the body of if or else, use the curly braces. For example:

```
C++
struct A
{
    int a;
    if (a>0)
        float b;
    else
    {
        double b;
        int c;
    }
};
```

switch Statement

`switch` statement has the following syntax:

```
statement-switch:
switch (sw-expr)
{
    case const-case-expr1:
        statement-block *
    [case const-case-expr2:
        statement-block *
    …
    ]
    [default:
        statement-block +
    ]
}
```

⚠ WARNING

`switch` statement's block must not be followed by a ';' character!

`switch` statement is evaluated according to the following procedure:

1. All `const-case-exprN` expressions are evaluated at compile time. If they fail to compute to a constant value, compilation error occurs. If you need to use non-const expressions, consider using the case_union.
2. `sw-expr` is evaluated at run time.
3. The resulting value is compared with each `const-case-exprN` value one by one until a match is found. If the match is not found, statement-block after the "default:" label is evaluated, if present.
4. If the match is found, all statement blocks after the corresponding "case" label are evaluated, until the "default:" label, end of switch statement or a break statement are met.

```C++
struct A
{
    BYTE type;
    switch (type)
    {
        case 0:
            int value;
            break;
        case 1:
            double value;
            break;
        case 2:
            string value;
            break;
        default:
            $assert("Invalid file");
      }    // note: no ';' allowed here!
};
```

break Statement

`break` statement has the following syntax:

```
statement-break:
break;
```

> ⓘ **NOTE**
> The ';' character at the end of the statement is mandatory.

The break statement may be used:

- Inside the switch statement to stop statement evaluation.
- Inside the for statement, while statement or do...while statement to cancel a loop.

In addition, `break` statement always ends the current scope, even if it is used outside of the switch or loops.

while Statement

`while` statement has the following syntax:

```
statement-while:
while (expr)
    statement-block
```

Evaluates statements and declarations in *statement-block* until `expr` becomes `false`. If expression is `false` at the first iteration, no statements are evaluated.

```
C++
var i = 10;
while (i)
{
    int a;
    i = i - 1;
}
```

for Statement

`for` statement has the following syntax:

```
statement-for:
for (init-expr; condition-expr; increment-expr)
    statement-block
```

`for` statement is equivalent to the following construct:

```
C++
init-expr;
while (condition-expr)
{
    statement-block;
    increment-expr;
}
```

It evaluates statements in *statement-block* while `condition-expr` evaluates to a non-zero value.

Note that unlike C/C++, all `for` statement expressions must be present and cannot be omitted. Hex Editor Neo does not support unary operators like `++`, `--`, `+=`, `-=` and others, so increments must be specified in the form of `i = i + 1` instead of `++i`.

`init-expr` must have the following syntax:

```
C++
init-expr:
var name = expr
```

For example,

```
C++
for (var i = 0; i < 10; i = i + 1)
{
    int a;
}
```

do...while Statement

`do…while` statement has the following syntax:

```
statement-dowhile:
do
    statement-block
while (expr);
```

Evaluates statements and declarations in *statement-block* until `expr` becomes `false`. If expression is `false` at the first iteration, statements in statement block are evaluated exactly one time.

```
C++
var i=10;
do
{
    int a;
    i = i - 1;
} while (i);
```

return Statement

`return` statement has the following syntax:

```
return expr;
```

Evaluates the passed expression and sets the current native function's return value. It also exits the current function. If used outside the function body, an exception is generated.

```
C++
function square(x)
{
    return x * x;
}
```

Scopes

A scope is a namespace for user-defined types, typedef-ed types, constants and native functions.

There is always a global scope, a scope that represents the source file itself. All enumerations, typedefs and user-defined types declared in the file (and not enclosed by other user-defined types) are said to be defined at the global scope.

```
C++
// beginning of the file
typedef int MyIntType;

enum MyEnum
{
    // …
};

const MyConstant = 5;

struct MyStruct
{
    // …
};
```

In the example above, all identifiers, that is, `MyIntType`, `MyEnum`, `MyConstant` and `MyStruct` are declared in the global scope.

Each user-defined type creates its own scope:

```
C++
struct A             // A is declared in the global scope and creates its own scope
{
    const B = 10;        // B is declared in scope of structure A
};
```

Every enclosed scope "sees" all its parent scopes. That is, when name-lookup is performed (for the search of the identifier), first, the most enclosed scope is searched. If the identifier is not found, a parent scope is searched and so on.

This allows an identifier to be overloaded in the enclosed scope:

```
C++
const MyConstant = 10;
struct A
{
    const MyConstant = 5;
    int array[MyConstant];  // will use MyConstant from the A scope
};

struct B
{
    int array[MyConstant];  // will use MyConstant from the global scope
};
```

A compiler does not provide a way to reference `MyConstant` from the global scope from scope *A* in this example. But once the scope is closed, a global scope is active again (see structure *B*).

Enumerations are slightly different in a way they use scopes: enumeration declaration does not create a scope but places all enumeration values into the parent scope. See the enumerations section for more information.

Constants and Constant Arrays

Constants allow you to calculate the value of an expression and store it. Compare constants with preprocessor constants. Preprocessor is run before compilation of source file occurs and therefore has limited expression evaluation capabilities.

Syntax:

```
const name-id = value-expr;
```

Constants are allowed in any scope. A `value-expr` must be constant:

```
C++
const MyConstant = 5;  // valid, constant expression

struct A
{
    int a;
    const double_a = a * 2;    // error, value-expr is not a constant
};
```

Constant Arrays

You can use the following syntax to declare an array:

```
C++
const name-id [ ] = { initializer-list };
```

Where `name-id` is a name of array and `initialize-list` is a comma-separated list of expressions that initialize array elements.

Variables and Variable Arrays

Variables work almost like constants with an exception that you can change their value at a later time.

Syntax:

```
C++
var name-id [= value-expr];
```

You do not specify the type of the variable. It is automatically determined from the type of the value-expr. You may change the variable type at a later time by assigning another value to a variable.

Variables are allowed at user-defined type scope. If `value-expression` is omitted, variable is initialized with zero. You can change the value of a variable using the following syntax:

```
C++
variable-name-id = expression;
```

Variables may be used in expressions just like constants. For example:

```
C++
struct A
{
    var SomeVariable = 10;    // declare variable and assign a value to it
// …
    SomeVariable = SomeVariable * 2 - 20;  // change the value of the variable
// …
    char Data[SomeVariable];    // use variable
};
```

Optimizations

Hex Editor Neo performs an optimization when it compiles variables. All constant expressions are evaluated to their numeric equivalents. Hex Editor Neo can also optimize constant sub-expressions if they do not have side effects.

C++

```
struct A
{
    var MyConstant = 60 * 60;    // will be optimized directly to 3600
    var PI = 3.1415926;
    var _2PI = 2 * PI;        // will be optimized directly to 6.2831852
    int a;
    var test = a * (_2PI / 180);  // sub-expression in parenthesis will be optimized
};
```

Using Variables

Variables let you overcome the limitations of standard lookup procedure. A good example is a definition of a PNG file structure (installed with Hex Editor Neo). A PNG file consists of several chunks of different type and size. Although these chunks are almost unrelated, sometimes the structure of a chunk greatly depends on some of the fields of one of the previous chunks. Using variables you may “capture” the value of such field and later use it in subsequent chunks to choose between one structure or another. See the provided sample file for more information on using variables.

Variable Arrays

You can use the following syntax to declare an array:

C++

```
var name-id [ [total-elements-expr] ] [ = { initializer-list } ];
```

Where `name-id` is a name of array, `total-elements-expr` is an optional number of elements in an array. If omitted, the number of expressions in the initializer-list sets the number of elements in an array.

`initialize-list` is a comma-separated list of expressions that initialize array elements.

Enumerations

Hex Editor Neo supports the special form of integer constants, called enumerations.

Syntax:

C++

```
// legacy syntax:
enum [name-id[<integer-type>]]
{
    value-id [ = const-expression]
    [, value-id [ = const-expression] …
    ]
};

// new syntax
enum [name-id[ : integer-type]]
{
    value-id [ = const-expression]
    [, value-id [ = const-expression] …
    ]
};
```

Enumeration may optionally have a name and a type. If name is omitted, a nameless enumeration is created. If type is omitted, it is defaulted to int.

An expression, if specified, must be a constant expression, that is, its value must be calculable at the compile-time. You may use immediates, constants and other previously defined enumerations as well as sizeof() operator in its static form.

If expression is omitted, the value of the current element is computed as a value of the previous element plus one. If this is a first enumeration element, its value will be 0:

```cpp
enum MyEnum : unsigned
{
    FirstValue,                             // defaulted to 0
    SecondValue,                            // defaulted to 1
    ThirdValue = 5,                         // overridden, equals 5
    FourthValue,                            // defaulted to 6
    FifthValue = ThirdValue - SecondValue,    // equals to 4
};
```

An enumeration does not create its own scope and places all values in the parent scope.

```cpp
enum MyEnum
{
    FirstValue           =0x00000010,
    SecondValue          =0x00000020
};

const test = FirstValue;   // valid, as FirstValue (and SecondValue) are placed in the global scope, paren
```

Using Enumerations

You may use named enumerations as types for fields in user-defined types. If you do this, Hex Editor Neo will automatically recognize the enumeration value when the structure is bound to the data. For example:

```cpp
enum MyFlags : unsigned
{
    FIRST_BIT_SET      =0x00000001,
    SECOND_BIT_SET     =0x00000002,
};

struct A
{
    MyFlags flags;
};
```

When you bind structure `A` to data, *flags* gets visualized as following:

Data Value	Display	
1	FIRST_BIT_SET	
2	SECOND_BIT_SET	
0	0	
3	FIRST_BIT_SET	SECOND_BIT_SET
5	FIRST_BIT_SET	4
8	8	

Hex Editor Neo automatically parses the enumeration value and displays its symbolic name (or names).

User-Defined Types

```
[public | private] (struct | union | protocol) [name-id]
{
    [ element-decl; [ element-decl; … ] ]
};

[public | private] case_union [name-id]
{
    case expression1:
        [ element_decl; … ]
    [
    case expression2:
        [ element_decl; … ]
    …
    ]
    [
    default:
        [ element_decl; … ]
    ]
};

element-decl:
  [ (field-decl | typedef-decl | const_decl | user-defined-type-decl) ; …]

field-decl:
  type var-decl [, var-decl …] ;

var-decl:
  (id | id[expression] | id:expression | id as type-id * [(expression)] )
```

The first syntax form allows you to define structure or union, while the second form allows you to define a case union.

When `public` keyword is placed before the structure declaration, the structure becomes a public user-defined type and appears in Bind Structure Window. A `private` keyword may be used to prevent the structure from being listed in the list of user-defined types in the Structure Binding window. If omitted, a structure declaration is private by default. Applies only to user-defined types, declared on the global scope.

A special directives may appear within a declaration of a structure, union or a case union:

C++
```
hidden:
visible:
```

A `hidden:` directive hides all subsequent fields and `visible:` directive makes fields visible. By default, all fields are visible. Hiding a field only hides it from the screen, the field remain visible when referenced in expressions.

This and subsequent sections provide an in-depth description of user-defined types.

Each user-defined type creates a scope. All enclosed constants, enumerations, typedefs, native functions and user-defined types are then included into this newly created scope.

A structure, union or case union may be nameless. Nameless types are allowed anywhere besides the global scope. A nameless type may also be used in the typedef declaration:

C++
```
typedef struct
{
    // …
} A;
```

equivalent to:

C++
```
struct A
{
    // …
};
```

while the following fragment creates a structure named A and its aliases B and C:

C++

```
typedef struct A
{
    // …
} B,C;
```

Supported Types

Structures

A structure is a combination of data fields. A structure occupies space required to store all its fields, one by one, subject to *structure packing* or alignment.

A structure definition consists of zero or more of data fields:

```
type var-decl [, var-decl…];
```

where `var-decl` is:

```
(id | id[array-size-expression] | id:bit-field-size-expression | id as type-id *)
```

A structure may contain different fields with a same name. If such a field is referenced in expression, an [] operator may be used to address individual fields. If this operator is not used, the first field is referenced.

Typedefs, constants, enumerations, native functions and nested user-defined types are also allowed within a structure definition.

Plain field, array field, bit field and pointer field are described in more detail in their corresponding sections.

Empty structures are eliminated from the output. See also the noautohide attribute section.

Example:

C++

```
struct A
{
    int a;              // plain data field
    int b:3;            // bit-field
    int c[10];          // array
    int d as B *;       // pointer

    short s,t[5],u:12;  // multiple fields may be combined
};
```

Packing and Alignment

The important thing about user-defined types is the size and alignment of a type. The size of the structure is a sum of sizes of all its fields (subject to alignment). The alignment of the built-in type equals its size, and alignment of the structure is calculated by Hex Editor Neo, taking in account the alignment of all structure fields and current structure packing value. By default, structure packing value is 1.

You may change the structure packing value using the following directive:

C++

```
#pragma pack(N)
```

where `N` is one of the following values: 1, 2, 4, 8, 16, 32.

> **NOTE**
> The following rule is used when computing the alignment of each structure field:
>
> Each data field starts at offset which is a multiple of its alignment. A number of unused padding bytes is inserted if required, but no more than the current structure packing value.

The implementation of structure packing and field alignment in Hex Editor Neo complies with standard C implementation.

Byte Order

By default, Hex Editor Neo respects the current byte order specified for the editor window. You can change the byte order at any time using the following directive:

```
C++
#pragma byte_order(LittleEndian | BigEndian | Default)
```

This directive changes the current byte order until the end of the current scope, or until another byte_order directive.

Unions

A union is a combination of data fields. In contrast to a structure, all union data fields are located at the same address and, therefore, share the same storage space. The size of the union equals to the size of the largest field, and alignment of the union equals the largest field's alignment.

A union definition consists of zero or more of data fields:

```
type var-decl [, var-decl…];
```

where `var-decl` is:

```
(id | id[array-size-expression] | id:bit-field-size-expression | id as type-id *)
```

A union may contain different fields with a same name. If such a field is referenced in expression, an [] operator may be used to address individual fields. If this operator is not used, the first field is referenced.

Typedefs, constants, enumerations, native functions and nested user-defined types are also allowed within a union definition.

Plain field, array field, bit field and pointer field are described in more detail in their corresponding sections.

Example:

```
C++
union A
{
    int intVal;
    short shortVal;
    double dblVal;
    char charArray[4];
    struct
    {
        int a;
        __int64 b;
    } nestedStruct;
};
```

Case Unions

A case union is a special construct offered by a Hex Editor Neo to dynamically select types at run time. It is virtually impossible to describe real-world data structures using only static types (types offered by C compiler, for example). And although dynamic types greatly increase the flexibility of the language to describe data structures, they still lack the ability to select one or another type based on run time conditions.

For example, imagine we have a byte in the data structure, followed by one of three different data structures, depending on this byte's value. Hex Editor Neo's case unions allow you to describe such data structure.

Case union syntax (copied from User-Defined Types section):

A union definition consists of zero or more of data fields:

```
C++
case_union [name-id]
{
    case expression1:
        [ element_decl; … ]
    [
    case expression2:
        [ element_decl; … ]
    …
    ]
    [
    default:
        [ element_decl; … ]
    ]
};
```

```
element-decl:
  [ (field-decl | typedef-decl | const_decl | user-defined-type-decl) ; …]

field-decl:
  type var-decl [, var-decl …] ;

var-decl:
  (id | id[expression] | id:expression | id as type-id *)
```

Case union consists of one or more *case blocks* and an optional *default block*. Hex Editor Neo evaluates each `expressionN` and if it is nonzero, elements immediately following a case block are used. All other case blocks and default block are ignored. If none of case expressions is evaluated to a non-zero value, the *default block* is used. If the *default block* is omitted, a case union becomes an empty structure and is removed from the output.

```
C++
struct B
{
    // …
};

struct C
{
    // …
};

struct A
{
    BYTE val;
    case_union
    {
        case val == 0:
            int a;
            int b;
        case val == 1:
            B b;
        default:
            C c;
    } s;
};
```

Case Union Optimization

All case expressions are evaluated at compile time. If an expression is a non-zero constant expression, a whole case union becomes equivalent to a corresponding structure. If all case expressions evaluate to constant zero, the whole case union becomes equivalent to a structure with fields from the default block. If there is no default block in a case union, it becomes an empty structure and is eliminated from the output.

Forward Declarations

Hex Editor Neo Neo requires that each referenced type must be defined before it is used; otherwise, the compile-time error occurs. Sometimes it is impossible or inconvenient to follow this rule. Forward declarations allow you to declare the identifier as a user-defined type, without actually defining it:

```
C++
struct B;          // forward declaration of B

struct A
{
    B b;           // compiles OK, as B has been declared
};

struct B           // actually define B
{
    // …
};
```

Syntax:

```
(struct | union | case_union) name-id ;
```

`name-id` is required in forward declarations.

All forward declarations must be resolved before the end of the source file, otherwise an error occurs. However, it is not an error not to resolve a forward declaration if it has not been referenced.

Data Fields

Plain Field

Plain field is an ordinary field of a given type.

Syntax:

```
type-id var-id;
```

Example of plain fields:

```
C++
struct B
{
    // …
};

struct A
{
    int a;
    B b;
};
```

Both `a` and `b` fields of structure `A` are plain fields.

Array Field

Array field describes an array of some data type. Array is a sequence of several values of the same type.

Syntax:

```
[[noindex]] type-id var-id[expression];
```

`Expression` may be constant expression or dynamic expression. If it evaluates to 0, the field is removed from the output.

Hex Editor Neo automatically distinguishes between a simple array and an ordinary array. An array of elements of integer and floating-point built-in types is considered a simple array. Simple arrays do not impose a limit on a number of items and are extremely cheap to bind and consume no memory at all. Ordinary arrays (that is, arrays of user-defined types, or string types) have a hard-coded limit on array item count (about 2 million items) and require a corresponding amount of free RAM. A `noindex attribute` may precede the array field declaration if you do not use an Array Indexing Operator in any of the expressions to refer to elements of this array.

This will save the memory and structure binding time.

Example of array fields:

```
C++
struct B
{
    // …
};

struct A
{
    int a[5];      // static array, considered as simple array
    B b[a[0]];     // dynamic array (a number of elements is taken from the first element of a). Not a sim
};
```

Simple and Ordinary Arrays

Any array of elements of integer or floating-point built-in types is called a simple array. Array of elements of other types is called an ordinary array.

The following table briefly describes the difference between two array types:

Property	Simple Array	Ordinary Array
User-defined element type supported	No	Yes
Consumes more memory as array's size increases	No	Yes
Consumes more time as array's size increases	No	Yes
Has upper array size limit	No	Yes
Supports [noindex] attribute	No, ignored if used	Yes, consumes less memory and time if used on an array

“Infinite” Arrays

You are allowed to declare an array of “infinite” size when declaring an array. The following syntax is used:

```
type-id var-id[*];
```

`type-id` must be a user-defined type that must contain at least one $break_array directive that will specify the last element of the “infinite” array.

This is very useful if array size is not known at the array declaration point. For example, the following code snippet is capable of parsing a C-style null-terminated string:

```
C++
struct StringCharacter
{
    char c;
    if (c == 0)
      $break_array(true);
};

struct NullTerminatedString
{
    StringCharacter chars[*];
};

// Display the class usage
struct FileStructure
{
    NullTerminatedString FileName;
    NullTerminatedString Location;
    // …
};
```

Visualization

When Hex Editor Neo visualizes an array, it optionally visualizes its first several values in-line. Other values are displayed when you expand the array item. Character arrays (arrays of elements of char and wchar_t types) are visualized as ANSI or UNICODE strings respectively.

Bit Field

Bit field is an integer field which occupies less space than the underlying integer type.

Syntax:

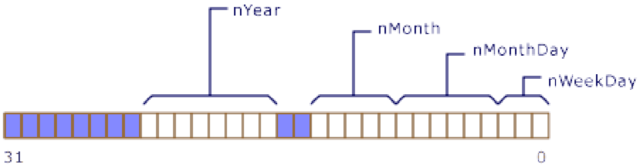
```
typeid var-id:expression;
```

The underlying `type-id` of a bit field must be an integer type. `Expression` may be constant expression or dynamic expression.

Example of bit fields:

```
C++
struct Date
{
    unsigned short nWeekDay  : 3;    // 0..7   (3 bits)
    unsigned short nMonthDay : 6;    // 0..31  (6 bits)
    unsigned short nMonth    : 5;    // 0..12  (5 bits)
    unsigned short nYear     : 8;    // 0..100 (8 bits)
};
```

The conceptual memory layout of an object of type `Date` is shown in the following figure.



Note that `nYear` is 8 bits long and would overflow the word boundary of the declared type, unsigned short. Therefore, it is begun at the beginning of a new unsigned short. It is not necessary that all bit fields fit in one object of the underlying type; new units of storage are allocated, according to the number of bits requested in the declaration.

The ordering of data declared as bit fields is from low to high bit, as shown in the figure above.

Pointer Field

Pointer field is functionally equivalent to a plain field but additionally describes the type this field points to. When Hex Editor Neo binds a pointer field, it automatically binds a pointed type at a calculated offset.

Syntax:

```
type-id var-id as pointed-type-id * [(expression)];
```

`Expression`, if present, is evaluated at run-time and the result is added to a field value. `type-id` must be an integer type. `pointed-type-id` must be a user-defined type.

Example of pointer field:

```
C++
struct B
{
    // …
};

struct A
{
    short ptr1 as B *;
    unsigned int ptr2 as B *(10);     // B will be bound at offset (ptr2 + 10)
};
```

The resulting offset must be an absolute offset in a file. In cases where fields contain only relative offsets, this keyword may be used in an expression to “convert” a relative offset to an absolute offset:

```
C++
struct B;

struct A
{
    short ptr1 as B *(this);  // B will be bound at offset (this + ptr1)
};
```

When pointers are processed and pointed structures are bound at resulting offsets, the current structure scope is used as a parent scope for a bound structure. This allows referencing its fields from the pointed structure:

```
C++
struct B;

struct A
{
    int a;
    int ptr as B *;
};

struct B
{
    int array[a];     // will reference a in A, if B is automatically bound via a pointer
};
```

Late-evaluation is performed for pointers, which allows pointed types to reference fields from the parent scope even if they are defined below the pointer field.

Attributes

Field Attributes

Hex Editor Neo supports a number of useful attributes that change the default behavior for individual bound fields. You should put attributes before a field you want them affect. The following syntax is supported:

```
attribute-list:
[ *attribute-decl ]

attribute-decl:
noindex | noautohide | read(expr) |
format(expr) | description(expr) | color_scheme(expr)
```

See the following sections for attribute descriptions.

Type Attributes

In addition to field attributes, a single display attribute is supported on types. It allows the user to change the default visualization for a type.

Field Attributes

noindex Attribute

Syntax:

```
noindex
```

Specifying this attribute for an array field turns off automatic building of array index. Array index is required for Array Indexing Operator to work properly. This attribute is ignored if used on simple array or non-array field.

noautohide Attribute

Syntax:

```
noautohide
```

By default, Hex Editor Neo eliminates fields which have zero size during binding. Specifying this attribute allows you to turn this behavior off.

onread Attribute

Syntax:

```
onread(expr)
```

Allows you to change the way this field is read by the Hex Editor Neo. You may specify expression to be evaluated each time Structure Viewer accesses the field's value.

Take the following notes into consideration:

- Your expression will be evaluated each time the field's value is read from the document, even during binding.
- Hex Editor Neo caches field values. This means that the result of your expression must be persistent. That is, for any `x` and `y`, if `x == y`, `expr(x) == expr(y)`.

In expression you may refer to actual field's value using a special variable `_1`:

```C++
struct A
{
    // The following field stores the size of the array minus 2
    [onread(_1 + 2)]
    int array_size;   // will be displayed as actual value + 2
    char array[array_size];
};
```

format Attribute

Syntax:

```
format(const-string-expr)
```

Use this attribute to set the format string used during visualizing of the field's value. Note that only part of the full format string must be specified: instead of "{0b16}" use just "b16". `const-string-expr` is evaluated at compile time.

description Attribute

Syntax:

```
description(const-string-expr)
```

Set the field description to be displayed in Hex Editor Neo user interface. `const-string-expr` is evaluated at compile time.

color_scheme Attribute

Syntax:

```
color_scheme(const-string-expr)
```

Set the color scheme to be used by Hex Editor Neo to visualize the field. `const-string-expr` is evaluated at compile time.

exact_only Attribute

Syntax:

```C++
exact_only
```

Using this attribute for enum fields forces exact matching algorithm. Normally, when this attribute is not specified, the following visualization algorithm is used for enumerations:

1. First, enumeration type is searched for exact match. If exact match is found, enumeration identifier is displayed.
2. If exact match is not found, enumeration type is considered a bit-field and is decomposited into components. Any remaining value is then added at the end.

Type Attributes

display Attribute

Syntax:

```
display(expr)
```

This attribute may be used to override the default type's visualization algorithm.

When Hex Editor Neo generates a value for a collapsed type, it by default displays values of first 5 type's fields. This attribute allows you to change that.

Hex Editor Neo evaluates the `expr` expression in the context of the current type (that is, you may reference all type fields directly). The result is then converted to string and displayed in Structure Viewer.

The following example renders the user-friendly MAC address:

C++

```
[display(format("{0b16Xw2arf0}:{1b16Xw2arf0}:{2b16Xw2arf0}:{3b16Xw2arf0}:{4b16Xw2arf0}:{5b16Xw2arf0}",
  data[0],data[1],data[2],data[3],data[4],data[5]))]
struct MAC
{
    unsigned char data[6];
};
```

The following example displays the sum of array's values:

C++

```
function sum(r)
{
    var sum = r[0];
    for (var i = 1; i < 6; i = i + 1)
        sum = sum + r[i];
    return sum;
}

[display(sum(ref(data)))]
struct MAC
{
    unsigned char data[6];
};
```

Typedefs

You can create an alias for any built-in or user-defined type.

Syntax:

C++

```
typedef existing-type new-type-id [,new-type-id …];
```

Type alias definitions are allowed at any scope. `existing-type` must be either built-in type, enumeration or user-defined type. Nameless types are allowed.

C++

```
typedef int INT;
typedef struct { int a,b; } MyStruct;

struct A
{
    // …
};

typedef A B,C,D;
```

Typedef does not create a new type, it only creates an alias for an existing type. You may reference a type by its original name, or by one of its aliases.

Directives

Directives are special commands to the compiler which are only allowed at non-global scope.

View the subsequent topics to get detailed description of each supported directive.

$assert Directive

Syntax:

```
C++
$assert(condition-expression [, message [, fatal-expression]]);
```

Assert directive is evaluated at run-time. First, `condition-expression` is evaluated. If it evaluates to non-zero value, nothing happens. But if it evaluates to a zero value, message is displayed to the user and structure binding is terminated. If message is omitted, standard "Assertion Failed" message is displayed. `message`, if present, must be a string expression. `fatal-expression`, if present, must be a constant expression. If it evaluates to a non-zero value, the assertion is fatal (this is a default behavior), that is, fired assertion terminates structure binding. If it evaluates to zero, assertion is only informational.

Assertions are good at verifying whether the data structure is being bound to correct data.

```
C++
struct A
{
    int a;
    $assert(5 < a && a < 10,"a must be between 5 and 10");
};
```

$print Directive

Syntax:

```
C++
$print(var-name-string-expression, var-value-expression);
```

The first expression must be a constant string expression and serves as a pseudo-field name. This name is displayed in the Structure Viewer Tool Window. It is also added as a real field into the current scope and may be later referenced in expressions. The second expression is a field's value. It may be either a constant expression or a non-const expression, that will be evaluated at run time.

```
C++
struct A
{
    int a;
    int b;
    $print("double_a", a * 2);
    $print("a/b", double(a) / b);
};
```

Both `$print` directives in the example above introduce new fields into the current scope (of struct `A`), but only the first one may be referenced in expressions, because the second one has incorrect name. So, it's OK to use any name for the first argument, but only syntactically correct ones may be referenced in expressions.

$break_array Directive

Syntax:

```
C++
$break_array(const-conditional-expression);
```

When used in a user-defined type, unconditionally breaks an enclosed array.

The parameter, which must be a constant value, specifies whether the current element should be included into an array (`const-conditional-expression` = true), or not (`const-conditional-expression` = false)

May be used either in conjunction with infinite array or with an ordinary array. If used not inside an array, the directive is ignored.

```
C++
struct StringCharacter
{
    char c;
    if (c == 0)
      $break_array(true);
};

struct NullTerminatedString
{
    StringCharacter chars[*];
};
```

$bind Directive

Syntax:

```
C++
$bind(type-string-expr, var-string-expr, addr-expr);
```

All expressions are evaluated at run time. First two are automatically converted to strings, while the third is expected to be of integer type.

This directive instructs parser to bind another structure to a given address. Binding is delayed until the current structure binding is successfully finished.

> ⓘ **NOTE**
> You must reference the full type name, for example `struct MyStruct`, not the `MyStruct`, and the referenced type must have been declared as public.

```
C++
public struct B
{
// …
};

public struct A
{
    int Offset;
    if (Offset != 0)
        $bind("struct B","pB",Offset);
};
```

$alert Directive

Syntax:

```
C++
$alert(expr);
```

Evaluates `expr` at bind time and displays the result in a message box.

$revert_to Directive

Syntax:

```
C++
$revert_to(reference-expression);
```

This directive updates the `current_offset`. It may be used to have look ahead in a structure. `reference-expression` is evaluated at run-time and must be a reference to a field in the current type. After this directive executes, `current_offset` becomes the start of a field.

C++

```cpp
struct A
{
    int type;
    switch (type)
    {
        case 0:
            B b;
            break;
        case 1:
            C c;
            break;
        default:
            $revert_to(ref(type));
            D d;
    }
};
```

$shift_by Directive

Syntax:

C++

```cpp
$shift_by(integer-expression);
```

This directive updates the `current_offset`. It may be used to have look ahead in a structure. `integer-expression` is evaluated at run-time and must be an integer value, which is added to `current_offset` upon directive execution.

C++

```cpp
struct A
{
    int skip_bytes;
    $shift_by(skip_bytes);
    int next_field;
};
```

$remove_to Directive

Syntax:

C++

```cpp
$remove_to(reference-expression);
```

This directive removes one or more last bound fields until the referenced field. `reference-expression` is evaluated at run-time and must be a reference to a field in the current type.

> ⚠ **WARNING**
> All fields being removed must be visible and no hidden fields must be between them.

C++

```cpp
struct A
{
    int type;
    switch (type)
    {
        case 0:
            B b;
            break;
        case 1:
            C c;
            break;
        default:
            $remove_to(ref(type));
            D d;
    }
};
```

Format String Syntax

This section describes the format string syntax. Format string is used in format() function and format attribute.

Library format string syntax is not compatible with the standard printf syntax. Instead, it has a different syntax.

The format string has blocks of plain text which are directly copied to the output and parameter placeholders. Each placeholder has the following syntax:

```
{<param-index>[width-decl][alignment-decl][plus-decl]
[precision-decl][base-decl][padding-decl][ellipsis-decl]
[locale-decl]}
```

The placeholder must be enclosed in curly braces. If you need to use the opening curly brace in the text, you need to duplicate it to distinguish from the placeholder beginning. There is no need to escape the closing brace, it will always be parsed correctly.

Parameter declaration starts with a parameter's number. This is the only mandatory field. Parameters are ordered starting from zero. All subsequent declarations are optional. If several declarations are used, their order is not significant and there must be no space or any other separator between them.

`width-decl`

Use this declaration to limit the minimum and/or maximum length of a rendered parameter, in characters. The syntax of a declaration is one of:

- `w<min-width>,<max-width>`
- `w<min-width>`
- `w,<max-width>`

Both `min-width` and `max-width` must be decimal integers and if specified, `max-width` must be larger than `min-width`.

`alignment-decl`

Use this declaration to set parameter alignment. It is ignored unless `width-decl` is also used. Use one of:

- `al` – align left (default)
- `ar` – align right
- `ac` – align center

`plus-decl`

Forces the plus sign to be rendered for positive numbers. Syntax:

- `+`

`precision-decl`

Use the declaration to specify the number of digits to be displayed after the comma. Used only for floating-point types. If not specified, the default one (6) is used.

- `p<number>`

`base-decl`

Specify a base for an integer. If any base besides 10 is used with the floating-point type, only the integer part is rendered. Only bases of 2, 8, 10, and 16 are supported. Lowercase or uppercase hexadecimal may be specified:

- `b2` – binary
- `b8` – octal
- `b10` – decimal (default)
- `b[0]16[x]` – lowercase hexadecimal. If prefix "0" is used, library adds "0x" before the number
- `b[0]16X` – uppercase hexadecimal. If prefix "0" is used, library adds "0X" before the number

`padding-decl`

Set the character to fill the space when `min-width` is set (see the `width-decl` above). The default one is space.

- `f<character>`

`ellipsis-decl`

Add the ellipsis sign when truncating output. It is not compatible with center alignment (will act as left alignment).

- `e`

`locale-decl`

Separate thousands with the default user locale's thousand separator. Will work only for base 10.

- `l`

Errors

This topic describes all compilation and binding errors generated by Hex Editor Neo.

`CE001`: The requested operation is not allowed on the given data type or not expected here

Operation or operator you attempted to use is not supported. Example:

C++
```
var result = "string" - 2;  // operator - is not supported for strings
```

`CE002`: Divison by zero

Divison by zero has been encountered.

C++
```
int array[5/0];
```

`CE003`: The specified identifier was not found

You referenced the previously undeclared identifier.

C++
```
public struct A
{
    int a;
    int b;
    int arr[c];   // generates CE003, c is undeclared
};
```

`CE004`: Scalar is expected

A requested operation is allowed only on scalar values.

C++
```
public struct A
{
    int data[10];
    int array[data];  // generates CE004, data is not a scalar
};
```

`CE005`: Vector is expected

A requested operation is allowed only on vector values.

C++
```
public struct A
{
    int a;
    int b[a[1]];  // generates CE005, a is not a vector
};
```

`CE006`: Array index is out of range

An attempt to access array's element that is outside of the declared array size.

C++
```
public struct A
{
    int a[10];
    int b[a[12]]; // generates CE006, a only has 10 elements (0..9)
};
```

`CE007` : Not implemented yet

This operation has not yet been implemented.

`CE008` : Invalid bit field size

Unsupported bit field size is used.

`CE009` : Syntax error

See error's additional message for detailed syntax error information.

`CE010` : Type has only been forward-declared

An attempt to materialize a type that has only been forward-declared is detected.

C++

```
// forward declare B
struct B;

public struct A
{
    B data;    // generates CE010
};

// end of file
```

`CE011` : Operation not supported for dynamic type

sizeof operator is used with dynamic type.

C++

```
struct B
{
    int size;
    char data[size];
};

public struct A
{
    char reserved[sizeof(B)]; // generates CE011, B is dynamic type
};
```

`CE012` : Type is redefined

An attempt to redefine already defined type is detected.

C++

```
struct B
{
    int a;
};

struct B  // generates CE012
{
    int c;
};
```

`CE013` : Assertion failed

Assertion (generated by $assert directive) has failed.

`CE014` : Constant expression is expected

Compiler expects a constant expression here.

`CE015` : Constant string expression is expected

Compiler expects a constant string expression here.

`CE016` : Wrong number of arguments for a function call

An invalid number of arguments used in a call to built-in function.

`CE017` : Subscript operation for non-indexed array (hint: remove [noindex] attribute)

[] operator has been used for non-indexed array. Remove the noindex attribute.

C++

```cpp
struct B { … };

struct A
{
    [noindex] B data[1000];

    char reserved[data[5].size];  // generates CE017, remove [noindex] from previous line
};
```

`CE018`**: Error returned by JavaScript engine**

JavaScript function returned an error.

`CE019`**: Invalid argument**

Invalid argument has been passed to built-in function.

`CE020`**: Maximum allowed recursion depth is reached**

Check your source file for infinite recursion.

C++

```cpp
struct B;

struct A
{
    B b;
};

struct B
{
    A a;
};

// will generate CE020 after several iterations
```

`CE021`**: Expression of another type is expected**

Compiler expects expression of another type here. Additional information specifies what type is expected.

Examples

A number of example structure definitions file that illustrate most features of the Structure Viewer are installed in the `Sample Structures` folder within the product installation folder.

Disassembler

A disassembler is a computer program that translates machine language into assembly language - the inverse operation to that of an assembler. A disassembler differs from a decompiler, which targets a high-level language rather than an assembly language. Disassembly, the output of a disassembler, is often formatted for human-readability rather than suitability for input to an assembler, making it principally a reverse-engineering tool.

Example

A processor consumes instructions encoded as raw bytes to change its internal state (to calculate something or to change the operation flow). For example, sequence of three bytes 83 C4 04 is interpreted by x86 processor as an instruction to add value 4 to register esp. However, it is difficult to operate with raw instruction bytes for humans. It is much easier to represent the same command as an assembler instruction:

```
    add esp, 4
```

This instruction is directly translated (or assembled) to `83 C4 04`.

Disassembler is intended to do the opposite. It will parse `83 C4 04` and produce a `add esp, 4`. So, a disassembler is needed to convert raw binary file into something readable by a human eye.

Supported Instruction Sets

A current version of the Hex Editor Neo supports disassembling:

- 32-bit x86-compatible instruction set (including FPO, MMX, SSE, SSE2 and 3DNow! instruction sets).

- 64-bit x64-compatible instruction set.
- Microsoft Intermediate Language (MSIL) - .NET assemblies.

A comprehensive instruction set documentation is available at Intel® (x86 and x64) and Microsoft® (MSIL: part III)web sites.

Definitions

This section provides a set of term definitions that will help you to get accustomed to the Hex Editor Neo's disassembler module.

PE File Format

The Portable Executable (PE) format is a file format for executables, object code, and dynamic-link libraries, used in 32-bit and 64-bit versions of Microsoft Windows operating systems. The term “portable” refers to the format's versatility in numerous environments of operating system software architecture. The PE format is basically a data structure that encapsulates the information necessary for the Windows OS loader to manage the wrapped executable code. A PE file consists of a number of headers and sections that tell the loader how to map the file into memory.

Hex Editor Neo's disassembler gathers information needed to parse the PE (Portable Executable) file from headers that are located at the beginning of a file.

PE Sections

An executable file (usually the one with .exe or .dll extension) is divided into sections (or segments) that are mapped to memory during load. Different sections can be mapped to different virtual addresses (raw section's size and size of section in memory may differ).

Usually different sections are introduced to split the file into several code/data blocks with different memory protection modes and to provide paging (swapping) mechanism.

Disassembler window allows you to select the section you want to disassemble. A section that contains executable code is usually named “.text” or "CODE".

Virtual Address

Virtual address is an address identifying a virtual (non-physical) entity. Virtual Address is used to describe location of data mapped into memory. Physical Address 0x1000 (in file) can be mapped to virtual address 0x401000. Disassembler displays both addresses - physical (column “Raw Address”) and virtual (column "Virtual Address"). In case no section information is available for an image, raw offsets cannot be converted to virtual addresses and the column is empty.

Symbols

Debug symbols is the information about what high-level programming language constructions generated specific piece of machine code in the given executable module. Sometimes it's embedded into the module's binary, or distributed as a separate file, or just discarded during the compilation and/or linking. Symbols enable a person using a debugger to gain additional information about the binary, such as the names of variables and routines from the original source code. This information is sometimes extremely helpful while trying to investigate and fix a crashing application.

Hex Editor Neo uses only part of debug symbols, namely, it is capable of displaying function and variable names where appropriate. It is also capable of automatically locating symbol files for used modules and showing exported function names.

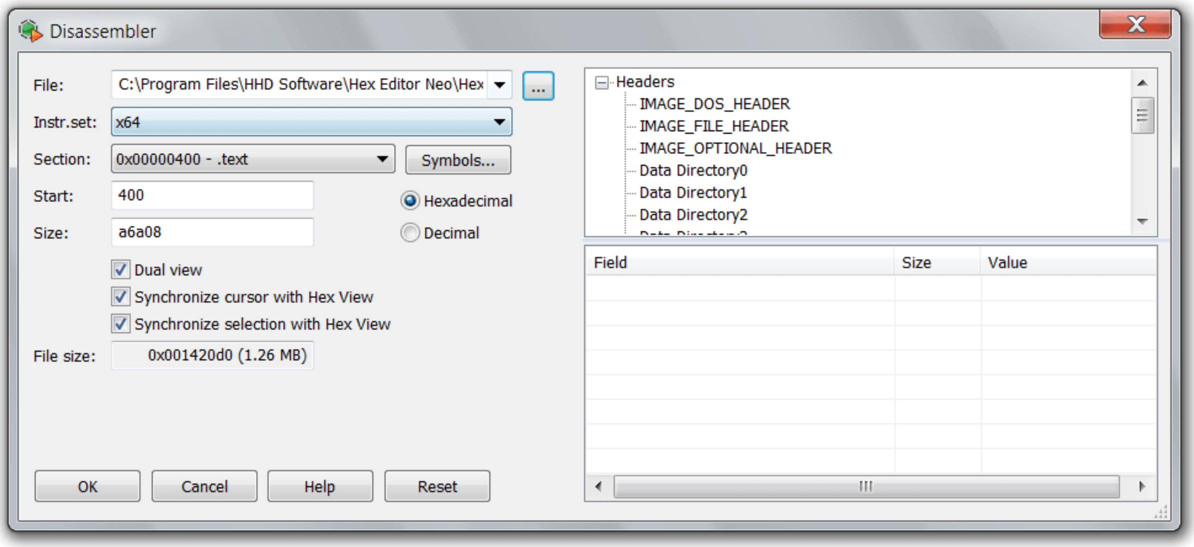
Starting Disassembler

To start disassembler, execute the **Tools » Run Disassembler...** command.

If you have a document opened in the editor, the disassembler window automatically selects this document for disassembling. Both files and processes may be disassembled this way. Hex Editor Neo is capable of locating a proper image and loading its PE header.

If the current document has a selection, its start and size are used to fill the corresponding fields in the Disassembler window. Otherwise, the cursor's position is used as a starting offset.

Disassembler Window



File: C:\Program Files\HHD Software\Hex Editor Neo\Hex

Instr.set: x64

Section: 0x00000400 - .text

Start: 400

Size: a6a08

● Hexadecimal

○ Decimal

☑ Dual view

☑ Synchronize cursor with Hex View

☑ Synchronize selection with Hex View

File size: 0x001420d0 (1.26 MB)

File

Enter the full path to an executable file or press the browse ("..." button).

Instruction Set

Select a required instruction set. Disassembler automatically selects the valid instruction set, according to the fields in the image's PE header.

Section

If the file has a valid PE Header, a list of file sections is displayed in this field. A first code section (usually named ".text" or "CODE") is automatically selected. You can select any other section, effectively changing the value of the Start and Size fields. As described above, if the current document is used for a disassembler, Start and Size fields are automatically filled using the cursor's position and/or current selection.

This field is disabled if MSIL instruction set is selected.

Symbols...

Click to display the Symbols Window for a selected file. Using this window you can select a specific symbol and instruct the disassembler to disassemble only this symbol (that is, to update the Start and Size fields appropriately).

Start

The starting offset for disassembling. This field is disabled if MSIL instruction set is selected.

Size

The size of the area for disassembling. This field is disabled if MSIL instruction set is selected.

Hexadecimal/Decimal switch

Set to specify whether offset and size are entered as hexadecimal or decimal numbers.

Dual view

If checked, both Disassembler View and usual editor window will be opened for a document. The views will be connected to each other, that is, highlighting an instruction in Disassembler View will select its bytes in a editor window provided "Synchronize cursor with Hex View" and "Synchronize selection with Hex View" options are enabled.

Synchronize cursor with Hex View

Paired editor window's cursor movement results in a disassembler's active row being changed.

Synchronize selection with Hex View

Disassembler automatically selects all bytes of the currently selected instruction in disassembler. This selection replaces the current selection of the paired editor window.

Reset

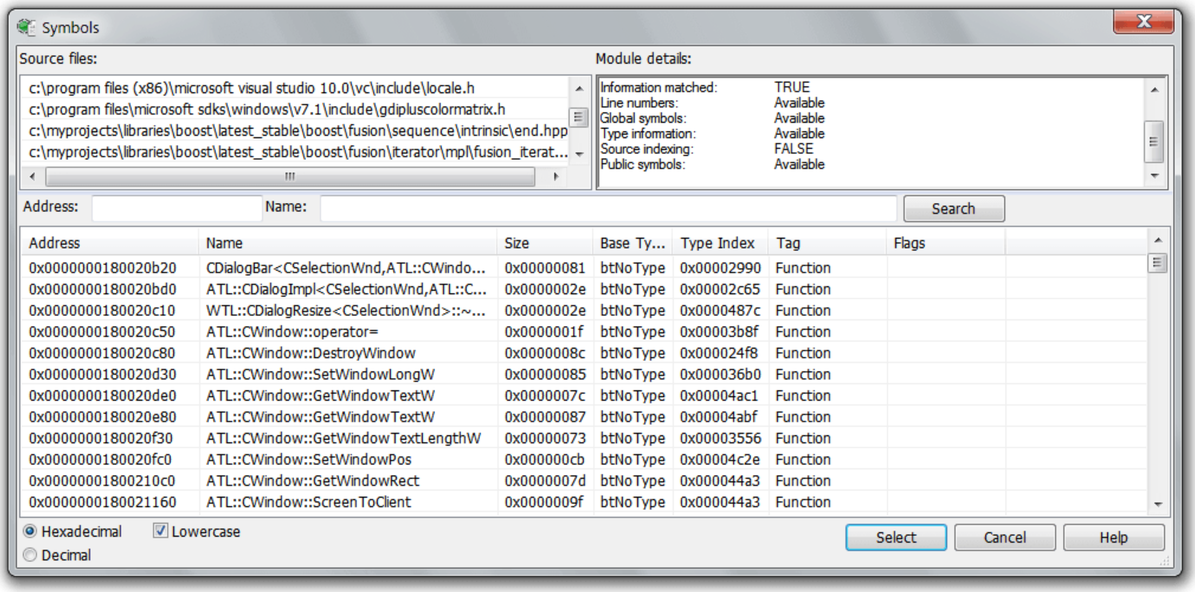
Click to reset the state of all fields to their default values.

Headers

This section displays the contents of the file's PE Header.

Symbols Window

Symbols window displays available symbolic information for a selected document.



Symbols

Source files:

c:\program files (x86)\microsoft visual studio 10.0\vc\include\locale.h
c:\program files\microsoft sdks\windows\v7.1\include\gdipluscolormatrix.h
c:\myprojects\libraries\boost\latest_stable\boost\fusion\sequence\intrinsic\end.hpp
c:\myprojects\libraries\boost\latest_stable\boost\fusion\iterator\mpl\fusion_iterat...

Module details:

Information matched:	TRUE
Line numbers:	Available
Global symbols:	Available
Type information:	Available
Source indexing:	FALSE
Public symbols:	Available

Address: Name:

Address	Name	Size	Base Ty...	Type Index	Tag	Flags
0x0000000180020b20	CDialogBar<CSelectionWnd,ATL::CWindo...	0x00000081	btNoType	0x00002990	Function	
0x0000000180020bd0	ATL::CDialogImpl<CSelectionWnd,ATL::C...	0x0000002e	btNoType	0x00002c65	Function	
0x0000000180020c10	WTL::CDialogResize<CSelectionWnd>::~...	0x0000002e	btNoType	0x0000487c	Function	
0x0000000180020c50	ATL::CWindow::operator=	0x0000001f	btNoType	0x00003b8f	Function	
0x0000000180020c80	ATL::CWindow::DestroyWindow	0x0000008c	btNoType	0x000024f8	Function	
0x0000000180020d30	ATL::CWindow::SetWindowLongW	0x00000085	btNoType	0x000036b0	Function	
0x0000000180020de0	ATL::CWindow::GetWindowTextW	0x0000007c	btNoType	0x00004ac1	Function	
0x0000000180020e80	ATL::CWindow::GetWindowTextW	0x00000087	btNoType	0x00004abf	Function	
0x0000000180020f30	ATL::CWindow::GetWindowTextLengthW	0x00000073	btNoType	0x00003556	Function	
0x0000000180020fc0	ATL::CWindow::SetWindowPos	0x000000cb	btNoType	0x00004c2e	Function	
0x00000001800210c0	ATL::CWindow::GetWindowRect	0x0000007d	btNoType	0x000044a3	Function	
0x0000000180021160	ATL::CWindow::ScreenToClient	0x0000009f	btNoType	0x000044a3	Function	

● Hexadecimal ☑ Lowercase
○ Decimal

The window is structurally divided into three parts. There is a horizontal splitter that can be used to change the size of these parts and the whole Symbols Window is resizable as well. There are *Source* files list at the top left, *Module* details field at the top right and Symbols list at the bottom of the window.

Source Files List

This list contains a full list of source files used to compile the given executable. This list may be empty if corresponding information is missing in the symbol file.

Each source file is displayed with full path name. Please note that path names are only valid on the same computer where the image was compiled.

You can copy the whole list or only a part of it to the Clipboard using the shortcut menu.

Module Details

Module details field provides information about the symbol file, its format, location and several other properties. It displays whether line numbers, global symbols, type information and public symbols are present in the symbol file or not. Hex Editor Neo does not use all information from the symbol file.

You can copy the contents of the window to the Clipboard using the shortcut menu.

Symbols List

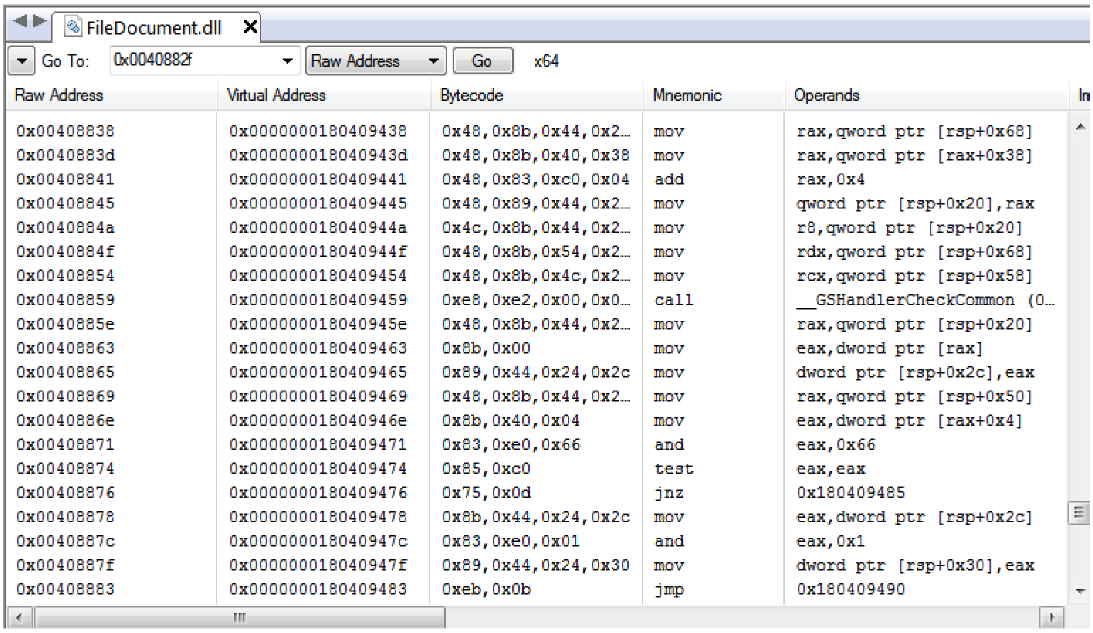
This list at the bottom of the window lists all symbols located for a given document. A symbol's raw address, symbol's undecorated name, size, type and flags are displayed.

You can use the *Address* and *Name* fields to search for a specific symbol.

Select a symbol and press the Select button (if available) to select it in the Disassembler Window, or press the **Jump** button to jump to it in the Disassembler View.

Disassembler View

Disassembler view displays all decoded instructions in an instruction list. For each instruction, the following information is provided:



Raw Address	Virtual Address	Bytecode	Mnemonic	Operands	In
0x00408838	0x0000000180409438	0x48,0x8b,0x44,0x2…	mov	rax,qword ptr [rsp+0x68]	
0x0040883d	0x000000018040943d	0x48,0x8b,0x40,0x38	mov	rax,qword ptr [rax+0x38]	
0x00408841	0x0000000180409441	0x48,0x83,0xc0,0x04	add	rax,0x4	
0x00408845	0x0000000180409445	0x48,0x89,0x44,0x2…	mov	qword ptr [rsp+0x20],rax	
0x0040884a	0x000000018040944a	0x4c,0x8b,0x44,0x2…	mov	r8,qword ptr [rsp+0x20]	
0x0040884f	0x000000018040944f	0x48,0x8b,0x54,0x2…	mov	rdx,qword ptr [rsp+0x68]	
0x00408854	0x0000000180409454	0x48,0x8b,0x4c,0x2…	mov	rcx,qword ptr [rsp+0x58]	
0x00408859	0x0000000180409459	0xe8,0xe2,0x00,0x0…	call	__GSHandlerCheckCommon (0…	
0x0040885e	0x000000018040945e	0x48,0x8b,0x44,0x2…	mov	rax,qword ptr [rsp+0x20]	
0x00408863	0x0000000180409463	0x8b,0x00	mov	eax,dword ptr [rax]	
0x00408865	0x0000000180409465	0x89,0x44,0x24,0x2c	mov	dword ptr [rsp+0x2c],eax	
0x00408869	0x0000000180409469	0x48,0x8b,0x44,0x2…	mov	rax,qword ptr [rsp+0x50]	
0x0040886e	0x000000018040946e	0x8b,0x40,0x04	mov	eax,dword ptr [rax+0x4]	
0x00408871	0x0000000180409471	0x83,0xe0,0x66	and	eax,0x66	
0x00408874	0x0000000180409474	0x85,0xc0	test	eax,eax	
0x00408876	0x0000000180409476	0x75,0x0d	jnz	0x180409485	
0x00408878	0x0000000180409478	0x8b,0x44,0x24,0x2c	mov	eax,dword ptr [rsp+0x2c]	
0x0040887c	0x000000018040947c	0x83,0xe0,0x01	and	eax,0x1	
0x0040887f	0x000000018040947f	0x89,0x44,0x24,0x30	mov	dword ptr [rsp+0x30],eax	
0x00408883	0x0000000180409483	0xeb,0x0b	jmp	0x180409490	

Raw Address

Instruction's raw address in a document.

Virtual Address

Instruction's virtual address, if available.

Relative Offset

A relative offset inside a method (applicable only in MSIL).

Bytecode

Bytes that comprise an instruction.

Mnemonic

Instruction's name.

Operands

All explicit instruction's operands, with appropriate modifiers. All referenced symbols and metadata tokens are decoded, if symbol information available.

Implicit Operands

Implicit operands, that is operands, which are not explicitly specified, but are still referenced or modified by an instruction. An example of instruction that implicitly modifies registers (esp and eip) is call.

CPU

CPU family in which this instruction appeared.

Flags Checked

All flags that this instruction reads.

Flags Modified

All flags this instruction modifies.

Right-click on the column bar to open the **Select Columns Window** where you can select columns for the list.

When symbols are available, all jumps and calls for which the Hex Editor Neo is able to locate a symbolic name show this name before the destination address. The destination address in this case follows the name in parenthesis.

Vertical lines in a view may be switched off, using the “Show grid lines” option in General Settings page.

View Refresh

When disassembled document is changed through one of the editor windows, disassembly may need to be refreshed. In some cases, where the size of the instruction remains the same, Disassembler View refreshes itself automatically and no additional refresh is required.

In other cases, manual refresh is required. To refresh, use the **Refresh** command from either the shortcut menu, or from the window's toolbar.

Positioning within a Document

Use the Edit » Go to Offset... command to go to a specific offset in the Disassembler View. In addition, you can use the window's toolbar to quickly jump to a given raw or virtual address.

Searching for a Text

You can search a Disassembler View for a given text. Use the Edit » Find... command to enter the search sequence and then press the Find button to find the next occurrence. Searching is performed only in selected columns (see above).

Exporting and Copying to Clipboard

You can export the whole Disassembler View or only selected part of it into a text file (`.txt` or `.csv`) or copy it into the Clipboard. Both commands are available in the shortcut menu. For the export command, you are provided with a choice of columns to export, for the Copy to Clipboard command, the currently selected data is exported.

Bookmarks

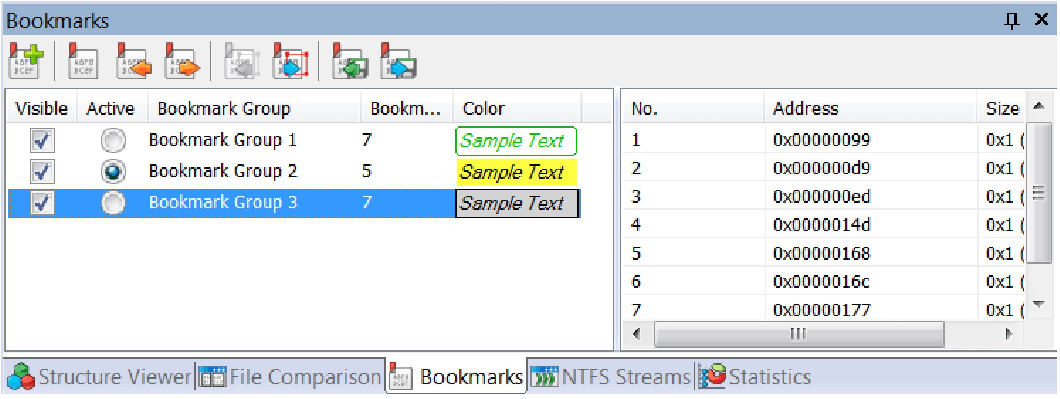
A bookmark is a stored location within a document. Bookmarks may be used to quickly navigate through the document.

Hex Editor Neo supports creation of several bookmark groups. Each group holds an unlimited number of bookmarks. You can specify different coloring schemes for different bookmarks. The Bookmarks Tool Window is used to display and manage all bookmark groups and their properties.

Each bookmarks group may be visible or hidden. All bookmarks of the visible bookmarks group are displayed in all editor windows belonging to a given document. All bookmarks groups are properties of a document, so each opened document may have its own bookmarks.

Bookmarks Tool Window

Bookmarks Tool Window displays all defined bookmarks groups for a current document. Each bookmarks group may be visible or hidden.



Visible	Active	Bookmark Group	Bookm...	Color
☑	○	Bookmark Group 1	7	Sample Text
☑	●	Bookmark Group 2	5	Sample Text
☑	○	Bookmark Group 3	7	Sample Text

No.	Address	Size
1	0x00000099	0x1 (
2	0x000000d9	0x1 (
3	0x000000ed	0x1 (
4	0x0000014d	0x1 (
5	0x00000168	0x1 (
6	0x0000016c	0x1 (
7	0x00000177	0x1 (

The check box next to each bookmark group signals if the group is visible.

On the right, the Bookmark Details window is displayed. It displays all the bookmarks of the currently selected bookmark groups. You can navigate the list with mouse or keyboard. When you select a given bookmark, the current editor window scrolls to the position of this bookmark.

Active vs. Selected Bookmark Group

There is one active and one selected bookmark group in a list. Selected bookmark group is signaled by a selection box while active bookmark group is signaled with an active radio button, which is next to group's name.

Several bookmarks commands always operate on the active group, while other bookmarks command operate on the selected group.

In addition, the *Bookmark Details* window always displays the details of the selected bookmarks group.

Creating and Deleting Bookmarks Groups

To create a new bookmarks group, select the **Bookmarks » New Bookmarks Group** command. In addition, new bookmarks group is automatically created in some cases, as described in Working with Bookmarks section.

To delete a bookmarks group, select it in a list and press the **Del** key. You can also delete a group from a shortcut menu.

Shortcut menu's **Remove All** command may be used to delete all defined bookmarks groups.

Working with Bookmarks

There are several commands that work with bookmarks.

Working with Active Bookmarks Group

Toggle Bookmark

Puts a bookmark on the currently active cell (a cell with a cursor). If there is already bookmark (in an active bookmarks group) on the current cell, it is removed. If there are no bookmarks groups defined for the active document, the new one is created and becomes active.

Complexity: constant-time.

Next Bookmark

The cursor is moved to the beginning of the next bookmark within the active bookmarks group. If there are no more bookmarks till the end of the document, the cursor is moved to the beginning of the very first bookmark in a group.

Complexity: constant-time.

Previous Bookmark

The cursor is moved to the beginning of the previous bookmark within the active bookmarks group. If there are no more bookmarks till the beginning of the document, the cursor is moved to the beginning of the very last bookmark in a group.

Complexity: constant-time.

Working with Selected Bookmarks Group

Selection to Bookmarks

Current editor window's multiple selection is converted to bookmarks and added to the selected bookmarks group. If there are no bookmarks groups defined for the active document, the new one is created.

Complexity: from constant-time to linear-time.

Bookmarks to Selection

The selected bookmarks group is converted to the current editor window's selection. If the window currently does not have a selection, the bookmarks group is silently converted into selection, otherwise, you are presented with a following choice:

- New selection - the current selection is dropped and bookmarks group is converted into the selection.
- Add to selection - the current selection and bookmarks group are merged together.
- Subtract from selection - the current bookmarks group is subtracted from the selection.

Complexity: linear-time (depends on the number of blocks in the selection and/or bookmarks group)

Other Commands

Save Bookmarks...

All defined bookmarks groups are saved to the file.

Complexity: linear-time.

Load Bookmarks...

Load one or several bookmarks groups from a file. In addition, loading data from selection files is also supported.

Complexity: linear-time.

Statistics

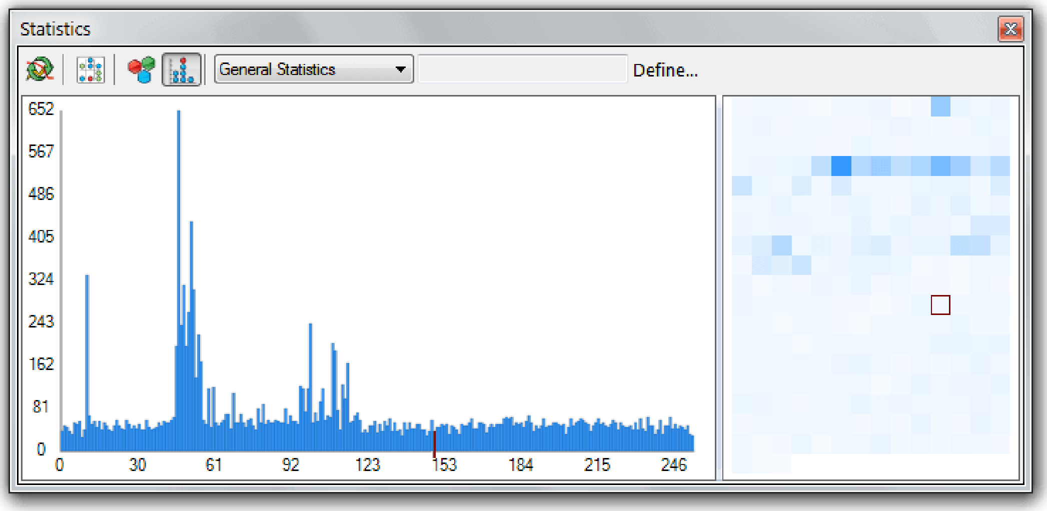
Hex Editor Neo provides unique capability of calculating several file statistics. You may calculate General Statistics and Pattern Statistics for any opened document. In addition, Descriptive Statistics is calculated for both modes, and Entropy Analysis is performed for General Statistics mode.

Statistics Tool Window is used to display the results of statistics calculations. To calculate statistics, open (or activate) the document for which you wish to calculate it, and execute the Tools » Statistics » Refresh command.

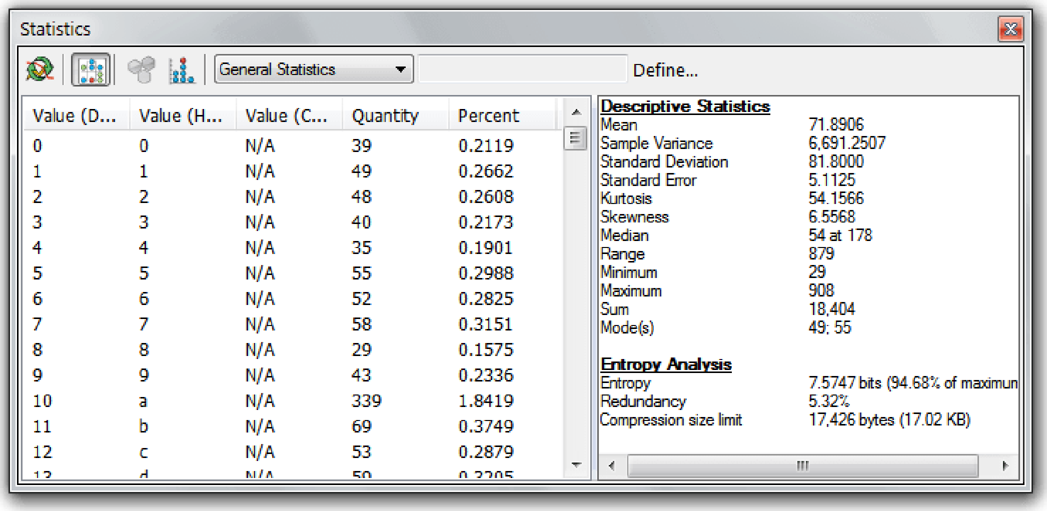
Statistics is always calculated for the whole file, unless the selection is present in the current editor window. If selection is present, statistics calculation is limited to this selection. Multiple selections are fully supported.

Statistics Tool Window

Statistics Tool Window is used to display the results of statistics calculation. The window provides two views: histogram



and table



Value (D...	Value (H...	Value (C...	Quantity	Percent
0	0	N/A	39	0.2119
1	1	N/A	49	0.2662
2	2	N/A	48	0.2608
3	3	N/A	40	0.2173
4	4	N/A	35	0.1901
5	5	N/A	55	0.2988
6	6	N/A	52	0.2825
7	7	N/A	58	0.3151
8	8	N/A	29	0.1575
9	9	N/A	43	0.2336
10	a	N/A	339	1.8419
11	b	N/A	69	0.3749
12	c	N/A	53	0.2879

Descriptive Statistics

Mean	71.8906
Sample Variance	6,691.2507
Standard Deviation	81.8000
Standard Error	5.1125
Kurtosis	54.1566
Skewness	6.5568
Median	54 at 178
Range	879
Minimum	29
Maximum	908
Sum	18,404
Mode(s)	49; 55

Entropy Analysis

Entropy	7.5747 bits (94.68% of maximun
Redundancy	5.32%
Compression size limit	17,426 bytes (17.02 KB)

Use the **Tools » Statistics » Table View** to switch between views.

There is a statistics calculation type switch at the top of the window. Choose from General Statistics and Pattern Statistics modes. For “Pattern Statistics” mode, a pattern needs to be defined. Press the **Define...** button to define a new pattern. After it is defined, it is displayed next to the type switch.

Histogram View

In histogram view, the graphical representation of the recently calculated statistics is displayed. You may define colors using the **Tools » Statistics » Modify Colors...** command. You may also copy the histogram image to the clipboard using the shortcut menu.

The **Statistics » Hide Maximum Value** switch may be used to temporary remove a maximum value from the histogram.

As you move a mouse over the histogram view, a tooltip with more information about the point under mouse cursor is displayed.

Table View

In table view, the tabular representation of the recently calculated statistics is displayed. You may sort the table by any column. In addition, the descriptive statistics window is displayed to the table's right. You may change their sizes using the splitter bar between them.

General Statistics

General Statistics is a distribution of individual bytes within the document (or selection). A document or selection is scanned and total number of each byte's occurrences is calculated. The results are then displayed in a table and on a histogram. Descriptive Statistics and Entropy Analysis are then calculated for the resulting data.

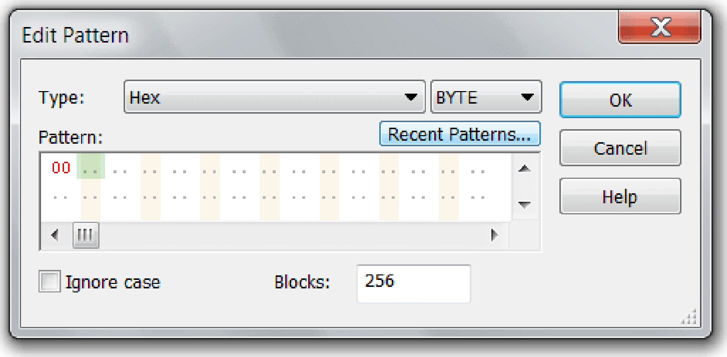
General Statistics may be used to estimate the amount of redundancy in a file - if you observe a number of large peaks on a histogram, it means several bytes are more often found in a document than others. This is very typical for executable and most data files. Compressed files, on the other hand, tend to be more “smooth” on their histograms: the number of occurrences of each byte in a file is nearly the same.

Pattern Statistics

Pattern Statistics is another statistics calculation mode, provided by Hex Editor Neo, in addition to theGeneral Statistics. In this mode, you define a pattern which is then searched in a document or current selection, if it is present. The whole target range is divided into a number of blocks (you define the number of blocks). The number of occurrences of a pattern in each block is then calculated. The results are displayed in a table and on a histogram. Descriptive Statistics is also calculated for the results.

Edit Pattern Window

When you switch to the “Pattern Statistics” mode, or press the **Define...** button in the Statistics Tool Window, the **Edit Pattern Window** is displayed.



A pattern is defined using the Pattern Dialog, which is encapsulated in this window. In addition, the Ignore Case option may be enabled to ignore case while matching the pattern. You also specify the number of blocks into which the file is divided.

Regular Expressions

The Pattern Statistics command fully supports regular expressions. To use regular expressions, select either “ASCII string (char[])” or "UNICODE string (wchar_t[])" pattern type, enter the regular expression, make sure the “Regular expression” checkbox is checked and enter the sub-expression number you want to search for. Sub-expression "0" represents the expression itself.

Take the following limitation into account:

- Using Pattern Statistics in regular expressions mode within a selection (either single-range, or multiple) is not supported.

Descriptive Statistics and Entropy Analysis

In addition to calculating two types of statistics, Hex Editor Neo also calculates some cumulative values for statistics results.

Descriptive Statistics

Descriptive Statistics is calculated for both General Statistics and Pattern Statistics results and is a standard statistical calculation for a random value. The following values are calculated:

- Mean
- Sample Variance
- Standard Deviation
- Standard Error
- Kurtosis
- Skewness
- Median
- Mode (one or several)
- Range
- Minimum value
- Maximum value
- Sum

Entropy Analysis

Entropy analysis is performed for General Statistics mode only. The single-byte (256 different symbols) alphabet is used in entropy calculations. The following values are computed:

Entropy

Entropy value in bits and as percentage from maximum (which is 8 for selected alphabet). The higher entropy, the less redundancy in the file.

Redundancy

Redundancy equals to `100% - Entropy` as percentage. Indicates the data redundancy in a file (or selection).

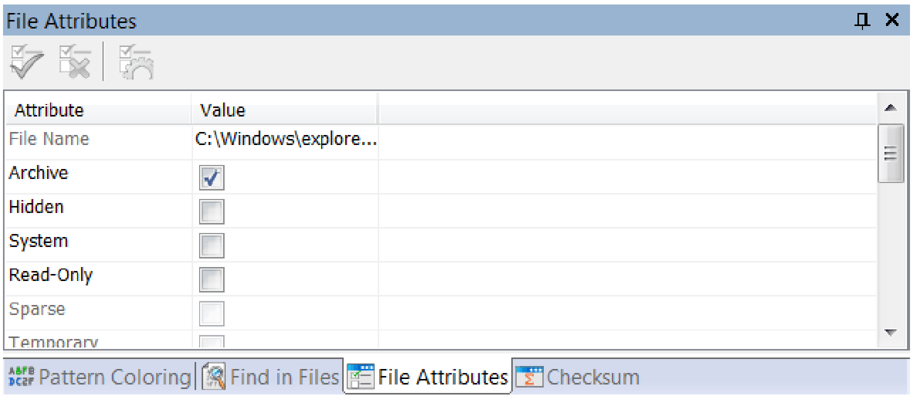
Compression size limit

Theoretical compressed size limit. Again, as a simple single-byte alphabet is used in computing entropy, this “theoretical” limit may be much larger than the real compressed file size, produced by any modern compressor, as they use advanced alphabet selection strategies.

Attributes

Attributes Tool Window

The Attributes Tool Window displays the current file's attributes. It also allows you to modify the state of some attributes.



Attribute	Value
File Name	C:\Windows\explore...
Archive	☑
Hidden	□
System	□
Read-Only	□
Sparse	□
Temporary	□

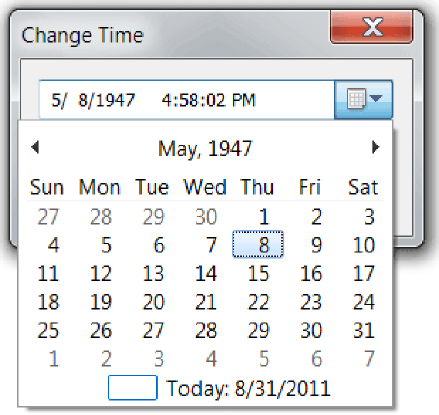
The following attributes are displayed for files and file streams:

Attribute	Description	Changeable?
File Name	Full file's path	NO
Archive	File is ready to be archived (file has been modified since last archival)	YES
Hidden	File is hidden	YES
System	File is system	YES
Read-Only	File is read only	YES
Sparse	File is a sparse file	NO
Temporary	File is a temporary	NO
Offline	File is offline	NO
Encrypted	File is encrypted	NO
Compressed	File is compressed	NO
Has Reparse Points	File has reparse points	NO
Created Date/Time	File's creation date and time	YES
Last Access Date/Time	File's last access date and time	YES
Last Write Date/Time	File's last write date and time	YES
Hard Links	A number of file's hard links	NO
Streams	A number of alternate data streams in a file	NO
Total Size (with streams)	A total size a file occupies on the disk	NO
Total Size (without streams)	A size of the file's unnamed (default) stream	NO
Total Streams Size	A total size of all file's named streams	NO

The following attributes are displayed for opened processes:

Attribute	Description	Changeable?
Process Name (ID)	The process name and process ID	NO
File Path	Full path to process' executable	NO
Number of Blocks	Total number of opened memory blocks	NO
Number of Modules	Total number of opened modules	NO
Start	Starting memory address	NO
Size	Size of opened range	NO
End	Ending memory address	NO

To a change a flag value, click on the checkbox. To change a date/time value, double-click on it. The following window appears:



5/ 8/1947 4:58:02 PM

May, 1947

Sun	Mon	Tue	Wed	Thu	Fri	Sat
27	28	29	30	1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31
1	2	3	4	5	6	7

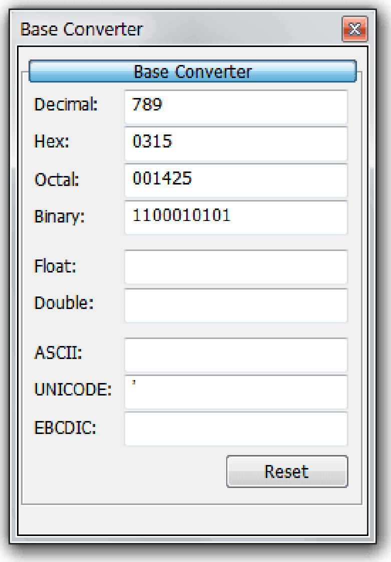
Today: 8/31/2011

To apply changes you made to a file's attributes, execute the **Tools » Attributes » Apply Changes** command. The **Tools » Attributes » Reset Attributes** command may be used to undo all attribute changes.

Base Converter

Base Converter Tool Window

The Base Converter Tool Window provides you with a mechanism to convert numbers from one format into another.



Decimal: 789

Hex: 0315

Octal: 001425

Binary: 1100010101

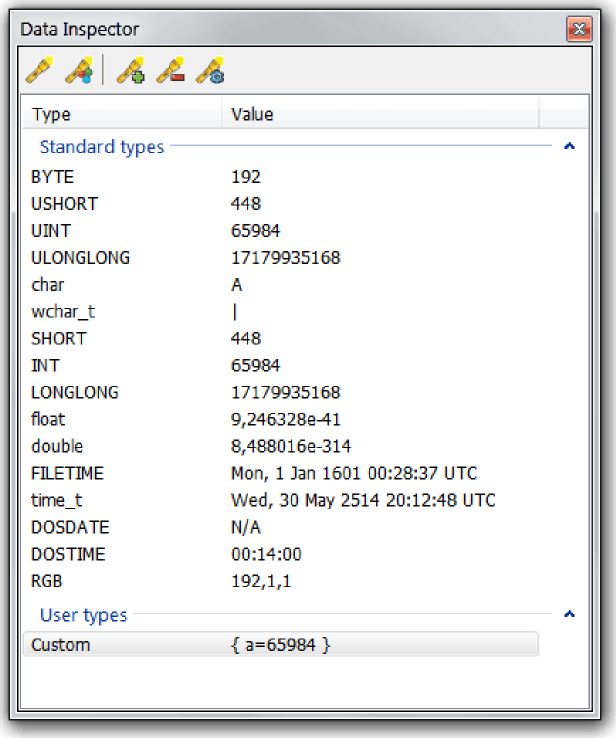
The following formats and encodings are supported by the Base Converter:

- Decimal
- Hexadecimal
- Octal
- Binary
- Float (single-precision floating-point number)
- Double (double-precision floating-point number)
- ASCII character
- UNICODE character
- EBCDIC character

Once you enter the value in one of the supported formats, it gets immediately converted into other compatible formats. Use the **Reset** button to clear all fields. Hexadecimal values may be entered with or without the `0x` prefix.

Data Inspector

The Data Inspector Tool Window allows you to interpret data under thecursor in several formats. For each format, decoded data is displayed in corresponding field in a tool window. As the cursor is moved, the window updates all fields. In addition, it can be instructed to highlight the currently selected field in an editor window, thus showing you all the cells the highlighted value occupies in the document.



Type	Value
Standard types	
BYTE	192
USHORT	448
UINT	65984
ULONGLONG	17179935168
char	A
wchar_t	|
SHORT	448
INT	65984
LONGLONG	17179935168
float	9,246328e-41
double	8,488016e-314
FILETIME	Mon, 1 Jan 1601 00:28:37 UTC
time_t	Wed, 30 May 2514 20:12:48 UTC
DOSDATE	N/A
DOSTIME	00:14:00
RGB	192,1,1
User types	
Custom	{ a=65984 }

For example, in Hex Bytesview type, selecting the ULONGLONG fields in the Data Inspector window highlights the cursor cell and next 7 cells, as 64-bit ULONGLONG value occupies 8 bytes.

You can configure the highlight colors using the **Tools » Data Inspector » Modify Colors...** command. Highlighting is toggled on or off with a **Tools » Data Inspector » Enable Highlighting** command.

Updated Data Inspector allows you to define your own formats. See the Creating New Format section for more information.

Fields

The following formats are automatically installed with Hex Editor Neo:

Format	Description
BYTE	8-bit unsigned integer value ranged from 0 to 255 (0 to 0xFF)
USHORT	16-bit unsigned integer value ranged from 0 to 65,535 (0 to 0xFFFF)
UINT	32-bit unsigned integer value ranged from 0 to 4,294,967,295 (0 to 0xFFFF FFFF)
ULONGLONG	64-bit unsigned integer value ranged from 0 to 18,446,744,073,709,551,615 (0 to 0xFFFF FFFF FFFF FFFF)
char	8-bit ASCII character
wchar_t	16-bit UNICODE character
SHORT	16-bit signed integer value ranged from -32768 to 32767 (0x8000 to 0x7FFF)
INT	32-bit signed integer value ranged from -2,147,483,648 to 2,147,483,647 (0x8000 0000 to 0x7FFF FFFF)
LONGLONG	64-bit signed integer value ranged from -9,223,372,036,854,775,808 to 9,223,372,036,854,775,807 (0x8000 0000 0000 0000 to 0x7FFF FFFF FFFF FFFF)
float	32-bit single-precision floating-point value
double	64-bit double-precision floating-point value

Data Modification

In addition to displaying data in different formats, the Data Inspector allows you to modify data in different formats. In order to do it, activate any field and double click it to start editing. The **Edit » Edit Cell** command may also be used to start editing currently active field. After you finish editing a field, press the Enter key to commit changes. Entered data will be propagated to the active document at the cursor's position. The field type will be used to determine the number of cells affected by the change. This action will result in a Write command being added to the document's operation history.

Hexadecimal values may be prefixed by the `0x` prefix. Character values may be entered either inside quotation marks, or without them. You may also use the Structure Viewer expression when entering a field value.

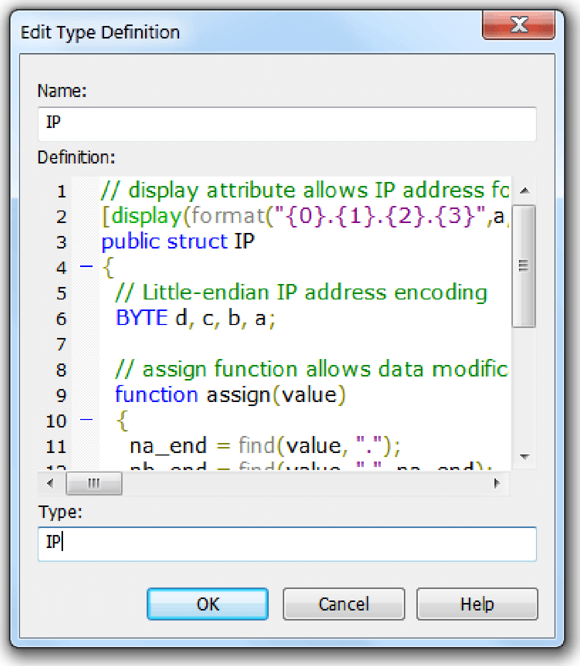
User-defined data format must include the special "member function" assign to successfully support data modification. See the Creating New Format section for more information.

Byte Order

Data Inspector respects the current editor window's byte order to display and process data in the list.

Creating New Format

New version of Data Inspector allows you to define your own formats. Structure Viewer language definition format is used to define the format.



Name: IP

Definition:

```
// display attribute allows IP address fc
[display(format("{0}.{1}.{2}.{3}",a,
public struct IP
{
  // Little-endian IP address encoding
  BYTE d, c, b, a;

  // assign function allows data modific
  function assign(value)
  {
    na_end = find(value, ".");
```

Type: IP

Use the following steps to define a new format:

1. Use **Tools » Data Inspector » Add New Type...** command to open the Type Definition window.
2. Enter the new type's name. 3, Enter the new type's definition. Definition must be a Structure Viewer's public user-defined type with optional display attribute.

If data modification is required, the defined public type must also have a special "member" function called `assign`. This function takes a single parameter and must convert it and assign to defined type's field(s).

The following example defines new Data Inspector type which displays an IP address.

```
C++
// display attribute allows IP address formatting
[display(format("{0}.{1}.{2}.{3}",a,b,c,d))]
public struct IP
{
  // Little-endian IP address encoding
  unsigned char d, c, b, a;

  // assign function allows data modification through the user interface
  function assign(value)
  {
    var na_end = int(find(value, "."));
    var nb_end = int(find(value, ".", na_end+1));
    var nc_end = int(find(value, ".", nb_end+1));

    a = int(substring(value, 0, na_end));
    b = int(substring(value, na_end + 1, nb_end - na_end - 1));
    c = int(substring(value, nb_end + 1, nc_end - nb_end - 1));
    d = int(substring(value, nc_end + 1));
  }
};
```

Checksum Calculation

Hex Editor Neo provides a number of checksum calculation algorithms. All algorithms are capable of quickly calculating the result for the whole document, or only part of it. All checksum calculation algorithms fully support multiple selection.

The following section, Checksum Tool Window, describes the user interface window used to configure and start checksum calculation. Below is a complete list of supported algorithms.

Simple summators

This section contains the following algorithms: 8-bit sum, 16-bit sum and 32-bit sum. It treats the document (or selection) as a stream of unsigned bytes and computes the sum of them. A summator is sized according to the selected algorithm and overflow may occur during calculation.

More summators

This section contains the algorithms that treat the document as a stream of 8, 16, 32 or 64-bit unsigned little-endian or big-endian numbers. Each algorithm calculates the simple 64-bit sum of all values.

Signed sums

This section has the same algorithms as in previous section, but each algorithm now operates on signed numbers.

Checksum

The following algorithms are supported:

Algorithm	Notes
CRC-16	Cyclic redundancy check. CRC polynomial: $x^{16} + x^{15} + x^2 + 1$. Used in XMODEM, USB, many others.
CRC-16 (CRC-CCITT)	Cyclic redundancy check. CRC polynomial: $x^{16} + x^{12} + x^5 + 1$. Used in X.25, V.41, Bluetooth, PPP, IrDA, BACnet
CRC-32	Cyclic redundancy check. CRC polynomial: $x^{32} + x^{26} + x^{23} + x^{22} + x^{16} + x^{12} + x^{11} + x^{10} + x^8 + x^7 + x^5 + x^4 + x^2 + x + 1$. Used in V.42, MPEG-2.
CRC XMODEM	Cyclic redundancy check. CRC polynomial: $x^{16} + x^{12} + x^5 + 1$. Used in XMODEM.
Custom CRC	Allows you to specify the polynomial values used in checksum calculation. See the Configuring Custom CRC section for more information.
Adler-32	Adler-32 checksum. Used in zlib and others.
Fletcher	RFC 1146. Fletcher checksum.

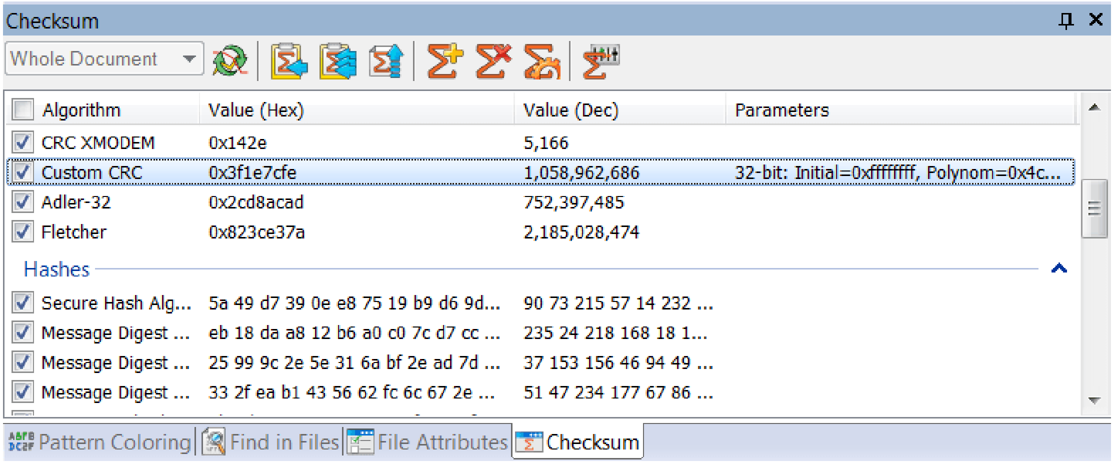
Hashes

Note that actual list of algorithms in this section depends on version and localization of operating system. Some of the following algorithms may not be available in old or localized versions of operating system.

Algorithm	Notes
MD2	RFC 1319. Digest size is 128 bits.
MD4	Digest size is 128 bits.
MD5	Digest size is 128 bits.
SHA-1	RFC 3174. Digest size is 128 bits.
SHA-256	Not supported on Windows XP
SHA-384	Not supported on Windows XP
SHA-512	Not supported on Windows XP
RMD-160	RIPEMD-160 (RACE Integrity Primitives Evaluation Message Digest) - 160-bit message digest algorithm.
RMD-128	RIPEMD-128 (RACE Integrity Primitives Evaluation Message Digest) - 128-bit message digest algorithm.

Checksum Tool Window

Checksum Tool Window is used to display checksum calculation results. It lists all algorithms supported on the current platform.



☐ Algorithm	Value (Hex)	Value (Dec)	Parameters
☑ CRC XMODEM	0x142e	5,166	
☑ Custom CRC	0x3f1e7cfe	1,058,962,686	32-bit: Initial=0xffffffff, Polynom=0x4c...
☑ Adler-32	0x2cd8acad	752,397,485	
☑ Fletcher	0x823ce37a	2,185,028,474	
Hashes			
☑ Secure Hash Alg...	5a 49 d7 39 0e e8 75 19 b9 d6 9d...	90 73 215 57 14 232 ...	
☑ Message Digest ...	eb 18 da a8 12 b6 a0 c0 7c d7 cc ...	235 24 218 168 18 1...	
☑ Message Digest ...	25 99 9c 2e 5e 31 6a bf 2e ad 7d ...	37 153 156 46 94 49 ...	
☑ Message Digest ...	33 2f ea b1 43 56 62 fc 6c 67 2e ...	51 47 234 177 67 86 ...	

Use the checkbox near the algorithm name to specify which checksums you want to compute. Choose whether you want selected checksums to be calculated for the whole document ("Whole Document" type) or for a current selection ("Selection Only" type). Click the Refresh toolbar button to start checksum calculation.

Displaying Results

As soon as checksum calculation completes, results for all computed checksums are displayed in the list. Checksum's value is displayed both as hexadecimal and decimal number. The shortcut menu may be used to copy the results to the Clipboard or export them to a comma-separated file. You can also double-click the individual result to bring up the Result window where you can easily view and copy the checksum value.

Adding, Removing and Restoring Algorithms

Hex Editor Neo supports algorithms which provide one or more customization parameters. Currently only Custom CRC algorithm supports this. You may have multiple entries of such algorithms in a list, each with its own set of parameters.

To add new algorithm, use the **Tools » Checksum » Add Algorithm...** command. To configure parameters for selected algorithm, use the **Tools » Checksum » Parameters...** command. To remove algorithm, use the **Tools » Checksum » Remove Algorithm** command. To reset the list of algorithms (including the default checkboxes), use the **Tools » Checksum » Reset Algorithms** command.

All commands are available through the main menu, Checksum Tool Window toolbar or context menu.

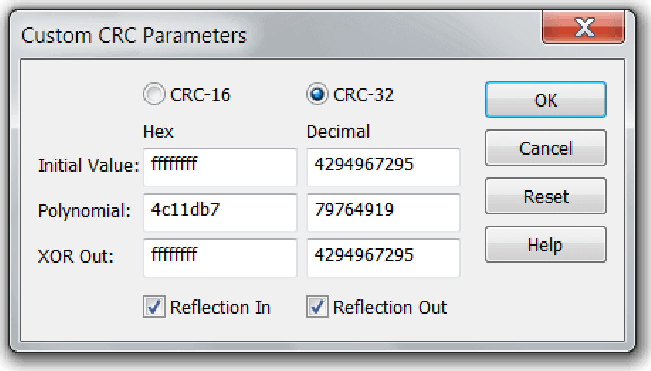
Performance Considerations

Hex Editor Neo is capable to utilize several processors or processor cores when multiple algorithms are selected. Most algorithms (especially summators) are extremely fast. The slowest algorithms are Custom CRC and MD2. When several algorithms are started on multi-core computer, the total execution time will be limited by the speed of the slowest algorithm.

Fast algorithms, executed on file opened from fast HDD or SSD are parallelized almost linearly.

Configuring Custom CRC

Custom CRC dialog is used to configure the Custom CRC checksum algorithm.



Custom CRC Parameters

○ CRC-16 ● CRC-32

	Hex	Decimal
Initial Value:	ffffffff	4294967295
Polynomial:	4c11db7	79764919
XOR Out:	ffffffff	4294967295

☑ Reflection In ☑ Reflection Out

To open a Custom CRC configuration dialog, use the **Tools » Checksum » Parameters...** command.

Select the type of CRC to compute: either *16-bit* or *32-bit*. Enter the algorithm *initial value*, *polynomial* and *XOR out* constants. *Reflection In* and *Reflection Out* switches specify whether the algorithm should reflect bits on input and/or on output.

Volume Navigator

Starting from version 6.01 Hex Editor Neo includes a built-in Volume Navigator which is capable of parsing volume structure.

Currently, only NTFS-formatted volumes and CDFS volumes are supported. Volume Navigator sometimes is also capable of parsing slightly damaged NTFS volume structure.

Features

Volume Navigator implements the following functionality:

Parsing volume structure

An entire volume is parsed and represented in Volume Navigator Tool Window. This includes all directories, files, file streams, file attributes and so on.

Showing file record structure

Whenever file record is selected in navigator's window, it is automatically parsed in Structure Viewer Tool Window.

Locating volume items

A location (all clusters) an item occupies on a volume may be highlighted in opened editor window.

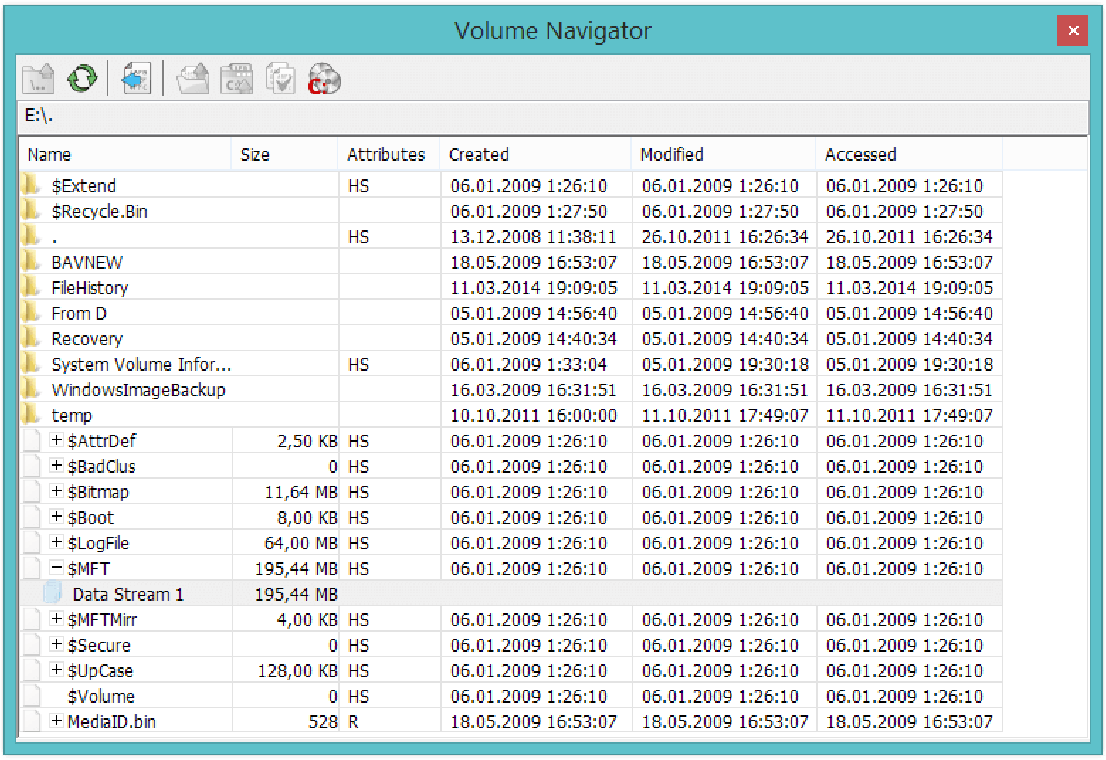
Copying volume items

Any selected item (stream, file, directory or entire volume) may be copied.

Opening Volume

Every time an supported volume is opened with File » Open » Open Volume... command, Volume Navigator automatically parses volume structure and displays it in its Volume Navigator Tool Window.

Volume Navigator Tool Window



E:\.

Name	Size	Attributes	Created	Modified	Accessed
$Extend		HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
$Recycle.Bin			06.01.2009 1:27:50	06.01.2009 1:27:50	06.01.2009 1:27:50
.		HS	13.12.2008 11:38:11	26.10.2011 16:26:34	26.10.2011 16:26:34
BAVNEW			18.05.2009 16:53:07	18.05.2009 16:53:07	18.05.2009 16:53:07
FileHistory			11.03.2014 19:09:05	11.03.2014 19:09:05	11.03.2014 19:09:05
From D			05.01.2009 14:56:40	05.01.2009 14:56:40	05.01.2009 14:56:40
Recovery			05.01.2009 14:40:34	05.01.2009 14:40:34	05.01.2009 14:40:34
System Volume Infor...		HS	06.01.2009 1:33:04	05.01.2009 19:30:18	05.01.2009 19:30:18
WindowsImageBackup			16.03.2009 16:31:51	16.03.2009 16:31:51	16.03.2009 16:31:51
temp			10.10.2011 16:00:00	11.10.2011 17:49:07	11.10.2011 17:49:07
+ $AttrDef	2,50 KB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $BadClus	0	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $Bitmap	11,64 MB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $Boot	8,00 KB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $LogFile	64,00 MB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
− $MFT	195,44 MB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
Data Stream 1	195,44 MB				
+ $MFTMirr	4,00 KB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $Secure	0	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ $UpCase	128,00 KB	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
$Volume	0	HS	06.01.2009 1:26:10	06.01.2009 1:26:10	06.01.2009 1:26:10
+ MediaID.bin	528	R	18.05.2009 16:53:07	18.05.2009 16:53:07	18.05.2009 16:53:07

Volume Navigator Tool Window contains a parsed NTFS volume structure. Each row represents a parsed file record. File records can be one of two types: directory record and file record.

When you change selection, cursor location in current editor window is moved to the beginning of the selected file's record. In addition, Structure Viewer shows parsed file record.

The following information is displayed for each file record:

- Name
- Size (not available for directories)
- Attributes
- Creation Date
- Last Modification Date
- Last Access Date

Double-click a directory item to open it. Click the plus sign next to file entry to see all file's streams. Clicking on a stream navigates the current editor window to the beginning of stream's data.

Volume Navigator Commands

The following commands are available on Volume Navigator toolbar or in item's context menu:

Up to Parent

Navigate to parent directory.

Update Current View

Rescan current directory.

Select All Stream Data

Select all clusters that selected stream occupies. May produce multiple selection object if stream is fragmented.

Open File in Editor

Open selected file in Hex Editor Neo.

Open Containing Folder

Open Windows Shell and locate it to selected file.

Copy to...

Copy selected item to a given location.

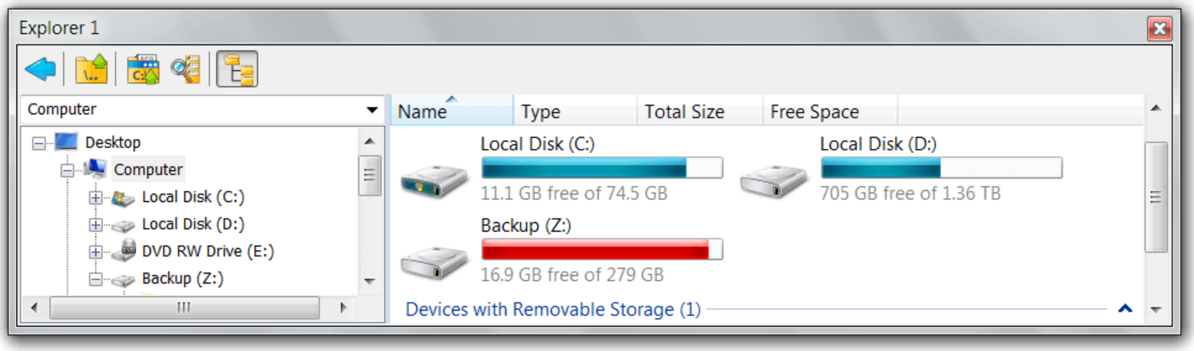
Copy Volume...

Copy the entire volume based on parsed volume structure.

Built-In Explorer

Explorer Tool Window

This tool window mimics the Windows Explorer. It consists of two parts - Folder List and File List. You may hide a Folder List using the Folders button on the toolbar. Use the splitter bar between parts to change their relative sizes.



Hex Editor Neo's Explorer behaves much like standard Windows Explorer. You may browse your file system, network neighborhood, open files in the editor by double-clicking on them, or dragging to the editor's window. You may also use drag&drop to copy or move files and folders between different folders, as you do it in Windows Explorer. Right-clicking the file or folder brings up the standard file or folder shortcut menu.

Previous and Next commands may be used to navigate backward and forward (within a list of visited folders). Up command navigates to a parent folder. Locate Current command navigates to the location where the currentdocument is situated. Find in Files command launches the Find in Files function in the current folder.

Two Explorer tool windows are present in the Hex Editor Neo. Each window has its own position, current folder and other settings.

Data Operations

Hex Editor Neo supports a number of data operations that can be applied either to the wholedocument, or a current multiple selection. All operations are found under the Operations main menu item and are structurally divided into five categories: Bitwise Operations, Arithmetic Operations, Shift Operations, Case Change Operations and Reverse Operations.

All data operations execute in linear time and depend on the selection's complexity. That is, for single-range selection operation execution time does not depend on data size.

Bitwise Operations

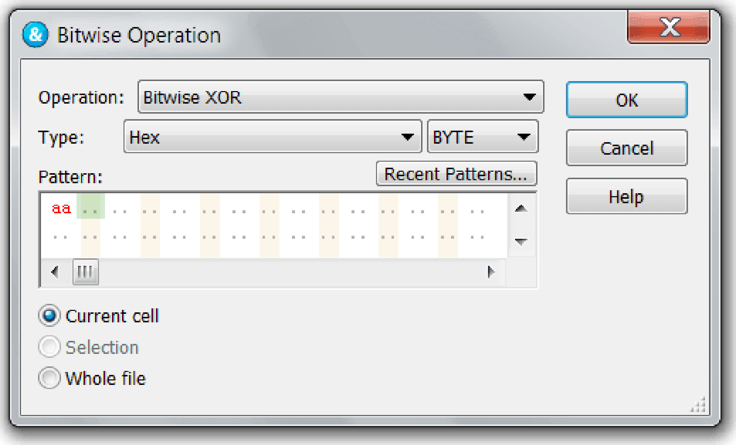
Bitwise operations include NOT, OR, AND and XOR. The first operation does not require an operand, while all others require the operand of a given size. More information is provided in the table below (in the table below x is a variable containg currently processing value):

Name	Operand	Operation Description
NOT	N/A	`x = ~x`
OR	`a`	`x = x | a`
AND	`a`	`x = x & a`
XOR	`a`	`x = x ^ a`

The size of both operands depends on the view type of the current editor window.

Bitwise Operation Window

When you execute a bitwise operation, the following window appears:



Bitwise Operation

Operation: Bitwise XOR

Type: Hex BYTE

Pattern: aa

● Current cell
○ Selection
○ Whole file

The operation you executed is automatically selected, but you can change it if you like.

If the chosen operation requires an operand, select its type and enter its value.

Using Patterns as Operands

You can use a pattern for a bitwise operation (except for NOT). In this case, the operation iterates through each byte (or word etc., depending on view type) as the operation is applied to the selection.

Alignment

Non-byte size operands are always aligned.

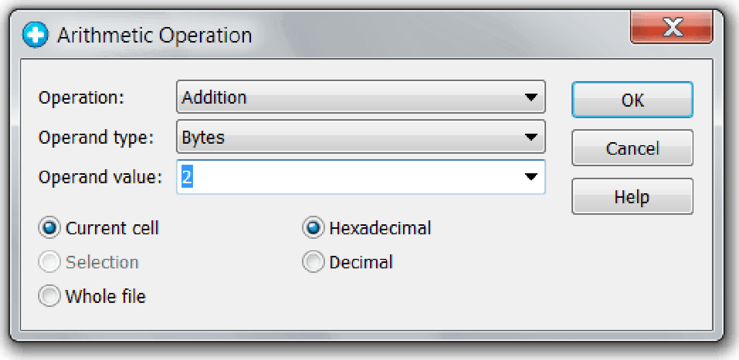
Arithmetic Operations

Arithmetic operations include *Negation*, *Addition*, *Subtraction*, *Multiplication*, *Division* and *Remainder*. The first operation does not require an operand, while all others require the operand of a given size. More information is provided in the table below (in the table below `x` is a variable that represents a current value):

Name	Operand	Operation Description
Negation	N/A	`x = -x`
Addition	`a`	`x = x + a`
Subtraction	`a`	`x = x - a`
Multiplication	`a`	`x = x * a`
Division	`a`	`x = [x / a]`
Remainder	`a`	`x = x % a`
Set Minimum	`a`	`x = x < a ? a : x`
Set Maximum	`a`	`x = x > a ? a : x`

Arithmetic Operation Window

When you execute an arithmetic operation, the following window appears:



Arithmetic Operation

Operation: Addition

Operand type: Bytes

Operand value: 2

● Current cell
○ Selection
○ Whole file

● Hexadecimal
○ Decimal

The operation you executed is automatically selected, but you can change it if you like.

If the chosen operation requires an operand, select its type and enter its value.

Alignment

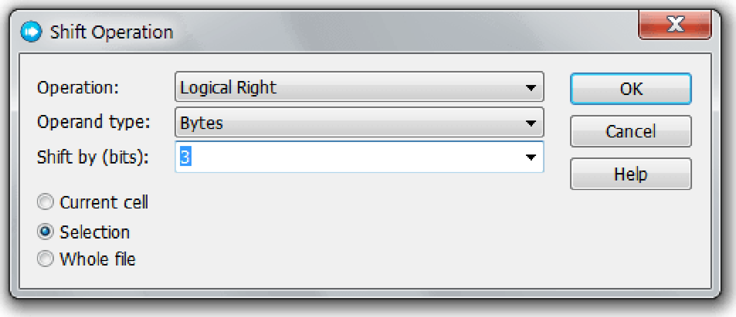
Non-byte size operands are always aligned.

Shift Operations

Shift operations include *Logical Left*, *Logical Right*, *Arithmetic Left*, *Arithmetic Right*, *Rotate Left* and *Rotate Right*. All operations require an integer operand that specify the number of bits to shift or rotate. Arithmetic shift differs from logical shift in that it saves the sign of the operand. Only right logical and arithmetic shift perform differently and only if the value is negative.

Shift Operation Window

When you execute a shift operation, the following dialog appears:



Operation: Logical Right
Operand type: Bytes
Shift by (bits): 3

○ Current cell
● Selection
○ Whole file

The operation you executed is automatically selected, but you can change it if you like.

Enter the number of bits to shift or rotate.

Alignment

Non-byte size operands are always aligned.

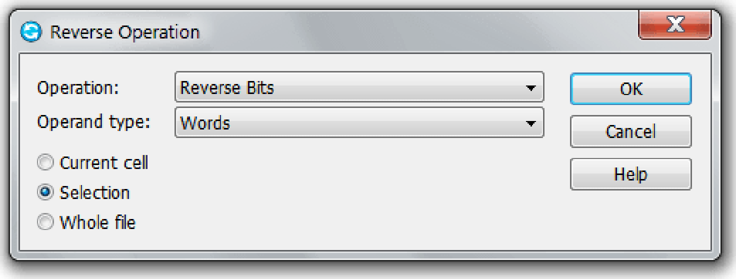
Case Change Operations

Case change operations include *Make Lowercase*, *Make Uppercase* and *Invert case*. The result of an operation depends on the current window's view type. If view type is set to Hex Words or Decimal Words, selection is treated as Unicode string, otherwise it is treated as single-byte string. In the latter case, current window's encoding is used to perform case change.

Reverse Operations

Reverse operations include *Reverse Bits* and *Byte Swap* operations. The actual behavior of both commands depends on the current editor window's group mode. For BYTE group mode, *Byte Swap* operation is not available.

When you execute a reverse operation, the following window appears:



Operation: Reverse Bits
Operand type: Words

○ Current cell
● Selection
○ Whole file

The complexity of both commands is linear, depending on the number of ranges in a selection. For a single range selection, the complexity is always constant, not depending on selection size.

Reverse Bits

Reverse Bits operation reverses the order of bits in each byte, word, double word or quad word in a current multiple selection.

- 010111012 => 101110102
- 01011101'111001102 => 01100111'101110102

Byte Swap

Byte Swap command reverses the order of bytes for each word, double word or quad word in a current multiple selection. This function is not available for a BYTE group mode.

- 123416 => 341216
- 1234abcd16 => cdab341216

Customization

Hex Editor Neo is a highly customizable application. You can customize almost every feature or module. This section describes several basic customization mechanisms.

In addition, other customizable features are described in other sections. This includes:

Editor Window Customization

You can customize the placement and layout of an editor window.

Structure Viewer Settings Page

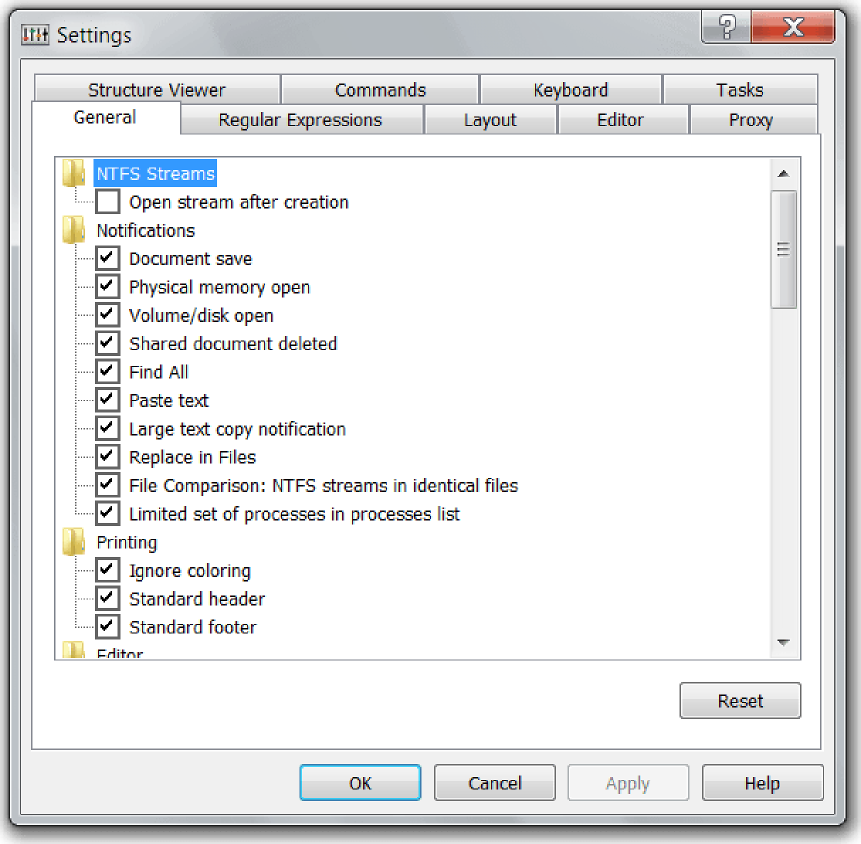
Structure Viewer allows you to define a list of directories that are used to search for included files. It also allows you to define an association between a structure scheme and file extension.

In addition, most interface dialogs, especially those that encapsulate a Pattern Window, allow you to change their size. The size is then saved and restored next time you use this dialog. Most window fields also store the values you entered into them and provide you with a list of last recently used values.

This section describes General Settings, Toolbar Customization and Keyboard Customization.

General Settings

General Settings page contains application-wide settings.



NTFS Streams
- □ Open stream after creation

Notifications
- ☑ Document save
- ☑ Physical memory open
- ☑ Volume/disk open
- ☑ Shared document deleted
- ☑ Find All
- ☑ Paste text
- ☑ Large text copy notification
- ☑ Replace in Files
- ☑ File Comparison: NTFS streams in identical files
- ☑ Limited set of processes in processes list

Printing
- ☑ Ignore coloring
- ☑ Standard header
- ☑ Standard footer

Editor

All settings on this page are divided into several groups.

General Group

This group contains the following settings:

Display splash screen

If enabled, the splash screen is displayed each time you launch the Hex Editor Neo. Splash screen remains visible during application startup and a few seconds later.

Always create backups

Tells the editor to always create backup copies of the file before saving changes to it. See the Always create backups Option for more information.

Lowercase hexadecimal

If enabled, hexadecimal letters ('A' to 'F') are displayed in lower case, otherwise, in upper case.

Default byte order

Specified the default byte order used by new editor windows. Byte Order can then be changed for each individual editor window.

Byte order change affects floating-point types

Specifies whether byte order change affects encoding of floating point types, float and double. The encoding of floating point types may be different for different platforms and files, so Hex Editor Neo provides you both methods.

Window switching style

Specifies the window switching style. See the Window Switching section for more information.

Last recently used documents to display: N

Specify the number of last recently used documents to display in the File menu.

Close affects the current tool window only

When enabled, clicking the Close button on the tool window closes only this window, if disabled, an entire tool window frame is closed.

Restore main window position on startup

If enabled, Hex Editor Neo restores the last position of its main window on startup.

Check for updates

Can be ”Every launch” (default), "Every week" or ”Never”. Specifies the frequency of checking for availability of new versions of the Hex Editor Neo.

Foreground downloading

Use all available bandwidth when downloading updates.

Check for low disk space before performing operations

Hex Editor Neo may require significant free space on one of your volumes for differnt ”heavy” operations. It makes a "best guess" on the required hard disk space amount before processing the operation and warns you if there is too little free space. You may switch this option off, but do it on your own risk!

Editor Group

This group contains the following settings:

Single Selection mode

Change the way multiple selection works in Hex Editor Neo. See the Single Selection Mode Option for more information.

Adjust selection on Insert operation

The current selection is shifted if you type new data with Insert Mode ON. This is a potentially slow operation and is not performed if you have a complex selection.

Digit grouping

Affects the visualization of long numbers in decimal view types. Uses the thousands separator defined in the current profile to increase the readability of long decimal numbers.

Display cursor address on the left

Specifies whether the cursor's address is displayed on the beginning of the current line.

Notifications Group

Hex Editor Neo has several notifications that are displayed to inform you about an important event. All these notifications have ”Do not display anymore” checkbox. If you checked this box and want to restore the default behavior, use the options in this group to do it.

NTFS Streams

This group contains the following settings:

Open stream after creation

When enabled, the editor automatically opens a named stream after it is created (using NTFS Streams » Create Stream... command).

Printing

This group contains the following settings:

Ignore Coloring

When switched on, the editor ignores all coloring and prints the document in black and white. All highlighting is ignored and only selection is displayed on the paper (by inverting colors). When this option is switched off all highlighting is printed.

Standard header

Print standard page header, which includes the document's name and current/total number of pages.

Standard footer

Print standard page footer, which includes the name of the application printed the document.

Copy&Export

This group contains the following settings:

Float copy/export number of digits

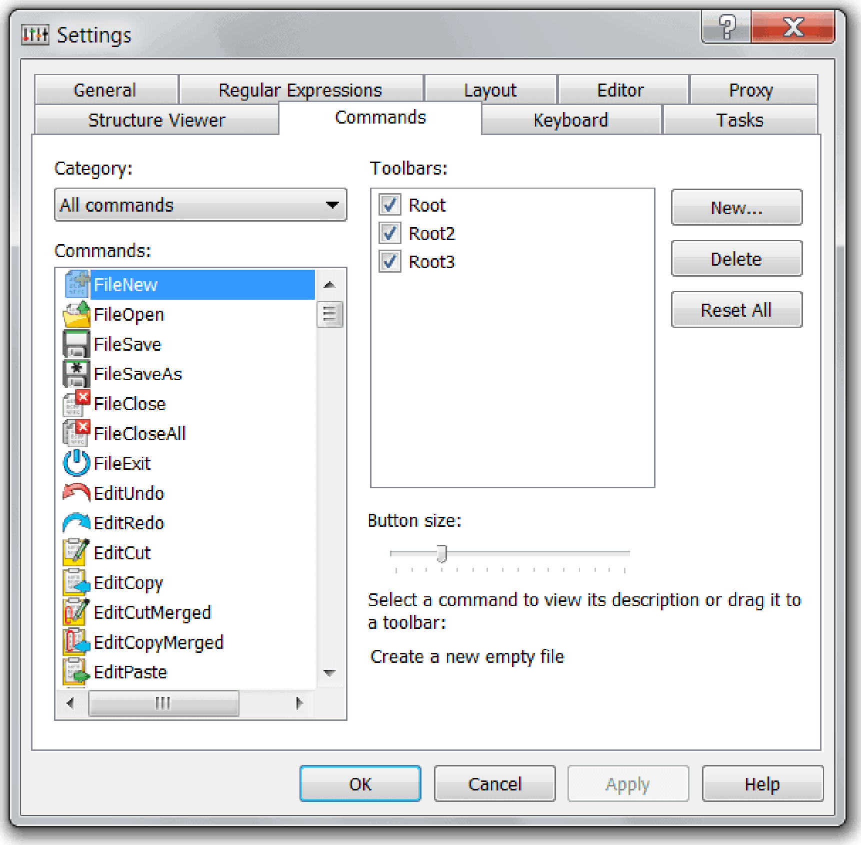
Specify the number of digits to be used while exporting single-precision floating-point numbers. See Formatted Data Format topic for more information.

Double copy/export number of digits

Specify the number of digits to be used while exporting double-precision floating-point numbers. See Formatted Data Format topic for more information.

Toolbar Customization

Commands page lets you customize the toolbars.



Category: All commands

Commands:
FileNew
FileOpen
FileSave
FileSaveAs
FileClose
FileCloseAll
FileExit
EditUndo
EditRedo
EditCut
EditCopy
EditCutMerged
EditCopyMerged
EditPaste

Toolbars:
☑ Root
☑ Root2
☑ Root3

Button size:

Select a command to view its description or drag it to a toolbar:
Create a new empty file

Creating New Toolbar

To create a new, empty toolbar press the **New...** button and enter the toolbar's name. Now you can add new commands to a created toolbar.

Deleting Toolbar

To delete a toolbar, select it in the list and click the **Delete** button.

Configuring a Toolbar

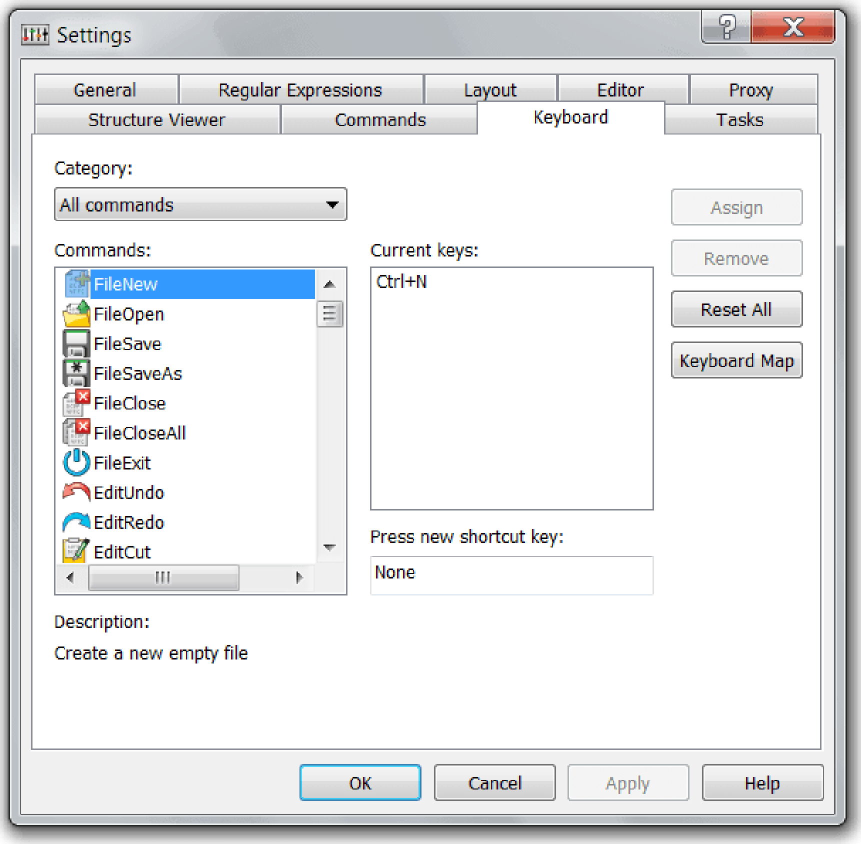
- To remove a button from the toolbar, click on it and drag away from the toolbar.
- To move a button to another location, click and drag it.
- To add a button to a toolbar, click on the command in the *Commands* list and drag it to the toolbar.

Other Options

Hide a toolbar by unchecking the box next to its name in the *Toolbars* list. Change the size of the toolbar icons with the *Button size* control. The Hex Editor Neo's unique vector icon technology renders command icons at any size without artifacts.

Keyboard Customization

Keyboard page allows you to customize keyboard shortcuts used by the Hex Editor Neo.



Category: All commands

Commands: FileNew

Current keys: Ctrl+N

Press new shortcut key: None

Description: Create a new empty file

The list of all commands is displayed on the left. Select a command to see the list of shortcuts assigned to it. They are displayed in a *Current keys* field. Each command may have several shortcuts, but a shortcut may not be shared between two or more commands.

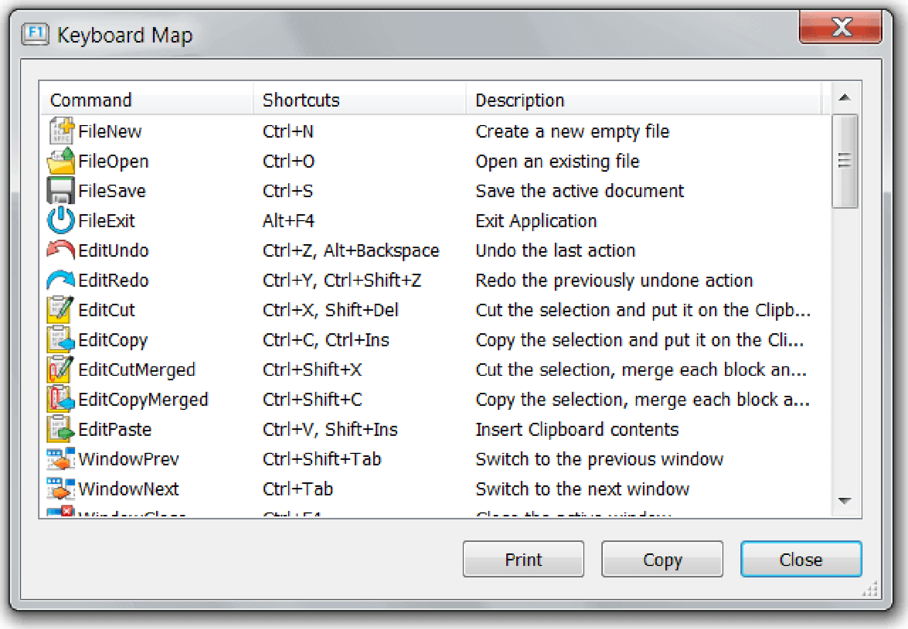
To delete a shortcut, select it in a list and press the **Remove** button.

To define new shortcut, activate the *Press new shortcut key* field and then press the key combination. Use the **Assign** button to assign the combination to a selected command.

Press the **Keyboard Map** button to open a Keyboard Map.

Keyboard Map

The Keyboard Map window displays all currently defined keyboard shortcuts.

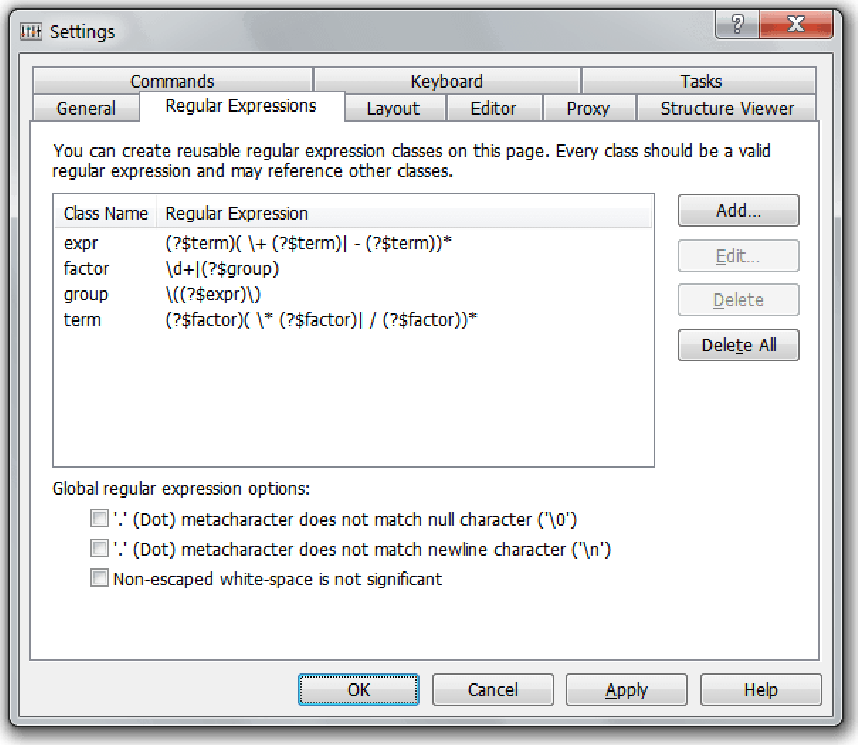


Command	Shortcuts	Description
FileNew	Ctrl+N	Create a new empty file
FileOpen	Ctrl+O	Open an existing file
FileSave	Ctrl+S	Save the active document
FileExit	Alt+F4	Exit Application
EditUndo	Ctrl+Z, Alt+Backspace	Undo the last action
EditRedo	Ctrl+Y, Ctrl+Shift+Z	Redo the previously undone action
EditCut	Ctrl+X, Shift+Del	Cut the selection and put it on the Clipb...
EditCopy	Ctrl+C, Ctrl+Ins	Copy the selection and put it on the Cli...
EditCutMerged	Ctrl+Shift+X	Cut the selection, merge each block an...
EditCopyMerged	Ctrl+Shift+C	Copy the selection, merge each block a...
EditPaste	Ctrl+V, Shift+Ins	Insert Clipboard contents
WindowPrev	Ctrl+Shift+Tab	Switch to the previous window
WindowNext	Ctrl+Tab	Switch to the next window

You can change the size of the window, print it or copy its contents to the Clipboard.

Regular Expressions Settings

Regular Expressions Settings page has several global options related to regular expressions, as well as allows you to manage named regular expression classes.



You can create reusable regular expression classes on this page. Every class should be a valid regular expression and may reference other classes.

Class Name	Regular Expression
expr	(?$term)(\+ (?$term)| - (?$term))*
factor	\d+|(?$group)
group	\((?$expr)\)
term	(?$factor)(* (?$factor)| / (?$factor))*

Global regular expression options:

□ '.' (Dot) metacharacter does not match null character ('\0')

□ '.' (Dot) metacharacter does not match newline character ('\n')

□ Non-escaped white-space is not significant

'.' (Dot) metacharacter does not match null character ('\0')

Specify that the . metacharacter will not match a null character.

'.' (Dot) metacharacter does not match newline character ('\n')

Specify that the . metacharacter will not match a newline character.

Non-escaped white-space is not significant

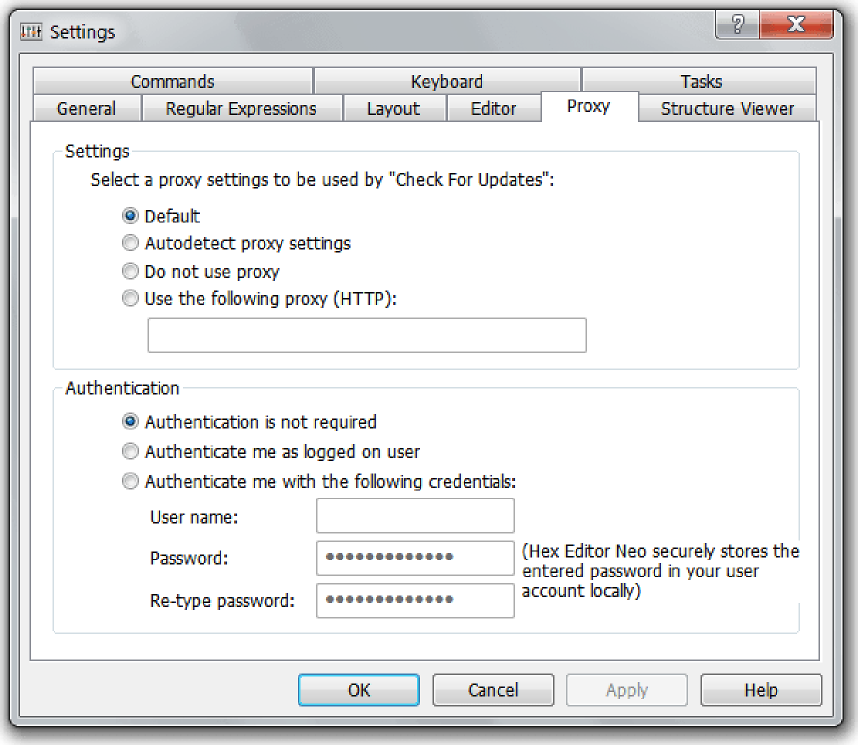
Specify that non-escaped white-space characters in a regular expression are ignored.

See also the Creating and Managing Classes section for more information.

Proxy Settings

This page allows you to configure the proxy server used by features Check for Updates, Downloader and Crash Dump Uploader. In most cases you don't need to make any changes, as defaults will work on majority of installations.

When Hex Editor Neo establishes a connection to remote server, it always does it over HTTP protocol over the 80 port. If your computer must use HTTP proxy when accessing HTTP resources, you may configure the proxy settings on this page. In addition, if your proxy server requires authentication, you may also configure credentials to use.



Settings

Select a proxy settings to be used by "Check For Updates":

● Default
○ Autodetect proxy settings
○ Do not use proxy
○ Use the following proxy (HTTP):

Authentication

● Authentication is not required
○ Authenticate me as logged on user
○ Authenticate me with the following credentials:

User name:

Password: ••••••••••••••

Re-type password: ••••••••••••••

(Hex Editor Neo securely stores the entered password in your user account locally)

Server Settings

There are four options you can use to configure a proxy server:

Default

Hex Editor Neo will use the proxy server configured in your default browser. This is a default setting.

Autodetect proxy settings

Hex Editor Neo will try to automatically detect proxy server settings.

Do not use proxy

Hex Editor Neo will bypass any configured proxy.

Use the following proxy (HTTP):

Specify the address (and optionally port number) of the proxy server to use. Examples:

```
myserver.com
```

will use the HTTP proxy server myserver.com on port 80 (the default).

```
myserver.com:8080
```

will use the HTTP proxy server myserver.com on port 8080

Proxy Server Authentication

There are three authentication options you can use:

Authentication is not required

Proxy Server does not require authentication.

Authenticate me as logged on user

Hex Editor Neo will use the currently logged on user to authenticate on the proxy server.

Authenticate me with the following credentials:

Enter the user name and password. You must enter the same password in both Password and Re-type password boxes. See the Security Considerations section below.

Security Considerations

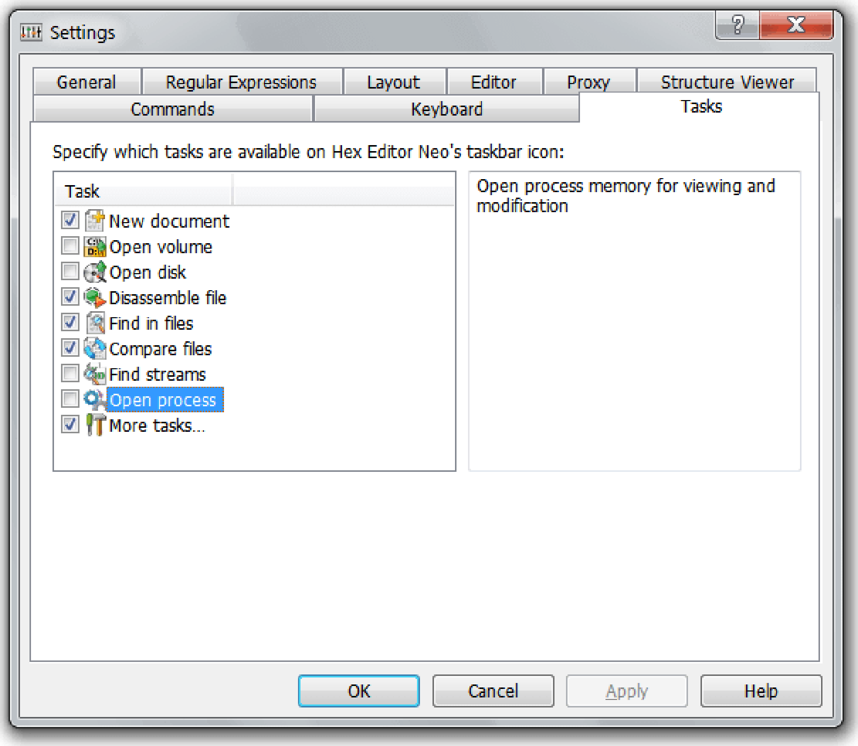
When you configure the Hex Editor Neo to use the entered credentials, it stores entered password in registry under the `HKEY_CURRENT_USER` key. It uses encryption to store the password. Only the same user is able to decrypt the password.

That is, if encrypted password is copied to another computer, an attacker will not be able to get the plain text password.

Tasks

This page allows you to configure tasks displayed in the Windows 7 Jump List for the Hex Editor Neo application icon. This list is displayed when you right-click the pinned (or running) application icon.

There is a predefined list of tasks that may be configured to appear in a jump list. You are free to select the items to be included in the list. Remember that more tasks you select, less items will be left for recently opened documents and pinned documents.



Specify which tasks are available on Hex Editor Neo's taskbar icon:

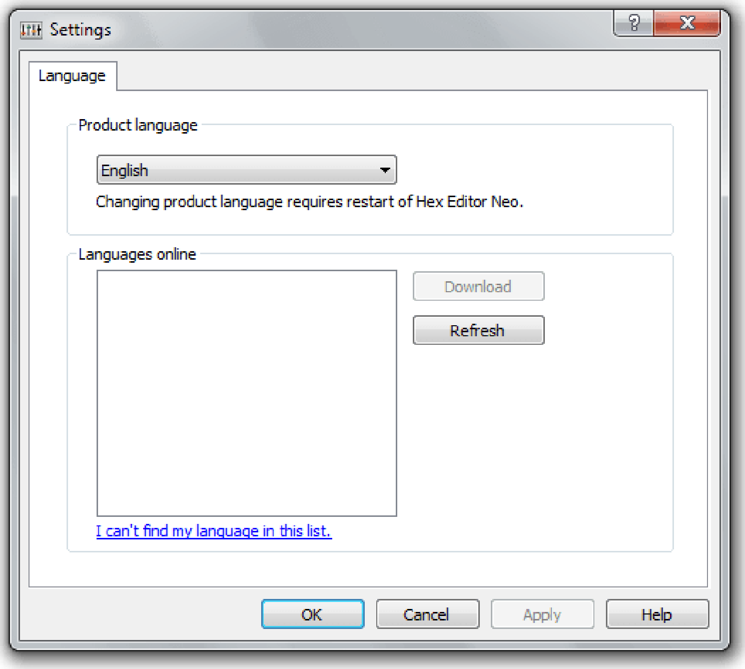
Task
☑ New document
☐ Open volume
☐ Open disk
☑ Disassemble file
☑ Find in files
☑ Compare files
☐ Find streams
☐ Open process
☑ More tasks...

Open process memory for viewing and modification

Select a task to view its description in the right pane. Put a checkmark next to task to enable it.

Languages

This page allows you to choose the Hex Editor Neo's interface language. The default interface language is English.



Product language

English

Changing product language requires restart of Hex Editor Neo.

Languages online

I can't find my language in this list.

Installed languages are listed in the first choice box. Select the one you want and press the OK button. Hex Editor Neo will need to be restarted in order to apply the changes.

Online Languages

More languages may be available on-line. When this page is displayed, Hex Editor Neo contacts the HHD Software web server and downloads a list of all available interface languages. It then allows you to download and install them. You may also manually refresh the list by clicking the **Refresh** button.

We can also publish updates to language packs. If Hex Editor Neo detects an update is available for installed language pack, Downloader's notification window is displayed with a prompt to download the update.

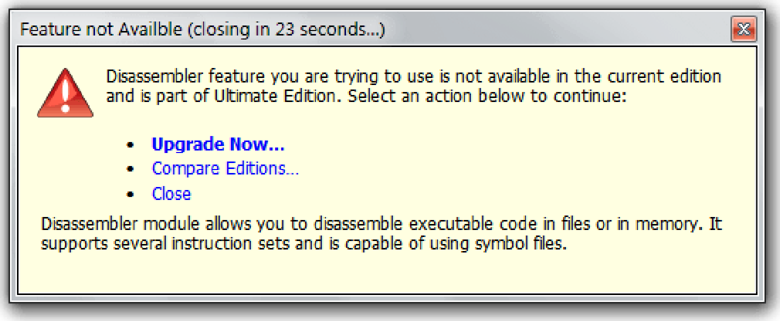
Purchasing Hex Editor Neo

Choosing Appropriate Edition

Hex Editor Neo is shipped in one of four different editions starting from Free Edition, which includes only basic functionality, up to Ultimate Edition, which combines all the power of advanced Hex Editor Neo features.

The detailed feature comparison chart is provided on-line.

In addition, the Hex Editor Neo has its own built-in "feature assistance" engine. Every time you try to use a feature which is not a part of the current edition, Hex Editor Neo brings a popup window. The window contains short feature description and displays the edition this feature is implemented in.



Feature not Availble (closing in 23 seconds...)

Disassembler feature you are trying to use is not available in the current edition and is part of Ultimate Edition. Select an action below to continue:

- **Upgrade Now...**
- Compare Editions...
- Close

Disassembler module allows you to disassemble executable code in files or in memory. It supports several instruction sets and is capable of using symbol files.

If you have just started using Free Edition, you may select the "Start 14-days trial" option to get an Ultimate Edition for the next 14 days. All Hex Editor Neo features become available and you receive the full power of the Ultimate Edition. When the trial period is over, Hex Editor Neo switches back to the Free Edition. Trial period may not be started again on this computer, but you can always upgrade to Standard, Professional or Ultimate Edition.

Choosing Additional Options

Several additional options and services are offered for those who purchase HHD Software products.

Lifetime Upgrades Service

According to our upgrade policy, all product bug fixes and minor upgrades (upgrades that do not change the major version number) are free for all customers. Major upgrades are available at special prices (major upgrades are free for customers owning subscription license types).

Our exclusive Lifetime Upgrade offer allows you to automatically receive ALL future product versions for free.

Please note that purchasing a product with Lifetime Upgrades service is cheaper and much more advantageous than upgrading product at a later time.

If you want to automatically receive all future versions of the purchased product for free, just check the Lifetime Upgrade option for your product in the shopping cart. If you are satisfied with bug fixes and minor upgrades only, uncheck this box during the order process.

How to Buy

Ordering On-Line

The simplest, cheapest and fastest way to purchase a product from HHD Software is to buy it on-line.

- To purchase the product directly from the web site use the Quick Buy link on the right to add the product to the virtual Shopping Cart
- You can also add additional products and services to the shopping cart. We offer various discount programs, which automatically apply when you order multiple products or multiple licenses. After you finish appending products and services to the shopping cart, verify all the data and press the Continue button.

After completing your order, you will receive the order confirmation E-mail followed by activation information E-mail from our order processing system. It will contain instructions and information required to register and activate the purchased product(s).

Ordering on-line from HHD Software is Safe and Secure.

Ordering Off-Line

In order to purchase Hex Editor Neo by fax, you need to perform the following steps:

1. Go to the Purchase section
2. Add the products and services you are interested in to the Shopping Cart
3. Switch to the Shopping Cart
4. Select the required edition and license type for each product in the cart
5. Enter the quantity for each product in the cart
6. Check all required additional services
7. Enter coupon code(s), if you have them
8. Check "Fax Order" option
9. Press the Continue button
10. Log in, if you already have an account
11. Validate all data in the order form and enter additional information (if required).
12. Press the Next Step button
13. Follow the instructions in the received e-mail from 2Checkout, our order processing partner.

Purchase Orders

In order to purchase our products using Purchase Orders, you need to perform the following steps:

1. Go to the Purchase section
2. Add the products and services you are interested in to the Shopping Cart
3. Switch to the Shopping Cart
4. Select the required edition and license type for each product in the cart
5. Enter the quantity for each product in the cart
6. Check all required additional services
7. Enter coupon code(s), if you have them
8. Check "Purchase Order" option
9. Press the Continue button
10. Log in, if you already have an account
11. Validate all data in the order form and enter additional information (if required).
12. Press the Next Step button
13. Validate all data, read instructions and then press Finish Order button
14. Proceed to Upload form and send your Purchase Order document

My Account Web Site Section

If you have ever purchased any of HHD Software products, you already have an account. It is automatically created at the time your shopping cart is transferred to the order processing server.

In My Account section you can get detailed information about your orders and purchased products, manage your personal data, download license files for purchased products, upgrade your products and so on.

The Password Hint function may be used to recover lost passwords.

If you experience any difficulties logging into your personal account, please contact us. We will try to resolve your issue as soon as we can. Providing us with your Purchase ID (Order REF#) will speed up the problem fixing.

Downloading License Files

For security reasons Hex Editor Neo license file automatically expires in about a week. This of course does not apply to an installed license.

If you need another license file, you can always download it for free after logging into the My Account section of our web site.

License downloading procedure:

1. Go to the Products section (https://www.hhdsoftware.com/Account/products). You'll be asked for a login and password.
2. Click on the product name in a list.
3. Click on the "Download License..." link.

4. Click the **Open** button to immediately install the license or the **Save** button to save the license file to disc.

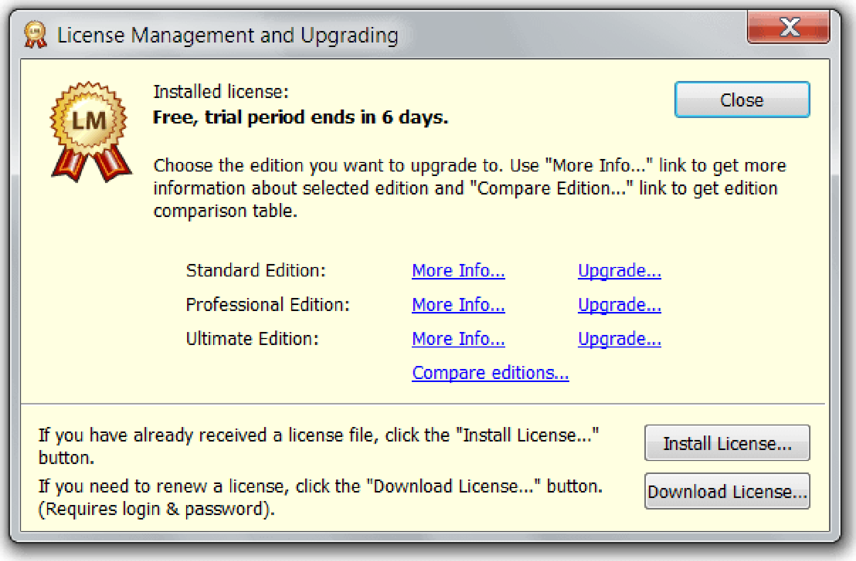
See the Installing License Files section for information on how to install downloaded license file.

Installing License Files

This section describes how you can install the license file stored on the disc. Before using the license file make sure you have the most recent version of the Hex Editor Neo installed on your computer.

Locate the downloaded license file in the Windows Explorer and double-click it. This will activate your copy of the Hex Editor Neo and unlock all features provided by the purchased license.

Alternatively, run the product, execute the **Help » License Management...** command and press the **Install License...** button. Locate the license file and press the **Open** button.



License Management and Upgrading

Installed license:
Free, trial period ends in 6 days.

Choose the edition you want to upgrade to. Use "More Info..." link to get more information about selected edition and "Compare Edition..." link to get edition comparison table.

If you have already received a license file, click the "Install License..." button.

If you need to renew a license, click the "Download License..." button. (Requires login & password).

Upgrading Hex Editor Neo

Hex Editor Neo is distributed in four different editions, including Free, Standard, Professional and Ultimate.

The powerful Hex Editor Neo functionality is flexibly divided between all these editions, allowing you to wisely choose the one appropriate for you. Please refer to the Choosing Appropriate Edition section for more information. Nevertheless, Hex Editor Neo may always be easily upgraded to a more powerful edition. Such upgrade is not free.

Upgrading from the Free Edition

Free Edition, as told by its name, costs nothing to install and use. Although there are a lot of features included in the Free Edition, a number of powerful and advanced features are not, and therefore, you may find it useful to upgrade either to Standard, Professional or Ultimate edition.

The “Upgrade” in this case corresponds to the product purchase. Product purchasing options are described in more detail in corresponding section.

To start a purchase, you may use the **Help » License Management…** command to open up a License Management Window. Click the “Upgrade…” link next to the selected edition to start the order process.

Upgrading from Standard or Professional Editions

If you currently have Hex Editor Neo Standard Edition licensed to you, you may upgrade either to the Professional or Ultimate Edition. Licensed Professional Edition may be upgraded to the Ultimate Edition. To perform an upgrade, navigate to the HHD Software Web Site'sUpgrade Section. You will be asked to log in, using your login and password. After that you will be able to choose the edition you want to upgrade to and proceed to the checkout.

As soon as your order is processed, the license file is e-mailed to you. Applying this license file activates the upgraded license and unlocks all its features.

Getting Support

How to Get Support

At HHD Software, we are committed to providing quality, bug-free software. If you experience any problems with our software or find any bugs, please don't hesitate to contact us using our contact page. Please provide a detailed description of your problem. Be sure to include which operating system you are running and the current version of the Hex Editor Neo (found in the **Help » About**).

Support can also be obtained by visiting our Support Web Site. This page contains a list of frequently asked questions (FAQs) that might solve your problem.

If you have any other inquires, comments, ideas, or suggestions on things you would like Hex Editor Neo to do, you can provide your feedback using the **Help » Feedback...** option.

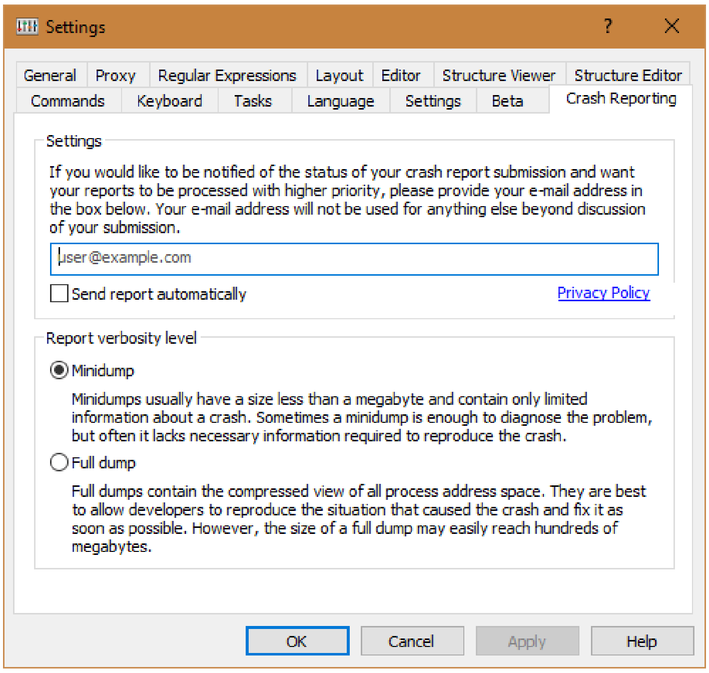
Crash Dumps

We have worked hard to eliminate all possible bugs in the product. Nevertheless, as in each software product, bugs occur from time to time. The worst of bugs are general protection faults or other types of exceptions that cause the operating system to forcefully close the application, possibly causing user data losses.

Hex Editor Neo includes the built-in crash reporter. If application crashes, a small crash report, called*minidump* is generated. You are offered to send a compressed report to HHD Software web site for analysis.

Crash Reporting Configuration

The **Crash Reporting** settings pages, accessible through the **Tools » Settings...** menu, allows you to configure the following information:



Settings

If you would like to be notified of the status of your crash report submission and want your reports to be processed with higher priority, please provide your e-mail address in the box below. Your e-mail address will not be used for anything else beyond discussion of your submission.

user@example.com

□ Send report automatically

Privacy Policy

Report verbosity level

● Minidump

Minidumps usually have a size less than a megabyte and contain only limited information about a crash. Sometimes a minidump is enough to diagnose the problem, but often it lacks necessary information required to reproduce the crash.

○ Full dump

Full dumps contain the compressed view of all process address space. They are best to allow developers to reproduce the situation that caused the crash and fix it as soon as possible. However, the size of a full dump may easily reach hundreds of megabytes.

You can optionally enter your e-mail address which will be submitted with crash dumps generated on your computer. If you provide your e-mail address, you might be contacted to provide additional information and notified when any progress is made concerning your report.

You can also choose the type of generated dump: *minidump* or *full dump*. Minidumps are usually very small (less than a megabyte) and contain only essential information. They are sometimes enough to diagnose and reproduce the problem. However for analyzing complex problems, a full dump is preferable, because it contains a copy of the whole process memory and allows to view the values of any local and global variables. The downside of a full dump is its size, which can easily exceed hundreds of megabytes.

Remember that the more crash dumps we receive the faster we release an update that fixes the bug.

All information is always submitted anonymously.

Crash Report Processing

All received crash dumps are automatically analyzed and grouped according to the problem type.

HHD Software developers browse the crash report database on a regular basis. Reports received from maximum number of user computers receive the highest attention. They are fixed at the earliest time. Less frequent bugs may take longer to be fixed.

The lack of full dumps for complex problems may also postpone the fix of the bug.

Having users' e-mails may actually speed up fixing particular bugs, even if they do not fall into “most frequent” category.

Scripting

Hex Editor Neo provides a programming interface to its basic file editing features. The interface provided by the Hex Editor Neo may be used by any code written in any automation-compatible language.

Three objects, File Document Object, Multiple Selection Object and Sequence Object are provided by the application. User code can create these objects, call methods they expose and query/set their properties. As a result, it may achieve the same functionality as provided by the Hex Editor Neo's user interface, with same performance characteristics. Hex Editor Neo's window does not appear on the screen when any of exposed objects is instantiated.

File Document Object

File Document object represents a file opened for editing. It corresponds to adocument in the Hex Editor Neo's user interface. A lot of editing actions may be performed on this object.

Such concepts as operation history, patch creation, Undo and Redo are fully accessible for user code via this object.

Creating File Document Objectsection describes how you create a File Document object and Working with File Document Object section illustrates the ways this created object may be used. The IFileDocument Interface section in Scripting Reference section contains in-depth documentation for all properties and methods exposed by the File Document object.

Multiple Selection Object

Multiple Selection object represents amultiple selection in a document. This object is used by a number of File Document object's methods to define the portion of the document on which this method operates.

Creating Multiple Selection Objectsection describes how you create a Multiple Selection object and Working with Multiple Selection Object section illustrates the ways this created object may be used. The IMultiSelection Interface section in Scripting Reference section contains in-depth documentation for all properties and methods exposed by the Multiple Selection object.

Sequence Object

Sequence object serves as a thin layer that helps scripting languages that lack support for pointers and arrays to construct and pass a pattern. For example, it is impossible to create pattern for a IFileDocument.Find method in JavaScript. In this case, the Sequence object comes to help.

Creating Sequence Objectsection describes how you create a Sequence object and Working with Sequence Object section illustrates the ways this object may be used.

Thread Safety

Any single object taken from the Hex Editor Neo may not be used by multiple threads at the same time. User code should serialize access to objects' methods and properties if it needs to access the object from different threads. In such scenario, user code may call object's methods and access object's properties from any thread, provided the access is strictly serialized.

At the same time, user code may simultaneously access two different objects from two different threads. There is no conflict in this situation.

Lengthy Operations Limitations

Unlike the Hex Editor Neo's user interface, File Document and Multiple Selection objects do not provide you with a way to cancel any lengthy operation. When a thread calls a lengthy operation, it only has an option to wait until it's finished. Object performing this operation may not be accessed from another thread until operation has finished.

Document Object

Creating Document Object

File Document object has a following class ID: `FileDocument.FileDocument`. Use the method provided by your language to create an ActiveX object. For example, in JavaScript:

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
// work with fdoc object
```

Created object is in uninitialized state. You cannot execute any method or access any property until you call the IFileDocument.New or IFileDocument.Open methods to initialize an object.

Working with Document Object

This section illustrates several document object usage scenarios. All examples in this section suppose that you have a valid reference to a file document object, as described in Creating Document Object section.

All actions that lead to document modification create new operations in document's operation history.

Initializing Document Object

Before you start using the newly created document object, you must initialize it.

If you want to associate a document object with any existing file, call the IFileDocument.Open method. If you want to associate a document object with an empty file, call the IFileDocument.New method. After that, the document object enters the initialized state and is ready to process further requests.

To open a volume, call the IFileDocument.OpenVolume method. You may also open a physical disk (IFileDocument.OpenPhysicalDisk), process memory (IFileDocument.OpenProcess) and physical memory (IFileDocument.OpenPhysicalMemory).

User Interface Analogue: Creating New Documents and Opening Documents.

Closing Document Object

The IFileDocument.Close method is used to close the document object. The object enters an uninitialized state after it is closed. All changes made to the document are silently discarded.

You don't need to explicitly call this method as it is automatically called when object is destroyed. Although, if you are going to reuse the document object (that it, call Open or New method again), this method must be called.

Saving Changes

The IFileDocument.Modified property is `TRUE` if the document has been modified and `FALSE` otherwise. It can be used to determine whether the document must be saved. To save a document, call the IFileDocument.Save or IFileDocument.SaveAs methods. The first method overwrites the existing file while the second method creates a copy of the file.

If the document object was initialized with a call to IFileDocument.New method, IFileDocument.Save method cannot be called until you call IFileDocument.SaveAs method that also updates the IFileDocument.FileName property. IFileDocument.FileName property contains the full path to the file this document is currently representing.

User Interface Analogue: Saving Documents.

Reading and Writing Data

The IFileDocument.Read and IFileDocument.Write methods are used to read and write file's data. Calling the IFileDocument.Write method creates new operation in file's operation history.

User Interface Analogue: Data Modification.

Inserting Data

Several file document object's methods are used to insert data into the file. All insert methods increase the file's size and shift remaining data to free up space for inserted data.

IFileDocument.Insert, IFileDocument.InsertByte and IFileDocument.InsertPattern methods are used to insert data into the document.

User Interface Analogue: Data Modification and Insert command.

Deleting Data

IFileDocument.Delete and IFileDocument.DeleteMulti methods are used to delete data from the document. After deletion, the size of the file is decreased and remaining data is shifted.

User Interface Analogue: Delete command.

Filling Data

Unlike Insert group of methods, Fill methods overwrite original file's data with new data.

IFileDocument.Fill, IFileDocument.FillMulti, IFileDocument.FillByte and IFileDocument.FillByteMulti methods are used to fill data.

User Interface Analogue: Fill command.

Find and Find All

Call the IFileDocument.Find method to find a pattern in a document. Call the IFileDocument.FindAll method to locate all occurrences of a pattern in a document.

User Interface Analogue: Find and Find All commands.

Replace and Replace All

The IFileDocument.Replace method is used to replace a single occurrence of the pattern with another pattern. The powerful IFileDocument.ReplaceAll method automatically locates all occurrences of specified pattern in a file and replace them with another pattern.

User Interface Analogue: Replace and Replace All commands.

Calculating Statistics

The IFileDocument.GatherStatistics method calculates the General Statistics for the document (or selection) and IFileDocument.PatternStatistics method calculates the Pattern Statistics for it.

User Interface Analogue: Statistics Tool Window.

Inserting Files

The IFileDocument.PutFile method is used to put the contents of a disk file to the current document.

User Interface Analogue: Insert File command.

Controlling File's Size

The read-write IFileDocument.FileSize property can be used to query or change the file's size. If you use it to change the size, new operation in operation history is created.

User Interface Analogue: Change File Size command.

Undo and Redo

The IFileDocument.CanUndo and IFileDocument.CanRedo properties are `TRUE` if IFileDocument.Undo and IFileDocument.Redo methods may be called for a document correspondingly. The IFileDocument.Undo method undoes the previous operation, placing it into the operation tail. IFileDocument.Redo method makes the first operation from operation tail a current operation.

User Interface Analogue: Edit » Undo and Edit » Redo commands.

Working with Operation History

IFileDocument.Purge, IFileDocument.SaveHistory and IFileDocument.LoadHistory methods are used to purge an operation history, save it to a file or load from a file correspondingly.

User Interface Analogue: History » Clear History and History » Purge… commands.

##Patch Creation

The IFileDocument.CreatePatch method is used to create a patch from the current state of the document.

User Interface Analogue: File » Create Patch… command.

Clipboard Methods

File document object's IFileDocument.Copy, IFileDocument.Cut and IFileDocument.Paste2 methods are used to put file's data to the Clipboard or paste data from the Clipboard into the document.

The IFileDocument.PasteText method is used to paste text from the Clipboard as it is, either in ANSI or UNICODE. You can also use the IFileDocument.PasteText2 method to paste the text from the Clipboard and convert it to a given encoding.

User Interface Analogue: Edit » Copy, Edit » Merge and Copy, Edit » Cut, Edit » Merge and Cut and Edit » Paste commands.

Bitwise and Other Operations

Four methods, IFileDocument.BitwiseOp, IFileDocument.ArithmeticOp, IFileDocument.ShiftOp and IFileDocument.CaseOp, are used to perform bitwise, arithmetic, shift and case change operations correspondingly.

Regular Expressions

The following methods accept regular expression as their parameters: IFileDocument.FindRegExp2, IFileDocument.FindAllRegExp2, IFileDocument.ReplaceAllRegExp2 and IFileDocument.PatternStatisticsRegExp2.

Multiple Selection Object

Creating Multiple Selection Object

An empty multiple selection object is created with a call to IFileDocument.CreateEmptySelection method. This means that you must have a valid File Document object in order to create a multiple selection object.

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
// work with msel object
```

Created object is not related to the document object, may live longer that its creator and may be used in calls to methods provided by other document objects.

Working with Multiple Selection Object

The created multiple selection object is empty. IMultiSelection.Empty property is TRUE for empty selection objects. You may use the IMultiSelection.AddRange method to add a contiguous range to the selection, IMultiSelection.RemoveRange method to remove (subtract) a range from the selection and IMultiSelection.ToggleRange method to “toggle” the given range in a selection.

IMultiSelection.InsertRange and IMultiSelection.DeleteRange are used to insert and delete new ranges into the selection. These methods differ from previously described in that the data beyond the inserted/deleted range is shifted. IMultiSelection.DeleteRange method is not currently implemented.

Call the IMultiSelection.Invert method to invert the current selection and IMultiSelection.Clear method to clear the current selection. Both methods perform in constant-time, not depending on the selection's complexity.

IMultiSelection.Save and IMultiSelection.Load methods may be used to save (with compression) the current selection to a file or load it from a file correspondingly. IMultiSelection.Load method accepts the loading mode, allowing you to merge two selection objects using different algorithms.

IMultiSelection.IsIn method checks if the given offset is located within the selection.

The IMultiSelection.TotalSize property holds the total size of all ranges in the selection. IMultiSelection.Count property holds the total number of ranges in the selection.

Sequence Object

Creating Sequence Object

An empty sequence object is created with a call to IFileDocument.CreateSequence method. This means that you must have a valid File Document object in order to create a sequence object.

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var seq= fdoc.CreateSequence();
// work with seq object
```

Created object is not related to the document object, may live longer that its creator and may be used in calls to methods provided by other document objects.

Working with Sequence Object

The created sequence object is empty. ISequence.Empty property is TRUE for empty sequences. You may use the ISequence.AddText and ISequence.AddData methods to add new data to a sequence, ISequence.Remove method to delete a part of the sequence and ISequence.Clear method to clear the sequence.

A copy of the sequence may be constructed with a call to the ISequence.Copy method. The ISequence.CreateSubSequence method, on the other hand, allows you to copy only part of the sequence.

Individual sequence bytes may be accessed and modified through the default ISequence.Value property. Current sequence size is retrieved through the ISequence.Length property. This same property may be used to change the size of the sequence, for example, to prepare the sequence before calling IFileDocument.Read method.

```
JavaScript
// Reading data from the document
var read_seq = fdoc.CreateSequence();
read_seq.Length = 1024;

fdoc.Read(read_seq.Data, 0, read_seq.Length);

// Performing Search & Replace
var find_seq = fdoc.CreateSequence(), rep_seq = fdoc.CreateSequence();

find_seq.AddData(SequenceDataBytes, 0x0d);
rep_seq.AddData(SequenceDataBytes, 0x0d, 0x0a);

var sel = fdoc.CreateEmptySelection();
sel.AddRange(0,fdoc.FileSize);

var occurrences = fdoc.ReplaceAll(find_seq.Data, find_seq.Length, rep_seq.Data, rep_seq.Length, false, sel
alert(occurrences + " replacements made.");
```

Parser Object

Obtaining Parser Object

Parser object is an intrinsic object. It is provided under the name `parser` to the script called by the Structure Viewer. There is no other way to obtain a reference to this object.

This object is a default global object for a running script, so its methods may be called directly, for example:

```
C++
alert("Message");   // equivalent to parser.alert("Message");
```

Working with Parser Object

Parser Object exposes a number of methods which can be used by the script function called by Structure Viewer. Consult the IParser interface section for more information.

Reference

Document Object

IFileDocument Interface

Description

This interface is implemented by File Document Object See the Creating File Document Object section to see how you create the object in your code.

Declaration

```
TypeScript
interface IFileDocument extends IDispatch {
    // Properties
    AutoCreateBranch: boolean;
    readonly FileName: string;
    FileSize: number;
    readonly Modified: boolean;
    readonly Stream: boolean;
    readonly ReadOnly: boolean;
    RegExpSyntaxError: string;
    readonly CanRedo: boolean;
    readonly CanUndo: boolean;
    readonly CanPaste: boolean;
    // Methods
    Close(): void;
    New(): void;
    Open(Name: string, ReadOnly: boolean): void;
    OpenPhysicalDisk(PhysicalDiskName: string, FriendlyName: string, ReadOnly: boolean): void;
    OpenPhysicalMemory(): void;
    OpenProcess(ProcessId: number, Start: number, Size: number, ReadOnly: boolean): void;
    OpenVolume(VolumeName: string, FriendlyName: string, ReadOnly: boolean): void;
    Save(ForceBackup: boolean): void;
    SaveAs(FileName: string): void;
    GetModifiedSel(Selection: IMultiSelection): void;
    Decrypt(Provider: string,
        ProviderType: number,
        AlgoID: number,
        Password: string,
        Selection: IMultiSelection,
        KeyLength?: number): void;
    Delete(Offset: number, Size: number): void;
    DeleteMulti(Selection: IMultiSelection): void;
    Encrypt(Provider: string,
        ProviderType: number,
        AlgoID: number,
        Password: string,
        Selection: IMultiSelection,
        KeyLength?: number): void;
    FillByte(FillValue: number, Offset: number, Size: number): void;
    FillByteMulti(FillValue: number, Selection: IMultiSelection): void;
    InsertByte(ByteFill: number, Offset: number, Size: number): void;
    PutFile(FileName: string, Offset: , InsertMode: boolean): void;
    CreatePatch(PatchName: string, Options: PatchOptions, PathToStubFile?: string): void;
    Purge(Level: HistoryPurgeLevel): void;
    Redo(Steps?: number): void;
    Undo(Steps?: number): void;
    Copy(Selection: IMultiSelection, MergeBlocks: boolean): void;
    Cut(Selection: IMultiSelection, MergeBlocks: boolean): void;
    Paste(Offset: number, InsertMode: boolean): void;
    Paste2(Offset: number, Type: TextType, InsertMode: boolean): void;
    Paste3(Offset: number, Type: TextType, Flags: Paste3Flags): void;
    PasteText(Offset: number, Unicode: boolean, InsertMode: boolean): void;
    PasteText2(Offset: number, CodePage: number, InsertMode: boolean): void;
    FindAllRegExp(RegExp: string,
        SubExpression: number,
        Flags: RegExpFlags,
        StartFrom: number,
        Size: number,
        Found: IMultiSelection): void;
    FindAllRegExp2(RegExp: string,
        CodePage: number,
        SubExpression: number,
        Flags: RegExpFlags,
        StartFrom: number,
        Size: number,
        Found: IMultiSelection): void;
    ReplaceAllRegExpWithRegExp(RegExp: string,
        ReplacePattern: string,
        CodePage: number,
        Flags: RegExpFlags,
        StartFrom: number,
        Size: number): void;
    ArithmeticOp(Selection: IMultiSelection,
        Type: ArithmeticOpType,
        OpSize: OperandSizeType,
        Operand?: any): void;
    CaseOp(Selection: IMultiSelection,
        Type: CaseOpType,
        Unicode: boolean,
        CodePage?: number): void;
    ShiftOp(Selection: IMultiSelection, Type: ShiftOpType, OpSize: , Bits: number): void;
    ReverseOp(Selection: IMultiSelection, Type: ReverseOpType, OpSize: OperandSizeType): void;
    CreateEmptySelection(): IMultiSelection;
    CreateSequence(): ISequence;
    BitwiseOpS(Selection: IMultiSelection, Type: BitwiseOpType, Sequence: ISequence): void;
    FillMultiS(Sequence: ISequence, Selection: IMultiSelection, Continue: boolean): void;
    FillS(Sequence: ISequence, Offset: number, Size: number): void;
    FindAllS(Sequence: ISequence,
        Selection: IMultiSelection,
        IgnoreCase: boolean,
        Found: IMultiSelection): void;
    FindS(Sequence: ISequence,
        Selection: IMultiSelection,
        StartFrom: number,
        SearchUp: boolean,
        IgnoreCase: boolean): void;
    InsertPatternS(Sequence: ISequence, Offset: number, Size: number): void;
    InsertS(Sequence: ISequence, Offset: number): void;
    ReadS(Sequence: ISequence, Offset: number): void;
    ReplaceAllRegExpS(RegExp: string,
        SubExpression: number,
        Flags: RegExpFlags,
        Sequence: ISequence,
        StartFrom: number,
        Size: number): void;
    ReplaceAllRegExp2S(RegExp: string,
        CodePage: number,
        SubExpression: number,
        Flags: RegExpFlags,
        Sequence: ISequence,
        StartFrom: number,
        Size: number): void;
    ReplaceAllS(SequenceFrom: ISequence,
        SequenceTo: ISequence,
        IgnoreCase: boolean,
        Selection: IMultiSelection): void;
    ReplaceS(Offset: number, Size: number, Sequence: ISequence): void;
    ToNumber(Value: any): number;
    WriteS(Sequence: ISequence, Offset: number): void;
}
```

C#

```
public interface IFileDocument : IDispatch
{
    // Properties
    bool AutoCreateBranch { get; set; }
    string FileName { get; }
    ulong FileSize { get; set; }
    bool Modified { get; }
    bool Stream { get; }
    bool ReadOnly { get; }
    string RegExpSyntaxError { get; set; }
    bool CanRedo { get; }
    bool CanUndo { get; }
    bool CanPaste { get; }
    // Methods
    void Close();
    void New();
    void Open(string Name, bool ReadOnly);
    void OpenPhysicalDisk(string PhysicalDiskName, string FriendlyName, bool ReadOnly);
    void OpenPhysicalMemory();
    void OpenProcess(uint ProcessId, long Start, ulong Size, bool ReadOnly);
    void OpenVolume(string VolumeName, string FriendlyName, bool ReadOnly);
    void Save(bool ForceBackup);
    void SaveAs(string FileName);
    void GetModifiedSel(IMultiSelection Selection);
    void Decrypt(string Provider,
        uint ProviderType,
        uint AlgoID,
        string Password,
        IMultiSelection Selection,
        uint KeyLength);
    void Delete(ulong Offset, ulong Size);
    void DeleteMulti(IMultiSelection Selection);
    void Encrypt(string Provider,
        uint ProviderType,
        uint AlgoID,
        string Password,
        IMultiSelection Selection,
        uint KeyLength);
    void Fill(ref byte Pattern,
    void Fill(ref byte Pattern,
        uint PatternSize,
        ulong Offset,
        ulong Size);
    void FillByte(byte FillValue, ulong Offset, ulong Size);
    void FillByteMulti(byte FillValue, IMultiSelection Selection);
    void FillMulti(ref byte Pattern, uint PatternSize, IMultiSelection Selection,  Continue);
    void Insert(ref byte Data, ulong Offset, uint InsertSize);
    void InsertByte(byte ByteFill, ulong Offset, ulong Size);
    void InsertPattern(ref byte Pattern,
        uint PatternSize,
        ulong Offset,
        ulong Size);
    void PutFile(string FileName, ulong Offset, bool InsertMode);
    void Read(ref byte Data, ulong Offset, uint ReadSize);
    void Write(ref byte Data, ulong Offset, uint WriteSize);
    void CreatePatch(string PatchName, PatchOptions Options, string PathToStubFile);
    void LoadHistory(IStream Stream);
    void Purge(HistoryPurgeLevel Level);
    void Redo(uint Steps);
    void SaveHistory(IStream Stream);
    void Undo(uint Steps);
    void Copy(IMultiSelection Selection, bool MergeBlocks);
    void Cut(IMultiSelection Selection, bool MergeBlocks);
    void Paste(ulong Offset, bool InsertMode);
    void Paste2(ulong Offset, TextType Type, bool InsertMode);
    void Paste3(ulong Offset, TextType Type, Paste3Flags Flags);
    void PasteText(ulong Offset, bool Unicode, bool InsertMode);
    void PasteText2(ulong Offset, uint CodePage, bool InsertMode);
    ulong Find(ref byte DataToFind,
        uint DataSize,
        IMultiSelection Selection,
        ulong StartFrom,
        bool SearchUp,
        bool ignore_case);
    void FindRegExp(string RegExp,
        uint SubExpression,
        RegExpFlags Flags,
        ulong StartFrom,
        ulong Size,
        ref ulong FoundOffset,
        ref ulong MatchSize);
    void FindRegExp2(string RegExp,
        uint CodePage,
        uint SubExpression,
        RegExpFlags Flags,
        ulong StartFrom,
        ulong Size,
        ref ulong FoundOffset,
        ref ulong MatchSize);
    void FindAll(ref byte DataToFind,
        uint DataSize,
        IMultiSelection Selection,
        bool IgnoreCase,
        IMultiSelection Found);
    void FindAllRegExp(string RegExp,
        uint SubExpression,
        RegExpFlags Flags,
        ulong StartFrom,
        ulong Size,
        IMultiSelection Found);
    void FindAllRegExp2(string RegExp,
        uint CodePage,
        uint SubExpression,
        RegExpFlags Flags,
        ulong StartFrom,
        ulong Size,
        IMultiSelection Found);
    void Replace(ulong Offset,
        uint SizeFrom,
        ref byte To,
        uint SizeTo);
    void ReplaceAll(ref byte From,
        uint SizeFrom,
        ref byte To,
        uint SizeTo,
        bool IgnoreCase,
        IMultiSelection Selection);
    void ReplaceAllRegExp(string RegExp,
        uint SubExpression,
        uint SubExpression,
        RegExpFlags Flags,
        ref byte To,
        uint SizeTo,
        ulong StartFrom,
        ulong Size);
    void ReplaceAllRegExp2(string RegExp,
        uint CodePage,
        uint SubExpression,
        RegExpFlags Flags,
        ref byte To,
        uint SizeTo,
        ulong StartFrom,
        ulong Size);
    void ReplaceAllRegExpWithRegExp(string RegExp,
        string ReplacePattern,
        uint CodePage,
        RegExpFlags Flags,
        ulong StartFrom,
        ulong Size);
    void ArithmeticOp(IMultiSelection Selection,
        ArithmeticOpType Type,
        OperandSizeType OpSize,
        object Operand);
    void BitwiseOp(IMultiSelection Selection, BitwiseOpType Type, ref byte Data, uint DataSize);
    void CaseOp(IMultiSelection Selection,
        CaseOpType Type,
        bool Unicode,
        object CodePage);
    void ShiftOp(IMultiSelection Selection, ShiftOpType Type,  OpSize, uint Bits);
    void ReverseOp(IMultiSelection Selection, ReverseOpType Type, OperandSizeType OpSize);
    ulong[] GatherStatistics(IMultiSelection Selection);
    void PatternStatistics(ref byte Pattern,
        uint DataSize,
        bool IgnoreCase,
        ref ulong DataBuffer,
        uint Blocks,
        IMultiSelection Selection);
    void PatternStatisticsRegExp(string RegExp,
        uint SubExpression,
        RegExpFlags Flags,
        ref ulong DataBuffer,
        uint Blocks,
        ulong StartFrom,
        ulong Size);
    void PatternStatisticsRegExp2(string RegExp,
        uint CodePage,
        uint SubExpression,
        RegExpFlags Flags,
        ref ulong DataBuffer,
        uint Blocks,
        ulong StartFrom,
        ulong Size);
    IMultiSelection CreateEmptySelection();
    ISequence CreateSequence();
}
```

C++

```
struct IFileDocument : IDispatch
{
    // Properties
    VARIANT_BOOL AutoCreateBranch;  // get set
    _bstr_t FileName;  // get
    unsigned long long FileSize;  // get set
    VARIANT_BOOL Modified;  // get
    VARIANT_BOOL Stream;  // get
    VARIANT_BOOL ReadOnly;  // get
    _bstr_t RegExpSyntaxError;  // get set
    VARIANT_BOOL CanRedo;  // get
    VARIANT_BOOL CanUndo;  // get
    VARIANT_BOOL CanPaste;  // get
    // Methods
    HRESULT Close();
    HRESULT New();
    HRESULT Open(_bstr_t Name, VARIANT_BOOL ReadOnly);
    HRESULT OpenPhysicalDisk(_bstr_t PhysicalDiskName, _bstr_t FriendlyName, VARIANT_BOOL ReadOnly);
    HRESULT OpenPhysicalMemory();
    HRESULT OpenProcess(unsigned long ProcessId, long long Start, unsigned long long Size, VARIANT_BOOL Re
    HRESULT OpenVolume(_bstr_t VolumeName, _bstr_t FriendlyName, VARIANT_BOOL ReadOnly);
    HRESULT OpenVolume(_bstr_t VolumeName, _bstr_t FriendlyName, VARIANT_BOOL ReadOnly);
    HRESULT Save(VARIANT_BOOL ForceBackup);
    HRESULT SaveAs(_bstr_t FileName);
    HRESULT GetModifiedSel(IMultiSelectionPtr Selection);
    HRESULT Decrypt(_bstr_t Provider,
        unsigned long ProviderType,
        unsigned long AlgoID,
        _bstr_t Password,
        IMultiSelectionPtr Selection,
        _variant_t KeyLength);
    HRESULT Delete(unsigned long long Offset, unsigned long long Size);
    HRESULT DeleteMulti(IMultiSelectionPtr Selection);
    HRESULT Encrypt(_bstr_t Provider,
        unsigned long ProviderType,
        unsigned long AlgoID,
        _bstr_t Password,
        IMultiSelectionPtr Selection,
        _variant_t KeyLength);
    HRESULT Fill(unsigned char * Pattern,
        unsigned long PatternSize,
        unsigned long long Offset,
        unsigned long long Size);
    HRESULT FillByte(unsigned char FillValue, unsigned long long Offset, unsigned long long Size);
    HRESULT FillByteMulti(unsigned char FillValue, IMultiSelectionPtr Selection);
    HRESULT FillMulti(unsigned char * Pattern, unsigned long PatternSize, IMultiSelectionPtr Selection,  C
    HRESULT Insert(unsigned char * Data, unsigned long long Offset, unsigned long InsertSize);
    HRESULT InsertByte(unsigned char ByteFill, unsigned long long Offset, unsigned long long Size);
    HRESULT InsertPattern(unsigned char * Pattern,
        unsigned long PatternSize,
        unsigned long long Offset,
        unsigned long long Size);
    HRESULT PutFile(_bstr_t FileName, unsigned long long Offset, VARIANT_BOOL InsertMode);
    HRESULT Read(unsigned char * Data, unsigned long long Offset, unsigned long ReadSize);
    HRESULT Write(unsigned char * Data, unsigned long long Offset, unsigned long WriteSize);
    HRESULT CreatePatch(_bstr_t PatchName, PatchOptions Options, _variant_t PathToStubFile);
    HRESULT LoadHistory(IStream * Stream);
    HRESULT Purge(HistoryPurgeLevel Level);
    HRESULT Redo(_variant_t Steps);
    HRESULT SaveHistory(IStream * Stream);
    HRESULT Undo(_variant_t Steps);
    HRESULT Copy(IMultiSelectionPtr Selection, VARIANT_BOOL MergeBlocks);
    HRESULT Cut(IMultiSelectionPtr Selection, VARIANT_BOOL MergeBlocks);
    HRESULT Paste(unsigned long long Offset, VARIANT_BOOL InsertMode);
    HRESULT Paste2(unsigned long long Offset, TextType Type, VARIANT_BOOL InsertMode);
    HRESULT Paste3(unsigned long long Offset, TextType Type, Paste3Flags Flags);
    HRESULT PasteText(unsigned long long Offset, VARIANT_BOOL Unicode, VARIANT_BOOL InsertMode);
    HRESULT PasteText2(unsigned long long Offset, unsigned long CodePage, VARIANT_BOOL InsertMode);
    unsigned long long Find(unsigned char * DataToFind,
        unsigned long DataSize,
        IMultiSelectionPtr Selection,
        unsigned long long StartFrom,
        VARIANT_BOOL SearchUp,
        VARIANT_BOOL ignore_case);
    HRESULT FindRegExp(_bstr_t RegExp,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long StartFrom,
        unsigned long long Size,
        unsigned long long * FoundOffset,
        unsigned long long * MatchSize);
    HRESULT FindRegExp2(_bstr_t RegExp,
        unsigned long CodePage,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long StartFrom,
        unsigned long long Size,
        unsigned long long * FoundOffset,
        unsigned long long * MatchSize);
    HRESULT FindAll(unsigned char * DataToFind,
        unsigned long DataSize,
        IMultiSelectionPtr Selection,
        VARIANT_BOOL IgnoreCase,
        IMultiSelectionPtr Found);
    HRESULT FindAllRegExp(_bstr_t RegExp,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long StartFrom,
        unsigned long long Size,
        IMultiSelectionPtr Found);
    HRESULT FindAllRegExp2(_bstr_t RegExp
    HRESULT FindAllRegExp2(_bstr_t RegExp,
        unsigned long CodePage,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long StartFrom,
        unsigned long long Size,
        IMultiSelectionPtr Found);
    HRESULT Replace(unsigned long long Offset,
        unsigned long SizeFrom,
        unsigned char * To,
        unsigned long SizeTo);
    HRESULT ReplaceAll(unsigned char * From,
        unsigned long SizeFrom,
        unsigned char * To,
        unsigned long SizeTo,
        VARIANT_BOOL IgnoreCase,
        IMultiSelectionPtr Selection);
    HRESULT ReplaceAllRegExp(_bstr_t RegExp,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned char To,
        unsigned long SizeTo,
        unsigned long long StartFrom,
        unsigned long long Size);
    HRESULT ReplaceAllRegExp2(_bstr_t RegExp,
        unsigned long CodePage,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned char * To,
        unsigned long SizeTo,
        unsigned long long StartFrom,
        unsigned long long Size);
    HRESULT ReplaceAllRegExpWithRegExp(_bstr_t RegExp,
        _bstr_t ReplacePattern,
        unsigned long CodePage,
        RegExpFlags Flags,
        unsigned long long StartFrom,
        unsigned long long Size);
    HRESULT ArithmeticOp(IMultiSelectionPtr Selection,
        ArithmeticOpType Type,
        OperandSizeType OpSize,
        _variant_t Operand);
    HRESULT BitwiseOp(IMultiSelectionPtr Selection, BitwiseOpType Type, unsigned char * Data, unsigned lon
    HRESULT CaseOp(IMultiSelectionPtr Selection,
        CaseOpType Type,
        VARIANT_BOOL Unicode,
        _variant_t CodePage);
    HRESULT ShiftOp(IMultiSelectionPtr Selection, ShiftOpType Type,  OpSize, unsigned long Bits);
    HRESULT ReverseOp(IMultiSelectionPtr Selection, ReverseOpType Type, OperandSizeType OpSize);
    unsigned long long[256] GatherStatistics(IMultiSelectionPtr Selection);
    HRESULT PatternStatistics(unsigned char * Pattern,
        unsigned long DataSize,
        VARIANT_BOOL IgnoreCase,
        unsigned long long * DataBuffer,
        unsigned long Blocks,
        IMultiSelectionPtr Selection);
    HRESULT PatternStatisticsRegExp(_bstr_t RegExp,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long * DataBuffer,
        unsigned long Blocks,
        unsigned long long StartFrom,
        unsigned long long Size);
    HRESULT PatternStatisticsRegExp2(_bstr_t RegExp,
        unsigned long CodePage,
        unsigned long SubExpression,
        RegExpFlags Flags,
        unsigned long long * DataBuffer,
        unsigned long Blocks,
        unsigned long long StartFrom,
        unsigned long long Size);
    IMultiSelectionPtr CreateEmptySelection();
    ISequencePtr CreateSequence();
};
```

IFileDocument Properties

AutoCreateBranch

```
TypeScript
AutoCreateBranch: boolean;
```

```
C#
bool AutoCreateBranch { get; set; }
```

```
C++
VARIANT_BOOL AutoCreateBranch;  // get set
```

Description

`true` if *Auto Create Branches* option enabled, `false` otherwise.

Query or set the AutoCreateBranch property value. See theHistory » Auto Create Branches switch description for more information about this property.

FileName

```
TypeScript
readonly FileName: string;
```

```
C#
string FileName { get; }
```

```
C++
_bstr_t FileName;  // get
```

Description

The full file's path name.

Example

Using the FileName property

```
JavaScript
var fdoc=new ActiveXObject("FileDocument.FileDocument");
fdoc.Open("c:\\temp\\file.bin");
alert("Full file name is " + fdoc.FileName);
```

FileSize

```
TypeScript
FileSize: number;
```

```
C#
ulong FileSize { get; set; }
```

```
C++
unsigned long long FileSize;  // get set
```

Description

Retrieve or change the current file's size. When used to change the file's size, new operation is created in document's operation history.

Complexity: constant-time.

Example

Setting file's size

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
fdoc.New();  // initialize a new, empty document
fdoc.FileSize = 1024*1024; // set the size of the file to 1 MB
fdoc.SaveAs("c:\\temp\\file.bin");
```

Modified

```
TypeScript
readonly Modified: boolean;
```

```
C#
bool Modified { get; }
```

```
C++
VARIANT_BOOL Modified;  // get
```

Description

Returns the modified document state.

Stream

```
TypeScript
readonly Stream: boolean;
```

```
C#
bool Stream { get; }
```

```
C++
VARIANT_BOOL Stream;  // get
```

Description

This property is `true` if document represents an NTFS stream and `false` otherwise.

ReadOnly

```
TypeScript
readonly ReadOnly: boolean;
```

```
C#
bool ReadOnly { get; }
```

```
C++
VARIANT_BOOL ReadOnly;  // get
```

Description

Retrieves the document's ReadOnly state.

RegExpSyntaxError

```
TypeScript
RegExpSyntaxError: string;
```

```
C#
string RegExpSyntaxError { get; set; }
```

```
C++
_bstr_t RegExpSyntaxError;  // get set
```

Description

Returns a textual representation (in English) of a regular expression syntax error, if any.

CanRedo

TypeScript

```
readonly CanRedo: boolean;
```

C#

```
bool CanRedo { get; }
```

C++

```
VARIANT_BOOL CanRedo;  // get
```

Description

Determine if you can call the IFileDocument.Redo method.

Example

Sample implementation of the Redo method

C++

```
void Redo(IFileDocument *pFileDocument)
{
  VARIANT_BOOL bCanRedo;

  pFileDocument->get_CanRedo(&bCanRedo);
  if (bCanRedo == VARIANT_TRUE)
    pFileDocument->Redo();
}
```

Sample implementation of the Redo method

C#

```
public void Redo(IFileDocument fdoc)
{
  if (fdoc.CanRedo)
    fdoc.Redo();
}
```

CanUndo

TypeScript

```
readonly CanUndo: boolean;
```

C#

```
bool CanUndo { get; }
```

C++

```
VARIANT_BOOL CanUndo;  // get
```

Description

Determine if you can call the IFileDocument.Undo method.

Example

Sample implementation of the Undo method

C++

```
void Undo(IFileDocument *pFileDocument)
{
  VARIANT_BOOL bCanUndo;

  pFileDocument->get_CanUndo(&bCanUndo);
  if (bCanUndo == VARIANT_TRUE)
    pFileDocument->Undo();
}
```

Sample implementation of the Undo method

```
C#
public void Undo(IFileDocument fdoc)
{
  if (fdoc.CanUndo)
    fdoc.Undo();
}
```

CanPaste

```
TypeScript
readonly CanPaste: boolean;
```

```
C#
bool CanPaste { get; }
```

```
C++
VARIANT_BOOL CanPaste;  // get
```

Description

Determine if you can paste data from the Clipboard.

Example

```
C++
// pFileDocument is initialized elsewhere
VARIANT_BOOL bCanPaste;
pFileDocument->get_CanPaste(&bCanPaste);
if (bCanPaste != VARIANT_FALSE)
{
  // Clipboard contains compatible data
} else
{
  // Clipboard contains incompatible data
}
```

IFileDocument Methods

Close

```
TypeScript
Close(): void;
```

```
C#
void Close();
```

```
C++
HRESULT Close();
```

Description

Discard document's operation history and close the document. You may subsequently call the IFileDocument.New or IFileDocument.Open method for this document.

Complexity: constant-time.

Example

Reusing document objects

```
C#
var fdoc = new FileDocumentLib.FileDocument();
fdoc.Open(@"c:\temp\file1");
// perform modifications to the file and save it
fdoc.Save(false);

// prepare the object to work with a next document
fdoc.Close();
fdoc.Open(@"c:\temp\file2");
// ...
```

New

```
TypeScript
New(): void;
```

```
C#
void New();
```

```
C++
HRESULT New();
```

Description

Creates a new, empty document.

Complexity: constant-time.

Open

```
TypeScript
Open(Name: string, ReadOnly: boolean): void;
```

```
C#
void Open(string Name, bool ReadOnly);
```

```
C++
HRESULT Open(_bstr_t Name, VARIANT_BOOL ReadOnly);
```

Parameters

`Name`

Full path to the opened file.

`ReadOnly`

Force read-only mode (the IFileDocument.Save method is disabled).

Description

Opens an existing document. Hex Editor Neo tries to get a read-only access to the file. It also denies write access to all future open attempts, until the file is closed.

Complexity: constant-time.

If supported by the file system, the name may be actually the name of the alternate data stream. Hex Editor Neo fully supports NTFS alternate data streams You may use any method provided by the object after opening the file stream. Note however, that there are few limitations that are described in the IFileDocument.Save method section.

Example

Opening a document

```
C#
var fdoc = new FileDocumentLib.FildDocument();
fdoc.Open(@"\\server\share\somefile.bin", false);
```

OpenPhysicalDisk

```
TypeScript
OpenPhysicalDisk(PhysicalDiskName: string, FriendlyName: string, ReadOnly: boolean): void;
```

```
C#
void OpenPhysicalDisk(string PhysicalDiskName, string FriendlyName, bool ReadOnly);
```

```
C++
HRESULT OpenPhysicalDisk(_bstr_t PhysicalDiskName, _bstr_t FriendlyName, VARIANT_BOOL ReadOnly);
```

Parameters

`PhysicalDiskName`

The string of form `\\.\PhysicalDriveN`, where `N` is a physical disk number (starting from 0).

`FriendlyName`

Friendly name. Used only in the editor. You may pass an empty string to this parameter.

`ReadOnly`

Specify `true` to open a disk as read-only, or `false` otherwise.

Description

Open physical disk.

OpenPhysicalMemory

```
TypeScript
OpenPhysicalMemory(): void;
```

```
C#
void OpenPhysicalMemory();
```

```
C++
HRESULT OpenPhysicalMemory();
```

Description

Open read only access to computer physical memory. Supported only on Windows 2000 and Windows XP.

OpenProcess

```
TypeScript
OpenProcess(ProcessId: number, Start: number, Size: number, ReadOnly: boolean): void;
```

```
C#
void OpenProcess(uint ProcessId, long Start, ulong Size, bool ReadOnly);
```

```
C++
HRESULT OpenProcess(unsigned long ProcessId, long long Start, unsigned long long Size, VARIANT_BOOL ReadOn
```

Parameters

`ProcessId`

Process Identifier

`Start`

Starting memory address

`Size`

Size of the range to open

`ReadOnly`

`true` to disable the Save command, `false` otherwise.

Description

Open process memory.

OpenVolume

```
TypeScript
OpenVolume(VolumeName: string, FriendlyName: string, ReadOnly: boolean): void;
```

```
C#
void OpenVolume(string VolumeName, string FriendlyName, bool ReadOnly);
```

```
C++
HRESULT OpenVolume(_bstr_t VolumeName, _bstr_t FriendlyName, VARIANT_BOOL ReadOnly);
```

Parameters

`VolumeName`

The name of the volume to open. May be a string of form `\\.\c:` to open a drive letter, or a full volume mount point name.

`FriendlyName`

The friendly name. Used only in the editor. You may pass an empty string in this parameter.

`ReadOnly`

Specify `true` to open a volume as read-only, or `false` otherwise.

Description

Open a volume (logical disk).

Save

```
TypeScript
Save(ForceBackup: boolean): void;
```

```
C#
void Save(bool ForceBackup);
```

```
C++
HRESULT Save(VARIANT_BOOL ForceBackup);
```

Parameters

`ForceBackup`

Force creation of backup copy of the file.

Description

Saves all document's changes and drop document's operation history. IFileDocument.FileName property must not be empty to successfully call this method. In particular, the Save method may not be called after the IFileDocument.New method. IFileDocument.SaveAs method always set the IFileDocument.FileName property, so you may call the Save method after the SaveAs method was once called for a document.

`ForceBackup` parameter is ignored (assumed to be `false`) if the current object represents the NTFS alternate data stream, physical disk, volume, process virtual memory or physical memory.

SaveAs

```
TypeScript
SaveAs(FileName: string): void;
```

```
C#
void SaveAs(string FileName);
```

C++

```
HRESULT SaveAs(_bstr_t FileName);
```

Parameters

`FileName`

Full name of the file to write

Description

Saves the file with a different name. The Save As command does not drop a document'soperation history. Passing the name of an NTFS alternate data stream to this method is an error and leads to undefined behavior.

To save a document to alternate data stream, first create a stream (this function is outside the scope of this library), open the File Document Object for created stream and use the IFileDocument.Copy and IFileDocument.Paste methods to copy the contents. Then call the created object's IFileDocument.Save method to apply changes.

GetModifiedSel

TypeScript

```
GetModifiedSel(Selection: IMultiSelection): void;
```

C#

```
void GetModifiedSel(IMultiSelection Selection);
```

C++

```
HRESULT GetModifiedSel(IMultiSelectionPtr Selection);
```

Parameters

`Selection`

Multiple Selection object to be filled with modified ranges.

Description

Fills a provided Multiple Selection object with ranges that describe the changed data in the document. The method clears the given multiple selection object before execution.

Complexity: linear-time, depending on the number of document modifications.

Example

Using GetModifiedSel method

C#

```
var fdoc = new FileDocumentLib.FileDocument();
fdoc.Open(@"c:\temp\file.bin");
fdoc.FillByte(0x35, 100, 20);
fdoc.FillByte(0x36, 200, 30);
var msel = fdoc.CreateEmptySelection();
fdoc.GetModifiedSel(msel);
// msel is now: [100..120) U [200..230)
```

Decrypt

TypeScript

```
Decrypt(Provider: string,
    ProviderType: number,
    AlgoID: number,
    Password: string,
    Selection: IMultiSelection,
    KeyLength?: number): void;
```

```
C#
void Decrypt(string Provider,
    uint ProviderType,
    uint AlgoID,
    string Password,
    IMultiSelection Selection,
    uint KeyLength);
```

```
C++
HRESULT Decrypt(_bstr_t Provider,
    unsigned long ProviderType,
    unsigned long AlgoID,
    _bstr_t Password,
    IMultiSelectionPtr Selection,
    _variant_t KeyLength);
```

Parameters

`Provider`

The name of the encryption provider. Consult the Microsoft Cryptography API documentation for more information.

`ProviderType`

The provider type. Consult the Microsoft Cryptography API documentation for more information.

`AlgoID`

Algortihm identifier.

`Password`

String containing a password.

`Selection`

Multiple selection object specifying data to encrypt.

`KeyLength`

Key length, for supported algorithms.

Description

Decrypt the contents of the document.

Delete

```
TypeScript
Delete(Offset: number, Size: number): void;
```

```
C#
void Delete(ulong Offset, ulong Size);
```

```
C++
HRESULT Delete(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

Range offset.

`Size`

Range size.

Description

Deletes the given range from the document.

Complexity: constant-time.

Example

Deleting document's data

C++

```cpp
CComPtr<IFileDocument> pFileDocument;
if (SUCCEEDED(pFileDocument.CoCreateInstance(L"FileDocument.FileDocument")))
{
  if (SUCCEEDED(pFileDocument->Open(L"c:\\temp\\file.bin", VARIANT_FALSE)))
  {
    pFileDocument->Delete(0x50, 0x2a);
    pFileDocument->Save(false);
  }
}
```

DeleteMulti

TypeScript

```typescript
DeleteMulti(Selection: IMultiSelection): void;
```

C#

```csharp
void DeleteMulti(IMultiSelection Selection);
```

C++

```cpp
HRESULT DeleteMulti(IMultiSelectionPtr Selection);
```

Parameters

`Selection`

Multiple selection object, which describes the ranges to remove from the document.

Description

Deletes the given multiple selection from the document.

Complexity: linear-time, depending on the selection's complexity.

Example

Deleting document's data

C++

```cpp
CComPtr<IFileDocument> pFileDocument;
if (SUCCEEDED(pFileDocument.CoCreateInstance(L"FileDocument.FileDocument")))
{
  if (SUCCEEDED(pFileDocument->Open(L"c:\\temp\\file.bin", VARIANT_FALSE)))
  {
    CComPtr<IMultiSelection> pMultiSelection;
    if (SUCCEEDED(pFileDocument->CreateEmptySelection(&pMultiSelection)))
    {
      pMultiSelection->AddRange(100, 20);
      pMultiSelection->AddRange(200, 30);
      pFileDocument->DeleteMulti(pMultiSelection);
      pFileDocument->Save(false);
    }
  }
}
```

Encrypt

TypeScript

```typescript
Encrypt(Provider: string,
    ProviderType: number,
    AlgoID: number,
    Password: string,
    Selection: IMultiSelection,
    KeyLength?: number): void;
```

```
C#
void Encrypt(string Provider,
    uint ProviderType,
    uint AlgoID,
    string Password,
    IMultiSelection Selection,
    uint KeyLength);
```

```
C++
HRESULT Encrypt(_bstr_t Provider,
    unsigned long ProviderType,
    unsigned long AlgoID,
    _bstr_t Password,
    IMultiSelectionPtr Selection,
    _variant_t KeyLength);
```

Parameters

`Provider`

The name of the encryption provider. Consult the Microsoft Cryptography API documentation for more information.

`ProviderType`

The provider type. Consult the Microsoft Cryptography API documentation for more information.

`AlgoID`

Algortihm identifier.

`Password`

String containing a password.

`Selection`

Multiple selection object specifying data to encrypt.

`KeyLength`

Key length, for supported algorithms.

Description

Decrypt the contents of the document.

Fill

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void Fill(ref byte Pattern,
    uint PatternSize,
    ulong Offset,
    ulong Size);
```

```
C++
HRESULT Fill(unsigned char * Pattern,
    unsigned long PatternSize,
    unsigned long long Offset,
    unsigned long long Size);
```

Parameters

`Pattern`

Pointer to a pattern.

`PatternSize`

Pattern size, in bytes.

`Offset`

Range starting offset.

`Size`

Range size.

Description

Fills a given range with a given pattern. A pattern is repeated until the required number of bytes is written to the file. If file is shorter than the filling range, the file's size is increased.

Complexity: constant-time.

Example

Filling a range with a simple pattern

```
C++
// pFileDocument is initialized elsewhere
unsigned char Pattern[]="Simple Pattern";
HRESULT hRes = pFileDocument->Fill(Pattern, sizeof(Pattern) - 1, 0x10000i64, 0x10ffi64);
```

FillByte

```
TypeScript
FillByte(FillValue: number, Offset: number, Size: number): void;
```

```
C#
void FillByte(byte FillValue, ulong Offset, ulong Size);
```

```
C++
HRESULT FillByte(unsigned char FillValue, unsigned long long Offset, unsigned long long Size);
```

Parameters

`FillValue`

The byte to put in the range.

`Offset`

Range offset.

`Size`

Range size.

Description

Fills a given range with a single byte value.

Complexity: constant-time.

Example

Filling a range with a single byte

```
C#
// fdoc is initialized elsewhere
fdoc.FillByte(0x34, 1000, 200);
```

FillByteMulti

```
TypeScript
FillByteMulti(FillValue: number, Selection: IMultiSelection): void;
```

```
C#
void FillByteMulti(byte FillValue, IMultiSelection Selection);
```

```
C++
HRESULT FillByteMulti(unsigned char FillValue, IMultiSelectionPtr Selection);
```

Parameters

`FillValue`

The byte to put in the selection.

`Selection`

The multiple selection object, which contains the ranges to fill in the document.

Description

Fills a given multiple selection with a single byte value.

Complexity: linear-time, depending on the selection's complexity.

Example

Filling a range with a single byte

```
C#
// fdoc is initialized elsewhere
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);
msel.AddRange(200, 30);
fdoc.FillByteMulti(0x35, msel);
```

FillMulti

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void FillMulti(ref byte Pattern, uint PatternSize, IMultiSelection Selection,  Continue);
```

```
C++
HRESULT FillMulti(unsigned char * Pattern, unsigned long PatternSize, IMultiSelectionPtr Selection,  Conti
```

Parameters

`Pattern`

Pointer to a pattern

`PatternSize`

Pattern Size

`Selection`

The multiple selection object, which contains the ranges to fill in the document.

`Continue`

True to continue filling in a new range and False to start from the beginning of the pattern. See the description of the “Transparent fill” flag in the Fill user-interface command for more information.

Description

Fills a given multiple selection with a specified pattern. The pattern is repeated until all given range(s) are filled. bCont parameter specifies whether to continue filling a new range from the previous range, or from the beginning of the pattern.

Complexity: linear-time, depending on the selection's complexity.

Example

Filling a range with a single byte

```
C#
// fdoc is initialized elsewhere
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);
msel.AddRange(200, 30);
byte[] pattern = new byte[] { 0x31, 0x32, 0x33 };
fdoc.FillMulti(ref pattern[0], pattern.Length, msel, false);
```

Insert

TypeScript

```
// This method is not available in scripting environment
```

C#

```
void Insert(ref byte Data, ulong Offset, uint InsertSize);
```

C++

```
HRESULT Insert(unsigned char * Data, unsigned long long Offset, unsigned long InsertSize);
```

Parameters

`Data`

Pointer to a pattern.

`Offset`

Insert offset.

`InsertSize`

Pattern size.

Description

Inserts a pattern into the document. Insert command shifts file's data to free up the space to fit an inserted pattern.

Complexity: constant-time.

Example

Inserting a pattern

C#

```
// fdoc is initialized elsewhere
byte[] pattern = new byte[] { 0x0d, 0x0a };
fdoc.Insert(ref pattern[0], 100, pattern.Length);  // insert a given pattern at the offset 100
```

InsertByte

TypeScript

```
InsertByte(ByteFill: number, Offset: number, Size: number): void;
```

C#

```
void InsertByte(byte ByteFill, ulong Offset, ulong Size);
```

C++

```
HRESULT InsertByte(unsigned char ByteFill, unsigned long long Offset, unsigned long long Size);
```

Parameters

`ByteFill`

The byte value to insert.

`Offset`

Insert offset.

`Size`

Insert size.

Description

Inserts a block of a given size into the document and fill it with a given byte value.

Complexity: constant-time.

Example

Inserting a pattern

```
C#
// fdoc is initialized elsewhere
fdoc.InsertByte('#', 100, 10000);
```

InsertPattern

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void InsertPattern(ref byte Pattern,
    uint PatternSize,
    ulong Offset,
    ulong Size);
```

```
C++
HRESULT InsertPattern(unsigned char * Pattern,
    unsigned long PatternSize,
    unsigned long long Offset,
    unsigned long long Size);
```

Parameters

`Pattern`

Pointer to a pattern.

`PatternSize`

Pattern Size.

`Offset`

Insert offset.

`Size`

Insert size.

Description

Inserts a given pattern into the document, repeating it to fill the given size. Insert command shifts file's data to free up the space to fit an inserted pattern.

Complexity: constant-time.

Example

Inserting a pattern

```
C#
// fdoc is initialized elsewhere
byte[] pattern = new byte[] { 0x0d, 0x0a };
fdoc.InsertPattern(ref pattern[0], pattern.Length, 100, 1000);
```

PutFile

```
TypeScript
PutFile(FileName: string, Offset: , InsertMode: boolean): void;
```

```
C#
void PutFile(string FileName, ulong Offset, bool InsertMode);
```

```
C++
HRESULT PutFile(_bstr_t FileName, unsigned long long Offset, VARIANT_BOOL InsertMode);
```

Parameters

`FileName`

The full path name of the file.

`Offset`

Insert offset.

`InsertMode`

`true` to insert a file's contents, `false` to overwrite the current document's data with data from the file.

Description

Writes or inserts the contents of the file into the current document. `InsertMode` parameter governs the behavior of the function.

Complexity: constant-time.

Example

Concatenating Files

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
fdoc.Open("c:\\temp\\file1.bin");
fdoc.PutFile("c:\\temp\\file2.bin", fdoc.FileSize, false);
fdoc.Save(false);
```

Read

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void Read(ref byte Data, ulong Offset, uint ReadSize);
```

```
C++
HRESULT Read(unsigned char * Data, unsigned long long Offset, unsigned long ReadSize);
```

Parameters

`Data`

A pointer to the buffer that receives the data read from a file

`Offset`

Read offset.

`ReadSize`

Total number of bytes to read.

Description

Reads data from a document. If requested data exceeds the current document's size, any excess bytes are filled with zeros.

Complexity: constant-time.

Example

Reading Data

```
C++
// pFileDocument is initialized elsewhere
unsigned char data[256];
pFileDocument->Read(data, 1000, 256);
```

Write

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void Write(ref byte Data, ulong Offset, uint WriteSize);
```

```
C++
HRESULT Write(unsigned char * Data, unsigned long long Offset, unsigned long WriteSize);
```

Parameters

`Data`

Pointer to the buffer containing the data to be written to the file.

`Offset`

Write offset.

`WriteSize`

Total number of bytes to write.

Description

Writes data to a document. The written data overwrites document's existing data and may also increase the file's size if it overlaps the current file's size. Write always creates a new operation in document's operation history.

Complexity: constant-time.

Example

Writing Data

```
C++
// pFileDocument is initialized elsewhere
unsigned char data[256];
pFileDocument->Write(data, 1000, 256);
```

CreatePatch

```
TypeScript
CreatePatch(PatchName: string, Options: PatchOptions, PathToStubFile?: string): void;
```

```
C#
void CreatePatch(string PatchName, PatchOptions Options, string PathToStubFile);
```

```
C++
HRESULT CreatePatch(_bstr_t PatchName, PatchOptions Options, _variant_t PathToStubFile);
```

Parameters

`PatchName`

The full path of the patch file. If file already exists, it is overwritten.

`Options`

Patch options. See [PatchOptions] enumeration for possible values.

`PathToStubFile`

An optional path to an executable stub file. Should be a full path to either `PatchApply32.exe` or `PatchApply64.exe` application, installed with the Hex Editor Neo.

Description

Creates a patch file. See the Patch Creation section for more information on patches.

Complexity: linear-time, depending on the number and complexity of operations in document's operation history.

Example

Creating patch

```
C#
// fdoc is initialized elsewhere
// Perform a modification to the file
fdoc.FillByte(0, 100, 20);
fdoc.CreatePatch(@"c:\patch.hexpatch", FileDocumentLib.PatchOptions.PatchCalculateHash | FileDocumentLib.P
```

LoadHistory

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void LoadHistory(IStream Stream);
```

```
C++
HRESULT LoadHistory(IStream * Stream);
```

Parameters

`Stream`

Pointer to a stream object from which to load history.

Description

Loads a document's operation history from a file.

Complexity: linear-time, depending on the saved history's complexity.

Purge

```
TypeScript
Purge(Level: HistoryPurgeLevel): void;
```

```
C#
void Purge(HistoryPurgeLevel Level);
```

```
C++
HRESULT Purge(HistoryPurgeLevel Level);
```

Parameters

`Level`

Purge level. Can be one of the values described in the HistoryPurgeLevel topic.

Description

Purges a document's operation history. See Purging History section for more information.

Complexity: constant-time for all purge levels except `HistoryPurgeAllButCurrent` and linear-time for `HistoryPurgeAllButCurrent`.

Example

Purging history

```
C#
// fdoc is initialized elsewhere
fdoc.FillByte(0x35, 100, 40);
// ...
fdoc.Purge(FileDocumentLib.HistoryPurgeLevel.HistoryPurgeAll);  // discard all operations
```

Redo

```
TypeScript
Redo(Steps?: number): void;
```

```
C#
void Redo(uint Steps);
```

```
C++
HRESULT Redo(_variant_t Steps);
```

Parameters

`Steps`

Optional number of operations to redo. If omitted, one operation is redone.

Description

Redoes `Steps` recently undone operations.

Complexity: constant-time.

SaveHistory

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void SaveHistory(IStream Stream);
```

```
C++
HRESULT SaveHistory(IStream * Stream);
```

Parameters

`Stream`

Pointer to a stream object to write history to.

Description

Saves the document's operation history to a given stream object.

Complexity: linear-time, depending on the history's complexity.

Undo

```
TypeScript
Undo(Steps?: number): void;
```

```
C#
void Undo(uint Steps);
```

```
C++
HRESULT Undo(_variant_t Steps);
```

Parameters

`Steps`

Optional number of operations to undo. If omitted, one operation is undone.

Description

Undoes last `Steps` operations.

Complexity: constant-time.

Copy

```
TypeScript
Copy(Selection: IMultiSelection, MergeBlocks: boolean): void;
```

```
C#
void Copy(IMultiSelection Selection, bool MergeBlocks);
```

```
C++
HRESULT Copy(IMultiSelectionPtr Selection, VARIANT_BOOL MergeBlocks);
```

Parameters

`Selection`

The multiple selection object.

`MergeBlocks`

`true` to merge selection blocks, `false` to leave them as is

Description

Copies the given selection to the Clipboard.

Complexity: linear-time, depending on the selection's complexity.

Example

Placing document's data to the Clipboard

```
C#
// fdoc is defined and obtained elsewhere
var msel = fdoc.CreateEmptySelection(); // create an empty selection object
msel.AddRange(100, 20); // add a first range to the selection
msel.AddRange(200, 20); // add a second range to the selection
fdoc.Copy(msel, false); // place data to the clipboard
```

Cut

```
TypeScript
Cut(Selection: IMultiSelection, MergeBlocks: boolean): void;
```

```
C#
void Cut(IMultiSelection Selection, bool MergeBlocks);
```

```
C++
HRESULT Cut(IMultiSelectionPtr Selection, VARIANT_BOOL MergeBlocks);
```

Parameters

`Selection`

The multiple selection object.

`MergeBlocks`

`true` to merge selection blocks, `false` to leave them as is

Description

Copies the given selection to the Clipboard and removes it from the document.

Complexity: linear-time, depending on the selection's complexity.

Example

Cutting document's data to the Clipboard

```
C#
// fdoc is defined and obtained elsewhere
var msel = fdoc.CreateEmptySelection(); // create an empty selection object
msel.AddRange(100, 20); // add a first range to the selection
msel.AddRange(200, 20); // add a second range to the selection
fdoc.Cut(msel, false); // place data to the clipboard
```

Paste

```
TypeScript
Paste(Offset: number, InsertMode: boolean): void;
```

```
C#
void Paste(ulong Offset, bool InsertMode);
```

```
C++
HRESULT Paste(unsigned long long Offset, VARIANT_BOOL InsertMode);
```

Parameters

`Offset`

Paste offset

`InsertMode`

`true` to insert data, `false` to overwrite data.

Description

Pastes data from the Clipboard to the given position. Pasted data either overwrites the current document's data, or is inserted into the document, shifting existing data forward, depending on the `InsertMode` parameter.

This method is superseded by IFileDocument.Paste2 method, but is still supported.

Example

Using Paste

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msel = fdoc.CreateEmptySelection();

msel.AddRange(0, 10);
fdoc.Copy(msel, false);

fdoc.Paste(20, true); // Equivalent to fdoc.Paste2(20, TypeHexByte, true);
fdoc.Paste(100, false); // Equivalent to fdoc.Paste2(100, TypeHexByte, false);
```

Paste2

```
TypeScript
Paste2(Offset: number, Type: TextType, InsertMode: boolean): void;
```

```
C#
void Paste2(ulong Offset, TextType Type, bool InsertMode);
```

```
C++
HRESULT Paste2(unsigned long long Offset, TextType Type, VARIANT_BOOL InsertMode);
```

Parameters

`Offset`

Paste offset

`Type`

Type of text in the Clipboard. Used only if Clipboard contains textual data, otherwise ignored. Can be one of the values from TextType enumeration. A number may be prefixed by the `0x` prefix which forces it to be in base 16.

`InsertMode`

`true` to insert data, `false` to overwrite data.

Description

Pastes data from the Clipboard to the given position. Pasted data either overwrites the current document's data, or is inserted into the document, shifting existing data forward, depending on the `InsertMode` parameter.

Example

Using Paste

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msel = fdoc.CreateEmptySelection();

msel.AddRange(0, 10);
fdoc.Copy(msel, false);

fdoc.Paste2(20, TextType.TypeHexByte, true);
fdoc.Paste2(100, TextType.TypeHexByte, false);
```

Paste3

```
TypeScript
Paste3(Offset: number, Type: TextType, Flags: Paste3Flags): void;
```

```
C#
void Paste3(ulong Offset, TextType Type, Paste3Flags Flags);
```

```
C++
HRESULT Paste3(unsigned long long Offset, TextType Type, Paste3Flags Flags);
```

Parameters

`Offset`

Paste offset

`Type`

Type of text in the Clipboard. Used only if Clipboard contains textual data, otherwise ignored. Can be one of the values from TextType enumeration. A number may be prefixed by the `0x` prefix which forces it to be in base 16.

`Flags`

Pasting flags. Can be one or more values from the Paste3Flags enumeration.

Description

Pastes data from the Clipboard to the given position. Pasted data either overwrites the current document's data, or is inserted into the document, shifting existing data forward, depending on the `InsertMode` flag in `Flags` parameter.

PasteText

```
TypeScript
PasteText(Offset: number, Unicode: boolean, InsertMode: boolean): void;
```

```
C#
void PasteText(ulong Offset, bool Unicode, bool InsertMode);
```

```
C++
HRESULT PasteText(unsigned long long Offset, VARIANT_BOOL Unicode, VARIANT_BOOL InsertMode);
```

Parameters

`Offset`

Paste offset

`Unicode`

Paste text as Unicode (`true`) or ANSI (`false`).

`InsertMode`

`true` to insert data, `false` to overwrite data.

Description

Pastes text from the Clipboard to the given position. Pasted data either overwrites the current document's data, or is inserted into the document, shifting existing data forward, depending on the `InsertMode` parameter.

Unicode parameter tells the Hex Editor Neo to interpret the text in the Clipboard as UNICODE or ANSI. `Unicode` is `true`, each character occupies two bytes, otherwise, it occupies a single byte.

PasteText2

```
TypeScript
PasteText2(Offset: number, CodePage: number, InsertMode: boolean): void;
```

```
C#
void PasteText2(ulong Offset, uint CodePage, bool InsertMode);
```

```
C++
HRESULT PasteText2(unsigned long long Offset, unsigned long CodePage, VARIANT_BOOL InsertMode);
```

Parameters

`Offset`

Paste offset

`CodePage`

The code page to convert text to. Set to `CP_UNICODE` (hardcoded as -5) to specify UTF-16 encoding.

`InsertMode`

True to insert data, False to overwrite data.

Description

Pastes text from the Clipboard to the given position. Pasted data either overwrites the current document's data, or is inserted into the document, shifting existing data forward, depending on the `InsertMode` parameter.

Hex Editor Neo uses the `CodePage` to convert the text in the Clipboard. Pass the `CP_UNICODE` (hardcoded as -5) to specify the UTF-16 encoding.

This method requires the `CF_UNICODETEXT` format to be present in the Clipboard in order to convert to the given encoding. If only `CF_TEXT` is available, than it operates exactly like the IFileDocument.PasteText method.

Find

```
TypeScript
// This method is not available in scripting environment
```

```
C#
ulong Find(ref byte DataToFind,
    uint DataSize,
    IMultiSelection Selection,
    ulong StartFrom,
    bool SearchUp,
    bool ignore_case);
```

```
C++
unsigned long long Find(unsigned char * DataToFind,
    unsigned long DataSize,
    IMultiSelectionPtr Selection,
    unsigned long long StartFrom,
    VARIANT_BOOL SearchUp,
    VARIANT_BOOL ignore_case);
```

Parameters

`DataToFind`

Pointer to a pattern.

`DataSize`

Pattern size.

`Selection`

Multiple selection object, which contains ranges in which you want to locate a pattern.

`StartFrom`

Offset from which you want to start searching.

`SearchUp`

`true` to search backwards and `false` to search forward.

`ignore_case`

`true` to ignore case and `false` to perform exact matching.

Return Value

Offset of the located pattern or -1 if pattern was not found.

Description

Searches for a pattern within a given selection. This method returns the offset of the matched pattern. To continue searching, call this method again, adjusting `StartFrom` parameter appropriately. If pattern is not found in the specified range, -1 is returned.

Complexity: linear-time, depending on the file's size and selection's complexity.

Example

Searching for a pattern

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msec = fdoc.CreateEmptySelection();

fdoc.Open(@"c:\temp\file.txt");
msec.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

byte[] pattern = new byte[] { 0x0d, 0x0a }; // EOL pattern
ulong EOL_Offset = fdoc.Find(ref pattern[0], pattern.Length, msel, 0, false, false);
// ...
// continue searching
EOL_Offset = fdoc.Find(ref pattern[0], pattern.Length, msel, EOL_Offset + 1, false, false);
```

FindRegExp

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void FindRegExp(string RegExp,
    uint SubExpression,
    RegExpFlags Flags,
    ulong StartFrom,
    ulong Size,
    ref ulong FoundOffset,
    ref ulong MatchSize);
```

```
C++
HRESULT FindRegExp(_bstr_t RegExp,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long StartFrom,
    unsigned long long Size,
    unsigned long long * FoundOffset,
    unsigned long long * MatchSize);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of values from RegExpFlags enumeration.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if RegExpTypeUNICODE flag is specified.

`Size`

Range's size. Must be a multiply of 2 if RegExpTypeUNICODE flag is specified.

`FoundOffset`

On output, the found offset is stored in this parameter.

`MatchSize`

On output, the match's size is stored in this parameter.

Description

Searches for an occurrence of a regular expression within a given range. To continue searching, call this method again, adjusting `StartFrom` field appropriately. If a pattern is not found in the specified range, this method returns an error.

Complexity: depends on the range's size and regular expression complexity.

I fregular expression syntax is invalid, the method returns (or throws) an error `E_INVALIDARG`. A IFileDocument.RegExpSyntaxError property contains the description of the syntax error.

When match is not found, the method returns (or throws) a `NOT_FOUND` error.

This function is obsolete. Use the IFileDocument.FindRegExp2 instead.

FindRegExp2

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void FindRegExp2(string RegExp,
    uint CodePage,
    uint SubExpression,
    RegExpFlags Flags,
    ulong StartFrom,
    ulong Size,
    ref ulong FoundOffset,
    ref ulong MatchSize);
```

```
C++
HRESULT FindRegExp2(_bstr_t RegExp,
    unsigned long CodePage,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long StartFrom,
    unsigned long long Size,
    unsigned long long * FoundOffset,
    unsigned long long * MatchSize);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`CodePage`

Code page for regular expression pattern encoding or CP_UNICODE (-5) for UTF-16.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be a combination of values from the RegExpFlags enumeration.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpTypeUNICODE` flag is specified.

`FoundOffset`

On output, the found offset is stored in this parameter.

`MatchSize`

On output, the match's size is stored in this parameter.

Description

Searches for an occurrence of a regular expression within a given range. To continue searching, call this method again, adjusting `StartFrom` field appropriately. If a pattern is not found in the specified range, this method returns an error.

Complexity: depends on the range's size and regular expression complexity.

I fregular expression syntax is invalid, the method returns (or throws) an error `E_INVALIDARG`. A IFileDocument.RegExpSyntaxError property contains the description of the syntax error.

When match is not found, the method returns (or throws) a `NOT_FOUND` error.

FindAll

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void FindAll(ref byte DataToFind,
    uint DataSize,
    IMultiSelection Selection,
    bool IgnoreCase,
    IMultiSelection Found);
```

```
C++
HRESULT FindAll(unsigned char * DataToFind,
    unsigned long DataSize,
    IMultiSelectionPtr Selection,
    VARIANT_BOOL IgnoreCase,
    IMultiSelectionPtr Found);
```

Parameters

`DataToFind`

Pointer to a pattern.

`DataSize`

Pattern size

`Selection`

Multiple Selection object, which contains ranges in which a pattern need to be located.

`IgnoreCase`

`true` to ignore case, `false` to perform exact matching.

`Found`

Multiple Selection object, which contains, on method's return, all located ranges.

Description

Locates all occurrences of a given pattern within a given multiple selection. You provide the function with an output Multiple Selection Object `Found`, in which it stores all located ranges. This object is automatically cleared before the operation begins. When the method returns, check the IMultiSelection.Empty property to see if there were any pattern occurrences.

Complexity: linear-time, depending on the file's size and selection's complexity.

Example

Searching all pattern occurrences

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msel = fdoc.CreateEmptySelection();
var mselOutput = fdoc.CreateEmptySelection();

fdoc.Open(@"c:\temp\file.txt");
msel.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

byte[] pattern = new byte[] { 0x0d, 0x0a }; // EOL pattern
fdoc.FindAll(ref pattern[0], pattern.Length, msel, false, mselOutput);
if (!mselOutput.Empty) // check if there are any matches
  fdoc.Copy(mselOutput,false);  // copy them to the Clipboard
```

FindAllRegExp

```
TypeScript
FindAllRegExp(RegExp: string,
    SubExpression: number,
    Flags: RegExpFlags,
    StartFrom: number,
    Size: number,
    Found: IMultiSelection): void;
```

```
C#
void FindAllRegExp(string RegExp,
    uint SubExpression,
    RegExpFlags Flags,
    ulong StartFrom,
    ulong Size,
    IMultiSelection Found);
```

```
C++
HRESULT FindAllRegExp(_bstr_t RegExp,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long StartFrom,
    unsigned long long Size,
    IMultiSelectionPtr Found);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more values from the RegExpFlags enumeration.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpTypeUNICODE` flag is specified.

`Found`

Multiple Selection object, which contains, on method's return, all located ranges.

Return Value

A number of occurrences

Description

Locates all matches of a given regular expression in a given range. You provide the function with an output Multiple Selection Object `Found`, in which it stores all located ranges. This object is automatically cleared before the operation begins. When the method returns, check the IMultiSelection.Empty property to see if there were any pattern occurrences.

Complexity: depends on the range's size and regular expression complexity.

This method is obsolete. Use the IFileDocument.FindAllRegExp2 instead.

FindAllRegExp2

TypeScript

```
FindAllRegExp2(RegExp: string,
    CodePage: number,
    SubExpression: number,
    Flags: RegExpFlags,
    StartFrom: number,
    Size: number,
    Found: IMultiSelection): void;
```

C#

```
void FindAllRegExp2(string RegExp,
    uint CodePage,
    uint SubExpression,
    RegExpFlags Flags,
    ulong StartFrom,
    ulong Size,
    IMultiSelection Found);
```

C++

```
HRESULT FindAllRegExp2(_bstr_t RegExp,
    unsigned long CodePage,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long StartFrom,
    unsigned long long Size,
    IMultiSelectionPtr Found);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`CodePage`

Code page for regular expression pattern encoding or CP_UNICODE (-5) for UTF-16.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more values from the RegExpFlags enumeration.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpTypeUNICODE` flag is specified.

`Found`

Multiple Selection object, which contains, on method's return, all located ranges.

Return Value

A number of occurrences.

Description

Locates all matches of a given regular expression in a given range. You provide the function with an output Multiple Selection Object `Found`, in which it stores all located ranges. This object is automatically cleared before the operation begins. When the method returns, check the IMultiSelection.Empty property to see if there were any pattern occurrences.

Complexity: depends on the range's size and regular expression complexity.

Replace

TypeScript

```typescript
// This method is not available in scripting environment
```

C#

```csharp
void Replace(ulong Offset,
    uint SizeFrom,
    ref byte To,
    uint SizeTo);
```

C++

```cpp
HRESULT Replace(unsigned long long Offset,
    unsigned long SizeFrom,
    unsigned char * To,
    unsigned long SizeTo);
```

Parameters

`Offset`

Replace offset.

`SizeFrom`

Size of the original pattern.

`To`

Pointer to a replace pattern.

`SizeTo`

Size of the replace pattern

Description

Replaces the given block with a pattern. This method replaces a range described by `Offset` and `SizeFrom` parameters with a pattern.

Complexity: constant-time.

Example

Replacing a pattern

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msec = fdoc.CreateEmptySelection();

fdoc.Open(@"c:\temp\file.txt");
msec.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

byte[] pattern1 = new byte[] { 0x0d, 0x0a }; // EOL pattern
byte[] pattern2 = new byte[] { 0x0d, 0x0a, 0x0d, 0x0a }; // Double-EOL pattern
ulong EOL_Offset = fdoc.Find(ref pattern1[0], pattern1.Length, msel, 0, false, false);
if (EOL_Offset != -1)
  fdoc.Replace(EOL_Offset, pattern1.Length, ref pattern2[0], pattern2.Length);
```

ReplaceAll

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void ReplaceAll(ref byte From,
    uint SizeFrom,
    ref byte To,
    uint SizeTo,
    bool IgnoreCase,
    IMultiSelection Selection);
```

```
C++
HRESULT ReplaceAll(unsigned char * From,
    unsigned long SizeFrom,
    unsigned char * To,
    unsigned long SizeTo,
    VARIANT_BOOL IgnoreCase,
    IMultiSelectionPtr Selection);
```

Parameters

`From`

Pointer to a search pattern.

`SizeFrom`

Search pattern size.

`To`

Pointer to a replace pattern.

`SizeTo`

Replace pattern size.

`IgnoreCase`

`true` to ignore case, `false` to perform exact matching.

`Selection`

Multiple Selection Object, describing the ranges in which to perform search and replace.

Return Value

A number of replacements done.

Description

Finds and replaces all occurrences of the given pattern with another pattern.

Complexity: varying.

Example

Searching all pattern occurrences

```
C#
var fdoc = new FileDocumentLib.FileDocument();
var msel = fdoc.CreateEmptySelection();

fdoc.Open(@"c:\temp\file.txt");
msel.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

byte[] pattern1 = new byte[] { 0x0d, 0x0a }; // EOL pattern
byte[] pattern2 = new byte[] { 0x0d, 0x0a, 0x0d, 0x0a }; // Double-EOL pattern
ulong nReplacements = fdoc.ReplaceAll(ref pattern1[0], pattern1.Length, ref pattern2[0], pattern2.Length,
```

ReplaceAllRegExp

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void ReplaceAllRegExp(string RegExp,
    uint SubExpression,
    RegExpFlags Flags,
    ref byte To,
    uint SizeTo,
    ulong StartFrom,
    ulong Size);
```

```
C++
HRESULT ReplaceAllRegExp(_bstr_t RegExp,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned char To,
    unsigned long SizeTo,
    unsigned long long StartFrom,
    unsigned long long Size);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from RegExpFlags enumeration.

`To`

Pointer to a replace pattern.

`SizeTo`

Replace pattern size.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Return Value

A number of occurrences.

Description

Finds and replaces all occurrences of regular expression matches with a given pattern.

Complexity: varying.

This method is obsolete. Use the IFileDocument.ReplaceAllRegExp2 instead.

ReplaceAllRegExp2

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void ReplaceAllRegExp2(string RegExp,
    uint CodePage,
    uint SubExpression,
    RegExpFlags Flags,
    ref byte To,
    uint SizeTo,
    ulong StartFrom,
    ulong Size);
```

```
C++
HRESULT ReplaceAllRegExp2(_bstr_t RegExp,
    unsigned long CodePage,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned char * To,
    unsigned long SizeTo,
    unsigned long long StartFrom,
    unsigned long long Size);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`CodePage`

Code page for regular expression pattern encoding or `CP_UNICODE` (-5) for UTF-16.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from the RegExpFlags enumeration.

`To`

Pointer to a replace pattern.

`SizeTo`

Replace pattern size.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Return Value

A number of occurrences.

Description

Finds and replaces all occurrences of regular expression matches with a given pattern.

Complexity: varying.

ReplaceAllRegExpWithRegExp

```
TypeScript
ReplaceAllRegExpWithRegExp(RegExp: string,
    ReplacePattern: string,
    CodePage: number,
    Flags: RegExpFlags,
    StartFrom: number,
    Size: number): void;
```

```
C#
void ReplaceAllRegExpWithRegExp(string RegExp,
    string ReplacePattern,
    uint CodePage,
    RegExpFlags Flags,
    ulong StartFrom,
    ulong Size);
```

```
C++
HRESULT ReplaceAllRegExpWithRegExp(_bstr_t RegExp,
    _bstr_t ReplacePattern,
    unsigned long CodePage,
    RegExpFlags Flags,
    unsigned long long StartFrom,
    unsigned long long Size);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`ReplacePattern`

A string that contains a replace regular expression.

`CodePage`

Code page for both regular expression patterns encoding or `CP_UNICODE` (-5) for UTF-16.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from RegExpFlags enumeration.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if UTF-16 encoding is used.

`Size`

Range's size. Must be a multiply of 2 if UTF-16 encoding is used.

Return Value

A number of occurrences.

Description

Finds and replaces all occurrences of regular expression matches with a given regular expression pattern.

Complexity: varying.

ArithmeticOp

```
TypeScript
ArithmeticOp(Selection: IMultiSelection,
    Type: ArithmeticOpType,
    OpSize: OperandSizeType,
    Operand?: any): void;
```

```
C#
void ArithmeticOp(IMultiSelection Selection,
    ArithmeticOpType Type,
    OperandSizeType OpSize,
    object Operand);
```

```
C++
HRESULT ArithmeticOp(IMultiSelectionPtr Selection,
    ArithmeticOpType Type,
    OperandSizeType OpSize,
    _variant_t Operand);
```

Parameters

`Selection`

The multiple selection object which contains ranges for this operation to work on.

`Type`

The operation to perform. Can be one of the values from the ArithmeticOpType enumeration.

`OpSize`

Specifies the operand size. Can be one of the values from the OperandSizeType enumeration.

`Operand`

Second operand. Ignored for `ArithmeticOpNegation` operation type.

Description

Performs an arithmetic operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

BitwiseOp

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void BitwiseOp(IMultiSelection Selection, BitwiseOpType Type, ref byte Data, uint DataSize);
```

```
C++
HRESULT BitwiseOp(IMultiSelectionPtr Selection, BitwiseOpType Type, unsigned char * Data, unsigned long Da
```

Parameters

`Selection`

The multiple selection object which contains ranges for this operation to work on.

`Type`

The operation to perform. Can be one of the values from the BitwiseOpType enumeration.

`Data`

Pointer to an operand pattern.

`DataSize`

Operand pattern size in bytes. Must be zero for `BitwiseOpNOT` operation type.

Description

Performs a bitwise operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

CaseOp

```
TypeScript
CaseOp(Selection: IMultiSelection,
    Type: CaseOpType,
    Unicode: boolean,
    CodePage?: number): void;
```

```
C#
void CaseOp(IMultiSelection Selection,
    CaseOpType Type,
    bool Unicode,
    object CodePage);
```

```
C++
HRESULT CaseOp(IMultiSelectionPtr Selection,
    CaseOpType Type,
    VARIANT_BOOL Unicode,
    _variant_t CodePage);
```

Parameters

`Selection`

The multiple selection object which contains ranges for this operation to work on.

`Type`

The operation to perform. Can be one of the values from CaseOpType enumeration.

`Unicode`

`true` to treat selection data as UNICODE, `false` otherwise. If this parameter is `true`, all blocks in a given selection must have alignment of 2 bytes.

`CodePage`

Optional code page that describes the encoding used in the selection. Ignored if `Unicode` parameter is True.

Description

Performs a case change operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

ShiftOp

```
TypeScript
ShiftOp(Selection: IMultiSelection, Type: ShiftOpType, OpSize: , Bits: number): void;
```

```
C#
void ShiftOp(IMultiSelection Selection, ShiftOpType Type,  OpSize, uint Bits);
```

```
C++
HRESULT ShiftOp(IMultiSelectionPtr Selection, ShiftOpType Type,  OpSize, unsigned long Bits);
```

Parameters

`Selection`

The multiple selection object which contains ranges for this operation to work on.

`Type`

The operation to perform. Can be one of the values from ShiftOpType enumeration.

`OpSize`

Specifies the operand size. Can be one of the values from OperandSizeType enumeration.

`Bits`

The number of bits to shift.

Description

Performs a shift operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

ReverseOp

```
TypeScript
ReverseOp(Selection: IMultiSelection, Type: ReverseOpType, OpSize: OperandSizeType): void;
```

```
C#
void ReverseOp(IMultiSelection Selection, ReverseOpType Type, OperandSizeType OpSize);
```

```
C++
HRESULT ReverseOp(IMultiSelectionPtr Selection, ReverseOpType Type, OperandSizeType OpSize);
```

Parameters

`Selection`

The multiple selection object which contains ranges for this operation to work on.

`Type`

The operation to perform. Can be one of the values from ReverseOpType enumeration.

`OpSize`

Specifies the operand size. Can be one of the values from OperandSizeType enumeration.

Description

Performs a bit or byte reverse operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

GatherStatistics

```
TypeScript
// This method is not available in scripting environment
```

```
C#
ulong[] GatherStatistics(IMultiSelection Selection);
```

```
C++
unsigned long long[256] GatherStatistics(IMultiSelectionPtr Selection);
```

Parameters

`Selection`

Multiple Selection object that describing ranges, in which you want to calculate statistics.

Return Value

Statistics array.

Description

Calculates file statistics. See theGeneral Statistics section for more information. On method return, each of 256 elements in an array contains the number of corresponding byte occurrences.

Complexity: linear-time, depending on the file's size.

Example

Calculating General Statistics

```
C++
// pFileDocument and pMultiSelection are initialized elsewhere
unsigned long long data[256];
pFileDocument->GatherStatistics(pMultiSelection, data);
```

PatternStatistics

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void PatternStatistics(ref byte Pattern,
    uint DataSize,
    bool IgnoreCase,
    ref ulong DataBuffer,
    uint Blocks,
    IMultiSelection Selection);
```

```
C++
HRESULT PatternStatistics(unsigned char * Pattern,
    unsigned long DataSize,
    VARIANT_BOOL IgnoreCase,
    unsigned long long * DataBuffer,
    unsigned long Blocks,
    IMultiSelectionPtr Selection);
```

Parameters

`Pattern`

Pointer to a pattern.

`DataSize`

Pattern Size.

`IgnoreCase`

`true` to ignore case, `false` to perform exact matching.

`DataBuffer`

Pointer to the statistics buffer.

`Blocks`

Number of blocks.

`Selection`

Multiple Selection Object, containing ranges in which you want to calculate statistics.

Description

Calculates file statistics. See the Pattern Statistics section for more information. On method return, the `DataBuffer` buffer is filled with calculated statistics values.

Complexity: linear-time, depending on the file's size.

Example

Calculating Pattern Statistics

```
C++
// pFileDocument and pMultiSelection are initialized elsewhere
unsigned __int64 data[1024];
unsigned char pattern[] = { 0x0d, 0x0a };
pFileDocument->PatternStatistics(pattern, sizeof(pattern), false, data, 1024, pMultiSelection);
```

PatternStatisticsRegExp

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void PatternStatisticsRegExp(string RegExp,
    uint SubExpression,
    RegExpFlags Flags,
    ref ulong DataBuffer,
    uint Blocks,
    ulong StartFrom,
    ulong Size);
```

```
C++
HRESULT PatternStatisticsRegExp(_bstr_t RegExp,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long * DataBuffer,
    unsigned long Blocks,
    unsigned long long StartFrom,
    unsigned long long Size);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from the RegExpFlags enumeration.

`DataBuffer`

Pointer to the statistics buffer.

`Blocks`

Number of blocks.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Description

Calculates file statistics for a given regular expression. See the Pattern Statistics section for more information. On method return, the `DataBuffer` buffer is filled with calculated statistics values.

Complexity: linear-time, depending on the file's size and regular expression complexity.

This method is obsolete. Use the IFileDocument.PatternStatisticsRegExp2 instead.

PatternStatisticsRegExp2

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void PatternStatisticsRegExp2(string RegExp,
    uint CodePage,
    uint SubExpression,
    RegExpFlags Flags,
    ref ulong DataBuffer,
    uint Blocks,
    ulong StartFrom,
    ulong Size);
```

```
C++
HRESULT PatternStatisticsRegExp2(_bstr_t RegExp,
    unsigned long CodePage,
    unsigned long SubExpression,
    RegExpFlags Flags,
    unsigned long long * DataBuffer,
    unsigned long Blocks,
    unsigned long long StartFrom,
    unsigned long long Size);
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`CodePage`

Code page for regular expression pattern encoding or `CP_UNICODE` (-5) for UTF-16.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from RegExpFlags enumeration.

`DataBuffer`

Pointer to the statistics buffer.

`Blocks`

Number of blocks.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Description

Calculates file statistics for a given regular expression. See the Pattern Statistics section for more information. On method return, the `DataBuffer` buffer is filled with calculated statistics values.

Complexity: linear-time, depending on the file's size and regular expression complexity.

CreateEmptySelection

```typescript
TypeScript
CreateEmptySelection(): IMultiSelection;
```

```csharp
C#
IMultiSelection CreateEmptySelection();
```

```cpp
C++
IMultiSelectionPtr CreateEmptySelection();
```

Return Value

Returns the newly created Multiple Selection Object.

Description

Sel Pointer to a variable that receives a pointer to the IMultiSelection interface of created multiple selection object.

Creates an empty selection object. Complexity: constant-time.

Example

Creating an empty selection object

```cpp
C++
// pFileDocument is obtained elsewhere
IMultiSelection *pMultiSelection {};
if (SUCCEEDED(pFileDocument->CreateEmptySelection(&pMultiSelection)))
{
  // work with a selection
  pMultiSelection->Release(); // release object
}
```

CreateSequence

```typescript
TypeScript
CreateSequence(): ISequence;
```

```
C#
ISequence CreateSequence();
```

```
C++
ISequencePtr CreateSequence();
```

Description

Create an empty Sequence Object.

BitwiseOpS

```
TypeScript
BitwiseOpS(Selection: IMultiSelection, Type: BitwiseOpType, Sequence: ISequence): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Selection`

> The multiple selection object which contains ranges for this operation to work on.

`Type`

> The operation to perform. Can be one of the values from BitwiseOpType enumeration.

`Sequence`

> Sequence object containing operand.

Description

Performs a bitwise operation on a given selection.

Complexity: linear-time, depending on selection's complexity.

This method is a replacement for IFileDocument.BitwiseOp when used in scripting languages.

FillMultiS

```
TypeScript
FillMultiS(Sequence: ISequence, Selection: IMultiSelection, Continue: boolean): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

> Sequence object containing the data to fill.

`Selection`

> The multiple selection object, which contains the ranges to fill in the document.

`Continue`

> True to continue filling in a new range and False to start from the beginning of the pattern. See the description of the “Transparent fill” flag in the Fill user-interface command for more information.

Description

Fills a given multiple selection with a specified pattern. The pattern is repeated until all given range(s) are filled. `Continue` parameter specifies whether to continue filling a new range from the previous range, or from the beginning of the pattern.

Complexity: linear-time, depending on the selection's complexity.

This method is a replacement for IFileDocument.FillMulti when used in scripting languages.

Example

Filling a range with a single byte

```
JavaScript
// fdoc is initialized elsewhere
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);
msel.AddRange(200, 30);
var pattern = fdoc.CreateSequence();
pattern.AddData(HexBytes, 0x31, 0x32, 0x33);
fdoc.FillMultiS(pattern, msel, false);
```

FillS

```
TypeScript
FillS(Sequence: ISequence, Offset: number, Size: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence containing data to fill.

`Offset`

Range starting offset

`Size`

Range size

Description

Fills a given range with a given pattern. A pattern is repeated until the required number of bytes is written to the file. If file is shorter than the filling range, the file's size is increased.

Complexity: constant-time.

This method is a replacement for IFileDocument.Fill when used in scripting languages.

Example

Filling a range with a simple pattern

```
JavaScript
// fdoc is initialized elsewhere
var pattern = fdoc.CreateSequence();
pattern.AddText("Simple Pattern", false);
fdoc.FillS(pattern, 0x10000, 0x10ff);
```

FindAllS

```
TypeScript
FindAllS(Sequence: ISequence,
    Selection: IMultiSelection,
    IgnoreCase: boolean,
    Found: IMultiSelection): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object containing a find pattern.

`Selection`

Multiple Selection object, which contains ranges in which a pattern need to be located

`IgnoreCase`

true to ignore case, false to perform exact matching.

`Found`

Multiple Selection Object, which contains, on method's return, all located ranges.

Description

Locates all occurrences of a given pattern within a given multiple selection. You provide the function with an output Multiple Selection Object `Found`, in which it stores all located ranges. This object is automatically cleared before the operation begins. When the method returns, check the IMultiSelection.Empty property to see if there were any pattern occurrences.

Complexity: linear-time, depending on the file's size and selection's complexity.

This method is a replacement for IFileDocument.FindAll when used in scripting languages.

Example

Searching all pattern occurrences

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
var mselOutput = fdoc.CreateEmptySelection();

fdoc.Open("c:\\temp\\file.txt");
msel.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

var pattern = fdoc.CreateSequence();
pattern.AddData(HexBytes, 0x0d, 0x0a); // EOL pattern
fdoc.FindAllS(pattern, msel, false, mselOutput);
if (!mselOutput.Empty) // check if there are any matches
  fdoc.Copy(mselOutput,false);  // copy them to the Clipboard
```

FindS

```
TypeScript
FindS(Sequence: ISequence,
    Selection: IMultiSelection,
    StartFrom: number,
    SearchUp: boolean,
    IgnoreCase: boolean): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object containing a find pattern.

`Selection`

Multiple selection object, which contains ranges in which you want to locate a pattern.

`StartFrom`

Offset from which you want to start searching.

`SearchUp`

`true` to search backwards and `false` to search forward.

`IgnoreCase`

`true` to ignore case and `false` to perform exact matching.

Return Value

Offset of the located pattern or -1 if pattern was not found.

Description

Searches for a pattern within a given selection. This method returns the offset of the matched pattern. To continue searching, call this method again, adjusting StartFrom field appropriately. If pattern is not found in the specified range, -1 is returned.

Complexity: linear-time, depending on the file's size and selection's complexity.

This method is a replacement for IFileDocument.Find when used in scripting languages.

Example

Searching for a pattern

JavaScript

```javascript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msec = fdoc.CreateEmptySelection();

fdoc.Open("c:\\temp\\file.txt");
msec.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

var pattern = fdoc.CreateSequence();
pattern.AddData(HexBytes, 0x0d, 0x0a); // EOL pattern
var EOL_Offset = fdoc.ToNumber(fdoc.FindS(pattern, msel, 0, false, false));
// ...
// continue searching
EOL_Offset = fdoc.ToNumber(fdoc.FindS(pattern, msel, EOL_Offset + 1, false, false));
```

InsertPatternS

TypeScript

```typescript
InsertPatternS(Sequence: ISequence, Offset: number, Size: number): void;
```

C#

```csharp
// This method is not available in managed environment
```

C++

```cpp
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object containing data to insert.

`Offset`

Insert offset.

`Size`

Insert size.

Description

Inserts a given pattern into the document, repeating it to fill the given size. Insert command shifts file's data to free up the space to fit an inserted pattern.

Complexity: constant-time.

This method is a replacement for IFileDocument.InsertPattern when used in scripting languages.

Example

Inserting a pattern

```
JavaScript
// fdoc is initialized elsewhere
var pattern = fdoc.CreateSequence();
pattern.AddData(HexBytes, 0x0d, 0x0a);
fdoc.InsertPatternS(pattern, 100, 1000);
```

InsertS

```
TypeScript
InsertS(Sequence: ISequence, Offset: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object containing the data to insert.

`Offset`

Insert offset.

Description

Inserts a pattern into the document. Insert command shifts file's data to free up the space to fit an inserted pattern.

Complexity: constant-time.

This method is a replacement for IFileDocument.Insert when used in scripting languages.

Example

Inserting a pattern

```
JavaScript
// fdoc is initialized elsewhere
var pattern = fdoc.CreateSequence();
pattern.AddData(HexBytes, 0x0d, 0x0a);
fdoc.InsertS(pattern, 100);  // insert a given pattern at the offset 100
```

ReadS

```
TypeScript
ReadS(Sequence: ISequence, Offset: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object into which data is read.

`Offset`

Read offset

Description

Reads data from a document. If requested data exceeds the current document's size, any excess bytes are filled with zeros.

Complexity: constant-time.

This method is a replacement for IFileDocument.Read when used in scripting languages.

Example

Reading Data

```
JavaScript
// fdoc is initialized elsewhere
var seq = fdoc.CreateSequence();
fdoc.Length = 256;
fdoc.ReadS(seq, 1000);
```

ReplaceAllRegExpS

```
TypeScript
ReplaceAllRegExpS(RegExp: string,
    SubExpression: number,
    Flags: RegExpFlags,
    Sequence: ISequence,
    StartFrom: number,
    Size: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from the RegExpFlags enumeration.

`Sequence`

Sequence object containing replace pattern.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Return Value

A number of occurrences.

Description

Finds and replaces all occurrences of regular expression matches with a given pattern.

Complexity: varying.

This method is a replacement for IFileDocument.ReplaceAllRegExp when used in scripting languages. This method is obsolete. Use the IFileDocument.ReplaceAllRegExp2S instead.

ReplaceAllRegExp2S

```
TypeScript
ReplaceAllRegExp2S(RegExp: string,
    CodePage: number,
    SubExpression: number,
    Flags: RegExpFlags,
    Sequence: ISequence,
    StartFrom: number,
    Size: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`RegExp`

A string that contains a regular expression. A regular expression must by in ECMAScript syntax.

`CodePage`

Code page for regular expression pattern encoding or CP_UNICODE (-5) for UTF-16.

`SubExpression`

The number of sub-match to search for. 0 means the entire expression.

`Flags`

Flags that change the behavior of the function. May be one or more of the values from the RegExpFlags enumeration.

`Sequence`

Sequence object containing replace pattern.

`StartFrom`

A start offset of the range. Must be a multiple of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

`Size`

Range's size. Must be a multiply of 2 if `RegExpFlags.RegExpTypeUNICODE` flag is specified.

Return Value

A number of occurrences.

Description

Finds and replaces all occurrences of regular expression matches with a given pattern.

Complexity: varying.

This method is a replacement for IFileDocument.ReplaceAllRegExp2 when used in scripting languages.

ReplaceAllS

```
TypeScript
ReplaceAllS(SequenceFrom: ISequence,
    SequenceTo: ISequence,
    IgnoreCase: boolean,
    Selection: IMultiSelection): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`SequenceFrom`

Sequence object containing a find pattern.

`SequenceTo`

Sequence object containing a replace pattern.

`IgnoreCase`

`true` to ignore case, `false` to perform exact matching.

`Selection`

Multiple Selection object, describing the ranges in which to perform search and replace

Return Value

A number of replacements done.

Description

Finds and replaces all occurrences of the given pattern with another pattern.

Complexity: varying.

This method is a replacement for IFileDocument.ReplaceAll when used in scripting languages.

Example

Searching all pattern occurrences

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();

fdoc.Open("c:\\temp\\file.txt");
msel.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

var pattern1 = fdoc.CreateSequence();
var pattern2 = fdoc.CreateSequence();
pattern1.AddData(HexBytes, 0x0d, 0x0a); // EOL pattern
pattern2.AddData(HexBytes, 0x0d, 0x0a, 0x0d, 0x0a); // Double-EOL pattern
var nReplacements = fdoc.ToNumber(fdoc.ReplaceAllS(pattern1, pattern2, false, msel);
```

ReplaceS

```
TypeScript
ReplaceS(Offset: number, Size: number, Sequence: ISequence): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Offset`

Replace offset.

`Size`

Size of the original pattern.

`Sequence`

Sequence object containing the pattern to replace.

Description

Replaces the given block with a pattern. This method replaces a range described by `Offset` and `Size` parameters with a pattern.

Complexity: constant-time.

This method is a replacement for IFileDocument.Replace when used in scripting languages.

Example

Replacing a pattern

JavaScript

```
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msec = fdoc.CreateEmptySelection();

fdoc.Open("c:\\temp\\file.txt");
msec.AddRange(0, fdoc.FileSize);  // We'll be searching in a whole file

var pattern1 = fdoc.CreateSequence();
var pattern2 = fdoc.CreateSequence();

pattern1.AddData(HexBytes,0x0d,0x0a);  // EOL pattern
pattern2.AddDate(HexBytes,0x0d,0x0a,0x0d,0x0a);  // Double-EOL pattern
var EOL_Offset = fdoc.ToNumber(fdoc.FindS(pattern1, msel, 0, false, false));
if (EOL_Offset != -1)
  fdoc.ReplaceS(EOL_Offset, pattern1.Length, pattern2);
```

ToNumber

TypeScript

```
ToNumber(Value: any): number;
```

C#

```
// This method is not available in managed environment
```

C++

```
// This method is not available in native environment
```

Parameters

`Value`

A value to convert.

Return Value

Value, converted to decimal type.

@xample

Value conversion

JavaScript

```
// document1 and document2 are defined elsewhere
document1.FileSize = document2.FileSize;    // valid, no processing in Javascript.
// Passing 64-bit integers is supported

document1.FileSize = document2.FileSize / 2; // invalid, "Not a Number" exception is thrown
document1.FileSize = document2.ToNumber(document2.FileSize) / 2;  // valid
```

Description

Converts 64-bit integer into scripting compatible integer. Hex Editor Neo extensively uses 64-bit integer numbers. Scripting languages do not directly support such values, so this method may be used to convert them to supported decimal type.

WriteS

```
TypeScript
WriteS(Sequence: ISequence, Offset: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Sequence`

Sequence object that contains the data to write.

`Offset`

Write offset

Description

Writes data to a document. The written data overwrites document's existing data and may also increase the file's size if it overlaps the current file's size. Write always creates a new operation in document's operation history.

Complexity: constant-time.

This method is a replacement for IFileDocument.Write when used in scripting languages.

Example

Writing Data

```
JavaScript
// fdoc is initialized elsewhere
var seq = fdoc.CreateSequence();
fdoc.AddData(HexBytes, 0, 1, 2, 3, 4, 5, 6, 7, 8, 9);
fdoc.WriteS(seq, 1000);
```

PatchOptions Enumeration

Symbol	Value	Description
`PatchNoOptions`	`0x00000000`	No options specified.
`PatchSaveFileName`	`0x00000001`	Save file's name for later verification.
`PatchCalculateHash`	`0x00000002`	Calculate and save file's hash.
`PatchRemoveReferences`	`0x00000004`	Remove external references (currently not implemented).
`PatchExecutable`	`0x00000008`	Create a self-installing patch. `PathToStubFile` parameter in IFileDocument.CreatePatch method is required if this option is used.

HistoryPurgeLevel Enumeration

Symbol	Value	Description
`HistoryPurgeTail`	`0`	All phantom operations (or operation tail) are dropped and removed.
`HistoryPurgeBranches`	`1`	All branches except the current one are dropped and removed.
`HistoryPurgeAllButCurrent`	`2`	All operations in a history are deleted. The document state is NOT changed, all modifications are “merged” into the single operation, which becomes an operation list root.
`HistoryPurgeAll`	`3`	Remove all operations except the very first one.

TextType Enumeration

Symbol	Value	Description
`TextTypeHexByte`	`0`	Hexadecimal numbers (from 0 to 0xFF)
`TextTypeHexWord`	`1`	Hexadecimal numbers (from 0 to 0xFFFF)
`TextTypeHexDword`	`2`	Hexadecimal numbers (from 0 to 0xFFFF FFFF)
`TextTypeHexQword`	`3`	Hexadecimal numbers (from 0 to 0xFFFF FFFF FFFF FFFF)
`TextTypeDecByte`	`4`	Decimal numbers (from 0 to 255)
`TextTypeDecWord`	`5`	Decimal numbers (from 0 to 65535)
`TextTypeDecDword`	`6`	Decimal numbers (from 0 to 4,294,967,295)
`TextTypeDecQword`	`7`	Decimal numbers (from 0 to 18,446,744,073,709,551,615)

Paste3Flags Enumeration

Symbol	Value	Description
`Paste3OverwriteMode`	`0x00000000`	Overwrite existing document data with data from the Clipboard. May not be combined with `Paste3InsertMode`.
`Paste3InsertMode`	`0x00000001`	Insert Clipboard data at the given position, extending document's size. May not be combined with `Paste3OverwriteMode`.
`Paste3LittleEndian`	`0x00000000`	Treat text in Clipboard as integers that have little-endian byte order. Used only if Clipboard contains textual data. May not be combined with `Paste3BigEndian`.
`Paste3BigEndian`	`0x00000002`	Treat text in Clipboard as integers that have big-endian byte order. Used only if Clipboard contains textual data. May not be combined with `Paste3LittleEndian`.

RegExpFlags Enumeration

Symbol	Value	Description
`RegExpTypeANSI`	`0x00000000`	Treat the given range as a stream of single-byte characters. May not be used with `RegExpTypeUNICODE` flag.
`RegExpTypeUNICODE`	`0x00000001`	Treat the given range as a stream of 16-bit unicode characters. May not be used with `RegExpTypeANSI` flag.
`RegExpIgnoreCase`	`0x00000002`	If this flag is specified, ignore case during search operation.

ArithmeticOpType Enumeration

Symbol	Value	Description
`ArithmeticOpNegation`	`0`	Arithmetic negation (change sign): `x[i] = - x[i]`;
`ArithmeticOpAddition`	`1`	Arithmetic addition: `x[i] += operand`;
`ArithmeticOpSubrtaction`	`2`	Arithmetic subtraction: `x[i] -= operand`;
`ArithmeticOpMultiplication`	`3`	Arithmetic multiplication: `x[i] *= operand`;
`ArithmeticOpDivision`	`4`	Arithmetic division: `x[i] /= operand`;
`ArithmeticOpRemainder`	`5`	Arithmetic division remainder: `x[i] %= operand`;

OperandSizeType Enumeration

Symbol	Value	Description
`OperandSizeByte`	`0`	8-bit integer (`BYTE`)
`OperandSizeWord`	`1`	16-bit integer (`WORD`)
`OperandSizeDword`	`2`	32-bit integer (`DWORD`)
`OperandSizeQword`	`3`	64-bit integer (`QWORD`)

BitwiseOpType Enumeration

Symbol	Value	Description
`BitwiseOpNOT`	`0`	Bitwise NOT: `x[i] = ~x[i];`
`BitwiseOpOR`	`1`	Bitwise OR: `x[i] |= operand[i % DataSize];`
`BitwiseOpAND`	`2`	Bitwise AND: `x[i] &= operand[i % DataSize];`
`BitwiseOpXOR`	`3`	Bitwise XOR: `x[i] ^= operand[i % DataSize];`

CaseOpType Enumeration

Symbol	Value	Description
`CaseOpLower`	`0`	Make selection lowercase
`CaseOpUpper`	`1`	Make selection uppercase
`CaseOpToggle`	`2`	Invert selection

ShiftOpType Enumeration

Symbol	Value	Description
`ShiftOpLogicalLeft`	`0`	Logical left shift: `x[i] <<= operand;`
`ShiftOpLogicalRight`	`1`	Logical right shift: `x[i] >>= operand;`
`ShiftOpArithmeticLeft`	`2`	Arithmetic left shift (equivalent to `ShiftOpLogicalLeft`): `x[i] <<= operand;`
`ShiftOpArithemticRight`	`3`	Arithmetic right shift: `x[i] >>= operand;` // performs sign extension
`ShiftOpRotateLeft`	`4`	Rotate left.
`ShiftOpRotateRight`	`5`	Rotate right.

ReverseOpType Enumeration

Symbol	Value	Description
`ReverseOpBits`	`0`	Reverse bits in a selection
`ReverseOpBytes`	`1`	Reverse bytes in a selection

Multiple Selection Object

IMultiSelection Interface

Description

This interface is implemented by the Multiple Selection Object. Its methods and properties are directly accessed by the low-level (native) languages like C++ and indirectly by automation-compatible languages, such as JavaScript and managed languages. Refer to Creating Multiple Selection Object and Working with Multiple Selection Object sections for usage information.

Declaration

```
TypeScript
interface IMultiSelection extends IDispatch {
    // Properties
    readonly Count: number;
    readonly Empty: boolean;
    readonly TotalSize: number;
    // Methods
    AddRange(Offset: number, Size: number): void;
    Clear(): void;
    DeleteRange(Offset: number, Size: number): void;
    InsertRange(Offset: number, Size: number): void;
    Invert(Size: number): void;
    IsIn(Offset: number): void;
    RemoveRange(Offset: number, Size: number): void;
    ToggleRange(Offset: number, Size: number): void;
}
```

```
C#
public interface IMultiSelection : IDispatch
{
    // Properties
    ulong Count { get; }
    bool Empty { get; }
    ulong TotalSize { get; }
    // Methods
    void AddRange(ulong Offset, ulong Size);
    void Clear();
    void DeleteRange(ulong Offset, ulong Size);
    void InsertRange(ulong Offset, ulong Size);
    void Invert(ulong Size);
    void IsIn(ulong Offset);
    void Load(IStream Stream, LoadMode LoadMode);
    void RemoveRange(ulong Offset, ulong Size);
    void Save(IStream Stream);
    void ToggleRange(ulong Offset, ulong Size);
}
```

```
C++
struct IMultiSelection : IDispatch
{
    // Properties
    unsigned long long Count;  // get
    VARIANT_BOOL Empty;  // get
    unsigned long long TotalSize;  // get
    // Methods
    HRESULT AddRange(unsigned long long Offset, unsigned long long Size);
    HRESULT Clear();
    HRESULT DeleteRange(unsigned long long Offset, unsigned long long Size);
    HRESULT InsertRange(unsigned long long Offset, unsigned long long Size);
    HRESULT Invert(unsigned long long Size);
    HRESULT IsIn(unsigned long long Offset);
    HRESULT Load(IStream * Stream, LoadMode LoadMode);
    HRESULT RemoveRange(unsigned long long Offset, unsigned long long Size);
    HRESULT Save(IStream * Stream);
    HRESULT ToggleRange(unsigned long long Offset, unsigned long long Size);
};
```

IMultiSelection Properties

Count

```
TypeScript
readonly Count: number;
```

```
C#
ulong Count { get; }
```

```
C++
unsigned long long Count;  // get
```

Description

Returns the number of ranges in a selection object.

Complexity: constant-time.

Example

Using the `Count` property

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
alert(msel.Count); // displays "0"
msel.AddRange(100, 20);  // selection: [100..120)
alert(msel.Count); // displays "1"
msel.AddRange(150, 20);  // selection: [100..120) U [150..170)
alert(msel.Count); // displays "2"
msel.AddRange(80, 80); // selection: [80..170)
alert(msel.Count); // displays "1"
```

Empty

```
TypeScript
readonly Empty: boolean;
```

```
C#
bool Empty { get; }
```

```
C++
VARIANT_BOOL Empty;  // get
```

Description

This property is `true` if the selection object is empty.

Example

Using the `Empty` property

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
alert(msel.Empty); // displays "true"
msel.AddRange(100, 20);  // selection: [100..120)
alert(msel.Empty); // displays "false"
msel.Clear();
alert(msel.Empty); // displays "true"
```

TotalSize

```
TypeScript
readonly TotalSize: number;
```

```
C#
ulong TotalSize { get; }
```

```
C++
unsigned long long TotalSize;  // get
```

Description

Returns the total selection size. This is a sum of sizes of all selection ranges.

Complexity: constant-time.

Example

Using TotalSize property

JavaScript
```
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();

msel.ToggleRange(100, 50);  // selection: [100..150)
alert(msel.TotalSize); // displays "50"
msel.ToggleRange(100, 10);  // selection: [110..150)
alert(msel.TotalSize); // displays "40"
msel.ToggleRange(0, 10);  // selection: [0..10) U [110..150)
alert(msel.TotalSize); // displays "50"
msel.ToggleRange(140, 20);  // selection: [0..10) U [110..140) U [150..160)
alert(msel.TotalSize); // displays "50"
msel.ToggleRange(10, 100);  // selection: [0..140) U [150..160)
alert(msel.TotalSize); // displays "150"
```

IMultiSelection Methods

AddRange

TypeScript
```
AddRange(Offset: number, Size: number): void;
```

C#
```
void AddRange(ulong Offset, ulong Size);
```

C++
```
HRESULT AddRange(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

Starting offset

`Size`

Range size

Description

Adds a given range to a selection. If the range intersects any existing ranges, they are combined with a given range. A number of ranges in a selection may change after adding a new range.

Complexity: linear-time, depending on the current selection configuration.

Example

Adding ranges to a selection

C#
```
// msel is initialized elsewhere and is currently empty
msel.AddRange(100, 20);  // selection: [100..120)
msel.AddRange(150, 20);  // selection: [100..120) U [150..170)
msel.AddRange(80, 80); // selection: [80..170)
```

Clear

TypeScript
```
Clear(): void;
```

C#
```
void Clear();
```

C++
```
HRESULT Clear();
```

Description

Clears the selection. After this function returns, selection object contains no ranges.

Complexity: constant-time.

DeleteRange

```
TypeScript
DeleteRange(Offset: number, Size: number): void;
```

```
C#
void DeleteRange(ulong Offset, ulong Size);
```

```
C++
HRESULT DeleteRange(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

N/A

`Size`

N/A

Description

This method is not currently implemented.

InsertRange

```
TypeScript
InsertRange(Offset: number, Size: number): void;
```

```
C#
void InsertRange(ulong Offset, ulong Size);
```

```
C++
HRESULT InsertRange(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

Insert offset.

`Size`

Insert size.

Description

Inserts a range into the selection object. As a result of this operation, existing ranges with offsets larger than `Offset` are shifted forward by `Size` bytes.

Complexity: linear-time, depending on the number of ranges to shift.

Example

Using the `InsertRange` method

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);  // selection: [100..120)
msel.AddRange(150, 20);  // selection: [100..120) U [150..170)
msel.InsertRange(130, 10); // selection: [100..120) U [160..180)
msel.InsertRange(0, 20); // selection: [120..140) U [180..200)
```

Invert

```
TypeScript
Invert(Size: number): void;
```

```
C#
void Invert(ulong Size);
```

```
C++
HRESULT Invert(unsigned long long Size);
```

Parameters

`Size`

The total size of an object. Used to properly invert selection.

Description

Inverts the current selection. All defined ranges become gaps and all gaps become ranges. This method accepts the total size which is usually the current file's size. Calling Invert method two times with a same `Size` value will leave the selection object intact.

Complexity: constant-time.

Example

Using the `Invert` method

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);  // selection: [100..120)
msel.Invert(200); // selection: [0..100) U [120..200)
msel.Invert(200); // selection: [100..120)
```

IsIn

```
TypeScript
IsIn(Offset: number): void;
```

```
C#
void IsIn(ulong Offset);
```

```
C++
HRESULT IsIn(unsigned long long Offset);
```

Parameters

`Offset`

Offset to check.

Return Value

A boolean value indicating whether the given offset lies within one of the selection's ranges.

Description

Check if the given offset lies within the selection. Returns `true` if the offset is inside of selection's ranges or `false` otherwise.

Complexity: constant-time.

Example

Using the `IsIn` method

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();
msel.AddRange(100, 20);  // selection: [100..120)
alert(msel.IsIn(0));  // displays "false"
alert(msel.IsIn(100));  // displays "true"
alert(msel.IsIn(110));  // displays "true"
alert(msel.IsIn(120));  // displays "false"
```

Load

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void Load(IStream Stream, LoadMode LoadMode);
```

```
C++
HRESULT Load(IStream * Stream, LoadMode LoadMode);
```

Parameters

`Stream`

Pointer to a stream object

`LoadMode`

Load mode. Can be one of the values from LoadMode enumeration.

Description

Loads the selection from a file. This method may be instructed to merge the loaded selection with a current one, using one of supported algorithms. Due to implementation details, the Load method usually tries to read more data from the stream object, than Save method wrote to it. This is not a problem if nothing is written beyond the selection's data in a stream. Otherwise, you should prepend the selection's data in a stream with a size value and adjust the stream pointer appropriately.

Complexity: linear-time, depending on current and loaded selections complexity.

Example

Loading and Saving selection

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var msel = fdoc.CreateEmptySelection();

msel.AddRange(100, 50);  // selection: [100..150)
// create a file and obtain a stream object for it
msel.Save(stream);
msel.Clear();  // selection: empty
msel.AddRange(50, 50);  // selection: [50..100)
// open a previously created selection file and obtain a stream object for it
msel.Load(stream, SelectionAdd);  // selection: [50..150)
```

RemoveRange

```
TypeScript
RemoveRange(Offset: number, Size: number): void;
```

```
C#
void RemoveRange(ulong Offset, ulong Size);
```

```
C++
HRESULT RemoveRange(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

Starting offset

`Size`

Range size

Description

Removes a given range from the selection. The specified range is “subtracted” from any intersected selection's ranges. If it does not intersect any range, nothing happens. The number of ranges in selection object may change after this method returns.

Complexity: linear-time, depending on the current selection configuration.

Example

Removing ranges from a selection

```
C#
// msel is initialized elsewhere and is currently empty
msel.AddRange(100, 50);  // selection: [100..150)
msel.RemoveRange(100, 10);  // selection: [110..150)
msel.RemoveRange(0, 10);  // selection: [110..150) - nothing changed
msel.RemoveRange(150, 20);  // selection: [110..150) - nothing changed
msel.RemoveRange(120, 10);  // selection: [110..120) U [130..150)
```

Save

```
TypeScript
// This method is not available in scripting environment
```

```
C#
void Save(IStream Stream);
```

```
C++
HRESULT Save(IStream * Stream);
```

Parameters

`Stream`

Pointer to a stream object

Description

Compresses and saves the selection object to a given stream.

Complexity: linear-time, depending on number of ranges in a selection object.

ToggleRange

```
TypeScript
ToggleRange(Offset: number, Size: number): void;
```

```
C#
void ToggleRange(ulong Offset, ulong Size);
```

```
C++
HRESULT ToggleRange(unsigned long long Offset, unsigned long long Size);
```

Parameters

`Offset`

Starting offset.

`Size`

Range size.

Description

Current selection ranges are intersected with a specified range. Those portions of the specified range that fall onto gaps are appended to the selection, and those portions that fall to existing ranges, are subtracted from the selection.

Complexity: linear-time, depending on the current selection configuration.

Complexity of this method is not worse than that of IMultiSelection.AddRange and IMultiSelection.RemoveRange.

Example

Using `ToggleRange` method

```
C#
// msel is initialized elsewhere and is currently empty
msel.ToggleRange(100, 50);  // selection: [100..150)
msel.ToggleRange(100, 10);  // selection: [110..150)
msel.ToggleRange(0, 10);  // selection: [0..10) U [110..150)
msel.ToggleRange(140, 20);  // selection: [0..10) U [110..140) U [150..160)
msel.ToggleRange(10, 100);  // selection: [0..140) U [150..160)
```

LoadMode Enumeration

Symbol	Value	Description
`SelectionNew`	`0`	Replaces the current selection with a one loaded from a file.
`SelectionAdd`	`1`	Combines the loaded selection with a current one.
`SelectionSubtract`	`2`	Subtracts the loaded selection from a current one.

Sequence Object

ISequence Interface

Description

This interface is implemented by a sequence object created through a File Document object. Use the methods of this interface from a scripting languages to construct a pattern to be passed to various methods of the IFileDocument interface.

Declaration

```
TypeScript
interface ISequence extends IDispatch {
    // Properties
    readonly Empty: boolean;
    Length: number;
    [Value: number]: number;
    // Methods
    AddData(Type: SequenceDataType, Values: number[]): void;
    AddText(Text: , Unicode: ): void;
    Clear(): void;
    Copy(): ISequence;
    CreateSubSequence(Index: number, Length: number): ISequence;
    Remove(Index: number, Length: number): void;
}
```

```
C#
// This interface is not available in managed environment
```

```
C++
// This interface is not available in native environment
```

ISequence Properties

Empty

```
TypeScript
readonly Empty: boolean;
```

```
C#
// This property is not available in managed environment
```

```
C++
// This property is not available in native environment
```

Description

`true` if the sequence is empty or `false` otherwise.

Length

```
TypeScript
Length: number;
```

```
C#
// This property is not available in managed environment
```

```
C++
// This property is not available in native environment
```

Description

Retrieve or change the current sequence length. Sequence length is expressed in bytes. When you change the sequence length, it is either truncated or extended. If the sequence was extended, it may contain garbage.

Value

```
TypeScript
[Value: number]: number;
```

```
C#
// This property is not available in managed environment
```

```
C++
// This property is not available in native environment
```

Description

Retrieve the byte from sequence.

ISequence Methods

AddData

```
TypeScript
AddData(Type: SequenceDataType, Values: number[]): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Type`

Type of the data to add. See SequenceDataType enumeration for more information.

`Values`

Any number of additional parameters which are added to a sequence. The type parameter describes the way they are interpreted.

Description

Add numeric data to a sequence. This method is used to add bytes, words, double words, quad words, floats and doubles to a sequence. Data is added to the end of the sequence.

Example

Adding values

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var seq = fdoc.CreateSequence();

seq.AddData(SequenceDataBytes, 0x0d, 0x0a); // add two bytes to a sequence
seq.AddData(SequenceDataDwords | SequenceDataBigEndian,
        0x12345678, 0xfedcba98, 0, 70000); // add a number of big-endian double words to a sequence
```

AddText

```
TypeScript
AddText(Text: , Unicode: ): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Text`

A string to be added.

`Unicode`

`true` to treat string characters as UNICODE or `false` to treat them as ANSI.

Description

Add textual data to a sequence. New data is appended to the end of the sequence.

Example

Adding text

```
JavaScript
var fdoc = new ActiveXObject("FileDocument.FileDocument");
var seq = fdoc.CreateSequence();

seq.AddText("<p>", false);
```

Clear

```
TypeScript
Clear(): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Description

Clear the sequence.

Copy

```
TypeScript
Copy(): ISequence;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Description

Create a copy of the sequence.

CreateSubSequence

```
TypeScript
CreateSubSequence(Index: number, Length: number): ISequence;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Index`

Starting index of a sub-sequence.

`Length`

Length of the sub-sequence.

Description

Create a sub-sequence of this sequence.

Remove

```
TypeScript
Remove(Index: number, Length: number): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Index`

Index of the starting byte to remove.

`Length`

The number of bytes to remove.

Description

Remove a part of the sequence.

SequenceDataType Enumeration

Symbol	Value	Description
`SequenceDataBytes`	`0`	Treat subsequent method parameters as bytes.
`SequenceDataWords`	`1`	Treat subsequent method parameters as words.
`SequenceDataDwords`	`2`	Treat subsequent method parameters as double words.
`SequenceDataQwords`	`3`	Treat subsequent method parameters as quad words.
`SequenceDataFloats`	`4`	Treat subsequent method parameters as floats (single precision floating-point numbers).
`SequenceDataDoubles`	`5`	Treat subsequent method parameters as doubles (double precision floating-point numbers).
`SequenceDataLittleEndian`	`0x00000000`	Treat numbers as having little-endian byte order. This option is on by default.
`SequenceDataBigEndian`	`0x00010000`	Treat numbers as having big-endian byte order. May be combined with other values. Ignored when `SequenceDataBytes` is specified.

Parser Object

IParser Interface

Description

This interface is implemented by the intrinsic parser object, provided to scripts running as part of the Structure Viewer structure binding under the name `parser`. The name may be omitted and the methods below may be called directly.

Declaration

```
TypeScript
interface IParser {
    // Methods
    abort(message: string): void;
    alert(message: string): void;
    bind(typeName: string, varName: string, offset: number): void;
    eval(Expression: string): boolean | number | string;
    print(varName: string, varValue: string): void;
    add_coloring_scheme(name: string, frontColor: object, backColor: object, outlineColor: object, roundEd
}
```

```
C#
// This interface is not available in managed environment
```

```
C++
// This interface is not available in native environment
```

IParser Methods

abort

```
TypeScript
abort(message: string): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`message`

A message to be displayed in the Structure Viewer Tool Window.

Description

Abort current binding. Behaves like the $assert directive.

alert

TypeScript

```typescript
alert(message: string): void;
```

C#

```csharp
// This method is not available in managed environment
```

C++

```cpp
// This method is not available in native environment
```

Parameters

`message`

String to display

Description

Display informational message in a popup message box. Should be used only for debugging purposes.

Example

Expression evaluation

JavaScript

```javascript
function f()
{
    var a = eval("pe_header.e_lfanew.sections[0].Name");
    alert("First PE file section name is \"" + a + "\"");
    return 0;
}
```

bind

TypeScript

```typescript
bind(typeName: string, varName: string, offset: number): void;
```

C#

```csharp
// This method is not available in managed environment
```

C++

```cpp
// This method is not available in native environment
```

Parameters

`typeName`

The name of the user-defined type. The type must be fully defined.

`varName`

The name of the variable. Must be unique.

`offset`

Structure starting address (absolute value).

Description

Bind a given structure to a given address. Hex Editor Neo performs delayed binding, that is, a new structure is bound only after the current one is successfully finished binding.

Example

Binding a structure

```
JavaScript
function f()
{
    bind("struct A","a",0);
}
```

eval

```
TypeScript
eval(Expression: string): boolean | number | string;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`Expression`

The expression to evaluate.

Return Value

Expression evaluation result.

Description

Calculate expression value. You may reference global constants, enumerations, field values of already bound types and so on.

Example

Expression evaluation

```
JavaScript
function f()
{
    var a = eval("pe_header.e_lfanew.sections[0].Name");
    alert("First PE file section name is \"" + a + "\"");
    return 0;
}
```

print

```
TypeScript
print(varName: string, varValue: string): void;
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`varName`

Name of the variable. Must be unique in the current scope.

`varValue`

Variable's value, as string.

Description

Add a virtual field to the output.

Example

Adding virtual fields

```
JavaScript
function f()
{
    print("var1",10);
    print("var2","Hello, World");
}
```

add_coloring_scheme

```
TypeScript
add_coloring_scheme(name: string, frontColor: object, backColor: object, outlineColor: object, roundEdges:
```

```
C#
// This method is not available in managed environment
```

```
C++
// This method is not available in native environment
```

Parameters

`name`

Scheme's name. Must not match any of existing coloring schemes.

`frontColor`

An object that specifies the font color. See Remarks for details.

`backColor`

An object that specifies the background color. See Remarks for details.

`outlineColor`

An object that specifies the outline color. See Remarks for details.

`roundEdges`

`true` to round outline edges, `false` otherwise.

Description

Create new binding-local coloring scheme. `FrontColor`, `BackColor` and `OutlineColor` must be JavaScript objects with `r`, `g`, `b` and `a` properties. If any of the property is omitted, its value is defaulted to 0, except for `a`, which value is defaulted to 255. All values must be within [0..255] range.

Example

Creating new color scheme

```
JavaScript
function f()
{
// Create a coloring scheme Red on Blue, no outline (0 alpha = full transparent), no round edges
    parser.add_coloring_scheme("my scheme",{ r:255, g:0, b:0, a:255 },
        { r:0, g:0, b:255, a:255 }, { a:0 }, false);
}
```

Built-In Updater

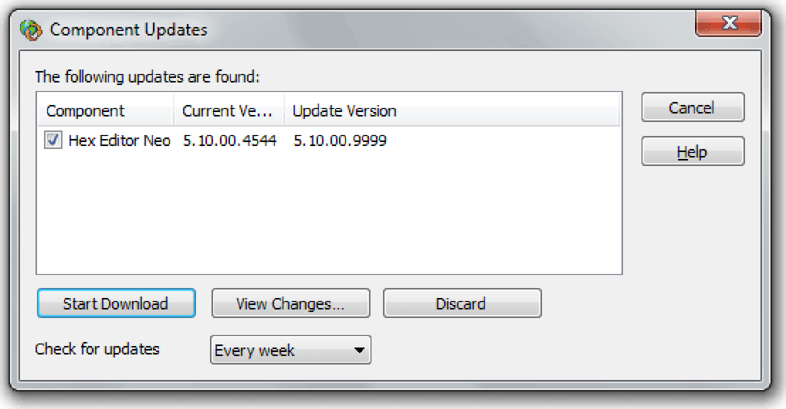
Hex Editor Neo includes the built-in updating mechanism. It can automatically detect new product versions, as well as new language packs and their updates.

By default, the updater is configured to check for updates on each run. It downloads about 500 bytes from the HHD Software's web server and does not send any private information. You can change the frequency of update checks as well as completely disable it.

You can also always manually check for updates using the **Help » Check for Updates** command.

Component Updates Window

This window is displayed when there new versions of product or installed language packs.



The following updates are found:

Component	Current Ve...	Update Version
☑ Hex Editor Neo	5.10.00.4544	5.10.00.9999

Check for updates: Every week

It lists all detected updates, with their currently installed version number and new version number. You can download selected updates, view changes or discard them. If you choose to discard updates, Hex Editor Neo will no longer notify you about those updates. It will, however, notify you of any future updates.

This window also allows you to change the default frequency of update checking. Please note that this option is also available on the General Settings page.

Settings Manager

Settings Manager centralizes application settings storage and management. Starting from version 6.20, it stores settings for all Hex Editor Neo components. It supports the following storage locations:

Registry Settings Storage

> This mode is the default one for all installations except portable installations. In this mode, all settings are stored in per-user location in system registry.
>
> Default folder for downloaded languages is `%LOCALAPPDATA%\HHD Software\Hex Editor Neo\Localization` (with backup folder `%INSTALLDIR%\Localization`).

Portable Settings Storage

> This mode is the default one for portable installations. All settings are stored in `portable.hexset` file, located in program startup folder. The presence of this file indicates the portable mode. Hex Editor Neo does not use or even access registry storage if started in portable mode.
>
> Downloaded languages location is `%LAUNCHDIR%\Localization` where `%LAUNCHDIR%` is program startup folder.

External File Settings Storage

> This mode is similar to portable mode, but uses any given external file for storing application storage. In this mode, location of external file is still stored in per-user registry location (no other settings are stored in registry). The main purpose of this mode is to put external settings storage file into shared location, like OneDrive or Dropbox shared folder and have Hex Editor Neo automatically share its settings across all user's devices.
>
> Default folder for downloaded languages is `%LOCALAPPDATA%\HHD Software\Hex Editor Neo\Localization` (with backup folder `%INSTALLDIR%\Localization`).

Exporting & Importing Settings

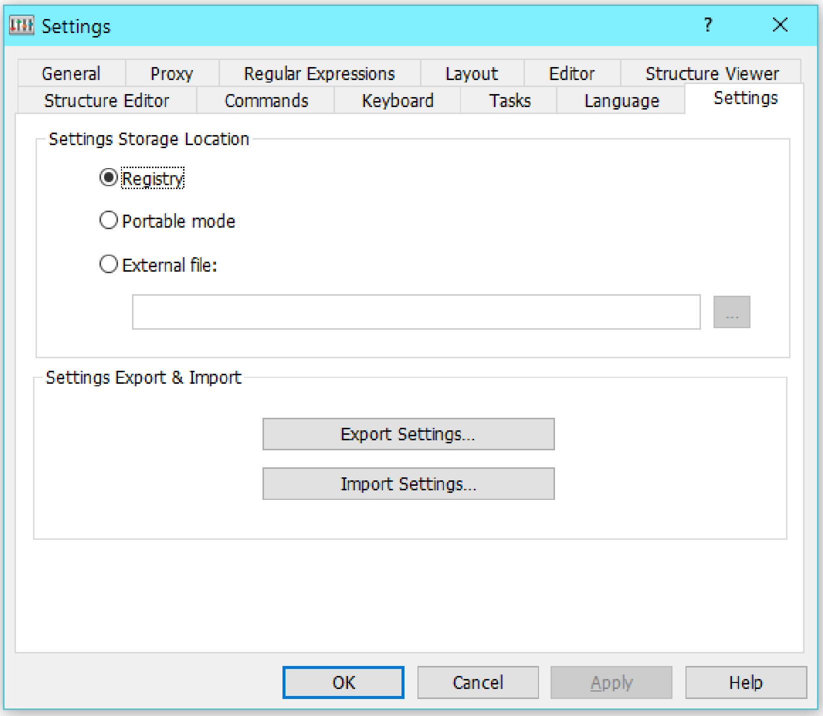
In addition to different storage locations, Settings Manager allows the user to manually export a subset of application settings to a given file and import the settings from a file. This may be used to copy application settings from one installation to another.

During export, the user is asked to select what components he wants to have in exported file. During import, the user is able to select either all or only a subset of component settings from an imported file.

See the Settings Page topic for more information.

Settings Page

This page allows the user to configure and use the Settings Manager.



Settings Storage Location

● Registry

○ Portable mode

○ External file:

Settings Export & Import

Export Settings...

Import Settings...

The upper half of the window allows the user to select the settings storage location. See the Settings Manager topic for in-depth description of each location. For External File location mode a path to external file must be specified.

Settings Management

Press the **Export Settings...** button to export application settings. The **Select Components Window** appears, allowing the user to select which components settings he wants to export.

Press the **Import Settings...** button to import application settings from a file. The **Select Components Window** appears, allowing the user to select which components settings he wants to import. It is recommended to restart the application after importing settings.

Press the **Reset Settings...** button to reset application settings. The **Select Components Window** appears, allowing the user to select which components settings he wants to reset. Application restart is required to complete settings reset. If all settings are reset, default settings will automatically be applied upon restart.