Construction Set Extender

shadeMe

Version 6.0

# Table of Contents

***<add stuff>***

# Enhancements

# Plugins and Masters

##### Creation and Modification of Master Files:

Master files can be actively edited and saved in the CS by setting them as active plugins. They will retain their master file status upon saving.

##### Modification of Master File Header Data:

The Author and Description fields of master files are no longer disabled by default and can be edited like any other plugin file.

##### Removal of the Need for Mod De-isolation:

The CS will now automatically save loaded ESP files as masters of the active plugin. The behavior can be toggled through the “Save Options” submenu in the “File” menu.

##### Saving Plugins as ESM Files:

The CS can now save plugins as either ESP or ESM files.

##### “Save As” Tool:

Active plugins can be saved under a different name by using the new “Save As” tool, found in the File menu.

##### Timestamp Preservation:

The editor is now able to save plugins without modifying their “Last Modified” file timestamp. The behavior can be toggled through the “Save Options” submenu in the “File” menu.

##### Automatic Backup Creation:

Backups of the active plugin get saved to the “Backup” folder in the workspace’s “Data” directory just before a plugin save operation begins. The behavior can be toggled through the “Save Options” submenu in the “File” menu.

# Workflow

##### Startup Options:

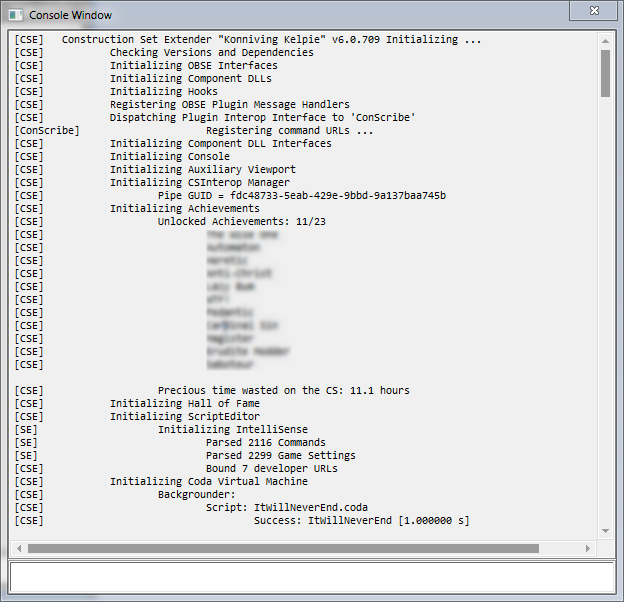
CSE allows the user to automatically perform the following operations right after the editor’s startup:

* + - Load a plugin and set it as the active file.
    - Load a script
    - Change the active workspace

The startup plugin can be set in the Data dialog, by selecting the required file in the listview and clicking on the ‘Set as Startup File’ button. The startup script/workspace can be set through the ‘CSE Preferences’ dialog, which is invoked from the File menu.

##### Console:

The console window is the standard output for all of the construction set’s (and CSE’s) output operations. It logs messages from various components of the CS, giving each an identifiable prefix. Its various tools can be accessed from its context menu, which can be brought up by right clicking anywhere in inside the window.



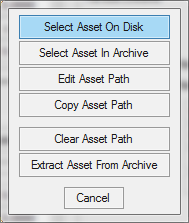
Certain commands can be entered and executed through the command line at the bottom of the window. Default commands:

* + *LoadPlugin string:<plugin name.extension> bool:setAsActive* – Marks the parameter plugin as loaded and initiates plugin loading.
  + *LoadForm string:<editorID>* – Opens the parameter form’s dialog for editing. References will be loaded into the render window.
  + *SavePlugin* – Saves the active plugin.
  + *AutoSave* – Saves the active plugin to “Data\Backup\” as a copy.
  + *Exit* – Closes the CS.

As with the runtime, the up and down arrow keys can be used at the command line to walkthrough its command history.

##### Enhanced Asset Selection:

Asset selection i.e., selection of textures, meshes, sound files, speedtree files and animation files, has been overhauled for intuitive access. Clicking on an “Add Asset” button brings up the dialog shown below.



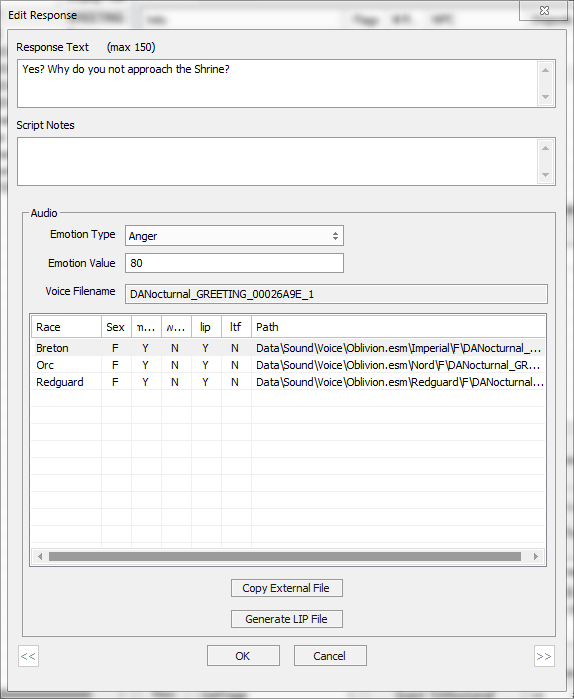
* + - * Select Asset On Disk – Opens the regular “Open File” dialog for disk access.
      * Select Asset In Archive – Opens the BSA browser, allowing the direct selection on assets inside BSA archives.  
          
        
      * Edit Asset Path – Allows the direct editing of the asset’s file path.
      * Copy Asset Path – Allows the quick copying of asset file paths between records.
      * Clear Asset Path – Resets the file path.
      * Extract Asset From Archive – Searches for the file inside any of the loaded archives and extracts it, if found.

##### Enhanced Find Text:

Entries in the find text dialog can directly be invoked for editing, i.e., double clicking the results of a search will bring up the corresponding item’s dialog box or load the object into the render window, if it is a reference.

##### Enhanced Response Editor:

The response editor has been modified to provide a more streamlined interface to mod authors. The voice recording tool has been removed, given its obsoleteness in comparison to 3rd party recording tools such as Audacity. A ‘Copy External File’ tool has been added. It allows the user to move recorded voice files from arbitrary workspaces and into the CS’s. It works on a per-race, per-sex basis – The target voice must be selected from the voiced races list in the editor.



CSE also rids the necessity to switch between editor versions to generate LIP files for voices – It implements the lip sync generator in the latest version of the Construction Set. Lip files are generated on a per-race, per-sex basis, similar to the ‘Copy External File’ tool. The lip generator no longer needs a valid WAV file of the recorded voice for its working – It will automatically convert the source MP3 file, if any, to WAV during generation.

CSE also adds a batch LIP generator tool that generates lip files for all loaded topics. It can be accessed from the “Character” menu.

##### Form Enumeration Filters:

The “Hide Unmodified Records” and “Hide Deleted Records” tools can be used to toggle the display state of forms that haven’t been modified by the active plugin or have been deleted, respectively. They can be accessed from the “View” menu.

##### Global Script Creation:

This tool allows quest scripts to be quickly created by specifying the editorIDs of both the quest and its script, along with the processing delay time. It can be accessed from the Gameplay menu.

##### Context Menu Tools:

CSE adds a number of new tools that can be accessed from any form’s context menu:

* Set FormID – Allows the formID of a form to be changed.
* Mark As Unmodified – Reverts the “Modified” flag on a form, preventing it from being saved to the active plugin.
* Undelete – Resets the “Deleted” flag on a form.
* Show Override List – Displays a list of all the loaded plugins that modify the form in question.
* Edit Base Form – Only visible for object references. Opens the reference’s base form edit dialog.
* Toggle Visibility – Only visible for object references. Toggles the visibility state of the reference.
* Toggle Children Visibility – Only visible for object references. Toggles the visibility state of the reference’s linked children.
* Preview – View the form’s 3D representation in the Preview window.
* Jump To Central Use Info List – Displays the central use info list window and scrolls to the form in question.
* Add To Active Tag – Adds the form to the Tag Browser’s selected tag, if any.

##### Batch Copy Eyes/Hair:

Hair and eye records of one race can be copied to another by using the “Copy Hair” or “Copy Eyes” tool found in the Face Data tab of the Race edit dialog.

##### Launch Game:

The “Launch Game” button, found on the main toolbar, is primarily used to spawn a mad, wild killer bull – cunningly disguised as a bird – that’s got winning odds of 80000 to 1 in cock fight.

##### Time of Day Slider:

A Time of Day slider has been added to the main toolbar. It requires sky rendering to be turned on.



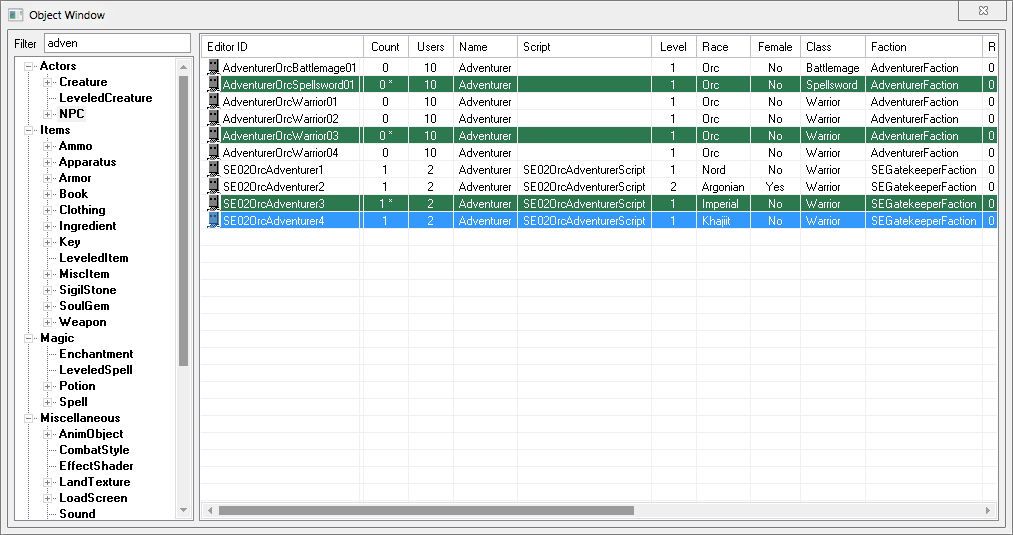
##### Workspaces:

The CSE allows the user to switch between multiple working directories when using the editor. Each workspace can be considered a separate root directory (one that contains the “Data” folder) that can house plugins and asset files independent of each other. Custom workspaces need to be placed inside the original game directory. Master files present in the default workspace (*<root>\Data*) are shared with custom workspaces.

The “Set Workspace” tool can be accessed from the File menu.

##### Object Window:

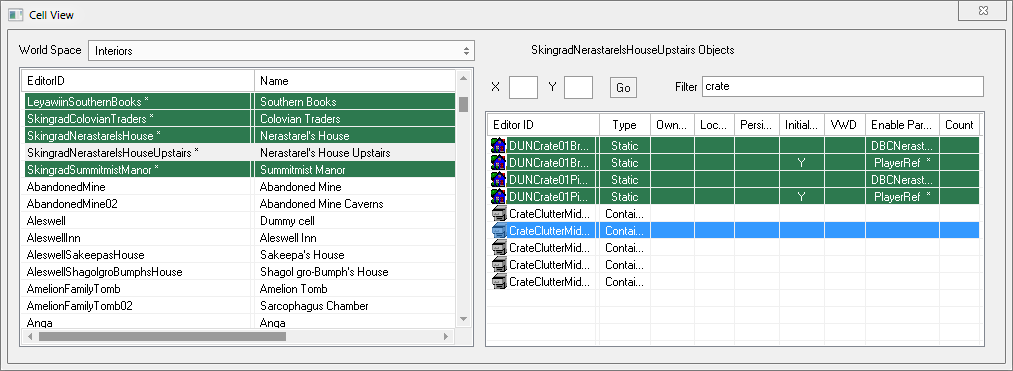
The following improvements have been made to the object window:



* Filter By EditorID – The object list can now be filtered by an editorID string. The filtering is performed as a case-insensitive substring search in each form’s editorID.

##### Cell View Window:

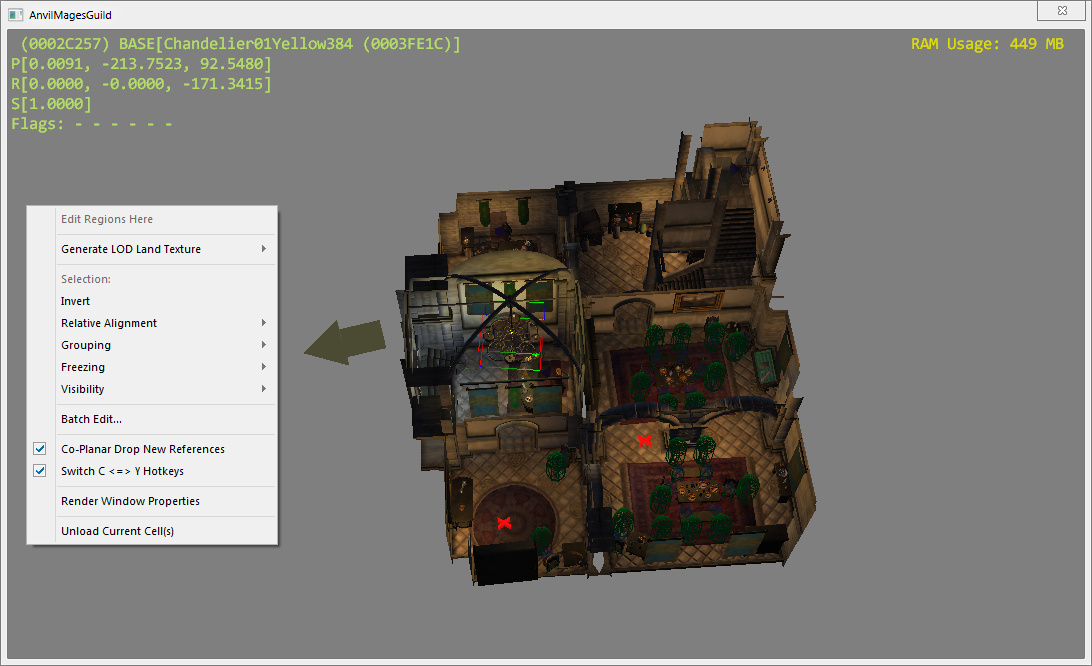
The following improvements have been made to the cell view window:



* Filter References By EditorID – The references list can be filtered by editorID, similar to the object window. If a reference doesn’t have an editorID, the filtering is performed on its base form.
* Jump to Exterior Cell – Enter the X and Y coordinates, hit “Go” and wait till you attain a velocity of +88mph.
* New Columns – The following sortable columns have been added to the reference list:
  + Persistent.
  + Initially Disabled.
  + Visible When Distant (VWD).
  + Enable Parent.
  + Count

##### Render Window:

The following improvements have been made to the render window:



* Increased Responsiveness – The viewport now operates at an average framerate of 48 FPS.
* On-screen Display - Detailed information on the active selection and the editor’s current RAM usage are displayed in the top corners of the window.
* Door markers Properties - Holding down the Control key and double clicking on door markers will now bring up their reference properties dialog box.
* Alternate Camera Movement Settings – The render window is now allowed to have a second set of camera/reference movement settings, editable through the CSE Preferences dialog.
* Initial Camera Placement – On loading an interior cell, the camera is placed at the location of the first reference. If the cell’s empty, it is placed at its origin.
* Reference Scaling – Collections of references can be scaled relatively by holding down the ALT modifier key while performing the scaling operation.
* Path Grid Editing Enhancements –
  + Path grid points can be unlinked from their linked references/relinked.
  + Path grid point operations can be undone/redone1.
* Landscape Editing Enhancements –
  + The active landscape texture can be changed from the “Landscape Texture Use” dialog, by double clicking on any of the listed land textures.
  + The upper limit on the landscape edit brush’s radius has been increased to 25 units.
* New Context Menu Tools –
  + Invert – Inverts the render window selection.
  + Relative Alignment – Aligns the selection to one of the 3 axes of its first reference.
  + Grouping - Allows multiple references to be grouped as a collective object. Selecting a member of a group using the left mouse button causes all of its members to be selected. This behavior will persist until the selection group is dissolved. A reference can be a member of only one group at a time.
  + Freezing - Freezes the movement of the selection. Frozen references cannot be moved in any way until they are thawed.
    - Thaw All In Cell – Un-freezes all frozen references in the loaded cell.
    - Freeze All Inactive – When enabled, all unmodified references are implicitly frozen to prevent accidental edits.
  + Visibility – Toggles the visibility of the selection/selection’s linked (enable parent) children.
    - Reveal All In Cell – Resets the visibility state of all the references in the loaded cell.
  + Batch Edit – Displays the batch reference editor for the loaded cell.
  + Co-Planar Drop New References – When enabled, new references will be placed co-planar with the object at the cursor location.
  + Switch C & Y Hotkeys – When enabled, the functionalities of the C (Isometric view) and Y (Axis modifier) is switched.
  + Unload Current Cell(s) – Unloads the cell(s) loaded into the render window.

1 – Path grid point deletion operations are only supported to a limited extent. Undoing a delete operation will not restore the state of the linked points.

New Hotkeys:

|  |  |
| --- | --- |
| Shortcut Key | Action |
| F1 | Show use info report for selection |
| 2 | Toggle selection visibility |
| SHIFT + V | Invert selection |
| SHIFT + E | Toggle co-planar dropping |
| SHIFT + Q | Freeze/Release auxiliary viewport camera |
| CONTROL + Q | Switch between the vanilla and alternate movement settings |
| CONTROL + R | Unlink path grid points from their linked references |

##### Script Compiler:

The following improvements have been made to the script compiler:

* Compiled bytecode size for scripts has been increased to 32KB.
* Compiler errors accumulate, i.e., script compilation will not halt on encountering an error.

##### LOD Texture Generator:

The following improvements have been made to the LOD texture generator:

* Diffuse map and normal map textures are created with the appropriate mipmap chains.
* The resolution of diffuse maps can be customized through the “CSE Preferences” dialog, with the new upper-limit being 6144px.
* Performance and stability has been improved significantly.
* Partial textures are deleted after the full LOD map is assembled, as dictated by its respective setting in the “CSE Preferences” dialog.

##### Live Change Log:

The live change log is a tool implemented by the CSE that tracks modifications made to records in real time. Currently, the following actions/events are supported:

* Form Instantiation.
* Form EditorID Change.
* Form FormID Change.
* Form “Active/Modified” Flag Change.
* Form “Deleted” Flag Change.

Tracked changes are logged to the session’s log with their timestamps. The session log can be accessed from the Console’s “Contexts” context menu item. If automatic plugin backups are enabled, the change log pertinent to that plugin’s session is saved along with it.

# User Interface

##### Safer Modification of List View based Records:

Forms of types such as Magic Effect, Race, Eyes, Hair, etc. (with the lone exception of Quests) are displayed as a list when editing them in the CS. The default behavior of such dialogs leads to many a dirty edit. CSE attempts to fix it by introducing the following changes:

* The ‘OK’ and ‘Cancel’ buttons are changed to ‘Apply’ and ‘Close’ respectively, thereby clarifying the actions they perform, i.e., ‘Apply’ saves any changes made to the currently selected record while ‘Close’ discards them and closes the edit dialog.
* The newly minted ‘Apply’ button no longer closes the dialog, thereby allowing the user to continue editing after saving.
* When switching to a different record, a ‘Save Changes’ confirmation is displayed. Changes are saved only when the user selects ‘Yes’.

##### Search and Replace:

The “Search & Replace” dialog no longer closes itself after a successful replace operation.

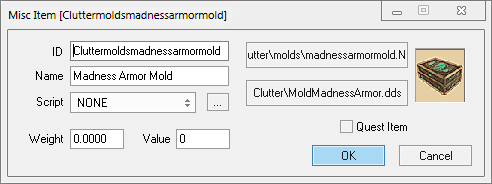
##### Result Script Editing:

Result scripts can now be edited in a larger dialog by clicking on the “…” button placed next to them.



##### EditorIDs in Edit Dialog Titles:

The editorID of the form being edited is now displayed in the dialog window’s title bar.



##### Main Editor Windows’ Visibility:

The object, cell view and render windows, on hiding, are completely hidden instead of being minimized to the bottom of the desktop. Their visibility state is also preserved between CS sessions.

##### Quick Lookup EditorID:

Middle clicking on a dialog control (buttons, text boxes, listview cells, combo boxes, etc.) whose text states a form’s editorID will bring up said form’s edit dialog.

##### Improved Dialog UIs:

The following dialogs’ UIs have been improved to enhance usability and better use the available screen real estate:

* Filtered Dialogue.
* Quest Editor.
* Dialogue Editor.
* Find Text.
* Idle Animation.
* AI Packages.
* Select Topic/Quest.
* Data.
* NPC.
* About.

##### Taskbar Visibility:

Almost every editor dialog can be made to show up in the taskbar. This behavior can be toggled from the “CSE Preferences” dialog.

##### Active Form Sorting:

Active forms, i.e., modified records, can be sorted to the top of most form lists (a listview that displays records) that support sorting. This behavior can be toggled from the “View” menu.

##### Active Form Colorization:

The foreground and background colors of active form items in form lists can be changed from their defaults of black and white. This behavior can be toggled from the “View” menu and the colors can be changed through the “CSE Preferences” dialog.

# Trifles

##### Performance Improvements:

The editor’s general performance and responsiveness has been noticeably improved.

##### Fast Exit:

The editor shuts down in matter of seconds, as opposed to minutes when not using the CSE.

##### Icons with Mipmaps/Texture Size Limitations:

Icons with mipmaps can be previewed correctly and the CS no longer generates errors about the matter. Also, the resolution limitation of 512px for certain textures has been removed.

##### Auto-loading BSA Archives:

All BSA archives in the Data folder are loaded at startup, regardless of their connection to an active plugin.

##### Integer-prefixed EditorIDs:

EditorIDs that start with integers display a warning, reminding the user of the caveats of using such identifiers. This behavior can be turned off through the “CSE Preferences” dialog.

##### Idle Animation Tree Initialization:

The root nodes of the idle animation tree are automatically initialized on editor startup, enabling master-less plugins to create IDLE records.

##### Archived Sound File Sampling:

Sound files, FX and voice files alike, that stored in BSA archives can be sampled from the editor directly without having to manually extract them beforehand.

##### 3rd Party Tool Launcher:



The CSE implements a rudimentary tool manager/launcher, with which 3rd party software can be launched directly from within the editor environment.

Both the manager and the list of registered tools can be accessed from the “Tools” menu.

##### Achievements:

The CSE smugly awards achievements to the user - for “doing stuff” - when they least expect it. It also tracks the total amount of time spent using the editor, a metric that is primarily used as an insidious means to instigate an existential crisis in the user.

##### Lash Chance “Panic Save” Handler:

Let’s face it – The CSE is an almost-sentient, handsome stallion of program. But it has “got heart”, as film critics like to say. And in that “heart”, it houses humility. While it knows that it’s capable of feats beyond the vanilla CS’s wildest dreams, it realizes that it isn’t omnipotent and cannot predict when its finicky host is about to vomit on the proverbial kettle. But it *can* do the next best thing –Try and shield the active plugin from that malodorous mix of bodily fluids and half-digested breakfast. It does so by attempting to save it on the event of a CTD.

If successful, the plugin is saved to the workspace’s “Data\Backup” folder under the name of “PanicSave.bak”. The dumped plugin may contain errors and/or lice, so approach with caution.

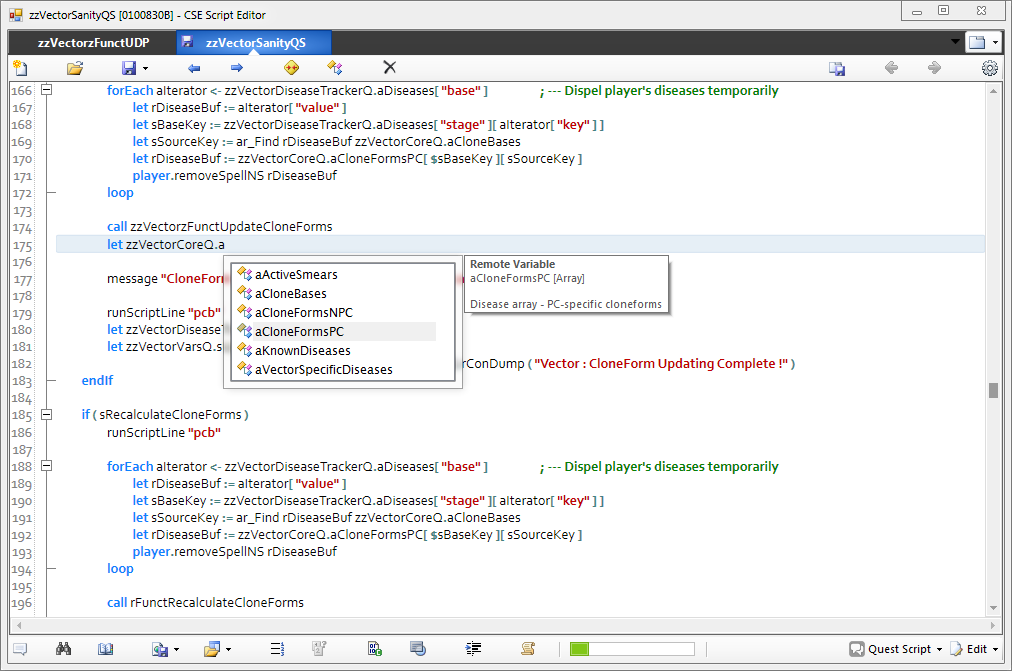
# Vanilla Bugfixes

The CSE fixes a ton of bugs and quirks present in the vanilla CS. The complete list follows:

|  |  |
| --- | --- |
| Response Editor Microphone | Fix for the CTD that occurs on machines with Realtek soundcards, when the response window is initialized without a microphone plugged in its socket. |
| Topic Info Data Reset | Fix for the bug that automatically clears result script text and info flags if they are visible when a new topic is added to the topic list. |
| NPC Editor Face-Gen | Fix for the CTD that occurs due to the improper initialization of the facegen renderer in NPC and creature dialogs. |
| Identical-To-Master Dialog And Worldspace Edits | Fix for the version control related bug that makes unnecessary edits to cells, dialogs and worldspaces should one of the plugin’s masters have an active record of the same. |
| Race Description Dirty-Edits | Fix for the bug that copies race description from one race record to another if the latter were to invoke the spell checker. |
| Code Level Assertions | This bug is deep rooted in the editor code and tends to cause a fairly large number of CTDs for no reason. |
| Unknown Record And Group Types In Plugins | Fix for the bug that caused a CTD when a plugin containing unknown records, sub records or group types was loaded into the editor. |
| Plugins With Missing Masters | Fix for the bug that caused the editor to exit when a loaded plugin was found to have a missing master. |
| Always-On-Top Data Dialog | Fix for the bug that caused the Data dialog to stay above all open windows. |
| Render Window Main Menu Item | Fix for the bug that prevented the Render window for being closed when using the View > Render Window main menu item. |
| Topic Info Copying | Fix for the bug that caused the wrong topic info record to be flagged as modified during a copy operation. |
| Lip Sync File Generator | The infamous lip sync tool has been finally fixed! More details in the next section. |
| Variable Declarations In Result Scripts | Fix for the bug that caused a CTD when compiling a result script that had local variable declarations. |
| New/Duplicate Form Selection | Fix for the bug that prevented newly created/duplicated list view-based forms from being selected after instantiation. |
| Reference Duplication | Fix for the bug that prevented the complete duplication of extradata between object references. |
| Plugin Author/Description Editing | Editing a plugin’s author/description field in the Data dialog sometimes corrupts it, the cause of which appears to be related to file access permissions. CSE attempts to prevent this by preemptively check the plugin file’s handles before committing such potentially dangerous changes. |
| Reference Record Serialization | Fix for the bug that prevented the correct serialization of deleted reference records under certain conditions. |
| Game Setting Cleanup | Fix for the limitation that caused modified game setting records to retain their state between plugin loads. |
| Form Usage Reference Counting | Fix for the bug that broke usage reference counting when a form was referenced more than once by another. |
| Anim-Object Creation | Fix for the bug that caused a CTD when an Anim-Object was created/edited when no plugins were loaded. |
| LOD Diffuse Map Filename | Fix for the bug that caused incorrect file names to be given to generated LOD color maps (which led to pink colored LOD meshes in-game). |
| Plugin Save | Fix for the bug that prevented the “Save Plugin” tool from being reused if a previous operation ended prematurely. |
| Incorrect Script Compiler Errors | Fix for the bug that displayed incorrect line numbers in script compiler error messages. |
| Light Object Reference First-Time Initialization | Fix for the bug that caused a CTD when a light object was placed in a cell for the first time. |
| Render Window “Fall” Operation | Fix for the bug that caused occasional CTDs when using the “Fall” tool. |
| Quest Stage Result Scripts | Fix for the bug that prevented quest stage result scripts from being cleared. |
| Reference Editor Z-Order | Fix for the bug occasionally caused reference edit dialogs to spawn underneath the render window. |
| NPC Editor Inventory Preview | Fix for the bug prevented NPC models from being updated correctly in the preview window after an item was removed from their inventory. |
| Faction Ownership In Conditions | Fix for the bug that prevented factions from being allowed as arguments to condition script commands that accepted parameters of the type “Owner”. |
| ESP/ESM File Associations | Fix for the bug that trashed ESP/ESM file associations at editor startup. |
| Path Grid Point Linking | Fix for the bug that invalidated the render window after a path grid point was linked to a reference. |
| Cell View Window Bounds | Fix for the bug that progressively reduced the size of the cell view window’s controls every time plugins were loaded into the editor. |
| Theme-Enabled Owner-Drawn Controls | Fix for the bug that caused CTDs when painting theme-enabled owner-drawn preview controls. |
| Landscape Texture Change | Fix for the bug that caused the render window to lose input focus after switching the active landscape texture. |
| Path Grid Point Creation | Fix for the bug that caused a CTD when a path grid point was created after every loaded path grid was destroyed. |
| Path Grid Point Selection | Fix for the bug that prevented the selection rectangle from showing on multiple path grid point selections. |
| Render Window Reference Duplication | Fix for the bug that reverted the render window’s selection to the original references during a duplication operation. |
| Non-Standard Line Endings In Scripts | Fix for the bug that prevented the correct parsing of script source code containing non-standard line endings. |
| Dialog Creation Failure | Fix for the bug that prevented modeless dialogs from being destroyed correctly, eventually exhausting the OS”s global window handle pool. |
| LOD “Black Texture” | Fix for the bug that caused half the pixels of generated LOD diffuse maps to appear black in color. |
| Cell Edit Dialog Dirty Edits | Fix for the bug that caused dirty editors when selecting cells in the Cell edit window. |
| Superfluous Addition Of Cell Water Data | Fix for the bug that unnecessarily added water extradata to cells that didn’t have any water. |
| Render Window Exterior Cell Loading | Fix for the bug that caused the render window to flicker intermittently when loading exterior cells. |
| Interior Cell Duplication | Fix for the bug that prevented lighting data from being copied when an interior cell was duplicated. |
| Sweeping Path Grid Point Selection | Fix for the bug that caused the render window to select every path grid point in the loaded cell(s) while reclaiming input focus. |
| Quest Stage Log Entry | Fix for the bug that caused the quest editor to close whenever the Enter key was pressed inside the Log Entry textbox. |
| “Path Grid Edit Mode” Toolbar/Menu Deactivation | Fix for the bug that caused the “Path Grid Edit Mode” main menu/toolbar buttons to relinquish their toggled state occasionally for no reason. |
| Path Grid Edit Mode Initialization | Fix for the bug that caused path grid points to incorrectly appear preselected when entering the path grid edit mode. |
| Loading Detached References | Fix for the bug that caused a CTD when a detached reference (a reference with no parent cell) was loaded into the render window. |
| Reference Variables In Compound Expressions | Fix for the bug that caused a CTD when a reference variable was used as a calling reference in a compound script expression. |
| Mismatching Parentheses In Set Expressions | Fix for the bug that prevented the script compiler from complaining about mismatching parentheses in Set expressions. |
| “Dirty Flag” Reset | Fix for the bug that caused the editor to reset its “Unsaved changes” flag when the Data dialog was closed. |
| Weather Sounds Listview Sorting | Fix for the bug that caused a CTD when the sounds listview in the weather edit dialog was sorted. |
| Render Window Axis-Modifier Hotkeys | Fix for the bug that caused the render window’s axis modifier keys (Z, X and Y) to work incorrectly. |

# New tools

##### Script Editor:



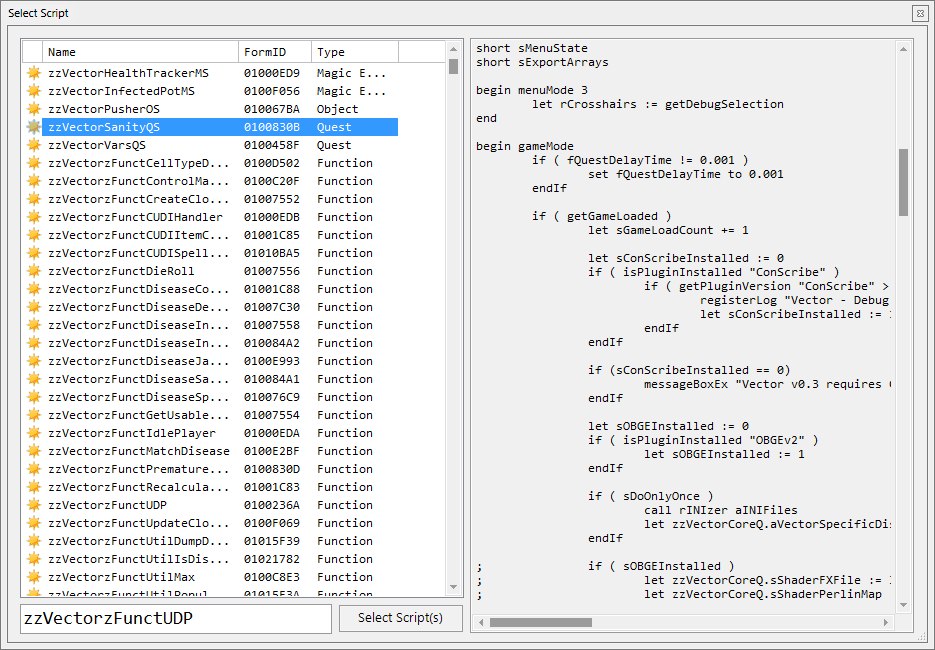
The CSE Script Editor is a complete replacement for the vanilla script editor. It has been written from scratch and is basically superior to the vanilla in every way. Its intuitive design allows scripters, old and new, to quickly acclimatize themselves with its many advanced features.

To begin with, the CSE Script Editor is a tabbed code editor. It can hold an arbitrary number of workspaces and allows operations such as tab rearranging and tab tearing. New workspaces can be instantiated with “New Tab” button present in the tab strip’s control box. Open workspaces can be sorted alphabetically from the control box’s drop down menu.

Workspaces can be rearranged by dragging their tab across the tab strip. They can also be “torn” out of their tab strips and dropped onto either another editor window’s tab strip or the desktop. The former relocates the workspace to the destination window, while the latter spawns a new editor at the drop location and moves the workspace into it.

The following is the list of the buttons/controls in a workspace in the order of appearance (Moving from top-left to bottom-right).

* New – Creates a new script.
* Open – Opens the ‘Select Script’ dialog for script selection.

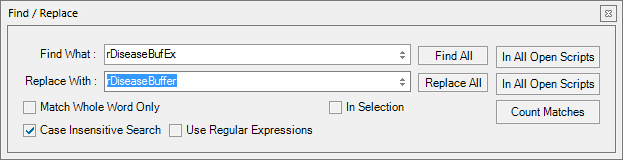


The list view displays all the loaded scripts and the text box to the right shows a preview of the selected script. The textbox at the bottom can be used to select a particular script by its editorID or formID. Multiple scripts may be selected for opening. The list view can be sorted by each column. The first column denotes the state of each script – A golden star denotes that the script is from an active plugin and a “X” mark denotes that the script has its “Deleted” flag set. The list view is status-sorted by default.

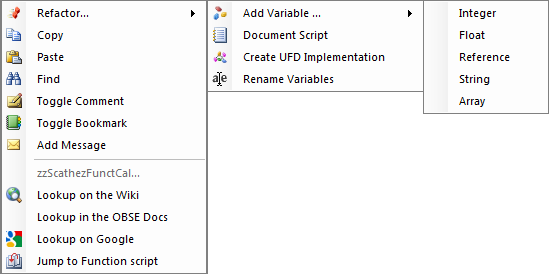
* Save – Attempts to compile and save the loaded script. This button has a drop down
  + Save Script but Do Not Compile – Saves the script text without compiling it to bytecode. On loading a non-compiled script, the editor will generate an error warning you about the script’s status.
  + Save Script and Active Plugin – Attempts to compile and save the script, but saves the active plugin regardless of the compilation result.
* Previous – Loads the previous script, if any.
* Next – Loads the next script, if any.
* Recompile Active Scripts – Attempts to compile and save every script in the active plugin. Compilation results are logged to the console.
* Recompile Script Dependencies – Attempts to compile and save any scripts (regular and result scripts) that might reference the current script and prints a detailed report to the console.
* Delete – Opens the ‘Select Script’ dialog for script deletion.
* Save All Open Scripts – Attempts to compile and save all open workspaces.
* Navigate Backward – Jump back in the navigation stack (more on this later).
* Navigate Forward – Jumps forward in the navigation stack.
* Preferences – Opens the “Preferences” window. Some changes may require a restart of the script editor.

A floppy-disc icon in a workspace’s tab indicates that its script has unsaved changes.

The bottom toolbar is actually a splitter bar which can be moved to resize the editor area and show the controls beneath it.

* Message List – Displays output messages from the script validator, preprocessor and the compiler. Custom messages are also displayed here. Double clicking on an item will either move the caret to the appropriate line or remove it from the list depending upon the message type.
* Find Results – Displays the last executed “Find/Replace” operation’s results. Double clicking on an item will move the caret to the appropriate line.
* Bookmark List – Displays stored bookmarks for the loaded script, if any. Double clicking on an item will move the caret to the appropriate line.
* Dump Script – Saves the loaded script as a file of arbitrary type in a selected folder.
  + Dump All Tabs – Saves all open workspaces to a selected folder as text files.
* Load Script – Loads a plain text type file from disk into the workspace. Replaces any existing content.
  + Load Multiple Scripts Into Tabs – Loads multiple scripts into a workspace of their own.
* Fetch Variable Indices – Enumerates every variable in the script, their type and index. Indices can be edited by double clicking on the desired cell.
* Update Variable Indices – To be used in conjunction with the above tool. Updates the script with the modified variable indices, if any. This is an advanced tool and must be used with care as it can easily break scripts.
* Toggle Offset Viewer – Displays line offsets in place of line numbers. Useful when debugging OBSE errors as they only mention offsets into script bytecode. This tool may only be used with compiled scripts.
* Toggle Preprocessed Text Viewer – Preprocesses the script text and displays the result in a separate text viewer.
* Sanitize Script Text – Performs various operations, as set in the Preferences window, on the script text to make it more legible. The following operations are supported:
  + Anneal Identifier Casing – Corrects the case of identifiers (editorIDs, variable names, command names, etc.).
  + Indent Script Lines – Indents script lines according to block structure.
  + Eval’ify If/ElseIf Statements – Adds the “Eval” keyword to all If/ElseIf statements.
  + Apply Compiler Override To Script Blocks – Prefixes script blocks with the compiler override specifier – “\_”.
* Bind Script – Allows the current script to be bound to a new or an existing scriptable object.
* Progress Bar – Indicates the compiled bytecode size of the current script.
* Script Type Menu – Specifies the current script’s type.
* Edit Menu –
  + Find/Replace – Displays the “Find/Replace” dialog.  
    
  + Goto Line – Jumps to the given line number. This tool cannot be used in the offset viewer.
  + Goto Offset – Jumps to the given script offset. This tool can only be used in the offset viewer.

The editor’s context menu offers quick access to some of its features:



* Refactor Menu –
  + Add Variable – Appends a new variable to the current script’s variable declaration block. If a string token is present at the context menu’s location, it is used as the name of the new variable.
  + Document Script – Inserts comment-based documentation into the script text.
  + Create UDF Implementation – Context sensitive. The tool is used to quickly create a template implementation of a user-defined function. Only displayed when the context menu’s opened at a user-defined function callsite and the string token at the menu’s location isn’t a known UDF’s identifier.
  + Rename Variables – Allows the current script’s variables to be renamed without losing their indices.
* Copy – Copies the string token at the menu’s location.
* Paste – Pastes the contents of the clipboard at the caret’s location.
* Find – Displays the “Find/Replace” dialog for the string token at the menu’s location.
* Toggle Comment – Toggles the comment status of the selection/current line.
* Toggle Bookmark – Sets bookmark on the current line. Bookmarks are saved with the script text, as metadata.
* Add Message – Adds a notification message for the current script. Messages are saved with the script text and displayed every time their parent script is loaded into a workspace. They can be deleted by double clicking on their respective items in the “Message List” listview.
* Lookup on the Wiki – Searches for the string token on the Elder Scrolls Construction Set Wiki.
* Lookup in the OBSE Docs – Searches for the string token in the OBSE Command Documentation.
* Lookup on Google – Searches for the string token on Google.
* Developer Page – Context specific. Opens a developer specified link, if any, in the default web browser. Only displayed for identifiers of script commands from 3rd party OBSE plugins that interoperate with the CSE.
* Jump to Object/Quest/Function Script – Context specific. Opens the script associated with the identifier at the menu’s location, if any. Only displayed for identifiers of scriptable objects and scripts themselves.  
    
  The “Navigate Forward/Backward” buttons in the main toolbar can be used to switch between workspaces after successive jumps.

And it keeps coming! The code editor offers even more:

* Syntax Highlighting.
* Code Folding.
* Brace Matching.
* IntelliSense.
* Script Validation.
* Auto-Recovery.
* A Preprocessor.

IntelliSense

IntelliSense is the name given to the script editor’s implementation of [auto-completion](http://en.wikipedia.org/wiki/Autocompletion#In_source_code_editors). It provides a convenient method to access script commands, local variables, remote scripts and their variables, user defined functions, game settings, global variables, quests and pretty much every other object one can create in the CS.

IntelliSense displays its popup list as you type in code, filtering its items to reflect the changes made to the token being typed. Once displayed, the Up and Down arrow keys can be used to navigate the suggestion list. The currently selected suggestion can be inserted at caret location by pressing the Tab key, while the Escape key closes the popup.

The suggestion list may contain items of the following types:

* Commands – Descriptions include command alias, description, number of parameters, command source and return type. Commands that require a calling reference are only displayed when the dot operator is used on a valid reference.
* Variables – Descriptions include their type and any comments that following their declaration.
* Quests – Descriptions include the name field of the quest and the editorID of the quest script, if any.
* User Defined Functions – Consider the following UDF script:

Scn SampleUDFScript

; this is an UDF script

; some text – foo

; more foo

Short sArg1 ; Some arg

Float fArg2 ; Another arg

Begin Function {sArg1 fArg2}

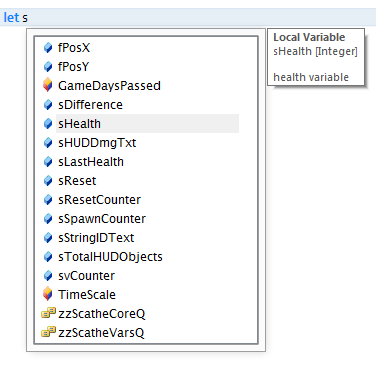
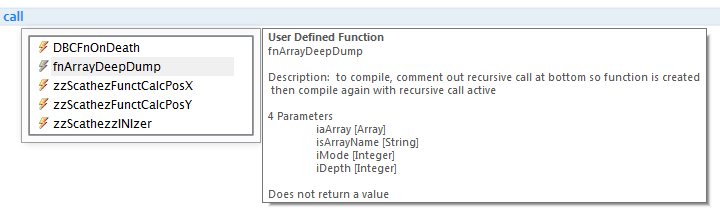
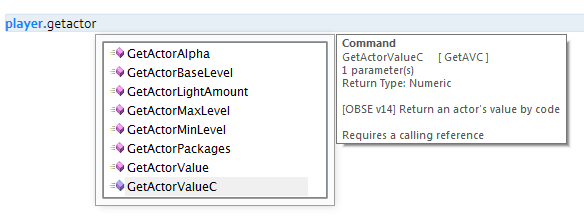
Let sArg1 := 111

SetFunctionValue sArg1

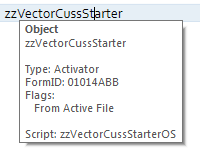
End

The description will include the comment text between the script name declaration and the first local variable’s. Arguments are treated as variables and enumerated. And finally, the return type of the UDF is stated.

IntelliSense supports the following context specific triggers:

* Set or Let – Suggests local variables, global variables and quests.  
  
* Call – Suggests user defined functions.  
  
* Dot (.) – Suggests remote variables (variables in the script attached to the first operand) and script commands that require a calling reference.  
  

IntelliSense also allows for quick access to an object’s properties in the form of tooltips. Hovering the mouse pointer over a valid identifier will bring up a tooltip describing the object using it.



Script Validator

The script validator catches errors that the vanilla script compiler doesn’t, namely:

* Invalid block types for non-object scripts.
* Script name re-declarations.
* Superfluous expressions in commands.
* Nested variable declarations.
* Variable re-declarations.
* Unreferenced variables.

The token parser expects operators, operands and function arguments to be delimited by one of the following characters: ., (){}[]\t

Preprocessor

The script editor implements a preprocessor engine that allows users to use various preprocessor directives, not unlike the [C preprocessor](http://en.wikipedia.org/wiki/C_preprocessor). All directive declarations/definitions need to be represented as comments. Preprocessor directives are grouped in two: Single and multi-line directives. Single line directives do not exceed a line of code in the text editor. Such directives use the ‘**#**’ character as their prefix. Multi-line directives, on the other hand, encompass multiple lines of code and must be prefixed with the ‘**@**’ character. The multi-line argument/value needs to be enclosed in curly braces. Some directives support no more than one encoding type.

For example:

;#DEFINE MACRO\_FOO “FOO~POO”

;@IF (MACRO\_FOO != 123.222 || (MACRO\_FOO < 10 && MACRO\_FOO > 4.2))

;{

; PRINT “MACRO CONDITION EVALUATED AS TRUE!”

;}

Define – Defines a preprocessor macro, similar to C’s. Macro identifiers can only contain alpha-numeric characters and underscores, and are case sensitive. They must be delimited with one of the following chars to be recognized: ., (){}[]\t. Macro values themselves can contain any character. They can be used in any context as the preprocessor simply replaces the macro identifier with its value before compilation. For instance,

;#define \_DEBUG 1

if \_DEBUG

print "This message will be printed if \_DEBUG is set to a non-zero value"

endIf

;@define PrintMESSAGEString

;{

; print “MessageOne!”

; print “MessageTwo!”

; ; comment

;}

if zzQuest.Var == 1

PrintMESSAGEString

endif

The preprocessor also allows the use of accessory operators during macro expansion. These operators are placed before macro identifiers and perform special operations on the values of macros. The following are the supported accessory operators:

* Stringize (#) – Wraps the macro’s value in double quotes.  
    
  ;#define STRIZE Help  
  print #STRIZE ; expands to “Help”

Import– Allows external text to be inserted into scripts, similar to #include in C’s. The text files to be inserted must be placed inside the script editor’s preprocessor resource folder (detailed further below). Consider the following example,

<Preprocessor Resource Directory>\TestSnip.txt

float fquestdelaytime

short doonce

long goldvalue

Regular Script zzTestQS

scn zzTestQS

;#import “TestSnip”

begin gamemode

print “foo”

end

Preprocessed Script zzTestQS

scn zzTestQS

float fquestdelaytime

short doonce

long goldvalue

begin gamemode

print “foo”

end

The Import directive is recursive, so imported scripts/snippets can have their own preprocessor directives. It does not support multi-line encoding.

Enum– Defines an enumeration (enum for short). An enumeration is basically a single line definition that allows multiple macros to be defined in order. Enum items can only have numeric values. They need not be continuous i.e., an item may be declared without an initialization value, in which case it will be assigned one more than the value of its predecessor. The default value starts with 0. The syntax for an enumeration is as follows:

;#ENUM ENUM\_NAME {ITEMA=VALUE ITEMB=VALUE ...}

;@ENUM ENUM\_FOO

;{

; ITEMA=VALUE

; ITEMB

;}

Enum items can be used as any other macro, by their identifier.

If – Controls compilation of portions of the script. If the expression written (after the directive identifier) evaluates as true, the code group following the directive is retained in the translation unit.

;#define DebugLevel 1

;#define foo “String”

;#define bar 4.5

;@if DebugLevel > 1 && DebugLevel < 3

;{

; print “Log Level A: Debug Message”

;}

;@if ((DebugLevel <= 12) || ((foo == “String”) && foo != 4.25))

;{

; print “Log Level X: Debug Message”

; if eval (Octopi.tentacles == “CSE > Skyrim”)

; player.kill

; endif

;}

The condition expression can only include macro identifiers and constants/literals. The directive supports the following relational operators, which are evaluated in their [default order](http://en.cppreference.com/w/cpp/language/operator_precedence) of their precedence.

* Equality [==]
* Less than or equal [<=]
* Greater than or equal [>=]
* Inequality [!=]
* Greater than [>]
* Less than [<]

In addition to the above, the logical operators AND [&&] and OR [||] are allowed in expressions. Parentheses may be used to override the default precedence.

Any text files placed inside the standard directives folder will be parsed before each preprocessor operation. Multi-line blocks can contain directive declarations – They will be expanded automatically when the parent directive is. The number of passes the preprocessor makes can be configured from the “Preferences” window.

Shortcut Keys

The CSE Editor adds a number of counter-intuitive shortcut keys for its various functions to aid the lazy scripter. And tejon.

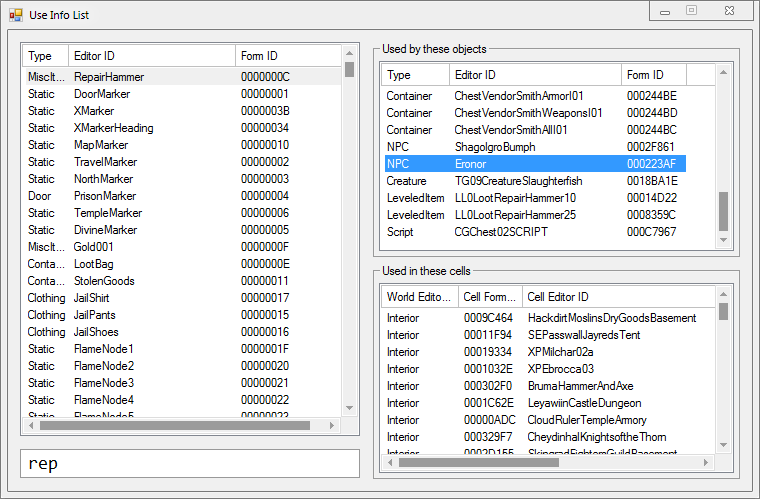
|  |  |
| --- | --- |
| Shortcut Key | Action |
| CONTROL + T | New workspace |
| Middle Mouse Click on a Tab | Close workspace |
| CONTROL + TAB  CONTROL + PAGE DOWN | Switch to the next workspace |
| CONTROL + SHIFT + TAB  CONTROL + PAGE UP | Switch to the previous workspace |
| CONTROL + 1…9 | Switch to the nth workspace |
| CONTROL + New Button | Open a new workspace and initialize a new script |
| SHIFT + New Button | New editor window |
| CONTROL + Open Button | Open a new workspace and display the Open Script dialog |
| CONTROL + Q | Toggle comment |
| CONTROL + O | Open script |
| CONTROL + S | Compile and save script |
| CONTROL + SHIFT + S | Save all open workspaces |
| CONTROL + D | Delete script |
| CONTROL + ALT + LEFT | Previous script |
| CONTROL + ALT + RIGHT | Next script |
| CONTROL + N | New script |
| CONTROL + F4 | Close script |
| CONTROL + B | Toggle bookmark |
| CONTROL + ENTER | Show IntelliSense interface |
| ESCAPE | Hide IntelliSense interface  Clear find result indicators |
| CONTROL + UP | Move current line up |
| CONTROL + DOWN | Move current line down |
| CONTROL + F | Find |
| CONTROL + H | Replace |
| CONTROL + G | Go to line |
| CONTROL + E | Go to offset |
| CONTROL + Left Mouse Click on Scriptable Object Identifier | Jump to Script |
| F1 (In the Select Script dialog) | Use info report for the selected script |

Resource Location

As with all Bethesda Game Studios Editor Extender-related resources, the script editor’s resources are to be saved inside the “Data\BGSEE” directory.

* Data\BGSEE\Script Editor\Preprocessor – Preprocessor resources such as importable snippets are saved in this folder.
* Data\BGSEE\Script Editor\Preprocessor\STD – Standard preprocessor directives are saved in this folder.

##### Centralized Use Info Listing:



The use info listing tool is basically a conglomeration of the use reports of every loaded record in the CS. It allows easy look up of cell and object use lists through its centralized listing. Furthermore, every item in the list can be edited directly by double clicking it. The textbox at the bottom is used to filter the form list by editorID and formID. Every form type, save MGEF and GMST, are listed and tracked.

It can be accessed from the “View” menu.

##### Batch Reference Editor:



The batch editor for references lives up to its name in most areas of the batch editing of references. Editable references must be present in the loaded cell. When initialized, the selected objects will automatically be checked in the editor’s object list - Only checked objects will be modified. The editor attempts to emulate the vanilla reference properties dialog as seen above: It can edit attributes of the following groups:

* 3D Data – Includes position, rotation and scale data.
* Flags – Includes flags for persistence, initially disabled state and visible when distant [VWD].
* Enable Parent, Ownership and Extra – Similar to the vanilla reference property dialogs.

The last 3 groups are applied selectively, to the objects that have the respective attributes and extradata. Each modifiable attribute has a checkbox next to it which indicates the enabled state of the corresponding attribute – The attributes modified are those with an ‘Enable’ check in their companion checkbox.

It can be accessed from the render window’s context menu.

##### Tag Browser:



The Tag Browser allows the user to attach arbitrary tags to any record. Tags can be nested with the use of drag-drop operations, renamed by (slowly) double clicking on their nodes. A record can be allocated multiple tags, but each tag may only contain a single instance. Records can be drag-dropped into the record list of the active tag. The record list behaves similar to the object window – Records can be double clicked for editing and drag-dropped into the render window for reference instantiation or indeed any other target location that allows drag-dropping. The textbox can be used to search for specific items in a tag’s record list. Tags/tagged records may be added/removed through the context menu. Tag hierarchies can be saved to disk using the ‘Save’ tool; the ‘Load’ tool is subsequently used to load a saved hierarchy. Invalid/non-existent records will be removed during a load operation. The textbox in the bottom can be used to find items in the record list.

It can be accessed from the “View” menu.