



User Manual

Version 2018

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3) zlib

zlib general purpose compression library
version 1.2.3, July 18th, 2005

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Jean-loup Gailly jloup@gzip.org

Mark Adler madler@alumni.caltech.edu

4) LightWrap++, a C++ wrapper for LightWave

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Software Design and Development

Michael Wolf

Management

Dagmar Bornemann

Documentation and Tutorials

Michael Wolf

Product Marketing

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db&w Bornemann und Wolf GbR
Seyfferstr. 34
70197 Stuttgart
Germany

www.db-w.com
info@db-w.com

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Introduction

frameD is a plugin for LightWave3D to create, load and manage image sequences defined by text files.¹

The main usage scenarios are image sequences that contain duplicate images (such as mouth shapes mapped on a character's face) as well as backplates used for reference.²

It can also be used to greatly speed up the access to image sequences, especially across a network. This is done by using both a RAM cache as well as the option to create and use proxy images.

These text files are treated by LightWave3D as animation files. However, they point to individual images which are loaded as frames of the "virtual" animation.

Since the individual images are loaded through the frameD plugin, it can perform additional processing or even not load from disk at all. This is leveraged by providing the option to load proxy images (which are created automatically) and by using available memory to cache images.

frameD supports both standard "IFL" based sequences as well as its own proprietary "XFD" format. The latter is XML based and allows for more attributes to be saved than simple IFL files allow for.

Features

- X-Sheet based editor for image sequences
- Loader settings per image sequence
- Image proxies to speed up interactivity in Layout
- Image RAM cache speeds up interactivity in Layout and rendering in some cases
- Retiming of image sequences using envelopes

Plugins

frameD consists of a collection of plugins with different purposes:

The frameD animation loader loads IFL/XFD based sequences into LightWave 3D.

The frameD editor allows the creating and editing of IFL/XFD based images sequences within Layout.

The frameD Master Plugin can be added to a scene in Layout to individually control settings per loaded Sequence.

Compatibility

FrameD 2018 is compatible with LightWave3D 2018 on Windows and MacOS.

Please visit <http://framed.db-w.com> for more up to date information.

¹ Gratuitous footnote. We'll try to make the following ones more informative. ;)

² We know – actually we expect – that many of you will come up with uses that we certainly never thought of.

Setting up frameD

Installation

The download contains ZIP compressed files for all platforms supported by frameD. Extract the appropriate ZIP file for your platform.

Windows

The frameD.p file can be copied to any directory where you keep your plugins. We recommend using a manually created plugin directory to separate third party plugins from plugins shipped with LightWave 3D. This will simplify upgrades of LightWave 3D.

Now use the Edit Plug-ins panel (alt-F11) of the Add Plugins menu item to add the plugin file shaderMeister.p to LightWave 3D.

Plugins can also be copied into the

`%userprofile%.NewTek\LightWave\2018.0\plugins`

directory in the user profile.

MacOS

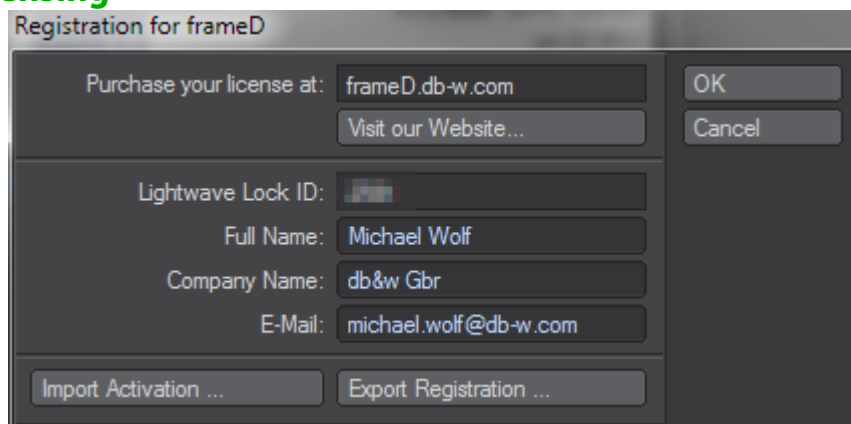
The OS X version of frameD is included as a DMG (Disk Image). Double click on the icon to mount the disk image.

Copy frameD.plugin to `~/Library/Application Support/NewTek/LightWave/2018.x/plugins`

This will allow LightWave 3D to automatically pick it up at the next restart.

In either case you are of course free to copy the plugin file to another location and add it manually.

Licensing



Once you've installed the plugin, apply the **db&w frameD Master** handler plugin to your scene, and click on the "Register Plugin..." button.

Alternatively you can also run the **db&w frameD Editor** generic plugin.

Enter your full name, company name (if applicable) and e-mail address. Export the registration and attach it to an e-mail to **registration@db-w.com**. We will mail you an activation code within 24 hours after payment is received, depending on the time difference³.

You can then import the (unzipped) keyfile attached to the activation e-mail.

The registration is now complete and you will see the interface of frameD, allowing you to use it.

The registration file is stored in the user profile by default, in the file frameD.key. If you use multiple licenses of LightWave 3D from a single network share, the registration manager will only append/edit licenses locked to the dongle installed on the host machine.

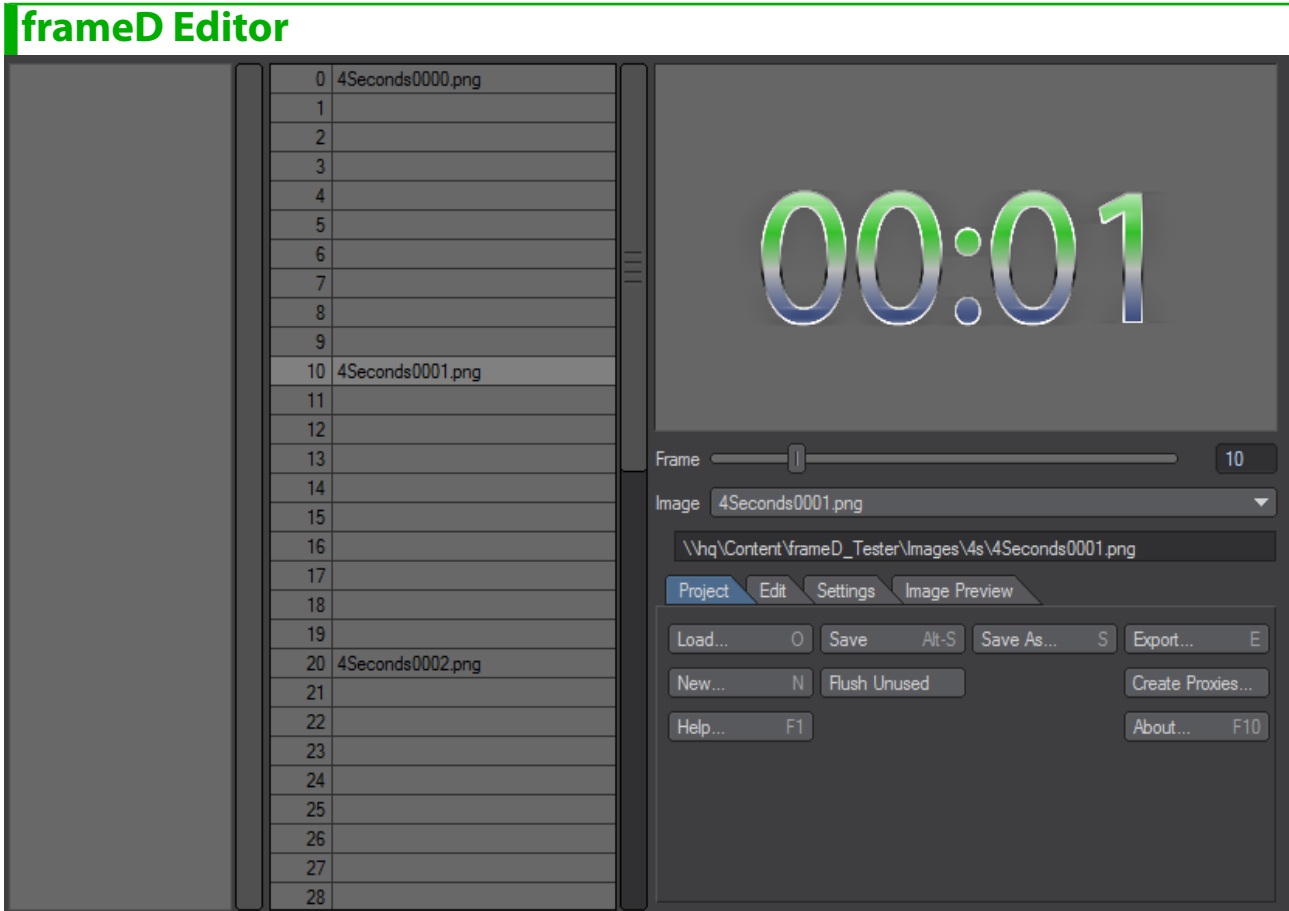
³ Our key generator needs some sleep every now and then ;)

A key file containing multiple keys can be copied to the same location as the frameD.p plugin file itself in the case of a network based, shared installation.

Running without a license

If there is no valid license then the frameD editor will not be available. It is also not possible to change any settings of the loaded sequences.

However, scenes created with frameD will still load and save, as well as render.



This is an overview of the frameD editor and the implemented functionality.

The list on the very left is the clipboard, next to it is the X-Sheet, it showing the frames in the sequence and the images assigned to them.

The preview shows the image at the currently selected frame.

Underneath the preview is the current frame slider (as well as a matching numeric input).

The tabs at the bottom right contain the menus which offer various options to edit, load and save sequences or change the way images are displayed.

The editor will load the last used project when the editor is launched and an automatic backup is found, asking the user first. No data can thus be lost by exiting it. The automatic backup is saved on exit, if there are frames assigned to the X-sheet.

If you'd like to start with a blank project, make sure to use "New..." in the editor prior to exiting it.⁴

X-Sheet (list view in the middle)

The X-Sheet displays a list of frames and the images they contain.

The X-Sheet highlights both the current frame as well as frame selections.

⁴ We agree that this behaviour isn't quite optimal. It is certainly bound to change in future revisions, at least by making it an option.

Current Frame

The current frame is highlighted using a slightly brighter row background. This is the same frame as the one selected by the frame slider underneath the preview.

The Image pop-up under the frame slider allows you to change the image used by the current frame.

Frame Selections

The X-Sheet also allows you to select entries directly by clicking on them. This is independent of the current frame that is displayed in the preview.

Selected frames are displayed using a brighter colour to display the text.

Alt-left-click will select a frame and directly open a pop-up to select an image (this is identical to the Image pop-up described further below).

Multi-selection with shift- or ctrl-left-click combinations are also possible to drag items.

Shift-click will select all images from the last selected one to the one clicked on.

Ctrl-click will toggle the selection state of the item.

Frame Dragging

Selected items can be dragged to another position.

By default, the first selected item will be swapped with the target of the drop operation.

If shift is pressed while dragging, they will then be deleted from their original positions (a move operation). The dragging indicator will switch to red to indicate move mode.

If ctrl is pressed while dragging, then the selected items will be copied without erasing the original entries (a copy operation). The dragging indicator will switch to green to indicate the copy mode.

While dragging, the start of the dragging operation will be highlighted using a light grey frame.

Right Click Menu

Often used functions are available by right clicking on the X-Sheet.

Insert Before Selected Frame(s)

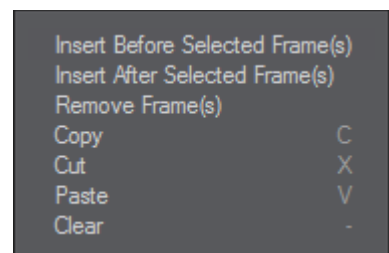
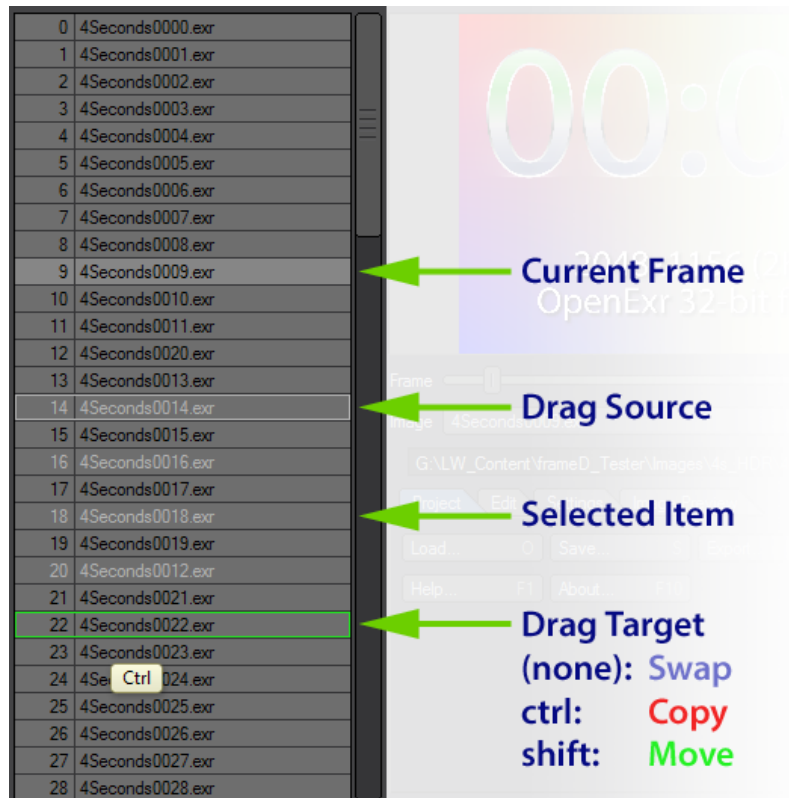
This will insert an empty frame before the selected frame(s).

Insert After Selected Frame(s)

This will insert an empty frame after the selected frame(s).

Remove Frame(s)

This will remove the selected frame(s).



Cut / Copy / Paste

Cut or copy the selection. Paste will happen on the current frame. Please see the section on the Edit Tab for further details.

Clear

Clears the selected frames.

Clipboard (list view on the left)

This displays the current content of the clipboard after a cut/copy operation. Nothing can be selected here, this list is just for informational purposes.

Frame slider

The slider allows you to set or scrub to the current frame in the X-Sheet.

Image

The image pop-up allows you to set the image for the current frame in the X-Sheet. You can also set it to (none) – in this case the first image that precedes the current frame will be used.

Images can be loaded using the (load image) option. Multiple images may be selected.

If one image is selected and frameD detects it as being part of a sequence, then it will prompt for a range of frames of that sequence to load.

This automatic detection works if only one frame is selected (it can be any frame of the sequence) and the frame numbers are at the end of the file name, before the extension. i.e. "textSequence0001.png"

Existing frames will be overwritten.

Project Tab

Load...

This will load an existing project into the frameD editor, clearing the current one.

It can load both IFL and XFD files.

Save

This will save the current project without prompting the user.

If the current project is a new project or the editor just started, then the user will be prompted for a file name.

If the project is used in the current LightWave 3D scene, then it will be updated there as well.

Save As...

This will save the current project either as a XFD or IFL file, prompting for a file name. Either of them can be loaded into LightWave 3D using the included frameD animation loader.

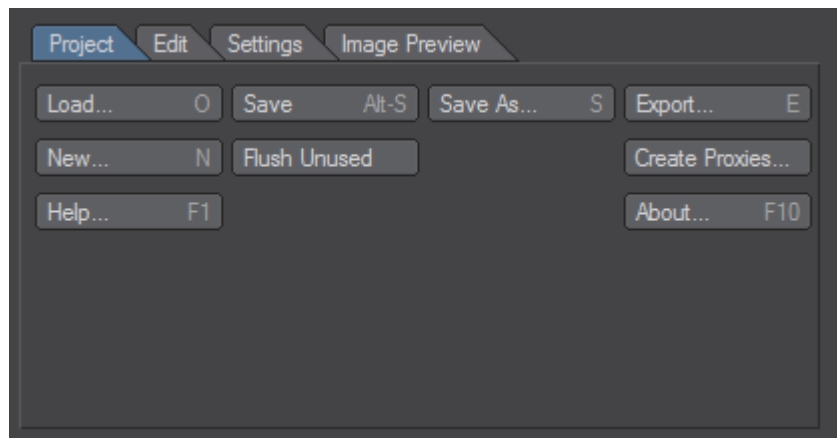
If the project is used in the current LightWave 3D scene, then it will be updated there as well.

Export...

Exports the current project as an IFL file

New...

Clears the project to start a new one.



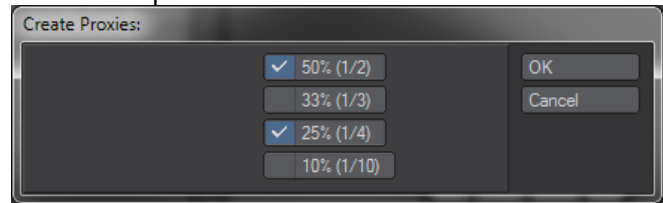
Flush unused

This removes all images that are not used in the current sequence.

Create Proxies...

Opens a window to select proxy sizes. This will create them in a single operation and store them on disk.

This isn't necessary as the loader will automatically create and save proxies, but it can speed up the very first time a sequence is loaded in Layout.



Help...

Currently displays the keyboard shortcuts as well as mouse options for the X-Sheet.

The help panel may remain open as a reference while you continue to work in the editor.

About...

Display the version number of frameD as well as the build date.

Edit Tab

Copy

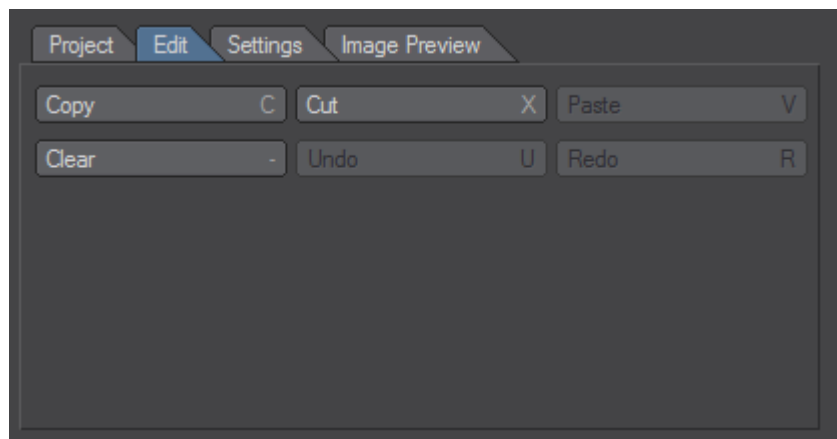
Copies the currently selected frames into the "clipboard".

The current contents of the clipboard is displayed as a third column in the X-sheet.

Cut

Copies the currently selected frames into the "clipboard" and then clears them in the x-sheet.

The current contents of the clipboard is displayed as a third column in the X-sheet.



Paste

Paste the contents of the clipboard into the x-sheet. The first frame to copy to is determined by the currently selected frame.

Clear

Clear the currently selected frame(s) from the x-sheet.

Undo

Undo the last edit(s) in the x-sheet. Only edits to the x-sheet are stored on the undo stack.

Redo

Redo the undo step⁵. Redos are available immediately after undos, but are cleared if further editing takes place.

5 Undoes the undo?

Settings Tab

A change of the preview start/end or the sequence length will clear the current selection of frames in the x-sheet.

Preview Start

Set the start frame to display in the x-sheet to limit the scope and focus of edits.

Preview End

Set the end frame to display in the x-sheet to limit the scope and focus of edits.

Last X-Sheet Frame

This sets the length of the sequence as displayed in the X-Sheet. If the new length is shorter than the previous one then excess frames will be deleted. However, there is also a warning before that happens.

If the length is extended then new, empty frames will be added at the end of the X-Sheet.

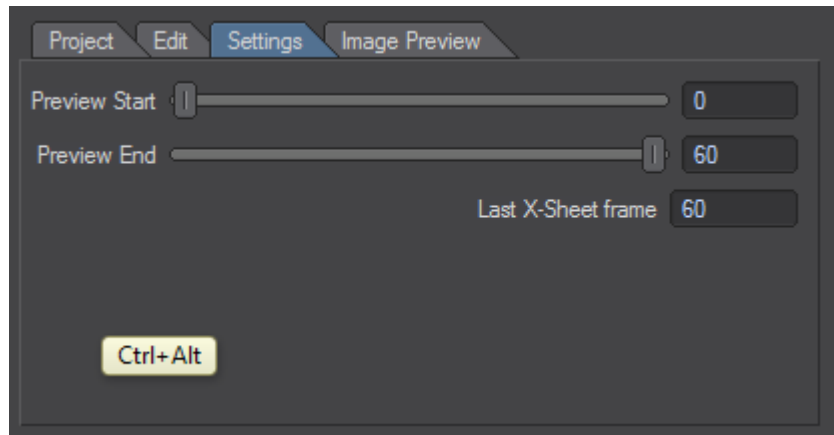


Image Preview Tab

These are general, non-project specific settings.

However, currently they are saved with the project.

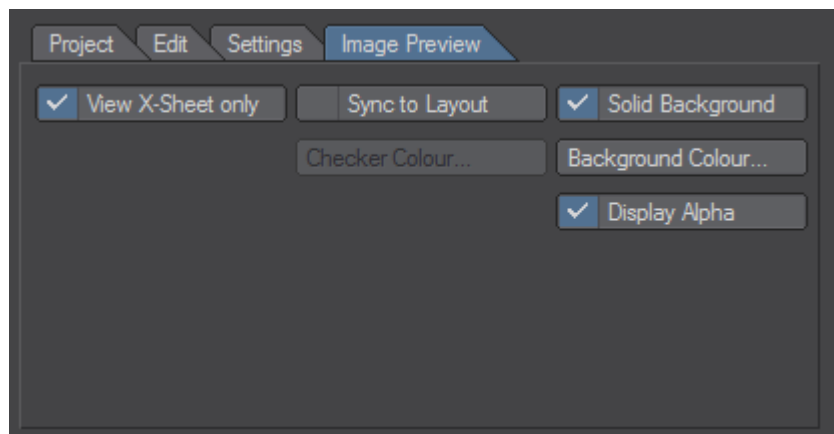
Preview X-Sheet only

If this is checked the preview displays the image stored in the selected frame. If the current frame contains no image, nothing will be displayed.

When not checked, it displays the image for the frame selected in the X-Sheet. If the current frame contains no image, the image from the earliest frame that contains one will be displayed.

Essentially, images are “held” until a new one is set in the X-Sheet.

This corresponds to the behaviour of the frameD loader as well as LightWave's behaviour when loading image sequences.



Sync to Layout

The current time is synced with Layout. If you scrub in Layout then the current frame in the frameD editor will change as well.

The reverse doesn't work. Scrubbing in frameD doesn't change the current frame in Layout.

Solid Background

Draw the background in the preview using either a solid colour or checks. This is only visible outside the current image or when the image contains an alpha channel.

Checker Colour

This defines the colour of the checks if the **Solid Background** option is off.

Background Colour

This defines the background colour in the preview.

Display Alpha Channel

If this option is enabled then the alpha channel⁶ of the current image will be taken into account when displaying it.

6 Obviously only if the current image actually contains an alpha channel.

Master Plugin

The frameD Master plugin makes the individual settings for frameD managed image sequences available in a scene. The settings are saved with the scene and respected in ScreamerNet as well⁷.

The **Sequences** tab hosts the individual controls for specific sequences. The **Image Cache** tab host the controls responsible for managing the image RAM cache which is used both by Layout as well as ScreamerNet.

The following controls are available:

Sequences

Sequence

This allows you to select the loaded frameD sequence to edit.

Override Image Editor

If this setting is turned off then the sequence playback is controlled by the settings in the image editor.

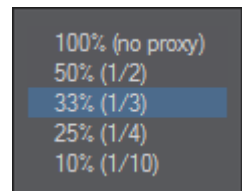
If it is turned on then the following controls are enabled, the sequence playback is controlled by them.

Please note: If this setting is turned on then the post-behaviour of the loaded frameD sequence needs to be set to Loop in the image editor.

Display Proxy Size

This sets the scale of the images loaded by the sequence when working interactively in Layout. Proxies will be created transparently by the frameD loader and stored in a subdirectory next to the images used in the sequence.

If proxy images exist on disk (and are more recent than the image file) then those will be loaded directly to speed up interactions in Layout.



Render Proxy Size

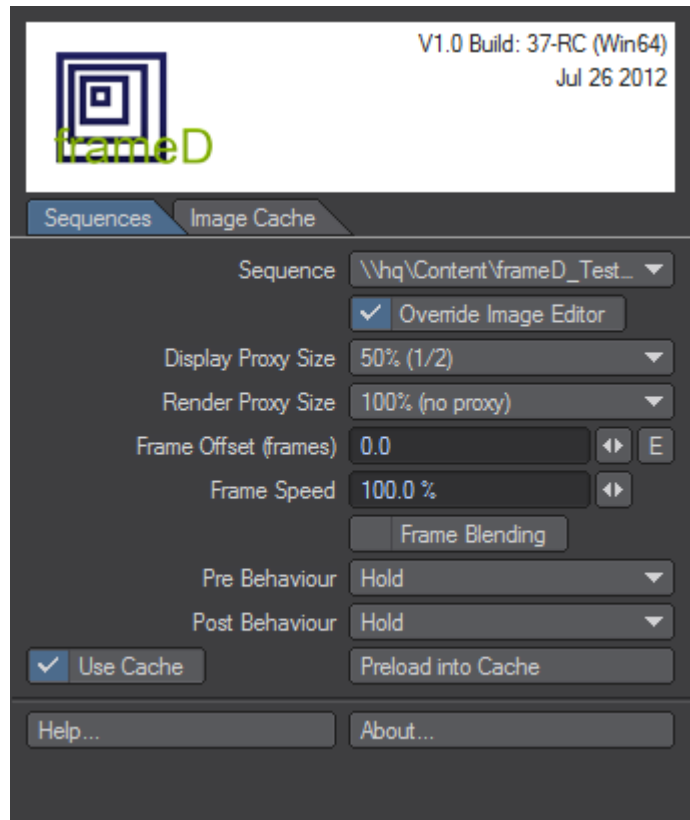
This sets the scale of the images loaded by the sequence when rendering. Proxies will be created automatically by the frameD loader and stored in a subdirectory next to the images used in the sequence.

If proxy images exist on disk (and are more recent than the image file) then those will be loaded directly.

Frame Offset (frames)

This changes the offset of the sequence. The setting is in frames and can be enveloped.

To directly control which sequence frame is loaded, at which time in Layout, use the envelope. If an envelope is used to define the offset, then the Frame Speed as well as the Pre- and Post-Behaviour will be ignored and the respective controls disabled.



⁷ Obviously, only the Render Proxy Size will be used when rendering in ScreamerNet.

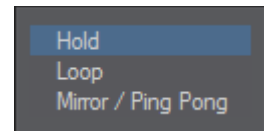
Frame Speed

This changes the speed of the frameD sequence. The sequence will always be loaded at the scene FPS settings.

If you slow down the sequence it may extend beyond the length as defined by LightWave in the image editor. You can change the end behaviour to "Loop" in the image editor to prevent that. The sequence will not loop in that case but behave as defined by the frameD Master.

Pre Behaviour

This setting determines how frames are handled when loaded before the starting frame of the sequence (which could be due to a negative current frame or a changed Frame Offset).



Hold

The first image of the sequence will be displayed

Loop

The sequence will be looped

Mirror / Ping Pong

The sequence will be repeated but the loops will be mirrored in time.

Post Behaviour

This setting determines how frames are handled when loaded after the end frame of the sequence.

Hold

The last image of the sequence will be displayed

Loop

The sequence will be looped

Mirror / Ping Pong

The sequence will be repeated but the loops will be mirrored in time.

Frame Blending

Frame Blending blends frames in the image sequence to smooth the transition between. If a sequence contains an image at frame 0 as well as another frame at frame 10, Frame Blending will gradually blend from one to the other over the course of the frames 1 to 9.

Blending will be performed onto the first image. If the second image is larger, it will be cropped. If it is smaller then it will be blended in on the top left of the first image.

Use Cache

This allows the current sequence to use the image cache if it is enabled. This setting is on by default.

Preload into Cache

This loads all images that are a part of the current sequence into the cache.

The size of the cache will not be increased automatically if they don't fit, instead, the images that have been used the least will be purged from RAM.

Help...

This opens a panel with short descriptions of the controls and associated functionality. You can leave it open as a reference.

About...

Displays detailed version information as well as credits for frameD.

Image Cache

The Image Cache stores used images in memory to allow for faster scrubbing within Layout. It also speeds up sequences that perform frame blending or the use of multiple sequences that refer to the same images on disk. If the memory limit of the cache is reached then the least recently⁸ used images will be removed from the cache.

Cache Images in Memory

This switch turns the image cache on or off for all sequences. If it is off, then image caching is completely disabled.

The amount of memory used by the cache is controlled by the following settings.

Max. free Memory to use

This determines the largest amount of memory that the cache may use. It is a percentage of the available (free, physical) memory on the workstation.

This allows the cache size to adapt to the amount of installed as well as available memory on the system.

Minimum Cache Size

This determines the minimum amount of memory for the cache. It will always provide at *least* this much memory to cache images.

The control understands the units MB, KB and GB⁹ for the cache size. Numbers without a unit are interpreted as Megabytes.

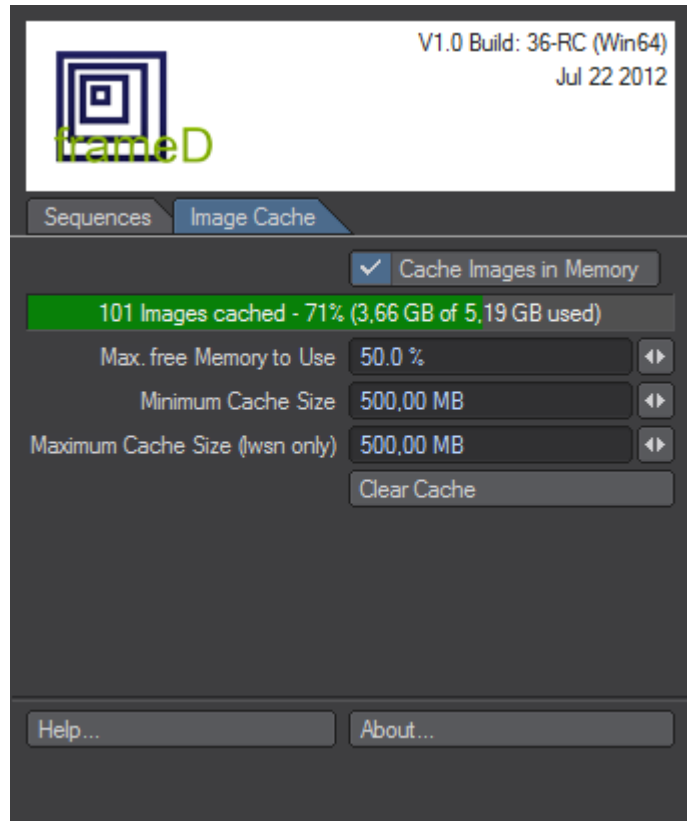
Maximum Cache Size

This is the largest amount of memory that the cache may use when rendering in Screamer.net. While there is no interactive workflow to accelerate, it can still speed up rendering if frame blending is used or multiple sequences use the same frames on disk.

The control accepts memory units just like the previous one. If set to 0 then the cache will be effectively disabled.

Clear Cache

This empties the cache to free up memory.



⁸ Which is just a fancy way of saying: The oldest images are removed.

⁹ Actually, just the first letter is taken into account here. i.e. "1 GB" is interpreted as one Gigabyte, as is "1gb" or even just "1g".

Appendix

Keyboard shortcuts for the editor

The frameD editor provides numerous to speed up working with it.

Shortcut	Function
← / →	Scrub to the previous/next frame, selecting it (and deselecting all other frames).
Ctrl + ← / →	Swap the contents of the current frame with the previous/next frame. Scrub to the previous/next frame, selecting it (and deselecting all other frames).
Alt + ← / →	Change the image for the currently selected frame to the previous/next frame respectively, alphabetically sorted. The first frame in the sorted list is (none).
Space	Select the current frame, deselect all others
Ctrl-Space	Toggle the selection state of the current frame
a	Select all frames
d	Deselect all frames
i	Invert (toggle) the frame selection
↑/↓	Change the current frame to the previous/next frame. Does not modify the selection.
Shift + ↑/↓	Change the current frame to the previous/next frame, adding it to the selection.
Ctrl + ↑/↓	Copy the currently selected frames to to the previous/next frames, keeping the copy selected.
Shift + Ctrl + ↑/↓	Move the currently selected frames to to the previous/next frames (setting the original frames to blank), keeping the moved frames selected.
-	Clear the selected images (set them to (none))
+	Load an image or sequence into the current frame
F1	Display the help panel
F10	Display the About panel
Esc	Close the editor (saving the project automatically, just in case)
o	Load a project
s	Save a project
Alt-s	Save a project without prompting for a file name
e	Export a project as an IFL file
c	Copy selection to clipboard
x	Cut selection to clipboard
v	Paste from Clipboard
u	Undo (only edits, not selections)
r	Redo (only edits, not selections)

Adding the IFL and the XFD extension to the list of known image types in LightWave 3D

The configuration file for LightWave 3D contains an entry that starts like the following

```
FileType Images
```

Adding the file extension for .xfd (framed projects) and .ifl will allow you to load them directly into Layout without having to display "All Types" in the file requester. Just append the following to the line:

```
;*.xfd;*.ifl
```

Description of the XFD file format

XFD is the native, XML based, format used by framed. It is used both to store editor projects and to load projects directly into LightWave 3D as an animation using the framed loader.

Sample XFD file

```
<?xml version="1.0" ?>
<framed firstFrame="0" length="100" version="1">
  <settings previewStart="0"
    previewEnd="100"
    currentFrame="0"
    syncToLayout="0"
    previewXsheet="1"
    solidBG="1"
    background.R="102" background.G="102" background.B="102"
    checks.R="153" checks.G="153" checks.B="153" />

  <frame src="Images\4s\4Seconds0000.png" duration="10"/>
  ...
  <frame src="Images\4s\4Seconds0100.png" />
  <clip src="Images\4s\4Seconds0000.png" />
  ...
  <clip src="Images\4s\4Seconds0100.png" />
</framed>
```

firstFrame is optional and 0 by default

settings stores the framed editor settings as attributes, they have no effect on loading the sequence into LightWave and may be omitted.

clip is optional as well and used to store images that are a part of the project but not in the sequence itself.

duration per frame is optional and 1 by default (if omitted)

src paths are either absolute or relative to the .xfd file itself.

Image specific files created by framed

framed automatically creates and stores scaled down versions of the images if required. These are used as proxies or to speed up loading sequences into the framed editor.

Scaled down images are stored in a sub-directory of the directory where the respective image is located.

The **thumbs** subdirectory stores images used to speed up loading projects into the framed editor. This will prevent it from needing to read all original images to create the preview displayed in the editor.

The **proxy** directories contain scaled down versions of the images used if a sequence is loaded as a proxy.

All of these directories and contained files may be deleted at any time. However, they will be created again if required by framed.

If the original image changes then the proxy/thumb will be re-created as well if required.

frameD saves 8-bit images as PNGs, HDR images as OpenEXR. In both cases the highest compression rate is used to keep disk usage down. While this slows down writing the images, this only happens rarely. Reading the images will not be affected¹⁰.

Proxy and thumb images are accompanied by a .xfi file, which is an XML file pointing to the actual image. This is required because frameD doesn't know if it is looking for a PNG or EXR image initially.

Known limitations and Issues¹¹

Supported image formats

FrameD loads images by using the image loading plugins for LightWave 3D directly. TGA and IFF are however not loaded by plugins and thus not supported by frameD.

Images with colour palettes are currently not supported.

Pixel aspect ratios other than 1 are only partially supported at the moment (ignored by the editor, passed through by the frameD loader).

Since infiniMap uses a completely different approach to managing images, by-passing the imaging pipeline of LightWave 3D completely, it will not work in combination with frameD. However, both may certainly be used at the same time.

Support for colour spaces

If OpenGL colour correction is enabled, then the preview image in the editor will be corrected as well. However, since the frameD editor doesn't support colour correction yet¹², this may result in washed out images.

This does not affect the ability to apply colour spaces to a frameD sequence when loading it into LightWave 3D. This is still possible via the global options or per sequence in the image editor.

Image cache

Cached images are not automatically updated in the memory cache if the image changes on disk.

Instances of frameD .xdf/.ifl sequences

Due to issues within the image instancing system in LightWave 3D (that is, instancing/referencing in the image editor) we don't recommend cloning instances of .xdf or .ifl sequences¹³.

However, it is easy enough to rename a .xdf or .ifl file and load that instead. Since the image cache is shared, and thus works across all .xdf or .ifl files that are loaded in a scene, there will be a small performance hit only.

Exporting IFL files

Since the IFL specifications are rather limited, there should be no spaces in the image names as well as the path from the exported .ifl file to the images.

¹⁰ It's actually slighter quicker since there's less data to read from the disks.

¹¹ We will certainly be working on removing these in the future.

¹² For speed and memory reasons. Actually either: The editor would either need to store images twice or linearise images on-the-fly every time they are displayed.

¹³ One reason would be to extract the alpha channel from the clone of a sequence