

LiveClone Users Guide

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Introduction

The *LiveClone* utility is designed to clone the content of one or more displays to other displays on AMD FirePro workstation graphics cards. Applications include presentation environments where a projector runs at a different resolution than the operators monitors or a setup using one monitor as a magnifier for an area of the regular desktop.

LiveClone opens a viewer window that displays the content of some other screen(s). The viewer window can be resized, dragged onto any attached monitor and maximised to fullscreen mode. It can be setup to automatically update it's content so that it always shows the content of the original display(s).

Displays may run at different resolutions and even be attached to different graphics cards.

LiveClone is a normal user-space application that builds on special FirePro workstation driver interfaces to achieve the highest possible performance. It therefore requires an AMD FirePro workstation graphics card and is compatible with Windows XP, Windows Vista and Windows 7.

Installation

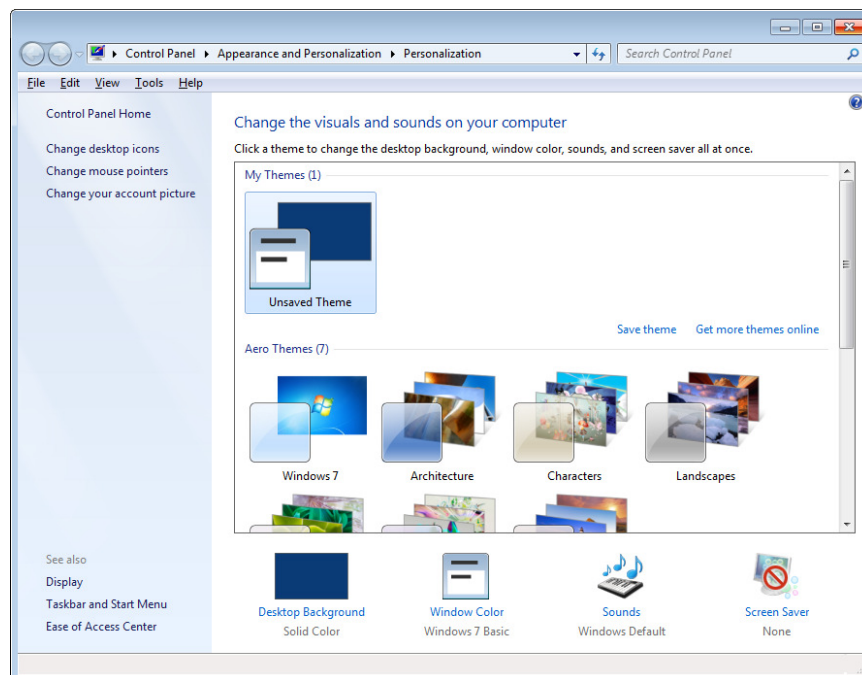
LiveClone comes as a NSIS installer. You need to accept the license agreement before the installer extracts the tool to your hard disk.

LiveClone requires the *Microsoft Visual Studio Redistributables* (C++ runtime environment). The installer will copy and register all required DLLs automatically, unless you de-select the *Runtime Environment* package during installation. It is safe to install the runtime environment in any case, so you should only de-select it if you are sure it has already been installed on your machine by other applications.

If the runtime environment is missing, LiveClone will abort with an error message like this:

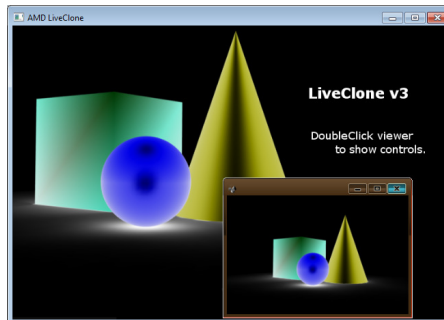


On Windows Vista and Windows 7, switch of the Aero desktop to disable composition and get the best performance. This is done by choosing a non-Aero theme in the control panels personalization settings:



Working with LiveClone

To launch LiveClone, just double-click `LiveClone.exe`. The viewer window will open and show a welcome screen for about five seconds before switching to a snapshot of your primary desktop.



You can resize the viewer window or move it to any display on your desktop. Just move it to the display that shall show the clone (a projector, for example). If the display configuration changes while liveclone is running, all settings are reset to factory defaults. The same happens if settings saved to the registry do not match the current system configuration to avoid display corruptions (see [Persistence](#)).

The tray icon

When LiveClone is running, an icon is shown in the system tray. Right-clicking that icon shows a context menu, allowing to reset any invalid configuration or access the settings dialog. You can also terminate a running session.



Main User Interface

LiveClone's main user interface is a small window providing a toolbar with buttons for the most important functions.



The button bar is usually hidden to save screen space (most often, LiveClone runs in fullscreen- and video-mode where no interaction with the clone is needed). Double-clicking anywhere in the clone viewer window will show or hide the button bar. Note that the bar is also freely movable across the entire desktop will always stay on top of other windows when visible.



Maximizing the clone / fullscreen mode

The clone viewer window can be move onto any attached screen and then switched to fullscreen mode by pressing the *fullscreen toggle button*. This way, the clone will appear without any window decorations and cover the entire screen. Click the button again to leave fullscreen mode.

It is also possible to resize the viewer window by dragging its border or clicking the viewer windows *maximise* button. However, this will preserve the windows decorations (borders and title bar).



Selecting the display to clone

The *choose-display* button will switch through all attached displays currently managed by windows. If the last display is reached, LiveClone will reset to the first display again. For multi-GPU systems or cards with many display outputs like the V7900, there may be up to as many as 24 displays to switch through.

Note that you may experience a mirror-in-the-mirror-in-the-mirror effect if LiveClone captures the display the viewer window is placed on.



Switching between video mode and manual updates

LiveClone may automatically update the clone window as fast as possible (video-mode) or issue updates only on the operators request (snapshot mode). The button with the video camera symbol switches between the two modes.

Manual updates are triggered by clicking the button with the camera symbol. This function is only available if LiveClone is not already running in video-mode anyways.



Update Viewer

The *update viewer* button updates the content of the clone viewer. The function only available when continuous capturing is disabled and provides a manual update of i.e. a projector image shown to an audience, rather than cloning the operators screen all the time.



Preserving correct aspect ratio

Use the *stretchmode* button to enable or disable the stretch mode.

Usually, the clone window shall display the content of the original screen without any distortions (stretch mode is *off*). If original and clone display have different resolutions, the content is scaled, preserving the aspect ratio of the original screen. This may lead to cinema-like black bars at the top and bottom (or left and right) side of the clone window.



Cloning source screens 1:1

LiveClone can duplicate the source display in it's original size, similar to the Pan&Scan mode found in nVidia drivers. Clicking the *1:1* button will set the clone viewer to show the source screen unscaled:

- If the source display has a larger resolution than the clone viewer, the viewer will select a subarea from the source display, matching it's own size. You can pan the subarea over the source screen like a magnifier glass by dragging

the mouse around, holding the middle mouse button pressed.

- If the source display has a smaller resolution than the clone viewer, the clone will show the entire source screen unscaled, padded with a dark frame covering unused pixels.



Use smooth filtering

If the resolutions of the original display and the clone viewer differ, the clone cannot map all pixels directly. Instead, the viewer overlays the original display with its own pixel raster and fetches the pixel color at each raster location.

If the *smooth filter button* is pressed, multiple source pixels are taken into account. If smooth filtering is disabled, only the closest-matching source pixel is used by the clone viewer.

Modern GPUs can perform filtering at almost no performance cost, so filtering should always be enabled. As an exception, it is sometimes desirable to not alter the original image in any way. In these cases smooth filtering must be disabled (See also 1:1 mapping).



Enabling a "soft mouse"

LiveClone captures just the screen's content by default, but not the mouse pointer. For presentations, the mouse pointer may be emulated on the clone by clicking the *soft mouse cursor* button. When the soft mouse is enabled, a fixed cursor arrow, laser pointer or flash light tracks the mouse position in the viewer window.

Note that changes to the cursor shape are not reflected in the clone viewer.



Saving screenshots to disk

Screenshots of the current viewer content may be saved to disk any time by clicking the *Save Screenshot* button.

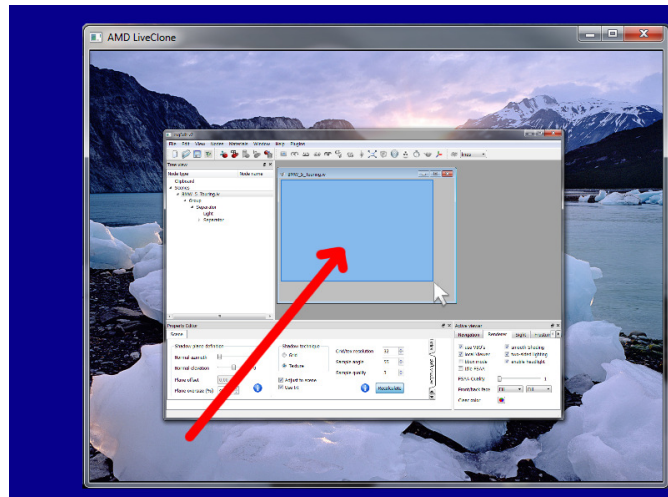
LiveClone will open a Save File dialog and the user may choose a directory and filename.

LiveClone generates unique default filenames that allow to save a series of screenshots without entering a new filename each time.



Subarea zoom and pan

By dragging a rectangle with the left mouse button pressed in the clone viewer window, LiveClone will zoom into the selected area. Zooming even further is achieved by repeated rectangle selections.



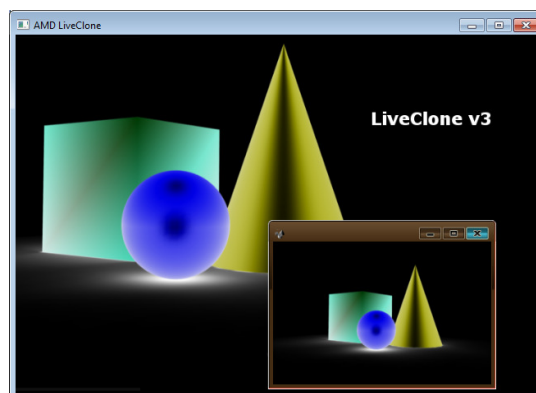
Once a subarea is selected, it may be panned around the entire captured desktop by dragging the mouse in the viewer with the middle mouse button pressed.

To release a subarea selection, click the *reset subarea* button in the toolbar menu.



Pause mode

The pause mode will stop any live capturing and show a pause screen image. The image to show can be custom-selected in the advanced settings. You may for example choose an agenda slide to be shown during coffee breaks in a presentations.





Exit LiveClone

Clicking the *Exit* button will end LiveClone.



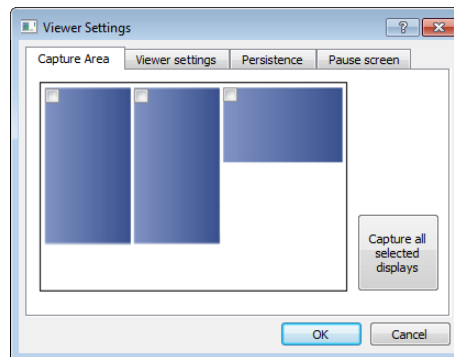
Advanced Settings

The toolbar buttons provide quick access to LiveClone most important functionality. In an effort to keep the UI as slim as possible, less often used features are moved to an advanced settings dialog. Open this dialog by clicking the *advanced settings* button.

Cloning multiple monitors

There are two ways to capture several displays into a single clone viewer:

1. Combine the displays to capture into an Eyefinity group. This way, a group of physical displays behaves just like a single, logical display and may be cloned like a regular monitor.
2. Select the displays to capture from the advanced user settings. This mode works with extended desktops where Eyefinity groups cannot be used. Note that for performance reasons only adjacent displays can be captured.



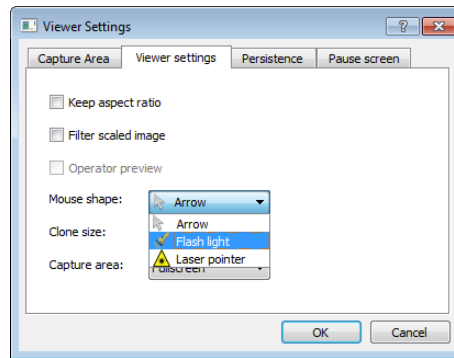
Create an Eyefinity group over more than one output display or resize the clone viewer window across several output displays to stretch the clone over more than one screen.

Changing Viewer Settings

Changing the Soft Mouse shape

Although the *soft mouse* mode does not track changes to the systems mouse cursor shape, it still offers various shapes as pre-selected soft cursors for the clone viewer window:

- Arrow: Standard Windows system mouse cursor. This is the default cursor shape.
- Flash light: Use this cursor shape to highlight areas in presentations. If the clone viewer window has the focus, any mouse wheel activity will change the size of the flash light.
- Laser pointer: Red, laser pointer-like shape for the soft mouse cursor.



Selecting well-defined sizes for subareas and viewer

Sometimes, it is important to adjust the size of the captured area to the size of the display, i.e. to avoid any scaling or distortions at all. For example, the clone viewer window and a subarea selection may both be set to a resolution of 1280x1024 to display a 1:1 clone on the cloned display.

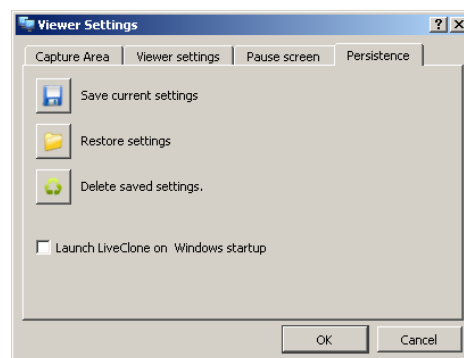
Looking at the other side of the coin, you may want to set the viewer to a fixed size, matching the size of a subarea.

Use current settings as default

LiveClone may save its current viewer settings to the registry via the *Save current settings* button. Doing so will restore the same settings (like position and size of the viewer window or mode settings) of the current clone viewer window on all future sessions of LiveClone.

Checking the *Launch LiveClone...* checkbox will create a user-specific registry key, causing Windows to start LiveClone at the next login of the current user automatically. All current settings will also be restored if they are saved to the registry (see above).

Unchecking the checkbox will remove the registry key again.

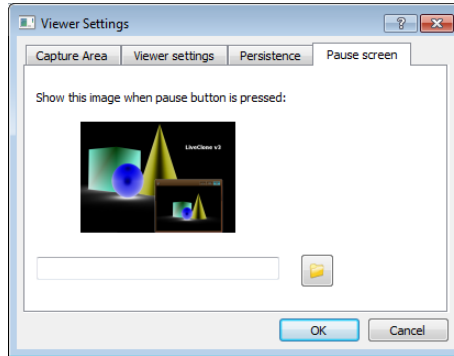


The *Restore settings* button loads settings from the registry and applies them to the active clone viewer window.

The *Delete saved settings* button deletes all settings from the registry and restores the initial state of LiveClone before its installation/first execution.

Change Pause Screen

The *pause screen* is intended to stop all cloning activity and replace the clone viewers window with pre-defined content on a single button click. This function may be useful in presentations to show an agenda slide during coffee breaks or temporarily hide the presenters desktop to prepare some silent setup.



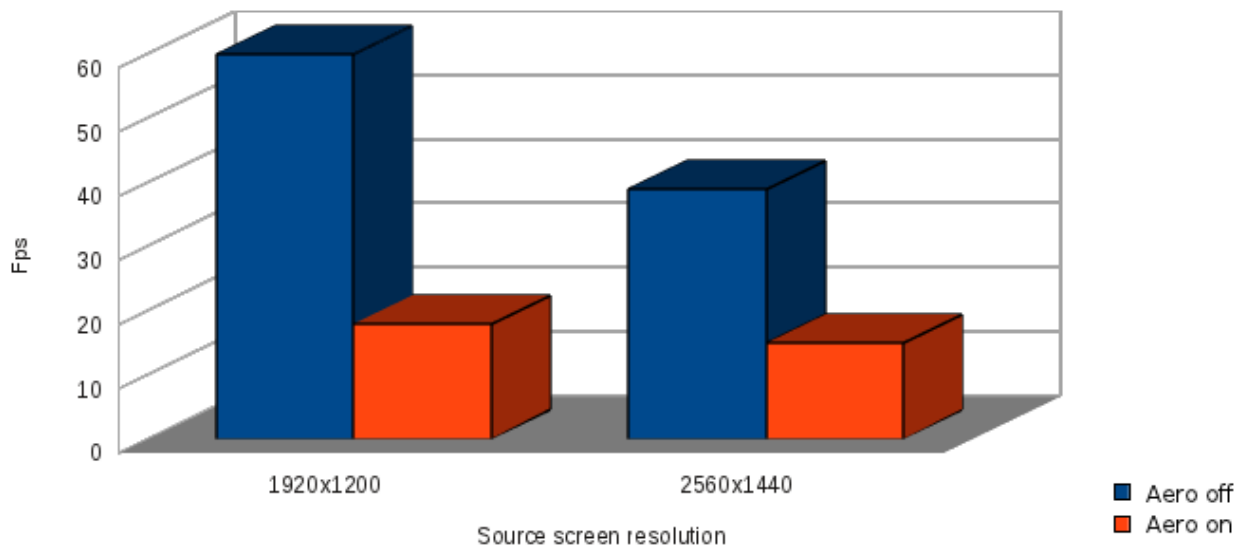
Changing the Pause screen can be done via the advanced settings dialog: Use the *Load image* button on the pause screen tab to select an image to be shown in pause mode. Note that your selection will be saved immediately to the registry, so you do not need to select your pause image in each session again.

Notes on Performance

The interactive performance of LiveClone mainly depends on the following factors:

1. Available bus bandwidth: Liveclone works by permanently taking screenshots of the source display and displaying them in it's clone viewer window. This implies a two-time trip over the PCIe bus for each frame. The transfer is uncompressed, so an HD resolution on the source screen requires a badwidth of about 180 MB/s for capturing at 30Hz.
2. Resolution of the source screens: The more pixels are needed to be cloned, the more data has to be transferred. Doubling the resolution of the source area will cut the display rate in the clone viewer to half.
3. Windows Aero mode: Selecting an Aero desktop theme enables Windows desktop decomposition. This feature unfortunately has a huge performance impact on Liveclone, because the entire clone is subject to yet another copy operation. For acceptable performance, Aero needs to be switched off.

The following chart shows the expected performance of various resolutions and graphic cards for LiveClone v3.x. The data was taken on a Core i7-860 machine with FirePro W8000 graphics:



Future enhancements

Upcoming versions of the FirePro graphics driver will provide a new application interfaces allowing for significant performance improvements. Early estimates are in the range of at least an order of magnitude. LiveClone release 4.x are planned to support this new interface in case the clone viewer runs on the same GPU as the source screens.