



QuickTransit™ for Silicon Graphics®
Installation and User's Guide

Version 1.2

007-4394-003

CONTRIBUTORS

Written by Ken Jones

Engineering contributions by Mark Curtis, David Haikney, George Hyman, Ross Keeping, Jon Leech, Alan Robinson, and Brian Thatch

Other contributions by Thomas Tannert

COPYRIGHT

© 2005 Silicon Graphics, Inc. All rights reserved; provided portions may be copyright in third parties, as indicated elsewhere herein. No permission is granted to copy, distribute, or create derivative works from the contents of this electronic documentation in any manner, in whole or in part, without the prior written permission of Silicon Graphics, Inc.

LIMITED RIGHTS LEGEND

The software described in this document is "commercial computer software" provided with restricted rights (except as to included open/free source) as specified in the FAR 52.227-19 and/or the DFAR 227.7202, or successive sections. Use beyond license provisions is a violation of worldwide intellectual property laws, treaties and conventions. This document is provided with limited rights as defined in 52.227-14.

TRADEMARKS AND ATTRIBUTIONS

Silicon Graphics, SGI, the SGI logo, IRIX, OpenGL, and Reality Center are registered trademarks and Altix, OpenGL Multipipe, OpenGL Vizserver, SGI Advanced Linux, SGI ProPack, and Silicon Graphics Prism are trademarks of Silicon Graphics, Inc., in the United States and/or other countries worldwide.

FLEXlm is a registered trademark of Macrovision Corporation. GNOME is a trademark of the GNOME Foundation. KDE is a trademark of KDE e.V, Incorporated. Intel is a registered trademark and Itanium is a trademark of Intel Corporation. Linux is a registered trademark of Linus Torvalds. MIPS is a registered trademark of MIPS Technologies, Inc. used under license by Silicon Graphics, Inc. QuickTransit is a trademark of Transitive Corporation and/or its affiliates in the United States and other countries. SUSE LINUX is a registered trademark of Novell, Inc. X Window System and the X device are trademarks of The Open Group. All other trademarks mentioned herein are the property of their respective owners.

New Features in This Release

QuickTransit 1.2 for Silicon Graphics includes the following changes:

- Support for SGI OpenGL Vizserver
- Expanded support for SGI Altix systems
- Miscellaneous bugfixes, enhancements, and improved application support

Record of Revision

Version	Description
001	March 2005 Initial release.
002	June 2005 Updated to support QuickTransit 1.1.
003	July 2005 Updated to support QuickTransit 1.2.

Contents

Record of Revision	v
About This Guide.	ix
Related Publications	ix
Obtaining Publications	ix
Conventions	x
Reader Comments.	xi
1. Product Overview.	1
2. Installing QuickTransit	3
Software Requirements	3
Hardware Requirements	3
Contents of the QuickTransit Packages	4
Installation/Upgrade Procedure.	4
QuickTransit Directory Structure	5
Licensing QuickTransit	5
Verifying a QuickTransit Installation/Upgrade	6
Creating Symbolic Links to Linux Files	6
3. Running IRIX Applications	9
Installing IRIX Applications	9
Launching IRIX Applications	9
Using an IRIX Shell	10
Using a Script	11
Licensing IRIX Applications	11
4. Troubleshooting	13
QuickTransit Log Files	14
The QuickTransit Configuration File	14

IRIX Scripts Not Running Correctly 14

Read Permission Errors While Running Applications 15

Error Starting IRIX Application from Directory outside of /*irix* 15

Visual Corruption in Certain Applications 15

Disappearing User Interface Items in Overlay Planes 16

Resource Limits and Unexpected Application Behavior 16

Window Manager Issues 17

Subtle Differences in Floating Point Results. 17

Graphics Application Not Running in Stereo 18

Problems with OpenGL Overlays 18

Problems with Indexed Color Visuals 18

About This Guide

QuickTransit for Silicon Graphics is a transparent dynamic binary translator. This guide describes how to install and run IRIX applications on Silicon Graphics Prism and SGI Altix platforms.

Related Publications

The following SGI documents contain additional information that may be helpful:

- *IRIX 6.5 Installation Instructions*
- *SGI ProPack for Linux Start Here*
- *SGI Altix 350 System User's Guide*
- *SGI Altix 3000 User's Guide*
- *Silicon Graphics Prism Visualization System User's Guide*
- *Silicon Graphics Prism Deskside Visualization System Hardware User's Guide*
- *Silicon Graphics Prism Visualization System User's Guide for Power & Team Scalable Configurations*
- *Silicon Graphics Prism Visualization System User's Guide for Extreme Scalable Configurations*

Obtaining Publications

You can obtain SGI documentation in the following way:

- See the SGI Technical Publications Library at <http://docs.sgi.com>. Various formats are available. This library contains the most recent and most comprehensive set of online books, release notes, man pages, and other information.
- You can view man pages by typing `man title` on a command line.

Conventions

The following conventions are used throughout this document:

Convention	Meaning
command	This fixed-space font denotes literal items such as commands, files, routines, path names, signals, messages and programming language structures.
<i>variable</i>	Italic typeface denotes variable entries and words or concepts being defined.
user input	This bold, fixed-space font denotes literal items that the user enters in interactive sessions. (Output is shown in nonbold, fixed-space font.)
interface	This font denotes the names of graphical user interface (GUI) elements such as windows, screens, dialog boxes, menus, toolbars, icons, buttons, boxes, fields, and lists. Functions are also denoted in bold with following parentheses.
manpage(x)	Man page section identifiers appear in parentheses after man page names.
Right angle brackets (>)	These brackets indicate a path through menus to a menu option. For example, " File > Open " means "Under the File menu, choose the Open option."

Reader Comments

If you have comments about the technical accuracy, content, or organization of this document, contact SGI. Be sure to include the title and document number of the manual with your comments. (Online, the document number is located in the front matter of the manual. In printed manuals, the document number is located at the bottom of each page.)

You can contact SGI in any of the following ways:

- Send e-mail to the following address:
techpubs@sgi.com
- Use the Feedback option on the Technical Publications Library Web page:
<http://docs.sgi.com>
- Contact your customer service representative and ask that an incident be filed in the SGI incident tracking system.
- Send mail to the following address:
Technical Publications
SGI
1500 Crittenden Lane, M/S 535
Mountain View, CA 94043-1351

SGI values your comments and will respond to them promptly.

Product Overview

QuickTransit for Silicon Graphics is a translator that allows software applications compiled for IRIX MIPS platforms to run transparently on SGI Linux systems based on Intel Itanium processors. These systems include the Silicon Graphics Prism and SGI Altix platforms.

QuickTransit retains an application's full functionality and provides performance levels that typically exceed native speeds on existing IRIX platforms. Applications are translated without any modification to the source code or binaries. To run an IRIX application, all that is required is a copy of the existing IRIX version of the software. QuickTransit includes a set of IRIX libraries and tools sufficient to run basic IRIX utilities and to install and run more complex utilities.

On Silicon Graphics Prism systems, scalable graphics products like OpenGL Multipipe and OpenGL Vizserver can work in conjunction with QuickTransit. QuickTransit allows you to run an IRIX graphics application unchanged while a native version of OpenGL Multipipe or OpenGL Vizserver handles the final display of the application. This allows, for example, running IRIX applications in a Reality Center environment using OpenGL Multipipe or serving the graphics to remote, collaborative users using OpenGL Vizserver.

Using exactly the same method as you would on an IRIX machine, you can install, launch, and run an IRIX application. QuickTransit translates the IRIX application dynamically every time it is launched. There is no separate translation stage required before the application can run. Dynamic translation allows QuickTransit to optimize the performance for each individual run of the application.

Key to the execution transparency is the filesystem architecture provided by QuickTransit. QuickTransit provides an IRIX environment for all of the IRIX applications. This IRIX environment is located in the `/irix` directory and it ensures that the IRIX libraries are cleanly separated from their Linux counterparts (for example, `/irix/usr/lib` versus `/usr/lib`). To an IRIX application, the `/irix` directory appears simply as `.`. This is similar to the functionality of the `chroot` command.

Installing QuickTransit

This chapter describes the installation of QuickTransit in the following sections:

- “Software Requirements” on page 3
- “Hardware Requirements” on page 3
- “Contents of the QuickTransit Packages” on page 4
- “Installation/Upgrade Procedure” on page 4
- “QuickTransit Directory Structure” on page 5
- “Licensing QuickTransit” on page 5
- “Verifying a QuickTransit Installation/Upgrade” on page 6
- “Creating Symbolic Links to Linux Files” on page 6

Software Requirements

The required software for QuickTransit for Silicon Graphics 1.2 is one of the following:

- SUSE LINUX Enterprise Server with SGI ProPack 4 Service Pack 2 or later
- SGI Advanced Linux Environment with SGI ProPack 3 Service Pack 5 or later

Hardware Requirements

QuickTransit for Silicon Graphics 1.2 requires a system from one of the following families of machines:

- Silicon Graphics Prism visualization systems
- SGI Altix systems

Contents of the QuickTransit Packages

QuickTransit for Silicon Graphics 1.2 consists of the following two required packages:

- | | |
|------------------|--|
| IRIX Environment | A collection of IRIX utilities, libraries, and configurations that enable IRIX applications to be installed and run. |
| QuickTransit | Contains the QuickTransit translator binary, utility scripts, and initialization scripts. |

Installation/Upgrade Procedure

Perform the following steps to install/upgrade QuickTransit:

1. Log in to the system as `root`.
2. Insert the QuickTransit CD into the system.
3. Enter the following command to mount the CD:

```
# mount /dev/cdrom /mnt/cdrom
```
4. Enter the following to start the QuickTransit installation script:

```
# /mnt/cdrom/INSTALL
```

The `INSTALL` script performs some sanity checks and then prompts you to confirm that you want to install QuickTransit.

After installation, the QuickTransit service will automatically start. This service will also be restarted on subsequent system boots.

QuickTransit Directory Structure

Table 2-1 describes the directory structure for QuickTransit.

Table 2-1 QuickTransit Directory Structure

Directory/File	Description
/usr/QuickTransit	The QuickTransit executables and utility files.
/usr/QuickTransit/etc/QuickTransit.conf	The QuickTransit configuration file.
/usr/QuickTransit/log	The QuickTransit log files used for debugging.
/irix	The IRIX environment.
/etc/init.d/QuickTransit	The QuickTransit service. The service is started by the install script and is also configured to start upon system boot.
/usr/share/doc/QuickTransit-1.2	User documentation.

Licensing QuickTransit

QuickTransit is capable of running a specific set of IRIX tools/utilities without the purchase of a software license. These tools are listed in Appendix A, "Translated IRIX Tools". To run other applications, you will need a QuickTransit license. To purchase a QuickTransit license, contact your local SGI sales office or SGI Direct at 1-800-800-7441.

To determine if QuickTransit is capable of supporting your IRIX application requirements, you can request an evaluation license from the following webpage:

<http://www.sgi.com/support/licensing>

Once you have purchased a QuickTransit license, you will receive an Entitlement ID. You may enter this Entitlement ID at the webpage just cited to receive your permanent license key.

QuickTransit licensing is administered with FLEXlm and requires a node-locked license. This is a license key that will only run on the system for which it was generated. Licenses are kept in the file `/etc/flexlm/license.dat`. If you require further instructions, refer to the instructions provided with your QuickTransit license.

For more information on FLEXlm, you can get the following manual from Macrovision Corporation:

Flexible License Manager End User Manual

Verifying a QuickTransit Installation/Upgrade

The following commands verify the QuickTransit packages by comparing information about the installed files with that from the `rpm` database:

```
$ rpm -V QuickTransit
$ rpm -V IRIX
```

These commands will print the details of any changes that have occurred to files installed by QuickTransit. For more details, see the `rpm` man page.

Creating Symbolic Links to Linux Files

QuickTransit presents IRIX applications with an IRIX filesystem containing the common libraries and infrastructure that IRIX applications require in order to run. These are the same libraries and files you would find if you had done a basic IRIX installation. The filesystem was derived from an IRIX 6.5.27m installation. This filesystem resides entirely under `/irix`.

When running a translated IRIX application, the directory structure under `/irix` becomes the root filesystem. For example, the following entry in a translated shell will list the contents of `/irix`:

```
$ ls /
```

The IRIX environment implementation is very similar to using `chroot` within Linux. Unlike `chroot`, the IRIX environment allows you to access files outside of `/irix` when running IRIX applications. This requires the creation of a symbolic link to the desired directory. This link must have the same name under both the Linux and IRIX filesystems.

For example, to allow IRIX applications to access the directory `/usr/share/photos`, create a symbolic link as shown in the following entries from a Linux shell:

```
$ mkdir -p /irix/usr/share/  
$ ln -s /usr/share/photos /irix/usr/share/photos
```

This escape to the Linux filesystem only works if the link and the target have identical names.

Note: As described in section “Launching IRIX Applications” on page 9, files passed in as arguments to IRIX executables must be given using the IRIX path rather than the Linux one.

By default, QuickTransit creates symbolic links for the following directories:

- `/home`
- `/mnt`
- `/root`
- `/tmp`

Running IRIX Applications

Using the following topics, this chapter describes how you run IRIX applications on your Silicon Graphics Prism or SGI Altix platform:

- “Installing IRIX Applications” on page 9
- “Launching IRIX Applications” on page 9
- “Licensing IRIX Applications” on page 11

Installing IRIX Applications

Once QuickTransit is fully installed on your system, further applications may be installed by simply following that application’s IRIX installation documentation. If required, the software manager (`swmgr`) and the command-line tool `inst` can be invoked from within a translated shell or directly, as shown in the following example:

```
$ /irix/usr/sbin/swmgr
```

If the application installs from a script, the script must be run from within a translated shell. The following section “Launching IRIX Applications” on page 9 describes how to launch a translated shell.

Launching IRIX Applications

You can execute IRIX programs as you would on an IRIX platform. For example, the following entry invokes the `grid` application:

```
$ /irix/usr/sbin/grid
```

The Linux kernel will detect that an IRIX binary is being run and invoke the translator automatically.

Files passed in as arguments to IRIX executables must be given using the IRIX path rather than the Linux one. For example, if you want to use the image file `/irix/usr/share/myImages/mypic.rgb` in a call to the application `imgview`, make the following entry:

```
$ /irix/usr/sbin/imgview /usr/share/myImages/mypic.rgb
```

Using an IRIX Shell

You can launch an IRIX shell in the normal fashion. The following entry launches the `sh` IRIX shell:

```
$ /irix/bin/sh
```

By default, the following shells are available in the IRIX environment:

- `bash`
- `csch`
- `ksh`
- `sh`
- `tcsh`

In an IRIX shell, you can install and launch applications as you would on an IRIX machine. When navigating the file system within an IRIX application, the `/irix` field does not appear in the file path, because the application treats the `/irix` as `.`. It is not possible to access any file or directory outside of `/irix`, unless a symbolic link is specifically created within `/irix`, as described in section “Creating Symbolic Links to Linux Files” on page 6.

Using a Script

While IRIX executables are automatically detected and passed to QuickTransit by the system, this does not happen with shell scripts that may come with an IRIX application—for example, scripts used to launch an IRIX application. Such scripts may not function correctly unless executed in an IRIX environment. To ensure the proper execution of such scripts, do one of the following:

- Simply invoke an IRIX shell and run the script.
- Prefix the script with any IRIX shell as in the following example:

```
/irix/bin/sh myscript.sh
```

Licensing IRIX Applications

Some applications have their own licensing scheme. To install a license for an IRIX application, refer to the IRIX licensing information for that application.

Many IRIX applications use the FLEXlm product. Some use a customized version. For node-locked licenses, you only need to install the license in the file specified in the application's documentation. For floating licenses, you can invoke the standard FLEXlm license server as it would be invoked on an IRIX machine, as shown in the following command:

```
$ /irix/usr/sbin/lmgrd -c LicenseFilePath
```

Note: The file path *LicenseFilePath* must be visible under */irix*.

The host ID for IRIX applications is exactly the same as the Linux one and can be found by running one of the following commands:

```
$ cat /proc/sgi_sn/licenseID
```

```
$ /irix/usr/sbin/lmhostid
```

For more information about installing IRIX software licenses, see the following document:

IRIX 6.5 Installation Instructions

Troubleshooting

This chapter describes some problems you might encounter and what to do to solve them. For additional considerations, see the QuickTransit release notes.

The following topics are described:

- “QuickTransit Log Files” on page 14
- “The QuickTransit Configuration File” on page 14
- “IRIX Scripts Not Running Correctly” on page 14
- “Read Permission Errors While Running Applications” on page 15
- “Error Starting IRIX Application from Directory outside of /irix” on page 15
- “Visual Corruption in Certain Applications” on page 15
- “Disappearing User Interface Items in Overlay Planes” on page 16
- “Resource Limits and Unexpected Application Behavior” on page 16
- “Window Manager Issues” on page 17
- “Subtle Differences in Floating Point Results” on page 17
- “Graphics Application Not Running in Stereo” on page 18
- “Problems with OpenGL Overlays” on page 18
- “Problems with Indexed Color Visuals” on page 18

QuickTransit Log Files

In the event of a problem with a translated application, QuickTransit records information that may be useful to SGI support personnel in the directory `/usr/QuickTransit/log`. This directory contains the following information:

- Information about the program being executed
- Any translation issues discovered at run time
- Information about program state at the time of a program crash

The information captured is similar to that in a Linux core file. These log files are in plain text, and you may be asked to send any log files present in this directory to SGI support personnel.

The QuickTransit Configuration File

By design, QuickTransit allows you to run your IRIX applications transparently in a Linux environment. However, some applications may require special accommodations to ensure proper behavior. The QuickTransit configuration file provides a mechanism to make the required accommodations. Its file path is as follows:

```
/usr/QuickTransit/etc/QuickTransit.conf
```

QuickTransit reads the configuration file upon startup. By default, the file is empty, but SGI support personnel may ask you to add options to this file if you have a problem with a translated application. In general, only add entries to this file when so advised by SGI support personnel, as anything else may cause unexpected results.

For an example of a potentially useful configuration option, see section “Subtle Differences in Floating Point Results” on page 17.

IRIX Scripts Not Running Correctly

If a shell script was originally written to run on an IRIX machine, then you should run the script from a translated shell (as described in “Using a Script” on page 11) in order to guarantee its proper execution. Running an IRIX script through a Linux shell may cause problems, since certain commands behave differently between IRIX and Linux. For

example, a script with the command `uname` might fail, as `uname` returns an OS-dependent string.

Read Permission Errors While Running Applications

If you get the following error when trying to run an application, then check the permissions on that binary by running `ls -l`:

```
QuickTransit Error: Unable to open binary_name
```

QuickTransit requires that your user ID has both Read and Execute permissions on all IRIX binaries executed through QuickTransit.

Error Starting IRIX Application from Directory outside of `/irix`

If you attempt to start an IRIX application from a directory that is not accessible from `/irix`, you will get the following error message:

```
Attempted to start translated application from directory: directory which is not visible from /irix
```

To correct this, create a symbolic link to make this directory visible from `/irix` as described in "Creating Symbolic Links to Linux Files" on page 6.

Visual Corruption in Certain Applications

Certain IRIX applications may exhibit cosmetic visual corruption when run on a Silicon Graphics Prism system. Icons, cursors, or text may appear corrupted or in the wrong color. This is caused by displaying the application on a little-endian X server, as used on Silicon Graphics Prism systems.

You can avoid this problem by setting the following environment variable before running an application that exhibits this behavior:

```
$ export QUICKTRANSIT_X_IMAGE_ENDIAN_WORKAROUND=y
```

Only set this variable if visual corruption is observed on a particular application.

Disappearing User Interface Items in Overlay Planes

Certain IRIX applications may display user interface items in an overlay plane. This is often used for shortcut menus, which can be accessed from the main workspace of the application with minimal mouse movement.

Due to the different behavior of X servers, these menus may appear and then disappear almost immediately on a Silicon Graphics Prism system. If this is observed, QuickTransit can provide an approximation of the behavior of the IRIX X server. To enable this approximation, set the following environment variable:

```
$ export QUICKTRANSIT_HIDE_X_VISIBILITYNOTIFY_EVENTS=y
```

Resource Limits and Unexpected Application Behavior

IRIX and Linux have different default resource settings for processes. You can inspect and change these resource settings using the `ulimit` command on both systems. Certain IRIX applications may behave incorrectly if their resource limits are set too low. In addition, some IRIX applications may not be able to cope with their resource limits being set to “unlimited”, since this setting is rarely used on IRIX. This may apply particularly to the stack size (`ulimit -s`) and maximum process RSS (`ulimit -m`) settings.

If you are experiencing unexpected application behavior, try resetting the value of any resource currently set to “unlimited” to a large but finite value, as shown in the following examples:

```
ulimit -s 500000          # 512 Mb maximum stack size
ulimit -m 8000000000     # 8 Gb maximum RSS size
```

For more details, see the `ulimit` man page.

Window Manager Issues

If you are experiencing problems related to window management, the problems might stem from the following conditions:

- Certain IRIX applications require specific window managers—for example, `mwm`. Consult the application documentation for such requirements. Most common window managers are available on Silicon Graphics Prism platforms.
- Certain window managers may override some `Ctrl` or `Alt` key sequences for their own purposes.

Many IRIX applications need to use these key sequences. If you need to use such an application, you need to reconfigure the window manager to not override the problematic key sequences. Consult the documentation for your window manager to get the instructions for disabling those key sequences (typically called *shortcuts*).

Subtle Differences in Floating Point Results

Although both the MIPS and Intel Itanium architectures both conform to the IEEE-754 standard, there are some slight differences in the way they handle calculations. These differences can cause different results to be obtained from the same calculation. The key difference is observed with compound operations, such as multiply-add. The MIPS architecture rounds the intermediate result to 64- or 32-bit precision (for double- and single-precision arithmetic, respectively). The Itanium architecture, on the other hand, calculates the intermediate result to a higher precision and rounds the final result to the required precision.

By default, QuickTransit calculates results in the same way as they would be calculated on the Itanium architecture—that is, with intermediate values calculated to a higher precision. This may result in some differences in the result that would be obtained on the MIPS architecture. If, for some reason, it is important to use the MIPS rounding scheme, then this can be enabled by adding the following line to the QuickTransit configuration file (`/usr/QuickTransit/etc/QuickTransit.conf`):

```
MIPS_FP_PRECISION=y
```

There is a small performance penalty associated with using this configuration option.

Graphics Application Not Running in Stereo

If an application that should run in stereo will not do so, ensure that stereo is enabled in your XFree86 configuration file. For settings specific to Silicon Graphics platforms, see the user's guide for your hardware platform. If stereo still does not function properly, check for application-specific requirements or settings.

Problems with OpenGL Overlays

If OpenGL overlays are not functioning in your applications, ensure that you have OpenGL overlays enabled in your XFree86 configuration file. For settings specific to Silicon Graphics platforms, see the user's guide for your hardware platform.

Problems with Indexed Color Visuals

Certain IRIX applications require 12-bit indexed color visuals for OpenGL. These are not supported in the OpenGL driver on Silicon Graphics Prism systems. QuickTransit is able to provide a partial emulation of this feature that is sufficient for many applications to use such visuals to display 3D graphics.

If your application has a problem with obtaining such a visual, then you can enable this emulation by setting the `QUICKTRANSIT_EMULATE_12_BIT_CI` environment variable before running the application as follows:

```
export QUICKTRANSIT_EMULATE_12_BIT_CI=y
```

Note: In QuickTransit 1.0, this emulation is on by default. Hence, applications that previously worked under QuickTransit 1.0 may now require this variable to be set.

Translated IRIX Tools

The following IRIX tools are provided with QuickTransit and no additional licensing is required for their use:

abs	fromgif	ipaste	scrsave
add	frommac	iroll	setlum
addborder	frompic	iset	sfconvert
addframe	fromppm	istat	sfinfo
addnoise	fromrla	ivcat	shear
aifc2aiff	fromsun	ivview	showfiles
aifccompress	fromtarga	izoom	showprods
aifcdecompress	fromxbm	jot	slide
aifcinfo	fromxwd	makemovie	snapshot
aifcresample	fromyuv	max	soundfiler
aiff2aifc	gamcal	mediaconvert	sub
assemble	gammawarp	mediaplayer	subimg
bgpaste	gendit	min	swmgr
blend	grelnotes	mousemon	thresh
blur	greyscale	mousewarp	tile
btree	grid	movie	toalias
cglue	halftone	movieconvert	toascii
clock	hipass3	moviemaker	tobin
colorbars	hist	movieplayer	tobw
compview	histeq	mult	togif
conimg	iavg	noblack	tomac
convolve	iblend	nullimg	tonews
cscale	ical	oneband	topict
dmconvert	iflip	over	toppm
dminfo	imean	perhist	tops
duotone	imgcopy	postcard	tosun
fieldmerge	imged	quant	totarga
fitimg	imgexp	randimg	toyuv
fromalias	imginfo	rectimg	verbatim
frombin	imgsize	relnotes	versions
fromcmap	imgview	repcolor	vhist
fromcube	imgwrap	rle	vfc
fromdi	inst	saturate	vis
fromface	invert	scope	xzoom

