Introduction to Image Files and Color Output

- **Overview of SCV Services**
- **Color Images**
- **Color Scanning**
- **Color Printing**
- **Making Slides**
- **Publications and Presentations**
- **Informal Discussion of your applications/interests**

Overview of SCV Services

SCV Services WWW Help Page: **http://www.bu.edu/SCV/scv-services.html**

Tektronix Phaser IISDX dye sublimation continuous tone PostScript printer

name: tekps

print commands: imtekpsprint, lpr -Ptekps

media: 8.5” x 11” paper and transparencies

resolution: 300 dpi

print area: 8.1” x 8.6”

number of colors: 16.7 million

graphics file formats accepted: PostScript and raster image files

documentation: Web page for Phaser IISDX

Tektronix Phaser 540 laser PostScript printer

name: teklaser

print commands: imteklaserprint, lpr -Pteklaser

media: 8.5” x 11” paper and transparencies

resolution: maximum of 600 dpi

print area: 8.2” x 10.6”

graphics file formats accepted: PostScript and raster image files

documentation: Web page for Phaser 540

Opal Convertible Film Recorder

media: 35mm slides

maximum size: 1280 x 1024 pixels

number of colors: 16.7 million

graphics file formats accepted: raster image files, PostScript, some PC formats

documentation: Web page for Slides

HP DeskScan II Scanner

media: both opaque and transparent artwork

resolution: maximum of 600 DPI

maximum size: 8.5” x 14”

number of colors: 16.7 million

graphics file format: As requested

documentation: Web page for Scanning

Color Images (Slide 1)

- **Elements of an Image**
- **Manipulating Color Images**

Elements of an Image

- **Raster Image: Rectangular array of Pixels**
- **Image Size and Resolution**
  - Significance of DPI
- **Image Color Precision/Depth**
  - True Color (24-bit)
  - Color Maps/Palettes (8-bit most common)
- **Compression**
  - None (example: raw PPM)
  - Lossless (example: GIF)
  - Lossy (example: JPEG)
- **Interleaving Method**
  - Pixel
  - Line
  - Plane
- **File Formats**
  - Why so many? (GIF, JPEG, RGB, BUCGL, XWD, XBM, etc...)
  - Format differences

Image File Formats Reference Books

Brown, C. Wayne and Shepherd, Barry J., *Graphics File Formats reference and guide*, Manning Publications Co., Greenwich, CT 1995.

Murray, James D. and vanRyper, William, *Encyclopedia of Graphics File Formats*, O'Reilly & Associates, Inc., Sebastopol, CA, 1994.

Color Images (Slide 2)

- **Elements of an Image**
- **Manipulating Color Images**

Manipulating Color Images

- **Unix Image Tools**
  - SDSC Image Tools
  - BUCGL Tools
  - Iris Tools
- **PostScript files**
  - What is a PostScript file?
  - Tools for working with PostScript files

    ghostview & ghostscript - viewers

    imfile - get information on a file

    imconv - PS <-> Image converter

    ps2img - input only
- **Unix Applications**
  - XV
  - Showcase
  - DVW
  - GIMP
- **Mac and PC Applications**
  - Photoshop
  - Many Others

Unix imaging programs available at the CGL

- **File Creation**
  - ximsave — Save a piece of a window (8 or 24 bit).
  - snapshot — Save a piece of an SGI screen. (**.rgb**)
  - xwd — Dump an image of an X window. (**.xwd**)
  - xv — Grab and crop an image of an X window.
  - MS/mstty — BU Modeling System - create images.
  - DVW — BU Paint System. (**.bucgl**)
  - Showcase — SGI drawing and presentation package.
  - Other software applications
- **Previewing Images**
  - ximview — View raster image file (SDSC only).
  - imview — Same as ximview on SGIs (24bit color).
  - ipaste — View a **.rgb** image on an SGI.
  - xwud — View a **.xwd** image.
  - xv — Nice interface, supports many formats.
  - DVW — View **.bucgl** image files only.
  - Showcase — Can import **.rgb** image files.
  - Other software applications
- **Getting information on Images**
  - imfile -long — Query raster image file (SDSC only).
  - imgquery — Query **.bucgl** image file.
- **Printing Images**
  - imtekpsprint — Print to Phaser IISDX printer.
  - imteklaserprint — Print to Phaser 540 printer.

SDSC Image Tools (Slide 1)

File Info

imformats	Lists the file formats supported by these Image Tools.
imfile	Determines the type of image file format used by each file on its command line and prints it to stdout. Use **-long** flag for additional information including image size.
imhist	Computes a histogram of an image

Conversion

imconv	Converts an input image file of one file format to an output image file with a differing file format.
imgray	Converts each input image to grayscale and saves it to an output file. Input and output files may have different image file formats.
immono	Converts each input image to monochrome and saves it to an output file. Input and output files may have different image file formats.

Manipulation

imcopy	Copies a portion of an input image into a new file. Input and output files may have different image file formats.
impaste	Pastes an input image onto a background image and saves the result into a new file. Input, background, and output files may have different image formats.
imscale	Scales input image by a selected scale factor, or scales it up or down to a desired size. Input and output files may have different image file formats.
imflip	Flips an input image vertically, horizontally, or both and stores the results in the specified output file. Input and output files may have different image formats.
imcat	Concatenates multiple image files into a single image.
imcomp	Composites two images together; input and output image file formats may differ.
imroll	Rolls images vertically and/or horizontally.
imrotate	Rotates an image in the image plane.
imshear	Shears an image in either the X or Y direction.
imsplit	Splits a file containing multiple image files into separate files.
imfill	Fills pixels in part or all of an image.
imadjust	Adjusts pixel values in an image.
imcltroll	Rolls color lookup table by a number of entries.

SDSC Image Tools (Slide 2)

Utilities new in Version 3.0 of the Image Tools

imdissolve	Dissolve between two images.
imkey	Chroma key two images together.
imlighten	Lighten or darken an image.
imstoryboard	Build a storyboard grid of images from a set of image files.

Viewing

imview	Determines the image file format of the file listed on the command line and displays the file in a GL window (usable only with SGI display).
ximview	Determines the image file format of the file listed on the command line and displays it in a GL window (on an SGI display) or an X window.

Saving

ximsave	Saves the contents of aa window or an arbitrary piece of a window screen into an image file. Trying to simultaneously capture parts of both 24-bit color and 8-bit color windows may cause unpredictable results.

Hardcopy

imtekpsprint	Sends the file (file can be in any file format supported by the SDSC image tools) on its command line to the Tektronix Phaser IISDX color PostScript printer.
imteklaserprint	Sends the file (file can be in any file format supported by the SDSC image tools) on its command line to the Tektronix Phaser 540 color PostScript printer.
imshoot	For CGL Staff Use Only - determines the image file format, centers the image in the appropriate frame buffer, and exposes a frame on the camera.

SDSC Image Tools (Slide 3)

Raster file formats supported by the SDSC Image Tools version 3.0

.bucgl, .img	Boston University image
.ras	Sun Rasterfile
.rgb, .sgi	SGI RGB image file
.rla	Wavefront raster image file
.hdf	NCSA Hierarchical Data File
.gif	Compuserve Graphics image file
.jpg	JPEG image file
.tiff	Tagged image file
.miff	ImageMagick's image file format
.xbm, .xpm	X11 bitmap file, X11 pixmap file
.xwd	X Window System window dump image file
.pbm	PBM Portable Bit, Gray, aNy and Pixel Map files
.icon	Sun Icon and Cursor file
.iff	Sun TAAC Image File Format
.rle	Utah Run length encoded image file
.synu	Synu image file
.pic	PIXAR picture file
.viff	Khoros Visualization image file
.tga	Truevision Targa image file
.bmp	Microsoft Windows bitmap image file
.cur	Microsoft Windows cursor image file
.ico	Microsoft Windows icon image file
.pix	Alias image file
.x	Stardent AVS X image file

Non-raster file formats supported by the SDSC Image Tools

.eps	Encapsulated PostScript file
.ps	PostScript file
.mpnt	Apple Macintosh MacPaint file
.pict	Apple Macintosh QuickDraw/PICT file
.pcx	ZSoft IBM PC Paintbrush file

Additional Unix Image Tools available at the CGL

- **Getting help on the SDSC Imge Tools**
  - “man imconv”
  - “imconv -help”
  - “imconv -fullhelp |& more”
  - SDSC Image Tools WWW Help Page
- **Boston University Computer Graphics Lab (BUCGL) Tools**

•imgturn	Rotate a BUCGL image file 90 degrees.
•imgquery	Inquire about a BUCGL image file.
•img_delete_header	Delete a BUCGL image file header.
•img_make_header	Output a BUCGL image file header.
•ps2img	Convert a PostScript file to a BUCGL file.
•img man page	Describes how to use the BUCGL image file format.

- **X Window System Utilities**

•xwd	Capture an image of an X Window.
•xwud	Display a **.xwd** format image file in X.

- **ImageVision Tools (supported formats: RGB, FIT, TIFF, GIF (read only), PhotoCD (read only))**

•imgcopy	Copy and convert image file.
•imginfo	Obtain information about image files.
•imgsnap	Save all or part of the screen in an image.
•imgview	Displays image files.
•imgworks	Visual tool for enhancing image files.

Silicon Graphics Inc (SGI, Iris) Tools (Slide 1)

- **All of the Iris Tools only support SGI RGB (.rgb) format image files.**
- **Primary Iris Tools**
    - snapshot - Save a portion of the screen to an image file.
    - ipaste - Display an image.
    - gammawarp - Lighten or darken an image.
- **All of the Iris Tools**

imged (1G) - small image editor
ipaste (1G) - display an image
mapimg (1G) - translates a screen image into an RGB image
snap (1G) - saves part of the screen in an image file
tobw (1G) - convert a color image to black and white

abs (6D) - get the absolute value of an image
add (6D) - add two images together
addborder (6D) - surround an input image with a border image
addframe (6D) - add a border to an image
addnoise (6D) - add noise to an image
assemble (6D) - assemble an array of smaller images
bgpaste (6D) - paste an image onto the root window
blend (6D) - linearly interporlate two images
blur (6D) - low pass filter an image
btree (6D) - display an image using a binary tree ordering.
cglue (6D) - create an rgb image out of 3 black and white images
conimg (6D) - create a constant image
convolve (6D) - convolve an input image with a kernel
cscale (6D) - scale the rgb colors of an image
dotgen (6D) - make an image of two crossed sinusoidal wave patterns
duotone (6D) - make a color duotone image from a black and white image
fieldmerge (6D) - merge two field images into one frame
fitimg (6D) - force an image to be a specific size.

fromalias (6D) - converts an Alias image to an Iris image
frombin (6D) - create an RGB Iris image file from a binary dump of image data
fromcmap (6D) - convert a color map into an image with one scanline
fromcube (6D) - convert a Cubicomp/Vertigo image file to IRIS format
fromdi (6D) - convert an old .di dithered image into an RGB image
fromface (6D) - convert a UNIX faceserver image into IRIS format
fromgif (6D) - convert a GIF image into an IRIS image
frommac (6D) - convert a MacPaint image into an IRIS image
frompic (6D) - convert a MOVIE BYU .PIC image to an IRIS image
fromppm (6D) - convert an image in Jef Poskanzer's format into an IRIS image
fromrla (6D) - converts a Wavefront image to an IRIS image
fromsun (6D) - convert a sun image into an IRIS image
fromtarga (6D) - convert a targa image into an IRIS image
fromxbm (6D) - convert an X Bitmap image into an IRIS image
fromxud (6D) - convert an xwd file into an IRIS image
fromxwd (6D) - convert an xwd file into an IRIS image
fromyuv (6D) - convert an Abekas yuv image into an IRIS image

Silicon Graphics Inc (SGI, Iris) Tools (Slide 2)

gammawarp (6D) - lighten or darken an image
gendit (6D) - perform general image dithering
halftone (6D) - half-tone an image
hipass3 (6D) - high pass filter an image
hist (6D) - compute and display the histogram of an image file.
histeq (6D) - histogram equalize an image file
iavg (6D) - average a set of images
iblend (6D) - blend two images using a mat
iflip (6D) - flip an image
imean (6D) - find the average pixel value of an image
imgexp (6D) - expand the range of pixel values in an image.
imgsize (6D) - print the size of an image
invert (6D) - invert an image
ipaint (6D) - Paint using bitmap images as brushes
iroll (6D) - roll an image in x and y directions
iset (6D) - set the type of an image.
istat (6D) - print the header information of a list of image files.
izoom (6D) - magnify or shrink an image
max (6D) - get the maximum of two images
min (6D) - calculate the minimum of two images
movie (6D) - show a series of images in a sequence
mult (6D) - multiply two images
noblack (6D) - remove all the black from an image
nullimg (6D) - make a black image file
oneband (6D) - get a single band of an image
over (6D) - put one image on top of another
perhist (6D) - print percent histogram values for an image
postcard (6D) - make an image look like a postcard
quant (6D) - quantify an image
randimg (6D) - generate a noise image
rectimg (6D) - display a color or BW image on the iris
repcolor (6D) - replace specified colors within an image
rle (6D) - force an image to be stored using run length encoding
saturate (6D) - change an image's saturation
scope (6D) - explore an image of any size
scrsave (6D) - save a part of the screen in an image file
setlum (6D) - modifies the luminance on an image
shear (6D) - shear an image diagonally
slide (6D) - zoom an image up for full screen display
snapshot (6D) - save a portion of the screen in an image file
sub (6D) - subtract two images
subimg (6D) - extract a sub-region from an image
thresh (6D) - threshold one image with another
tile (6D) - repeats an image in two dimensions

toalias (6D) - Convert an IRIS image to an Alias image
toascii (6D) - use text characters to represent an image
tobin (6D) - Convert an Iris image to binary dump of pixel data
togif (6D) - convert an IRIS image to a Compuserve GIF image
tomac (6D) - convert an IRIS image to MacPaint format
tonews (6D) - convert an IRIS image into NeWS format
topict (6D) - convert an IRIS image to Macintosh PICT format
toppm (6D) - convert an IRIS image file into Jef Poskanzer's ppm image format
tops (6D) - Convert an iris image to PostScript
toscitex (6D) - Convert IRIS images into Scitex CT2T images
tosun (6D) - convert an IRIS image to a sun raster file
totarga (6D) - Convert an IRIS image to a type 2 (RGB) targa image
toyuv (6D) - convert an IRIS image to yuv format

verbatim (6D) - force an image to be stored without run length encoding
vhist (6D) - display a 3-D volume histogram of a color image
xzoom (6D) - magnify or minify an image in the x direction

Color Scanning

- **Procedure**
    - Web help page: **http://www.bu.edu/SCV/help/scan.htm**l
    - Drop off your flat artwork at the Computer Graphics Lab.
    - Fill in a scan request form and pay $1 per scan in advance.
    - Once your scanning job is completed, pick up your artwork.
- **Color Precision**
    - 24 bit color
    - 8 bit color
    - 8 bit grayscale
    - 1 bit black & white
- **Image Size/Resolution/DPI**
    - File size
- **Why are you scanning this image in?**
    - Slides or Printing - High Resolution
    - Web Page - Low Resolution

Suggested Reference Books

Kammermeier, Anton and Kammermeier, Peter, *Scanning & Printing*, The Bath Press, Avon, England 1995.

Jackson, Richard, MacDonald, Lindsay and Freeman, Ken, *Computer Generated Color*, John Wiley & Sons, Ltd, West Sussex, England 1994

Color Printing

- **Procedure**
  - Web help pages:

    http://www.bu.edu/SCV/help/tekps.html

    http://www.bu.edu/SCV/help/teklaser.html
  - Generate a PostScript or raster image file you wish to print.
  - Choose a printer and appropriate command line arguments to imtekpsprint or imteklaserprint.
  - Send your file(s) to the printer.
  - Pick up your prints at the Computer Graphics Lab and pay for them.
- **Printers**
  - Phaser IISDX - **tekps - imtekpsprint**
  - Phaser 540 - **teklaser - imteklaserprint**
- **Issues**
  - Cost
  - Quality
  - Print Area
- **Color Gamut**
- **Technology**
  - Dye-sublimation
  - Laser
  - Thermal Wax
- **Image Orientation**
  - Portrait
  - Landscape

Making Slides

- **Procedure**
  - Web help page: **http://www.bu.edu/SCV/help/slides.htm**l
  - Use the **slides** command or use anonymous ftp to lobster.bu.edu to submit image files for film recording.
  - We can now also accept files in PostScript format and from many Macintosh and PC packages such as PowerPoint. However, it is best to contact us to go over the details of your request and see if we can accommodate you.
  - Send mail to **slides@lobster.bu.edu** to notify the SCV staff about your images and what you want done.
  - Pay for your slides when you pick them up. The cost is dependent on the number of slides you want and how quickly you need to have them.
- **Image Size**
  - The ratio of the slide format is 5 to 4 so you should try to make your images as close to this ratio as possible for best results.
- **Pixel Blooming effect**
- **Orientation**
  - Landscape is more natural.

Publications and Presentations

- **Print**
  - Books
  - Journals
  - Covers
- **Format**
  - Grant proposals
  - Thesis
- **Live**
  - Poster sessions
  - Lectures
  - Industrial video
  - Broadcast video
  - Exhibitions
- **Craftsmanship & Aesthetics**
  - Image layout manipulation
  - Text/Labels
  - Resolution
  - Antialiasing
  - Color
  - Sizing

Informal Discussion of your applications/interests

- **Why are you here?**
- **Do you have plans to utilize our services?**
- **Do you have specific questions regarding your applications?**