## Basics of Image Processing

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- 3 GIMP-Basics
- 4 Screenshots
- 5 Cropping
- 6 Scaling

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# Image ImageProcessing GIMP-Basics Screenshots Cropping Scaling Latex OpenOffice Image - definitions

## Raster image (bitmap) - Vector image

- In computer graphics, a raster graphics image or bitmap:
  - is a data structure representing a generally rectangular grid of pixels, or points of color, viewable via a monitor, paper, etc.
  - raster images are stored in image files with varying formats.
- In computer graphics, a vector graphics:
  - is the use of geometrical primitives (points, lines, curves, and shapes or polygons), which are all based upon mathematical equations, to represent images
- Images may be
  - two-dimensional: a photograph, screen display,
  - three-dimensional: such as a statue.

## Image - Characterization

## Bitmap image is technically characterized

- by the width and height of the image in pixels
  - giving the resolution of the image
- by the the number of bits per pixel
  - meaning the color depth, which determines the number of colors it can represent.

quality of raster image determinded by resolution and color depth

## Color Spaces:

- RGB color space: Red, Green, Blue additive colors
  - color depth: defined by three bytes one byte for each color.
  - standard for computer displays since 1995
- Monochrom space: an image with only black and white pixels
  - requires only a single bit for each pixel.
- others: sRGB, Adobe-RGB, CMYK (printers), etc.
- RAW data by digital SLR cameras always shot in RAW mode



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Image ImageProcessing GIMP-Basics Screenshots Cropping Scaling Latex OpenOffice Image Processing Overview

## Image Processing operations are among many other

- Geometric transformations: enlargement, reduction, and rotation
- Color corrections such as
  - brightness and contrast adjustments, quantization, or conversion to a different color space
- Image editing: increase the quality of a digital image

manipulate, enhance, and transform images

- HDR High dynamic range imaging
  - Extending dynamic range by combining differently exposed images

## Special Software needed for Digital Image Processing (DIP)

- DIP is done by special software to manipulate images in many ways
  - Adobe Photoshop line
  - GIMP GNU Image Manipulation Program
  - DPP Canon Digital Photo Professional for Canon DSLRs
  - ACDSee more simple application



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GIMP - The Gnu Imaga Manipulation Program Features - I

## What is GIMP

- a free raster graphics editor
- to process digital graphics and photographs
  - image composition: creating graphics and logos
  - photo retouching: removing unwanted image features
  - resizing and cropping photos
  - converting between different image formats (very important use)
  - create basic animated images in GIF format
  - altering colors, combining multiple images
- free software replacement for Adobe Photoshop
  - it is not designed to be a Photoshop clone
- the project was started in 1995
- current version (2.6) works with numerous OS:
  - Linux, Microsoft Windows, Apple's Mac OS X, OpenSolaris, FreeBSD

Image ImageProcessing GIMP-Basics Screenshots Cropping Scaling Latex OpenOffice GIMP - The Gnu Imaga Manipulation Program

Features - II

#### Effects and filters and formats

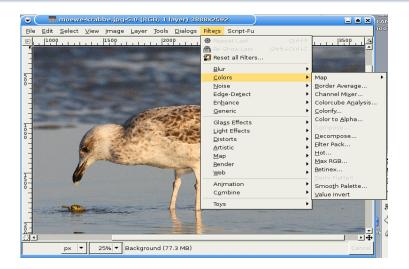
- GIMP has approximately 150 standard effects and filters
  - Drop Shadow, Blur, Motion blur and Noise.
  - operations can be automated with scripting languages
  - Scheme (LISP) interpreter named Script-Fu is built in
  - external Perl, Python, or Tcl can be used
- File formats (read and write)
  - BMP, JPEG, PNG, GIF, TIFF
  - Autodesk flic animations, Corel Paint Shop Pro images
  - Adobe Photoshop Documents, PostScript documents
- File formats (read only)
  - Adobe PDF documents
  - raw image formats used by many digital cameras

Starting GIMP Version 2.2.13 in Debian Etch



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#### General requirements

- make a snapshot from a window or from the full screen or from a region of the screen
- set a delay to prepare effects on the screen/window
- convert output to different formats

## Software for generating screenshots

- gnome-screenshot
  - basic functions, command line parameters, lightweight
- ksnapshot
  - very professional, all requirements implemented
  - this is a screenshot generator only
- GIMP
  - very usable, all necessary functions available
  - DIP program !

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## Screenshot with ksnapshot

Starting ksnapshot

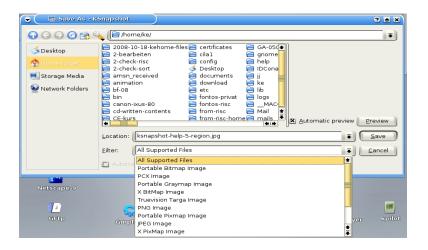
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## Screenshot with ksnapshot

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## Screenshot with ksnapshot

Output format filter



## Screenshot with ksnapshot Help page

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The mini command line (invoked with Alt+F2) may also be used to start KSnapshot

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## Screenshot with GIMP

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Screenshot with GIMP How to get menu lists by aquire



## Full screen snapshot



## Full screen shot - filetypes

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Image ImageProcessing GIMP-Basics Screenshots Cropping Scaling Latex OpenOffice Cropping - filetypes

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Cropping - filetypes



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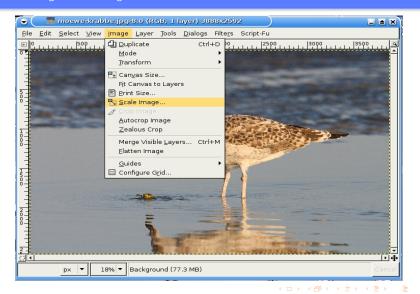


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## Scaling in GIMP

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## Scaling in GIMP Image - Scale Image



## Scaling in GIMP

Window for new dimensions

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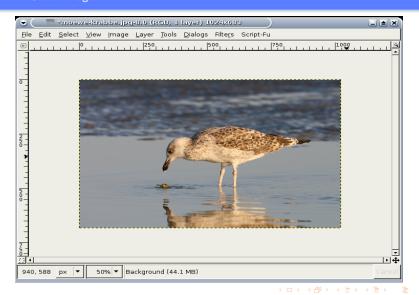
## Scaling in GIMP

Set new dimensions

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## Scaling in GIMP Scaled image





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How to include graphics in Latex

### Using Latex you can include only .eps graphics (example.tex)

\documentclass{article}
\usepackage{graphicx}
\includegraphics[height=4in]{graphic.eps}
\end{document}

compile it by latex example.tex

Using PdfLatex you can include png, pdf, jpg, files (pdf-example.tex)

\documentclass{article}
\usepackage[pdftex]{graphicx}
\includegraphics[height=4in]{emtex.pdf}
\end{document}

#### compile it by pdflatex pdf-example.tex

Includegraphics Details The full command structure

#### Full command

\includegraphics [key=value,...]{file}

- the optional parameter accepts comma separated list of keys with associated values
- the keys can by used to change the width, height and rotation of the included graphics
- **file** is the graphics. The type may be .eps only using **latex**
- **file** is the graphics. The type may be: .png, .pdf, .jpg using **pdflatex**
- the most important keys:
  - width: scale graphics to the specified width
  - heigth: scale graphics to the specified heigth
  - angle: rotate graphics counterclockwise
  - scale: scale graphics

Image ImageProcessing GIMP-Basics Screenshots Cropping Scaling Latex OpenOffice Includegraphics Details

#### File conversion and Compatibility

- programs to convert graphics formats:
  - epstopdf
  - GIMP

For compatibility between latex and pdflatex:

- do NOT use file extensions in the file parameter
- create the appropriate versions of the graphics in the directory
- latex will look for .eps files
- pdflatex will look for .png, .pdf, .jpg files in this order !

## Includegraphics Examples

### Parameters for includegraphics

\includegraphics{sample0\_a.pdf}
 - will use the graphics as it is
\includegraphics[scale=0.7]{sample0\_a.pdf}
 - scales the inserted PDF image by factor 0.7
\includegraphics[width=12.5cm]{sample0\_a.pdf}
 - will show the image transformed to width 12.5 cm
\includegraphics[height=4in]{sample0\_a.pdf}
 - textwidth is the width of a standard paragraph
\includegraphics[height=0.65\textwidth]{sample0\_a.pdf}
\includegraphics[width=.9\columnwidth,bb=67 385 525 742]{cpu.eps}
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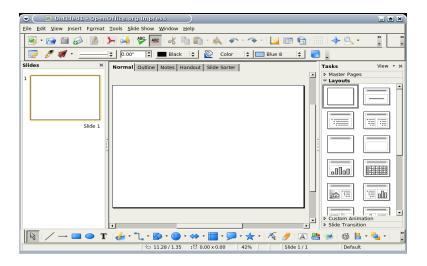
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## Insert images in OpenOffice

Start new presentation



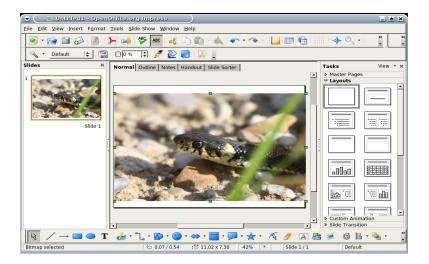
## Insert images in OpenOffice

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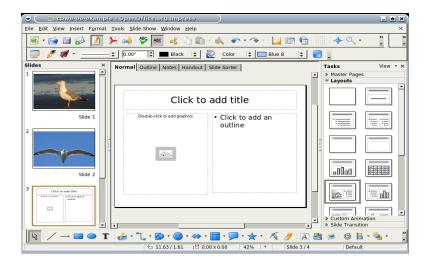
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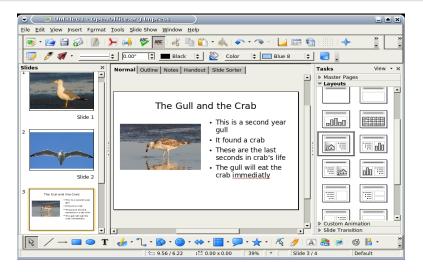
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### Insert images in OpenOffice Use layouts



## Insert images in OpenOffice

Layout filled with image and text



End of Basics of Image Processing

Thanks for your attention !