

# Basics of Image Processing

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# Agenda

- 1 Image
- 2 ImageProcessing
- 3 GIMP-Basics
- 4 Screenshots
- 5 Cropping
- 6 Scaling
- 7 Latex
- 8 OpenOffice

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# 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 determined 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 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 Image 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

# GIMP - The Gnu Image Manipulation Program

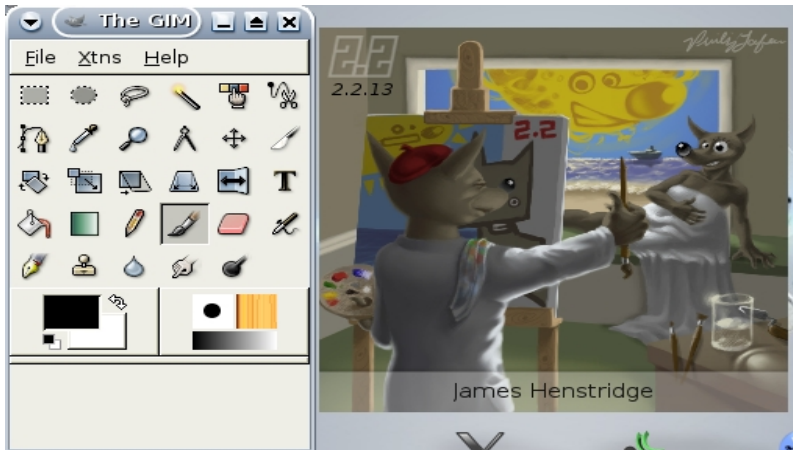
## Features - II

### Effects and filters and formats

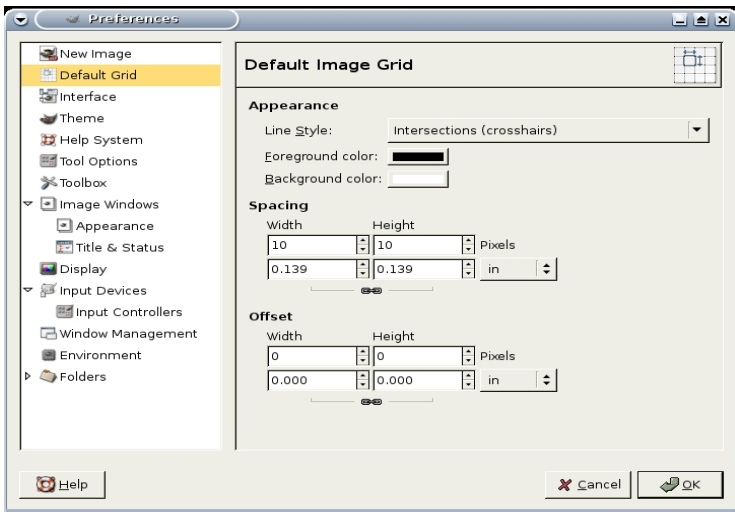
- GIMP has approximately 150 standard effects and filters
  - Drop Shadow, Blur, Motion blur and Noise.
  - operations can be automated with scripting languages
  - Scheme (LISP) interpreter named Script-Fu is built in
  - external Perl, Python, or Tcl can be used
- File formats (read and write)
  - 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

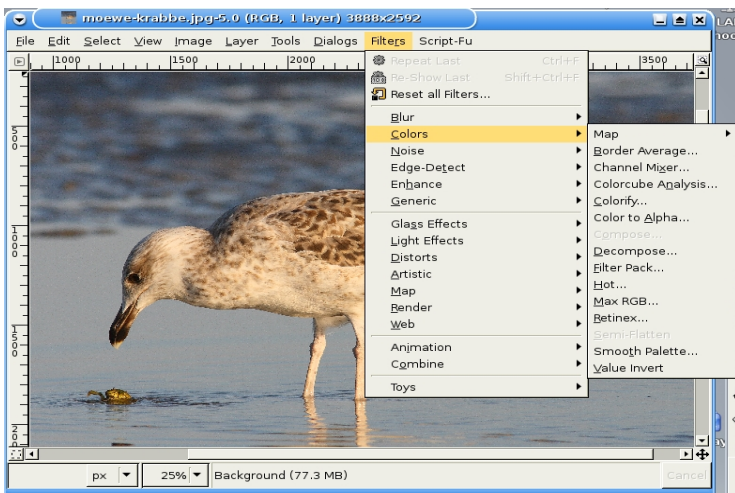
Version 2.2.13 in Debian Etch



# GIMP Preferences



# GIMP - Filters



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# Screenshot

## General requirements

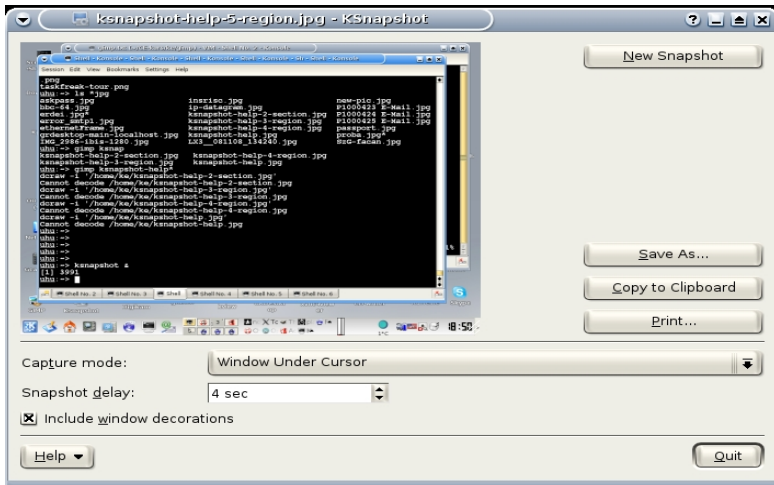
- make a snapshot from a window or from the full screen or from a region of the screen
- set a delay to prepare effects on the screen/window
- convert output to different formats

## 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 !

# Screenshot with ksnapshot

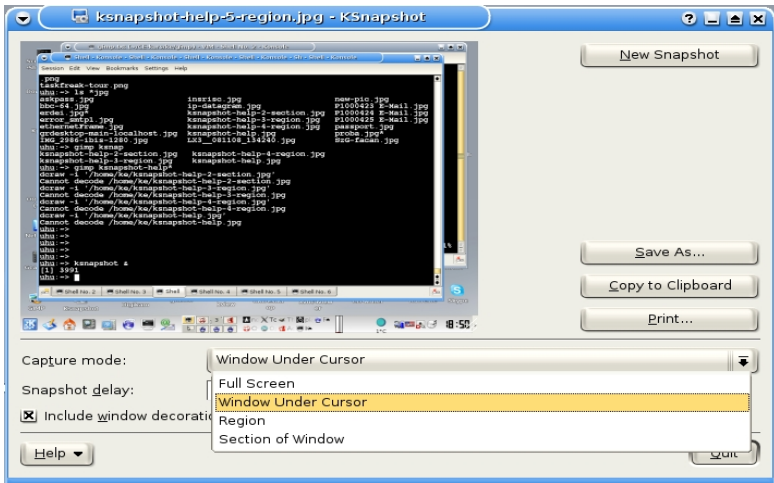
## Starting ksnapshot





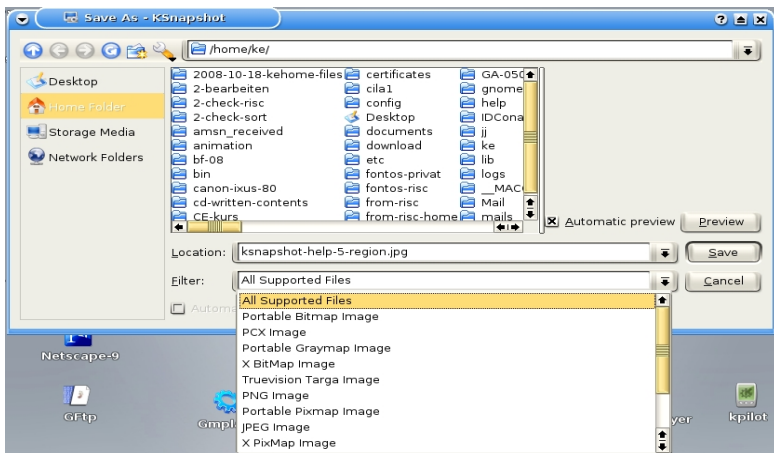
# Screenshot with ksnapshot

## Capture mode



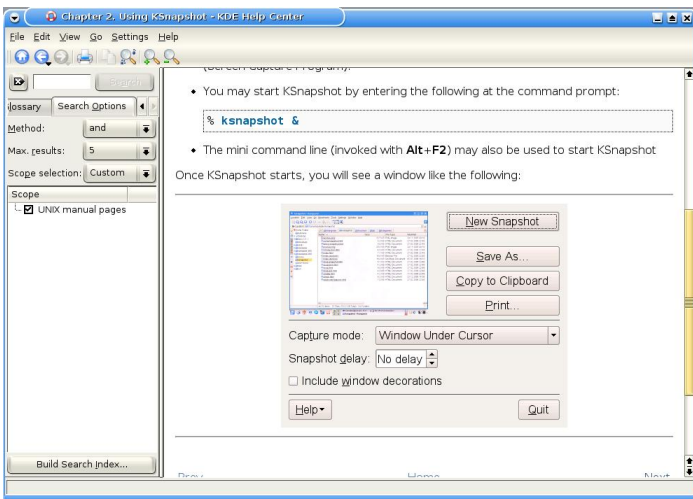
# Screenshot with ksnapshot

Output format filter



# Screenshot with ksnapshot

## Help page



# ksnapshot - help - section

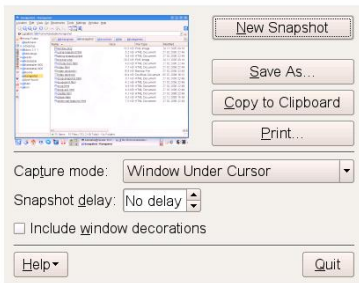
## Window section screen shot

- You may start KSnapshot by entering the following at the command prompt:

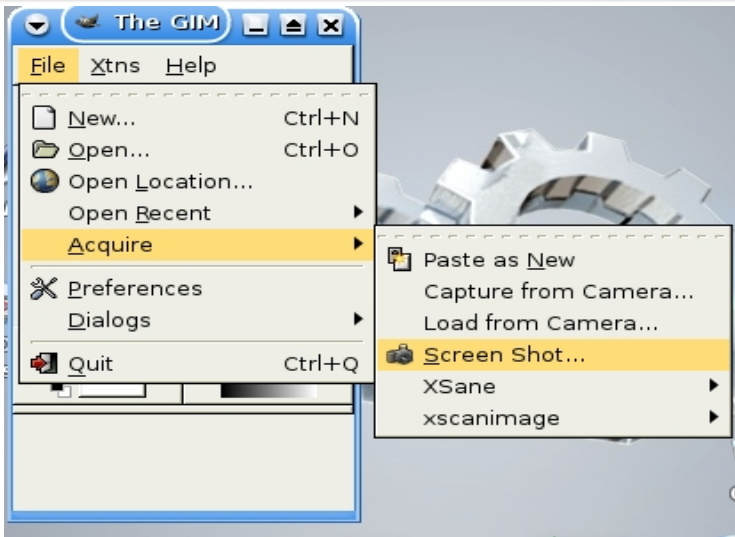
```
% ksnapshot &
```

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

Once KSnapshot starts, you will see a window like the following:

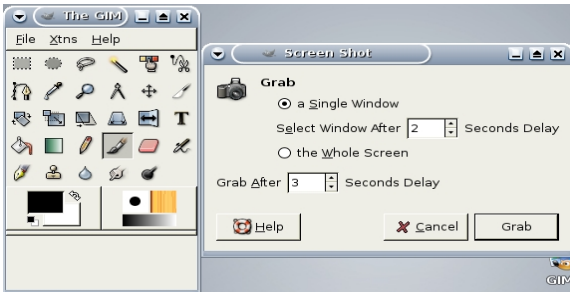

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# Screenshot with GIMP

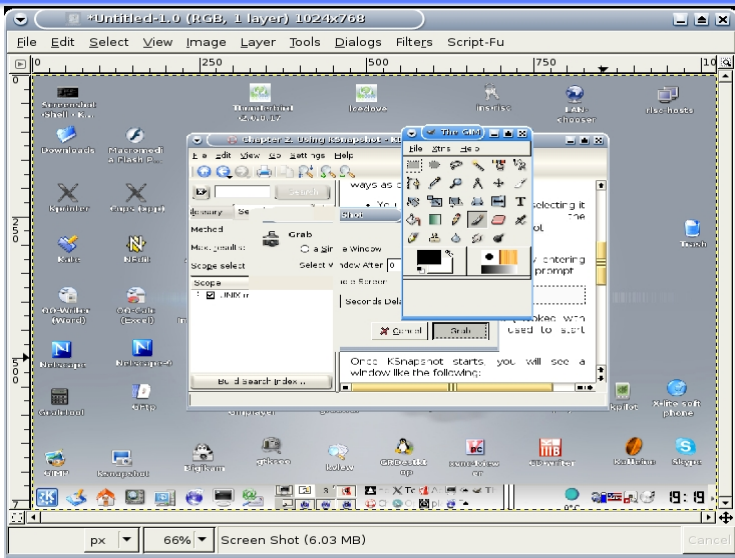


# Screenshot with GIMP

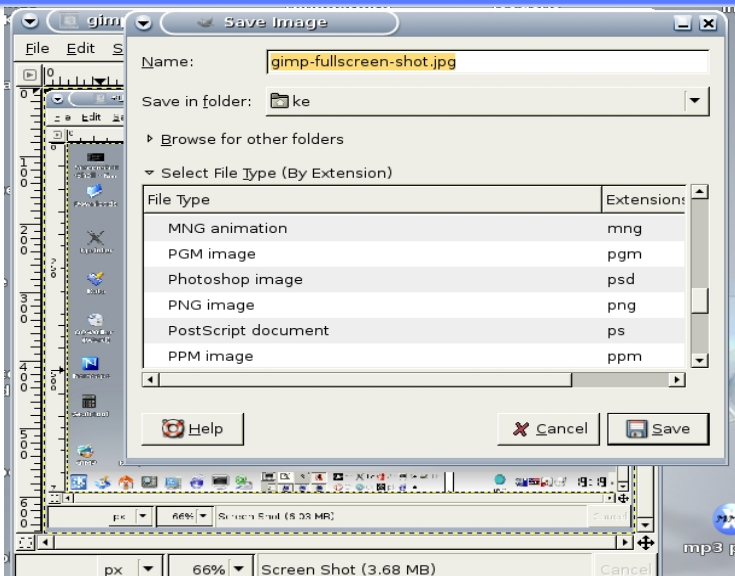
How to get menu lists by aquire



## Full screen snapshot



# Full screen shot - filetypes

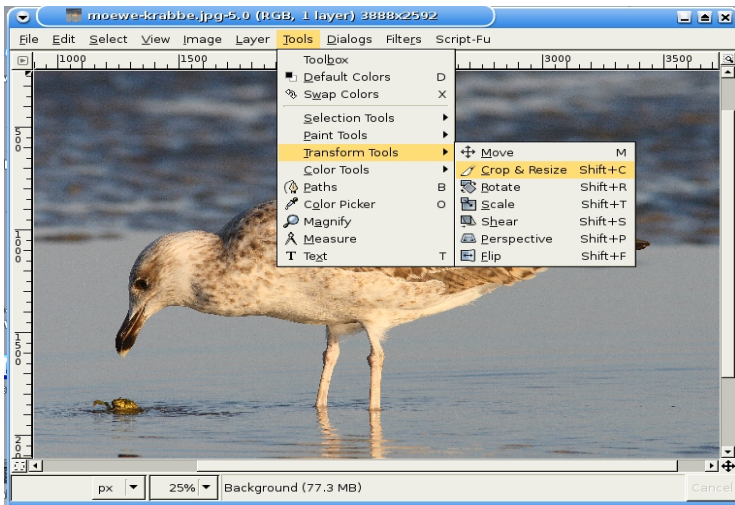




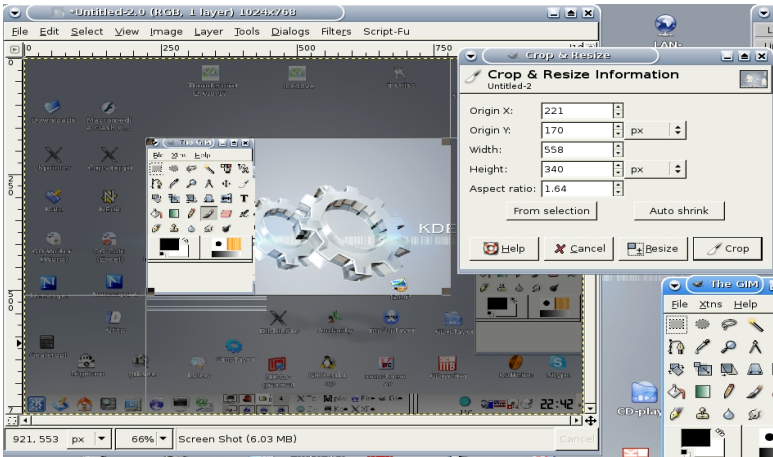
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# Cropping - filetypes



## Cropping - filetypes

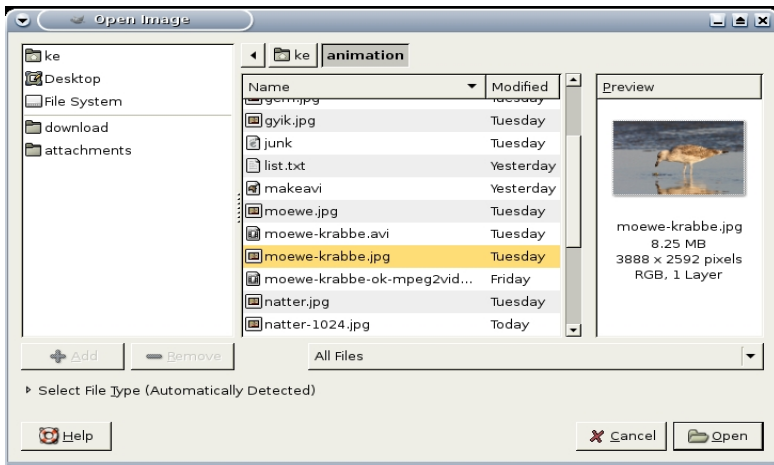


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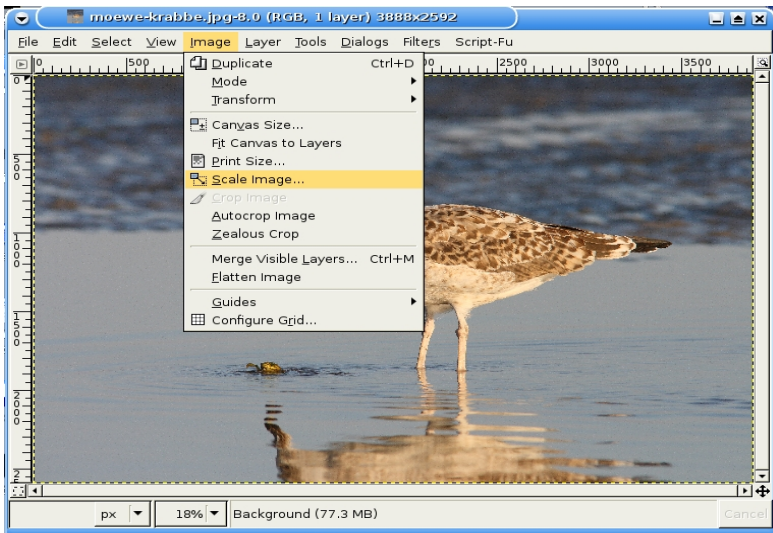
# Scaling in GIMP

Open file



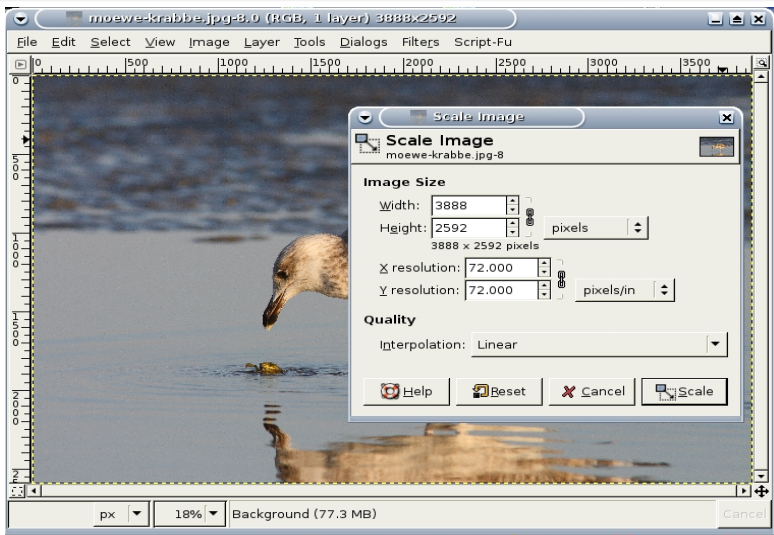
# Scaling in GIMP

Image - Scale Image



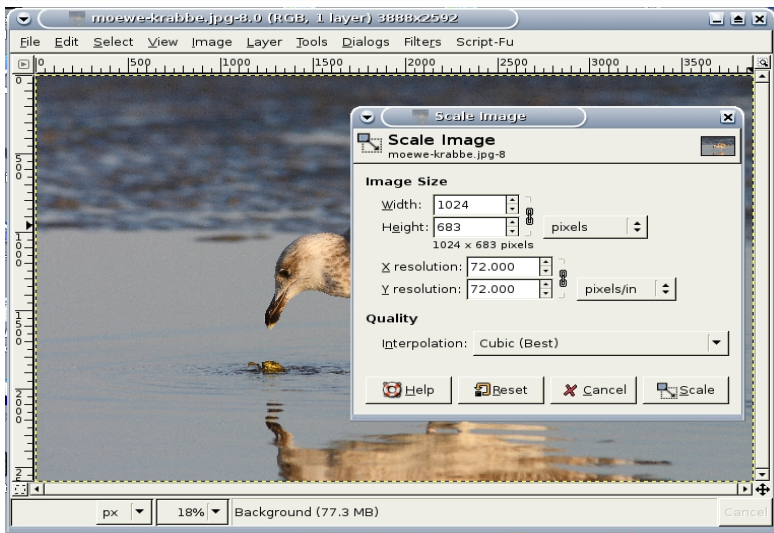
# Scaling in GIMP

Window for new dimensions



# Scaling in GIMP

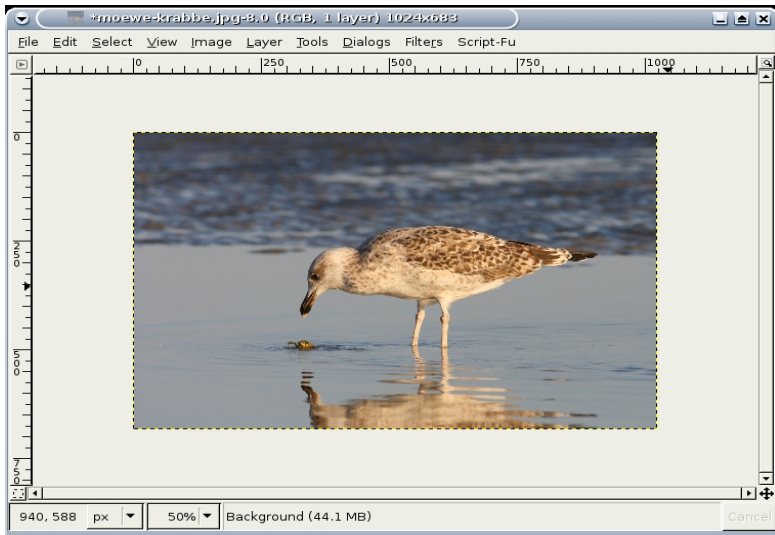
Set new dimensions





# 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 be 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
  - **height**: scale graphics to the specified height
  - **angle**: rotate graphics counterclockwise
  - **scale**: scale graphics

# 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}
```

```
\includegraphics[width=0.4\textwidth]{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}
```

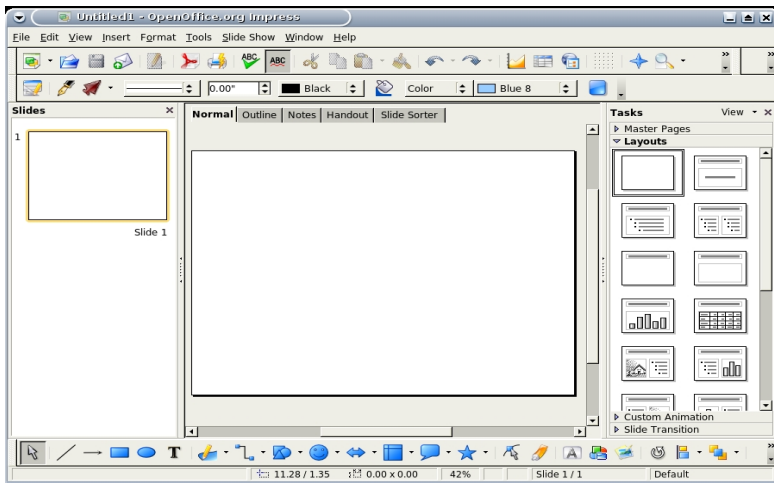
```
\includegraphics[angle=90,width=\columnwidth]{arch.eps}
```

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# Insert images in OpenOffice

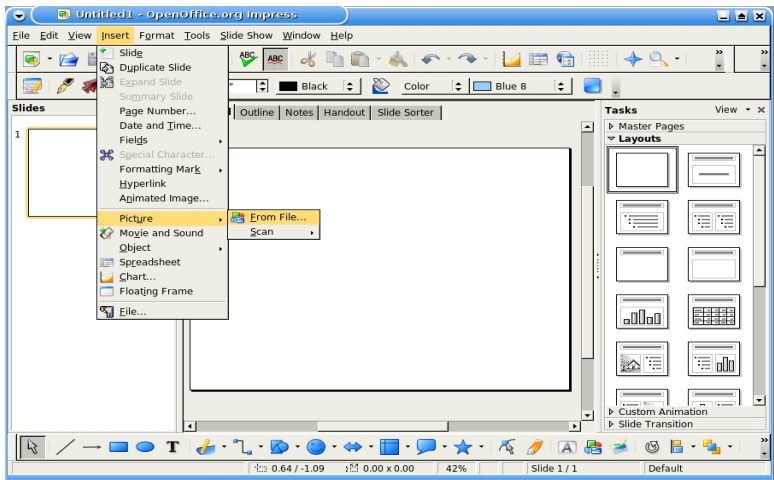
Start new presentation





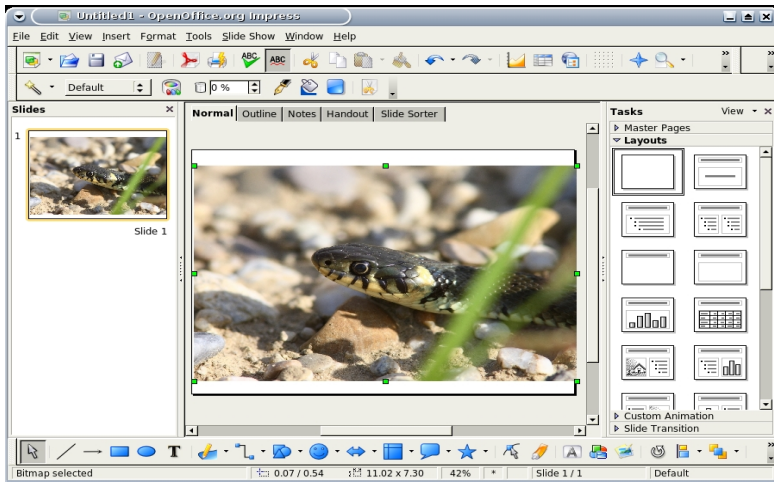
# Insert images in OpenOffice

Insert image in the slide



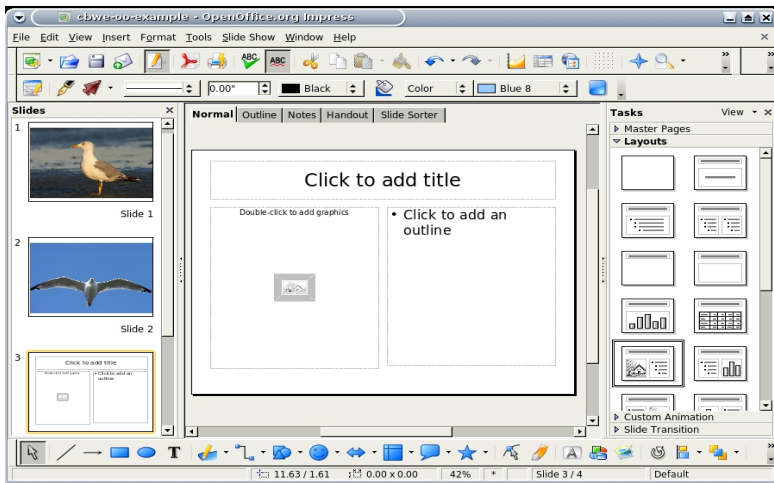
# Insert images in OpenOffice

Image inserted



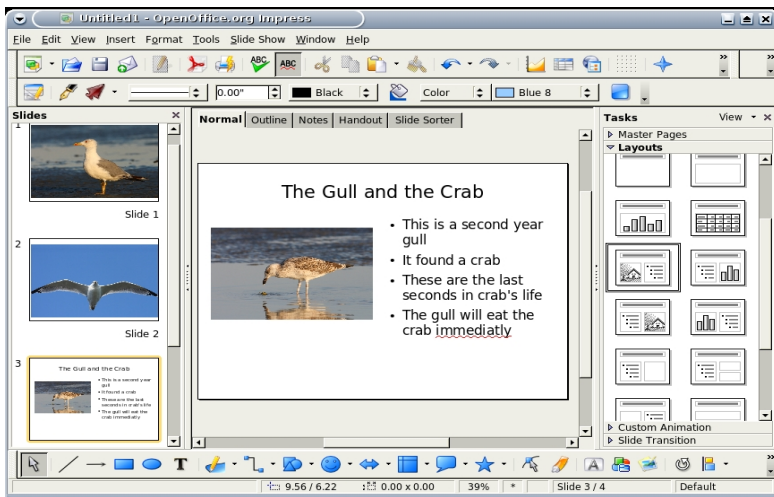
# Insert images in OpenOffice

## Use layouts



# Insert images in OpenOffice

Layout filled with image and text



# End of Basics of Image Processing

Thanks for your attention !