Linux Multimedia Commands

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Multimedia Packages

- ImageMagick
    - A collection of tools and libraries for many image formats
- SoX
    - The swiss army knife of sound processing programs
- FFmpeg
    - Complete solution to record, convert and stream audio and video, libraries and commands
- Lots of other media commands
    - atob
        - Convert from something to something
    - Alternatives to the ones mentioned here
        - mencoder, part of mplayer, uses ffmpeg and other libraries

Note:

Capabilities and formats supported tends to vary depending on libraries available at compile time and/or installed on the system

ImageMagick

- ImageMagick is an open source software suite for displaying, converting, and editing bitmap/raster image files
- ImageMagick is written in standard C
- Licensed under the ImageMagick License, a BSD-style license
- It can read and write over 100 image file formats including DPX, EXR, GIF, JPEG, JPEG-2000, PDF, PhotoCD, PNG, Postscript, SVG, and TIFF
- Extremely powerful and rich in features
- Does not have a GUI, unlike similar software (e.g. Gimp)
- Mainly consists of a number of command-line interface utilities for manipulating images
- Has numerous APIs
- A number of programs, such as MediaWiki, phpBB, and vBulletin, can use ImageMagick to create image thumbnails if it is installed. Also used by other programs, such as LyX, for converting images
- Fork of 5.5.2 in 2002 called GraphicsMagick, completely independent since, not covered
    - GraphicsMagick calls itself the swiss army knife of image processing...
    - Mission is to be a more stable version of ImageMagick for open source and proprietary applications
    - Claims of improvements over ImageMagick without breaking API or utilities operation
    - used to process billions of files at the world's largest photo sites (e.g. Flickr and Etsy)

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ImageMagick's Features

- Format conversion: convert an image from one format to another
- Transform: resize, rotate, crop, flip or trim an image
- Transparency: render portions of an image invisible
- Draw: add shapes or text to an image
- Decorate: add a border or frame to an image
- Special effects: blur, sharpen, threshold, or tint an image
- Animation: create a GIF animation sequence from a group of images
- Text & comments: insert descriptive or artistic text in an image
- Image identification: describe the format and properties of an image
- Composite: overlap one image over another
- Montage: juxtapose image thumbnails on an image canvas
- Motion picture support: read and write the common image formats used in digital film work
- Image calculator: apply a mathematical expression to an image or image channels
- High dynamic-range images: accurately represent the wide range of intensity levels found in real scenes ranging from the brightest direct sunlight to the deepest darkest shadows
- Large image support: read, process, or write mega- and giga-pixel image sizes
- Encipher or decipher an image: convert ordinary images into unintelligible gibberish and back again

ImageMagick's Interfaces

- Application Programming Interfaces in your favorite language
    - G2F (Ada)
    - MagickCore (C)
    - MagickWand (C)
    - ChMagick (Ch)
    - ImageMagickObject (COM+)
    - Magick++ (C++)
    - JMagick (Java)
    - L-Magick (Lisp)
    - NMagick (Neko/haXe)
    - MagickNet (.NET)
    - PascalMagick (Pascal)
    - PerlMagick (Perl)
    - MagickWand for PHP (PHP)
    - IMagick (PHP)
    - PythonMagick (Python)
    - MBS Realbasic (REALbasic)
    - RMagick (Ruby)
    - TclMagick (Tcl/TK)
    - RemoteMagick (XML-RPC)
- Typically used from the command line programs

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ImageMagick's Command Line Programs

- animate
  - animates an image or image sequence on any X server
- compare
  - mathematically & visually annotate the difference between an image & its reconstruction
- conjure
  - interprets and executes scripts written in the Magick Scripting Language (MSL)
- convert
  - convert between image formats as well as resize an image, blur, crop, despeckle, dither, draw on, flip, join, re-sample, and much more
- display
  - displays an image or image sequence on any X server
- identify
  - describes the format and characteristics of one or more image files
- import
  - saves any visible rectangular area, window, or entire screen on an X server & outputs it as an image file
- mogrify
  - Similar to convert but overwrites the original image file, whereas, convert writes to a different image file
- montage
  - create a composite image by combining several separate images
- stream
  - lightweight tool to stream one or more pixels or portion of a image to your choice of storage formats
- other commands for API usage
  - Magick++-config, Magick-config, MagickCore-config, MagickWand-config, Wand-config

ImageMagick's convert Command

- convert [input-options] input-file [output-options] output-file
    - convert image.jpg -resize 100x100 -quality 80 thumb.png
    - #!/bin/bash
      ```
      for f in *.jpg ; do
              convert ${f} -resize 128x96 -quality 80 ../thumbs/${f} 2<&1 >> thumbs.log
      done
      ```
    - #!/bin/bash
      ```
      PNG="${1%.*}.png"
      convert "$1" -resize "$2" \
      \( +clone  -threshold -1 -draw 'fill black polygon 0,0 0,12 12,0 fill
      white circle 12,12 12,0' \
      \( +clone -flip \) -compose Multiply -composite \
      \( +clone -flop \) -compose Multiply -composite \
      \) +matte -compose CopyOpacity -composite "${PNG}"
      DROP="60x4+4+4"
      if [ "$3" = "left" ]; then  DROP="60x4-4+4"; fi
      convert -page +4+4 "${PNG}" -matte \
      \( +clone -background gray -shadow "${DROP}" \) +swap \
      -background none -mosaic "${PNG}"
      ```
      Used to create drop shadows → http://www.obsidian-studios.com/hosting/
- To many freakin options...
    - http://www.imagemagick.org/www/command-line-options.html
- Lots of provided usage examples, Google has more!
    - http://www.imagemagick.org/Usage/
- Most common and widely used command

SoX

- Sound eXchange, abbreviated SoX, is a free cross-platform (Windows, Linux, MacOS X, etc.) digital audio editor
- SoX is written in standard C
- Licensed under the GNU GPL
- It can convert various formats of digital audio files in to other formats
- It can apply various effects to audio files
- SoX can play and record audio files on most platforms
- Used via a command line interface
- An API is not provided
  - Third party one is available under development, very limited
- SoX does not support any audio formats natively
- SoX relies on third party libraries for the various audio formats it supports
- To many features to list here
  - http://sox.sourceforge.net/Docs/Features

SoX's Command Line Programs

- sox
  - Used to convert/process audio files
  - sox [global-options] [format-options] infile1 [[format-options] infile2] ... [format-options] outfile [effect [effect-options]] ...

- play
  - Used to play audio files
  - Not a real command but a symlink to sox command
  - play [global-options] [format-options] infile1 [[format-options] infile2] ... [format-options] outfile [effect [effect-options]] ...

- rec
  - Used to record audio files
  - Not a real command but a symlink to sox command
  - rec [global-options] [format-options] outfile [effect [effect-options]] ...

SoX's sox Command examples

- #!/bin/bash
  for f in *wav ; do
        sox -v 1 ${f} -r 44100 ${f/wav/mp3}
  done
- #!/bin/bash
  for f in *mp3 ; do
        sox ${f} -c2 ${f} bass 2 treble 2
  done

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FFmpeg

- FFmpeg is a complete free / open source, cross platform, solution consisting of libraries and programs to record, covert, and stream audio and video
- FFmpeg is mostly written in C
- Licensed under the LGPL 2.1+ or GPL 2+ (depending on options enabled)
- Includes libavcodec
    - the leading audio/video codec library
    - used by several other projects
- Includes libavformat
    - audio/video container mux and demux library
- ffmpeg command line program
    - used for converting/transcoding multimedia files
- Supports numerious formats and protocols
    - http://en.wikipedia.org/wiki/FFmpeg#Codecs.2C_formats_and_protocols_supported

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FFmpeg's Components

- ffmpeg
  - command line tool to convert one video file format to another. It can also grab and encode in real time from a TV card.
- ffserver
  - An HTTP and RTSP multimedia streaming server for live broadcasts. It can also time shift live broadcast.
- ffplay
  - Simple media player based on SDL and on the FFmpeg libraries.
- ffprobe
  - A command line tool to show media information.
- libavcodec
  - A library containing all the FFmpeg audio/video encoders and decoders. Most codecs were developed from scratch to ensure best performance and high code reusability.
- libavformat
  - A library containing demuxers and muxers for audio/video container formats.
- libavutil
  - A helper library containing routines common to different parts of FFmpeg. This library includes adler32, crc, md5, sha1, lzo decompressor, Base64 encoder/decoder, des encrypter/decrypter, rc4 encrypter/decrypter and aes encrypter/decrypter.
- libpostproc
  - A library containing video postprocessing routines.
- libswscale
  - A library containing video image scaling and colorspace/pixelformat conversion routines.
- libavfilter

FFmpeg's ffmpeg Command Usage

- ffmpeg [[infile options][-i infile]]... {[outfile options] outfile}...
- Image processing
    - ffmpeg -i infile.avi
    - ffmpeg -f image2 -i image%d.jpg outfile.mpg
    - ffmpeg -i infile.mpg image%d.jpg
- Audio
    - ffmpeg -i infile.avi -vn -ar 44100 -ac 2 -ab 192 -f mp3 infile.mp3
    - ffmpeg -i infile.avi -vn -ar 44100 -ac 2 -ab 192 -f mp3 infile.mp3
- Video
    - ffmpeg -i infile.avi outfile.mpg
    - ffmpeg -i infile.avi -ab 56 -ar 44100 -b 200 -r 15 -s 320x240 -f flv outfile.flv
- Stream
    - ffmpeg -f video4linux2 -s 640x480 -r 25 -i /dev/video0 -vcodec mjpeg -strict -1 -b 1000 -bufsize 500 -qmin 20 -qmax 20 -an udp://127.0.0.1:1234/webcam.mjpg
- Record
    - ffmpeg -f video4linux2 -s 640x480 -r 25 -t 90 -i /dev/video0 -f mpeg outfile.mpeg

References

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