

# Video Encoding Systems S2: MORE FFMPEG

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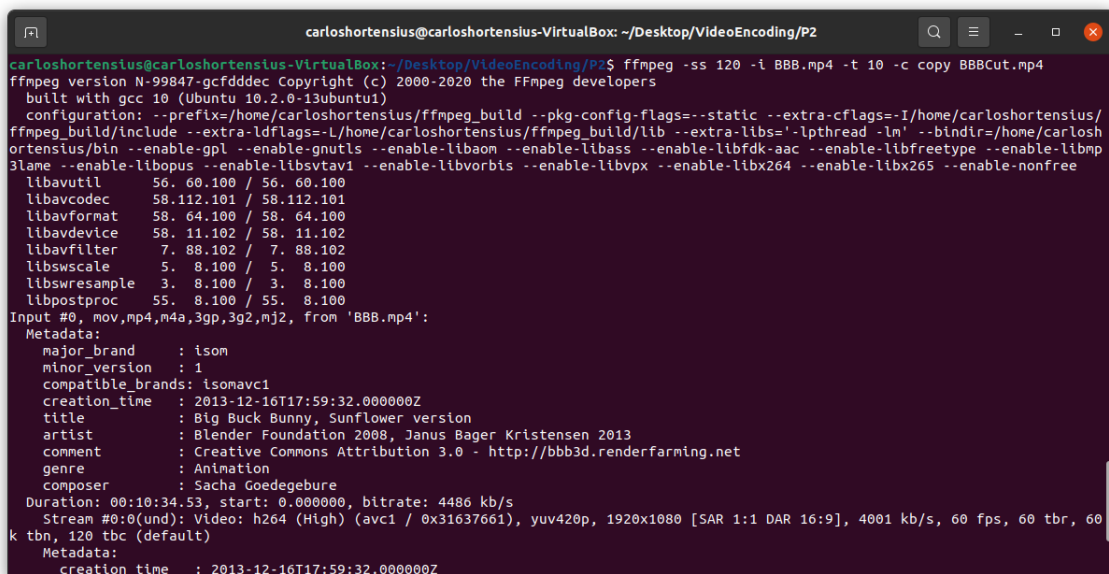
In this seminar we are going to do more exercises using the ffmpeg commands. The python scripts have been uploaded to github in the following link: [Git-Hub repository for Seminar 2](#)

## 1 Cut a video

The objective of this first section is to use an ffmpeg command to cut a video and thus have a video with less duration. For that we will use the following command

```
ffmpeg -ss 120 -i input.mp4 -t 10 -c copy output.mp4'
```

We can see that we can establish the starting point of the video (second 120) and the duration (10s) For the case of BBB video I did the following:



```
carlos hortensius@carlos hortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carlos hortensius@carlos hortensius-VirtualBox:~/Desktop/VideoEncoding/P2$ ffmpeg -ss 120 -i BBB.mp4 -t 10 -c copy BBBCut.mp4
ffmpeg version N-99847-gcfdddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carlos hortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carlos hortensius/
ffmpeg_build/include --extra-ldflags=-L/home/carlos hortensius/ffmpeg_build/lib --extra-libs='-lpthread -lm' --bindir=/home/carlos hortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter    7. 88.102 / 7. 88.102
  libswscale     5.  8.100 / 5.  8.100
  libswresample  3.  8.100 / 3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBB.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 1
    compatible_brands: isomavc1
    creation_time    : 2013-12-16T17:59:32.000000Z
    title           : Big Buck Bunny, Sunflower version
    artist          : Blender Foundation 2008, Janus Bager Kristensen 2013
    comment         : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre           : Animation
    composer        : Sacha Goedegebure
  Duration: 00:10:34.53, start: 0.000000, bitrate: 4486 kb/s
  Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 4001 kb/s, 60 fps, 60 tbr, 60 k tbn, 120 tbc (default)
  Metadata:
    creation_time    : 2013-12-16T17:59:32.000000Z
```

## 2 Extract YUV histogram

The YUV histogram denotes the amount of color that we have in a given image, or in this case in a given video, which is in fact a set of images. If we want to display this histogram at the same that the video we do the following command line:

```
ffplay input.mp4 -vf "split=2[a][b],[b]histogram,format=yuva444p[hh],[a][hh]overlay"
```

```

carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2$ ffmpeg BBBCut.mp4 -vf "split=2[a][b],[b]histogram,format=yuva444p[hh],[a][hh]overlay"
ffmpeg version N-99847-gcfdddec Copyright (c) 2003-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carloshortensius/ffmpeg_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs=-lpthread -lm' --bindir=/home/carloshortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter    7. 88.102 / 7. 88.102
  libswscale     5.  8.100 / 5.  8.100
  libswresample  3.  8.100 / 3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':   0B f=0/0
Metadata:
  major_brand      : isom
  minor_version    : 512
  compatible_brands: isomiso2avc1mp41
  title           : Big Buck Bunny, Sunflower version
  artist          : Blender Foundation 2008, Janus Bager Kristensen 2013
  composer        : Sacha Goedegebure
  encoder         : Lavf58.64.100
  comment         : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
  genre           : Animation
Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60 k tbn, 120 tbc (default)
Metadata:

```

In the case that we want to save this display as a video (all in the same line):

```
ffmpeg -i input.mp4 -vf
```

```
"split=2[a][b],[b]histogram,format=yuva444p[hh],[a][hh]overlay" output.mp4
```

### 3 Resize the video

Given an input video with some dimensions in terms of resultution, change this dimensions by scaling it.

1. 720p

```

carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mp4 -vf scale=-1:720 BBBCut720p.mp4
ffmpeg version N-99847-gcfdddec Copyright (c) 2003-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carloshortensius/ffmpeg_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs=-lpthread -lm' --bindir=/home/carloshortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter    7. 88.102 / 7. 88.102
  libswscale     5.  8.100 / 5.  8.100
  libswresample  3.  8.100 / 3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':
Metadata:
  major_brand      : isom
  minor_version    : 512
  compatible_brands: isomiso2avc1mp41
  title           : Big Buck Bunny, Sunflower version
  artist          : Blender Foundation 2008, Janus Bager Kristensen 2013
  composer        : Sacha Goedegebure
  encoder         : Lavf58.64.100
  comment         : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
  genre           : Animation
Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60 k tbn, 120 tbc (default)
Metadata:

```

2. 480p

```

carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mp4 -s hd480 -c:v libx264 -crf 23 -c:a a
ac -strict -2 BBB480p.mp4
ffmpeg version N-99847-gcfddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carloshortensius/
ffmpeg_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs=-lpthread -lnl --bindir=/home/carlosh
ortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp
3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter     7. 88.102 /  7. 88.102
  libswscale     5.  8.100 /  5.  8.100
  libswresample  3.  8.100 /  3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 512
    compatible_brands: isomiso2avc1mp41
    title            : Big Buck Bunny, Sunflower version
    artist           : Blender Foundation 2008, Janus Bager Kristensen 2013
    composer         : Sacha Goedegebure
    encoder          : Lavf58.64.100
    comment          : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre            : Animation
  Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
    Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60
k tbn, 120 tbc (default)

```

3. 360 x 240

```

carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mp4 -vf scale=360:240 BBB360x240.mp4
ffmpeg version N-99847-gcfddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carloshortensius/
ffmpeg_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs=-lpthread -lnl --bindir=/home/carlosh
ortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp
3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter     7. 88.102 /  7. 88.102
  libswscale     5.  8.100 /  5.  8.100
  libswresample  3.  8.100 /  3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 512
    compatible_brands: isomiso2avc1mp41
    title            : Big Buck Bunny, Sunflower version
    artist           : Blender Foundation 2008, Janus Bager Kristensen 2013
    composer         : Sacha Goedegebure
    encoder          : Lavf58.64.100
    comment          : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre            : Animation
  Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
    Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60
k tbn, 120 tbc (default)

```

4. 160 x 120

```

carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mp4 -vf scale=160:120 BBB160x120.mp4
ffmpeg version N-99847-gcfddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=--static --extra-cflags=-I/home/carloshortensius/
ffmpeg_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs=-lpthread -lnl --bindir=/home/carlosh
ortensius/bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp
3lame --enable-libopus --enable-libsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter     7. 88.102 /  7. 88.102
  libswscale     5.  8.100 /  5.  8.100
  libswresample  3.  8.100 /  3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 512
    compatible_brands: isomiso2avc1mp41
    title            : Big Buck Bunny, Sunflower version
    artist           : Blender Foundation 2008, Janus Bager Kristensen 2013
    composer         : Sacha Goedegebure
    encoder          : Lavf58.64.100
    comment          : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre            : Animation
  Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
    Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60
k tbn, 120 tbc (default)

```

## 4 Change to mono and change audio codec

I have first looked at the video properties by using the command `ffmpeg -i video.mp4`

```
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox:~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mp4
ffmpeg version N-99847-gcfddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=-static --extra-cflags=-I/home/carloshortensius/ffmpe
g_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs='-lpthread -lm' --bindir=/home/carloshortensius/
bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp3lame --enable-
libopus --enable-lsbsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter     7. 88.102 / 7. 88.102
  libswscale     5.  8.100 / 5.  8.100
  libswresample  3.  8.100 / 3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 512
    compatible_brands: isomiso2avc1mp41
    title            : Big Buck Bunny, Sunflower version
    artist           : Blender Foundation 2008, Janus Bager Kristensen 2013
    composer         : Sacha Goedegebure
    encoder          : Lavf58.64.100
    comment          : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre            : Animation
  Duration: 00:00:13.02, start: 0.000000, bitrate: 3961 kb/s
  Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3644 kb/s, 60 fps, 60 tbr, 60k tbn
, 120 tbc (default)
  Metadata:
    handler_name     : GPAC ISO Video Handler
  Stream #0:1(und): Audio: ac3 (ac-3 / 0x332D6361), 48000 Hz, 5.1(side), fltp, 320 kb/s (default)
  Metadata:
```

Then we run the following command line in order to change the channels of the audio and its codec:

```
ffmpeg -i input.mp4 -ac 1 -acodec mp3 output.mp4
```

Here we set the audio channels to 1 and the audio codec to mp3, and then we can have a look at the properties of the output video:

```
carloshortensius@carloshortensius-VirtualBox: ~/Desktop/VideoEncoding/P2
carloshortensius@carloshortensius-VirtualBox:~/Desktop/VideoEncoding/P2$ ffmpeg -i BBBCut.mono.mp4
ffmpeg version N-99847-gcfddec Copyright (c) 2000-2020 the FFmpeg developers
  built with gcc 10 (Ubuntu 10.2.0-13ubuntu1)
  configuration: --prefix=/home/carloshortensius/ffmpeg_build --pkg-config-flags=-static --extra-cflags=-I/home/carloshortensius/ffmpe
g_build/include --extra-ldflags=-L/home/carloshortensius/ffmpeg_build/lib --extra-libs='-lpthread -lm' --bindir=/home/carloshortensius/
bin --enable-gpl --enable-gnutls --enable-libaom --enable-libass --enable-libfdk-aac --enable-libfreetype --enable-libmp3lame --enable-
libopus --enable-lsbsvtav1 --enable-libvorbis --enable-libvpx --enable-libx264 --enable-libx265 --enable-nonfree
  libavutil      56. 60.100 / 56. 60.100
  libavcodec     58.112.101 / 58.112.101
  libavformat    58. 64.100 / 58. 64.100
  libavdevice    58. 11.102 / 58. 11.102
  libavfilter     7. 88.102 / 7. 88.102
  libswscale     5.  8.100 / 5.  8.100
  libswresample  3.  8.100 / 3.  8.100
  libpostproc   55.  8.100 / 55.  8.100
Input #0, mov,mp4,m4a,3gp,3g2,mj2, from 'BBBCut.mono.mp4':
  Metadata:
    major_brand      : isom
    minor_version    : 512
    compatible_brands: isomiso2avc1mp41
    title            : Big Buck Bunny, Sunflower version
    artist           : Blender Foundation 2008, Janus Bager Kristensen 2013
    composer         : Sacha Goedegebure
    encoder          : Lavf58.64.100
    comment          : Creative Commons Attribution 3.0 - http://bbb3d.renderfarming.net
    genre            : Animation
  Duration: 00:00:10.07, start: 0.000000, bitrate: 3479 kb/s
  Stream #0:0(und): Video: h264 (High) (avc1 / 0x31637661), yuv420p, 1920x1080 [SAR 1:1 DAR 16:9], 3402 kb/s, 60 fps, 60 tbr, 15360 t
bn, 120 tbc (default)
  Metadata:
    handler_name     : GPAC ISO Video Handler
  Stream #0:1(und): Audio: mp3 (mp4a / 0x6134706D), 48000 Hz, mono, fltp, 64 kb/s (default)
  Metadata:
```

We can see that the audio changed from 5.1 to mono, and the audio codec changed from ac3 to mp3

## 5 All together in a script

Finally we have written a script the python in which the user is asked for the path where his video is and the name of this video, and then he is given to claim what modifications he wants to do