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学习

video

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#video

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1:

-
- -◦
- - ◦
- ◦
- HTTP◦
- DRM◦

- ◦
- - ◦

Examples

Blender Foundation Tears of Steel. “HD 720p~365MBmov2.0”. “mov”.

SRT. ◦ ◦

[/MediaInfo](#) ◦ [GUIMediaInfo API](#).

MediaInfo GUI. ◦ ◦

```
▼ C:\Tmp\tears_of_steel_720p.mov
  ▼ General
    ..... Complete name: C:\Tmp\tears_of_steel_720p.mov
    ..... Format: MPEG-4
    ..... Format profile: QuickTime
    ..... Codec ID: qt_0000.02 (qt_)
    ..... File size: 355 MiB
    ..... Duration: 12 min
    ..... Overall bit rate: 4 056 kb/s
    ..... Writing application: Lavf53.32.100
```

◦ MPEG-4. MPEG-4/ISOMP4. AppleMediaInfo“QuickTime”.

MP4MPEG-4 - MPEG-4. MPEG-4.

ISOMPEG-4. ◦

```
Video
  ID: 1
  Format: AVC
  Format/Info: Advanced Video Codec
  Format profile: Main@L3.1
  Format settings, CABAC: No
  Format settings, ReFrames: 2 frames
  Format settings, GOP: M=4, N=18
  Codec ID: avc1
  Codec ID/Info: Advanced Video Coding
  Duration: 12 min
  Bit rate: 4 000 kb/s
  Width: 1 280 pixels
  Height: 534 pixels
  Display aspect ratio: 2.40:1
  Frame rate mode: Constant
  Frame rate: 24.000 FPS
  Color space: YUV
  Chroma subsampling: 4:2:0
  Bit depth: 8 bits
  Scan type: Progressive
  Bits/(Pixel*Frame): 0.244
  Stream size: 338 MiB (95%)
  Writing library: x264 core 122
  Encoding settings: cabac=0 / ref=2 / deblock=1:0:0 / ar
  Language: English
```

◦ *Format*

AVCH.264. AVC.

◦ ◦ High Profile.

◦ ◦ 720pHD. 1280x720/720p.

◦ ◦

- ◦ ◦



```
Audio
  ID: 2
  Format: MPEG Audio
  Format version: Version 1
  Format profile: Layer 3
  Mode: Joint stereo
  Codec ID: .mp3
  Duration: 12 min
  Bit rate mode: Constant
  Bit rate: 192 kb/s
  Channel(s): 2 channels
  Channel positions: Front: L R
  Sampling rate: 44.1 kHz
  Compression mode: Lossy
  Stream size: 16.8 MiB (5%)
  Language: English
  Default: Yes
  Alternate group: 1
```

◦ ◦ “MPEG Audio Layer 3”MP3◦

◦

—————
MPEG-4◦ ◦ - ◦

MP3 - AAC◦

H.264 Main◦ HighH.264High Profile◦

◦ ◦

—————
[FFprobe](#) [FFmpeg](#) [MP4](#) [Bento4](#) ◦ ◦ [MediaInfo](#)◦

<https://riptutorial.com/zh-CN/video/topic/5690/>

2:

- - -◦
 - - ◦
 - ◦
 - HTTP◦
 - DRM◦

- ◦
- - ◦ ◦

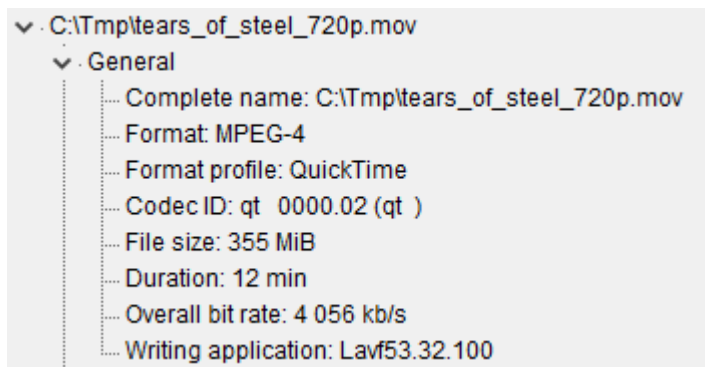
Examples

Blender Foundation [Tears of Steel](#) ◦ “HD 720p~365MBmov2.0” ◦ “mov”◦

SRT◦ ◦ ◦

[/MediaInfo](#) ◦ [GUIMediaInfo API](#)◦

MediaInfo GUI◦ ◦ ◦



◦ MPEG-4◦ *MPEG-4/ISOMPEG4* ◦ AppleMediaInfo“QuickTime”◦

MP4MPEG-4 - MPEG-4◦ MPEG-4◦

ISOMPEG-4◦ ◦

```
Video
  ID: 1
  Format: AVC
  Format/Info: Advanced Video Codec
  Format profile: Main@L3.1
  Format settings, CABAC: No
  Format settings, ReFrames: 2 frames
  Format settings, GOP: M=4, N=18
  Codec ID: avc1
  Codec ID/Info: Advanced Video Coding
  Duration: 12 min
  Bit rate: 4 000 kb/s
  Width: 1 280 pixels
  Height: 534 pixels
  Display aspect ratio: 2.40:1
  Frame rate mode: Constant
  Frame rate: 24.000 FPS
  Color space: YUV
  Chroma subsampling: 4:2:0
  Bit depth: 8 bits
  Scan type: Progressive
  Bits/(Pixel*Frame): 0.244
  Stream size: 338 MiB (95%)
  Writing library: x264 core 122
  Encoding settings: cabac=0 / ref=2 / deblock=1:0:0 / ar
  Language: English
```

◦ *Format*

AVCH.264. AVC.

◦ ◦ High Profile.

◦ ◦ 720pHD. 1280x720/720p.

◦ ◦

- ◦ ◦




```

v . Audio
  ID: 2
  Format: MPEG Audio
  Format version: Version 1
  Format profile: Layer 3
  Mode: Joint stereo
  Codec ID: .mp3
  Duration: 12 min
  Bit rate mode: Constant
  Bit rate: 192 kb/s
  Channel(s): 2 channels
  Channel positions: Front: L R
  Sampling rate: 44.1 kHz
  Compression mode: Lossy
  Stream size: 16.8 MiB (5%)
  Language: English
  Default: Yes
  Alternate group: 1

```

◦ ◦ “MPEG Audio Layer 3”MP3◦

◦

—————
MPEG-4◦ ◦ - ◦

MP3 - AAC◦

H.264 Main◦ HighH.264High Profile◦

◦ ◦

—————
[FFprobe](#) [FFmpeg](#)MP4[Bento4](#) ◦ ◦ [MediaInfo](#)◦

◦

Blender Foundation[Tears of Steel](#) ◦ “HD 720p~365MBmov2.0”◦ “mov”◦

[Bento4](#)mp4infomp4dump[FFmpeg](#)◦

“QuickTime”MOVISO - MP4◦ ◦

◦ ISO - ◦ mp4dump

```
mp4dump tears_of_steel_720p.mov
```

```
[ftyp] size=8+12
  major_brand = qt
  minor_version = 200
```

```

compatible_brand = qt
[wide] size=8+0
[mdat] size=8+371579623
[moov] size=8+598972
  [mvhd] size=12+96
    timescale = 1000
    duration = 734167
    duration(ms) = 734167
  [trak] size=8+244250
    [tkhd] size=12+80, flags=f
      enabled = 1
      id = 1
      duration = 734167
      width = 1280.000000
      height = 534.000000
  ...

```

◦ *moov8598972*。◦ [ISO / IEC 14496-12](#)。

- - *mdatmp4dump*。

- - 。

```
ffmpeg -i tears_of_steel_720p.mov -an -vcodec copy video_track.mov
```

◦

◦ H.264 - -

- I - 。
- P - “5”。
- B - P - “510”。

I2。

```
mp4info --show-layout video_track.mov
```

◦

```

...
00000959 [V] (1) size= 7615, offset=15483377, dts=491008 (39958 ms)
00000960 [V] (1)* size=104133, offset=15490992, dts=491520 (40000 ms)
00000961 [V] (1) size= 16168, offset=15595125, dts=492032 (40042 ms)
00000962 [V] (1) size= 4029, offset=15611293, dts=492544 (40083 ms)
00000963 [V] (1) size= 24615, offset=15615322, dts=493056 (40125 ms)
00000964 [V] (1) size= 4674, offset=15639937, dts=493568 (40167 ms)
00000965 [V] (1) size= 18451, offset=15644611, dts=494080 (40208 ms)
00000966 [V] (1) size= 95800, offset=15663062, dts=494592 (40250 ms)
00000967 [V] (1) size= 30271, offset=15758862, dts=495104 (40292 ms)
00000968 [V] (1) size= 10997, offset=15789133, dts=495616 (40333 ms)
00000969 [V] (1) size= 28458, offset=15800130, dts=496128 (40375 ms)
00000970 [V] (1) size= 9593, offset=15828588, dts=496640 (40417 ms)
00000971 [V] (1) size= 24548, offset=15838181, dts=497152 (40458 ms)
00000972 [V] (1) size= 6853, offset=15862729, dts=497664 (40500 ms)

```

```
00000973 [V] (1) size= 27698, offset=15869582, dts=498176 (40542 ms)
00000974 [V] (1) size= 7565, offset=15897280, dts=498688 (40583 ms)
00000975 [V] (1) size= 24682, offset=15904845, dts=499200 (40625 ms)
00000976 [V] (1) size= 5535, offset=15929527, dts=499712 (40667 ms)
00000977 [V] (1) size= 38360, offset=15935062, dts=500224 (40708 ms)
00000978 [V] (1)* size= 82466, offset=15973422, dts=500736 (40750 ms)
00000979 [V] (1) size= 13388, offset=16055888, dts=501248 (40792 ms)
00000980 [V] (1) size= 2315, offset=16069276, dts=501760 (40833 ms)
00000981 [V] (1) size= 21983, offset=16071591, dts=502272 (40875 ms)
00000982 [V] (1) size= 3384, offset=16093574, dts=502784 (40917 ms)
00000983 [V] (1) size= 22225, offset=16096958, dts=503296 (40958 ms)
...
```

◦ (1)*I-pictures◦ ◦

◦ //B

4030PNG

```
ffmpeg -i video_track.mov -ss 00:00:40 -vframes 30 picture%04d.png
```

- PB◦

7◦ mp4info - 40000009667◦ ◦ “I”◦ ◦

DASH

DASH◦ DASH◦

Fiddler◦ [dash.js](#)◦

[Axinom DASH](#) “Clear”1080p◦

Sample Streams ▾

http://media.axprod.net/TestVectors/v7-Clear/Manifest_1080p.mpd

00:02:37.583
Frame 3782 @ 24.00 fps
H.264 High Profile 1920x1080 @ 3000 kbps



dash.jsURL http://media.axprod.net/TestVectors/v6-Clear/Manifest_1080p.mpd ◦ Load ◦

```
http://media.axprod.net/TestVectors/v7-Clear/Manifest_1080p.mpd
http://media.axprod.net/TestVectors/v7-Clear/2/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/15/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/18/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/18/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/2/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/15/0001.m4s
http://media.axprod.net/TestVectors/v7-Clear/15/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/5/init.mp4
http://media.axprod.net/TestVectors/v7-Clear/5/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/18/0002.m4s
http://media.axprod.net/TestVectors/v7-Clear/5/0003.m4s
...
```

- XMLISO / IEC 23009-1 ◦ DASH ◦

AdaptationSet ◦ ◦

Representation ◦ ◦ ◦

```
AdaptationSet [ segmentAlignment=true group=1 maxWidth=1920 maxHeight=1080 maxFrameRate=24 par=16:9 ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="1200000" media="$RepresentationID$/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="8" mimeType="video/mp4" codecs="hev1.2.4.L63.90" width="512" height="288" frameRate="24" />
  <Representation id="9" mimeType="video/mp4" codecs="hev1.2.4.L63.90" width="640" height="360" frameRate="24" />
  <Representation id="10" mimeType="video/mp4" codecs="hev1.2.4.L90.90" width="852" height="480" frameRate="24" />
  <Representation id="11" mimeType="video/mp4" codecs="hev1.2.4.L93.90" width="1280" height="720" frameRate="24" />
  <Representation id="12" mimeType="video/mp4" codecs="hev1.2.4.L120.90" width="1920" height="1080" frameRate="24" />
AdaptationSet [ segmentAlignment=true group=2 lang=en ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="24000" media="$RepresentationID$/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="15" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="1" />
  </Representation>
AdaptationSet [ segmentAlignment=true group=2 lang=en-AU ]
  <SegmentTemplate timescale="24000" media="$RepresentationID$/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="16" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="1" />
  </Representation>
AdaptationSet [ segmentAlignment=true group=2 lang=et-ET ]
  <SegmentTemplate timescale="24000" media="$RepresentationID$/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="17" mimeType="audio/mp4" codecs="mp4a.40.29 audioSamplingRate=48000 startWithSAP=1" />
    <AudioChannelConfiguration schemeIdUri="urn:mpeg:dash:23003:3:audio_channel_configuration:2011" value="1" />
  </Representation>
AdaptationSet [ segmentAlignment=true group=3 lang=en ]
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="main" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <Role schemeIdUri="urn:mpeg:dash:role:2011" value="subtitle" xmlns="urn:mpeg:dash:schema:mpd:2011" />
  <SegmentTemplate timescale="1000" media="$RepresentationID$/$Number%04d$.m4s" startNumber="1" duration="1" />
  <Representation id="18" mimeType="application/mp4" codecs="wvtt" startWithSAP="1" bandwidth="428" xmlns="urn:mpeg:dash:schema:mpd:2011" />
```

◦ ◦ "Role"

◦ ◦

/◦

SegmentTemplate URL ◦ DASH4 ◦ "init.mp4"

DASH Live DASH Live DASH ◦ ◦ DASH "profile"

URL

1. 2360p1518◦
2. 0001.m4s◦
3. ◦
4. 1080p51080p◦
5. ◦

DASH ◦ ◦

Axinom DASH ◦ ◦ DASHHTTP◦

DASH ◦ ◦ ◦ Windows

```
copy init.mp4 /b + 0001.mp4 /b + 0002.mp4 /b + 0003.mp4 /b track.mp4
```

track.mp4。MP4mp4infoFFmpeg。

<https://riptutorial.com/zh-CN/video/topic/5879/>



1280

720

Picture Aspect Ratio (PAR) 9:16

◦ DAR16◦ PAR◦

169PAR9:16◦ ◦

PAR = 720/1280 = 9:16 = 0.5625

SAR

◦

◦ SAR◦



1280

Sample Aspect Ratio (SAR) 81:256



1280

720

Picture Aspect Ratio (PAR) 9:16

◦ SAR = PAR / DAR◦

$SAR = 9:16 / 169 = 9/16/16/9 = 81/256 = 3.1604938271604938271604938271605$

PAR。

<https://riptutorial.com/zh-CN/video/topic/5713/>

S. No	Contributors
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