

Encoding and embedding Video

Learn how to convert and embed video for the web.

Introduction

We all watch video on our computers and mobile phones:

- Aren't you just a little bit interested in how it works?
- How can we stream huge audio/video files
- What is needed to convert those files?
- Encoding 101 - learn the basics of video encoding

<https://www.youtube.com/watch?v=2cbXxyr0DCY>

Topics

1. **Formats**
2. **Video Encoding**
3. **Video Embedding Software**

1. Format

Video encoding, also known as **video transcoding**:

- basically the process of converting a file from one format to another
- Or making a format compatible with Web players and mobile devices
- undergone an **encoding process**
- different browsers, video players, and devices support different formats
- And each format comes with its own specifications
- And not all devices support the same formats

1. Format

There are many **video encoding methods**, and all involve a little degradation:

- you can't avoid encoding but..
- capturing your videos in the highest quality format
- Export as uncompressed or use a low-compression
- Avoid using lower quality formats like YouTube

1. Format

There are many video **formats** available, each with benefits and limitations:

- high quality video files are huge
- 1 hour uncompressed HD video requires ~13GB disc space
- consider how your video is to be stored and shared
- Initially you should choose **H.264** as the preferred codec
- It will produce an **MP4** file format container

1. Format

The most commonly used options are **QuickTime**, **MPEG2**, **MPEG4** and **H.264**.

- each **format** has a predefined **preset** corresponding to a specific device
- each device will often have a different bit rates
- The higher the bitrate = larger the file
- The larger the file = higher quality

1. Format

MP4 can be understood as a container that stores video and audio information

H.264 is the Codec used to compress that information: (More on that later)

- **H.264** is an advanced video compression method
- ideal for **HD** as well as heavily-compressed video
- Used by **Blu-ray** players, **TV** and **web streaming**

1. Format

MOV is also file format used by Apple's **QuickTime** players:

- Again, it's a container that stores audio and video information
- It uses its own **QuickTime Codec**
- Can be compressed for the web
- Is not fully compatible with other playback devices
- But can be easily converted to an **MP4** container on other devices for playback

1. Format

AVI (Audio Video Interleaved) is a media container that stores nearly any format of audio and video and plays them back simultaneously:

- Also a container for video and audio information
- use video compression based on an older **MPEG-4 Codec**
- can be played on most computers worldwide
- usually compatible with smart TVs and disc players
- is not suitable for media streaming
- It was superseded by the **MKV** (Matroska) file format

1. Format

WMV (Windows Media Video) is a container when exported is a smaller file but at a reduced quality:

- originally developed for internet streaming
- superseded by H.264
- it is supported by Microsoft's Xbox 360 games console

1. Format

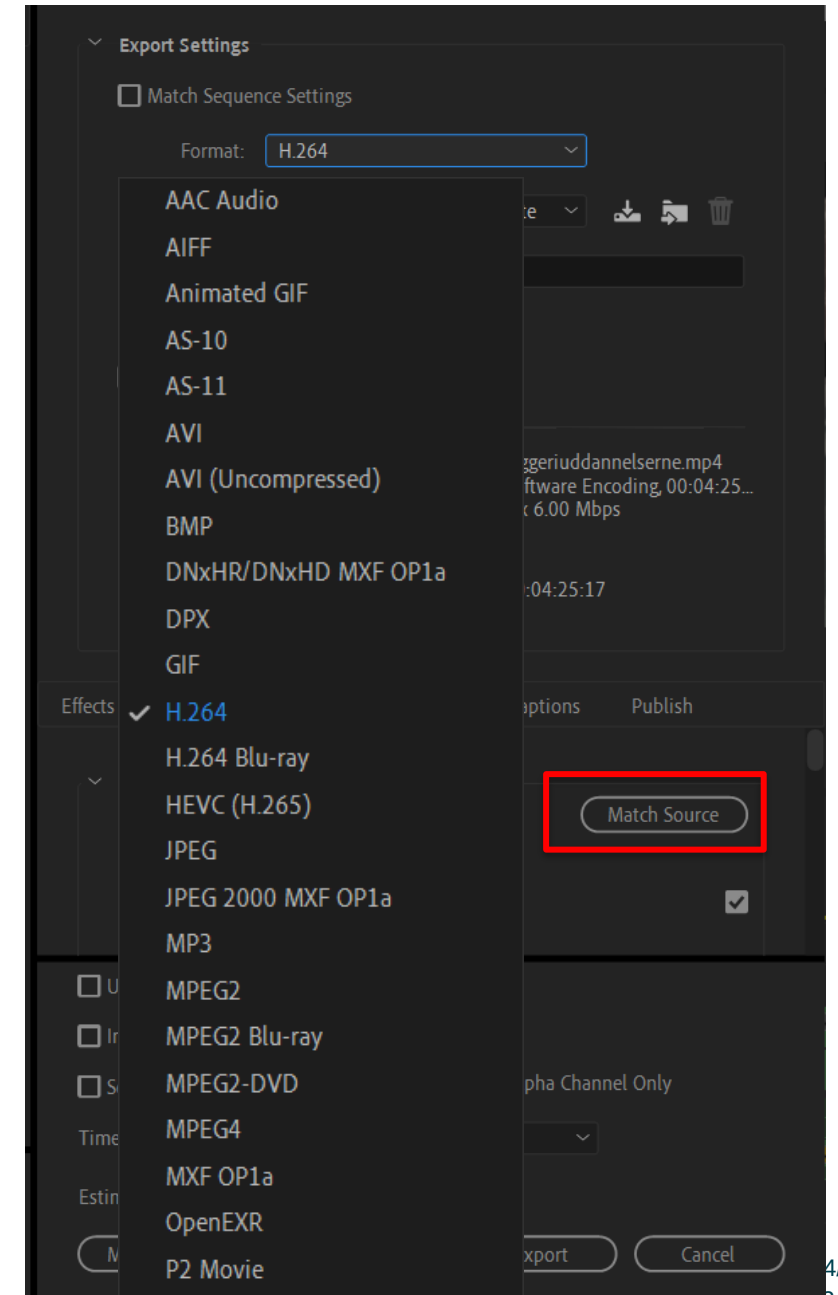
WebM and **Ogg** are two types related to **HTML5** video encoding containers:

- **.ogg** or **.ogv** uses Theora encoding
- **WebM** is a Google project
- Both are supported by Firefox and Google Chrome
- open source video compression formats
- Replaced the **.flv** format for embedded video

Guided Practice

Open Premier Pro and export 20 seconds of video:

- Click the Format Options field
- Search for H264
- Check **Match Source**
- Press **Export/Queue (Media Encoder)**



2. Video Encoding

A **Video Codec** is a electronic circuit based on an algorithm that allows for compression or decompression of digital video:

- **Codecs** are developed for specific playback devices
 - this process is also known as **Video Encoding**
 - different Web Video playback devices have their own specific **video Codecs**

2. Video Encoding

HEVC or **High Efficiency Video Coding** is a compressing standard developed in 2010 by MPEG and VCEG.

- splitting a single frame into multiple portions
- compresses the frames into a video bit stream
- which can be stored or transmitted divided into Coding Units
- They are supported by **H264**, **H265**, **4K** and **MP4** file formats
- They can be played back on **DVD**, **TV**, **CD**, **PC** etc.. devices

2. Video Encoding

In 2010 **Google** released the **VP8** codec specification with an open-source royalty free license:

- **VP8** is to **web** what **H.264** is to **TV** and **video**
- With it was the introduction of the **webm** container
- **Matroska** together with **Vorbis** introduced the **mkv** container

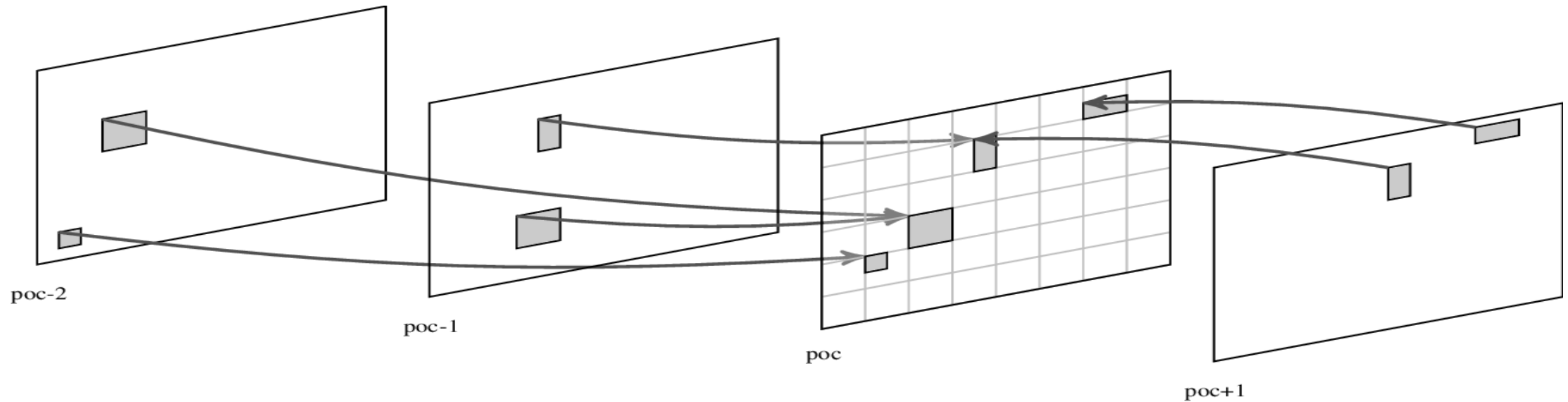
2. Video Encoding

To understand how encoders work, we must first look at **Inter-Prediction**:

- is motion compensated prediction
- shifted areas of the reference pictures are used for prediction
- resulting displacement between the area in the reference picture and the current PB
- The area is interpreted as the motion of the area between the reference picture and the current picture.

2. Video Encoding

Inter-Prediction In HEVC, inter prediction is performed on the prediction block (PB) level. The corresponding prediction unit (PU) contains the information how inter prediction is performed.



2. Video Encoding

The areas used for **Inter-Prediction** are known as **Macroblocks** and motion Vectors:

- In MPEG streams video is made up of three different types of images
- They are stored in groups called a GOP – (A Group of Pictures)
- **I** (Intra) , **P** (Predicted) and **B** (Bi-Directional Predicted)

2. Video Encoding

I (Intra) are completely refreshed frames where all the images are newly encoded:

- They only reference itself
- do not rely on any other images
- The first image in a **GOP** must be of this type

2. Video Encoding

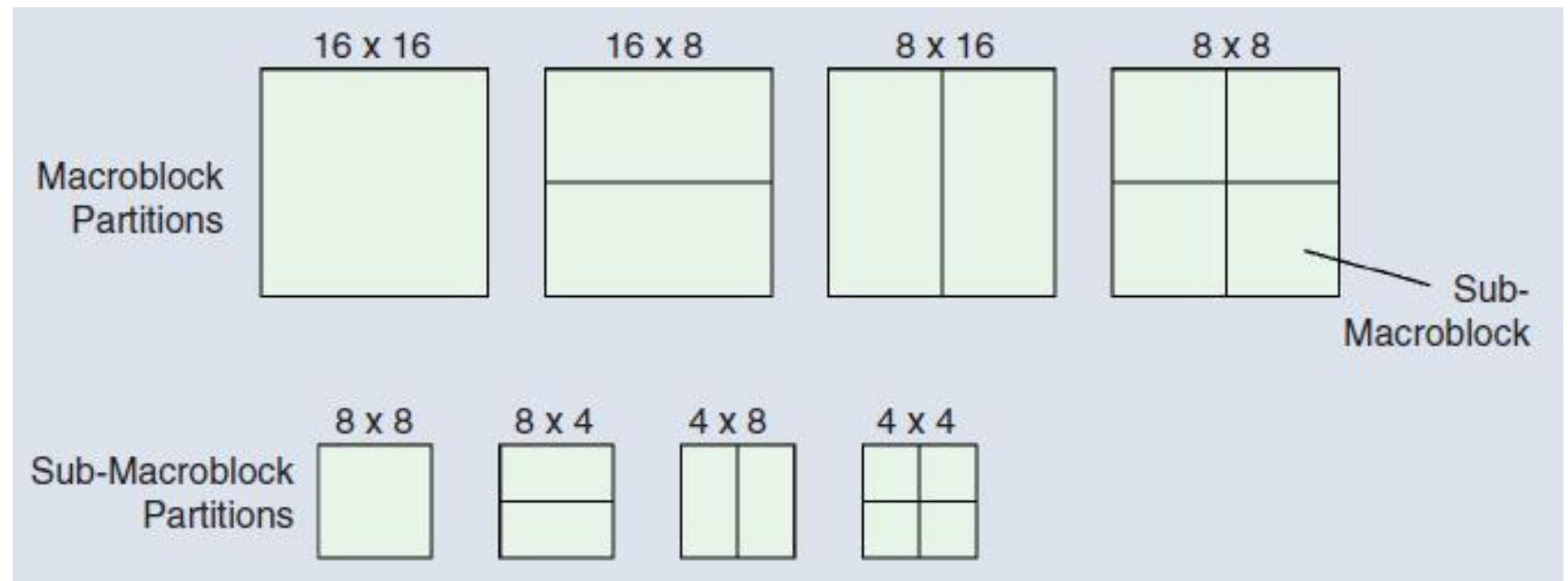
In **Predicted** and **Bi-Directional** frames, use previously decoded reference images:

- **P** (Predicted) – the macroblocks are newly encoded, copied, moved or changed to construct a full picture
- **B** (Bi-Directional Predicted) – images are encoded and decoded and referenced for future display
- A filter known as a **Macroblock** allocates a colour to an GOP if a specific condition is met

2. Video Encoding

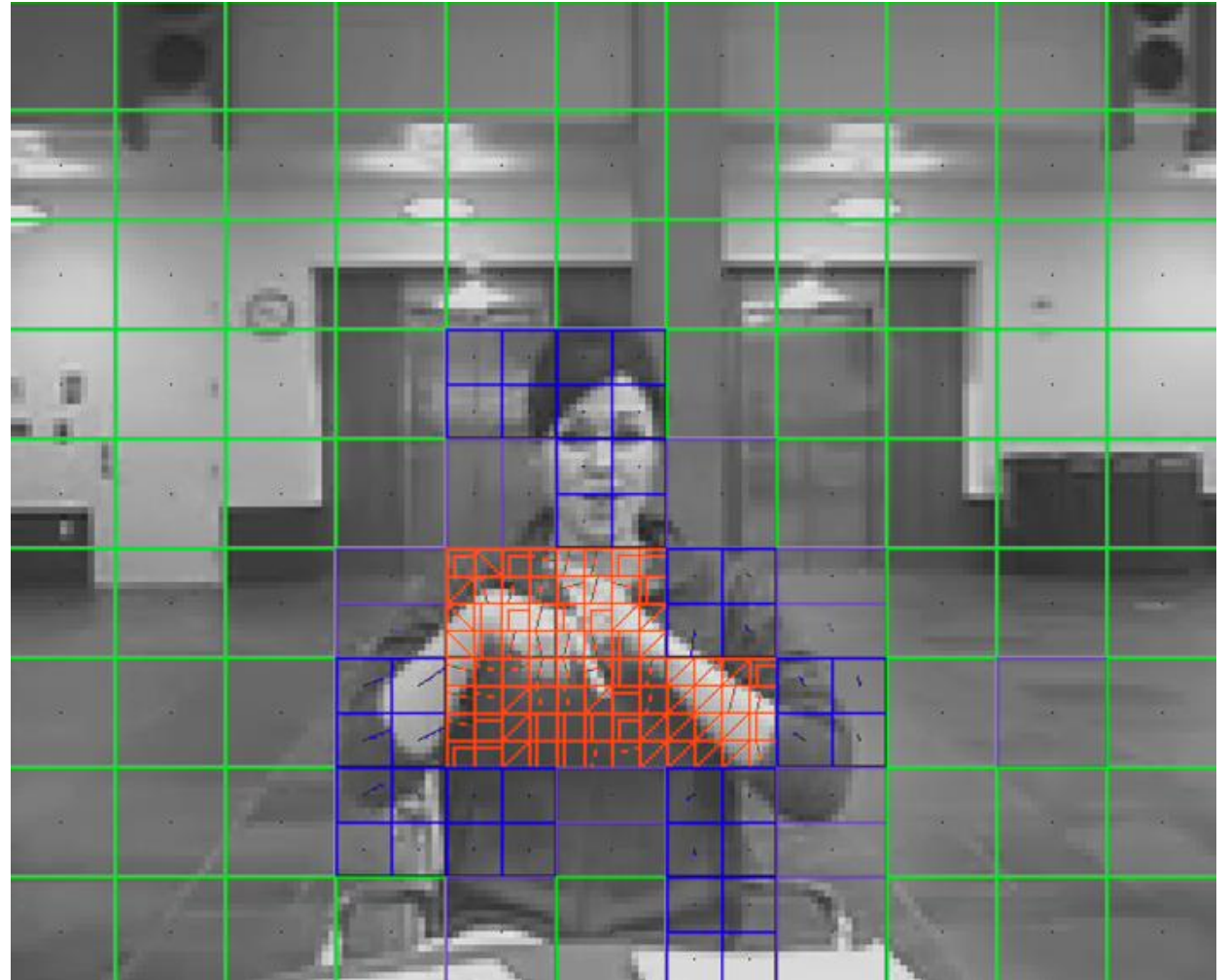
Macroblocks consist of 8px x 8px:

- are created from 4 smaller blocks of 4px x 4px
- Four of these blocks (16px x 16px) make a **macroblock**
- encoded different ways depending on complexity



2. Video Encoding

Macroblock is a processing unit in video compression formats based on linear block transforms.



2. Video Encoding

Most editing software comes with a type of **Media Encoder** although there are pros and cons:

- greater control over the video workflow
- manage and encode large video files locally
- maintaining the video encoding software
- requires processor speed from hardware
- May require a IT professional dedicated to that skill

2. Video Encoding

A cloud **video encoding** service removes the task of maintaining an encoder farm:

- most technology companies have shifted to cloud services
- No fixing and updating software and hardware
- costs less and is quite flexible
- companies only pay for exactly what is used
- The downfall is the ability to handle large files

2. Video Encoding

When searching for both downloadable and cloud-based **video encoding** services, pay attention to:

- Devices and operating systems
- Look at the file formats supported
- Speed of encoding, batch conversion
- Interface, features and functions
- Costs

2. Video Encoding

Hey!Watch

Is an example
of a cloud based video encoding
service.

[Jobs](#)[Tools](#)[API](#)[Support](#)[Create job](#) and

Create a Job

Input

Enter the media URL to convert:

Source URL 

URL of the video / audio file. We can transfer media files from HTTP, FTP and SFTP servers.
We support the most popular formats such as MP4, MOV, OGV, WebM, AVI, MPEG, FLV, MKV, MP3, AAC and more.

CDN settings

All the media files will be uploaded to the CDN of your choice.

Choose your provider ▼

Outputs

 Video encoding 
Choose a Simple Format... ▼
/path/video.mp4 

 HLS 
Default variants 
/path/playlist.m3u8 



2. Video Encoding

Hey!Watch

- Web application Upload to encode
- Converts local files as well as online video clips
- Supports a wide variety of file formats: H264, MP4, WMV, DivX, HD Video, Mobile 3GP/MP4, iPod, Archos and PSP
- allows for 10MB of video uploads per month for free
- podcast feed generation and automatic batch processing

2. Video Encoding

Other examples of **video Encoders** include:

- Freemake.com Video Converter makes video web-ready and it provides ready HTML code
- Quick Media Converter is another Windows-based converter that outputs to H.264, OGG, for HTML5
- Free Video Coding is an online service which helps create a web video player
- MediaCoder Supports video joining, sound syncing, aspect ratio adjustment
- Handbrake great

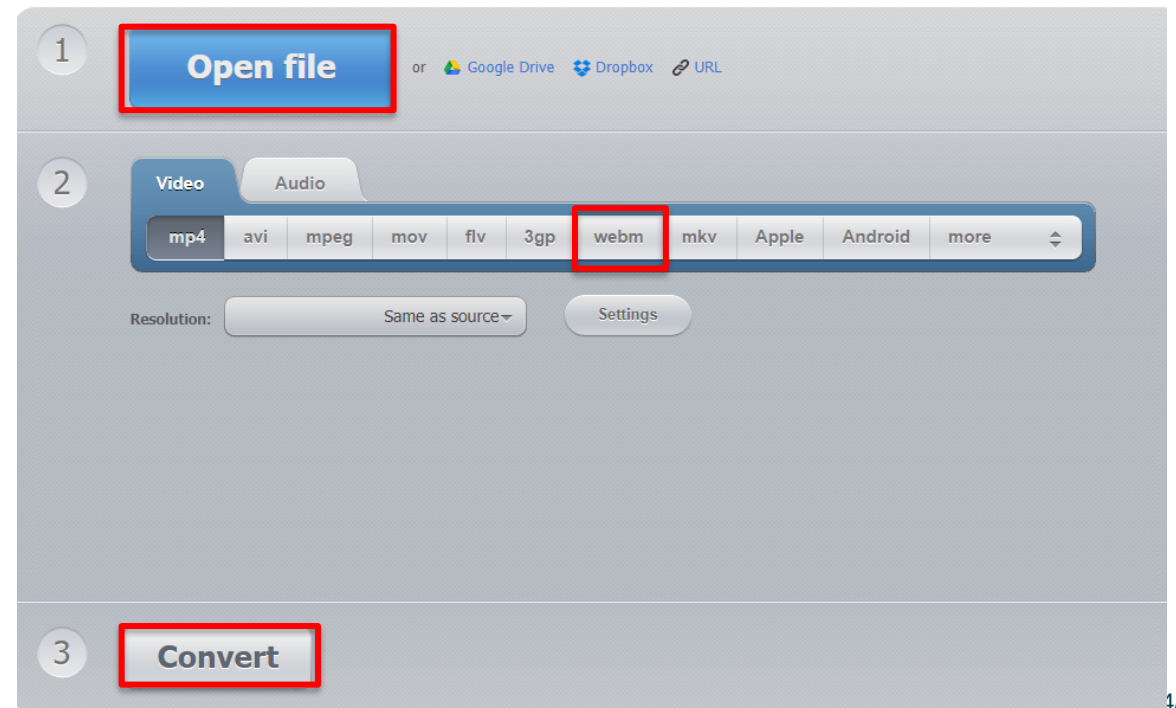
2. Video Encoding

- Easy HTML5 Video was developed to convert videos into HTML5 supported formats
- Any Video Converter Is a fast and Free conversion tool for almost all video formats
- Free HD Video Converter Factory Free Video conversion and built-in editing tool with a drag and drop interface
- Videora Converter Was designed for converting video files for handheld device
- Free Video Converter Supports Batch conversion, merge several clips into a single file

Guided Practice

Encode the video clip you exported earlier into a web video format:

- **Goto** <https://convert-video-online.com/>
- Click **Open file**
- **Add** the video file from your computer
- Select the **webm** format
- Click **Convert** and wait



3. Embedding

It is never been easier to put video content on websites and blogs:

- there's a lot of different tools
- Some of them are free
- others are pricey
- Here is the most popular ways to **embed web video**



3. Embedding

Once upon a time, this method was used for embedding video using code:

```
13  
14 <embed src="sample.mov" width="600" height="400"  
15 scale="aspect" controller="true">  
16  
17
```

3. Embedding

Although the new standard is to use the **HTML5 Video** embed code on your page:

- It is the most straightforward way to add video
- The **<video>** tag markup allows you to add video
- without the need for any plugins or players
- prepare your video into three variants – H.264, OGG and WebM

3. Embedding

The sample code for HTML5 video looks like this:

```
9
10
11<video width="320" height="240" controls autoplay
12poster="video.jpg">
13<source src="movie.mp4" type="video/mp4" />
14<source src="movie.ogg" type="video/ogg" />
15<source src="movie.webm" type="video/webm" />
16Your browser does not support the video tag.
17</video>
18
```

Note the multiple file formats

3. Embedding

Some of the properties you can add to the video tag include:

autoplay	Sets or returns whether the audio/video should start playing as soon as it is loaded
controls	Sets or returns whether the audio/video should display controls (like play/pause etc.)
loop	Sets or returns whether the audio/video should start over again when finished
poster	Allows you to add an image to the start of the video before it is started playing.

[Click here for more properties, events and methods](#)

3. Embedding

Although, a 70MB video at this width and height will load with minimal buffering:

- But there might be a several seconds of waiting involved
- visitors will see the slider bar is increase
- your web host service will get a large spike in traffic
- you might incur additional expenses

3. Embedding

Another issue, is loading the video:

- that certain parts of your web page might not load, or become functional
- until after the video is fully loaded
- Or some images might not display
- This problem occurred in Firefox and MS IE/Edge

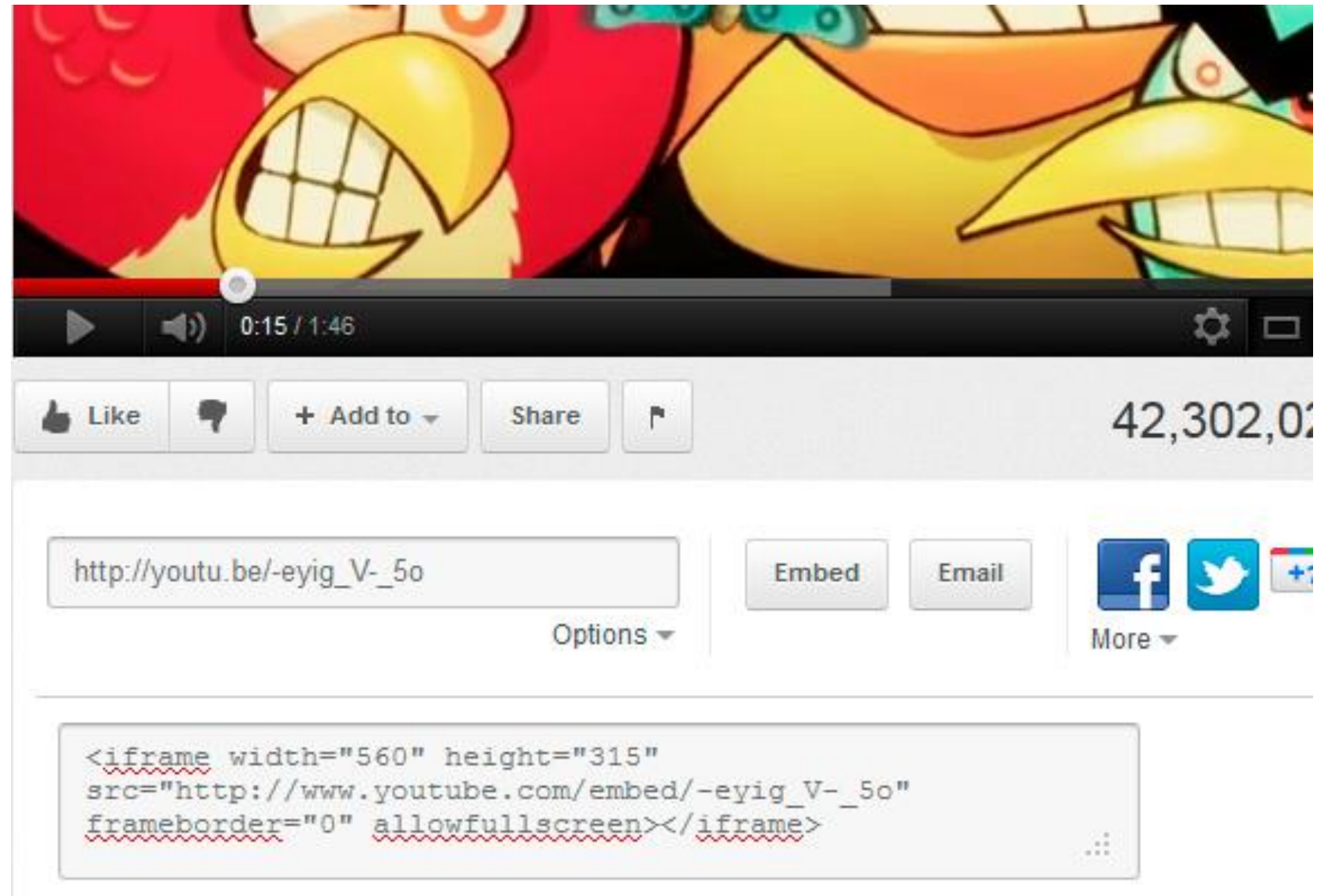
3. Embedding

This is good if your movie clip is about 10 seconds long and bandwidth and buffering times are not an issue, but..

- you can always use fast, free and easy services
- But you'll lose all control of your video
- anyone and everyone has access to your video

3. Embedding

YouTube



42,302,02

http://youtu.be/-eyig_V-_5o Options ▾

Embed Email

More ▾

```
<iframe width="560" height="315"
src="http://www.youtube.com/embed/-eyig_V-_5o"
frameborder="0" allowfullscreen></iframe>
```

3. Embedding

If you run a branded channel on **YouTube** you can benefit from their **Embed Code**:

- increases the chances of attracting visitors
- upload a video to your channel
- Get the embed code from the player
- paste it into your web page
- Track views, search queries, comments, ratings, playlists, etc.
- customize the player to play in different formats

3. Embedding

Vimeo

```
<iframe src="http://player.vimeo.com/video/35873217?portrait=0&
amp;color=f03c00" width="305" height="153" frameborder="0"
webkitAllowFullScreen mozallowfullscreen allowFullScreen"></iframe>
```



Preview the embedded video



The owner of this video has customized and locked some of the embedding options.

3. Embedding

With **Vimeo's Embed Code** you can easily integrate your video onto websites or blogs:

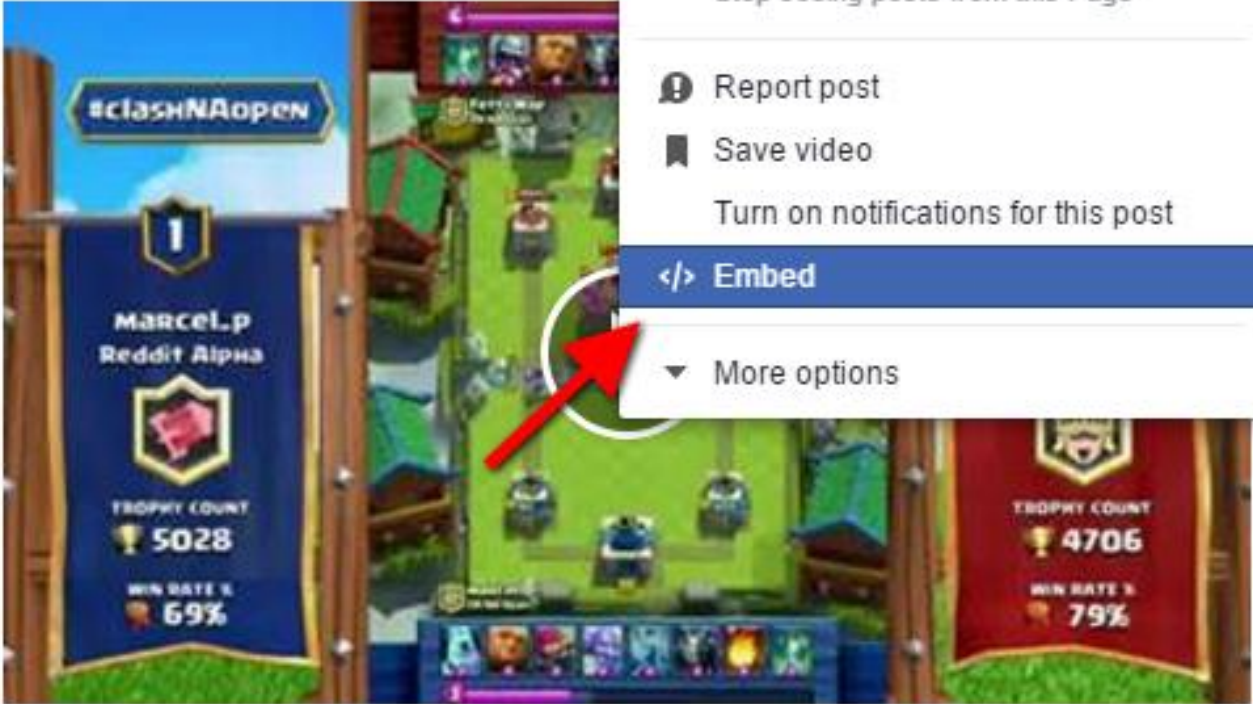
- The player is very handsome and streamlined
- Offers a few embedding options
- Basic account holders can customize player size, text colours and other elements
- Plus members have complete control over the player
- With options to choose what happens next and where the video can appear

3. Embedding

Facebook Video Integration

**Clash Royale** was live.
8 hrs · 🌐 · 🌐

The Clash Royale NA Open Continue Royale tournament to date... Who will



✕ Hide post

See fewer posts like this

✕ Unfollow Clash Royale

Stop seeing posts from this Page

🗨 Report post

🔖 Save video

Turn on notifications for this post

</> Embed

▼ More options

👍❤️😂 3.5k

1.7k Comments 118 Shares 36k Views

👍 Like

💬 Comment

➦ Share

3. Embedding

Facebook doesn't officially provide any video embedding options although there is a workaround:

- **Video Integration**
- Every video on Facebook has an id in the URL



- Copy the last digits and paste them into the code
- put that code on a web page

3. Embedding

Facebook Video Integration

← → ↻ 🔍 <http://www.facebook.com/video/video.php?v=2894326448598>

```
9
10
11 <object width="400" height="224" >
12
13     <param name="allowfullscreen" value="true" />
14     <param name="allowscriptaccess" value="always" />
15     <param name="movie" value="http://www.facebook.com/v/xxx" />
16     <embed src="http://www.facebook.com/v/2894326448598"
17 " type="application/x-shockwave-flash"
18 allowscriptaccess="always" allowfullscreen="true" width="400" height="224">
19     </embed>
20
21 </object>
```

3. Embedding

oEmbed

The screenshot shows the WordPress 'Insert from URL' dialog. On the left sidebar, the 'Insert from URL' option is highlighted with a red arrow and the number '1' and the text 'Choose Option'. The main area displays a Twitter post from WP Smackdown (@wpsmackdown) about Calypso, with a video embed from AutomaticEng. A red arrow points to the URL input field at the top, labeled with the number '2' and the text 'Paste URL'. Another red arrow points to the video embed, labeled with the number '3' and the text 'Preview'. A final red arrow points to the 'Insert into post' button at the bottom right, labeled with the number '4' and the text 'Click "Insert into post"'. The video embed shows a grid of people in a video conference.

Insert Media
Create Gallery
Create Audio Playlist
Featured Image

Insert from URL

1 Choose Option

Insert from URL

https://twitter.com/wpsmackdown/status/669161533948231680 2 Paste URL

WP Smackdown
@wpsmackdown

The full story behind Calypso, @WordPress' new, open-source publishing platform -- [ow.ly/UZiEN](#) [ow.ly/eGSzU](#)
9:31 AM - 24 Nov 2015

AutomaticEng

3 Preview

The Story Behind the New WordPress.com
By AutomaticEng @AutomaticEng
A little over a year and a half ago, we had a dramatic rethink of the technologies and development workflows for building with WordPress. Our existing codebase and workflows had served us well, but...

View on web

4 Click "Insert into post"

Insert into post

3. Embedding

oEmbed is an open standard for embedding videos and images into a website:

- An API allows websites to display embedded content
- use a video URL from YouTube, Vimeo, Dailymotion, Flickr, Scribd, Hulu and others
- No HTML code to copy and paste
- integration uses your Facebook's status bar update
- when you paste a link, it is automatically renders in the video player
- Can also be integrated into WordPress

3. Embedding

For amateur sites, these solutions might not be such a problem but for a professional web site, this is not acceptable, so...:

- If you want to put video on your site but not use YouTube and alike
- Use the HTML5 <video> tag
- Make sure the server you are using can support the bandwidth
- your audience shouldn't have to wait too long for the video to load

3. Embedding

These are just a few of what's out there:

- well suited for both novice and savvy web developers
- each have their own pros and cons
- third-party hosting, makes you dependent on the video channel policy
- it's up to you to decide which method of video embedding to use

```
9
10
11 <video width="320" height="240" controls autoplay poster="video.jpg">
12 <source src="movie.mp4" type="video/mp4" />
13 <source src="movie.ogg" type="video/ogg" />
14 <source src="movie.webm" type="video/webm" />
15 Your browser does not support the video tag.
16 </video>
17
18
```

Summary

Encoding and embedding video

1. **Formats** – The container in which a video file has been compressed
2. **Video Encoding** – a set of presets used when compressing a video file
3. **Video Embedding Software** – Methods for embedding video on a web page

Independant Practice

On you own, take 5 minutes to review what has been learnt to day:

- In your working portfolios
- Write down in your own words
- what you understand about today's key topics

Resources List

Literature:

- Dockert, J., 2016. *Learn Adobe Premiere Pro CC for Video Communication*. San Francisco: Adobe Press. Pp 103-108

Video

- [Video Formats, Codecs and Containers \(Explained\)](#)
- [Understanding the Macroblocks Filter](#)
- [H.264 Part 1: Encoding & Decoding Basics:](#)
- [How to Understand Codecs](#)