video - It's a lot more than just a HTML5 tag

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Abstract

The `<video>` element was first proposed by Opera Software in February 2007.

Integrating video elements into the HTML5 standard has changed the world forever and for the better and enabled us to gradually rid ourselves from the proprietary, exploitable and often slow FLASH technology.
However, the means to embed video in HTML5 enabled web pages is only the tip of the iceberg.

In this session, we will discuss other crucial aspects of handling and serving video.

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Session Overview

This session will cover in detail the following aspects and how we handle them in the Kaltura Open Source Video Platform:

- Video ingestion [uploading, encoding/transcoding]
- Content distribution and Caching
- Redundancy
- Metadata cataloging and Searching
- On-the-fly repackaging of MP4 files into DASH, HDS and HLS

We will conclude with an end-to-end demo of the Kaltura Video Platform.

Video ingestion - uploading

The HTML5 standard has done a lot for us.

Using the File API, which was added to the DOM in HTML5, it's now possible for web interfaces to ask the user to select local files and then read the contents of those files. This selection can be done by either using an HTML `<input>` element or by drag and drop.

In comparison to pre-HTML5 upload experiences, this seems like witchcraft.

However, ingesting media files by means of a web I/F is not enough.

Video ingestion - uploading cont'd

As with any complex system, when building a comperehensive media platform, you must always have automation in mind.

Your system should support automatic media ingestion by various means, suitable for both the tech and non-tech savvy.

Here are just a few examples for ingestion methods:

- By writing code utilising the platform's API
- By placing files in designated directories
- By submitting a file containing URIs to the media files to ingest [bulk uploading]

Media Transcoding

Media transcoding is a process in video processing in which the video is reformatted from one format/codec (internal structure) into a new format/codec.

This is usually done in cases where a target device does not support the format or has limited storage or bandwidth capacity that mandates a reduced file size, or, in order to convert incompatible or obsolete data to a better-supported or modern format.

So, wait, if that's transcoding, what's encoding then?
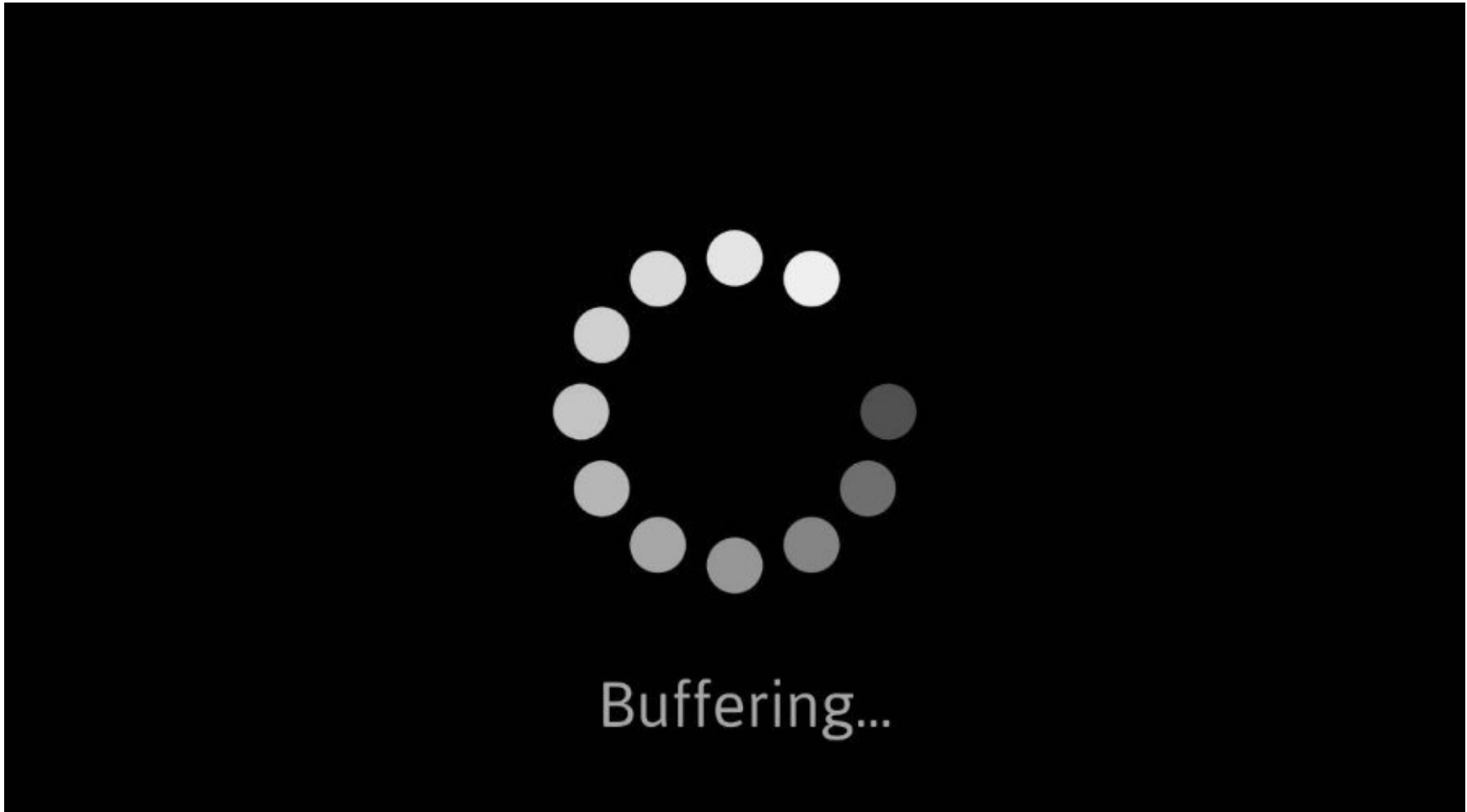

Encoding

Encoding takes raw, analog source content and converts it to a digital format. Think of converting your Fight Club VHS tape to MPEG or converting your very old family Super8 films so you can watch them from the comfort of your laptop.

People often use transcoding and encoding interchangeably but now, you can be clever [and annoying] and correct them:)

Transcoding - why is it so important?

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Transcoding - why is it so important?

Media files are generated by many kinds of tools and devices - professional authoring tools, different grades of cameras, desktop transcoders, grabbing devices, etc.

Each one of those has a different purpose and a different output format (or codec).

For example, professional authoring tools tend to use the ProRes video codec. This codec is great for editing purposes as it has high-quality preserving capabilities but of course, that comes with a price; to wit: the resulting media file is likely to be very very big, size wise.

Transcoding - why is it so important?

In today's world, media is consumed from multiple devices - desktop/laptop computers, tablets, mobile phones, etc.
Many of these devices do not have the capability to play ProRes files.

Even if they could, the common network conditions cannot handle those kinds of bitrates (since obviously, the higher the bitrate, the bigger the file).
And so, for the video files to be viewable from all devices, you have to transcode those sources into something that can be successfully delivered and played.

ABR Delivery - HLS, DASH, etc

The challenges stemming from different devices and codec support are not the end of it!
Even if the video file is technically playable on all devices we care to support, bandwidth and storage are both limiting factors to consider.

This problem is intensified because we need to support mobile devices "on the move".

This is addressed by providing several versions per media entry, each with different bitrate/quality levels. This is called Adaptive Bitrate (ABR). Currently, the most common ABR delivery protocols are Apple's HLS and MPEG DASH.

Content distribution and Caching

So, we managed to solve bandwidth and storage issues by transcoding and ABR algorithms, but what about geo challenges? If our system is meant to serve users from all over the globe, how do we ensure the best quality of service?
In comes CDN.

A content delivery network or content distribution network (CDN) is a geographically distributed network of proxy servers. The goal is to distribute service spatially relative to end-users to provide high availability and high performance.
There are many CD networks out there, ideally, you'd want a platform that enables you to use multiple CDN providers without having to change your core logic.

Redundancy

As with any high availability system, all components should be deployed on multiple nodes. This is critical; not only in order to avoid downtime but also due to performance considerations.

By using CDN, the media content [and other static assets] are covered but that still leaves everything else; to wit:

- API servers
- Front servers
- DB servers
- Caching servers
- Storage/Origin server

Metadata cataloging and Searching

OK, so we've got our media ingestion and delivery all covered, yay! But how do we ensure people can easily find our great content?

Like any other asset, a media file has a lot of metadata associated with it.
In addition to technical metadata such as duration, format, etc, you'll want each media asset to have a descriptive display name, a meaningful description and tags to help the user discovery process.

Perhaps you'll also want to file your assets under different categories/channels and what about searching through captions for given keywords?

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API, API and more API

As with any modern system, the API is a key component. Providing a comprehensive and flexible API allows both internal and external applications to make the best use of your media management platform.

Generally speaking, anything and everything your platform supports should be possible to do by making API requests.

Join Johnathan Amit-Kanarek's session to learn about the RESTful approach of handing media.

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Thank you && Questions

Appendix - Useful Resources

Manifesto for video on the web

World Premier of Opera with builtin video support

Adaptive Bitrates

Why Transcoding is Important

Install Kaltura CE