Livetree Filecoin Architecture Overview

Introduction

Since 2018 Livetree has built up a range of video solutions that can be operated via our own cloud. We are seeking to decentralise the solution, through the migration of our Azure storage of video files and related meta-data using Filecoin.io.

We were successful in our application to Filecoin.io's grant programme, with the application available here. The purpose of this document is to support the first deliverable of the grant application by setting out the technical architecture.

Context

Livetree's principal activity is to build community's with special interests backed by data royalty marketplaces for video recommendations, advertising and translation services for video content, namely, film and TV. We have focused our video solution toward telling the stories around sustainability. Namely, raising awareness and enabling users to take direct action toward achieving U.N.'s 17 Sustainability Development Goals. The platform is available via https://fairweb.livetree.com

Architecture

At a later stage we will be looking to replace our CDN networks with Filecoin and rollout our own media-object video protocol. We will continue to use Azure transcoding and DRM services along with a custom video player which will be made open source along with the supporting artefacts.
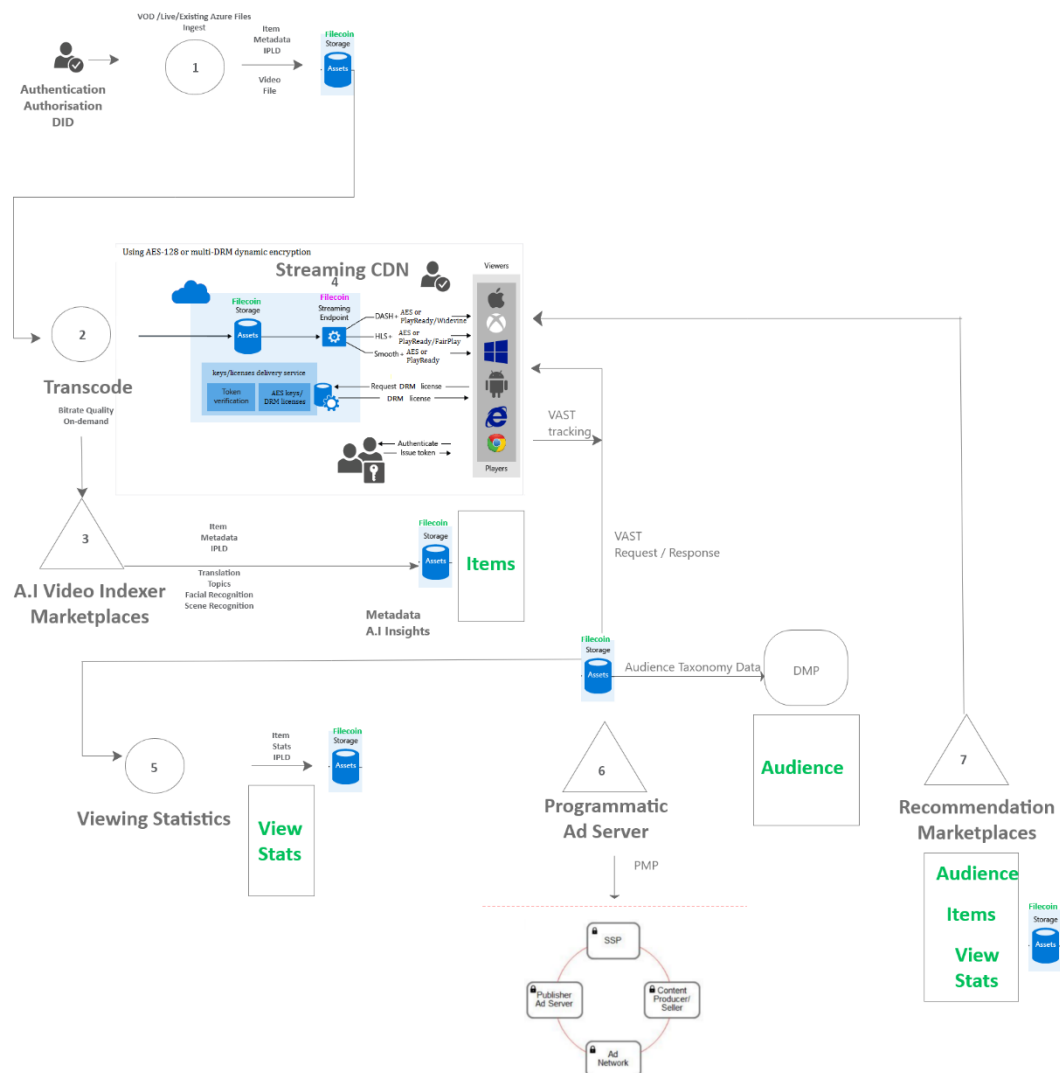
The following numbers correlate to the above architecture diagram.

1. **Ingest Video Files:** Process of getting the files into the system from a Content Provider. This could be a WebRTC live stream, VoD HTTP upload or using existing Azure blob using tools such as Azure Storage Explorer or MSP Cloudberry. A tool will be made available to move the videos directly to Filecoin for cold storage.
2. **Transcode:** Create various qualities of video and formats. The videos are transcoded using Azure media services at the moment as throughput speed is essential, when Filecoin offers faster throughput possibilities in future releases, we will seek to migrate this section of the architecture.

3. **A.I Video Machine Learning Marketplace:** The Item Meta Data is enhanced with A.I. video processing for speech-to-text, facial recognition and scene detection. The goal being the processing engine will be designated by the Content Providers to select which engine/app marketplace they wish to use to process their videos. Item Meta Data will be stored to Filecoin as structured data via Ceramic/IPLD.
4. **Streaming CDN Endpoint**: This currently uses a variety of CDN streaming providers including Strivecast, Verizon, Akamai and Microsoft. As Filecoin evolves we plan on moving the CDN provider to a decentralised solution such as Filecoin itself or Webrtc Peer5
5. **Tracking statistics:** Audience and viewing data including Ad tracking as part of the VAST protocol and stored to Filecoin as structured data via Ceramic/IPLD.
6. **Programmatic Ad Marketplace**: Dynamic Ad Insertion is aggregated along with a IPFS Data Management Platform, Ad Marketplace and related RTB Buyers.
7. **Recommendation Marketplace**: In part combination of Item, Tracking Stats and Audience data a user Item recommendation is produced. This builds the possibility for a marketplace of recommendation engines which could be selected via the front end.

Security Considerations

The following 3 items are Private meaning they should not be retrievable from the Filecoin network except by authorised parties:

1. **Video files owned by a Content Provider**: Video files need to be encrypted so that they cannot be retrieved by any particular public party utilising the Filecoin network. For example, for a BBC documentary, the video should not be publicly downloadable in any form as it is a licensed piece of content and the file itself should not be otherwise retrievable in a usable format.
2. **Item meta-data owned by a Content Provider:** The Content Provider should be able to add audit updates, and meta data such as when the film was it made, who is in it, cast crew, description plus any AI-generated meta data.
3. **Audience Tracking Statistics**: This is data related to who watched it, how long, whether they skipped paused and other related Ad events. The Content Provider and Advertiser should be able to access this data in relation to their items. The User who generated the viewing stats should also be able to download their log and Opt in / out of anonymous / collection and usage according to GDPR.

In order to secure the data on Filecoin/IPFS we are implementing Ceramic tools to store structured data chains (DAGs) using IPLD → IPFS → Filecoin mechanisms.