

# Backend Server Expertise



- **Server side Applications: Segmenter, nDVR, DRM key management, Ad Server**
- **Backend application scaling**
  - Live Segmenter
  - Network DVR
  - Dynamic Ad Insertion into the Live Segmenter workflow
  - Implement CPIX Specification compliant DRM key delivery mechanism
  - Implement Key delivery of encryption keys for Widevine, FairPlay and PlayReady DRM
  - Enhancing Backend codebase for efficiency and scaling
  - Containerization of backend services



**Client:**

MobiTV

**Industry:**

Digital Media Streaming

**Technology Service:**

Video Streaming (PAAS model)

**Scope:**

## Improvements and enhancements of Live Segmenter

**Challenge:**

Continuous improvement to the platform. Performance optimization to maximize hardware utilization to reduce costs

**Solution:**

1. Add features like HEVC, Configuration and health management using consul, NetDVR, Playready, FPS, DynamicAd insertion, Key Server and Elemental Encoder Integration
2. Automatic bitrate selection based on target device
3. Performance improvement by Intelligent buffer management, Optimal failure handling, Improve performance of Thumbnail generation, Data driven segment generation and Improvement to Archiving process

**Outcome:**

New features were added to the Live Segmenter. Its performance was improved by 30-40%.



**Scope:**

## Network DVR with support for private and shared recording

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**Challenge:**

Provide a Network Digital Video recording service to record private and shared recordings to enable secure storage and streaming of recorded content.

**Solution:**

1. Developed scalable master-slave architecture for handling large number of recordings
2. Recording jobs can be scaled based on load.
3. Recordings are stored across multiple Shards.

**Outcome:**

Successfully developed and deployed the NetDvr service supporting private and shared recording.

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## Dynamic Ad Insertion into the Live Segmenter workflow

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**Challenge:**

1. Personalized region or customer targeted Ads
2. Seamless integration of Ads into the target content

**Solution:**

1. Insert SCTE35 events into DASH and HLS manifest
2. Split segments exactly at Ad boundaries for seamless integration
3. Integrate with third party Ad insertion server

**Outcome:**

Successfully added the feature for SCTE35 events handling into the Live Segmenter and enabled integration with 3rd Party Ad insertion server.



**Client:**  
Mediakind

**Industry:**  
OTT Media Delivery

**Technology Service:**  
OTT backend DRM Support

**Scope:**

## Implement support for CPIX Specification compliant DRM encryption key delivery mechanism

**Challenge:**

1. Implement an industry standard best practice mechanism for Key exchange between Packager, Key Management Service, Player and DRM License servers.
2. Backward compatibility with existing use cases.

**Solution:**

1. Use CPIX (Content Protection Information Exchange Format) standard to parse incoming key requests consisting of information like stream type, DRM standard, Key rotation etc.
2. Maintain the parsed information in an efficient custom designed class and data structures with efficient accessibility.
3. Generate encryption keys using the received information and subsequently recreate the CPIX document to be sent as a response from the Key management system.

**Outcome:**

A generic Key Management System (KMS) that can respond with keys to any packager using the CPIX Open standard.



**Scope:**

## Implement Key Rotation mechanism for delivery of encryption keys for Widevine, FairPlay and PlayReady DRM

**Challenge:**

1. Static DRM keys for media are vulnerable to being hacked in case of any security breach.
2. This compromises the entitlements based on individual subscriptions.
3. Need to find a way to safeguard media playback of live channels under all situations.

**Solution:**

1. Implementation of key rotation based on certain intervals.
2. This applies to multiple DRM types such as Widevine, FairPlay and PlayReady.
3. This significantly reduces the chances of compromising the media playback; irrespective of the client device.

**Outcome:**

1. Secure OTT playback with keys refreshing at certain intervals.
2. In case of security breach, the situation get rectified automatically without any requirement to manually change the keys in the database.

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**Industry:**

OTT Media Delivery

**Technology Service:**

OTT Backend DRM Support



**Client:**  
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**Industry:**  
OTT Media Delivery

**Technology Service:**  
OTT Backend Infrastructure

**Scope:**

**Incorporate third party Redis database client library (Redis++) in OTT Backend codebase to leverage connection pooling mechanism for efficient scaling**

**Challenge:**

1. An increasing number of Redis connections and corresponding latency were responsible for adding delays into OTT Backend APIs frequently used during playback.

**Solution:**

1. Utilize connection pool for Redis connections.
2. Utilize Redis Plus Plus; a popular open-source client with an inbuilt pool mechanism.
3. Implement a Singleton design approach for maintaining the Redis connections from OTT Backend.

**Outcome:**

1. Reduced connection attempts to Redis along with minimal latency for creating the connection is achieved.
2. Scale test results showed significant improvement with increased efficiency and reduced latency.



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OTT Media Delivery

**Technology Service:**  
OTT Backend Infrastructure

**Scope:**

## Containerization of backend services to attain efficient scaling of services

**Challenge:**

1. Some backend OTT services (such as heartbeat/beacon service) need to support a higher volume of transactions as compared to others.
2. This service earlier was a part of the Content Controller appliance and hence it was not practical to increase the appliance instances where other services offered by the appliance would stay unutilized.
3. Need to maintain the same business logic and utilize the same codebase when converting the service to a container.

**Solution:**

1. Creation of separate heartbeat(beacon) microservice in the form of a container image.
2. Generation of beacon pod with master and side-car containers for automated service discovery, log management and KPI export.

**Outcome:**

1. Beacon pods successfully deployed in production-site Kubernetes clusters.
2. Auto-scaling and fault tolerance of beacon service achieved using tools provided by K8S.
3. Beacon Service latency reduced to less than 20ms after containerized deployment.