



Optimizing Video Codecs for Next Generation Media Products



- Faster time-to-market
- Minimal use of hardware accelerators, resulting in cost savings
- Seamless reuse for porting on future IPs
- Quick ramp-up of resources

Situation

A world leader in digital video technologies needed technology solutions, which would form part of its current and next generation products. The requirements arose due to emergence of new codec standards and market expectations. The need was to enhance the products' capability to include newer standards and features. The technology solutions involved optimizing video codecs, such as WMV9, MPEG-4, and others, to the proprietary platform instruction set of respective products.

The customer wanted to significantly minimize processing time and memory consumption, without making changes to the hardware of the product. This would enable the optimized use of memory and processing cycle resulting in packing of additional features and value-adds.

Challenge

Apart from the need to work on emerging and latest digital video technologies, the principal challenge was to implement the codecs meeting the performance constraints set by the platform. Further challenges, included:

- Requirement of extensive software optimization, as there were no compatible hardware accelerators available.
- Achievement of high frame rates per second.
- Simulator and emulators with limited debugging capabilities.
- Synchronization for Multi-processor implementations.
- Implementation with (standard based) bit stream compliance.

Implementing the encoders and decoders on hardware platforms that were under concurrent development, added to the challenges in these programs. This meant that every change in the hardware, bug fixes or feature changes resulted in an impact on the codec development.

Celstream Response

Celstream quickly put together a highly skilled team, proficient in embedded technology and appropriate digital multimedia technologies and standards. The team initially worked on understanding the customer requirements and expectations.

The team chose to use agile development methodology, which enabled the team to:

- Demonstrate the progress to the customer on a regular basis,
- Adopt changes to functionality details based on customer feedback.

Celstream divided the codec optimization into a three step process:

- C/C++ model of floating point implementation on a PC-based platform,
- Generic ANSI C code, integer implementation and memory utilization optimization for PC-based platform,
- Custom porting & optimization for target platform.

The chosen architecture allowed native implementations for all the specified environments. Features were broken down into OS-Platform-specific (GUI front end, Device listeners & emulators, etc.) and OS-Platform-independent (Synchronization, File-I/O, Authentication, etc.). Based on the feature breakdown, project teams developed such features based on a clearly drawn out interface implementation and integration plan.

A common set of test cases were developed to test cross platform functionality. Additionally, another set of test cases were developed to test platform-specific features.

In the absence of precise profiling tools, the optimization of codecs could be next to an impossible task. Celstream implemented

High Quality Optimization Capability

Skilled engineers with knowledge of varied techniques are a critical need in creating optimized Codecs. Celstream's team has deep experience in the development and optimization of Audio, Video and Speech codecs.

Based on our extensive experience we have been able to distill the methodologies and best practices in optimizing for performance intensive solutions. The processes also enable us to create high-quality deliverables, consistently.

The team has successfully met the optimization challenges, for new and existing standards, platforms and environments. Our customers benefit from our strong optimization experience and high-quality, on time deliverables.

in-house development tools and libraries that significantly enhanced the quality of the deliverables and shortened the development time.

Celstream's optimization processes and methodologies helped deliver robust and high quality products, meeting time-to-market objectives of all the products.

Technology

In developing this solution, Celstream used the following key platforms and technologies:

- Microsoft® WMV9, MPEG-4 & MPEG-2 video coding standards
- Embedded C on Linux® platform
- C/assembly coding for SPARC® & other IP blocks
- Client proprietary hardware IP

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