Multi-Threaded HEVC (H.265) Software Decoder

ARM Cortex-A Series of processors with NEON™ SIMD
Intel Atom & Intel Core Family Processors

Overview

AceThought’s Multi-Threaded HEVC decoder software module for ARM processors (Cortex A-8, Cortex-A9 & Cortex-A15) Intel processor (Atom & Core family) implements Main Profile, Main 10 Profile & Main Still Picture Profile of the ITU - T H.265 standard.

High Efficiency Video Coding (HEVC) or H.265 is a next generation video coding standard, which reduces bit-rate requirement by 50% compared to H.264/AVC High Profile with same picture quality.

Benefits

- Optimized for ARM Cortex-A family processors and Intel Atom & Core family processors.
- Multi-thread for multi-core processors.
- Efficient software architecture
- Re-entrant library
- Error detection of lost packets and frames
- Implemented in ANSI C with key modules optimized for different processor instruction set, which makes it easily portable to embedded processors.
- Both C and C++ interfaces are available for easy integration
- Available on Google Android®, Apple iOS®, WP8, Windows & Linux

Features

- Fully compliant with Recommendation ITU-T H.265 Main, Main 10 and Main Still Picture profile
- I, P and B Picture
- Tiles, Slices and Dependent slices
- All Coding Tree Block Sizes (64 to 16)
- All Transform Block Sizes (32 to 4)
- All intra prediction modes and sizes
- Symmetric and Asymmetric Motion Partitions.
- All inter prediction unit sizes
- In-loop Deblocking filter
- Sample Adaptive Offset
Performance - ARM

The Table 1 below summarizes the CPU Load for Quad-Threaded HEVC decoder on 1.6 GHz quad core ARM Cortex-A15 application processor with NEON™ Advanced SIMD running under Android OS 4.3.

Table 1. Performance Benchmark Numbers for 1.6 GHz Quad Core ARM Cortex A15

<table>
<thead>
<tr>
<th>Profile</th>
<th>Resolution</th>
<th>Bit-Rate</th>
<th>Frame-Rate</th>
<th>CPU Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>720x480</td>
<td>1Mbps</td>
<td>24fps</td>
<td>11 %</td>
</tr>
<tr>
<td>Main</td>
<td>1280x720</td>
<td>2Mbps</td>
<td>24fps</td>
<td>25 %</td>
</tr>
<tr>
<td>Main</td>
<td>1280x720</td>
<td>3Mbps</td>
<td>24fps</td>
<td>30 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>3Mbps</td>
<td>24fps</td>
<td>55 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>4Mbps</td>
<td>24fps</td>
<td>60 %</td>
</tr>
</tbody>
</table>

Performance – Intel

The Table 2 below summarizes the CPU Load for Quad-Threaded HEVC decoder on 2.5 GHz dual core Intel Core-i5 application processor running under 64-bit Windows 7 OS.

Table 2. Performance Benchmark Numbers for 2.5 GHz Dual Core Intel Core-i5

<table>
<thead>
<tr>
<th>Profile</th>
<th>Resolution</th>
<th>Bit-Rate</th>
<th>Frame-Rate</th>
<th>CPU Load</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main</td>
<td>1280x720</td>
<td>2Mbps</td>
<td>24fps</td>
<td>11 %</td>
</tr>
<tr>
<td>Main</td>
<td>1280x720</td>
<td>3Mbps</td>
<td>24fps</td>
<td>14 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>3Mbps</td>
<td>24fps</td>
<td>21 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>4Mbps</td>
<td>24fps</td>
<td>25 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>6Mbps</td>
<td>24fps</td>
<td>27 %</td>
</tr>
<tr>
<td>Main</td>
<td>1920x1080</td>
<td>10Mbps</td>
<td>24fps</td>
<td>33 %</td>
</tr>
</tbody>
</table>

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