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Chips In The Cloud

The Democratization of Media Transformation

Transforming media is today the single largest consumer of compute power. From the point of creation to the point of consumption, video content goes through multiple transformations, each of which is highly compute intensive.

Between those points, storage and communication media dictate the need for multiple transformations. These include codec and bitrate changes, HDR processing, video scaling, transrating to adaptive bitrate bundles, and so forth.

As video streaming over the internet developed, conventional wisdom was that spinning up servers to handle this load was the most flexible and cost-effective approach.

The sheer scale of video traffic has reached the point where new applications are limited by the traditional server paradigm. Social media allows each of us to tell our stories to friends and relatives. We are all our own TV stations, and as more and more of us broadcast, the processing load to transform the media we create is becoming cost-prohibitive even to the largest and best-funded media companies.

ARE TODAY'S DATA CENTER SERVERS THE RIGHT SOLUTION?

Despite software being the fashionable answer, it is always hardware that comes to the rescue when costs are in play. The internet is inundated with live user videos, playback of user-generated content, live streaming of events, widespread distribution of entertainment, gaming, video chat, etc. Spinning up servers to handle the compute load for encoding, scaling, transcoding, format conversion, etc. is no longer viable. Hardware acceleration is a must.

The 1RU rack, limited to 1KW, cannot be stuffed with server CPUs or GPUs. Power and space play a big role in the OPEX equation, and it is well established that application specific hardware is the answer to CAPEX headaches.

THE HYBRID CAR PARADIGM

Socionext was formed by merging the semiconductor businesses of Fujitsu and Panasonic. The company is a market leader in video technology, from action cameras and dSLRs to TV and Blu-ray, and powers high-end broadcast systems and mass-market IOT devices.

In applying dense transcode ICs used in broadcast to the cloud server application, Socionext's engineers faced challenges including power, density, compatibility, cost, etc. The list seemed endless, and impossibly difficult.

The breakthrough came when the company adopted the hybrid car paradigm to video processing in the data center. Hybrid cars are popular because they resemble and function like gas-powered cars, and yet they are incredibly fuel-efficient and save money.

The hybrid model Socionext engineers adopted with server partners has a sea of transcode ICs (32 to be specific) densely packed into a 1RU server, under the hood of a Xeon E5 CPU. The server chassis has a familiar form factor

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and supports dual redundant power supplies, dual port 10 Gbe LAN and other features standard to data center servers.

Furthermore, software porting is facilitated by an FFmpeg plug-in that makes integration a snap. All the complexity of dealing with hardware is under the hood.

A regular server using FFmpeg/ x264 and handling 4 full HD ABR transcode bundles in real time costs ~$15K and that is just in hardware costs. Buy that appliance from one of the market leaders and it would cost $40K. The cloud rental model looks attractive … until you hit volume. Then the bills pile up.

CHIPS IN THE CLOUD:
THE DENSE TRANSCODE SERVER

Along with our partners, Socionext has created a server on steroids. Aggregated over 32 MB86M30 Chips in the 1RU, we have some amazing stats:

Full HD Bundles	128
720P Bundles	256
1RU Power	< 1KW
Power per bundle	< 5W
Cost per ABR	< $1K
Live 4KP60 Channels	32

The Socionext MB86M30 chip, a power-efficient and powerful transcoder, is deployed in TV broadcast. Implementation of the AVC and HEVC tool kit is comprehensive, leading to high coding efficiency.

HEVC IS COMING, HEVC IS COMING …

Recently, Apple announced iOS support for HEVC. Spinning up servers to handle the sharp increase in compute cycles for HEVC encoding has video service operators looking seriously at escalating costs.

The crux of the matter is that video encoding is a problem best solved by dedicated hardware. With 20 years of experience, Socionext engineers have the skills and expertise to create ultra-efficient engines to encode video with the lowest cost and power. Deploying a bunch of these ICs in a 1RU has led to a compelling solution.

Power, density, and cost: Socionext engineers not only delivered on three key objectives, but did so for tomorrow's codec of choice. The iOS announcement made it clear—HEVC is here, and is here to stay.

PAVING THE WAY FOR NEW APPLICATIONS

As the company discusses deployment of the dense transcode server with customers, we have unexpectedly observed new and compelling applications. Our initial vision was OTT distribution and live user-generated content. These, of course, are the applications of choice for a dense transcode server.

Live user content is exploding, and the need to deliver a good viewing experience to a variety of devices at different operating points, makes ABR transcoding a must. We expect to see significant growth in this application area.

When considering the cost of video storage, rather than storing AVC, our server can transcode to HEVC to reduce storage by 40-50%. On the way out, when a user pulls a stream, the system performs ABR transcoding—to AVC or HEVC. The dense 1RU server streamlines the entire operation, saves cost, and adds (HEVC) value.

The telecom network is moving to a private data center architecture, leveraging special servers rather than the custom hardware used yesteryear. Plugging a dense transcode server into the rack gives the systems architect a powerful, low-cost, and easily integrated facility to change formats or drop bitrates, and adapt the network to peak conditions.

THE DEMOCRATIZATION
OF MEDIA TRANSFORMATION

Paid video streaming services have already deployed ABR transcoding for premium content. This is unviable for high volumes of streams, such as user-generated content or carrier traffic at the edge of the network. A robust, low-cost, easily deployable solution with a tight footprint is needed to bring media transformation to mass consumption.

The dense transcode server offered by Socionext's partners solves the problem for current as well as future generation OTT codecs.

ABOUT SOCIONEXT
Socionext is an innovative enterprise that designs, develops and delivers System-on-Chip products to customers worldwide. The company is focused on imaging, networking, computing and other dynamic technologies that drive today's leading-edge applications. Socionext leads the market in video technology and powers high-end broadcast systems and mass-market IOT devices. The company combines world-class expertise, experience, and an extensive IP portfolio to provide exceptional solutions and ensure a better quality of experience for customers. Socionext Inc. has offices worldwide to lead its product development and sales activities. For more information, please contact us at **datacenter@us.socionext.com.**