Pipelined Stream Processing

Design Advantages

- Direct, high-bandwidth PCI Express connect cuts latency

- Performs a combination of multiple steps in a single, unified environment: decode –>process –>encode

- No need for expensive, error-prone high speed interconnect of various "boxes"

- Lower power, less rackspace, higher performance

Typical Applications

- Compliance monitoring

- Control rooms for various applications

- TV-like applications like large screens, multiple displays and others

- Anything that deals with combining and processing a large number of streams into mixed feeds

Many applications require numerous steps to process a stream passing through a system. The SharpStreamer Pro™ accelerator card and MaxCore™ platform from Artesyn Embedded Technologies provide the perfect environment for this task.

The Challenge

Are you displaying multiple types of content from different sources on a very large screen (or multiple screens), reviewing streams for content and correctness, or even recording a large number of TV or camera channels while making other adjustments to them? All of these applications —and many more — need the capability to not only take all these different feeds, decode them into a common format and then, dependent on the actual task, take several transformation steps before finally encoding them for storing or displaying. They also need to be able to do this in real time. The major challenge to meet is the pure fact that raw video streams consume very high bandwidth and are very sensitive to packet loss or bits moving.

The Legacy Solution

In a rack mount server based environment, this pipeline translates into a large number of servers for the initial decode, a high-end switch to interconnect all servers, another stack of servers for processing, and finally yet another stack of servers to play the resulting, encoded stream(s) out to the respective destination. All this needs high bandwidth interconnects, possibly even up to 100G in order to cope with raw video streams, which is costly and, as there is a high number of connections required, prone to trouble when connecting and configuring. Additionally, when making changes to the setup, this can be quite time consuming and frustrating.

MaxCore™ Platform

The MaxCore™ Way

Artesyn's revolutionary *MaxCore*™ architecture enables combining all steps of the pipeline in a single enclosure, interconnected through a common, high-speed PCI Express bus that delivers at least 25Gbps to every single CPU in a single slot. When utilizing the *SharpStreamer*™ *Pro* card with its two CPUs (with integrated GPUs) on a single board together with the SharpSwitch™ intelligent NIC card, this configuration allows up to 28 Intel® Xeon® E3-15xx CPUs in a single enclosure working on the content passing through.

Due to the fact that every one of these CPUs is a server-type CPU, the resulting pipeline is highly configurable and can forward and process content at line rate. Configuration and lining up of the single steps on the pipeline can take place in a single CPU SharpServer™ card that is part of the intelligent network adapter.

Additionally, the PCI Express based architecture allows the use of COTS PCI Express cards to feed additional sources into the system for processing according to the application's specific needs. Similarly, the architecture allows use of specific cards to connect external storage for recording.

Benefits

When basing your application on the *MaxCore platform*, there are a number of benefits:

Simplified architecture

Due to the use of a configurable PCI Express switch and the reduction to a single enclosure, all processing steps remain internal to the system, removing the need for high-value sensitive cabling and switches. As all process steps taken are based on a familiar x86 architecture, this also simplifies the task of building applications processing the streams. Should a need for application-specific processing arise, this can simply be added in the form of a standard PCI Express card.

Enhanced data flow

Utilizing the PCI Express bus for transporting data improves latency, as both the packing and unpacking steps needed in network-based architecture, plus additional latency introduced through Ethernet switch silicon are removed. The massive interconnect bandwidth of at least 25Gbps per CPU offered by the PCI Express implementation presents such a large overprovision
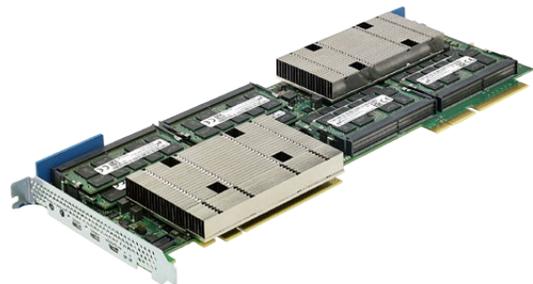
MaxCore™ Platform

SharpStreamer™ Pro PCIE-7210 Accelerator Card
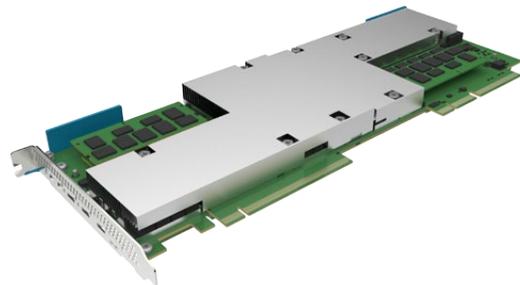
SharpServer™ PCIE-7410 Microserver Card

ARTESYN™
EMBEDDED TECHNOLOGIES

over today's typical – even raw – data rates that immediate forwarding of data to its recipient with minimal latency can be expected. This combination offers far superior overall behavior and throughput, compared to traditional approaches, with even better scalability.

Less space

The collapse of multiple appliances and their respective interconnects into a single enclosure means a much higher density packaging, resulting in a fraction of the footprint compared to other implementations. Not only does this create advantages in mobile applications, it also saves on operating expense in the form of rack space that needs to be rented. Even if reliability requires duplicating the setup, this is still far below what would normally be required for this application.

Lower power consumption

Moving from multiple single-function servers that consume 750W+ each to a single appliance also significantly lowers the power consumed. A single, fully-equipped MaxCore system consumes less power than three servers while providing far more processor cores! Additionally, less cooling required also means even less power required.

By the numbers

Comparing a MaxCore based solution to standard rack mount servers (RMS), a single MaxCore platform equipped with microservers delivers up to the equivalent of 24 bare metal servers, saving 83% of CapEx and 91% on OpEx[1]. Depending on the actual video application, MaxCore and SharpStreamer products can replace up to 7 RMS in an OTT video environment when processing 2000 HD streams.[2]

Flexibility

In summary, Artesyn offers a combination of a unique, inherently high-performance architecture with a variety of multiple purpose cards. Several applications can be served with a highly configurable standard PCI Express based system offering flexibility, standard I/O and a familiar x86 architecture, which gives system designers the ability to tailor their application precisely for their respective use case.

Interested?

If you find this interesting, connect with your Artesyn Application Engineering team for an in-depth discussion of your particular requirements, a demo or a test system now!

[1]Source: Virtual Video Transcoding in the Cloud Whitepaper by Artesyn, Dell, Intel.
[2]As usual, benchmarks can only give approximate guidance, the best way to find a fitting solution is to test the environment in your application.

PipelinedStreamProcessing-SolutionBrief-Feb2016

ARTESYN™
EMBEDDED TECHNOLOGIES