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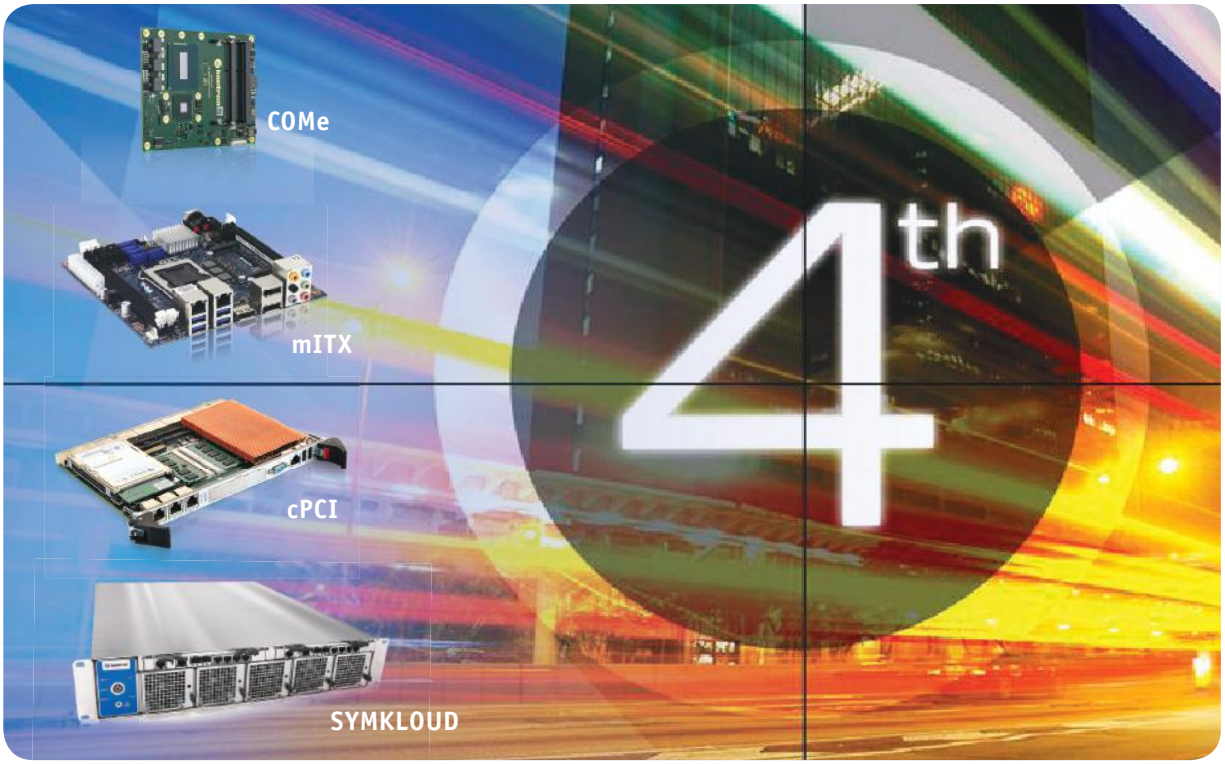
» Whitepaper «



The 4th generation Intel® Core™ processors

One new microarchitecture for all mid-range to high-end embedded applications

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The 4th generation Intel® Core™ processors serve the embedded computing space with a new microarchitecture which Kontron will implement on a broad range of embedded computing platforms. Based on the 22 nm Intel® 3D processor technology already used in the predecessor generation, the processors, formerly codenamed 'Haswell', have experienced a performance increase which will doubtlessly benefit applications. Beside a 15 % increased CPU performance especially the graphics has improved by its doubled performance in comparison to solutions based on the previous generation processors. At the same time, the thermal footprint has remained practically the same or has even shrunk. These improvements and the high scalability from cost-optimized Celeron® versions up to high-end Intel® Core™ i7 and Xeon® processors make the new Intel® Core™ microarchitecture a perfect match for nearly each and every mid-range to high-end embedded applications. In a first step Kontron has implemented the new microarchitecture on COM Express®, Mini-ITX, 6U CompactPCI®, and the Kontron SYMKLOUD Media cloud platforms with further platforms to follow. So, in what way can embedded appliances benefit from these improvements?

With improved processing and graphics performance as well as energy efficiency and broad scalability, the 4th generation Intel® Core™ processors with its new microarchitecture provide an attractive solution for a broad array of mid-range to high-end embedded applications in target markets such as medical, communications, industrial automation, infotainment and military. This whitepaper gives engineers a closer look into the architectural improvements of the new microarchitecture and delivers the answers as to how they can integrate these most efficiently into their appliances.

CONTENT

Overview

Embedded computer applications demanding mid-range to high-end performance always face the same problem. They need more speed but at the same time this demand is frequently coupled with strict requirements in terms of power efficiency to deliver a level of performance per watt that fits the needs of space-, weight- and power-constrained applications that characterize many embedded deployments. With the development of a new microarchitecture based on the 22 nanometer (nm) 3D tri-gate transistor technology, Intel® introduced several architectural improvements that lay the groundwork needed to continuously fulfill these tough demands over the next years to come.

The 4th generation Intel® Core™ processors, which are the first processors to leverage this new microarchitecture and that will be implemented on a broad range of Kontron platforms, provide improved processing and graphics performance as well as energy efficiency. The processing power has been increased by 13 %; the 3D graphics performance by up to 100 %. Together with USB 3.0 and PCIe 3.0 support, intelligent systems can now process high data loads and deliver stunning visuals to users. New technologies have also been added to create higher levels of responsiveness and manageability in data security systems. Additional increases in performance have been achieved for floating point-intensive and parallel computing with the support of the new Intel® AVX2 and OpenCL 1.2. Target applications include digital signal and image processing applications in the medical, industrial automation and MAG (Military, Aerospace and Government) markets, as well as cloud-based video transcoding for content delivery networks. OEMs looking for a compelling visual experience of intelligent systems displaying videos, graphics and interactive content will enjoy the advantages of increased 3D and media performance as well as the support of DirectX® 11.1 and OpenGL 4.x. Another new feature is the support for 4K displays, connected via HDMI.

Embedded computing platforms that implement the new processors enable OEMs to build applications with increased processing density and I/O bandwidth within the same thermal envelopes as its predecessors. This also meets or even exceeds the requirement for improved size, weight and power of embedded designs and enables designers to utilize the power of the latest quad-core Intel® processors on small form factors such as COM Express® and Mini-ITX and, additionally, even on larger blades such as 6U CompactPCI. All of the architectural improvements are worth taking a closer look at as well as how OEMs in the different verticals can unleash the full potential of this new processor architecture by deploying standardized and proven platforms to minimize design risks and speed up time-to-market.

With the launch of a dedicated cloud platform parallel to the introduction of the processor, the way designs are made available in the embedded and communication market has changed. For the first time the launch performance on system level has occurred as fast as we know it from the consumer and IT market where traditionally systems are made available parallel to the processor. For the embedded market it is a milestone achievement, as it shows that embedded computer vendors have now become as powerful as the system vendors in the conventional IT sector. Furthermore, it is worth mentioning that this dedicated cloud platform is tailored to meet the needs of the hosted services and cloud service provider market which includes cloud infrastructure for machine-to-machine (M2M), or Internet of Things (IoT), network applications. But let's first take a look at the new microarchitecture and its improvements before we go on to discuss the most important embedded markets.

A universal microarchitecture

With the 4th generation Intel® Core™ processors, the new microarchitecture has been made available on the already proven 22nm tri-gate transistor technology. The new microarchitecture will be used for all the different market segments which x86 technologies serve. So the processor will be deployed in a whole range of hardware from server class Intel® Xeon® designs,

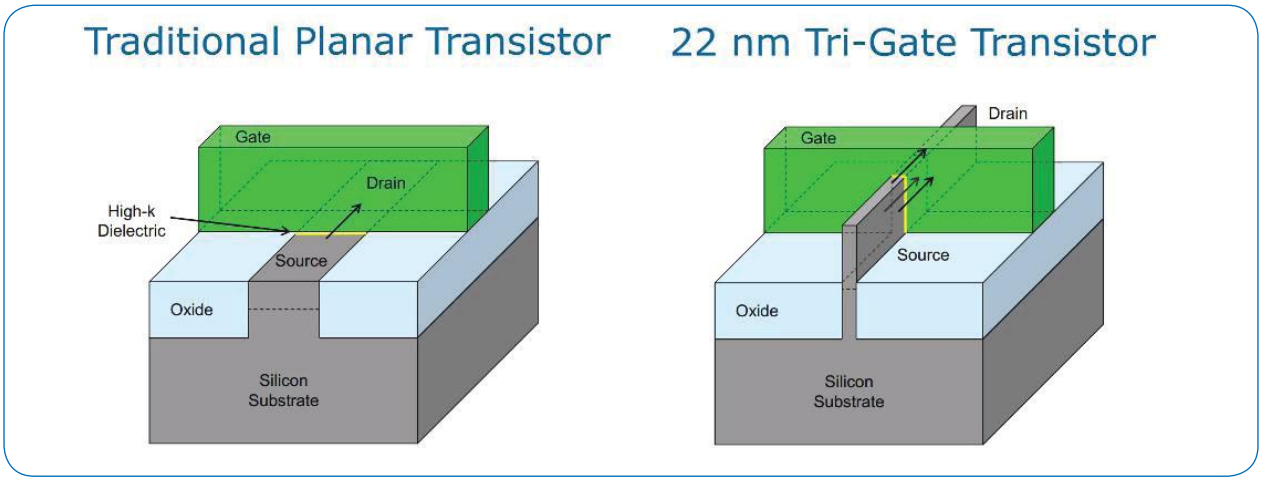


Figure 1:3D Tri-Gate transistors form conducting channels on three sides of a vertical fin structure to maximize current flow on the one hand and reduce leakage current on the other hand. Tri-Gate transistors can have multiple vertical fins connected together to increase total drive strength for higher performance [1] © Intel®

to desktops and notebooks right down to x86-based tablet computers. This broad range of applications out of the IT and consumer sectors makes this new microarchitecture a universal platform offering the broadest eco system and software support that has ever been available. Subsequently, for many embedded design engineers this makes it a preferred platform for all mid-range to high-end embedded applications as it also covers the long term availability aspects in terms of x86- compatibility, which is important for many embedded applications. How does the new microarchitecture compare with its predecessors?

The new microarchitecture enables 4th generation Intel® Core™ processors to offer up to 10 to 15 % enhanced CPU performance. Without going too deep into the details of micro operations running at the core, the 4th generation Intel® Core™ processors – for example – feature-optimized instruction caches and out of order execution. For multi-thread applications requiring a deterministic real time behavior this is of great relevance. Another feature is the improvement of the execution units, which increases the number of micro operations (uops) per cycle from 6 as it was formerly to now 8 uops/cycle – an increase of 33 %. Such improvements take place on the level of micro operations. Thus, the effective performance increase is a little lower and depends on the application itself. Beside these optimizations on the actual microarchitecture level, important improvements have been achieved by the new instruction extensions that have been added in nearly all areas of the x86 instruction sets. By adopting applications to the new extensions which have become available, OEMs can significantly improve the performance density and responsiveness of their embedded applications. In detail the new enhancements which have been introduced are; Intel® Advanced Vector Extensions 2.0 (Intel® AVX2), Intel® Fused Multiply Add, new Bit Manipulation Instructions (BMI) and Transactional Synchronization Extensions (TSX). All these improvements contribute to an improved computing performance that is now available in an extremely broad range of performance flavors.

Intel® Advanced Vector Extensions 2.0 (Intel® AVX2)

Building upon the Intel® Advanced Vector Extensions that were already in place since the 2nd generation of Intel® Core™ processors, the 4th generation Intel® Core™ processors now feature AVX2 for enhanced media processing. While AVX introduced 256 bit SIMD (Single Instructions on Multiple Data) operations for floating point operations, the new AVX2 offers additional 256-bit SIMD operations for integer operations. Further to this, AVX2 adds 16 new gather instructions, which are used to load non-contiguous data elements for both integer and floating point SIMD operations. This is required to simplify vectorization code. By this, AVX2 helps to accelerate image and video analytics and video pre- and post-processing. This feature is required, for example, in demanding security, surveillance, machine vision, medical, weather, radar or military applications.[2]

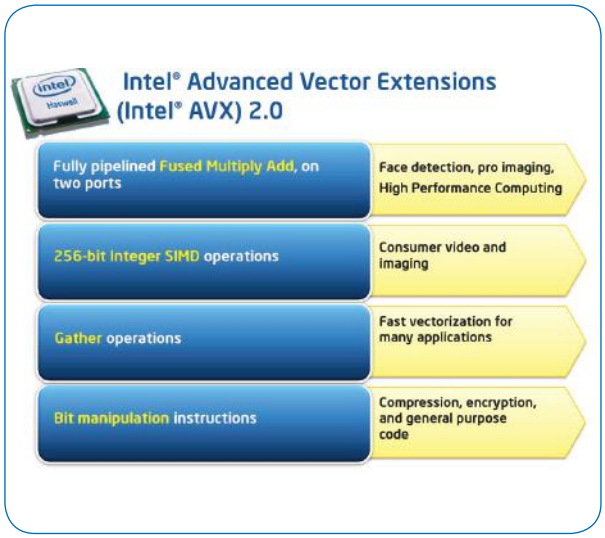


Figure 2: © Intel®

Intel® Fused Multiply Add

Dedicated to improving floating point performance, the 4th generation Intel® Core™ processors also feature two Fused Multiply Add (FMA) ports per core. They increase the calculated GFLOPS/watt ratio compared to the 3rd generation Intel® Core™ processors by up to four times. Target applications that will especially benefit from this improvement can be found in scientific computing as well as in high-performance embedded computing markets such as medical, military and security.

Bit Manipulation Instructions (BMI)

Especially helpful for TCP/IP-based networked systems are new Bit Manipulation Instructions (BMI) introduced by the 4th generation Intel® Core™ processors. They enable bit field manipulations, sbit counting and arbitrary precision integer multiply and rotation. This feature will increase performance of mission-critical, network-centric applications such as cryptography, storage and networking. As one can see, the new microarchitecture offers a whole range of advantages for parallel computing executed via SIMD. In order to leverage these advantages, developers have to adapt their applications to the new opportunities of parallel code.[3]

Transactional Synchronization Extensions (TSX)

To simplify the task of programming race- and deadlock-free parallel code, the new 4th generation Intel® Core™ processors also introduces transactional memory extensions (TSX). Especially when parallel server threads or OpenCL kernels need to be synchronized, the hardware can take care of optimizing the performance and concurrency. This helps engineers to concentrate on the data correctness of parallel executed code.[4]

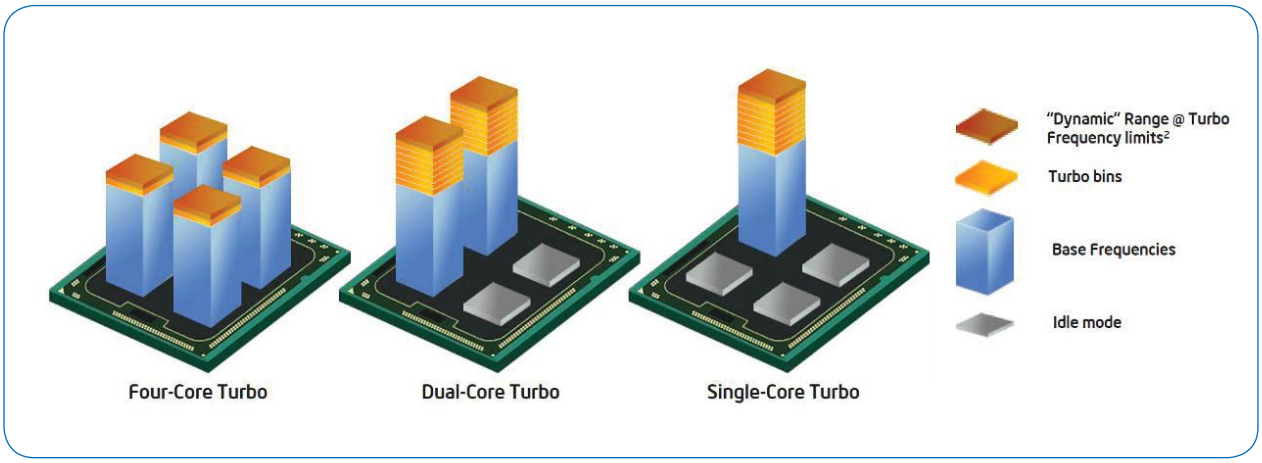


Figure 3: With Intel®'s Turbo Boost Technology, in certain circumstances cores can be run faster than the indicated speeds. For example, when running a single threaded application, the CPU can boost the speed of a single core for just that task. © Intel®

Customizable performance

Besides supporting turbo boost technology and the individually definable - and thus limitable - TDP of the processors, which is very interesting for thermal restricted embedded designs, the new microarchitecture comes in a very broad performance range. Core frequency can be as high as 3.9 GHz, quad-core performance in Turbo mode with 84 watt TDP down to 25 watt consuming 1.6 GHz dual-core performance. Thus, one can really say that the new architecture has customizable performance. For the embedded market, mobile processor performance range is particularly relevant. These processors with integrated graphics cores are available from Intel® Core™ i7 processor with up to 4x 2.4 GHz performance down to cost-optimized Intel® Celeron™ processor variants. And they will even offer an upcoming one-chip, 15 watt TDP offering, which will become available later in 2013. It accommodates higher performance processing in a smaller chip package to enable lighter and thinner compute platforms for intelligent systems such as portable ultrasound equipment or industrial controllers / HMIs.

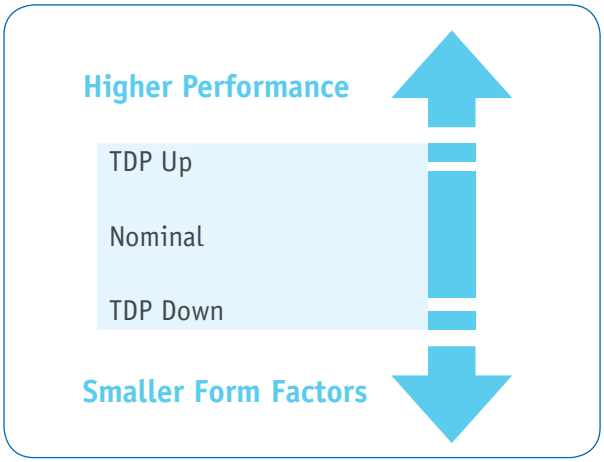


Figure 4: The configurable TDP of the 4th generation Intel® Core™ processors allows multiple TDP levels within the same component [5] © Intel®

Many application areas

With all the different performance stages, the new 4th generation of Intel® Core™ processors is perfectly tailored for a multitude of applications ranging from thermal sensitive designs up to compute-intensive designs or from graphics-intensive designs to I/O demanding applications. For all these different application areas the new 4th generation of Intel® Core™ processors offers attractive features. Pure performance-hungry applications, such as industrial computers and servers as well as robots, POS terminals or telecom routers and switches will benefit from the AVX 2.0 extensions as well as the Turbo Boost and Hyper-Threading support. For I/O-intensive applications ECC is provided as well as maximum I/O flexibility with speeds up to PCIe Gen3, USB 3.0 as well as SATA 6G to connect for example high-speed cameras or the multitude of different I/O in test & measurement, factory automation or with kiosk systems and ATMs or the wireless infrastructure.

Smart features for the thermal sensitive area

The thermal-sensitive designs will first and foremost benefit from the configurable TDP, which means that the new processor can be mounted into even smaller designs based i. e. on COM Express® modules. The upcoming 15 watt version is also predestined for example for rugged tablet PC designs. It will also provide higher performances per watt for longer battery life. The very efficient sleep mode will not only reduce energy consumption but will also change the way mobile systems or stationary devices are used, as they can remain in sleep mode for an even longer period of time. In addition, the low voltage DDR3-L memory support contributes to lower platform power consumption. Typical embedded applications in the thermal-sensitive area are for example all the portable devices in medical, military or industrial control as well as thin clients in (cloud-) server-based, always connected embedded applications. Battery-powered stationary designs or even UAVs are other typical application areas.

MARS: Smart battery support for portable devices
For battery-powered designs, Kontron offers application-ready Smart battery system management that is ready to use and easy to integrate resulting in less development effort and faster time-to-market. Owing to its modular structure, it can be individually configured for any application. Copy & paste layouts and routings are offered for application development in the loop. MARS supports up to two smart batteries in parallel or serial mode and supports different types of smart batteries for cost-efficient designs. A wide input voltage range from 5 to 28 for charging and power supply is available as well as the support of a parallel mode with enhanced battery efficiency and faster recharging cycles.

Ubiquitous enhanced graphics

For all these different applications, the 4th generation Intel® Core™ processors integrate enhanced graphics that provide a significant increase in performance compared to their predecessors. In order to fulfill the broad range of different application requirements, from power-optimized designs up to highly immersive graphics-oriented applications, the GPUs are highly scalable and provide a wide range of configuration options.

Entry-level graphics, entitled Intel® HD graphics, now feature ten execution units instead of six as found in the 3rd gen Intel® Core™ processors. At a comparable power level, embedded appliances can now offer round about 35 percent higher graphics performance. The mid-range graphics now provide 20 execution units instead of 16 in the predecessor.

Completely new for the BGA processor variants is the top-of-the line Intel® Iris™ graphics with 40 execution units. It comes in two different versions: the Intel® Iris™ graphics 5100 and the Intel® Iris™ Pro graphics 5200 which features additional fast DRAM on the processor package. While all other graphics cores use the main memory, the additional DRAM for the Intel® Iris™ Pro graphics 5200 helps to push the performance to the level of a discrete graphics card. It offers twice the graphics performance than that of the most powerful 3rd generation Intel® Core™ processor GPU. System developers of gaming, digital signage and simulation systems will experience a huge benefit from this new level of performance, as they can now build highly integrated embedded systems with immersive hi-res 3D graphics in small form factor designs with reduced components, lower cooling requirements and less power demands.

Together with the general performance improvements, the new graphics cores support latest graphics APIs such as DirectX® 11.1 and the platform-independent Open GL 4.x to provide a more immersive and realistic 3D experience at higher resolutions. Especially applications such as gaming, interactive kiosk and POS/POI applications as well as simulators will benefit from this performance increase. Additionally, a large number of applications in the area of industrial and/or medical imaging also use algorithms based on OpenGL to improve the quality of images.

When it comes to delivering increased graphics power on the screen, the 4th generation Intel® Core™ processors support up to three independent displays, with the possibility to span the desktop across three displays lined up horizontally. In control rooms, for instance, this enables superb situational awareness. The support of DisplayPort 1.2 not only enables multi-stream transport for daisy-chaining displays, but also provides the bandwidth to support monitor resolutions of up to 4K (3840 x 2160 / with HBR2). The multi-monitor support is relevant, for example, in digital signage installations and control rooms, where one system controls several monitors. 4K support enables information to be displayed on huge panels which provide sharp and detailed visualization with pixilation not visible for the viewer, even when in close proximity to the screen. Further features for the Intel® Clear Video HD Technology such as image stabilization, gamut mapping and frame rate conversion add to the high visual capabilities of the new 4th generation Intel® Core™ processor.

General purpose GPU options

For applications employing the highly parallel graphics processing unit for computational tasks – also known as General Purpose Processing on GPUs – the new Intel® HD graphics cores now support OpenCL 1.2 which extends the OpenCL specification with several new features to enhance parallel programming. One example is the ability to partition a computing device, such as a GPGPU into different sub-devices increasing the task parallelization. Another new feature is the ability to compile OpenCL into external libraries to include highly parallel algorithms into conventional programs. Target areas can be found in every high-performance embedded computing application starting in industrial vision for quality control, medical imaging and ranging up to radar applications in avionics and ISR and sonar in military

Improved security

With 4th generation Intel® Core™ processor-based designs, developers can furthermore enjoy improved security thanks to new features i.e. McAfee® Deep Defender support, new Intel® AES Instructions and the Intel® Platform Detection Technology with BIOS Guard.

Whereas the Intel® Platform detection Technology with BIOS Guard after attacks helps to recover and update to quickly return to a known normal good state, the McAfee® Deep Defender is designed to protect and defend systems against malicious software. Its kernel-level behavioral monitoring exposes and removes unknown threats, including rootkits, to preempt zero-day malware. It resides between the memory

and OS to perform real-time memory and CPU monitoring and removes low-level threats that traditional OS-based protection cannot detect, lowering re-imaging and remediation costs and enhancing overall security. [6]

The new Intel® AES instructions enable fast and secure data encryption and decryption and protect valuable data and assets from theft or loss, using the Advanced Encryption Standard (AES) which is defined by FIPS Publication no. 197. Since AES is currently the dominant block cipher, and it is used in various protocols, the new instructions are valuable for a wide range of applications. The architecture consists of six instructions that offer full hardware support for AES. Four instructions support the AES encryption and decryption, and other two instructions support the AES key expansion. The AES instructions have the flexibility to support all usages of AES, including all standard key lengths, standard modes of operation, and even some non-standard or future variants.

They offer a significant increase in performance compared to the current pure-software implementations because application performance is not affected. Beyond improving performance, the AES instructions provide important security benefits. By running in data-independent time and not using tables, they help in eliminating the major timing and cache-based attacks that threaten table-based software implementations of AES. In addition, they make AES simple to implement, with reduced code size, which helps minimize the risk of inadvertent introduction of security flaws, such as difficult-to-detect side channel leaks. [7]

Continued support for Intel® vPro™ and Intel® AMT technology, now in version 9.0, enables secure data exchange among increasingly connected devices across various industries and allows for problems to be diagnosed, managed, and repaired remotely, which can make many onsite service visits unnecessary.

These and several other security features which were already supported in previous generations are a great enhancement to hardware platforms and are a must in a world where ever more devices are connected. However, for remote access to their systems application engineers often require even greater support due to the fact that many new designs have a tendency to remain permanently connected and online, and engineers spend increasingly more time on remote and cloud projects. For this type of connection, Kontron is able to provide these applications with all types of wireless connectivity from a single source in order to accelerate time-to-market and reduce the integration task for customers. So M2M connectivity is always an option for all the embedded platforms Kontron provides.

The new core comes in many different shells

Owing to their highly attractive feature set, the 4th generation Intel® Core™ processors are ideal candidates with which engineers can build new sophisticated embedded applications in a wide range of different physical configurations as well as interface configurations. But at the same time the continuous evolution in x86 innovations puts a lot of pressure on OEMs to not fall behind with the implementation of this new processor technology. To ensure that customers can keep up pace with new innovations as simply, quickly and as cost-efficiently as possible, embedded hardware manufacturers like Kontron work with a dual strategy: firstly, in regards to standardization and, secondly, by offering value-added services for implementing new processor technology. The aim is to ensure that customers will have little to no worries about implementing the latest processors.

The first Kontron intelligent platforms to feature the 4th generation Intel® Core™ processors will be the standard form factors Mini-ITX, COM Express®, 6U CompactPCI®, and the Kontron SYMKLOUD MS2900 Media cloud platforms with further boards and systems to follow. An impressive fact is that there are not only board level products available right from the start, but also dedicated cloud platforms for content delivery network applications such as transcoding. This underlines Kontron's efforts to shape the product offerings even more to industry-specific demands and to deliver a wider range of application-ready platforms. So, which product customers opt for and what are the special features which differentiate these new 4th generation Intel® Core™ processor based platforms?

Mini-ITX embedded motherboards

Seen from the angle of the most common standard form factors, the main thing to mention are the embedded motherboards. Kontron has chosen to implement the new 4th generation of Intel® Core™ processors into the Mini-ITX form factor which underlines the ongoing SFF trend even for high-end embedded processor technology. With the Mini-ITX form factor engineers can immediately develop system designs based on the broad ATX-compliant ecosystem. This makes this motherboard standard an ideal platform for many applications that could chose a standard board from the consumer sector but they also need the robustness, interfaces as well as longevity of embedded systems. By making a Mini-ITX board available parallel to the processor launch Kontron enables simultaneous

KTQ87/mITX

engineering and roll-out along the entire value creation chain from chip vendor up to original equipment manufacturers. Building a design on an embedded motherboard has a long-term availability of seven years ensures that OEM installations will always have the same function and functionality which dramatically simplifies updates and after sales service. The high-quality design of the Kontron embedded motherboards with features such as solid capacitors (POSCAP) additionally improves application reliability and availability in the field even in harshest environments. The embedded feature set contributes in addition to the long-term availability of applications in all the various embedded and intelligent system markets up to cyber physical systems.

The embedded Mini-ITX motherboard Kontron KTQ87/mITX based on 4th generation Intel® Core™ i7/i5/i3 processors and Intel® Embedded Q87 chipset offers engineers leading-edge embedded processing performance in a compact and ATX-compliant footprint. The performance is scalable from mid-range to high-performance embedded applications and target markets can be found in industrial automation, medical, gaming and digital signage as well POS/POI. For application-specific extension cards, it offers one PCI Express Gen 3.0 slot as well as one Mini-PCIe. Further peripherals can be connected via four SuperSpeed USB (USB 3.0) and ten USB 2.0 ports as well as the Kontron-specific embedded feature connector, which executes up to 160 GPIO, analog-to-digital converter (ADC) and digital-to-analog converter (DAC) minimizing the need for individual I/O boards.

If all the flexibility of the Kontron Mini-ITX embedded motherboards does not suffice, or if an even smaller form factor is required, it is recommendable to move in the direction of Computer-on-Modules. Without a doubt - COM Express® is Computer-on-Module standard which is accepted worldwide and is the perfect fit for the new mid-range to high-end processors. That's why Kontron always makes COM Express® Computer-on-Modules available parallel to important processor launches.

COM Express® basic Computer-on-Modules

Just as with the mini-ITX motherboards, engineers can immediately evaluate these new benchmark Computer-on-Modules on all Kontron COM Express® pin-out type 6-compliant starter kits. A further important issue though, is that engineers can immediately test existing designs with these new boards. Therefore Kontron also offers standardized migration support services to accelerate the design-in phase for fastest field deployment. Due to the fact that these new benchmark processor modules remain within the thermal envelop of their predecessors, engineers developing demanding mid-range to high-end embedded applications can immediately benefit from the improved processing and graphics performance – in most cases without having to alter the thermal system design.

Based on the 4th generation Intel® Core™ processors, the new Kontron COM Express® basic Computer-on-Modules COMe-bHL6 are the most powerful and highly scalable COM Express® modules to have ever become available. Without exceeding the thermal boundaries of comparable predecessors, they offer an unprecedented level of graphics performance for triple independent, daisy-chained displays which support up to 4K resolution for stunning user experiences. Compelling visual performance for displaying videos, graphics and interactive content is also provided by the support of DirectX® 11.1 and OpenGL 4.x. This makes the new Computer-on-Module an ideal fit for feature-rich, graphics-oriented applications such as digital signage servers running several displays, gaming systems and high-performance medical appliances. Design engineers of high-end embedded computer systems who have to efficiently balance out performance, watts and costs, benefit from Kontron's highly scalable range of 4th generation modules.

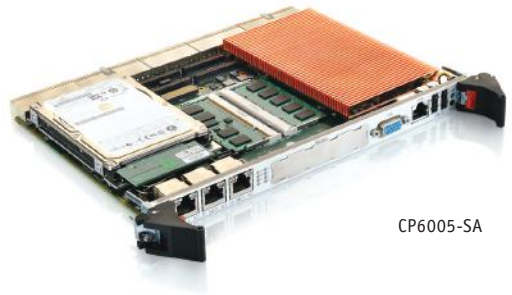
COMe- bHL6

The Kontron COM Express® pin-out type 6 COMe-bHL6 modules are designed with the Intel® Mobile QM87 chipset and will be made available from the cost-optimized low-power processor variants up to the quad-core Intel® Core™ i7 processors with up to 4x 2.4 GHz performance

6U CompactPCI® blades

Besides SFF designs also applications in which High-End Blades such as 6U CompactPCI® are used require increased performance density together with passive cooling in order to provide more performance and bandwidth on a given footprint. This is why Kontron for 6U CompactPCI® utilizes a high-performance board configuration with Intel® Mobile QM87 chipset, which offers up to four times more GFLOP per watt, up to 15 % higher CPU performance and double the graphic performance in comparison to preceding generations. In addition, Kontron massively increased data throughput over the backplane due to PCIe 3.0 or the optional 2x 10 Gigabit Ethernet to optimize intra system board to board communication and thus inter processor communication. Thus, the new Kontron 6U CompactPCI® CP6005SA processor board primarily targets compute-intense applications such as sonar, radar and video stream analytics in commercial avionics and military. Further application areas can be found in markets such as telecommunication and medical image processing.

New features such as the Intel® Advanced Vector Extensions 2 (Intel® AVX2) and the extended GPGPU support prove to be particularly advantageous for high performance embedded computing. With the Kontron CPI6005-SA, OEMs can now attain DSP performance density with generic x86-technology. By using established and standardized APIs such as DirectX11.1 OpenGL 4.0, OpenCL 1.2 and compiler support for GPGPU, OEMs can develop high-performance applications much faster and more flexibly. In the case of existing applications having to be upgraded, OEMs profit from minimal re-design work thanks to the rear I/Os compatibility to previous Kontron 6U CompactPCI® CPU boards. Furthermore, application-specific I/Os can be integrated via hot-swappable XMC/PMC modules.



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SYMKLOUD - media cloud platform

Different to all the board level launches which are more generic platforms for several different markets and applications, the Kontron SYMKLOUD Media platform is highly dedicated for any content delivery in the cloud for the broadcast and Cable/IPTV markets. The platform has been designed to meet the requirements for next-generation data centers and cloud service providers. Carriers and mobile operators who outsource or manage their own data centers for various hosted services will benefit from SYMKLOUD's 3-in-1 modular approach of integrated switching, load balancing and processing, plus the versatile options for redundant configurations for High Availability.

SYMKLOUD

With its support for the newly released 4th generation Intel® Core™ i7 Quad-Core processor and Intel® Mobile QM87 chipset, the SYMKLOUD Media Platform will be able to handle massive workloads of IP content delivery such as fixed and mobile video transcoding applications deployed in cloud infrastructure. The changing demands in the broadcast industry are leading to an ever increasing pressure to explore IP, cloud options, as the viewing experience diversifies across interactive TV sets, tablets, plus on-demand video services are more popular than ever. The market push is to move this portion into the cloud for all multi-screen deployments.

Next-generation data centers requirements will continue to evolve so it is crucial that providers look for new hardware and software solutions that are fully integrated and application-ready. These solutions must also provide improved power and cluster management, and deliver cost-effective 5 NINES high-availability. The good news is that a series of new Intel®-based media platforms is now available. These platforms are truly cloud-worthy solutions which service providers can use to prepare for video growth predictions as well as drive the growth for OTT and TV Everywhere, HD formats and devices, mobile video and video surveillance.

Custom designs and application-ready platforms

Furthermore, Kontron supplements its portfolio of systems, boards and modules with an extensive range of custom design services at the system and board level which enables solutions to be tailored to individual application requirements. This also includes a wide array of software services such as operating system and hypervisor implementations as well as migration support including validation and verification. With its comprehensive support, including software building blocks, customers benefit from application-ready platforms which let them fully concentrate on their core competences.

Figure 5: Since 2006, the Original Design and Manufacturing services customer SKIDATA has been purchasing paying machines for parking tickets. These are not only assembled at Kontron; the embedded computer technology is also designed by Kontron

Just how far Kontron's custom service portfolio reaches is demonstrated in Kontron's Original Design and Manufacturing (ODM) services. Within this complex ODM service offering, not only can OEM customers purchase or have systems, boards and modules developed, the complete assembly of their customer-specific system can be carried out. SKIDATA is a classic example of this type of customer. Since 2006, the company has been purchasing parking ticket machines at Kontron. The fabless company has the machines assembled at Kontron and integrates its embedded computer technology which was developed at Kontron.

Original Design and Manufacturing Services

For manufacturers of such complex systems with embedded computer technology, Kontron's ODM services range from the development of embedded computing intelligence, go on to include system assembly and culminate in whole supply chain management – even covering taking care of the customer's customer and including lifecycle support. Customers like SKIDATA are thus in a position to establish themselves as a fabless company. The advantages of fabless manufacturing are low investment costs and, with that, low capital binding in production facilities. The capital saved by doing this can therefore be invested elsewhere, i.e. in the accelerated development of innovations or in addressing new markets.

The goal is to provide any customers requiring these services with a truly extensive, application-ready platform and to release them from the unnecessary ballast of hardware implementations or procurement and logistics management for serial productions.

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About Kontron

Kontron is a global leader in embedded computing technology. With more than 44 % of its employees in research and development, Kontron creates many of the standards that drive the world's embedded computing platforms. Kontron's product longevity, local engineering and support, and value-added services, helps create a sustainable and viable embedded solution for OEMs and system integrators.

Kontron works closely with its customers on their embedded application-ready platforms and custom solutions, enabling them to focus on their core competencies. The result is an accelerated time-to-market, reduced total-cost-of-ownership and an improved overall application with leading-edge, highly-reliable embedded technology.

Kontron is listed on the German TecDAX stock exchanges under the symbol "KBC". For more information, please visit: **www.kontron.com**

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