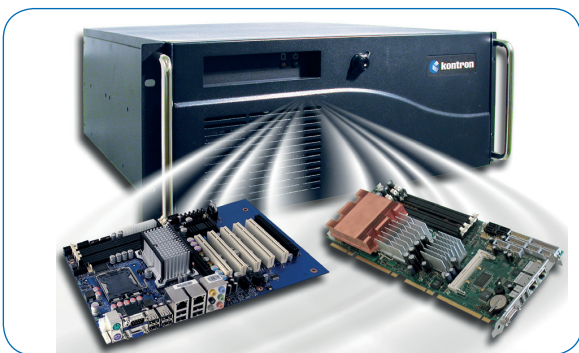# » Application Story «

KI**S**S Rackmount Server in Automation

Agent software from Asentics with multicore industrial servers from Kontron

A successful symbiosis for industrial image processing

The new agent-based software architecture from Asentics for industrial image processing on surface inspection applications, such as PCB inspection, takes full advantage of the performance offered by Kontron industrial servers equipped with x86-based multicore processors. At the same time, the highly flexible agent-based software architecture accelerates the application-specific configuration of Asentic's image processing systems. The combined solution is a successful symbiosis of the latest hardware technology and the related software.

After much speculation over the last two years about the possibilities offered by embedded systems based on multicore processor technology, we are now starting to see the first applications that fully realize the promised potential. Asentics uses Kontron's multicore industrial servers to get the maximum out of its multicore capable software agents. These agents constitute the Pulsoft Director software tool that is part of the company's Videolab image processing system. What are software agents and what are the advantages for users? The term "software agent" describes a software entity that acts with a certain degree of autonomy in order to carry out tasks on behalf of a user. Users do not need to know what the agent does in detail. They give the order and the agent carries it out. The result is an extremely easy-to-use and intuitive user interface. Since software agents communicate with each other in order to achieve a specified goal, users can assign several tasks to different agents. Inter-agent communication is autonomous and does not require any input from the user. This is particularly helpful for complex image processing applications, e.g. surface inspection, where several image recognition methods need to be used. Software agents make it easier for users to operate complex systems. This is a big advantage, not only for initial implementations but also for existing implementations where the boundary conditions are not fully known in the beginning and the system setup needs to be modified. In addition, image processing systems are often used in different industrial processes and need to be configured with various components.

Moreover, boosting the performance of conventional systems requires updating the entire software to a more powerful version. With agents it is a lot easier: simply add the required agents. This can even take place during runtime via a network connection, USB stick, or CD. Installation is convenient and hassle-free thanks to the agents' software interface to the image processing system that has been written to handle all possible requirements. The newly loaded agent is easily integrated into existing applications and the image processing system has immediate access to all of its features. Configuration, modification during runtime and upgrades can be carried out easily and flexibly. Networking capabilities enable the Asentics agents to be used for distributed applications (central and complex or distributed and networked).

As well as enabling easy operation for users and flexible configurations, the software agents are also capable of multi-processing. When Asentics started work on the software agents, multi-processing was not a major issue. Asentics based its software agents on Microsoft's COM technology (Component Object Model) that forms the basis of the .NET technology and is a component of Windows XP and Windows Vista. This technology forms the basis for designing the agents (object creation) and the dynamic interaction of the agents (inter-process communication). COM-capable agents/objects are language-independent and can be DLLs as well as executable programs. Since they are language-independent it is possible to incorporate source code, and thereby the methods, of different manufacturers. Asentics has already implemented a

number of different methods. Image processing methods that have not been available until now can also be implemented easily and quickly. It often only takes a few hours. By seamlessly integrating this technology into user interfaces capable of multi-processing (Windows), as well as the Pulsoft Director's automatic management system, it is possible to take full advantage of multi-processor systems without the need for any user intervention or having to configure the system. This is a great advantage for users. The accompanying profiler tool graphically displays the load on the system caused by each agent. Since the Asentics agents are also network-capable, system administration of distributed or complex processes on several servers is also possible, enabling flexible system configurations. All of these factors make the Asentics solution a prime example of effectively using x86 multicore systems for industrial applications.

To best meet its hardware requirements for surface inspection applications, Asentics uses multicore industrial servers from Kontron. The Kontron servers are based on standard modular components and scalable CPU boards that offer the flexible configuration Asentics needs in order to meet the various demands of different applications. Kontron delivers the individually configured systems within just a few working days, which makes project planning easy for Asentics.

Modular und robust

The modularity of the KISS (Kontron Industrial Silent Server) family starts with its diverse range of chassis sizes ranging from 1U to 4U with short versions (KISS-4U Short and KISS-2U Short) that have a reduced installation depth for applications that require more space for connecting cables or additional components at the rear. In addition, the industrial servers are based on standard embedded computer technology such as the ATX compatible ATX, Flex-ATX and mini-ITX form factors or the space-saving PICMG 1.0 and PICMG 1.3 conforming Kontron slot CPU boards with the respective backplanes. The new PICMG 1.3 configurations are particularly flexible: they offer scalable
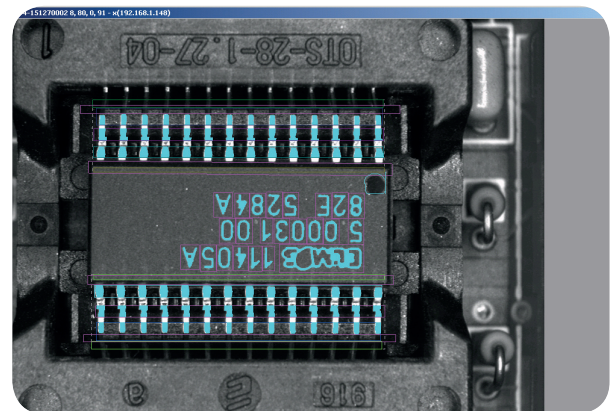

Image 1: Kontron's KISS servers are used by Asentics, for example, in a microchip inspection system for components that control car airbags. The picture shows the relevant inspection areas for the chip.

expansion options from PCIe only and PCIe/PCI to applications that also require ISA boards. This is especially interesting for applications that require older, specific solutions to be implemented into the system in order to secure one-off investment costs. Importantly, all of this is available in a form factor environment that is ATX compatible and has thereby outlived generations of different PC busses.

The KISS servers also use standard PC hardware for expansion cards. This makes the systems extremely modular and ensures cost-effective configuration. All standard ISA, PCI, PCIx and PCI-e cards can be used. In terms of mechanical design, standard profiles are used as far as possible for constructing robust designs that are shock and vibration protected, for example, for RAID systems that are accessible from the front. The system's outer panels can also be quickly removed for convenient access. The physical design of the servers is far removed from the design of less robust office servers. Just by turning the lock on the front you realize that the system is robustly designed for highly reliable operation in demanding environments. What is true for the mechanics is also true for the electronics and storage media.

High reliability

The high reliability of the KISS servers under continuous operation is a decisive factor for Asentics: If the image processing system goes down, the machines and conveyors stop running or even worse there are batches of finished goods that have not passed through the image processing quality control. This is why Asentics took great care to choose the right system components such as, for example, the industrial servers: "The Kontron KISS servers are working reliably in continuous operation at our customers' sites", declares Dr. Horst G. Heinol-Heikkinen, CEO of Asentics.

Image 2: Thanks to the configuration flexibility of the KISS server system that is based on modular, standard components and scalable CPU boards, individual hardware configurations are available within just a few days.

Long-term availability

A further critical factor in favor of the KISS server is long-term availability, which to a large extent is due to the Kontron boards that are available in the same configuration for up to 5-7 years. This enables systems that have been in operation for years to be easily and cost-effectively expanded using the same components without the need for expensive re-qualification

Image 3: Extremely reliable performance under continuous operation is a decisive reason why Asentics uses the Kontron KISS servers for its image processing software for quality control applications (industrial image processing)

testing and re-certification. It is also a big advantage when it comes to carrying out maintenance on industrial systems. In most cases, however, there is no need to replace the boards since they are already robustly designed for a long life. They might need to be replaced due to damage incurred under violent conditions (e.g. lightning), inappropriate use, or inappropriate maintenance in extremely dusty conditions. For OEMs the decisive factor, however, is validation of the entire system that usually only needs to be performed once during the whole life cycle of the OEM solution. This simplifies not only documentation but also long-term customer support due to the supply of functionally and physically identical components.

Since Kontron develops its own boards, these completely identical configurations (with customer specific BIOS and API libraries if desired) provide a high degree of investment security. The mini-ITX, Flex-ATX, ATX and PICMG 1.x boards are available from Kontron without KISS housings. The same long-term availability applies. This makes investment in Kontron KISS servers extremely secure and (compared with boards designed especially for special server configurations from other manufacturers or third party suppliers) cost effective thanks to economies of scale. Central production in Eching, near Munich, is another advantage for European customers since it ensures a level of service that Asian companies cannot match, even if they have small offices in Europe. Similar production facilities in the San Diego, California area ensure that North American customers receive rapid deliveries and service excellence. Kontron's Premier Membership in the Intel® Embedded and Communications Alliance (Kontron is the only European & American-based company with this membership status) ensures that the KISS servers are always available with the latest embedded processors and chipsets.

For example, Kontron was able to launch its latest PICMG 1.3 board simultaneously with the launch of the Intel® Q35 GMCH embedded chipset. This board offers Intel® Core™2 Quad processors and advanced remote management functions for the 1U, 2U and 4U versions and is currently available in Europe. North American availability is expected in late 2008.

Image 4 (For the box on the KISS server): The KISS server PCI 760 supports Intel® VPro™ technology for remote out-of-band system administration. Out-of-band administration provides access to the server via a client computer, even when the server is not running. It enables users to resolve software or boot failures and grants access when software-based management agents are not available.

Günther Dumsky

Product Marketing Manager at Kontron

High-end industrial servers with remote management functions

The new ultra quiet (<35 dB) Kontron KISS PCI 760 industrial servers offer scalable CPU performance ranging from single core and dual core Intel® processors up to the Intel® Core™2 Quad processor Q6700 running at 2.66 GHz. Performance is boosted even further by a front side bus of up to 1333 MHz and up to 8 Gigabytes of DDR2 Dual-Channel RAM. In addition to outstanding performance, these latest members of Kontron's KISS family of industrial servers also come with built–in, comprehensive Intel® Active Management Technology (Intel® AMT) 3.0 remote management engine that offers enhanced security and remote management for easier maintenance, higher system availability and, therefore, reduced total costs of ownership. System managers benefit from Intel® AMT 3.0 because they can remotely carry out tasks such as installation of a new OS or setting BIOS parameters without the need for additional remote management hardware or an on-site presence. If there is an operating system failure, managers can run diagnostics, update patches and reboot the system via the network from a central service system within a few minutes. State-of-the-art system security is provided by Intel® Trusted Execution Technology and there is an on-board trusted platform module – TPM 1.2 – for software and data protection. These features make the Kontron KISS 1U, 2U and 4U servers ideal for companies that use distributed rack servers in comparatively harsh and difficult to reach environments. For example, railway operators and facility companies (gas, water, electricity), as well as operators of traffic lights, toll collection systems and weather stations, all confront challenging environmental conditions. Large companies with distributed shop floor systems will also benefit from these remote management features. Interface flexibility for the Kontron KISS PCI 760 industrial servers is provided by up to 1 x PEG, 4 x PCIe x1 and up to 7 x PCI, 12 x USB 2.0, one parallel and two serial interfaces (16550 UART-compatible) and 3 x 10/100/1000 base-T Ethernet. Data storage media are connected via 300Mbps SATA II interfaces and offer RAID 0, 1, 5 and 10 functionalities. If high-end PEG graphics are not needed, the integrated Intel® Graphics Media Accelerator 3100 (Intel® GMA 3100) supports DirectX 9.0c for full Windows Vista Aero compliance and resolutions of up to QXGA (2048 x 1536) at 75 Hz via a VGA connector. With a MTBF of 50,000 hours (approx. 5.7 years of continuous use) the extremely robust and shock resistant systems ensure high availability and minimum maintenance. Moreover, the temperature-controlled and ultra quiet fans are hot swappable for easier servicing. The KISS systems come with either a desktop housing or a housing for mounting in a 19 inch cabinet. The lockable front panel, on the European KISS systems, offers IP2x protection and optional IP 5x. Designed for continuous operation, the KISS systems are CE certified and UL suitable. The high-availability Kontron KISS-4U and KISS 2U servers support Windows 2000, Windows XP, Windows 2003 Server and Vista. European KISS systems are available as preconfigured standard systems or can be customized as needed and delivered as tested and independently certified solutions. All North American KISS systems are pre-certified to meet US and Canadian standards and are configured with processor, memory, drives and accessories to meet each customer's needs. North American availability of the PCI-760 KISS system is expected in late 2008.

Why do you need the fastest multicore industrial servers for surface inspection?

The test speed is getting faster and faster. This increases the throughput of machines and systems. Asentics image processing solutions with multicore processors currently reach a speed of 150 ms for two dimensional texture recognition. For the production of electronic circuit boards, for example, this enables boards to be tested at a production speed of up to 400 boards per minute.

» In addition, the collected data on surface features is becoming increasingly complex: as well as two dimensional textures, it is now possible to capture three dimensional textures with nano resolution. Other tasks include complex color analyses and capturing the characteristics of complex patterns.

» Demands on documentation are also rising: With demands for maximum 100 DPM (Defects Per Million) in the electronic and automotive industries everything needs to be documented, including pictures. This requires sufficient and secure storage capacity.

» Complex systems with comparatively lower performance can be integrated into a single system for simplified administration and data security.

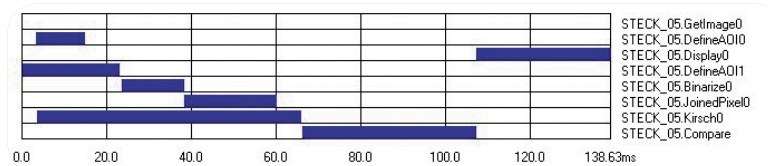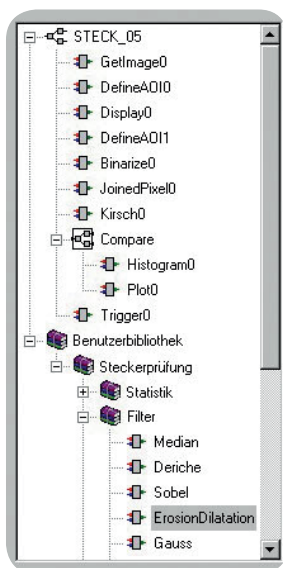## Simple operation with system technology

With the Pulsoft Director's graphical editor, users get a library that contains a clear and logically arranged overview of all the image analysis processes that are relevant to them. Each analysis is represented by an agent that is specially designed for that particular process. The agent has inputs and outputs for exchanging data with other agents. Using drag and drop in the graphical editor, the agents are connected to form a network. This creates a clear overview of complex analyses that is easy to edit and expand. To simplify a network, different complex networks can be united in a simple macro-agent. These macro-agents can be given names and stored in the library for later use. This method enables complex image analysis processes to be collected according to the steps that are important for the user. Each agent can be easily adjusted to suit the respective application by double clicking on the configuration dialog box. This is also true for macro-agents. Information on the agents nested within a macro-agent can also be displayed in a clearly arranged dialog box.
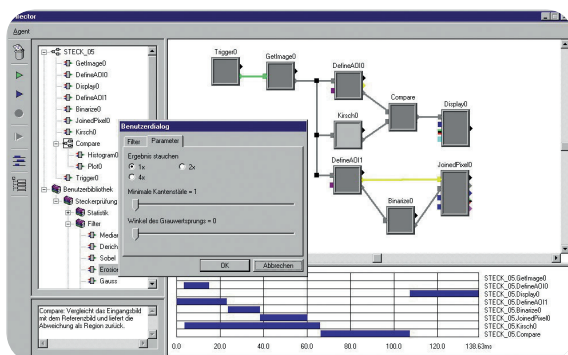
Screen 1: Director with open dialog box. The example shows a highlighted kirsch filter in the network – a standard agent.
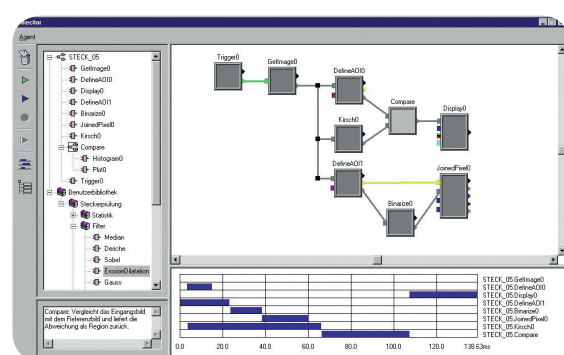
Screen 2: The Asentics Application-Builder "Pulsoft Director" with an example agent network (right), agent library (left) and profiler (bottom).

Screen 3: Extract from the agent library that is clearly structured according to function and ncludes created macro-agents.

Screen 4: The network profiler shows the duration of each agent and the entire system after each cycle.

About Kontron

Kontron is a global leader in embedded computing technology. With more than 40% 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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