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SCALE	DRAWING SCALE
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ELLIPSE 2 = 1 X .375

The World's First Hybrid-Core Computer.



ECO	DESCRIPTION	DATE	INC.

PERFORMANCE HAS HIT A BRICK WALL

Scientists and engineers in industry and research use high-performance computing (HPC) tools to see into the unseeable, stop actions that are unstoppable, and model events that are too expensive or impossible to carry out empirically. Competition drives the need for larger and more accurate simulations and models, and that means that there's always a need for more performance.

However, performance is getting harder to come by. Development of off-the-shelf processors—now the backbone of high performance computing—is increasingly constrained by the laws of physics. Increasing processor frequencies and semiconductor densities have created a heat and power “brick wall”; extrapolating current trends predicts a processor die that is hotter than the surface of the sun!

INTRODUCING THE WORLD'S FIRST HYBRID-CORE COMPUTER

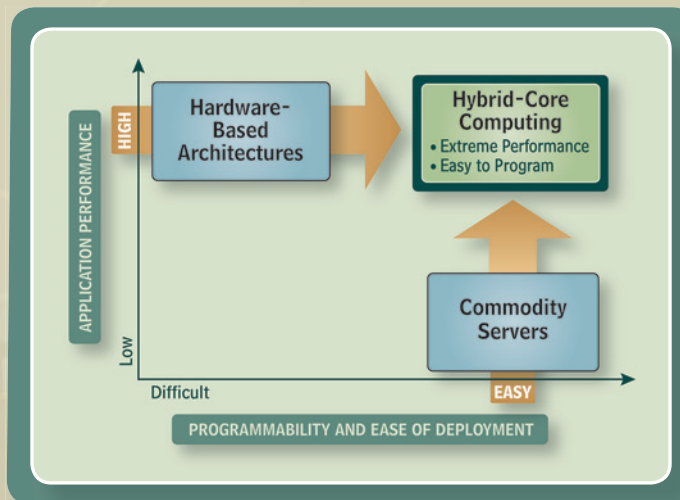
To tackle the power, performance and programmability challenges faced by the HPC community, Convey Computer™ Corporation has developed the world's first hybrid-core computer system. The new system breaks performance barriers and circumvents power restrictions to bring the performance

of application-specific hardware to mainstream, off-the-shelf applications.

The Convey systems employ a unique and innovative combination of knowledge and technologies, giving users and IT managers an entirely new way of tackling the demanding needs of their HPC challenges.

AN INSATIABLE NEED FOR RAW PERFORMANCE

Convey was born because HPC users have a notorious and insatiable need for raw performance, yet today are



trapped by a heat and power barrier. Conventional attempts at circumventing that barrier generally involve efforts to leverage multi-core processors or employ asymmetric hardware-based solutions. These solutions have historically been difficult to integrate and deploy, often requiring the use of multiple software toolsets or significant rewriting of applications.

HYBRID-CORE COMPUTING: COMMODITY ECONOMIES WITH CUSTOM PERFORMANCE

Hybrid-core computing is based on an asymmetric computing architecture that combines the economies and programmability of industry standard processors with the extreme performance and efficiency of a hardware-based, application-specific design. The system employs a coprocessor that augments the capabilities of a commodity processor with increased memory bandwidth and processing elements optimized for

performance-critical operations. Instructions executed by the coprocessor appear as extensions to the x86 instruction set; applications can contain both x86 and coprocessor instructions in a single instruction stream.

Unlike other heterogeneous or asymmetric architectures, the processors share a coherent virtual address space, making the system appear as a single

processor with multiple application-specific cores. The cache-coherent, shared view of memory eliminates the need for intrusive application modifications or performance-robbing communications with attached I/O devices, and means that developers can use a standard development environment.

POWER IN LEVERAGING THE STANDARD x86 ECOSYSTEM

The Convey HC-1™ system leverages the familiar x86 ecosystem for both

development and runtime environments, substantially reducing the complexity and costs of deploying such a high-performance system. Application development, including coding, debugging, and deployment, takes place using industry standard FORTRAN, C, and C++ development tools—reducing the need for any specialized talent to deploy or maintain the system.

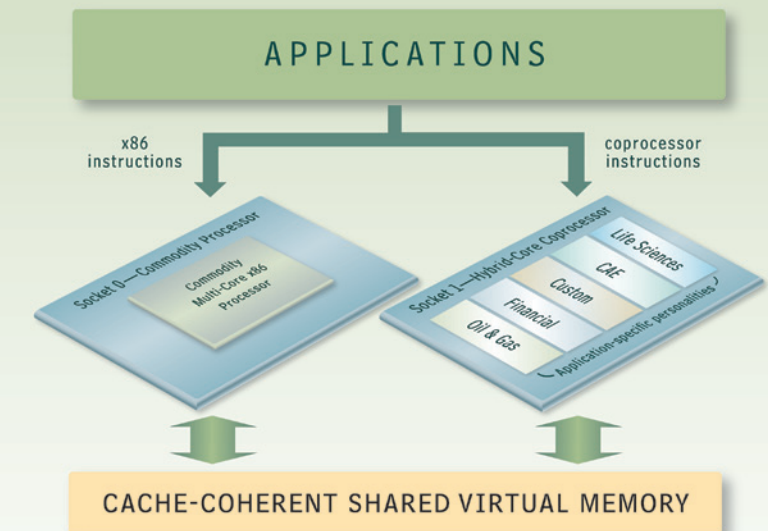
Further, because the Convey development and runtime environments are based on the Linux® operating system, the Convey systems easily integrate into an existing clustered environment. Both open source and third-party administration and job management tools are at home on the system, reducing deployment costs and presenting a familiar environment to users and IT staff.

PERSONALITIES PROVIDE OPTIMAL PERFORMANCE

Unique to the Convey adaptive architecture are dynamically loadable personalities. Personalities are extensions to the x86 instruction set that are implemented in hardware and optimize performance of specific portions of an application. For example, a personality designed for seismic processing may implement 32-bit complex arithmetic instructions—and at performance levels well beyond that of a commodity processor.

A system may contain multiple personalities that can be dynamically loaded, depending upon the application that is currently executing (although

Hybrid-Core Computing



only one personality can be loaded at a time). The ability to adapt the architecture to different applications means the Convey servers can be repurposed “on the fly”—making them extremely flexible in mixed-use environments.

Convey provides pre-defined personalities including those for Oil and Gas, CAE, Bioinformatics, and Financial Services industries. Users may also develop their own with the optional Personality Development Kit (PDK).

MORE PERFORMANCE, LOWER ENERGY COSTS

Without any complicated programming models or cumbersome attached accelerator hardware, applications can benefit from application-specific personalities, providing significant speedups.

Benefits of the Convey system include:

- ▶ Breaking through the current power/performance wall by increasing applications performance up to 16x that of a similarly-sized commodity server (depending upon the application)
- ▶ Significantly reducing support, power, and facilities costs
- ▶ Lowering system management costs by using industry-standard, Linux-based system management tools
- ▶ Reducing application porting and development efforts through the use of standard software development toolsets.

To learn more about how hybrid-core computing can improve your performance and productivity, please visit www.conveycomputer.com.



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