

# One Linux cluster has many uses

By Stan Posey

Conventional cluster systems are enjoying a rapid growth trend with design engineers and CAE analysts. There are reasons for their popularity. So reliant are these systems on plain-vanilla commodity technology that most are known as "white box" clusters.

Indeed, typical Linux clusters offer cost advantages that were never attainable in the economies enabled by proprietary RISC and UNIX. That's awfully attractive for budget-conscious users looking to expand computing capacity enough to give them access to 16, 32 or even more CPUs.

Meanwhile, most CAE software has caught up to the trend of distributed parallel processing, or distributing compute tasks across multiple CPUs, each of which can access only the local memory assigned to it. Finite element analysis (FEA example below) applications for structural impact analysis and nearly all computational fluid dynamics (CFD example at right) software have

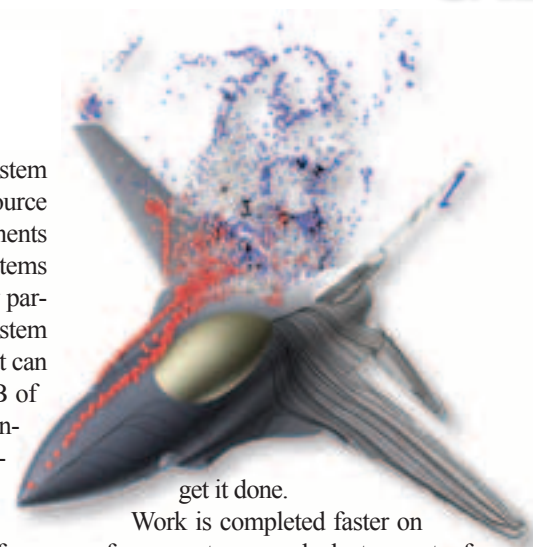
Ideally, organizations should adopt a versatile architecture – one that accommodates both distributed and shared-memory applications. Fortunately, recent developments suggest just such a future for clusters. A new generation of Linux OS-based clusters of large shared-memory nodes provides the best of both worlds, accommodating both parallel and throughput CAE jobs.

Design engineering and analysis groups worldwide have begun implementation of clusters that handily deliver generous shared-memory parallel resources "on node," and provide scalable capabilities "off node." These systems not only can independently scale CPUs similar to white box clusters, but also scale memory and I/O like the high-performance supercomputers that deliver the uppermost capability of CFD and FEA achievements.

This new class of "hybrid cluster" allows

for multiple applications in a single-system environment, while relying on open-source software and industry-standard components to ensure cost-effectiveness. Hybrid systems combine distributed and shared-memory parallel deployment of a high-throughput system architecture, resulting in single nodes that can scale to up to 32 processors and 384 GB of memory. Meanwhile, high-speed interconnect technology eliminates I/O bottlenecks by transferring data at 6.4 GB/s.

Unlike conventional white box clusters, a flexible hybrid cluster doesn't force engineers to choose between single-discipline considerations of CFD or FEA tasks. CFD simulations are distributed across CPUs and over multiple nodes, and FEA structural analysis tasks run within a single large-node, shared-memory environment. Engineers throughout an organization can accomplish both – and they don't need multiple clusters to

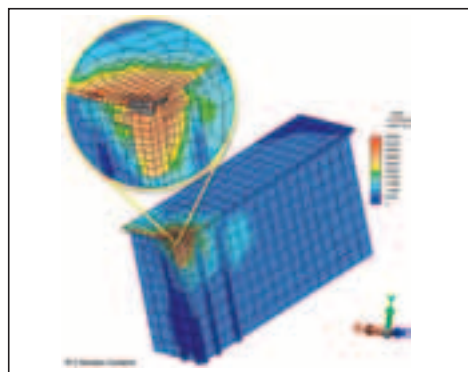


get it done.

Work is completed faster on fewer systems, and cluster cost of ownership drops dramatically with fewer expenses tied to interconnect fabric and administration.

Stan Posey manages HPC applications and industry development strategy for the Silicon Graphics Inc. (sgi.com) North American Field Organization.

Circle DPN 323



Duratek, Inc. of Richland, WA, used Algor FEA software to verify this Industrial Packaging Type 2 (IP-2) radioactive waste container that had to meet strict regulatory safety standards for shielding, containment and structural strength.

evolved to where they perform well on distributed memory clusters.

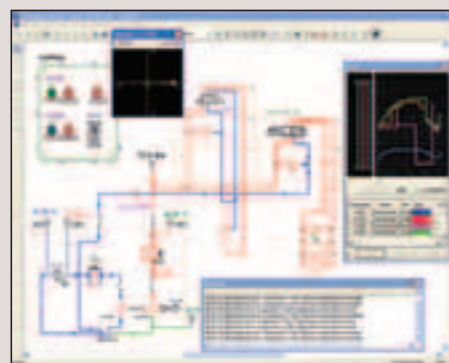
But commodity clusters come with disadvantages that can cost organizations more than they think. Rigid partitioning of cluster memory per nodes, for instance, can hobble application performance. And many users are discovering that the initial appeal of low-cost clusters can quickly fade as they begin to realize the "hidden costs" of maintaining and administering far-flung commodity clusters.

## Fluid power CAD simplifies circuit design

Famic Technologies Inc. of Montreal (automationstudio.com) offers an integrated software suite that assists engineers in the design and documentation of their systems, and brings a new dimension to help manufacturers optimize the overall system implementation process. Originally designed for the fluid power industry, Automation Studio software has become a tool to draw schematics, size components, simulate entire systems and help document engineering projects consisting of various technologies such as pneumatics, hydraulics, mobile hydraulics, PLCs, sequential function chart (SFC), electrical controls and electromechanical applications. All these capabilities yield high productivity during project development, enable a pre-validation stage in the design process, and further expand the use of documents for the entire lifecycle of the machine or product including service, training, maintenance and the cre-

ation of a user manual.

Automation Studio makes complex circuit design easier using simple drag and drop functions to place library sym-



Automation Studio software can present electrical circuit designs as well as fluid power.

bols onto the multi-layered project workspace. The libraries contain thousands of symbols compliant with ISO, IEC and JIC standards, as well as entire ranges of major manufacturers' components. To speed up the design

process, the component properties dialog box allows users to quickly assign or import various types of information to all components such as identifiers, descriptions, part numbers, etc. Users can also define their own fields to any symbol to customize their documentation in concordance with their environment. By using the Bill of Material module, users can easily extract project data to create complete project documentation.

As opposed to other CAD solutions, Automation Studio easily enables simulation of entire systems without having to program complex mathematical models, and uses full-color animation to bring circuits to life. Each component has its own simulation models and becomes color-animated, making it easy to spot problem areas and to optimize system behavior.

This article was provided by Famic Technologies Inc.

Circle DPN 320

## Océ | Delivering the difference

**Productive Colour. Extremely Easy.**  
Wide format colour printing system

The Océ TCS400 colour printing system will help you to cut days or weeks from time-to-market for your product. The Océ TCS400 gives companies using CAD applications a fast, easy and hassle-free way to handle wide format colour, and black-and-white technical document output:

- Faster processing of large CAD files means less time waiting
- Easy copying and scanning of wide format originals means no missed deadlines
- High quality print and copy output means fewer mistakes

Print wide format in colour.  
It's easy.



Océ-Canada Inc. 1-800-668-1945 www.oce.ca info@oce.ca

Circle DPN 69

Proximity

Proximity

Laser Sensors

Ultrasonic

Pressure Sensors

Encoders

## There's a new kid on the block...

And you can teach this little one a thing or two

The incredibly small MINOS photoelectric sensor features the latest in photoelectric sensing technologies to help you solve tough applications as never before.

The housing measures an amazing 8 X 10 X 10mm, with cable outlets available from the rear or the bottom of the sensor. The MINOS simply fits in a lot of very tight places.

The teach function makes setup extremely easy, allowing the range and the light/dark function to be set via the built in button or by an external connection

A teachable background suppression version ignores shiny backgrounds & varying object colours, providing superior repeatability.

**Baumer electric**  
4046 Mainway Drive, Burlington, Ontario, L7M 4B9  
Phone: (905) 335 8444 Fax: (905) 335 8320  
http://www.baumerelectric.ca

Circle DPN 70