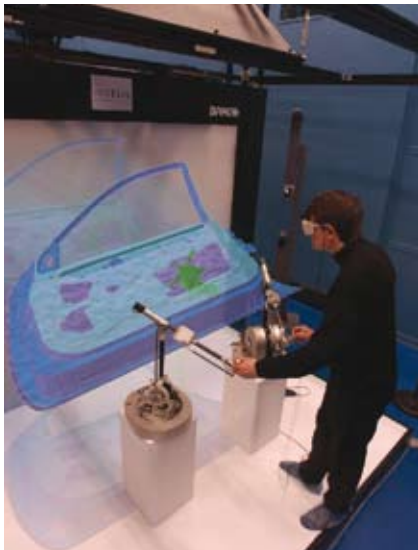




PROJECT RESULTS

Dealing with real-time

High-level system for a real-time applications development environment



Supercomputers for robust mission-critical application servers are needed in many application domains. Overall market growth in parallel platforms is ranging between 30% and 60% per year – but, to date, their real-time capability has been under-utilised. HYADES has now connected the predictable response time of a symmetric multi-processing (SMP) node dealing with real time and providing a single system image – with the scalability of high performance computing (HPC) applications using message passing.

In order to ensure high processing and communication speeds, scalability and availability, large and medium-scale servers use two types of multiprocessor architecture: symmetric multiprocessing (SMP) and massively parallel processing (MPP). Centralisation and the growing need for robust mission-critical application servers are extending the use of parallel computing beyond its historical market.

Today, many professional applications require real-time operation and intensive computational capabilities. Typical examples are natural resources prospection, medical imagery, virtual reality and wireless communications infrastructures. For years these have used specialised digital signal processors and cluster interconnects, as well as customised operating systems employing non-standard application program interfaces. Parallel-distributed systems based on commercial off-the-shelf (COTS) technology have spread widely in recent years. Today, using COTS makes it possible to build powerful high performance computer (HPC) clusters at low cost for parallel commercial applications. These systems are well-suited to intensive computing and high throughputs, but their real-time capabilities have remained mostly unexploited.

The HYADES project sought to provide real-time capability on multiprocessor systems by addressing all related implications, among which are overall latency control, resource reservation, load balancing, interconnect integration, application development and performance monitoring.

High-growth market

Overall HPC market growth was 34% in 2004. During this period, the growth for low cost systems – i.e. those priced at less than \$ 50,000 – was 65%.

The need for real-time operation in intensive software systems is rapidly increasing due to mass-market demands for new services. This is especially the case today for digital contents exchange and video-on-demand applications.

HYADES (ITEA 01010)



Partners

Bull
CEA-List
Dolphin Interconnect Solutions
LIFL
Mandrakesoft
THALES Communications

Countries involved

France
Norway

Start of the project

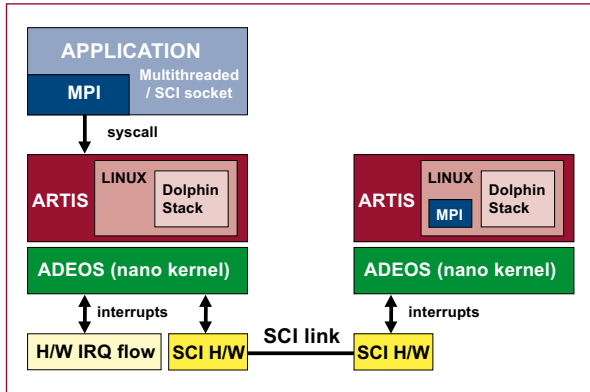
September 2002

End of the project

June 2005



PROJECT RESULTS



The technology developed in HYADES can be used in infrastructure components to provide the expected quality of service and scalability required to follow the growing demand. In the near future, services will be provided dynamically and exchanged in a global mobility context, thus requiring mobile terminals to embed a flexible real-time software execution base.

HYADES real-time capabilities will be of great value in areas such as medical and healthcare systems; training simulators and synthetic environments providing augmented reality for airplane pilots, surgeons, and assembly line designers in the automotive industry; and video-surveillance systems with automatic threat assessment. Home appliances such as multimedia PCs could also benefit from this technology.

Success on several fronts

Adeos/DIC and ARTiS, two complementary real-time extensions to Linux for single and multi-processor systems, have been released in open-source. They provide a definite enhancement over standard Linux

when real-time is needed, while also retaining full compatibility with existing Linux codebase and applications.

Bull has produced a suitable Linux kernel, including kernel debugging tools and expertise to support the partners in implementing real-time solutions. It also provided suitable parallel libraries, HPC administration software and expertise to aid the introduction of HPC solutions.

In addition, the development of the Dolphin Real-Time Sockets for the 64 bit architecture enables any application transparently to take advantage of the low latency, high speed SCI interconnect.

Finally, the Mandriva Linux distributions for 64-bit architectures have been enhanced during HYADES project, with cross-benefits between IA64 and AMD Opteron-based software contents. In this respect, clustering tools have been integrated in these distributions.

For virtual reality applications, HYADES successfully demonstrated the use of HPC systems for real-time interaction with complex models.

Broad application

All applications having high data throughput and heavy computations with stringent real-time constraints will benefit from HYADES technology. This includes: training simulation, wideband data acquisition, video content distribution, wireless software radio and virtual reality systems.

Major project outcomes

Dissemination

- 8 publications
- 12 presentations at conferences/fairs

Exploitation

- 2 new products
- 2 new services of which one is intended for internal use

Patents

- 1 published
- 1 submitted

Standardisation

- Contributions to:
- Linux Standards Base
 - Posix

Open-source software

- 10 contributions to open-source tools
- 1 full Linux distribution

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